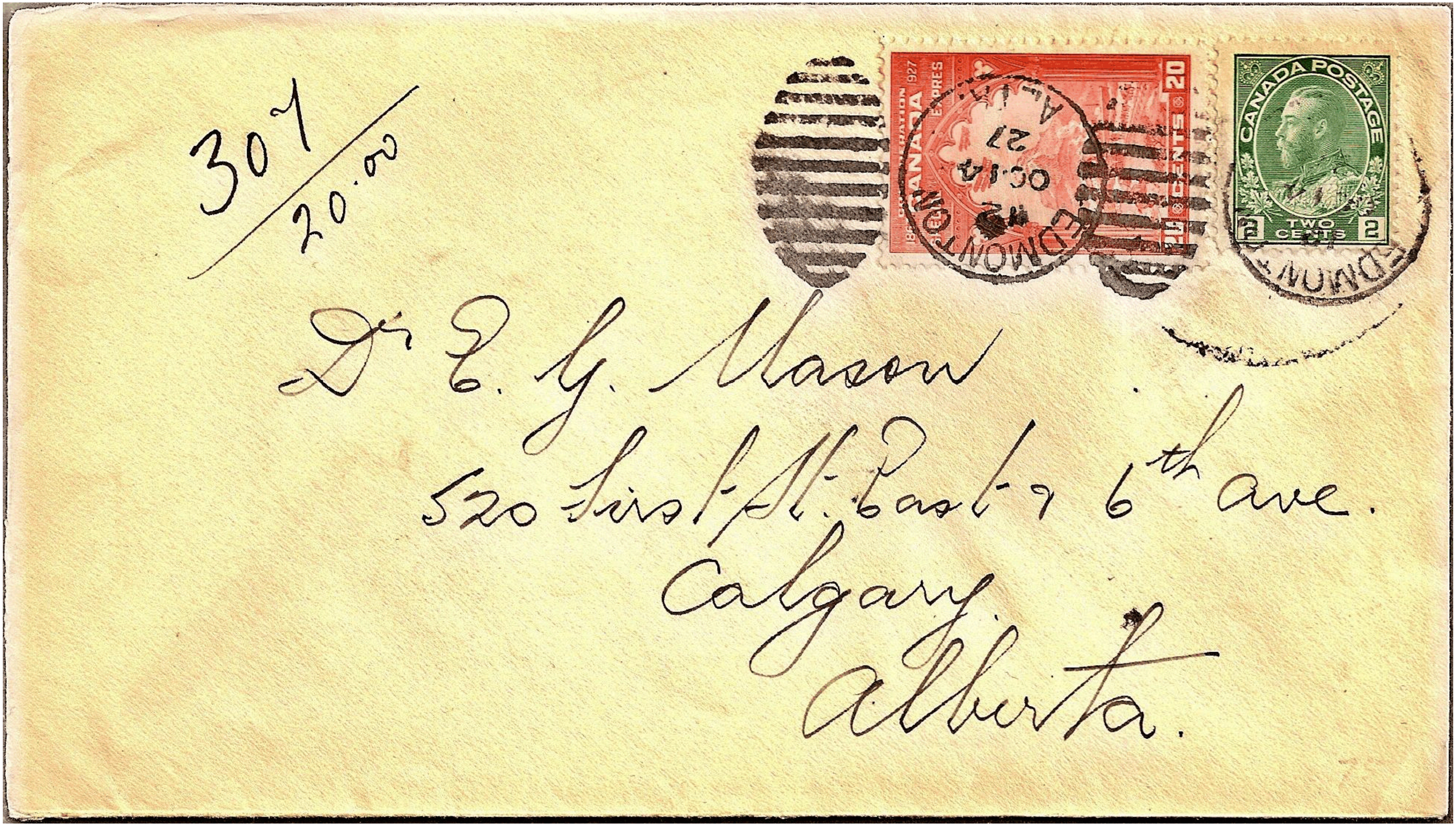
OPUNTIA 522



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Dr E. G. Mason
520 First St. East 6th ave.
Calgary
Alberta.

Early April 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.

A CENTURY OF ORGANIZED PHILATELY IN CALGARY

by Dale Speirs

It was a hundred years ago today
Dr Mason got the philatelists to play
They've been going in and out of style
But they're guaranteed to have a big smile
So may I introduce to you
The one and only Dale Speirs
And Dr Mason's stamp collecting friends.

[Not written by anyone from Liverpool, England.]

In April 1922, Dr Edward George Mason met with four stamp collecting friends in his downtown Calgary office. They agreed to form a club called the Calgary Philatelic Society, which has been in continuous existence ever since. Quite an accomplishment, as very few local clubs of any kind, not just philatelic, survive to their centenary.

I was in charge of planning the centennial birthday party for our regular monthly meeting on April 6, 2022. This will be one of many events this year. The CPS will be celebrating all year long, and are hosting a national stamp convention this coming Labour Day weekend in a posh downtown hotel.

In my capacity as the club archivist (no one else wanted the job) I read through the archives from the minutes of the founding meeting to date. In 1992 I published a booklet of 60 pages on the club's history.

Over the years I updated the history and in 2017 published a 150-page book, available as a free pdf from the club website www.calgaryphilatelicsociety.com. This is free to anyone; just go to the website and look for a link that says "Club History".

Mason was born in Hamilton, Ontario, in 1874, the year before some Mounties arrived at the junction of the Bow and Elbow rivers and thought that would be a good place for a fort.

In 1902, Mason and his wife Katharine arrived in Calgary, which had dropped the Fort part of its name and was now a bustling city.

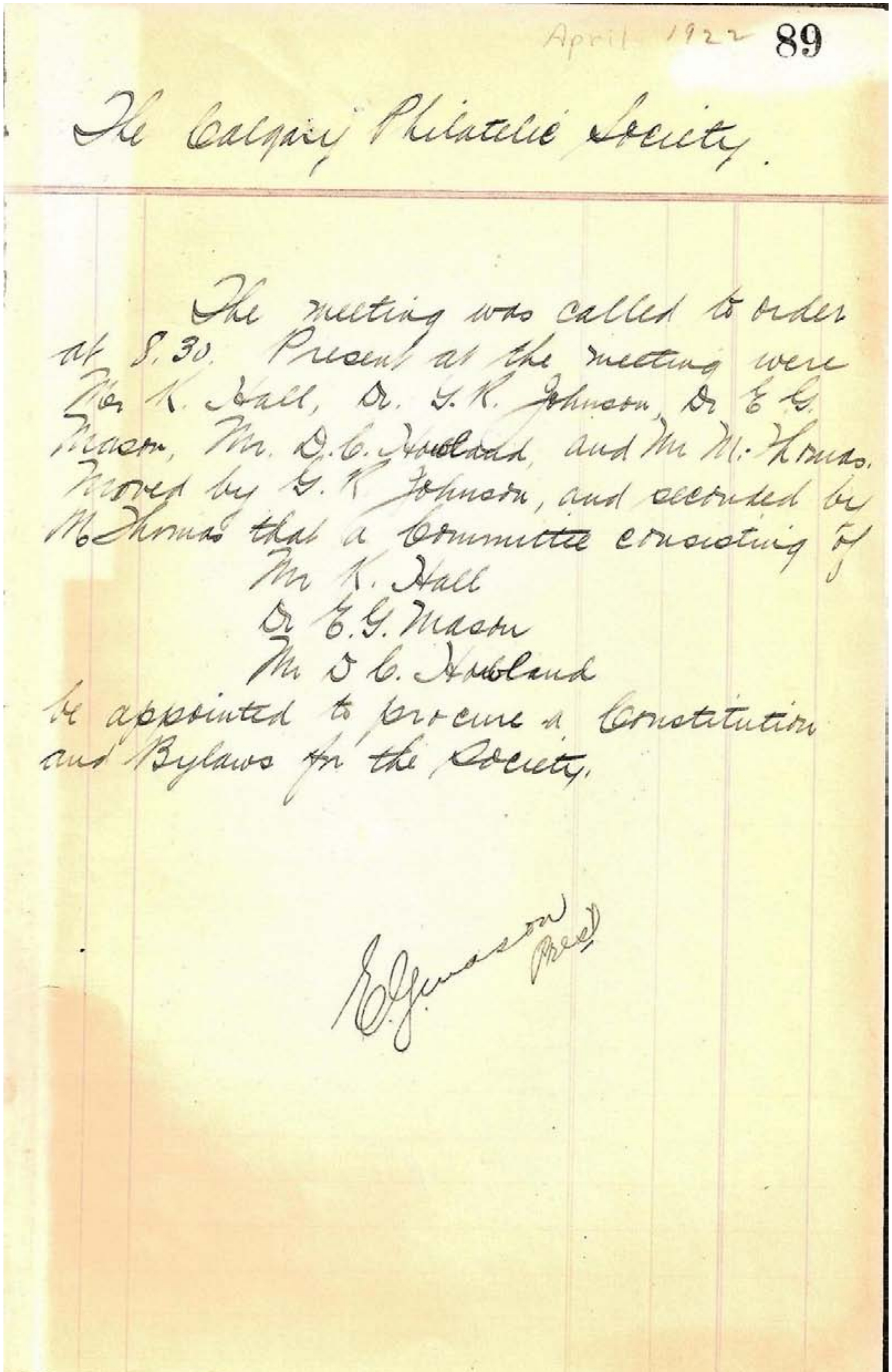
The photo at left, courtesy of his great-granddaughter, shows him circa the 1930s, as CPS members would have known him in the first two decades of the club.

The Masons had three children, Katharine Jr, Elizabeth, and Anthony, all born before World War One. I never had the time to track down descendants, especially in those pre-Internet days when genealogy was a hard row to hoe. Edward died in 1947 January.

In the autumn of 2021, I was contacted by Drew Richardson, who was writing the history of amateur football/rugby in Calgary. He came across a reference to Mason at the CPS website while Googling for more information.

Mason had founded Calgary's first rugby club in 1906, the Calgary Tigers. Canadian-rules football and rugby did not separate until after World War Two so players switched back and forth with no distinction. Richardson put me in touch with Mason's great-granddaughter Beth.

She and her family were thrilled to learn that her ancestor was an honoured man in the ranks of organized philately. I invited her and relatives to attend our centennial meeting. Mason had twenty direct descendants, of whom nine lived in Alberta. Four of them were able to attend the meeting, plus spouses.



April 1922 89

The Calgary Philatelic Society.

The meeting was called to order at 8.30. Present at the meeting were Mr K. Hall, Dr. G. K. Johnson, Dr E. G. Mason, Mr. D. C. Howland, and Mr M. Thomas. Moved by G. K. Johnson, and seconded by M Thomas that a Committee consisting of

Mr K. Hall
Dr E. G. Mason
Mr D C. Howland

be appointed to procure a Constitution and Bylaws for the Society.

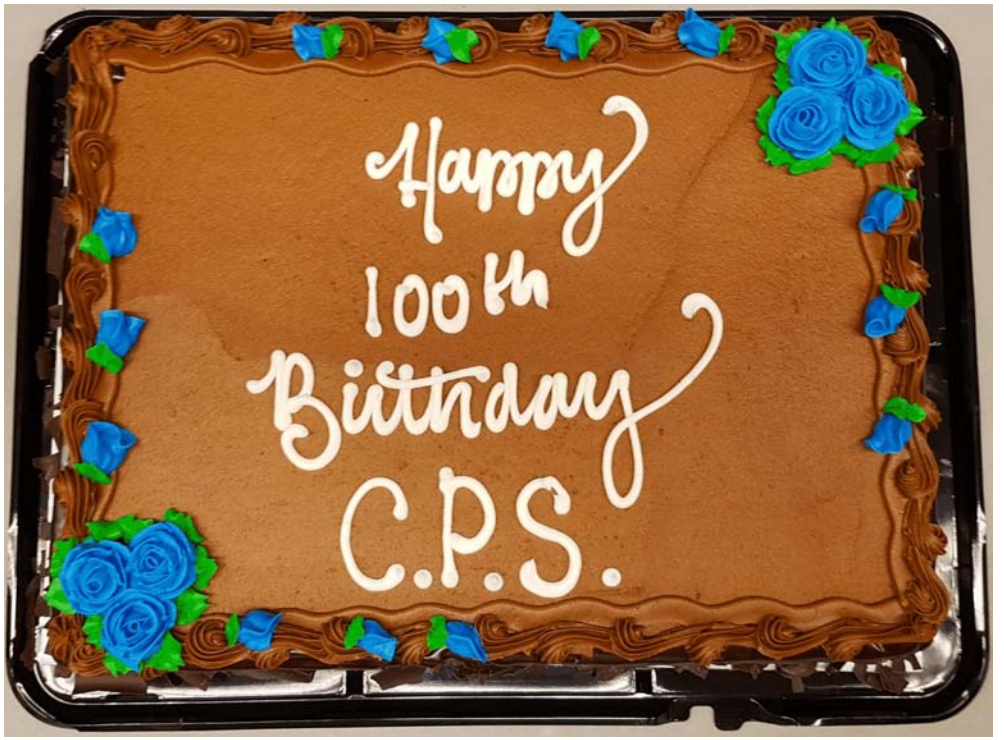
E G Mason Pres

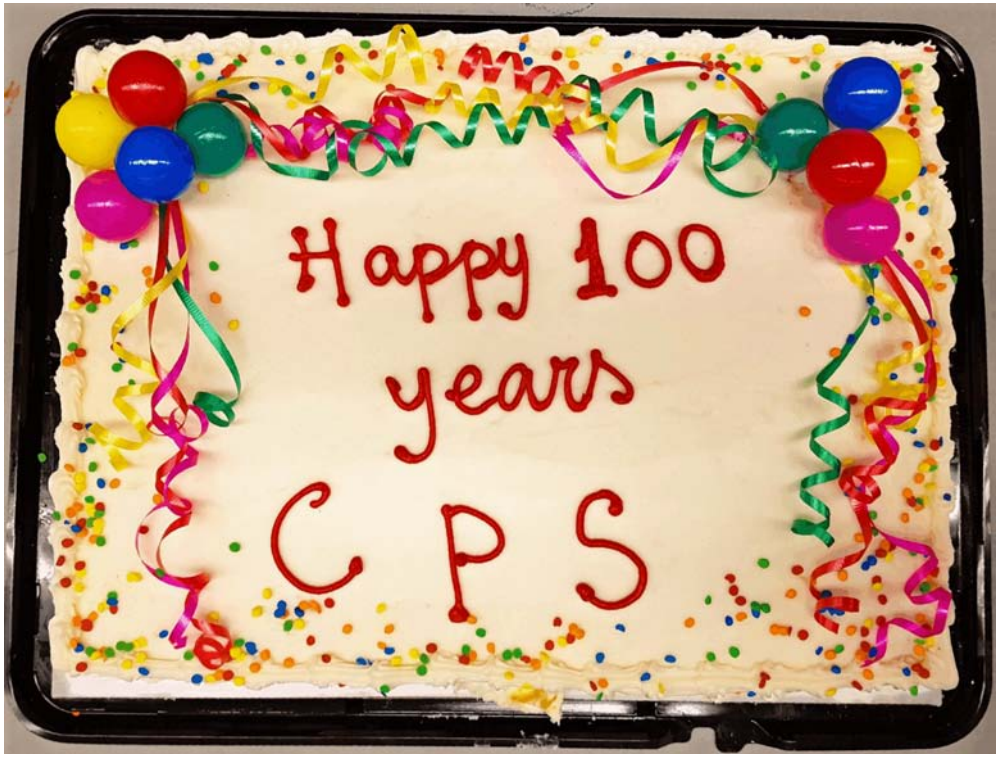
My greatest fear over the past two years was that our centennial celebration would have to be on Zoom, but fortunately pandemic restrictions eased off just in time. There was symmetry to the history of the CPS. When the club was founded in April 1922, the world had just survived the great influenza pandemic, and now we were celebrating just after surviving a second pandemic.

At left is the scan of the minutes of the founding meeting, written by Mason as the first president of the CPS. Preserved in the club archives ever since. Below is one of the CPS annual awards, the Dr Edward G. Mason Long Service award.

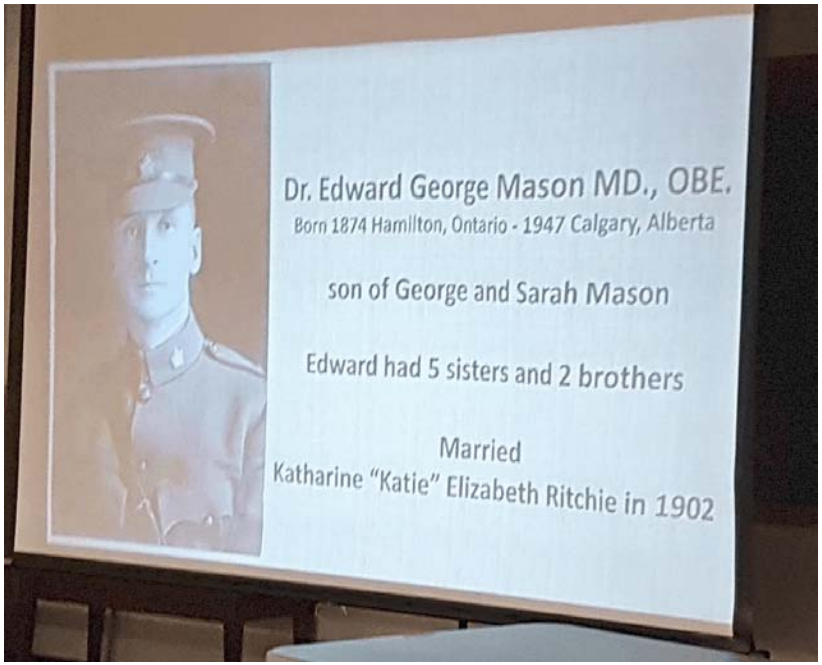
The party was a success and went as smoothly as I had hoped. In the photo below are (left to right) Beth and her sister Carol, who are Mason's great-granddaughters, then Beth's daughters Jennifer and Shannon, who therefore are great-great-granddaughters. The Mason trophy can be seen in front of them.

We had two slab cakes for the party, and of course sang "Happy birthday, dear CPS". A good time was had by all.





The programme began with me presenting a brief history of the CPS. Beth then had a slide show about Dr Mason and his life and family.



We had a full room, nevermind social distancing since we are all vaccinated. The Mason women served the cakes. Free food always brings out a crowd.

PHILATELIC FICTION: PART 4

by Dale Speirs

[Parts 1 to 3 appeared in OPUNTIA #417, 479, and 498.]

