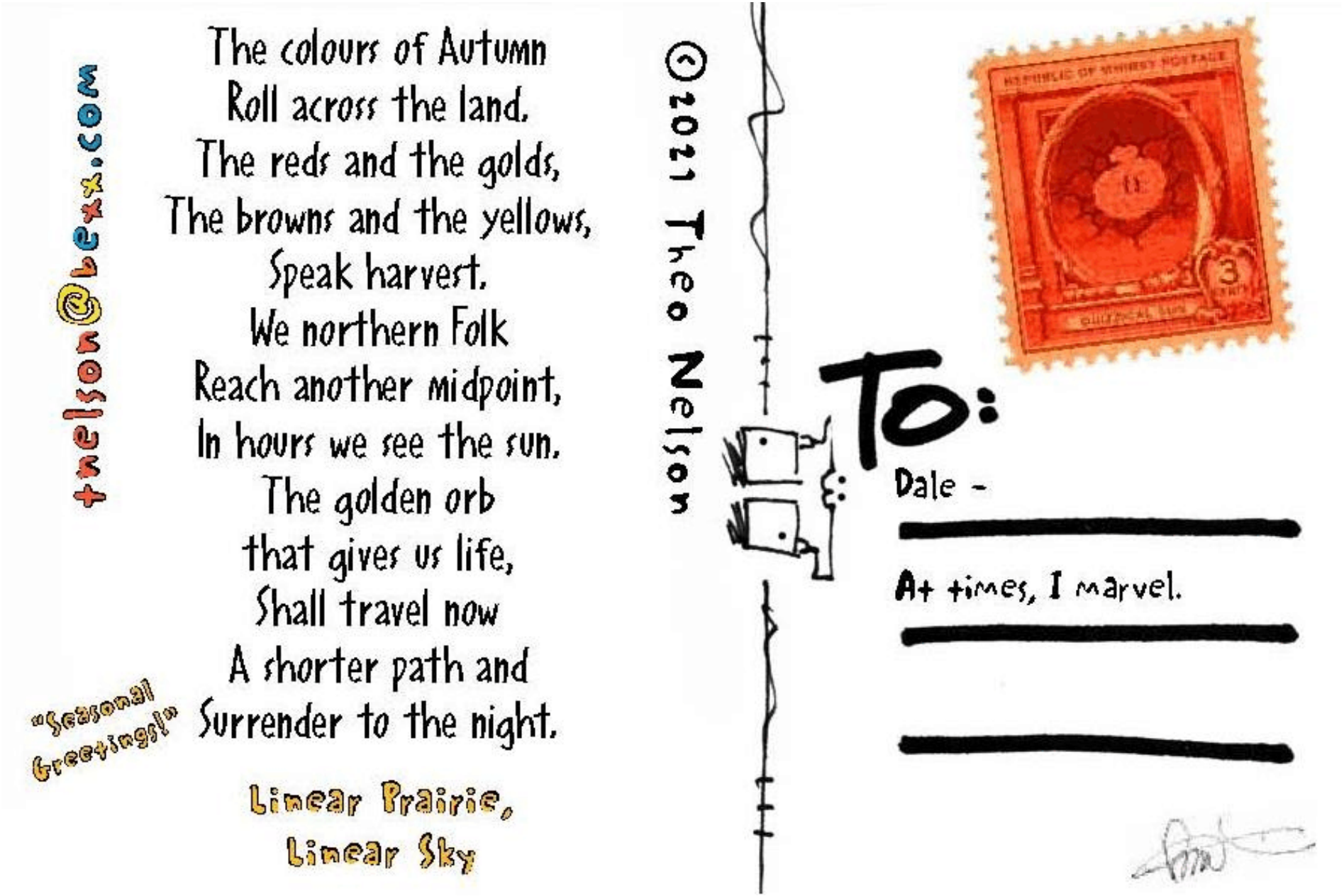
OPUNTIA 510

Thanksgiving 2021

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.

ABOUT THE COVER

I dispatched the last issue of OPUNTIA on September 21, forgetting that Theo Nelson, a fellow Calgarian, would be sending me his quarterly mail art postcard marking the astronomical turn of the seasons. I can only plead distraction by the federal election the day before. By way of amends, the autumnal equinox card is shown on the cover and the message side herewith.

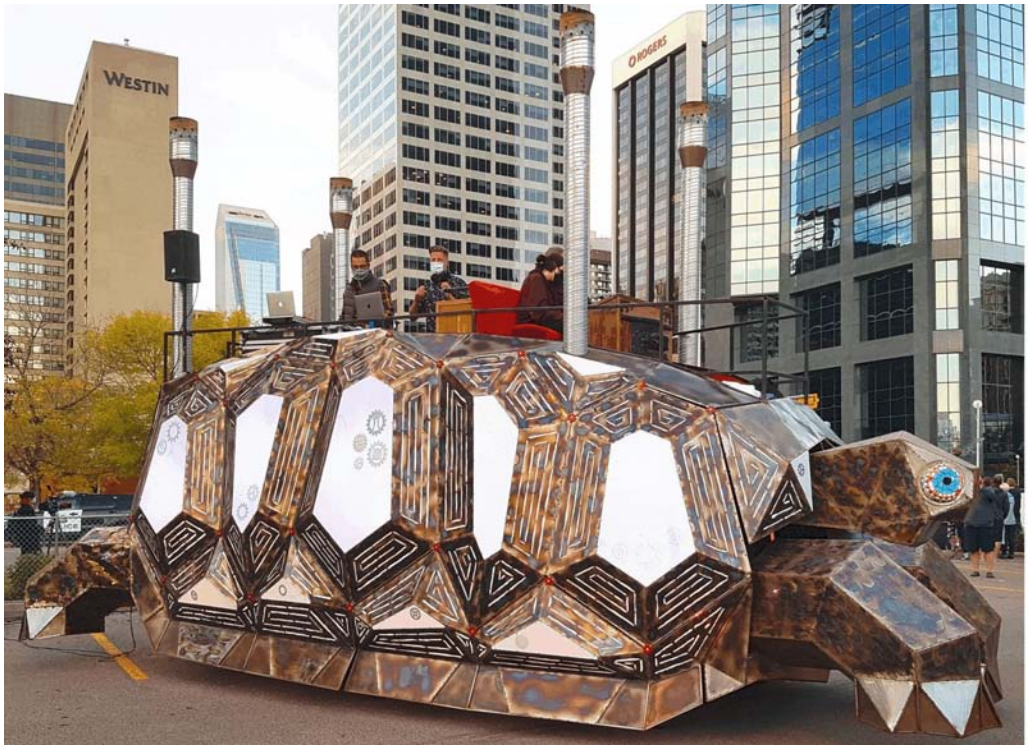


BEAKERHEAD 2021
photos by Dale Speirs

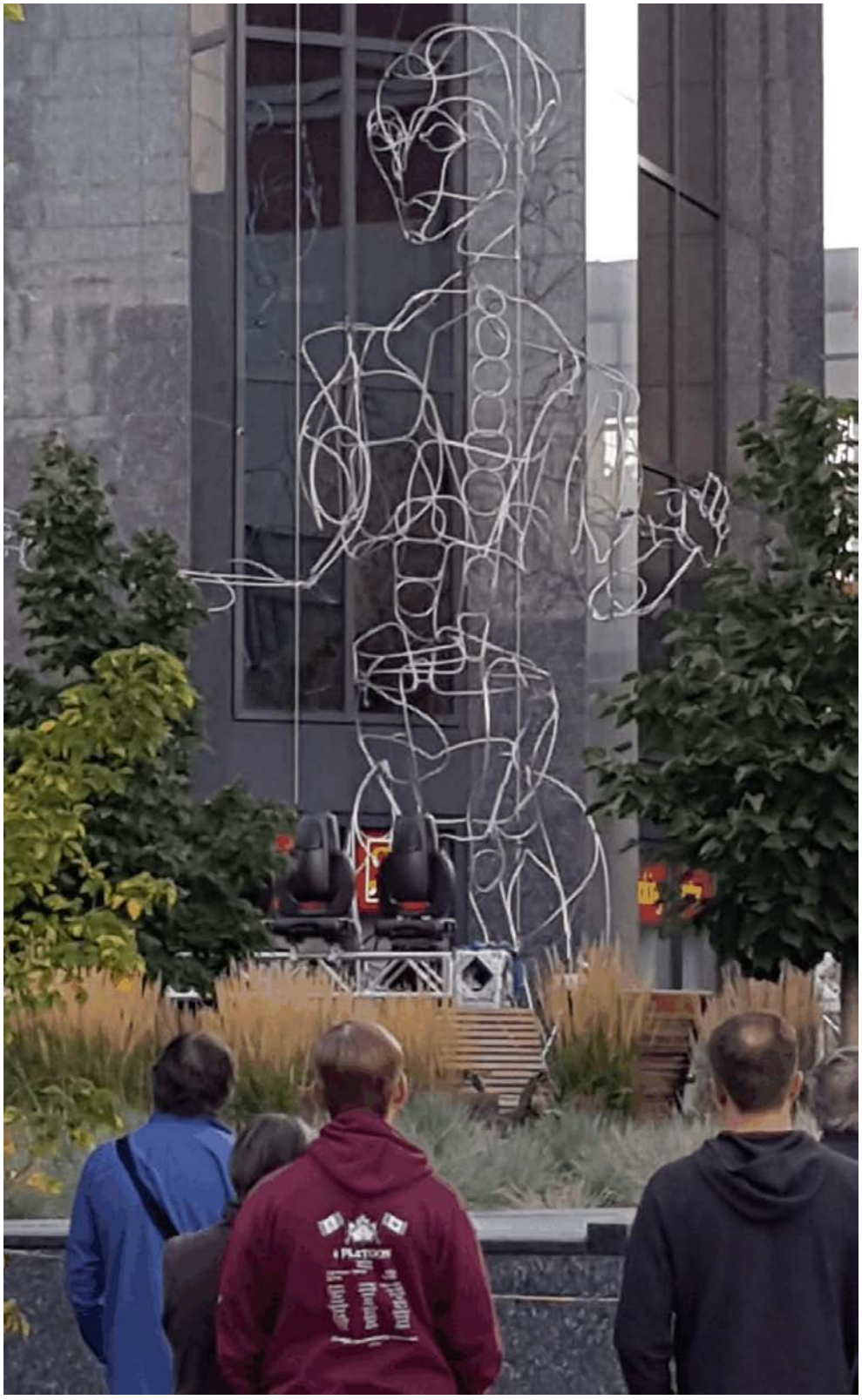
[2015 to 2019 reports appeared in OPUNTIAs #322, 353, 391, 424, and 455. The event was cancelled in 2020.]

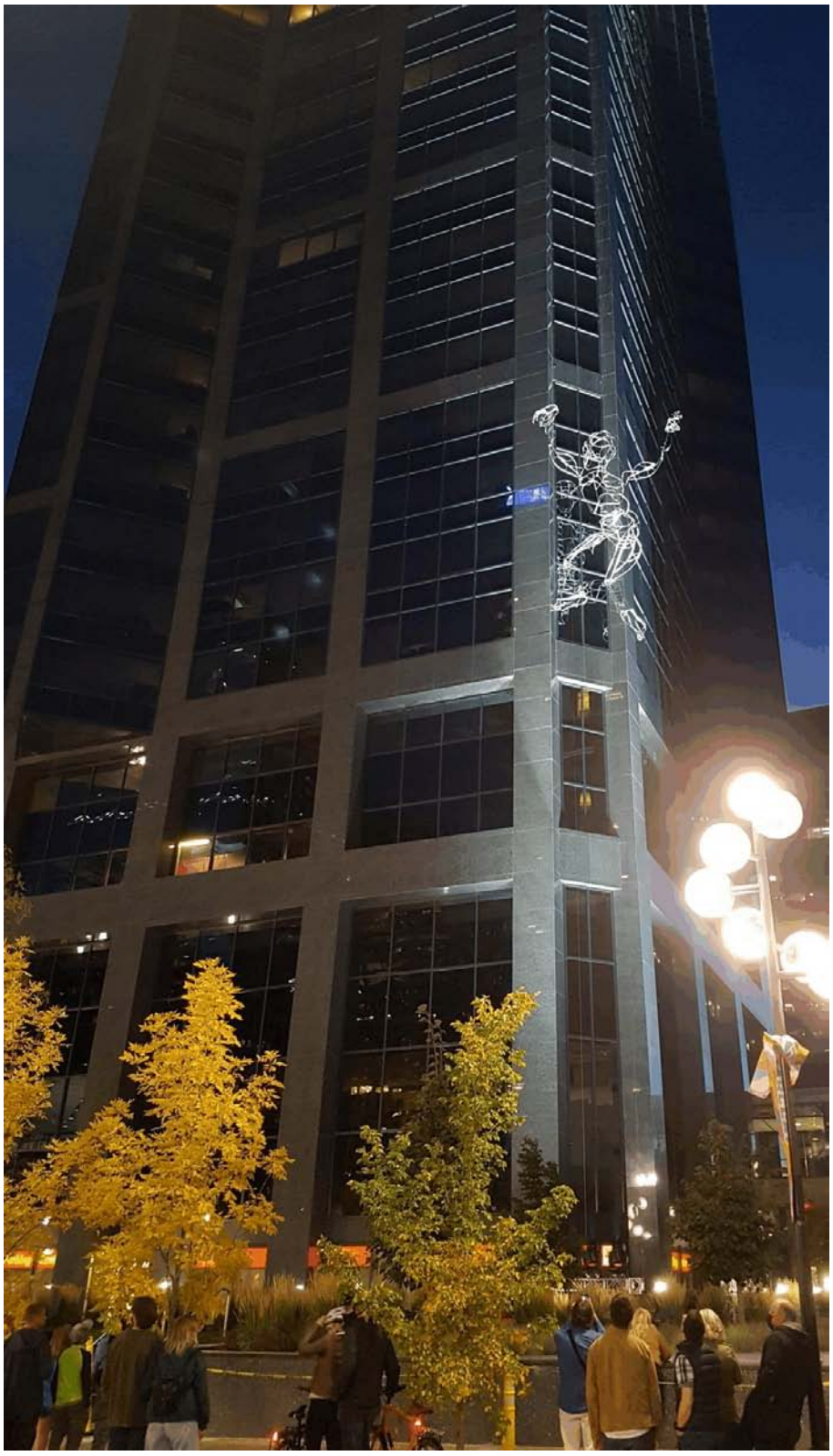
The Beakerhead festival downtown was partially revived on Saturday night, September 25. This techno art festival was very popular with us Cowtowners, where robots, steampunks, and light displays used technology for art installations. The fourth wave of the pandemic prevented any indoor events this year but some outdoor events were held.