"Jud Perkins Tackles Philately" was a short story by Harold de Polo (1915 July, THE BLACK CAT, available as a free pdf from www.archive.org) about a roving con man who tried to branch out into postage stamps.

Jud Perkins was working various rackets in Rochester, New York, when he crossed paths with a teenager looking through a small stockbook of stamps. The boy Johnny had just left a meeting of the New York State Philatelic Society.

Johnny was much agitated because he had seen three Brattleboro postmaster provisional stamps on display at the meeting. He would never be able to afford the then price of $700 for one of the rarities of American philately.

Perkins arranged with Johnny's father to take him along to Brattleboro, Vermont, in the hopes of finding some more provisionals. Johnny posed as Perkins' son, and the two toured the countryside selling cheap goods and knicknacks.

As they were about to leave each farm, Johnny would put on an act and ask wistfully if the farmer had any old stamps or covers. If so, they would buy them cheap, hoping to find a Brattleboro provisional. Finally at one farm they got lucky and found some of the stamps.

Unfortunately Johnny slipped up and said Mr Perkins instead of Papa. That put the farmer on guard. Instead of buying the provisionals for pennies, Perkins was forced to pay hundreds of dollars per stamp.

He did so thinking he would still make a profit on the deal. Alas, when he got back to the city, he learned the provisionals were counterfeits. The con man had been conned.

"C/o Mr Makepeace" by Peter Phillips (1954 February, MAGAZINE OF FANTASY AND SCIENCE FICTION, available as a free pdf on www.archive.org) concerned the unfortunate gentleman who kept getting mis-addressed mail.

The letters were addressed to E. Grabcheek Esq, c/o Tristram Makepeace, 36 Acacia Avenue, London, England. Makepeace didn't know any such person so he retoured it to the post office.

They bounced it and subsequent letters back to him on the grounds that he lived there, they delivered it correctly, and any problem was between him and Grabcheek.

The letters only contained blank sheets of paper and kept coming incessantly. He destroyed them and they re-appeared by magic, finally driving him insane. After he was institutionalized, the final letter arrived addresses to Ezreel Grabcheek, but without the c/o.

BWAH HA! HA!: PART 16

by Dale Speirs

[Parts 1 to 15 appeared in OPUNTIAs #371, 372, 378, 388, 391, 393, 397, 409, 422, 427, 434, 451, 475, 491, and 502.]

Frankenstein.

The standard and indeed the very epitome of monsters was set two centuries ago with the Frankenstein story. The novel is seldom read today and the popular version is that established in the movies. To see what the monster was really like, you can download a free pdf of the novel from www.gutenberg.org

Possibly the funniest outgrowth of the monster story took place on Halloween night in 1952. The American Armed Forces Network sent three radio reporters into the dark and gloomy abandoned schloss Burg Frankenstein, near Darmstadt. They were to broadcast live from walkie-talkies as they prowled the castle.

Carl Nelson was the man sent down into the crypt. What he didn't know was that the producer had rigged a grotesque statue to come to life when a reporter entered the crypt. To add to the merriment, after the reporters entered, the doors were quietly locked. The plan worked perfectly.

Live and on air, Nelson ran screaming from the crypt, pounded frantically on the door trying to escape, and shouted on air that he was being chased by a monster, begging the producer for help. Suddenly there were only faint background noises, as Nelson fainted from fright. Listeners however, thought he had been killed by the monster.

The listeners flooded the military police with telephone calls. Several carloads of MPs were dispatched to the castle. The AFN radio station had listeners across Europe, and those in the Rhine valley panicked exactly the same as happened in 1938 during Orson Welles' famous Martian invasion broadcast.

The mp3 of Nelson's hysteria is available as a free download from the Old Time Radio Researchers at www.otrr.org/OTRRLibrary. Search for "Frankenstein Castle Hoax". It is a 6-minute piece, well worth listening to. Play it at your next Halloween party, and your guests will love it.

"What Lies Beneath The Bandages" by Richard Zwicker (2020 October, MYSTERY WEEKLY MAGAZINE, available from www.wildsidepress.com or Amazon print-on-demand) made Frankenstein's monster and Igor into a detective team circa 1825 Switzerland. The Baron was dead by then, so the monster took his name.

Because of the Hollywood movies, the monster is today considered a dim-witted hulk who could barely grunt. However, if you read the original novel, which few have, the monster was articulate, indeed wordy and prolix. He was intelligent, not a stumbling beast. That he could become a private investigator was not too unreasonable.

Living in Geneva, the ungainly duo became involved in the case of a young woman afflicted by a stalker. His identity was not a secret but the problem was trying to prove the charges in court. He was very good at shifting suspicion to others.

Those involved, including the woman, worked at a museum of Egyptology. There was a mummy who wouldn't stay put, or perhaps more than one of them. Frankenstein and Igor solved the case mainly by steady plodding work, never giving the culprit any rest.

To Rule The World.

Many mad scientists want to rule the world. Then again, many sane people want to rule the world.

THE LUCIFER COMPLEX was a 1978 movie that imitated THE BOYS FROM BRAZIL, also released that year. The script was written by David L. Hewitt and Dale Skillicorn. Despite being a low-budget production, the producer managed to sign Robert Vaughn and Keenan Wynn, who probably needed the money. Available on "Mad Scientist Theatre", a DVD boxed set issued by Mill Creek Entertainment.

The story opened with endless establishing shots and was framed by a narrator who watched the events unfold on a 1970s mainframe computer. You know the kind, the size of wardrobes, with lots of spinning tapes and blinking lights. Throughout the movie, there were jump cuts to the narrator adjusting his computer to view another scene.

All the information of the world was stored on one laser disk. Millions of books, countless videos, and endless data on that one disk. The narrator made one good point though. He thanked out loud whoever it was that had indexed the disk by subject. No keyword searches on this computer.

He watched some battlefield scenes of World War One, then switched to a music video of an absolutely pathetic rock-and-roll band. He watched it for several minutes while I switched to 32X speed to get past it. Then to the Vietnam War, strangely in black-and-white.

Finally the actual plot began. Omniscient cameras showed a neo-Nazi camp in an American desert. A busload of international delegates heading to inspect the camp were gassed on board and removed.

Thence to a nightclub where spy Glenn Manning, played by Vaughn, was watching a belly dancer. The club was dark except for two spotlights, a pink one on the dancer and a bright white one on Manning, sitting halfway back among the tables. He was more conspicuous than the dancer.

Another woman picked him up. She tried to imitate the movements of the dancer, leading Manning to speak the only good line of the movie: "*I think you could do with a little less bump and a little more grind.*"

They never got to start anything, as Manning was called away with news of the missing delegates, and subsequently drove out to the desert where the bus was still sitting.

Eventually Manning was sent to South America where he ended up in a facility operated by Herr Doktor Vogel. The Nazis were kidnapping world leaders, hence the bus incident, then cloning them and infiltrating the clones back into the corridors of power.

Assorted alarums occupied the rest of the movie as Manning tried to sabotage the Fourth Reich, as the Nazis called themselves. He escaped and was pursued through a Florida swamp with lots of stock shots of alligators. They did nothing.

He was recaptured or perhaps never escaped, as he may have been brainwashed. Indeed he soon realized he was still in the camp. There were numerous women prisoners being used as surrogate mothers for the clones.

Manning made friends with April, one of the prisoners. She escaped, was recaptured, then made her way to Manning's room where he was sitting on his hospital bed talking to Vogel.

The camera shots alternated between establishing shots behind Manning, looking toward the doctor, and vice versa looking toward Manning from the front. The front shots showed two pillows propped up against the headboard of the bed, which vanished in the rear shots. The pillows were white and the headboard was dark grey, so the continuity error was very noticeable.

Manning escaped and roamed about the hospital, where he found the clone factory. Various alarums occurred but to no avail until Manning and April began using martial arts against the guards. One of the worst displays of chop socky seen in the cinema.

As Manning and April escaped outside the hospital but still inside the camp, a gun battle erupted. The women prisoners stole the guards' submachine guns and came out blazing.

Their guns fired thousands of rounds without reloading or melting the gun barrel. They stood out in the open and fired at guards hiding behind walls. The guards went down like 9-pins while being unable to shoot any of the women.

Manning stole a tank some soldier had carelessly left sitting with the keys in the ignition. The Nazis had stored hundreds of barrels of gasoline around their buildings. When Manning began firing with the tank, the camp went up like a Roman candle.

Manning and some of the women went down into a building where they found Der Fuhrer himself. Yes, Hitler was alive, well, and cloning himself. Very spry for a man who should be dead or in his 80s.

Seeing his plan was doomed, he pushed some buttons that he said would open up something called sea gates and flood the world. Stock shots showed a reservoir dam overflowing.

Really? Enough water to flood the continents? Calgary is 1 km above sea level so we wouldn't worry, but anyone living along the coasts might be nervous. The movie ended with the narrator shaking his head at the folly of mankind, and the viewers shaking their heads at the folly of movie makers.

DEATH WARMED UP was a 1984 New Zealand movie written by David Blyth and Michael Heath. Lots of gore and sex, so not suitable for viewing with your young children. Available on "Mad Scientist Theatre", a DVD boxed set issued by Mill Creek Entertainment.

This was a standard mad scientist creates zombies plot. They were not the shuffle shuffle kind but moved normally like any healthy human. Their eyes were white (rolled up by the actors) and they had strange bulges on their skulls. The creator was Dr Howell, no first name ever given.

Years before, he had tortured a young man named Michael Tucker for experimental purposes. Tucker's father was a doctor who had Howell disbarred, so the son was programmed to take a shotgun and kill his parents. Tucker was judged insane and put in a psychiatric institution.

Seven years later, Tucker was released as apparently cured. With his girlfriend Sandy and another young couple Lucas and Jeannie, they visited the island where Howell had his research laboratory. The other didn't know that Tucker was out for revenge and wanted to kill Howell. The island had tourist facilities, so that was where they stayed.

Tucker first had to fight his way through a zombie army. The death toll steadily mounted, both zombies and supporting actors. What should be noted was that the zombies were not undead but living humans whose minds were deadened by Howell's surgery and drugs. They were nimble and good fighters.

Highlights, besides the nudity, included zombies on dirt bikes chasing the group through utility tunnels. It was a shame that more use wasn't made of the New Zealand scenery. Most of the movie could have been filmed on a Hollywood back lot.

The battle inside Howell's research hospital included zombies on fire, zombies electrocuted, and zombies blasted with shotguns at point-blank range. In an unusual twist, the hero Tucker didn't survive to the end of the movie. Sandy was the only main character left alive when the end credits rolled. A slightly better than average zombie movie.

Brains.

Brain transplants were a staple of mad scientist stories, although the way modern medicine is going, they may become reality sooner rather than later.

NICK CARTER, MASTER DETECTIVE aired on old-time radio from 1943 to 1955. The detective first appeared in print in 1886, predating Sherlock Holmes, and often appeared on stage and in movies. Nick Carter appeared in his own pulp magazines and dime novels, written by house authors. Like many other multimedia action-adventure heroes, there was little continuity between the different media.

Carter had boundless confidence in his ability and came across as arrogant to all. He had his own laboratory, a huge library, and kept better files than the FBI.

THE STOLEN BRAIN (1914) by an anonymous house author is available as a free pdf from www.gutenberg.org. The plot is obvious from the title.

Nick Carter was hired by John D. Wallace, who had doubts concerning his next-door neighbour Dr Hiram A. Grantley. Strange things were going on in the Grantley residence. Animal vivisection gave way to slum dweller vivisection and brain transplants.

Carter's plan was to create a diversion by exploding a bomb in the street. On the assumption that Grantley and his staff would rush outside to investigate, Carter would enter the house on a lightning raid to gather evidence. Didn't work.

Eventually Grantley was run to ground but he was acquitted at trial. Legal stuff such as lack of convincing evidence, that sort of thing. Alarums and excursions followed aplenty and stretched over years, not just days or months. Carter and the authorities finally got Grantley a second time.

The dastardly cad eventually escaped, setting off a fresh string of excursions. Carter tracked down Grantley to his next laboratory and caught him in the act of bwah-ha!-ha!-ing at a damsel in distress. This time the matter was resolved by putting a bullet between Grantley's eyes.

The book then abruptly segued into a different case, a Boston highwayman named Jack Weeden and his accomplice Billy Young, who liked to execute people en masse. Not as a serial killer but all at once in batches. The problem wasn't trying to locate Weeden and his gang but to survive taking them into custody.

Weeden used poison darts as his weapon of choice. In the final confrontation he bwah-ha!-ha!-ed a few moments, then committed suicide with his own poison. Before dying, he told Carter he killed because he enjoyed it. Mad indeed.

HOUSE OF THE LIVING DEAD was a 1974 South African movie written by Max Marais. The movie is on "Mad Scientist Theatre", a DVD boxed set issued by Mill Creek Entertainment.

The venue was a vineyard during the Cape Colony era, operated by Lady Brattling and her two sons Michael and Breck (both parts played by the same actor). Michael was the good son who helped his mother while Breck was deformed and insane. Breck was the mad scientist, trying to prove the soul was organic and could live outside the human body.

Mary Anne Carew was Michael's fiancee. Lady Brattling didn't want her to marry because the family had a history of insanity and she feared any children would have the same problem. She wanted the family line to end with her sons.

Breck spent much of his time in his laboratory experimenting on baboons, which he caught wild in the vineyard, and on natives, which he murdered. His family tolerated him, unaware of where he was getting brains to isolate souls and put them in glass jars. The servants, both European and native, bought charms and wards from the local witch woman for their protection.

Carew had trouble adjusting to life on the estate, not the least because Lady Brattling opposed her. Not only were the natives restless, so were the police. There were many excursions around the farm and various alarums in the big house.

Breck secretly killed his brother and put his soul in a jar, then impersonated Michael as required. He decided the next stage of his experiments was to combine two souls. Since Michael and Carew were affianced, they seemed the logical pair. Carew was still alive but that was a detail which could be easily remedied.

She was stretched out on the operating table when a local doctor barged in and tried to stop Breck. A fight broke out, during which Breck accidently killed his mother and one of the jars was broken.

The soul leaped free and latched onto Breck, obviously getting its revenge. As he lurched around the laboratory, other jars were broken and the souls ganged up on him.

A very noisy finish at top volume with lots of screaming. Breck went to join his brother and mother in death. The family curse was ended. The movie was fairly well played and is worth watching once.

Death Rays.

The concept of death rays originated from several quarters in the middle 1920s as the new technology of radio began to spread. It didn't take inventors and science fiction writers long to surmise that broadcast radio could be made narrowcast. Enough energy pumped into the beam would make it burn, dissolve, or kill whatever it touched.

Lots of people, including Nikola Tesla, claimed they had invented such a beam, although no one ever demonstrated it. In modern terms, a death ray would be either a powerful laser or a charged-particle beam.

An early death ray story was "The Power Ray" by Jack Barnette (1930 March, SCIENTIFIC DETECTIVE MONTHLY, available as a free pdf from www.archive.org), the title of which summarized the plot. Charley Wright was the scientific detective, a radiotrician (as the term then was).

Dr August Schmitt had died by electrical beam in the presence of witnesses in his laboratory. How it worked, no one knew, and Wright was called in by police as a consultant. He looked out the window and noticed that the spot where Schmitt died was in line through the window with a competing laboratory across the street, one that dealt in high-energy electrical transmission.

Dr Kurtz was the owner of the other laboratory and had been a classmate of Schmitt back in Germany. After the war, Schmitt and Kurtz both came to the USA and went into the electrical business. They were bitter enemies. The conclusion seemed obvious.

Except there was a twist. Kurtz was elsewhere when the beam killed Schmitt. Kurtz had left his laboratory assistant Haffer some instructions on how to perform an experiment with the power rays. Haffer made a mistake that killed Schmitt. As he was aligning the power ray, he accidently swung it through the window and unknowingly killed Schmitt.

"The Vaunsburg Plague" by Julius Long (1937 February, WEIRD TALES, available as a free pdf from www.archive.org) had the standard mad scientist with beautiful daughter. Bronson, no first name given, had invented a ray that aged humans into senility and physical death within minutes.

He tried to negotiate a deal with a World Dictator (as they were then known) but found out the hard way that whomever sups with the Devil needs a long spoon. However, the ray backfired on the dictator and terminated his regime. The narrator got the girl of course.

Playing At The Game Of God.

"Wife Of The Dragonfly" by Paul Ernst (1936 February, WEIRD TALES, available as a free pdf from www.archive.org) was about Medill Corey, a mad experimenter, not really a scientist. He had discovered how to put his mind into animals such as dragonflies and spiders.

He used his abilities to spy on his wife Beatrice, whom he suspected was having an affair with Doctor Voight. He was slowly driving her mad by his uncanny knowledge of what she was doing, following her inconspicuously about as a dragonfly. His plan was succeeding, until he died from a heart attack while his mind was in a spider.

There was a chance he could resuscitate himself if he could quickly crawl back to his body, climb up to his head, and transfer his mind back into his brain. Beatrice and Voight came into the room and found the body. Just as Medill reached the head, Voight saw him. A kind-hearted man, the doctor didn't kill the spider but scooped it up with a piece of paper and tossed it out the window.

Lying on the lawn, Medill could only stare up at the giant cliff that was the house wall, unable to climb back up in time before the body was beyond recovery. He would die a spider.

"Out Of The Sun" by Granville S. Hoss (1936 December, WEIRD TALES) was about a mad scientist convinced there was life on the Sun. All the other scientists laughed at him and wouldn't let play any reindeer, pardon me, scientist games. Baxter Bliss went off to Mountain Top, Wyoming, and set up his laboratory there.

He constructed a room that could be filled with heat to thousands of degrees. First he allowed sunlight to shine in and then turned up the heat. A half-dozen lumps formed on the floor of the chamber and began moving around. One of them survived to maturity, a beautiful naked woman. She was illustrated full frontal. I'm surprised that issue wasn't banned from the mails.

She and Bliss tried to communicate but they lived in two different worlds, and not just figuratively. The story then hopped over the climax and ended with a newspaper story about Bliss being burned to death and the body of a naked woman found next to him. Her body was made of an unknown substance like nothing ever seen before (with apologies to Mr Spock).

THE STRANGE DR WEIRD was an anthology series that aired on radio during the 1944-45 season, written by Robert A. Arthur. The show was a mixture of mysteries and weird fantasy. The episodes were 15 minutes long and are available from the Old Time Radio Researchers at www.otrr.org/OTRRLibrary

"Journey Into The Unknown" aired on 1944-11-21. Professor Gregg worked with his son Paul on developing a superstrength serum. Paul could now lift 400 pounds. The serum was also expected to lengthen his lifespan by thirty years, although one wonders how that could be calculated.