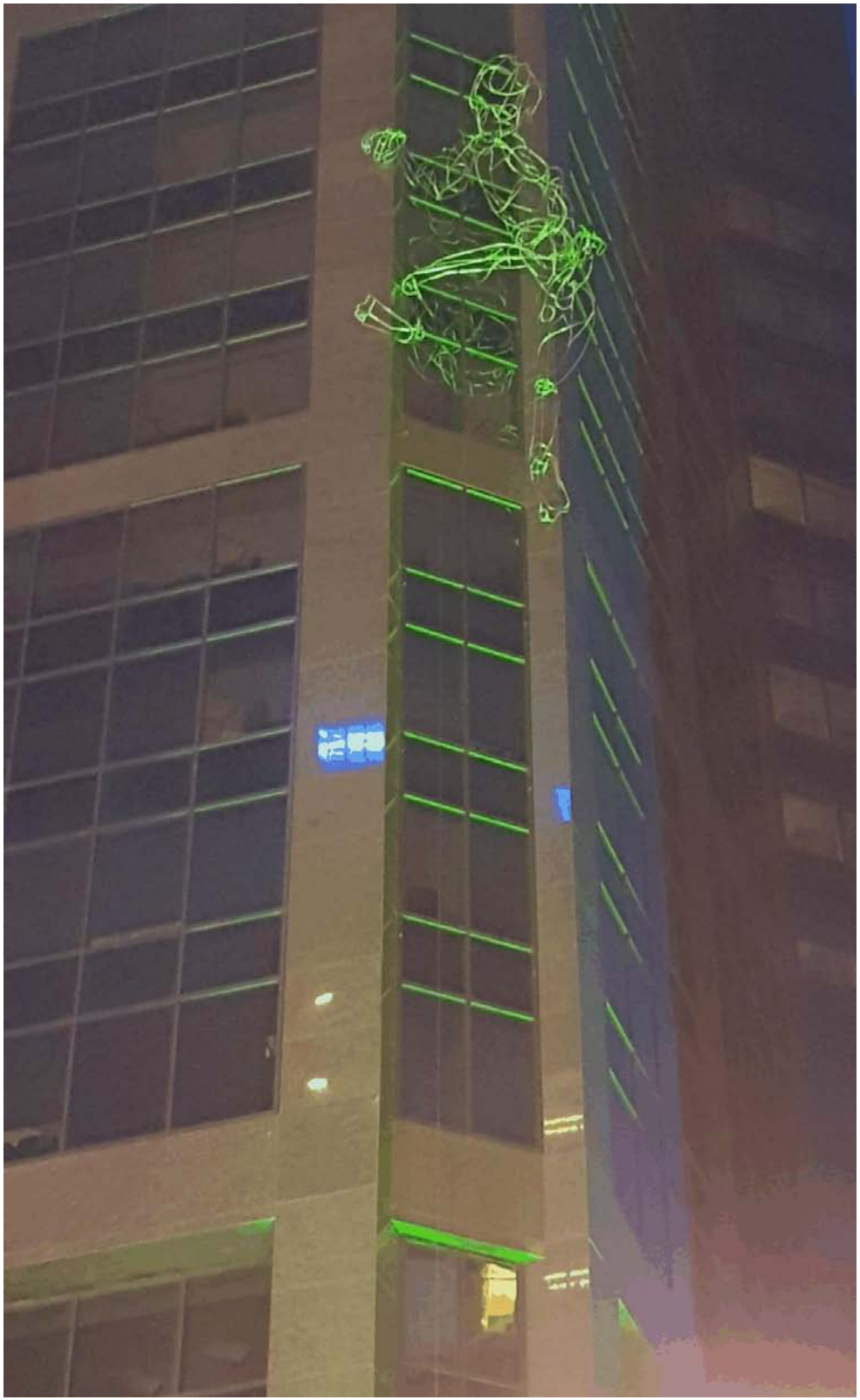
I arrived at 19h30 before sunset. Many of the exhibits were the same as in previous years but the steampunk turtle was new.



The most popular event was called The Ascent, where a giant marionette named David climbed up the side of the Devon Tower skyscraper. On the next and succeeding page are snapshots of the marionette. The first photo was taken before sunset. David didn't start climbing until after dark. Its, or his, colours changed as the spotlights changed.







AROUND COWTOWN
photos by Dale Speirs

Having digested their Thanksgiving dinners, Albertans turned attention to municipal elections, to be held province-wide on October 18. Calgary's incumbent mayor Naheed Nenshi, the first Muslim mayor of a large city in North America, announced his retirement after twelve years in office.

That left the mayoralty race wide open and not just figuratively, as 27 candidates vied for the job. On the council, eight incumbents did not seek re-election. There were 100 candidates for the 15 seats. School board elections are also being held, with 37 candidates for six public school wards, and 18 candidates for six separate school (Roman Catholic) wards.

The provincial government will also be inserting three referendum questions plus a vote for nominees to the Canadian Senate. When I go to vote, the polling clerk will be handing me a telephone directory instead of a ballot.

Meanwhile, others had their problems. I saw this poster on a bus stop in Altadore. I'm not certain if it was serious. I had to Google Ed Sheeran, never having heard of him, who turned out to be an English singer.

Everywhere a sign, including these contradictory signs on 7 Street SW at 7 Avenue.

OUT AND ABOUT IN ALBERTA
photos by Dale Speirs

On September 27, I drove out on an errand to the village of Cremona, in the Rocky Mountain foothills about 45 minutes drive northwest of Calgary. The village is at the junction of Highway 22 and Highway 580. The settlement is small enough that everyone has the same postal code T0M 0R0, which they made clever use of on their highway sign. The founder of the village played the violin and named it after the hometown of Stradivarius.

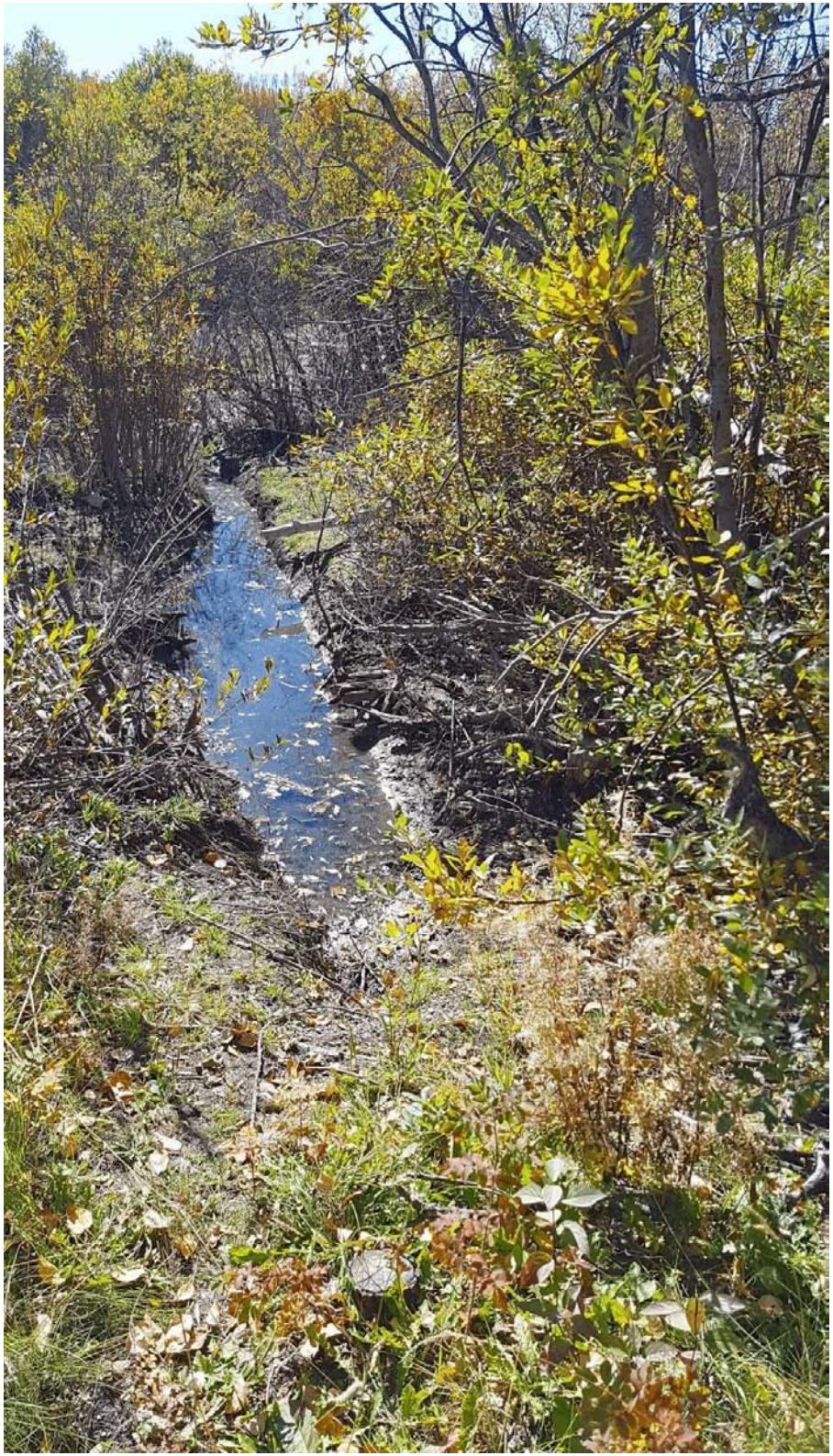
The village pond is their major park. At the entrance of the park was this Pinkest Little Town sign. I had to look it up on Google but in 2011 the Cremona/Water Valley people raised the most funds for a breast cancer event. Water Valley is a hamlet just southwest of Cremona. Sort of a suburb, if a village can be said to have a suburb.

A group of cowgirls rode their horses along Highway 22 from Crowsnest Pass to Sundre. All the villages and hamlets along the highway pledged money. However, it doesn't look as if the Cremonans have been as deep-pocketed for charity since.

At lower right is the trailhead for the village pond.

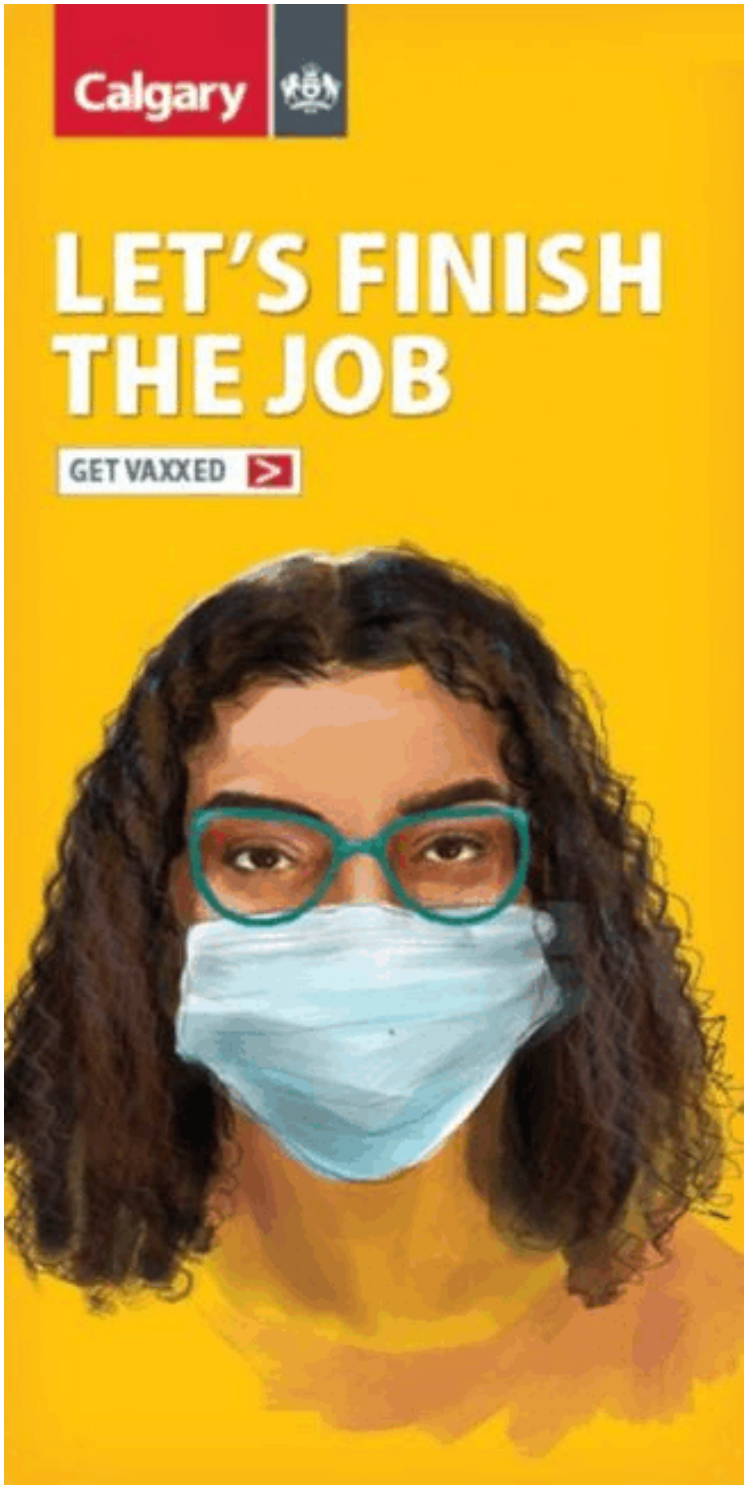
Below: Two views of each end of the pond. The middle part wasn't as exciting.

At right: A typical sight along Alberta waterways, a channel dug by beavers so they can float out branches from the trees they cut down.



On the return trip, I went east on Highway 580. The harvest was underway and I saw these combines near Carstairs. For you city slickers, a new combine like these starts at about $600,000.

CURRENT EVENTS: PART 26
by Dale Speirs



[Parts 1 to 25 appeared in OPUNTIAs #474, 475, 479, 480, 483, 484, 488 to 503, and 507 to 509.]

Seen In The COVID-19 Literature.

McIntyre, R.S., et al (2021) **Suicide reduction in Canada during the COVID-19 pandemic: lessons informing national prevention strategies for suicide reduction.** JOURNAL OF THE ROYAL SOCIETY OF MEDICINE doi.org/10.1177/01410768211043186 (available as a free pdf)

Authors' abstract: *Overall suicide mortality rate decreased in Canada from 10.82 deaths per 100,000 in the March 2019 to February 2020 period to 7.34 per 100,000 (i.e. absolute difference of 1,300 deaths) in the March 2020 to February 2021 period. The overall Canadian unemployment rate changed from an average monthly rate of 5.7% in 2019 to 9.5% in 2020.*

Our results indicate that for the first postpandemic interval evaluated (i.e., March 2020 to February 2021), suicide rates in Canada decreased against a background of extraordinary public health measures intended to mitigate community spread of COVID-19.

An externality of public health measures was a significant rise in national unemployment rates in population measures of distress. Our results suggest that government interventions that broadly aim to reduce measures of insecurity (i.e., economic, housing, health), and timely psychiatric services, should be prioritised as part of a national suicide reduction strategy, not only during but after termination of the COVID-19 pandemic.

Schrimpf, M.B., et al (2021) **Reduced human activity during COVID-19 alters avian land use across North America.** SCIENCE ADVANCES 7:doi.org/10.1126/sciadv.abf5073 (available as a free pdf)

Authors' abstract: *The COVID-19 pandemic resulted in extraordinary declines in human mobility, which, in turn, may affect wildlife.*

Using records of more than 4.3 million birds observed by volunteers from March to May 2017–2020 across Canada and the United States, we found that counts of 66 (80%) of 82 focal bird species changed in pandemic-altered areas, usually increasing in comparison to prepandemic abundances in urban habitat, near major roads and airports, and in counties where lockdowns were more pronounced or occurred at the same time as peak bird migration.

Our results indicate that human activity affects many of North America's birds and suggest that we could make urban spaces more attractive to birds by reducing traffic and mitigating the disturbance from human transportation after we emerge from the pandemic.

Ashokkumar, A., and J.W. Pennebaker (2021) **Social media conversations reveal large psychological shifts caused by COVID-19's onset across U.S. cities.** SCIENCE ADVANCES 7:doi.org/10.1126/sciadv.abg7843 (available as a free pdf)

Authors' abstract: *The current research chronicles the unfolding of the early psychological impacts of coronavirus disease 2019 (COVID-19) by analyzing Reddit language from 18 U.S. cities (200,000+ people) and large-scale survey data (11,000+ people). Large psychological shifts were found reflecting three distinct phases.*

When COVID-19 warnings first emerged ("warning phase"), people's attentional focus switched to the impending threat. Anxiety levels surged, and positive emotion and anger dropped. In parallel, people's thinking became more intuitive rather than analytic.

When lockdowns began ("isolation phase"), analytic thinking dropped further. People became sadder, and their thinking reflected attempts to process the uncertainty. Familial ties strengthened, but ties to broader social groups weakened.

Six weeks after COVID-19's onset ("normalization phase"), people's psychological states stabilized but remained elevated. Most psychological shifts were stronger when the threat of COVID-19 was greater. The magnitude of the observed shifts dwarfed responses to other events that occurred in the previous decade.

As of October 8, Canada had 1,655,424 cases of COVID-19, with 28,184 deaths. 71.9% of the population was fully vaccinated. Canada's population is about 38,000,000.

Fiction.

I'm working my way through THE WEIRD (2011), an 1,126 page anthology by Ann and Jeff VanderMeer of 110 stories. One of them was "Soft" (1984) by F. Paul Wilson, about a pandemic with no happy ending or vaccine. The virus caused bones to crumble into calcium dust. Infected humans could hear a crinkling sound in the end stages as their bones dissolved into chalky goo.