Paul's fiancé Julia was kept in the dark about the serum. The glitch, and there was one, was that he began reverting to a Neanderthal, then an ape. His face broadened and became flat, and body hair grew long and thick. His mind began blanking out as he degenerated.

Father and son tried unsuccessfully to find an antidote. What followed was a standard Jekyll and Hyde story. Paul terrorized the village as an ape, murdering women, then returned to the laboratory with no memory of the event.

Julia became suspicious. The police set up a dragnet for the ape. Paul killed his father and was machine-gunned by police. The narrator Dr Weird said he had gotten the laboratory documents and was going to carry on where the Greggs left off. Any volunteers?

Just Plain Careless.

"When The World Slept" by Edmond Hamilton (1936 July, WEIRD TALES, available as a free pdf from www.archive.org) was narrated by Jason Lane, who liked to experiment with biological cultures from meteorites. He had his remote situated laboratory, as mad scientists so often do, where he isolated two cultures from a meteorite.

He tested them in sequence on rabbits but nothing happened. He injected himself likewise but again nothing developed. In anger he threw one of the cultures out the window where the glass container smashed against a tree and spilled the fluid. He thought nothing of it until a few weeks later when he had to go into town to resupply with food.

The inhabitants were sprawled about, sound asleep. So were all the animals, and, as Lane surmised, even bacteria had gone into dormancy. After many trials and tribulations, he found an airplane at a city airport and flew around the world. Everywhere was the same, with humans and critters lying about fast asleep.

After about a year, he found a way to revive them from the effects of the culture. He hadn't been affected because he had taken both cultures, one of which was the antidote to the other. He simply splashed the other culture about and let it spread to revive the world.

Some major plot flaws though. Humans asleep for a year would have metabolized their body's food reserves and died of starvation. Those who slept outside would have been affected by the climate, freezing to death in winter or dehydrating in hot climates. Every town would have burned from conflagrations arising from unattended fires.

THE WHISTLER was an old-time radio anthology series that aired from 1942 to 1955. It was not a mystery show. Both the narrator and the protagonist explained everything to the listener as a perfect crime was plotted and carried out. The criminal would gloat after the crime and get in a few bwah-ha!-ha!s.

After the final commercial, the epilogue would reveal some detail the criminal overlooked that tripped him up. It was for the listener to keep track of the little details and discard the red herrings, then predict what the twist ending would be.

"Sleep, My Pretty One" was written by Ruth Born and aired on 1949-04-17. Dr Max Mitchell had invented E-37, a possible cure for encephalitis, known as sleeping sickness. His hospital refused him permission to test it on humans.

Max pressured his fiancé Jean to become a test subject. She was suffering from a cold but that didn't stop him. He injected her with a fatal dose of the disease in the guise of a cold cure. From there, he took her to a remote farmhouse.

The only other person was a deaf housekeeper who was, politely speaking, a blithering fool. By then Jean was experiencing the symptoms. Max had brought the only dose of E-37.

The horror was that at the farmhouse, Jean accidently dropped the vial and smashed it. Max had a laboratory in the farmhouse where he raced to develop a second dose. Jean tried to telephone back to the city to get help, but the lines were down. Max was fanatical on the subject. Jean realized she could not marry such a man but she couldn't flee. He injected the E-37 and she fainted.

After the final commercial, she woke up, cured by the solution. She decided to marry Max after all. The twist seemed to be that nobody died and there was a happy ending. My guess is that after producing a daughter for him, Jean would die, thereby establishing the standard scenario of the mad scientist with a beautiful daughter.

Drones.

"The Scarab" by Raymond Z. Gallun (1936 August, ASTOUNDING, available as a free pdf from www.archive.org) was about the use of a 5-cm long drone to thwart a mad scientist. It was shaped in the form of a scarab beetle for camouflage.

A wanna-be world dictator had stood off all the armies of the planet. Their firepower was useless against his superscience machines defending his headquarters. The scarab drone, however, quickly infiltrated the lair since no one noticed or paid attention to an insect buzzing past.

Once inside, the scarab injected the key workers with anaesthetic, disabling them long enough to shut down the machines. The idea of a small drone like this was pure fantasy eight decades ago. Nowadays, not so much.

The Golden Atom.

The Rutherford model of the atom as protons with electrons orbiting them gave rise to the idea of atoms as miniature stellar systems. Subsequently physicists discarded this idea in favour of electrons as waves, but science fiction writers held on to the old idea decades after it became obsolete.

Ray Cummings published in 1919 a story "The Girl In The Golden Atom" which developed into a subgenre of science fiction about voyages to atoms via a superscience machine that miniaturized the hero down to the level where an electron became a planet.

A few variations considered the Solar System as an atom, and had the hero enlarging upward into the next universe. Alternatively, a civilization in one of our atoms did the same and enlarged itself into our universe.

I think that one reason for the popularity of these stories was that it enabled authors to keep the lost world trope going. By 1919, Earth had been explored by Europeans to the point where it was difficult to stage adventures in jungles with a hero rescuing a fair maiden from witch doctors.

Lazy writers, and their even lazier readers, could thus have lost world stories set on electrons. I've reviewed such stories in issues #372, 388, 451, 475, and 502 of this zine.

By the late 1930s, golden atom stories had faded away but some still appeared. An example was "Worlds Within" by John Russell Fearn (1937 March, ASTOUNDING, available as a free pdf from www.archive.org). The variation in this story was that Martians were the ones fiddling about with atomic worlds. They inadvertently triggered a civilization from an atom to send a vessel up into our universe, looking to colonize a new world.

The matter was resolved by the atom people settling on Earth, which at that time was still in the Pleistocene ice ages. Those people degenerated into savages who eventually became humans.

"The Incredible Visitor" by Clifton B. Kruse (1938 May, ASTOUNDING) used a new variety of miniaturization, when aliens visited Earth. They were from an ultra-dense planet and microscopic in size. Their gigantic, to them, starships were the size of a baseball.

The aliens found the size of Earthlings and fauna were astounding, pardon the expression. There was no method to take back specimens to the home planet per se, but a workaround was figured out which could miniaturize the humans down to the size of the aliens.

Following on in that same issue of ASTOUNDING was ""Procession Of Suns" by R.R. Winterbotham. Twenty stars had appeared in the sky, traveling in sequence from one arm of the Milky Way to another. The premise was that the galaxy was a molecule in a bigger universe which had been electrically charged. The stars were ions, jumping from one arm to the next like a spark gap.

The good news was that Earth would abide, physically speaking. The bad news was that humans had gone berserk at the sight of 21 suns in the sky. Society had collapsed, and wars were being fought across the planet.

TRAIN OF EVENTS: PART 5

by Dale Speirs

[Parts 1 to 4 appeared in OPUNTIAs #403, 416, 461, and 489.]

Disoriented Trains.

THE HAUNTING HOUR was an anthology radio series of mystery, fantasy, and horror, which aired from 1944 to 1946. Writer and actor credits were not given. Available as free mp3s from the Old Time Radio Researchers at www.otrr.org/OTRRLibrary

"Murder Is My Business" aired on 1945-10-06. The episode began on a train when a panicky woman told her husband Carl Tatum that a murderer was stalking her. At the next stop a young woman Maggie Stewart got on and met Mrs Tatum on the train.

The following stop was Pell City. Carl didn't notice because someone had shot him dead in his seat with a silenced handgun. Wayne O'Hara, traveling on the train, took charge, claiming to be a police detective. Mrs Tatum had disappeared, leaving Stewart to take the blame.

O'Hara and Stewart searched for Tatum at Pell City. Various excursions followed. O'Hara proved to be an imposter named Donald Lambert. Everyone met at a lake house where they explained the plot to each other.

The Tatums had been blackmailing Lambert's wife, who committed suicide. Donald wanted revenge. The police arrived in the nick of time. Since the principals involved had already explained away the loose threads, the police didn't have much to do except arrest a few suspects.

THE WHISTLER was an old-time radio anthology series that aired from 1942 to 1955. It was not a mystery show. Both the narrator and the protagonist explained everything to the listener as a perfect crime was plotted and carried out. The criminal would gloat after the crime and get in a few bwah-ha!-ha!s.

After the final commercial, the epilogue would reveal some detail the criminal overlooked that tripped him up. It was for the listener to keep track of the little details and discard the red herrings, then predict what the twist ending would be.

"Curtain Call" was written by Robert Eisenbach and Jackson Gillis, and aired on 1947-08-27. Martin Elliott was an upcoming Broadway stage actor. His success was predicated on his loveless marriage to Julia, who had contacts to boost his career. Unfortunately the main contact was her brother, a playwright who keeled over from a heart attack.

He had finished his play, a star vehicle, which his agent Gordon Tucker found in the estate. Martin didn't know that and abandoned Julia in the middle of the night for better prospects in Boston.

Martin returned to New York City upon hearing the news. He had only just left town when he read what happened in the morning newspaper. If he could sneak back in before Julia awoke, then she would never know.

Unfortunately she did, having awakened early that morning. She caught him sneaking into the apartment. He soon regretted his impetuousness, even more so after he killed her in a quarrel.

The rest of the episode was his long fall, as he desperately tried to cover his tracks. Not just figuratively, because his alibi involved proving he was on a train to Boston.

Martin had to do some fast juggling with trains, heading back and forth between Boston and New York City. His main task was making himself conspicuous on the Boston train. He chatted up various people and hoped they would remember him. A traveling salesman vouched for Martin, and it looked like he was in the clear.

The twist was a cigarette lighter belonging to the salesman, with his name engraved on it. Martin had accidently come away with the lighter and had it on him when he killed Julia. The police found the lighter lying beside her body. If Martin and the salesman were both in Boston, how did the lighter get to New York City?

Novel Murders.

MURDER ON THE FLYING SCOTSMAN (1997) by Carola Dunn was set in 1923 when the Marple of the story, Daisy Dalrymple, was on the famous train for Scotland. En route she met an old schoolmate Anne Breton, of the McGowans of Dunston Castle. Her grandfather Alistair McGowan was on his deathbed and the entire family was going to see him off.

Alistair had previously announced his brother Albert would receive the entire estate. Needless to say, that was a great disappointment to all the other potential heirs, who had been hoping to get a piece of the fortune.

When Albert was murdered on the train, his death wasn't a complete surprise. Besides sorting out the suspects, there was squabbling about jurisdiction. The train had crossed three counties during the possible time of death.

Fortunately the body was discovered before the train crossed into Scotland. The train schedule had to be kept and likewise the murder investigated. The joke was on all the heirs when an audit revealed the fortune had been embezzled away.

RIPE FOR MURDER (2016) by Carlene O'Neil was the third novel in a cozy series about Penny Lively and her family, who operated a winery near Cypress Cove, California. She and the winery manager Connor went to a resort to hear details about a proposed tourist railway through wine country. The line would certainly attract more guests.

Among others at the meeting was her neighbour's daughter Chantal Martinelli, who spent her time flirting with potential investors. Married or not, she didn't care, until Tara Duport, the wife of one of them, was murdered just after a screaming match between the two women.

Much of the action and Marpleing took place on a wine country train. Duport's death turned out to be accidental. She fell off the train while drunk. The murderer, and there was one, used the situation to kill his own wife and confuse the situation.

He made a mistake that could only happen on a train, having to do with the emergency brake cord. The novel made good use of the train, not just as a venue for the deaths but as an integral part of the story.

Grand Theft Train.

"The Train That Vanished" by R.R. Winterbotham (1936 July, ASTOUNDING, available as a free pdf from www.archive.org) took place in a South American

jungle where a railroad crossed the wilderness. There was, as there usually was, a revolution underway.

The rebels learned a train was carrying munitions for government troops. A scientifically minded rebel built small devices that generated a powerful positive electric charge. One was embedded in the track and the other was smuggled into the locomotive.

The device worked better than anticipated. When the two devices crossed at high speed, the train was flung into outer space by the mutual repulsion of the two positive charges. The story ended with an explanation that during the seconds that the train was high in midair, Earth's rotation left it behind in outer space.

Nice try but the fallacy was obvious. If you jump straight up in the air standing in your living room, you land on the same spot. Vertical acceleration does not alter horizontal speed.

THE THIRD MAN aired on old-time radio for a season in 1951-52, with Orson Welles as Harry Lime. No writers were credited. The mp3s are often labeled with varied series titles using the name Harry Lime. The character came from Graham Greene's movie and later novel adaptation. Well worth downloading as free mp3s from www.archive.org.

Lime met a nasty end in the original movie. In the opening narration of the radio episodes, Welles told the audience that these stories were set before Lime was shot dead fleeing through the sewers of Vienna like a rat. Lime was a confidence man constantly traveling throughout Europe.

In the radio series, most of his schemes seemed to fall through, yet he always had money to live well and go gambling in casinos. Lime narrated all the episodes as if he were a god speaking from Olympus, complacent in his superiority over the lumpenproletariat while oblivious of the fact that he lost more often than he won.

"It's In The Bag" aired on 1952-02-22. The episode opened with Harry Lime on board the Orient Express, traveling from Istanbul to Paris. He was trying to get as much distance as possible from Turkey for reasons that need no explaining.

Lime was stuck with a Greek seatmate who was a choriátis (the Greek word for boor; I looked it up on Google Translate). Staphapopolos got drunk on the wine he brought along, but then desperately fought off the urge to sleep.

Lime was puzzled why the Greek didn't just settle back in his seat and sleep it off like anyone else would have done. Staphapopolos blurted out that he was carrying US$10,000 and didn't want it stolen. Talk about waving a red flag.

Lime told him that he himself was carrying $100,000 in counterfeit currency and wasn't worried. Pretending to sleep, Lime began scheming. Staphapopolos said he made his money in the black market and was worried about getting it past the customs officers.

The plan that Lime developed was to sell Staphapopolos the counterfeits for the bargain price of $10,000. At the next station, Lime called ahead to Belgrade police and told them the counterfeits were on board. En route Staphapopolos and Lime made the swap.

The police took both of them into custody, and the bags of currency. Lime was released the next morning with apologies since his currency proved to be genuine. Resuming his travels, his new traveling companions were a beautiful woman Olga Yagorshin and another man who crimped Lime's style with Olga.

Of greater concern to Lime was that his bag of currency suddenly vanished as the train went through a dark tunnel. He certainly wasn't going to raise an alarm. Instead he tried to deduce which of the other two had stolen it and, more importantly, where they had hidden it. He couldn't see any hiding place in their compartment.

Complications spread, with an excursion down the tunnel. An infodump detailed the improbable events with several twists that involved spies smuggling currency to finance their operations.

Lime's bag was confiscated but in turn he got a medal from the Yugoslav government and his liberty. His conclusion and lesson to be learned was that one shouldn't speak to strange men on trains.

Come Spy With Me.

"The Vanishing Diplomat" by Harry Van Demark (1910 November, THE BLACK CAT, available as a free pdf from www.archive.org) caught my eye because it was set on the Canadian Pacific transcontinental railroad.

A British diplomat was carrying some papers to his government in England from Japan. In those days, the fastest route was a steamer from Japan to Vancouver, then the train across Canada to Halifax, and thence by steamer to London. The entire trip only took a month.

The diplomat went missing from a sleeper car on the train as it went over the Rockies. There were night porters at both ends of the car and the window was locked from the inside. There were Japanese agents on board, who had obviously kidnapped him in order to get the documents. The question was how they did it. The snatch was made as the train laboured over Rogers Pass, where it could only travel as walking speed up the slope.

Eventually the detectives figured out the elaborate method, involving a hatch in the roof, a fishing net hung outside the window, and an agent to lock the windows and hatch before sauntering out into the corridor as an ordinary passenger.

ESCAPE was an anthology series that aired on radio from 1947 to 1954. The episodes were a mix of genres from mystery, science fiction, and adventure. Available as free mp3s from the Old Time Radio Researchers at www.otrr.org/OTRRLibrary

"Train From Oebisfelde" was written by Ross Murray and aired on 1953-09-06 during the height of the Cold War. Bruce Kellander was an Allied agent transporting Lawton Herrick, a physicist defecting from East Germany to Hanover. The Communists wanted Herrick dead at any cost, along with the atomic secrets he carried in his head.

Just as the train rolled out, Kellander was informed that a Communist agent had boarded with a bomb capable of destroying the train. The explosion was set for when the train crossed the Oker River bridge. The agent would trigger the bomb if the train stopped before then.

Kellander desperately searched the train. He tried logic, reason, and hunches, to no avail. He basically succeeded because the final place he searched was the last possible place to search. The agent never got a speaking part. Kellander shot first. A standard spy story.

Pat and Jean Abbott were latecomers to the married sleuths subgenre, based on the novels by Frances Crane. On radio, ABBOTT MYSTERIES aired from 1945 to 1947. The series was revived for the 1954-55 season as THE ADVENTURES OF THE ABBOTTS. The radio episodes were written by Howard Merrill.

Jean usually narrated the segues, while Pat did the action scenes. She was a jealous wife. They bickered anytime he went near a good-looking woman. Her main function was to have things explained to her and frequently be kidnapped.

"The Blue Rocket Express" aired on 1955-04-17. The Abbotts were entraining to Chicago. Upon boarding, Jean met and struck up a conversation with Professor Ernest Duffield. He was en route to California for a conference on bacteriological warfare.

A loud-mouthed boor named Charlie Gregg barged into the Pullman car. "*I'm the original good time Charlie*", he blared, and no one doubted him. "*Have you heard the one about the near-sighted octopus and the bagpipes?*"

Jump cut to a later scene when a gunman did the barging, this time into Duffield's compartment. He demanded the professor turn over a bacterial culture, saying he intended to shop it around to foreign militaries. There was a struggle, the outcome of which wasn't made known to the listeners.

The Abbotts detrained at Chicago, while Duffield and Gregg went on to California. Having finished their business in Chicago, the Abbotts took the Blue Rocket Express back to New York City. They had the same compartment going back that Gregg had on the outbound trip.

When they pulled down the berth, Duffield's corpse was in it. Abbott used the train's radiotelephone to call the California train, who said Duffield was on that train. As the train slowed down for the next stop, the Abbotts jumped off so as to avoid the police and other fussy people who would obstruct Pat's investigation.

They made their way by one method after another to reach California and boarded the train. The Duffield impersonator was Gregg, who was understandably surprised to see the Abbotts. He bolted off the train with the bacterial culture.