Worse yet, people didn't die immediately, but lived as helpless sacs of organs and skin. They couldn't speak because their jaws were gone, they couldn't control their eyes because the eye muscles had no skull bone to work against, and their arms and legs were flabby tentacles, again because the muscles had no bones.

SHERLOCKIANA: PART 38
by Dale Speirs

[Parts 32 to 37 appeared in OPUNTIAs #470, 474, 486, 492, 496, and 501.]

The original Sherlock Holmes stories written by Sir Arthur Conan Doyle are referred to as the canon, while stories written by other authors are called pastiches.

Pastiches: Anthologies.

A SHERLOCK HOLMES ALPHABET OF CASES (K TO O) was the third volume of a series of pastiches by Roger Riccard (2019). I reviewed the first two volumes in OPUNTIAs #496 and 501.

The first story was "The Kaiser Role", a sequel to "The Gunsmith Of Sherwood" story in the previous volume. Heligoland revolutionary Lydia Wyt had taken refuge in the Danish Embassy and was now trapped there. At that time Germany and Britain were allies because the Kaiser was Queen Victoria's grandson.

Mycroft Holmes was pulled into the affair because he was something in the Foreign Office. Sherlock Holmes and Watson sympathized with Wyt but could not overtly help her escape London. Turning her over to the Germans would be a death sentence.

She did escape across the English Channel, with Holmes and Watson trailing her. The Heligoland patriots had a clever plan to replace the Kaiser with a doppelganger, who would then issue a proclamation giving Heligoland its freedom. Sherlock stymied the plan, ensuring peace in their time. Of course, it only delayed the inevitable war that began in 1914.

"The Trinity Leprechaun" took place while Holmes and Watson were in Dublin. They were approached by Father O'Keefe of Trinity College, who said the college was plagued by a prankster dressing up as a leprechaun. The pranks were at first in good fun but were becoming more serious, such as gassing the night watchman unconscious.

The investigation followed in logical order and Holmes soon had a pair of suspects in mind. He used an equally logical method to trap the leprechaun, a green tarpaulin covered with a thick layer of glue. The human-sized flytrap worked and caught the culprit.

She was a suffragist, which provided an excuse for the final chapter to be an infodump on Irish folklore and history. On her promise to cease and desist, no prosecution was made. The future was obviously on her side.

"The Monique Mystery" began with the disappearance of Scottish lawyer Cecil Forrester in the North Sea while on a business trip. His brother Barclay rushed to snatch away the estate before the Married Women's Property Act came into force a few weeks later. Prior to that Act, when a husband died his estate went to his next of kin by blood, not his wife. Barclay would leave his sister-in-law as a penniless widow.

Holmes had two tasks, to discover where Cecil was, and to stall Barclay until the Act came into force. Assorted alarums were mixed in with the detecting. Holmes learned that Cecil was hiding in Rotterdam for unknown reasons, then committed suicide, caused by a brain tumour. The trick was to forestall the Dutch from issuing a death certificate until after the Act became law. Mycroft did his part in helping slow the bureaucracy.

"The Notable Musician" involved John Phillip Sousa and his band arriving in London to give a royal command performance. Unfortunately a crate containing their sousaphones went astray. This was a serious matter because such specialized instruments could not be easily replaced.

Holmes concluded the disappearance was not theft since there was no black market in sousaphones. Pawnshops would not buy them, nor was a ransom demanded. Searching the dockside warehouse where the ship's freight had been unloaded, Holmes found part of the crate's tag.

This led to the supposition that the crate had been mis-delivered. The question was where, and the answer was needed quickly in time for the concert. The vital clue was the chance discovery that one of the dock workers was dyslexic. Knowing how he misread the tag then revealed where the crate had been sent. The missing sousaphones were recovered and all was well. With a hearty oom-pah-bah, Sousa carried on.

"The Origami Mystery" began with a young woman whose family had in their possession some antique Japanese origami figures on rice paper. What wasn't known until the story began was that the paper came from a treasure map of a huge hoard in Japan.

Professor Moriarty found out and was soon on the hunt. Holmes and Watson had their share of alarums but eventually managed to stymie the origami heist. The treasure would be kept safe for the nation but Moriarty would undoubtedly return.

The story came across as a routine adventure. Too soon in the plot it was surmised by Holmes that the origami paper markings were important. The reader will instantly guess the sort of to-ing and fro-ing that would follow. The rest was just Holmes and Watson collecting plot coupons.

Pastiches: Short Stories.

"The Gloria Scott" by Terence Faherty (2021 Jan/Feb, ELLERY QUEEN) continued his series of edits of canon stories by Dr Watson. The premise was that the published stories of the canon were final drafts after much revision which changed the original events. Faherty's pastiches were the supposed first drafts, often dramatically different, with Watson's editing remarks as asides. Very funny in many places.

This particular pastiche had the Gloria Scott being a play attended by an heiress, who then went missing with her lover. They hid in plain sight by changing names and joining a music hall troupe, where no one would expect them to be.

"The Shadow Of The New" by Mike Adamson appeared in the same issue of ELLERY QUEEN. This was an interesting pastiche that addressed Holmes' first encounter with Professor Moriarty. In the canon, the professor was suddenly sprung on readers late in the series. This pastiche details the initial rise to power of Moriarty, and Holmes' dawning suspicions that there was a mastermind of crime at work in England.

Mycroft Holmes.

Kareem Abdul-Jabber, well-known basketball player, and Anna Waterhouse have a series of pastiches about Sherlock's smarter brother. I reviewed their first novel MYCROFT HOLMES in issue #340 of this zine. The sequel was MYCROFT AND SHERLOCK (2018), the year was 1872, and Mycroft was a rising star in the War Office.

His friend was Cyrus Douglas, a tall Negro who was not a basketball player since James Naismith wouldn't invent it until 1891. Douglas lost a cargo ship when it ran aground off Dorset. He operated a charity school for street orphans. Sherlock was dragooned into looking after it while Douglas hurried off to see what could be salvaged from the ship.

Other subplots included the opium trade, a series of murders among London Chinese, money laundering, and Sherlock's investigations among the street urchins. Mycroft began finding connections among them and the story progressed.

He was distracted by Queen Victoria, who summoned him for an important task. Scotland and England were to play the first recognized international soccer game. She wanted Mycroft to fix the game and arrange for a face-saving draw. He was understandably put out at wasting his energies on such trivial matters but duly complied with her wish.

Sherlock and Mycroft kept crossing each other's path in their separate investigations. They kept finding lots of clues but made no real progress in the middle of the novel. Events culminated with great excitement down at the docks and near death for Sherlock. He survived, as we knew he would.

Following on in the series was THE EMPTY BIRDCAGE (2019), which took place the following year. An economic recession was beginning. The subplots included Sherlock investigating the death of a distant relative of Queen Victoria. Mycroft was distracted by his platonic love's fiance being kidnapped. He persuaded Cyrus Douglas to help find him.

Various alarums and excursions came and went. As the death toll mounted, there became apparent a connection to a failed financial speculation that left many small investors hurt. One man vowed revenge.

The Holmes brothers went about collecting plot coupons. The murderer certainly had a unique method of operation. He used a blowpipe firing poisonous darts and had a pet crow trained to jab people in the jugular vein. In the end, a twist ending solved the matter. The conclusion was forced, not entirely satisfactory.

Pastiches: Magazines.

SHERLOCK HOLMES MYSTERY MAGAZINE is a trade paperback published at intervals and well worth the price. Available from www.wildsidepress.com, although I find it easier to buy from www.amazon.ca because it saves me trouble with foreign exchange and the friendly folks at Canada Customs.

The magazine has Sherlockiana but in each issue also runs non-Holmes mystery fiction and true crime essays. There is an ongoing column "Ask Mrs Hudson" in which the dear old lady acted as an agony aunt. Each issue has a reprinted story from the original canon by Sir Arthur Conan Doyle.

I object to that last item because it takes away space that could be used for new pastiches. The original stories are continuously in print, so there is no need to reprint them. Anyone who wants to read the canon will have no difficulty finding copies.

Issue #26, dated 2018, has the pastiche "The Adventure Of The Tired Captain" by S. Subramanian. Not a ship captain, but a cricket team captain, who was being blackmailed and consequently seemed likely not to take the field for the big game. The solution seemed too pat amidst the exposition of cricket culture and subsequent philosophical dissertation by Holmes.