Shots were fired, and Gregg fell off the cliff to his death. In the aftermath, the real Duffield introduced himself. The dead man was a decoy, and so was the flask of bacterial culture. Gregg had died for some coloured water.

Hear That Lonesome Whistle Blow.

Michael Shayne began as a series of novels by Davis Dresser, writing under the pseudonym of Brett Halliday. As a fictional detective, Shayne appeared not only in print but as an old-time radio series, movies, television, and a mystery fiction digest.

Dresser quit writing Shayne stories after 1958 but farmed out the Halliday pseudonym as a house name to other writers, so the stories continued to appear for decades afterwards.

THE NEW ADVENTURES OF MICHAEL SHAYNE aired on old-time radio from 1944 to 1953. The series was based on the novels by Brett Halliday, although the episodes were pastiches. From 1944 to 1948, Shayne was located in San Francisco and had a pretty secretary named Phyllis Knight. Available as free mp3s from the Old Time Radio Researchers at www.otrr.org/OTRRLibrary

"The Key System Train" was written by Richard de Graffe and aired on 1945-09-24. Jane Agnew wanted her boss G.W. Hyland dealt with for his rude behaviour. She worked in his chemical laboratory and had been accused of stealing a formula. Slander and abuse, she said it was. Michael Shayne and Phyllis Knight explained to her that she needed a lawyer, not a detective.

The conversation was interrupted by a telephone call from William J. Pringle, who wanted Shayne to shadow him. In the background was heard the sound of a train passing by. Pringle had foolishly publicly threatened to kill Hyland and now feared if the man died, he would be blamed. He wanted Shayne to alibi for him.

Back to Miss Agnew. She said Hyland had accused her of smuggling the formula to a competitor Burton Gordon Feldman. However, Feldman said it was his formula and Hyland was the thief. That provided three people who wanted Hyland dead.

Hyland never got a speaking part, having been murdered at the 4m20s mark of the episode. He was shot dead through the heart while in his laboratory. Shayne and Knight attended the scene. As they talked with police, trains constantly passed by.

Knight found a note on the floor that said "*Pringle killed me. Hyland*" Sloppy police work to have missed that. Agnew and a fellow employee doubted the note was genuine because the handwriting was an untypical scrawl.

Hyland had issued all his employees with handguns, being paranoid about security. Agnew's gun was missing, as contrary to Hyland's policy she kept it in her desk drawer instead of carrying it on her person. Pringle said his gun was missing, but Shayne found it in Hyland's desk. The gun had not been fired though. Again, the police should have found the gun. No wonder they needed a private detective.

Pringle said he had telephoned Shayne from his home in a San Francisco suburb. The listener will have guessed the train noises said otherwise. Shayne and Knight went about town investigating, finding lots of clues but not making any real progress.

Shayne finally realized the solution after the umpteenth train had passed the murder scene. Took him long enough, for the listeners had the solution ten minutes prior. Pringle had telephoned from the murder scene and pretended to be calling from his house, nowhere near the tracks.

He confessed and blabbed all instead of keeping his mouth shut. The denouement tied up loose ends except one. Everyone accepted that the accusatory note written by Hyland was genuine, scrawled in his death throes.

I don't. Hyland was stated to have been shot through the heart. He would have lost consciousness immediately, dropped to the floor like a sack of potatoes, and died a moment later. He would not have lived long enough to go to his desk, get pen and paper, and compose the note.

Train Of Dreams.

"It Might Have Happened Otherwise" by Hugh Pendexter (1915 October, ADVENTURE MAGAZINE, available as a free pdf from www.gutenberg.org) was about a man named Parsly, who served as station agent and telegraph-operator at a train junction in lumber country.

He didn't like his job much. He was paid $50 per month, which was little even in 1915, and could never seem to get ahead financially. Each day, in his capacity as an express agent, he handled cash in amounts of $100 to $2,000 sent to or from the lumber companies for payrolls and accounts payable.

Quite a temptation, so he began fantasizing how he would make a big score. The heist would have to be on a day with thousands of dollars flowing. That part was simple, as he only had to put the cash in his pocket and take a train to the big city. He realized that the express company would be on his trail forever, so he went into deep planning on how to change his identity and disappear elsewhere.

Instead, his station was held up by bandits. He stopped them and found it was easier to be an honest man facing bandits than to be a bandit. His reward was a new job with the express company that paid double and put him on a promotions track. The story was basically a "but it was only a dream" plot but with a twist.

Tracks.

Railways could make or break a settlement during the pioneer days. If the tracks bypassed a village, it would dwindle away. Conversely, sidings often developed into towns. A junction would make it a city.

"The Man Who Moved A Town" by Frank X. Finnegan (1909 September, THE BLACK CAT, available as a free pdf from www.archive.org) began with a traveler Sylvester Grubb riding into the village of Lynchville.

The inhabitants were rude to him, there was no room at the hotel, the only cafe was closed, and the livery stable refused to put up his horse. He got his revenge though, for he was an scout for a railway.

The company were planning a spur line up that valley, with a road bridge as well. Grubb recommended the line go up a different valley, and so it did. Lynchville faded away and a new town grew up at the bridge.

Haunted Trains.

INNER SANCTUM MYSTERIES was an old-time radio mystery anthology series that aired from 1941 to 1952. (This and other episodes are available as free mp3s from www.otrr.org/OTRRLibrary) The host was a smarmy man who liked to make ghoulish puns. Each episode opened with the sound of a door slowly creaking open.

"The Unforgiving Corpse", written by John Roeburt, aired on 1951-05-28, sponsored by Mars chocolate bars. The setting was Santa Manto, out there beyond reason, as the host said. Ben Sears was the railroad station master, afflicted with guilt.

Ten years prior, he had failed to set a track signal properly, as a result of which engine driver Kirby Willis died in a train wreck on the 11h55. The vengeful ghost of Willis had returned to haunt Sears. Twas the anniversary week of the wreck and Willis said he would be riding the train each night.

Stepson Fred came by the station as he usually did each night. A telegraph message came in. Both men understood Morse code. It announced the 11h55 was coming by. A codicil was added, that Willis was riding with the train.

Just to check, Sears walked over to the cemetery. He found Willis' grave was open. That night the train came roaring through and wrecked again. As the crash reverberated, the host interceded with a commercial for Mars Forever Yours bars.

Back at the episode, Fred calmed Sears down and told him there was no wreck. Sears took the town supervisor Wilson to the cemetery. The grave was indeed open. So was that of Jenny, Willis' fiancée, who had died of a broken heart after hearing of the original wreck back then. Both heard her accusing voice.

The next morning Wilson ordered Fred's arrest. The stepson resented Sears and thought to drive him into an early grave by faking all the events. Not so incidently, he would inherit Sears' property and wealth.

But that night another message came through. Sears stopped the train but it restarted and went on. He had been hallucinating. There was a body lying beside the track, shot dead and wearing handcuffs. Another telegraph message came through about an escaped prisoner and a moll Jenny.

Sears' mind was gone though. He would not listen to anyone, still obsessed with Willis.

TWISTED FICTION: PART 2
by Dale Speirs

[Part 1 appeared in OPUNTIA #505.]

Suspense.

SUSPENSE was one of the most popular anthology series on radio, airing from 1940 to 1962. Its final episode was in fact the very last old-time radio episode ever aired. This series is available as free mp3s from the Old Time Radio Researchers at www.otrr.org/OTRRLibrary

"Summer Storm" aired on 1945-10-18 and was written by Louis Estes. The narrator Eddie was sneaking out of a cheap rooming house when he got into an argument with the landlord Mr Waters. The argument escalated into a physical alteration which Eddie won.

Waters lay dead on the floor despite Eddie only having shoved him. The ruckus aroused the neighbours, who rushed into the room. Eddie hid himself while they called the police. He was trapped.

He worked himself up into the attic, unable to escape. Mrs Waters and the other boarders constantly came and went, preventing Eddie from getting out of the house. Eddie kept narrating his increasing desperation and psychological collapse.

Mrs Waters was the next victim, or was she? Eddie didn't think her death was his fault but knew on one would believe him. Finally he escaped the house, just as a storm began pouring. He stopped at a diner.

So did a policeman, who told the cook that both the Waters had just died from ptomaine poisoning after eating contaminated food. It wasn't murder. The couple happened to keel over as Eddie was struggling with them.

"Murder By An Expert" was written by John Shaw and aired on 1947-07-24. Edith Reeves had tired of her husband Bob. A decisive woman, she stabbed him dead in the neck. After a commercial break for Roma Wines, touting wine and soda over ice, she then dealt with the consequences.

Her lover George helped her plot the killing. He provided an alibi for her but the police didn't need it. Bob's brother Jimmy was found at the scene holding the knife. He said he had come over to visit Bob and had unthinkingly picked up the knife.

Edith falsely testified the brothers had quarreled. All went well until George told her that he was seeing another woman. Nonetheless he wanted half of Bob's estate as a blackmail payment.

Understandably Edith went to pieces. A woman scorned, etcetera. She framed George for the murder. Well, these things happen in the best of families.

"After The Movies" was written by Jack Finney and aired on 1950-12-07. The narrator Al Benning was serving on a jury. The trial had recessed for a couple of days, so he and his wife Ann went to a movie.

Afterward they stopped at an ice cream parlour to buy a quart of chocolate ice cream to take home. The cost was 60 cents. I'm tempted to insert a digression about how people today don't understand inflation but let it pass.

Ann found an envelope on the floor as they were leaving. It contained $10,000 in cash. The orchestra crashed into a crescendo and the announcer Harlow Wilcox began a conversation with a raspy-voiced Santa Claus about Autolite spark plugs. Just the thing for Christmas.

Back at the ice cream parlour, the Bennings discussed the matter with the soda jerk, then went home with the cash. The couple decided to keep the cash. There was a note threatening retaliation if the bribe didn't work. The wording was vague but seemed to be addressed to a juror on Al's jury.

He phoned the police but they didn't rush over. The gangsters who supplied the money showed up first. Ann babbled that she had read the note. If the law of natural selection had been operating properly, one wonders why she hadn't been eliminated from the gene pool long before.

The gangsters took her hostage and told Al he'd better convince the jury to acquit their boss. He got himself in deep but the police eventually sorted him and the gangsters. The twist was that Al was the bribed juror. He had accidently dropped the envelope, and had phoned the gangsters instead of the police.

Ann didn't survive. Al hadn't planned on the gangsters killing his wife. He didn't get the $10,000 either. Santa Claus wrapped up the episode by reassuring listeners that he made his toys in the North Pole workshop with the same quality that Autolite made their auto parts.

The Whistler.

THE WHISTLER was an old-time radio anthology series that aired from 1942 to 1955. It was not a mystery show. Both the narrator and the protagonist explained everything to the listener as a perfect crime was plotted and carried out. The criminal would gloat after the crime and get in a few bwah-ha!-ha!s.

After the final commercial, the epilogue would reveal some detail the criminal overlooked that tripped him up. It was for the listener to keep track of the little details and discard the red herrings, then predict what the twist ending would be.

The series was only heard on the west coast. The sponsor was Signal Oil, whose commercials were often an amusing contrast to what had gone on immediately before in the episode. This series is available as free mp3s from the Old Time Radio Researchers at www.otrr.org/OTRRLibrary

"Confession" aired on 1943-01-31. Marty Heath had been refused a life insurance policy because he had a medical problem. He didn't want to tell his wife Clara, which caused a rift when she sensed something was amiss.

In a tavern, a stranger named Blain accosted Marty. He had learned that Marty had three months to live. When Marty asked how he knew, he said he went to the same doctor and had overheard the conversation from the waiting room. Mighty thin walls in that office.

Blain offered $10,000 cash if Marty would confess to the murder of Stanley Rober. The episode broke for a commercial from Signal Gasoline. Feeling depressed because your car is outpaced by others on hills? Brighten your feelings by using Signal gasoline. You'll feel much better.

Marty tried to be indirect about his problem but Clara wasn't having any of it. The deal went ahead. Marty confessed with a letter to the police. Clara followed him and messed up the plan. She became an active accomplice and suggested they run for shelter.

They flew to New Orleans en route to Havana. (This was before the Communist takeover.) A private detective tracked them down and told Marty the laboratory tests were mistaken. He wasn't going to die of health problems. The catch was that he was going to die in the electric chair for Rober's murder.

Break for the final commercial, plugging Signal engine oil. Then the twist. The deadly lab test was Blain's. Marty was a healthy man. Their results had accidently been switched and the doctor was most apologetic. Blain confessed to the murder and the plot before dying.

"Til Death Do Us Part" was written by John W. Hart. This episode was aired several times with variations between 1944 and 1950. The version reviewed here is dated 1944-07-30, identifiable because the opening was a brief speech by President Harry Truman touting war bonds.

Norman Grayson was an art dealer who sold fake manuscripts to Richard Morris, dying of heart disease. His wife Janet helped the sale even though she knew the documents were fake. Grayson offered them for $35,000 but Janet had Richard sign a cheque for $50,000.

Naturally this perturbed Grayson. A flim-flam man, he was suspicious as to Janet's motive. Richard died the next day. She dropped the hammer even before the funeral. She told Grayson that she wanted him to buy back the manuscripts for $50,000.

She explained that Richard's will tied up his estate in a trust that would only pay her $800 a month. That was good money in those days but wouldn't allow her to keep living in the style to which she had become accustomed. She wanted the $50,000 lump sum as something to be going on with.

Grayson visited her house and slipped her a mickey with sleeping pills from Richard's sickbed. That allowed him to search the house for the manuscripts. He found them and walked out unobserved. Leaving the mansion, he tossed the vial of pills into a shrub bed.

The twist was that Janet had poisoned Richard and was poisoned in return. The police searched the premises after the coroner's report came through. They found the pill jar with only Grayson's fingerprints on them.

"The Gentle Way" was written by Jack Hastey and aired on 1947-06-23. Bruce Rhymer had worked in a commercial laboratory for years. Once again he was passed over in favour of his rival Cliff Cardigan, and was now that man's assistant. Very galling, and he wanted revenge.

Simply killing him would put Rhymer in the electric chair. He decided to use psychological warfare and make another man unknowingly the catspaw to kill Cardigan.

Jules Emery was a fellow laboratory worker also disgruntled by a stagnant career. To add to his resentment, Cardigan had romanced his wife years ago. Rhymer planted seeds of suspicion in Emery's mind and began manipulating Cardigan to take small actions that would annoy Emery.

The plan seemed to be working. Emery became angrier and angrier. His marriage began to crumble. Rhymer got him angrier by leaking Emery's research on botulin to the newspapers under Cardigan's name.

Cardigan's body was found, with multiple physical trauma. Emery confessed to the murder. Rhymer was made acting administrator and would no doubt be confirmed in that position. He settled in at his new desk and began smoking one of Cardigan's cigars to celebrate his victory.

After the final commercial, the twist was inserted. A police detective telephoned Rhymer. Cardigan had been killed by a hit-and-run driver who was later caught and confessed. Emery's confession was that he had killed Cardigan by injecting botulin into his cigars.

Since the police knew otherwise, they held Emery on a psychiatric charge. The detective warned Rhymer not to touch the cigars.

"The Twelve Portraits Of Marcia" was written by John Montsos and aired on 1948-01-21. Everyone pronounced her name Marsha instead of Mar-see-ah, but later in the episode one of the characters spelled out her name. The artist Ralph Winston had painted twelve portraits of Marcia. He needed publicity to sell the paintings, so decided to murder her and make it look like suicide.

Sidney Selsen was an art dealer who, unbeknownst to Winston, had received a letter from Marcia about the paintings. Selsen told police that he had arrived just in time to hear the gunshot, rushed in, and found her body. Since Winston took several minutes to set up the death scene, Selsen must have noticed something and was therefore lying.

They danced around the subject, with blackmail as the unspoken subject. Selsen expected to handle Winston's sales and life. He put the pressure on the artist, partly by changing his story about Marcia to cast doubt on the suicide story.

Winston blew through his money and became dependent on Selsen. He wondered who bought the Marcia portraits, and finally learned Selsen had them. The blackmail came out into the open. Blackmailers tend to have shorter lives. Winston grabbed Selsen's gun and shot him dead in his gallery.

Then to the final commercial and the twist at the end of the episode. The gun was loaded with blanks and a newspaper photographer hiding behind a curtain got some wonderful shots. Selsen had never known Marcia in real life but fell in love with her via the paintings. He avenged her death.

"Quiet Suicide" was written by Robert Eisenbach and Jackson Gillis, and aired on 1948-02-18. Frank Reynolds was a bigamist with a wife Millicent in Los Angeles and Diane in New York City.

Bigamy is the one crime that is its own punishment. Reynolds was becoming a nervous wreck trying to keep his two lives apart and prevent the two women from learning about each other. Diane was cooling off towards Frank, egged on by her Uncle George, who thought he was after her family fortune. He had a private detective following Frank and sometimes even her.

Frank arranged a quiet rendezvous with her in the city, away from her relatives' influence. He decided on her murder, staged as a suicide with sleeping pills. Diane told her uncle that Frank was coming in to the city on the train a day

later, lying to her uncle so she could have some private time with her husband. Frank gave her a drink well saturated with dissolved sleeping pills.

The detective arrived and found Diane's body in her bed. Frank meanwhile fled to the railway station to shore up his alibi about coming into town the next day. Another detective, named Pearson and police this time, caught Frank in the station in the early morning hours. His alibi held up until Pearson pointed out that the sleeping pills had been prescribed in Los Angeles. Frank resigned himself to a trip to the hoosegow.

Her uncle suddenly alibied Frank by saying that Diane had been in Los Angeles a month ago without telling Frank. Further, Uncle George had private detectives following her because she had tried to commit suicide after returning home.

Was this the twist ending? No, because the final commercial hadn't played. Signal Oil broke in to warn motorists how important it was to check their engine fan belt and radiator hoses. You'll be glad you had it done before more serious trouble developed. Diane didn't drive a car, so it probably wouldn't have helped her.

In the epilogue, Frank realized that the only reason Diane would have gone to Los Angeles was because she had somehow learned about Millicent. Pearson apologized and was about to leave when the alarm clock went off in the bedroom. If Diane had deliberately committed suicide, then why had she set her alarm clock?

"Boiling Point" was written by Joe Fugano and aired on 1948-03-03. Kelly Jamieson had married Janice, a social climber who had ambitions for him that he found oppressive. She was definitely the alpha in the relationship.

Janice ran their real estate office Jamieson & Jamieson with an iron hand. She wasn't malignant, just too business-like, and paid for it. Janice had a heart attack, as type-A personalities so often do.

Recuperating at home, she had a nurse named Vera, who captured Kelly's attention. He began contemplating murder. But first, a message from Signal Oil for its Go Farther gasoline.

Kelly also went further. Not just with thoughts of murder but with the opportunity to get in on a $40,000 land deal. He figured that was a golden opportunity. Janice arose from her sickbed and was suspicious of the deal. Kelly took material action, booby trapping a small bridge to the Jamieson's mountain cabin. The idea was that her car would topple into a canyon. Unfortunately a fellow real estate agent named Mac showed up earlier at the cabin via a back road.

Even more unfortunately, Vera drove up in her car. Kelly tried to head her off, telling Mac the bridge would fail. The sounds of the bridge collapsing were followed by the final commercial, an appeal by Signal Oil for donations to the Red Cross disaster assistance.

In the twist ending, Mac handed Kelly a note from Janice. She had discovered his affair with Vera and was going to Reno to file for a divorce. She wished Kelly the best of luck with Vera. Mac went to a telephone to report a murder to the police.

"The Big Gamble" was written by George Esner and aired on 1948-10-03. The plot began when a racehorse mare gave birth to identical twins. The owner Mac and his trainer hatched a conspiracy to register only one colt as Wonderboy and keep knowledge of the other hidden.

Their idea was to train one horse as a champion runner and the other as an also-ran. Training the latter wasn't as easy as might seem, since horses want to run and jockeys want to win. They had to make the second twin look natural while running slow.

The good horse would boost the odds by winning, placing, or showing. Every so often, the slow twin would compete as Wonderboy and finish out of the money. The two men would bet against the horse and clean up.

People got suspicious. Greed incited the wrong people to take an interest in the race. Unfortunately the two men made a bet with a vicious Kentucky colonel who warned them if they didn't fix the race properly then they would be taken for a long ride, one way.

Wonderboy was to lose to Corsair, the colonel's horse. Mac was dating the trainer's daughter, without her father's knowledge. The night before the big race, she discovered the deception and threatened to expose him. They were strolling along the river at the time and his greed overcame his personal feelings.

Unfortunately Wonderboy won going away. There had been a mixup and Mac was going for a long ride. The twist was that before the race, the trainer was informed his daughter's body had been found in the river.

Distraught, he went off with the police to identify the body, leaving an apprentice to look after Wonderboy. As the listener will guess, instead of sending the slow twin to the race, the champion runner was brought to the post.

"Hired Alibi" was written by Bernard Gerard and aired on 1948-12-05. Paul Burns was driving out in the Arizona desert when he picked up a hitchhiker Joe Morbella.

Burns managed a silver mine. He and his wife Edith had fiddled the books for $14,000. He recognized Morbella as a wanted murderer. Thinking to use him for some method of evading the embezzlement, Burns hired Morbella as an assistant.

The new man was installed in the guest room of the Burns house. He wasn't happy in a desk job, which upset Burns as the company's scheduled audit approached. However, things settled down. The Burns' daughter Ruth began a relationship with Morbella. Paul didn't know about that, although the listeners easily surmised the romance.

Paul Burns reshuffled the books to list the missing money as cash in hand, stored in a safe in the office where Morbella worked. He then told Morbella the sheriff had come by asking questions. Paul played it dumb, as if he didn't know Morbella was a murderer. He gave him some spending cash, loaned him the car keys, and told him to run for freedom.

After Morbella left, Paul tipped off the sheriff, telling him $14,000 was missing. The officer came by later and told Paul that Morbella and an accomplice had been arrested. The murder charge took precedence, so Morbella would stand trial for murder and the accomplice as an accessory after the fact.

The twist was that the accomplice was Ruth. She was eloping with Morbella and didn't know what her father had done.

"High Death" was written by Edwin Spangenberg and aired on 1951-03-11. Jim and Laura were mountain climbing with Peter and Mona. Jim wanted Mona, but needed Laura's money. So began the triangle.

The episode was bloated with ominous forebodings. Laura had dreams about dying on the mountain. Jim muttered out loud to Mona that he wanted Laura dead. Mountain guide Stephan emphasized the importance of maintaining climbing ropes in good condition. Cut to the sponsor Signal Oil, who warned listeners about the dangers of engine wear.

Jim got ideas about improving his situation by staging an accident. He damaged Helen's ropes so they wouldn't hold her weight. The five characters went up the mountain for the inevitable at an overhanging wall.

There was a double twist. It was Jim who slipped and fell off the cliff. Helen lowered her rope to him but he wouldn't take it and fell to his death. As he went Aaaaahhhh!, there was another jump to Signal Oil, which continued to hammer home the tragedy of engine wear.

Back at the cliff, the four survivors camped out for the night. They were puzzled why Jim wouldn't take the rope. Stephan mentioned that he personally inspected all the ropes before they went up the mountain and had found a damaged one. He replaced it with a good rope.

The Mysterious Traveler.

THE MYSTERIOUS TRAVELER was an anthology radio series which aired from 1943 until 1952 as half-hour episodes. The shows 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*".

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 Many episodes or scripts were later clipped down to 15 minutes for the series THE SEALED BOOK and THE STRANGE DR WEIRD.

"The Accusing Corpse" aired on 1944-04-16. The narrator was Dr Smith, a county coroner, telling about the case of wealthy stockbroker Philip Drake. His wife Vivian was leaving him, so he called in her brother Roger to talk to her.

It was April 6. (Note the air date for this episode.) She told Philip she had another man. He uttered those famous lines: "*If I can't have you, no one else*

will." Her last words, exactly at the 4m mark, were "*You're not going to stop me*".

BANG! went Philip's gun. Roger was surprisingly sympathetic. Since Vivian had loudly announced she was leaving, she wouldn't be missed. Roger took the gun and told Philip he would bury her body in the woods behind the manor house. Vivian had put blanks in the gun. After they were out of sight in the woods, she discontinued her corpse act, and the two discussed their conspiracy.

Roger began working on Philip the next day. He borrowed $20,000 for a supposed business deal. Vivian was annoyed that she had to remained in hiding while Roger worked his blackmail. He went to back to Philip later for another $40,000. Vivian was stir crazy and defiant of Roger. She went shopping and had some clothes delivered.

Then a jump cut ahead a week. Roger wanted another $60,000, but this time Philip refused and became suspicious. He demanded to see the grave. Roger showed him a grave, with a female body in it. Back at the mansion, they had a friendly chat over drinks, one of which was poisoned.

As Philip lay dying, Roger explained he had killed Vivian. He then tried to make the deaths look like murder-suicide. He told police that Philip confessed to murdering her on April 6, then killed himself that day, April 16. Smith noticed her clothes contained the delivery receipt from April 9. The rest hardly needed stating.

FANDOM MATTERS
by Dale Speirs

Carol Pinchefsky published a book this year TURN YOUR FANDOM INTO CASH, available from the usual online sources as a 200-page trade paperback. The fandom she refers to comprises media science fiction and cosplaying. She called it geek fandom throughout the book, and in passing near the end referred to traditional literary fandom as nerd fandom.

The book read quite well and I went through it in one sitting. It was a fascinating look at electronic fandom and merchandising. Nothing about zines but lots about social media.

She began by discussing intellectual property, which is copyright, trademarks, and patents. She emphasized that corporations are clamping down on fanfic or purveyors of homemade trinkets using trademarked characters. As computer software advances, rights owners are increasingly able to track down and stomp smalltime operators that in previous years got away with violations.

Resist the temptation to produce coffee cups or key chains with movie superhero images. Somebody else already has the licence to do so. However, it doesn't mean that you can't negotiate a licence with big corporations for unusual items that no one else is producing. Rights holders actually do want to licence goods because they recognize those items will help boost the franchise.

Just don't offer to produce Superman condoms, which the studio will reject because they consider the character to be family-friendly. It is also astonishing how many people think they're the first to propose key chains, memory sticks, or coffee cups as suitable items.

Pinchefsky provides practical advice on getting licences, copyrights, and trademarks. She recommends that fans create their own characters and universes if they want to be more than just a jobber manufacturing trinkets. She goes into some detail about funding a small business with Kickstarter or Patreon.

Much of her advice is aimed at the American market, so she talks about federal and state taxes, and such uniquely American problems as buying health insurance. However, skipping over those details, there is useful advice about running a business professionally.

By that is meant getting proper legal and accounting advice, and finding a professional software company to set up a website, not your neighbour's 11-year-old kid no matter how gifted he is. Where fans often fail is in running a business as a business, with proper record keeping and not mixing personal and business funds.

Cost control is what usually makes or breaks a business. Start off small and resist those little extras that don't pay their way. Pinchefsky quoted one dealer who learned the hard way it is impossible to make a bourse table pay if you fly to a convention and ship your goods by air. There's a reason why experienced dealers drive vans.

Social media gets the lion's share of attention. Concentrate on one feed but join as many others as possible and set up archive pages to point to your main action. This will help prevent cybersquatters from stealing your business's name. The other advantage is that if you are booted off one service, you can keep your business running elsewhere.

Crowd funding is problematic. You can't come out of nowhere and expect people to give you money if they never heard of you. That means first building up a good reputation online for selling goods at a fair price and delivering them. Stay out of flame wars.

The management of Kickstarter warn potential clients that only 38% of the campaigns are funded, and 11% get nothing at all, zero, zilch. As Pinchefsky wrote, you have to have a crowd before you can successfully crowdfund. This means a website with solid original content, a constantly updated blog, and a Twitter feed at a bare minimum.

Electronic payment is a necessity, which means your business has to get accounts from a bank, Paypal, eTransfer, and credit cards. Even at conventions, if you specify cash only, you will lose sales because most fans don't want to carry big wads of cash.

YouTube is an example of making your content pay for itself via sponsorships, but does require work. A common failing in social media is fans starting off with daily blogs or videos in a burst of enthusiasm, then dropping out after a few months or even weeks because of the workload and running out of ideas.

Conventions are discussed in two ways, dealing and running one. Dealers have to judge carefully which conventions are worth attending. Selling Darth Vader merchandise at a fantasy convention probably won't pay for the table.

Pinchefsky wrote about convention running for profit. The younger generation does not understand the idea of fan-run conventions by non-profit clubs. To them, a convention is a way to make money, or would be if they did it right. Convention disasters are common enough. Garth Spencer wrote an entire series in early issues of OPUNTIA about such ignominious events, and they still happen even today.

Anyone operating a convention has to separate their gosh-wow fannishness from the business side. Pinchefsky mentions conventions that hired actors from dead television shows that no one cared about except the convention chairman.

That reminded me of how Calgary's general convention ConVersion died. After decades of success, it was taken over by Trekkies who thought for sure people would turn out to see actors who played the third Klingon from the left or a crowd extra in a 30-second scene on the Enterprise.

Writers are commonly in social media, desperately plugging their books. One publisher pointed out that only about 200 authors live solely by their works, and the vast majority need day jobs to survive. Editing pays less per hour than a convenience store clerk. The majority of professional editing jobs are in New York City, one of the most expensive places in the world to live. Comic book publishers don't have staff. All their writers and illustrators are freelancers who come and go.

Pinchefsky wrote that fans hoping to earn money online should specialize and look for a small niche. Gushing about Marvel characters won't distinguish you from millions of other blogs with the same idea. In particular, you must have original content worth reading or viewing and be able to keep up the pace at a steady trot. Cut-and-paste clips or links won't do the job.

Writers in particular should offer a few freebies. Not all of their novels or short stories, but an occasional bone with meat on it. The idea is to bring back viewers regularly, not just get a single hit.

Making money from fandom is hard work. The Internet is littered with countless dead sites of those who thought they could make easy money.

CURRENT EVENTS: PART 38
by Dale Speirs

[Parts 1 to 37 appeared in OPUNTIAs #474, 475, 479, 480, 483, 484, 488 to 503, and 507 to 521.]

As of April 5, COVID-19 had killed 37,772 Canadians. 81.1% of Canadians were vaccinated. Pointless to report anymore how many total cases there were since the provinces no longer count non-hospitalization cases.

Seen In The COVID-19 Literature.

Guth, S., et al (2022) **Bats host the most virulent, but not the most dangerous, zoonotic viruses.** PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES USA 119:doi.org/10.1073/pnas.2113628119 (available as a free pdf)

[Zoonotic diseases are those which originated in animals and spread into humans, such as AIDS, Mad Cow Disease, and COVID-19.]

Authors' abstract: *Identifying virus characteristics associated with the largest public health impacts on human populations is critical to informing "zoonotic risk" assessments and surveillance strategies.*

Efforts to assess zoonotic risk often use trait-based analyses to identify which viral and reservoir host groups are most likely to source zoonoses but have not fully addressed how and why the impacts of zoonotic viruses vary in terms of disease severity ("virulence"), capacity to spread within human populations ("transmissibility"), or total human mortality ("death burden").

We analyzed trends in human case fatality rates, transmission capacities, and total death burdens across a comprehensive dataset of mammalian and avian zoonotic viruses.

Bats harbor the most virulent zoonotic viruses even when compared to birds, which alongside bats have been hypothesized to be special zoonotic reservoirs due to molecular adaptations that support the physiology of flight.

Reservoir host groups more closely related to humans, in particular, primates, harbor less virulent but more highly transmissible viruses. Importantly, a disproportionately high human death burden, arguably the most important metric of zoonotic risk, is not associated with any animal reservoir, including bats.

Our data demonstrate that mechanisms driving death burdens are diverse and often contradict trait-based predictions. Ultimately, total human mortality is dependent on context-specific epidemiological dynamics, which are shaped by a combination of viral traits and conditions in the animal host population and across and beyond the human-animal interface.

Understanding the conditions that predict high zoonotic burden in humans will require longitudinal studies of epidemiological dynamics in wildlife and human populations.

Aiken, E., et al (2022) **Machine learning and phone data can improve targeting of humanitarian aid.** NATURE 603:doi.org/10.1038/s41586-022-04484-9 (available as a free pdf)

Authors' abstract: *The COVID-19 pandemic has devastated many low- and middle-income countries, causing widespread food insecurity and a sharp decline in living standards. In response to this crisis, governments and humanitarian organizations worldwide have distributed social assistance to more than 1.5 billion people.*

Targeting is a central challenge in administering these programmes: it remains a difficult task to rapidly identify those with the greatest need given available data. Here we show that data from mobile phone networks can improve the targeting of humanitarian assistance.

Our approach uses traditional survey data to train machine-learning algorithms to recognize patterns of poverty in mobile phone data; the trained algorithms can then prioritize aid to the poorest mobile subscribers. We evaluate this approach by studying a flagship emergency cash transfer program in Togo, which used these algorithms to disburse millions of US dollars worth of COVID-19 relief aid.

Our analysis compares outcomes, including exclusion errors, total social welfare and measures of fairness, under different targeting regimes. Relative to the geographic targeting options considered by the Government of Togo, the machine-learning approach reduces errors of exclusion by 4 to 21%.

Relative to methods requiring a comprehensive social registry (a hypothetical exercise; no such registry exists in Togo), the machine-learning approach increases exclusion errors by 9 to 35%.

These results highlight the potential for new data sources to complement traditional methods for targeting humanitarian assistance, particularly in crisis settings in which traditional data are missing or out of date.

Kirpich, A., et al (2022) **Excess mortality in Belarus during the COVID-19 pandemic as the case study of a country with limited non-pharmaceutical interventions and limited reporting.** SCIENTIFIC REPORTS 12:doi.org/10.1038/s41598-022-09345-z (available as a free pdf)

Authors' abstract: *Public health intervention to contain the ongoing COVID-19 pandemic significantly differed by country since the SARS-CoV-2 spread varied regionally in time and in scale. Since vaccinations were not available until the end of 2020, non-pharmaceutical interventions (NPIs) remained the only strategies to mitigate the pandemic spread at that time.*

Belarus in Europe is one of a few countries with a high Human Development Index where no lockdowns have ever been implemented and only limited NPIs have taken place for a period of time. Therefore, the Belarusian case was evaluated and compared in terms of the mortality burden.

Since the COVID-19 mortality was low, the excess overall mortality was studied for Belarus. Since no overall mortality data have been reported past June 2020 the analysis was complemented by the study of Google Trends funeral-related search queries up until August 2021.

Depending on the model, the Belarusian mortality for June of 2020 was 29 to 39% higher than otherwise expected with the corresponding estimated excess death was from 2,953 to 3,690 while the reported COVID-19 mortality for June 2020 was only 157 cases.

The Belarusian excess mortality for June 2020 was higher than for all neighboring countries with an excess of 5% for Poland, 5% for Ukraine, 8% for Russia, 11% for Lithuania and 11% for Latvia.

The relationship between Google Trends and mortality time series was studied using Granger's test and the results were statistically significant. The results for Google Trends searches did vary by key phrase with the largest excess of 138% for April 2020 and 148% for September 2020 was observed for a key phrase "coffin", while the largest excess of 218% for January 2021 was observed for "funeral services".

In summary, there are indications of the excess overall mortality in Belarus, which is larger than the reported COVID-19-related mortality.

Teplensky, M.H., et al (2022) **Spherical nucleic acids as an infectious disease vaccine platform.** PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES USA 119:/doi.org/10.1073/pnas.2119093119 (available as a free pdf)

Authors' abstract: *Despite recent efforts demonstrating that organization and presentation of vaccine components are just as important as composition in dictating vaccine efficacy, antiviral vaccines have long focused solely on the identification of the immunological target.*

Herein, we describe a study aimed at exploring how vaccine component presentation in the context of spherical nucleic acids (SNAs) can be used to elicit and maximize an antiviral response.

Using COVID-19 as a topical example of an infectious disease with an urgent need for rapid vaccine development, we designed an antiviral SNA vaccine, encapsulating the receptor-binding domain (RBD) subunit into a liposome and decorating the core with a dense shell of CpG motif toll-like receptor 9 agonist oligonucleotides.

This vaccine induces memory B cell formation in human cells, and in vivo administration into mice generates robust binding and neutralizing antibody titers. Moreover, the SNA vaccine outperforms multiple simple mixtures incorporating clinically employed adjuvants.

Through modular changes to SNA structure, we uncover key relationships and proteomic insights between adjuvant and antigen ratios, concepts potentially translatable across vaccine platforms and disease models.

Importantly, when humanized ACE2 transgenic mice were challenged in vivo against a lethal live virus, only mice that received the SNA vaccine had a 100% survival rate and lungs that were clear of virus by plaque analysis.