"The Brixton Jewel Theft Caper" by Jack Grochot tied together three apparently unrelated cases in Brixton, a counterfeiting operation, a murder, and a jewel theft.

The combatants included a printer who was earning a bit of money on the side by printing a bit of money on the side, and a jeweler who tried an insurance fraud by staging the theft. The prostitute was the go-between in both directions. The murdered clerk was simply in the wrong place at the wrong time.

Holmes soon realized who the murderer was, but recognized that getting proof for a court trial was another matter. And so he did, posing as a doctor who specialized in social diseases.

SHMM #27 appeared in 2019. The "Ask Mrs Hudson" column, no writer credited, contained a preamble about how it was that Holmes came to reside at 221B. Since Sherlock's income was variable in those days, his brother Mycroft vouched for the rent. She was quite surprised at the quantity of books and laboratory equipment he moved into the rooms. Watson was no problem as a roommate because he was a doctor and an ex-officer, and therefore quite respectable.

MYSTERY WEEKLY MAGAZINE is, despite its title, a monthly. I'm sure there was a reason. MWM is published out of Ancaster, Ontario, at www.mysteryweekly.com, although I bought my copies via Amazon print-on-demand. This periodical has a wide variety of mystery fiction but the issues I buy are the Sherlock Holmes specials, published every October. They have more Holmes stories in those issues than SHMM.

From the 2016 October issue was "The Adventure Of The Missing Princess" by Michael Mallory. The pastiche combined the disappearance of royalty with the Elephant Man. Princess Alexandra, wife of the Prince of Wales and future King Edward VII, had visited Joseph Merrick, the Elephant Man, at the hospital where he lived in seclusion.

She came incognito and then left the same way. From there, she vanished. A quiet panic spread through Whitehall, both Holmes brothers were involved, and Watson was in the middle of events. The Princess eventually returned, having visited her sister in Denmark, whose daughter had given birth to a deformed child much the same as Merrick. Everything was tied together neatly by the denouement.

Also from the 2016 October issue was "The Case Of The Masticated Hand" by Jaap Boekestein and Roelof Goudriaan, which began with a summons from the widow of Samuel Lofthouse. He was an archaeologist who brought back two females from a recent dig.

One was a mummy from Sumeria, said to be a goddess incarnated, and the other was Samuel's wife, an Arabic woman who soon found herself adrift in England without her husband. The hand was that of the mummy.

Samuel was murdered by a faker calling himself Professor d'Ory, who was into extreme occult in the worst way. Holmes and Watson failed to stop him from raising the goddess back to life. The good news was that she didn't like slimy little men trying to order her around and therefore smote d'Ory with lightning. Justice was served without the bother of a court trial.

"The Mystery Of The Bee's Egg" by Eric Cline was the third pastiche of this issue. Holmes and Watson were called to Scotland to investigate the suspicious death of a construction foreman Thomas Fergus on a bridge being built across the Firth of Kynoch. (Presumably a reference to the Tay bridge disaster.)

Fergus had been investigating the shoddy materials supplied for the bridge. Holmes and Watson traced back the source of the defective materials but the death didn't seem to be murder by someone working for the supplier. The conclusion was that Fergus' death was accidental. He was out on a girder testing it when he slipped and fell.

The pastiche included infodumps about the shoddy state of engineering back in those days, and the poor quality of building materials. The story will be more understandable if you read up on the Tay Bridge beforehand (try Wikipedia).

The 2017 October issue of MYSTERY WEEKLY MAGAZINE began with "The Adventure Of The Lyceum Theatre Curse" by Michael Mallory. The client was Bram Stoker, whose day job for most of his life was manager of the Lyceum Theatre in London. He didn't become famous for his vampire novel until late in life.

His theatre was rehearsing MACBETH. They were plagued by various accidents, which the credulous attributed to a curse. Holmes and Watson figured someone was trying to sabotage the production and bankrupt the theatre. The murder of the actor who played Banquo's ghost was the turning point.

At the next rehearsal, Holmes made himself up as the dead man and played the ghost. His performance triggered an outburst from the murderer, who was horrified to see his victim reappeared. The accidents were a screen for murder, based on revenge for events long ago. Some nice twists in the story.

"The Adventure Of The Very Quiet American" by Eric Cline took Holmes and Watson out to the country where Sir Bernard Early had met an ugly death. He had married a younger woman, had great wealth, and had a handsome young American man staying with them. A rather blatant setup for the plot.

Sir Bernard's body was found in a pigpen, mostly eaten by pigs. One of the pigs later died of formaldehyde poisoning, which prompted a check of the bits and pieces of Sir Bernard's body. That led to murder charges for the other two members of the love triangle. A straightforward case, albeit not for the squeamish who enjoy bacon for breakfast.

Pastiches: Old-Time Radio.

Sherlock Holmes was very successful on radio. He aired on several networks with several sets of actors from 1930 to 1956, encompassing the entire lifespan of old-time radio. Basil Rathbone and Nigel Bruce had a long run, but others played the parts before and after. (These and other old-time radio shows are available as free mp3s from www.otrrlibrary.org.)

"The Guest In The Coffin" aired on 1949-02-14, written by Howard Merrill. Someone was killing London police constables, seemingly at random. Not long after, a mortician delivered an empty coffin for Holmes, along with a threat that his master would kill Holmes by Friday midnight.

The villain was, of course, Professor Moriarty. Came the strokes of midnight and there were many alarums in front of 221B. One wonders why the residents of Baker Street hadn't long ago commenced legal action against Holmes for being a vexatious nuisance.

Moriarty arrived and bwah-ha!-ha!-ed at great length, explaining in his monologue that he wanted to demoralize the police and general public. That would set the stage for a crime wave and allow his minions to control the city. He failed, having talked too long, but did escape. Soon to be heard again in a future episode. A bland plot and episode.

"The Adventure Of The East End Strangler" was written by Max Ehrlich and aired on 1949-02-28. In the opening scene, Watson stated the adventure took place ten years after the Jack the Ripper killings. After three women were strangled in Stepney in the east end of London, the police called in Holmes and Watson.

Scotland Yard flooded the area with police but they couldn't catch the strangler. He was almost caught once but escaped, although not without leaving some clues.

Holmes discovered a pattern. Each woman was upper-crust, had withdrawn a large sum of money on the day of death, and had been drawn to her place of death by a bogus letter demanding the money with menaces.

The letters were based on inside information that only servants would know. Holmes asked Lestrade to review the constables assigned to Stepney. He spotted a suspicious officer named Higgins, who made a run for it. His accomplice was a manor house maid who gossiped with other servants elsewhere, then funneled the information to him. They split the money so obtained.

Higgins didn't want to leave any loose ends so he tried to strangle the maid but was intercepted by Holmes and Lestrade. Justice prevailed and there was one less bent copper.

"The Mad Miners Of Cardiff" was written by Howard Merrill and aired on 1949-04-11, just before Easter. At the start of the episode, the sponsor Clipper Craft encouraged its male listeners that nothing was more cheerful than stepping out in an Easter parade in a brand-new suit from their dealers. People wouldn't believe how little the suits cost, yet looked so good.

Digression: The Easter parade was an American tradition originating in the 1880s where church-goers dressed in the latest styles for Easter Sunday. After church services, they would stroll en masse down the principal street showing off their finery. Although popular, the custom drew a lot of criticism as being non-Christian and was confined to a few larger cities, particularly New York City.

Back to the plot, where no one strolled. The recent widow Anne Powers owned a coal mine in Wales. Miners down the shaft babbled about unspeakable

horrors but would not describe what they saw. Some sort of eldritch creature, possibly squamous, that drove them mad on sight. All very Lovecraftian.

The men walked off the job. Powers received an offer to buy the mine at scrap value from her foreman Jeffery but refused, choosing instead to bring in Sherlock Holmes.

Holmes and Watson went down the shaft. They found a dead miner, and a moment later Jeffery appeared. He was of course trying to steal away the mine from the widow. He tried to bribe the duo, then threatened them with coal gas, then said he would blow up the mine. There was a brief struggle but no prizes for guessing who won.