This work underscores the potential for SNAs to be implemented as an easily adaptable and generalizable platform to fight infectious disease and demonstrates the importance of structure and presentation in the design of next-generation antiviral vaccines.

Bulle, B.G., et al (2022) **Public health implications of opening National Football League stadiums during the COVID-19 pandemic.** PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES USA 119:doi.org/10.1073/pnas.2114226119 (available as a free pdf)

Authors' abstract: *Using attendance data from the 2020 National Football League (NFL) regular season and local COVID-19 case counts, we estimate the public health impact of opening NFL stadiums to fans during the COVID-19 pandemic. Data are analyzed using robust synthetic control, a statistical method that is employed to obtain counterfactual estimates from observational data.*

Unlike previous studies, which do not consider confounding factors such as evolving policy landscapes in different states, the synthetic control methodology allows us to account for effects that are county specific and may be changing over time.

We find it is likely that opening stadiums had no impact on local COVID-19 case counts; this suggests that, for the 2020 NFL season, the benefits of providing a tightly controlled outdoor spectating environment, including masking and distancing requirements, counterbalanced the risks associated with opening.

These results are specific to the 2020 NFL season, and care should be taken in generalizing our conclusions. In particular,

1) these data reflect a period during which earlier strains of COVID-19 were dominant prior to the emergence of more-transmissive strains such as the Delta and Omicron variants, and

2) the data are restricted to outdoor environments; hence our results cannot be applied to small indoor spaces where transmission-restricting controls are essential.

Divorce rates are correlated with the economy. During hard times, couples often decide to tough it out. The pandemic effect is obvious on this chart, as is the crash in oil prices during the 1980s. Alberta produces 40% of North America's petroleum and its economy lives or dies on the price of oil.

SEEN IN THE LITERATURE

Astronomy.

Xiang, M., and H.W. Rix (2022) **A time-resolved picture of our Milky Way's early formation history.** NATURE 603:doi.org/10.1038/s41586-022-04496-5 (available as a free pdf)

Authors' abstract *The formation of our Milky Way can be split up qualitatively into different phases that resulted in its structurally different stellar populations: the halo and the disk components. Revealing a quantitative overall picture of our Galaxy's assembly requires a large sample of stars with very precise ages.*

Here we report an analysis of such a sample using subgiant stars. We find that the stellar age-metallicity distribution [Fe/H] splits into two almost disjoint parts, separated at age about 8 gigayears.

The younger part reflects a late phase of dynamically quiescent Galactic disk formation with manifest evidence for stellar radial orbit migration; the other part reflects the earlier phase, when the stellar halo and the old a-process-enhanced (thick) disk formed.

Our results indicate that the formation of the Galaxy's old (thick) disk started approximately 13 Gyr ago, only 0.8 Gyr after the Big Bang, and 2 Gyr earlier than the final assembly of the inner Galactic halo. Most of these stars formed around 11 Gyr ago, when the Gaia-Sausage-Enceladus satellite merged with our Galaxy.

Over the next 5 to 6 Gyr, the Galaxy experienced continuous chemical element enrichment, ultimately by a factor of 10, while the star-forming gas managed to stay well mixed.

Subgiant stars, which are stars sustained by hydrogen shell fusion, can be unique tracers for such purposes, as they exist in the brief stellar evolutionary phase that permits the most precise and direct age determination, because their luminosity is a direct measure of their age.

Moreover, the chemical element compositions determined from the spectra of their photosphere surfaces accurately reflect their birth material composition billions of years ago. This makes subgiants the best practical tracers of Galactic archaeology, even compared to main-sequence turn-off stars, whose surface abundances may be altered by atomic diffusion effects.

However, because of the short lifetime of their evolutionary phase, subgiant stars are relatively rare, and large surveys are essential to build a large sample of these objects with good spectra, which have not been available in the past.

With the recent data release (eDR3) of the Gaia mission and the recent data release (DR7) of the LAMOST spectroscopic survey, we identify a set of approximately 250,000 subgiant stars based on their position in the effective temperatures.

Welch, B., et al (2022) **A highly magnified star at redshift 6.2.** NATURE 603:815-818

Authors' abstract: *Galaxy clusters magnify background objects through strong gravitational lensing. Typical magnifications for lensed galaxies are factors of a few but can also be as high as tens or hundreds, stretching galaxies into giant arcs.*

Individual stars can attain even higher magnifications given fortuitous alignment with the lensing cluster. Recently, several individual stars at redshifts between approximately 1 and 1.5 have been discovered, magnified by factors of thousands, temporarily boosted by microlensing.

Here we report observations of a more distant and persistent magnified star at a redshift of 6.2 ± 0.1, 900 million years after the Big Bang. This star is magnified by a factor of thousands by the foreground galaxy cluster lens WHL0137–08 (redshift 0.566), as estimated by four independent lens models.

Unlike previous lensed stars, the magnification and observed brightness (AB magnitude, 27.2) have remained roughly constant over 3.5 years of imaging and follow-up. The delensed absolute UV magnitude, -10 ± 2, is consistent with a star of mass greater than 50 times the mass of the Sun.

Dong, R., et al (2022) **A likely flyby of binary protostar Z CMa caught in action.** NATURE ASTRONOMY 6:331-338

Authors' abstract: *Close encounters between young stellar objects in star-forming clusters are expected to markedly perturb circumstellar disks. Such events are witnessed in numerical simulations of star formation, but few direct observations of ongoing encounters have been made.*

Here we report sub-0.1?-resolution Atacama Large Millimeter/Submillimeter Array and Jansky Very Large Array observations towards the million-year-old binary protostar Z Canis Majoris in dust continuum and molecular line emission.

A point source ~4,700 AU [AU = astronomical unit, the distance from Earth to the Sun, used as a standard marker] *from the binary has been discovered at both millimetre and centimetre wavelengths. It is located along the extension of a ~2,000 AU streamer structure previously found in scattered light imaging, whose counterpart in dust and gas emission is also newly identified.*

Comparison with simulations shows signposts of a rare flyby event in action. Z CMa is a 'double burster', as both binary components undergo accretion outbursts, which may be facilitated by perturbations to the host disk by flybys.

Kaib, N.A. (2022) **Comet fading begins beyond Saturn.** SCIENCE ADVANCES 8:doi.org/10.1126/sciadv.abm9130 (available as a free pdf)

Author's abstract: *The discovery probability of long-period comets (LPCs) passing near the Sun is highest during their first passage and then declines, or fades, during subsequent return passages.*

Comet fading is largely attributed to devolatilization and fragmentation via thermal processing within 2 to 3 astronomical unit (au) of the Sun (1 au being the Earth-Sun distance).

Here, our numerical simulations show that comet-observing campaigns miss vast numbers of LPCs making returning passages through the Saturn region (near 10 au) because these comets fade during prior, even more distant passages exterior to Saturn and thus elude detection.

Consequently, comet properties substantially evolve at solar distances much larger than previously considered, and this offers new insights into the physical and dynamical properties of LPCs, both near and far from Earth.

Because of the gravitational barriers of Jupiter and Saturn, long-period comets just attain semimajor axes (a) in excess of ~20,000 astronomical unit (au) before perturbations from the Galactic tide and passing stars can torque their perihelia (q, or distance of closest approach to the Sun) from the outer solar system to near Earth.

During their first perihelion passage through the inner solar system, energy kicks from the gas giants will either eject these "new" LPCs on hyperbolic orbits or shrink their semimajor axes to much smaller values, allowing them to make one or more return passages near the Sun and Earth.

Owing to their shorter orbital periods and potential for multiple near-Sun passages, we might then expect "returning" LPCs to be much more commonly observed than new LPCs making their first passage through the inner solar system.

However, this is not the case; LPCs on new orbits (for which the formal classification criterion is a >104 au) comprise 45% of all found LPCs with well-determined orbits.

The reason this number is disproportionately large relative to dynamical expectations is because higher near-surface volatile content of new LPCs enhances cometary activity, maximizing their discovery probability.

In contrast, thermal processing during prior perihelion passages diminishes the brightness of returning LPCs as they devolatilize and fragment, or "fade," during each orbital revolution.

Wu, B., et al. (2022) **Landing site selection and characterization of Tianwen-1 (Zhurong rover) on Mars.** JOURNAL OF GEOPHYSICAL RESEARCH: PLANETS 127:doi.org/10.1029/2021JE007137 (available as a free pdf)

Authors' abstract: *The Chinese Mars rover Zhurong onboard the Tianwen-1 probe successfully landed on Mars in May 2021. Here, we report our efforts*

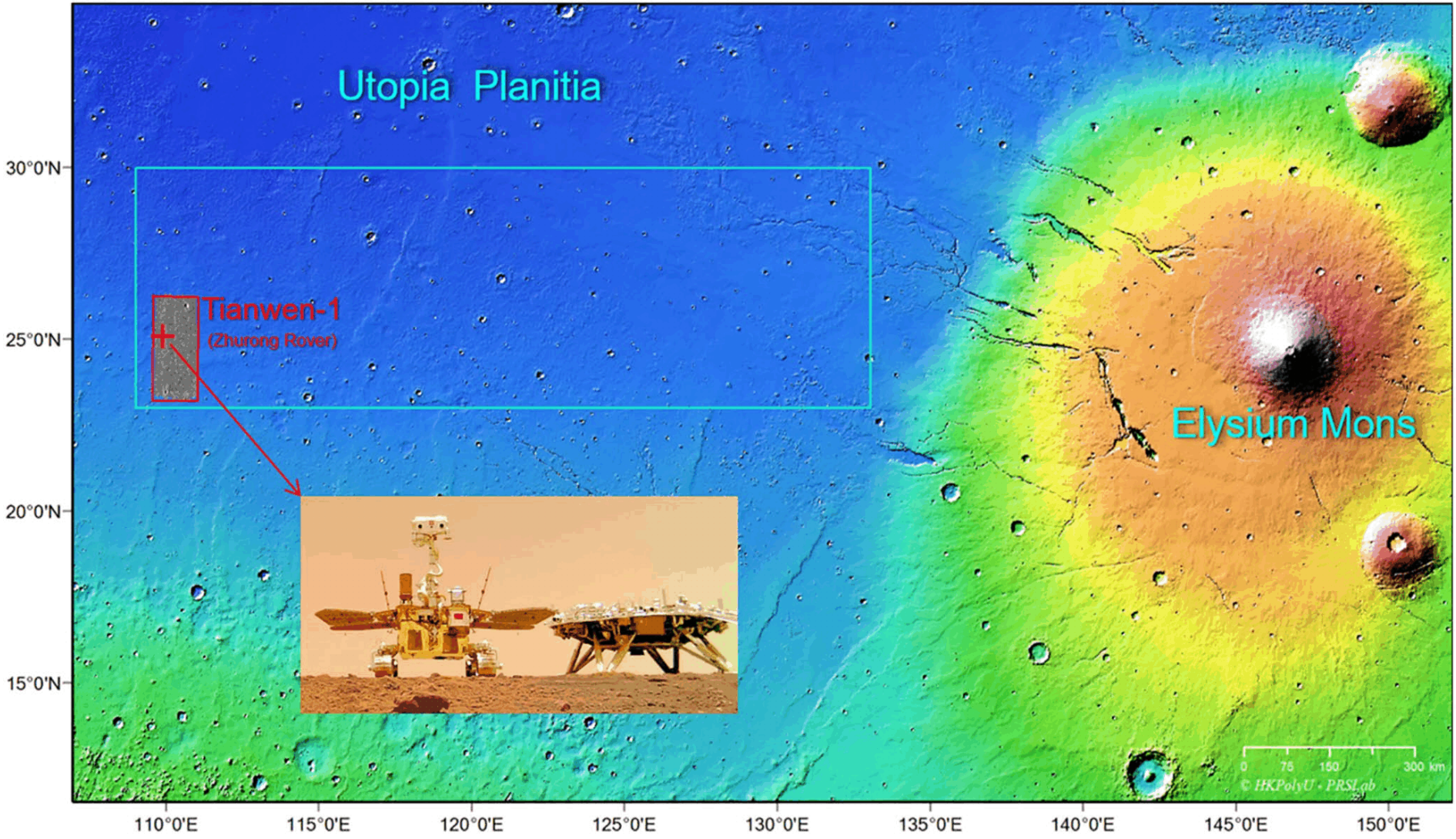
in selecting a landing site for Zhurong within a pre-identified landing region in southern Utopia Planitia.

Using the high-resolution images collected by a camera onboard the Tianwen-1 orbiter, the landing region was analyzed in detail in terms of surface slopes, crater densities and rock abundances, which enabled the optimized determination of a landing ellipse (56 × 22 km for the major and minor axes) with minimum hazards and assisted the successful landing of the Zhurong rover.

We also characterized the landing site and region after landing. Surface images captured by a camera onboard the Zhurong rover revealed a low rock abundance of approximately 4% at the landing site, similar to the rock measurements from orbital data before landing.

Images of the surface features and a hole excavated by the pulsed retrorockets beneath the lander suggested a shallow regolith structure with a surficial layer of dust and sand over a layer of duricrust, and brecciated/fragmented rocks and bedrocks beneath. Crater size-frequency distribution analysis indicated that the landing region might have experienced multiple episodes of resurfacing.

[Image is from this paper.]



Dinosaurs.

Padian, K. (2022) **Why tyrannosaurid forelimbs were so short: An integrative hypothesis.** ACTA PALAEONTOLOGICA POLONICA 67:doi.org/10.4202/app.00921.2021 (available as a free pdf)

Author's abstract: *The unusually shortened limbs of giant theropods, including abelisaurids, carcharodontosaurids, and derived tyrannosauroids such as Tyrannosaurus rex have long been an object of wonder, speculation, and even derision on the part of both paleontologists and the public.*

Two questions commonly asked are "Why did the forelimbs become so short?" and "What did the animals use such short forelimbs for, if for anything?" Because basal tyrannosauroids and their outgroups, as well as the outgroups of other giant theropods, had longer forelimbs, the foreshortening of these elements in derived taxa was secondary, and it ostensibly involved a shift in developmental timing of the forelimb elements.

Factors proposed to have influenced the evolutionary foreshortening include natural selection, sexual selection, energetic compensation, ontogenetic vagaries, and rudimentation due to disuse. Hypotheses of use have varied from a supporting anchor that allows the hindlimbs a purchase to stand from a reclining position to a pectoral version of pelvic claspers during intercourse to a sort of waving display during sexual or social selection.

None of these hypotheses explain selective regimes for reduction; at best, they might argue for maintenance of the limb, but in all cases a larger limb would have suited the function better.

It is likely that we have been looking the wrong way through the telescope, and that no specific function of the forelimbs was being selected; instead, another crucial adaptation of the animal profited from forelimb reduction.

Here I propose, in the context of phylogenetic, ontogenetic, taphonomic, and social lines of evidence, that the forelimbs became shorter in the context of behavioral ecology: the great skull and jaws provided all the necessary predatory mechanisms, and during group-feeding on carcasses, limb reduction was selected to keep the forelimbs out of the way of the jaws of large conspecific predators, avoiding injury, loss of blood, amputation, infection, and death.

Fabbri, M., et al (2022) **Subaqueous foraging among carnivorous dinosaurs.** NATURE 603:852-857

Authors' abstract: *Secondary aquatic adaptations evolved independently more than 30 times from terrestrial vertebrate ancestors. For decades, non-avian dinosaurs were believed to be an exception to this pattern. Only a few species have been hypothesized to be partly or predominantly aquatic.*

However, these hypotheses remain controversial, largely owing to the difficulty of identifying unambiguous anatomical adaptations for aquatic habits in extinct animals. Here we demonstrate that the relationship between bone density and aquatic ecologies across extant amniotes provides a reliable inference of aquatic habits in extinct species.

We use this approach to evaluate the distribution of aquatic adaptations among non-avian dinosaurs. We find strong support for aquatic habits in spinosaurids, associated with a marked increase in bone density, which precedes the evolution of more conspicuous anatomical modifications, a pattern also observed in other aquatic reptiles and mammals.

Spinosaurids are revealed to be aquatic specialists with surprising ecological disparity, including subaqueous foraging behaviour in Spinosaurus and Baryonyx, and non-diving habits in Suchomimus.

Adaptation to aquatic environments appeared in spinosaurids during the Early Cretaceous, following their divergence from other tetanuran theropods during the Early Jurassic.

Fiorelli, L.E., et al (2022) **First titanosaur dinosaur nesting site from the Late Cretaceous of Brazil.** SCIENTIFIC REPORTS 12:doi.org/10.1038/s41598-022-09125-9 (available as a free pdf)

Authors' abstract: *Titanosaurs were successful herbivorous dinosaurs widely distributed in all continents during the Cretaceous, with the major diversity in South America.*

The success of titanosaurs was probably due to several physiological and ecological factors, in addition to a series of morphological traits they achieved during their evolutionary history.

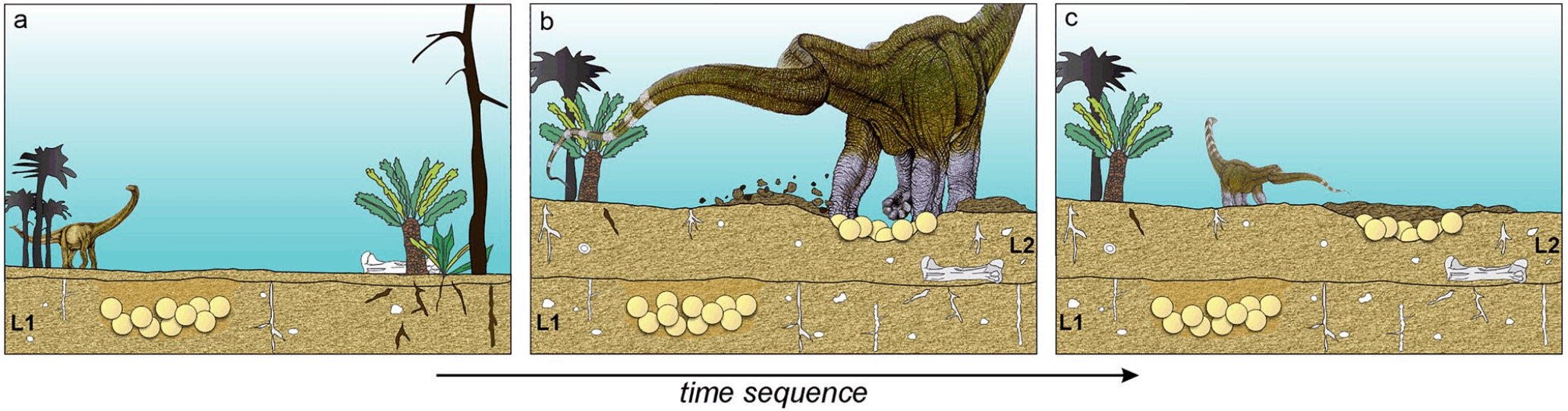
However, the generalist nesting behaviour using different palaeoenvironments and strategies was key to accomplish that success. Titanosaur nesting sites have been found extensively around the world, with notable records in Spain, France, Romania, India, and, especially, Argentina.

Here, we describe the first titanosaur nesting site from the Late Cretaceous of Brazil that represents the most boreal nesting site for South America. Several egg-clutches, partially preserved, isolated eggs and many eggshell fragments were discovered in an Inceptisol palaeosol profile of the mining Lafarge Quarry, at the Ponte Alta District (Uberaba Municipality, Minas Gerais State), corresponding to the Serra da Galga Formation (Bauru Group, Bauru Basin).

Although classical mechanical preparation and CT scans have not revealed embryonic remains in ovo, the eggs and eggshell features match those eggs containing titanosaurian embryos found worldwide. The morphology of the egg-clutches and observations of the sedimentary characteristics bolster the hypothesis that these sauropods were burrow-nester dinosaurs, as was already suggested for the group based on other nesting sites.

The egg-clutches distributed in two levels along the Lafarge outcrops, together with the geopalaeontological data collected, provide clear evidence for the first colonial nesting and breeding area of titanosaur dinosaurs in Brazil.

[Images are from this paper.]



The End Times.

Junium, C.K., et al (2022) **Massive perturbations to atmospheric sulfur in the aftermath of the Chicxulub impact.** PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES USA 119:doi.org/10.1073/pnas.2119194119

Authors' abstract: *Sulfur isotopes confirm a key role for atmospheric sulfur gases in climatic cooling, mass extinction, and the demise of dinosaurs and other global biota after the Chicxulub bolide impact at the Cretaceous-Paleogene boundary.*

The sulfur isotope anomalies are confined to beds containing ejecta and, in the immediately overlying sediments, are temporally unrelated to known episodes of volcanism that also bracket this event, further addressing the controversial role of the Deccan Traps in the extinction.

Sulfate aerosols have long been implicated as a primary forcing agent of climate change and mass extinction in the aftermath of the end-Cretaceous Chicxulub bolide impact.

However, uncertainty remains regarding the quantity, residence time, and degree to which impact-derived sulfur transited the stratosphere, where its climatic impact would have been maximized.

Here, we present evidence of mass-independent fractionation of sulfur isotopes (S-MIF) preserved in Chicxulub impact ejecta materials deposited in a marine environment in the Gulf Coastal Plain of North America. The mass anomalous sulfur is present in Cretaceous-Paleogene event deposits but also extends into Early Paleogene sediments.

These measurements cannot be explained by mass conservation effects or thermochemical sulfate reduction and therefore require sulfur-bearing gases in an atmosphere substantially different from the modern.

Our data cannot discriminate between potential source reaction(s) that produced the S-MIF, but stratospheric photolysis of SO2 derived from the target rock or carbonyl sulfide produced by biomass burning are the most parsimonious explanations.

Given that the ultimate fate of both of these gases is oxidation to sulfate aerosols, our data provide direct evidence for a long hypothesized primary role for sulfate aerosols in the postimpact winter and global mass extinction.

Bertrand, O.C., et al (2022) **Brawn before brains in placental mammals after the end-Cretaceous extinction.** SCIENCE 376:doi.org/10.1126/science.abl5584

Authors' abstract: *Mammals have the largest ratio of brain to body size (encephalization) among vertebrates. It has been believed that this relationship emerged early on in mammalian evolution, with enlarging brains leading the way into new and diverse forms.*

However, encephalization rates across mammals beginning in the Paleocene were found instead that body sizes were the first to increase, allowing for niche filling after the extinction of the dinosaurs.

It was only later, in the Eocene, that brain size began to increase, likely driven by a need for greater cognition in increasingly complex environments. This led to the highly encephalized brains of today, including those of humans.

Mammals are the most encephalized vertebrates, with the largest brains relative to body size. Placental mammals have particularly enlarged brains, with expanded neocortices for sensory integration, the origins of which are unclear.

We used computed tomography scans of newly discovered Paleocene fossils to show that contrary to the convention that mammal brains have steadily enlarged over time, early placentals initially decreased their relative brain sizes because body mass increased at a faster rate.

Later in the Eocene, multiple crown lineages independently acquired highly encephalized brains through marked growth in sensory regions. We argue that the placental radiation initially emphasized increases in body size as extinction survivors filled vacant niches. Brains eventually became larger as ecosystems saturated and competition intensified.

Zoology.

Migliore, L.J., et al (2022) **A new species of jewel beetle (Coleoptera, Buprestidae, Agrilus) triggers the production of the Brazilian red propolis.** SCIENCE OF NATURE 109:doi.org/10.1007/s00114-022-01785-x

[Propolis is a mixture of plant resins, waxes, and secretions produced by bees to seal open spaces or cracks in their hives. It has some antibiotic properties and is used in folklore medicine but there are no scientific studies proving it has real medicinal value. Nonetheless there is a steady market for it.]

Authors' abstract: *Red propolis is a substance produced by bees by mixing resins from plants with wax, oils, and other secretions to protect the hive against natural enemies. Dalbergia ecastaphyllum (L.) Taub. (Fabaceae) is the primary botanical source of the Brazilian red propolis, where bees Apis mellifera L. collect a reddish resin from the stems to produce propolis.*

This species occurs in coastal dune and mangrove ecosystems, where local beekeepers install their beehives for propolis production. The induction of propolis production was virtually unknown.

Previous reports and field evidence suggested that the reddish resin available in D. ecastaphyllum stems was not produced spontaneously but induced by the presence of a parasitic insect that feeds on the plant's stems.

Research in the apiaries of the beekeepers' association of Canavieiras, Bahia, Brazil, led to the capture of a jewel beetle of an unknown species of the genus Agrilus Curtis (Buprestidae). It was confirmed that this jewel beetle is a red propolis production inductor.

The adult and immature of this new species, Agrilus propolis Migliore, Curletti, and Casari sp. nov. are here described and illustrated. Behavioral information on the biology and chemical ecology confirms that the reddish resin of D. ecastaphyllum is directly related to the beetle attack and only occurs when Agrilus propolis sp. nov. adults emerge from the plant stem.

This information is very important for Brazilian propolis producers interested in expanding red propolis production, which can have favorable effects on the economy of mangrove communities, promoting income generation, creating new business opportunities, and helping to sustain local communities and families.

Zhou, J., et al (2022) **Outsourced hearing in an orb-weaving spider that uses its web as an auditory sensor.** PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES USA 119:doi.org/10.1073/pnas.2122789119 (available as a free pdf)

Authors' abstract: *Hearing is a fundamental sense of many animals, including all mammals, birds, some reptiles, amphibians, fish, and arthropods. The auditory organs of these animals are extremely diverse in anatomy after hundreds of millions of years of evolution, yet all are made up of cellular tissue and are morphologically part of the bodies of animals.*

Here, we show that hearing in the orb-weaving spider Larinioides sclopetarius is not constrained by the organism's body but is extended through outsourcing hearing to its extended phenotype, the proteinaceous, self-manufactured orb web.

We find that the wispy, wheel-shaped orb web acts as a hyperacute acoustic antenna to capture the sound-induced air particle movements that approach the maximum physical efficiency better than the acoustic responsivity of all previously known eardrums.

By sensing the motion of web threads, the spider remotely detects and localizes the source of an incoming airborne acoustic wave, such as those emitted by approaching prey or predators.

By outsourcing its acoustic sensors to its web, the spider is released from body size constraints and permits the araneid spider to increase its sound-sensitive surface area enormously, up to 10,000 times greater than the spider itself. The spider also enables the flexibility to functionally adjust and regularly regenerate its external "eardrum" according to its needs.

Schluessel, V., et al (2022) **Cichlids and stingrays can add and subtract 'one' in the number space from one to five.** SCIENTIFIC REPORTS 12:doi.org/10.1038/s41598-022-07552-2 (available as a free pdf)

Authors' abstract: *The numerical understanding of cichlids and stingrays was examined regarding addition and subtraction abilities within the number space of one to five. Experiments were conducted as two alternative forced-choice experiments, using a delayed matching to sample technique.*

On each trial, fish had to perform either an addition or subtraction, based on the presentation of two-dimensional objects in two distinct colors, with the color signaling a particular arithmetic process. Six cichlids and four stingrays successfully completed training and recognized specific colors as symbols for addition and subtraction.

Cichlids needed more sessions than stingrays to reach the learning criterion. Transfer tests showed that learning was independent of straightforward symbol memorization. Individuals did not just learn to pick the highest or lowest number presented based on the respective color; instead, learning was specific to adding or subtracting 'one'.

Although group results were significant for both species in all tests, individual results varied. Addition was learned more easily than subtraction by both species. While cichlids learned faster than stingrays, and more cichlids than stingrays learned the task, individual performance of stingrays exceeded that of cichlids.

Previous studies have provided ample evidence that fish have numerical abilities on par with those of other vertebrate and invertebrate species tested, a result that is further supported by the findings of the current study.

Capano, J.G., et al (2022) **Modular lung ventilation in Boa constrictor.** JOURNAL OF EXPERIMENTAL BIOLOGY 225:doi.org/10.1242/jeb.243119

Authors' abstract: *The evolution of constriction and of large prey ingestion within snakes are key innovations that may explain the remarkable diversity, distribution and ecological scope of this clade, relative to other elongate vertebrates.*

However, these behaviors may have simultaneously hindered lung ventilation such that early snakes may have had to circumvent these mechanical constraints before those behaviors could evolve.

Here, we demonstrate that Boa constrictor can modulate which specific segments of ribs are used to ventilate the lung in response to physically hindered body wall motions. We show that the modular actuation of specific segments of ribs likely results from active recruitment or quiescence of derived accessory musculature.

We hypothesize that constriction and large prey ingestion were unlikely to have evolved without modular lung ventilation because of their interference with lung ventilation, high metabolic demands and reliance on sustained lung convection.

This study provides a new perspective on snake evolution and suggests that modular lung ventilation evolved during or prior to constriction and large prey ingestion, facilitating snakes' remarkable radiation relative to other elongate vertebrates.

Koyasu, H., et al (2022) **Mutual synchronization of eyeblinks between dogs/cats and humans.** CURRENT ZOOLOGY 68:doi.org/10.1093/cz/zoab045 (available as a free pdf)

Authors' extracts: *In humans Homo sapiens, eyeblinks play an important role in communication. Blinks are synchronized between two individuals during conversation, with shared breaks between contexts, suggesting that blink synchronization can facilitate the sharing of a rhythm during communication between two individuals.*

In the case of individuals with autism spectrum disorder, whose major symptom is impaired communication, there is no blink synchronization.

It has also been suggested that dogs Canis familiaris and cats Felis silvestris catus use blinks as communication signals with humans. For example, ... the approaching behavior of cats increased when the human observer blinked.

In summary, although the time lag varied, mutual synchronization of blinks existed between humans and dogs/cats; with humans blinking after dogs/cats blinked, and dogs/cats blinking after humans did. In addition, there was no correlation between human blink rates and dog/cat blink rates.

If the dogs and cats increased the rates of blinking depending on the human blink, there would be a positive correlation between human blink rates and dog/cat blink rates.

This indicated that blink synchronization in this study was not caused by increased blink rates, but by adjustment of the timing of spontaneous blinks to the timing of the partner.

Speirs: This brought back memories of my childhood on the ranch when us kids would have staring contests with the barn cats, trying to see who would blink first. We didn't have video games in those days to amuse us, so we made our own fun. Those were the days.

Yu, C., et al (2022) **Do bovids evolve hindquarter markings for anti-predation?** CURRENT ZOOLOGY 68:doi.org/10.1093/cz/zoab048 (available as a free pdf)

Authors' abstract: *Conspicuous coloration in animals serves many functions such as anti-predation. Anti-predation strategies include motion dazzle and flash behavior. Motion dazzle markings can reduce the probability of being preyed on because the predators misjudge their movement.*

In flash behavior, prey demonstrate conspicuous cue while fleeing; the predators follow them; however, the prey hide their markings and the predators assume that the prey has vanished.

To investigate whether bovids use conspicuous hindquarter markings as an anti-predatory behavior, we undertook phylogenetically controlled analyses to explore under what physiological characteristics and environmental factors bovids might have this color pattern.

The results suggested that rump patches and tail markings were more prevalent in bovids living in larger-sized groups, which supports the hypothesis of intraspecific communication. Moreover, we observed the occurrence of conspicuous white hindquarter markings in bovids having smaller body size and living in larger groups, suggesting a motion dazzle function.

However, the feature of facultative exposing color patterns (flash markings) was not associated with body size, which was inconsistent with predictions and implied that bovids may not adopt this as an anti-predator strategy. It was concluded that species in bovids with conspicuous white hindquarter markings adopt motion dazzle as an anti-predation strategy while fleeing and escaping from being prey on.

We constructed a list of the 126 bovids excluding extinct and domesticated species to score whether conspicuous rumps, tail markings, and tail tip markings exist in the species of bovids.

Speirs: The study animals were wild species of bovids, not domestic cattle. Our ranch was mainly Charolais, a pure white or cream coloured breed. We had some Simmentals (beige patches on white) and the occasional Hereford cow (reddish brown patches on white) if Dad saw a bargain at the auction mart. I don't recall coyotes being a problem on our ranch, since deer were safer for them to hunt.

Environment.

Curras, M.R., et al (2022) **Carnivore niche partitioning in a human landscape.** AMERICAN NATURALIST 199:496-509

Authors' abstract: *To minimize competitive overlap, carnivores modify one of their critical niche axes: space, time, or resources. However, we currently lack rules for how carnivore communities operate in human dominated landscapes.*

We simultaneously quantified overlap in the critical niche axes of a simple carnivore community, an apex carnivore (Puma concolor), a dominant mesocarnivore (Lycalopex culpaeus), and a subordinate small carnivore (Lycalopex griseus), in a human landscape featuring pastoralists and semidomestic carnivores (i.e., dogs, Canis familiaris).

We found that dominant species had strong negative effects on the space use of subordinate ones, which ultimately created space for subordinate small carnivores. Humans and dogs were strictly diurnal, whereas the native carnivore community was nocturnal and exhibited high temporal overlap.

Dietary overlap was high among the native carnivores, but dogs were trophically decoupled, largely because of human food subsidies. Our results show that in landscapes with evident human presence, temporal and dietary partitioning among native carnivores can be limited, leaving space as the most important axis to be partitioned among carnivores.

We believe that these findings, the first to simultaneously assess all three critical niche axes among competing carnivores and humans and their associated species (i.e., domesticated carnivores), are transferable to other carnivore communities in human-modified landscapes.

Shipley, J.R., et al (2022) **Climate change shifts the timing of nutritional flux from aquatic insects.** CURRENT BIOLOGY 32:doi.org/10.1016/j.cub.2022.01.057

Authors' abstract: *Climate change can decouple resource supply from consumer demand, with the potential to create phenological mismatches driving negative consequences on fitness. However, the underlying ecological mechanisms of phenological mismatches between consumers and their resources have not been fully explored.*

Here, we use long-term records of aquatic and terrestrial insect biomass and egg-hatching times of several co-occurring insectivorous species to investigate temporal mismatches between the availability of and demand for nutrients that are essential for offspring development.

We found that insects with aquatic larvae reach peak biomass earlier in the season than those with terrestrial larvae and that the relative availability of omega-3 long-chain polyunsaturated fatty acids (n-3 LCPUFAs) to consumers is almost entirely dependent on the phenology of aquatic insect emergence.

This is due to the 4- to 34-fold greater n-3 LCPUFA concentration difference in insects emerging from aquatic as opposed to terrestrial habitats.

From a long-sampled site (25 years) undergoing minimal land use conversion, we found that both aquatic and terrestrial insect phenologies have advanced substantially faster than those of insectivorous birds, shifting the timing of peak availability of n-3 LCPUFAs for birds during reproduction.

For species that require n-3 LCPUFAs directly from diet, highly nutritious aquatic insects cannot simply be replaced by terrestrial insects, creating nutritional phenological mismatches.

Zolkos, S., et al (2022) **Multidecadal declines in particulate mercury and sediment export from Russian rivers in the pan-Arctic basin**. PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES USA 119:doi.org/10.1073/pnas.2119857119

Authors' abstract: *Russian rivers are the predominant source of riverine mercury to the Arctic Ocean, where methylmercury biomagnifies to high levels in food webs. Pollution controls are thought to have decreased late-20th-century mercury loading to Arctic watersheds, but there are no published longterm observations on mercury in Russian rivers.*

Here, we present a unique hydrochemistry dataset to determine trends in Russian river particulate mercury concentrations and fluxes in recent decades.

Using hydrologic and mercury deposition modeling together with multivariate time series analysis, we determine that 70 to 90% declines in particulate mercury fluxes were driven by pollution reductions and sedimentation in reservoirs. Results suggest that Russian rivers likely dominated over all other sources of mercury to the Arctic Ocean until recently.

High levels of methylmercury accumulation in marine biota are a concern throughout the Arctic, where coastal ocean ecosystems received large riverine inputs of mercury (Hg) (40 $Mg \cdot y^{-1}$) and sediment (20 $Tg \cdot y^{-1}$) during the last decade, primarily from major Russian rivers.

Hg concentrations in fish harvested from these rivers have declined since the late 20th century, but no temporal data on riverine Hg, which is often strongly associated with suspended sediments, were previously available. Here, we investigate temporal trends in Russian river particulate Hg (PHg) and total suspended solids (TSS) to better understand recent changes in the Arctic Hg cycle and its potential future trajectories.

We used 1,300 measurements of Hg in TSS together with discharge observations made by Russian hydrochemistry and hydrology monitoring programs to examine changes in PHg and TSS concentrations and fluxes in eight major Russian rivers between ca. 1975 and 2010.

Due to decreases in both PHg concentrations (micrograms per gram) and TSS loads, annual PHg export declined from 47 to 7 $Mg \cdot y^{-1}$ overall and up to 92% for individual rivers.

Modeling of atmospheric Hg deposition together with published inventories on reservoir establishment and industrial Hg release point to decreased pollution and sedimentation within reservoirs as predominant drivers of declining PHg export.