As Holmes and Watson escorted Jeffery out of the mine, he began babbling about how evil lurked below. Men should not be working deep down for coal. The horror, the horror. Since he had been trying to steal ownership of the mine, his rant wasn't believable.

Pastiches: Modern Radio.

THE MIS-ADVENTURES OF SHERLOCK HOLMES was a humourous radio series that aired in the 2010s and is available as free mp3s from www.otrrlibrary.org Dr Watson narrated. Mrs Hudson was Irish instead of Scottish and had a different personality than usually portrayed. Holmes was played as an idiot and Watson was the smart one who fixed up the narrative in his stories.

The mp3 episodes are mis-numbered. The internal dialogue does mention the correct episode number most of the time. The episodes are mostly standalone but are best listened to in sequence because they continue story arcs across several chapters. When I tried to research the mp3s, the Google results kept bringing up Vince Stadon as the script writer, but the mp3s credit Joe Bevilacqua and Daws Butler as the writers.

I suspect there are two radio series floating around out there with identical titles and which happened to be aired about the same time in the 2010s. Bevilacqua's Wikipedia biography made no mention of this series, but the Stadon references are different episode titles than the ones from OTRR.

Joe Bevilacqua did the intro and outro commentaries for these episodes. He gave co-credit for the scripts and occasionally full credit to Daws Butler. The sound quality of the episodes was excellent. Good humour and well recommended.

"The Mystery Of The Creepy Hack Writer" was the premiere episode. Bevilacqua was ambiguous in the intro about the script but apparently it was written by Daws Butler.

In the preamble, Watson said the canon stories were much adjusted from reality. As an example, he had been living at 221B first and invited in Holmes as a roommate. Watson was the clever one, and Holmes was the blithering idiot.

Holmes had been living rough on the streets while hunting Jack the Ripper. The episode dragged a bit as the setup was explained to both the listeners and Mrs Hudson. She in turn explained to Holmes and Watson all the rules of her house. No smoking or drinking, no drug taking, no evening visitors, and no dogs. She was going to be disappointed.

Their first client Fitzroy McFarlane finally arrived at the 14-minute mark. His wife Stella had been murdered the previous afternoon. The couple had been strolling in a park when a canary attacked her. This will be funnier to those who know the canon, wherein Watson mentioned in passing the case of Wilson the notorious canary trainer but never gave further details.

Holmes didn't believe the story, and spotted McFarlane as an imposter. He was actually Herbert Winston Newcastle, a tobacco salesman selling door-to-door.

That being set aside, the plot jumped to Watson trying to think up titles for Sherlock Holmes stories. "The Adventures Of A Non-Entity" didn't seem to work, although he did like "The Adventures Of Dr Watson".

Newcastle returned, this time telling Watson he was a hack writer looking to act as an agent. His real name was Arthur Conan Doyle, and he promised Watson he could place the Holmes stories in the STRAND MAGAZINE. They agreed to stretch the truth in order to make Holmes a great detective. And so began the adventures.

The second episode, so identified in the outro, was "My Dinner At Baker Street", written by Joe Bevilacqua. Dr Watson began with an explanation that

221 Baker Street did not have 17 steps from the ground floor to the rooms upstairs, but only 12, one of which was broken.

This led to an extended running gag through the rest of the series of people climbing up and down the stairs, often tripping on the broken step. Mrs Hudson was particularly put out because she had to keep running up and down the stairs to deliver the courses. Each time she went up and down the stairs, her footsteps were slower and slower.

The dinner was for a meal in honour of Holmes' old mathematics teacher Prof. James Moriarty. Yes, that one. As Watson mentioned in the first episode and again in this one, he frequently rewrote the facts to produce a better story.

Mrs Hudson complained that as a best-selling author, Watson should not be late with the rent and food bill. He ignored her remarks, as he did with her none too subtle hints for a free copy of his recently published A STUDY IN SCARLET.

The menu of the dinner illustrated Hudson's culinary skills or lack of them. She began with Artichoke Pudding, having run out of plums. The main course was Beef Brisket With Plums. "*That's why I had none left for the pudding*", she said. The vegetables were Carrots In Mustard And Ice Cream Sauce. Dessert was Pickled Rhubarb On Milk Toast.

Moriarty brought along a bottle of poisoned wine. Watson stopped Holmes from drinking it. Lestrade showed up to arrest Moriarty but the police had to release him for lack of evidence.

Television.

In 1954 and 1955, a television series SHERLOCK HOLMES was aired on NBC. It was written and produced by Sheldon Reynolds in France, where production costs were much lower. Ronald Howard was Holmes and H. Marion Crawford played Watson. Howard was relatively young and fit the canon better than the more famous Rathbone. Crawford was well into middle age but played Watson as an intelligent man, not the blithering idiot that Nigel Bruce did.

Most of the episodes were pastiches but some were based on canon stories, however loosely. Interestingly there was some continuity between episodes when characters referred back to previous events. That was unusual for the times, as most television show episodes were zero-reset.

The episodes are in the public domain and therefore available in several different DVD box sets. The episodes I'll cite here are from the set issued by St. Clair Entertainment, "Ultimate Sherlock Holmes TV".

"The Case Of The Greystone Inscription" was written by Gertrude and George Fass, and aired on 1955-01-31. The client was Millicent Channing, whose fiance John Cartwright had disappeared while researching history at Greystone Castle in Scotland. She went up to find him, but Sir Thomas Greystone, the laird, and his dashing young son Walter, denied he had been there.

Holmes and Watson searched Cartwright's flat and found a copy of ancient cryptic doggerel which described how to find treasure of King Richard hidden in Greystone Castle. Off they went to yon bonny braes, taking Channing with them.

They snooped around and were soon taken at gunpoint by the Greystones, who admitted they had Cartwright locked up in the tower (well, it was a castle). The Greystones only had the first few lines of the doggerel, so they had to make a deal with the devil, ie, Holmes.

Both parties commenced the treasure search, using Holmes' information. They did so with daggers drawn in an uneasy truce. Figuratively speaking that is, for Sir Thomas had the shotgun. The search succeeded, in a hidden chamber containing a large chest filled with Richard's crown jewels.

Father and son were for killing the others inside the dungeon so the police would never find them. However the door into the chamber had closed, and only Holmes knew how to open it. Elsewise, they would all die there. Holmes took the shotgun from Greystone, opened the door, and so to the denouement.

The treasure went to Buckingham Palace since it was still the property of the royal family. The Greystones went to prison for forcible confinement, and Channing and Cartwright were married off stage. As for Holmes and Watson, they enjoyed a cold lobster dinner at 221B.

"The Case Of The Laughing Mummy" was written by Charles Early and aired the following week on 1955-02-07. Reggie Taunton was an old schoolmate of Watson. He was a country squire with an unusual problem. His uncle Joseph was an archaeologist who sent him an Egyptian mummy, plus a crate of sand from the Sahara Desert. Annoyingly the mummy would laugh at intervals,

which certainly caught Holmes' interest. Another guest at the house was Prof. Gaulkins, who was a colleague of Joseph.

Reggie was engaged to Rowena Featherstone, whose aunt did not approve of the impending nuptials. He was a wealthy squire to be sure, but to have a laughing mummy lying about the manor house was most unseemly.

Upon arrival at the Taunton estate, Reggie showed Holmes the sarcophagus. While pointing out an inscribed curse, he pricked his thumb. Note that well. But on with the dinner party, prepared by Rowena, who was not a good cook. Fortunately the meal was interrupted by laughing from the mummy.

Holmes discovered the sound was actually reverberating down the chimney. Shortly after the mummy arrived, Reggie had installed a new wind vane on the roof. Holmes experimented with it and found that when the wind had the vane at a certain angle, a sound was generated across the chimney top.

The great detective also noticed that while the sarcophagus was genuine 14th Dynasty, the corpse and its wrappings were modern, as in the last few weeks. The deceased was in fact Uncle Joseph. The professor broke down and told the story. He and Joseph had quarreled in public just before they went down an exploratory shaft and found a tomb.

When Joseph tried to open the sarcophagus, he suddenly cried out in pain and stepped back before dropping dead to the ground. There were no other witnesses and Gaulkins feared being accused of murder. He packed Joseph's body with desiccants, wrapped it in surgical gauze stained with tea to look old, and successfully shipped the body back to England.