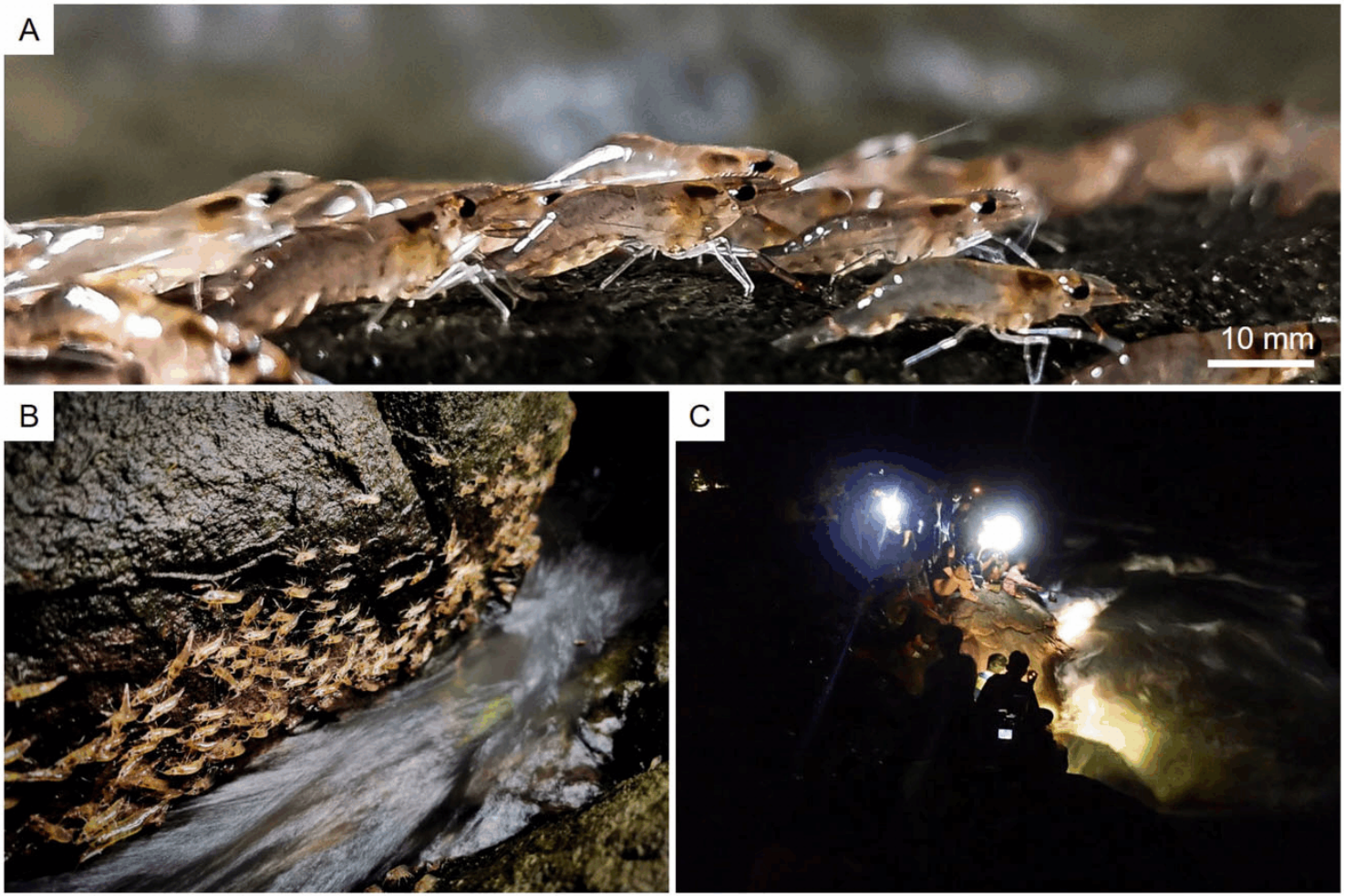
Hongjamrassilp, W., and D.T. Blumstein (2022) **Humans influence shrimp movement: a conservation behavior case study with "Shrimp Watching" ecotourism.** CURRENT ZOOLOGY 68:doi.org/10.1093/cz/zoab017 (available as a free pdf)

Authors' abstract: *In Ubon Ratchathani, Thailand, thousands of tourists annually come to see a unique mass migration of shrimps on land (referred to as "shrimp parading"). Preliminary work suggests that this tourism has negatively impacted the shrimps.*

To reduce tourism-related impacts we studied: 1) the decisions shrimps make when parading and 2) how shrimps respond to different light intensities and colors. We created an artificial stream and tested the conditions that influence parading by experimentally varying the presence of light and systematically manipulating water velocity (10, 60, and 100 cm/s). Additionally, we conducted an in situ experiment to study how shrimps respond to tourists' lights under three intensities (50,400, and 9,000 lux) and five colors (white, blue, green, orange, and red). We found most shrimps prefer to leave the river when it is dark and there is low water flow.

Shrimps responded the least to red (kmax¼630 nm) and orange (kmax¼625 nm) light at 50 lux. These findings were used to develop a management plan by creating three different tourist zones, which maximize tourist needs and minimize the anthropogenic impacts on the shrimps.

[Images are from this paper, showing the shrimp migration and tourists watching by flashlight.]



Lipson, M., et al (2022) **Ancient DNA and deep population structure in sub-Saharan African foragers.** NATURE 603:doi.org/10.1038/s41586-022-04430-9 (available as a free pdf)

Authors' abstract: *Multiple lines of genetic and archaeological evidence suggest that there were major demographic changes in the terminal Late Pleistocene epoch and early Holocene epoch of sub-Saharan Africa. Inferences about this period are challenging to make because demographic shifts in the past 5,000 years have obscured the structures of more ancient populations.*

Here we present genome-wide ancient DNA data for six individuals from eastern and south-central Africa spanning the past approximately 18,000 years (doubling the time depth of sub-Saharan African ancient DNA), increase the data quality for 15 previously published ancient individuals and analyse these alongside data from 13 other published ancient individuals.

The ancestry of the individuals in our study area can be modelled as a geographically structured mixture of three highly divergent source populations, probably reflecting Pleistocene interactions around 80 to 20 thousand years ago, including deeply diverged eastern and southern African lineages, plus a previously unappreciated ubiquitous distribution of ancestry that occurs in highest proportion today in central African rainforest hunter-gatherers.

Once established, this structure remained highly stable, with limited long-range gene flow. These results provide a new line of genetic evidence in support of hypotheses that have emerged from archaeological analyses but remain contested, suggesting increasing regionalization at the end of the Pleistocene epoch.

By around 50 kiloyears ago, technological innovations and symbolic behaviours (such as ornaments, bone tools, pigments and microliths) that were present earlier in the Middle Stone Age become more consistently expressed across sub-Saharan Africa.

Archaeologists refer to this as the transition to the Later Stone Age. By around 20 ka, these material culture components were nearly ubiquitous, but regionally diverse. One explanation is that people began living in larger and/or more connected groups, with variations in population size and connectivity driving differences in material culture across space and time.

Given the morphological variation among Late Pleistocene skeletons, interactions may have involved deeply structured populations, consistent with some population history models based on genetics. The advent of genome-wide ancient DNA (aDNA) technology holds promise for better understanding major changes in material culture and hypothesized demographic shifts among ancient African foragers.

Compared to elsewhere, especially Europe, there has been little genomic investigation of ancient African peoples. Previously available aDNA sequences from sub-Saharan African foraging contexts, despite being relatively recent (younger than about 9 ka), provide evidence of ancient genetic structure that has since been disrupted by demographic transformations (such as the spread of food production, as well as colonialism, imperialism, enslavement and modern sociopolitical reorganization).

The structure of ancient populations cannot be robustly reconstructed based solely on genetic data from present-day people.

Crassard, R., et al (2022) **The use of desert kites as hunting mega-traps: functional evidence and potential impacts on socioeconomic and ecological spheres.** JOURNAL OF WORLD PREHISTORY 35:1-44

[Desert kites are chest-high dry stone walls built by ancient humans to funnel herds of wild game into killing grounds. They were never noticed from the ground as such since everyone assumed they were just geological features. When pilots began flying over Arabia in the 1920s, the patterns of the walls were immediately recognized as pounds, usually in the shape of a kite. There is a good article on them at Wikipedia if you want to know more.]

Authors' abstract: *For almost a century there has been debate on the functional interpretation of desert kites. These archaeological structures have been interpreted as constructions for animal hunting or domestication purposes, sometimes for both, but with little conclusive evidence.*

Here, we present new evidence from a large-scale research programme. This unprecedented programme of archaeological excavations and geomatics explorations shows the unequivocal and probably exclusive function of kites as

hunting traps. Considering their gigantic size, as well as the significant energy and organization required to build them, these types of traps are called mega-traps.

Our research is based on five different field studies in Armenia, Jordan, Kazakhstan and Saudi Arabia, as well as on satellite imagery interpretation across the global distribution area of kites throughout the Middle East, the Caucasus and Central Asia.

This hunting interpretation raises questions about the transformation of the landscape by human groups and the consequent anthropogenic impacts on local ecological equilibrium during different periods of the Holocene. Finally, the role of trapping in the hunting strategies of prehistoric, protohistoric and historic human groups is addressed.

Speirs: This abstract caught my eye because there are hundreds of similar structures in Alberta and Saskatchewan, only we call them buffalo pounds. Ancient aboriginal tribes, before the horse was introduced by the Spanish conquistadors, maintained funnel walls that narrowed to the top of a cliff.

The tribes herded the bison around the back slopes to the traps, then stampeded them over the cliff. The dead and dying bison were then cut up for dried meat. Once the horse was introduced, it was easier to run down bison and the pounds were abandoned.

The biggest buffalo pound in Alberta is Head-Smashed-In, a world-class park and museum today, two hours drive south of Calgary. The photo is one I took in 2013 when I visited Head-Smashed-In and shows where the bison were stampeded off the cliffs.

Clark, J., et al (2022) **The age of the opening of the Ice-Free Corridor and implications for the peopling of the Americas.** PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES USA 119:doi.org/10.1073/pnas.2118558119

Authors' abstract: *The Ice-Free Corridor (IFC) has long played a key role in hypotheses about the peopling of the Americas. Earlier assessments of its age suggested that the IFC was available for a Clovis-first migration, but subsequent developments now suggest a pre-Clovis occupation of the Americas that occurred before the opening of the IFC, thus supporting a Pacific coastal migration route instead.*

However, large uncertainties in existing ages from the IFC cannot preclude its availability as a route for the first migrations. Resolving this debate over migration route is important for addressing the questions of when and how the first Americans arrived. We report cosmogenic nuclide exposure ages that show that the final opening of the IFC occurred well after pre-Clovis occupation.

The Clovis-first model for the peopling of the Americas by ~13.4 kiloyears ago has long invoked the Ice-Free Corridor between the retreating margins of the Cordilleran and Laurentide ice sheets as the migration route from Alaska and the Yukon down to the Great Plains.

Evidence from archaeology and ancient genomics, however, now suggests that pre-Clovis migrations occurred by at least ~15.5 to 16.0 ka or earlier than most recent assessments of the age of IFC opening at ~14 to 15 ka, lending support to the use of a Pacific coast migration route instead.

Uncertainties in ages from the IFC used in these assessments, however, allow for an earlier IFC opening which would be consistent with the availability of the IFC as a migration route by ~15.5 to 16.0 ka.

Here, we use 64 cosmogenic (^{10}Be) exposure ages to closely date the age of the full opening of the IFC at 13.8 ± 0.5 ka. Our results thus clearly establish that the IFC was not available for the first peopling of the Americas after the Last Glacial Maximum, whereas extensive geochronological data from the Pacific coast support its earlier availability as a coastal migration route.

Modern Humans.

Zhao, B., et al (2022) **Prolonged drying trend coincident with the demise of Norse settlement in southern Greenland.** SCIENCE ADVANCES 8:doi.org/10.1126/sciadv.abm4346 (available as a free pdf)

Authors' abstract: *Declining temperature has been thought to explain the abandonment of Norse settlements, southern Greenland, in the early 15th century, although limited paleoclimate evidence is available from the inner settlement region itself.*

Here, we reconstruct the temperature and hydroclimate history from lake sediments at a site adjacent to a former Norse farm. We find no substantial temperature changes during the settlement period but rather that the region experienced a persistent drying trend, which peaked in the 16th century.

Drier climate would have notably reduced grass production, which was essential for livestock overwintering, and this drying trend is concurrent with a Norse diet shift.

We conclude that increasingly dry conditions played a more important role in undermining the viability of the Eastern Settlement than minor temperature changes.

Savage, P.E., et al (2022) **Sequence alignment of folk song melodies reveals cross-cultural regularities of musical evolution.** CURRENT BIOLOGY 32:doi.org/10.1016/j.cub.2022.01.039 (available as a free pdf)

Authors' abstract: *Culture evolves, but the existence of cross-culturally general regularities of cultural evolution is debated. As a diverse but universal cultural phenomenon, music provides a novel domain to test for the existence of such regularities.*

Folk song melodies can be thought of as culturally transmitted sequences of notes that change over time under the influence of cognitive and acoustic/physical constraints.

Modeling melodies as evolving sequences constructed from an ''alphabet'' of 12 scale degrees allows us to quantitatively test for the presence of

cross-cultural regularities using a sample of 10,062 melodies from musically divergent Japanese and English (British/American) folk song traditions.

Our analysis identifies 328 pairs of highly related melodies, finding that note changes are more likely when they have smaller impacts on a song's melody.

Specifically, notes with stronger rhythmic functions are less likely to change, and note substitutions are most likely between neighboring notes. We also find that note insertions/deletions (''indels'') are more common than note substitutions, unlike genetic evolution where the reverse is true.

Our results are consistent across English and Japanese samples despite major differences in their scales and tonal systems. These findings demonstrate that even a creative art form such as music is subject to evolutionary constraints analogous to those governing the evolution of genes, languages, and other domains of culture.

Pancrazi, R., et al (2022) **How distorted food prices discourage a healthy diet.** SCIENCE ADVANCES 8:doi.org/10.1126/sciadv.abi8807 (available as a free pdf)

Authors' abstract: *Public policy making for the prevention of diet-related disease is impeded by a lack of evidence on whether poor diets are a matter of personal responsibility or a choice set narrowed by environmental conditions. An important element of the environment is market imperfections in food retail that distort prices.*

We use a rich dataset on quantities and prices of food purchases in the United States and a structural model of dietary choices to examine variation in diets across households that have different levels of income and live in different neighborhoods.

We find that price distortions account for one-third of the gap between the recommended and actual intake of fruits and vegetables. A feasible fiscal intervention that remedies these distortions makes all consumers better off.

Speirs: Starch is cheap. Fresh fruits and vegetables are not. That is why obesity is widespread.

Technology.

Shimron, E., et al (2022) **Implicit data crimes: Machine learning bias arising from misuse of public data.** PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES USA 119:doi.org/10.1073/pnas.2117203119 (available as a free pdf)

Authors' abstract: *Although open databases are an important resource in the current deep learning (DL) era, they are sometimes used "off label". Data published for one task are used to train algorithms for a different one.*

This work aims to highlight that this common practice may lead to biased, overly optimistic results. We demonstrate this phenomenon for inverse problem solvers and show how their biased performance stems from hidden data-processing pipelines.

We describe two processing pipelines typical of open-access databases and study their effects on three well-established algorithms developed for MRI reconstruction: compressed sensing, dictionary learning, and DL.

Our results demonstrate that all these algorithms yield systematically biased results when they are naively trained on seemingly appropriate data. The normalized rms error improves consistently with the extent of data processing, showing an artificial improvement of 25 to 48% in some cases.

Because this phenomenon is not widely known, biased results sometimes are published as state of the art; we refer to that as implicit "data crimes." This work hence aims to raise awareness regarding naive off-label usage of big data and reveal the vulnerability of modern inverse problem solvers to the resulting bias.

Nadini, M., et al (2022) **Emergence and structure of decentralised trade networks around dark web marketplaces.** SCIENTIFIC REPORTS 12:doi.org/10.1038/s41598-022-07492-x (available as a free pdf)

Authors' abstract: *Dark web marketplaces (DWMs) are online platforms that facilitate illicit trade among millions of users generating billions of dollars in annual revenue.*

Recently, two interview-based studies have suggested that DWMs may also promote the emergence of direct user-to-user (U2U) trading relationships.

Here, we carefully investigate and quantify the scale of U2U trading around DWMs by analysing 31 million Bitcoin transactions among users of 40 DWMs between June 2011 and Jan 2021. We find that half of the DWM users trade through U2U pairs generating a total trading volume greater than DWMs themselves.

We then show that hundreds of thousands of DWM users form stable trading pairs that are persistent over time. Users in such stable pairs turn out to be the ones with the largest trading volume on DWMs.

Then, we show that new U2U pairs often form while both users are active on the same DWM, suggesting the marketplace may serve as a catalyst for new direct trading relationships.

Finally, we reveal that stable U2U pairs tend to survive DWM closures and that they were not affected by COVID-19, indicating that their trading activity is resilient to external shocks.

Our work unveils sophisticated patterns of trade emerging in the dark web and highlights the importance of investigating user behaviour beyond the immediate buyer-seller network on a single marketplace.

Ze, Q., et al (2022) **Soft robotic origami crawler**. SCIENCE ADVANCES 8:doi.org/10.1126/sciadv.abm7834 (available as a free pdf)

Authors' abstract: *Biomimetic soft robotic crawlers have attracted extensive attention in various engineering fields, owing to their adaptivity to different terrains. Earthworm-like crawlers realize locomotion through in-plane contraction, while inchworm-like crawlers exhibit out-of-plane bending-based motions.*

Although in-plane contraction crawlers demonstrate effective motion in confined spaces, miniaturization is challenging because of limited actuation methods and complex structures. Here, we report a magnetically actuated small-scale origami crawler with inplane contraction.

The contraction mechanism is achieved through a four-unit Kresling origami assembly consisting of two Kresling dipoles with two-level symmetry. Magnetic actuation is used to provide appropriate torque distribution, enabling a small-scale and untethered robot with both crawling and steering capabilities.

The crawler can overcome large resistances from severely confined spaces by its anisotropic and magnetically tunable structural stiffness. The multifunctionality of the crawler is explored by using the internal cavity of the crawler for drug storage and release. The magnetic origami crawler can potentially serve as a minimally invasive device for biomedical applications.

[Image is from this paper.]