Holmes closely examined the sarcophagus lid and spotted a needle embedded just where someone would put their hand when opening the casket. It had been filled with poison millennia ago and killed Joseph. There was none left when Reggie pricked his finger, which was why he survived.

MATTHEW 24:6: PART 7
by Dale Speirs

[Parts 1 to 6 appeared in OPUNTIAs #389, 391, 392, 412, 426, and 455.]

Cli-Fi.

Northern Europe is habitable because of the Gulf Stream warming it. "Shifting Seas" by Stanley G. Weinbaum (1937 April, AMAZING STORIES, available as a free pdf from www.archive.org) considered the consequences if it disappeared. The story began with a volcano blowing apart Central America where Nicaragua once was.

It took a few weeks for the effects to become evident. The warm waters no longer deflected north because the Pacific Ocean current now went eastward and swept the warm waters of the Caribbean straight to Africa, where the continent bent the current southward. The Gulf Stream, which is what makes northern Europe habitable, especially Britain, ceased to exist.

200 million Europeans would not be harvesting crops or living in houses habitable for the kind of cold that is normal in Canada or the northern USA. The fiat currencies of Europe became worthless since they were no longer backed by anything worthwhile, and gold was the only true money.

The flood of refugees overwhelmed the more fortunate nations. In our time, the Americans complain of 11 million illegal immigrants, but at least they didn't all arrive within a couple of months. Financial investment fled Europe just as fast. War loomed.

The British couldn't understand why Canada and the USA wouldn't shelter them, what with all their empty lands, not understanding those lands were empty for a reason. On much of the Canadian prairies and American Great Plains, it takes a hectare of land to support one cow, not just the pasturage but because there is only enough water for one animal.

The hero Ted Welling had a plan. The mountain ranges running down the spine of Central America were below water, but not so far below that a wall couldn't be constructed to block the equatorial current.

The European nations mortgaged their futures to help the USA pay for the cost, as indeed they had to. Since the wall could be blown apart by a wing of heavy bombers, such as possessed by the USA, that tipped the balance of power. A new type of Manifest Destiny.

"Winter On The Planet" by Warner Van Lorne (1937 April, ASTOUNDING, available as a free pdf from www.archive.org) was about a new snowball Earth. Snow and ice kept coming and coming, and soon modern civilization collapsed. The chronicle did not end in total extinction.

Instead, the surviving humans had time to tunnel out new cities under the massive ice sheets. Artificial lighting allowed crop farming, and the survivors managed to get by. An early example of hard cli-fi.

Supertrains Last All Winter Long.

SNOWPIERCER (2014) was probably the most bizarre train movie ever produced. The screenplay by Bong Joon-ho and Kelly Masterson was based on a French graphic novel LE TRANSPERCENEIGE by Jacques Lob, Benjamin Legrand and Jean-Marc Rochette.

The premise was that attempts to reverse global warming tipped the climate too far the other way and turned Earth into a snowball. The only survivors were on a giant bullet train with hundreds of wagons. Its track circled the planet, which was completely covered by snow and ice. No one lived in the outside world, whose temperatures were colder than an Antarctic winter.

A map was briefly shown of the track, which circled the edges of the Americas, crossed the Bering Strait, then circled the edges of Eurasia and Africa. Time on board the train was measured as one year per complete circuit. The train never stopped and was powered by some sort of miracle technology.

The rear wagons were slums, and those living in them were fed protein bars made from recycled everything, including humans. After 17 years, children had been born on the train. Every so often the rear passengers were thinned out in batches of 75 in order to maintain the closed ecosystem of the train. Nothing was wasted, and the dead were processed into protein bars.

Past a certain point, the wagons became more luxurious and the passengers were upper class. Near the front, people lived like the Trumps and the Bidens in great luxury. They dined on steak and fresh vegetables grown in special wagons further back.

The inventor and owner of the train was only known as Wilford. The movie began in the rear wagons where Curtis Everett led a rebellion and the lumpenproletariat began moving forward wagon by wagon. Wilford was much talked about but no one had ever seen him. It wasn't until near the end, when Everett and a few survivors made it to the Sacred Engine, that Wilford appeared.

He was an old man, for the train had been running for 17 years by then, and let Everett reach him because he wanted a successor. Wilford said Everett was the first person to walk the full length of the train. Not even he had done that when the train was being built.

The rebellion began in the rear cars when someone discovered that the armed guards supplying them with daily protein bars did not have any bullets in their assault rifles. The moment that was discovered, the fighting began, and the mob slowly worked its way forward, disabling the compartment doors one by one.

This was a Korean-made movie with a mostly Caucasian cast. Lots of chop-socky and violence along the way. One nice point was recognition of the language problem instead of just having everyone speak English. Characters spoke in their own languages, mostly English but a lot of Korean. They had universal translator devices so they could understand each other.

In the end, the train was finally derailed by an avalanche as it went through mountains. Almost everyone died, both front section and rear section. They were all equal now.

There was a final twist in which one survivor saw a polar bear, indicating that life was still out there. It was climbing in the mountains, which made me wonder. Polar bears are maritime animals who live on pack ice and coastal shores.

Be that as it may, and ignoring some other illogical plot points, the movie was very well done. The SFX were top quality. This movie could not have been made by a Hollywood studio, as they would have just turned it into Die Hard on a train. There were numerous small throwaway images that helped build up a bizarre culture on board the train. Well worth viewing.

Human Disasters.

I was browsing through Amazon.ca and happened across a DVD of the 1976 movie THE HINDENBURG. The movie was written by Nelson Gidding, Richard Levinson, and William Link, based on the 1972 book of the same name by Michael M. Mooney. I never saw it when the film was in first-run theatres, so I ordered it.

The explosion and wreck of the Hindenburg in 1937 was never explained. Probably something sparked the hydrogen gas cells into a raging inferno. Sabotage was suspected but no evidence could be produced. The inferno burned up any evidence, whether for accidental cause or deliberate.

Germany did not want to admit the possibility of sabotage since the Nazis denied there was any resistance to their policies and all good Germans heartily supported Hitler. Der Fuhrer wrote it off as an accident, but conspiracy theorists then and now proclaimed it was sabotage.

The explosion and crash of the zeppelin only took a few minutes, so the movie needed more to go on. The plot therefore covered the final voyage from Germany to the fatal end in New Jersey on the premise that the disaster was sabotage.

The characters included Luftwaffe officer seconded to security to hunt for a saboteur planting a bomb, a Gestapo agent who seemed friendly enough if you weren't Jewish, and assorted passengers with something to hide. Since viewers know the outcome, there was no suspense, so the movie concentrated on characters and background details.

The movie was in colour but when the explosion occurred, it faded to black-and-white and was intercut with actual newsreel footage. The scene shifted back and forth between the newsreels, the characters struggling to escape the burning zeppelin, and the famous "Oh the humanity!" coverage by radio reporter Herb Morrison, who got the biggest story of his career.

The SFX were very well done, remembering this movie was made in the middle 1970s, and hold up well even today. The sets were realistic reconstructions based on actual blueprints. Well worth viewing.

THEY SHALL MOVE OUT OF THEIR HOLES LIKE WORMS OF THE EARTH: PART 10

by Dale Speirs

[Parts 1 to 9 appeared in OPUNTIAs #307, 308, 331, 347, 390, 399, 415, 439, and 474.]

Short Stories.

"Subterranea" by W. Elwyn Backus (1931 November, WEIRD TALES, available as a free pdf from www.archive.org) put the entrance to an underground world beneath the Great Pyramid at Giza. The brave explorers were Trent Allison and Hugh Ghent and their guide Ahmid. They sneaked into the pyramid, then descended a hitherto unknown shaft they had found. It led them a mile deep.

The first alarum and/or wonder was a giant slug about the size of a bus. The second one, which killed Ahmid, was a giant trapdoor spider. Down, down, down they went to a sunless sea but lit by a yellow glow from phosphorescent algae.

There were human inhabitants. Allison and Ghent made friends with them and eventually learned the language. That being too dull to sustain the story, they met the Stygian hordes, the rat men. Many alarums later, it grew too hot for them to stay longer. Not just figuratively but because the barbarian section was lit by natural gas flares. The geology was unstable but the two men found a way back up, surfacing at Lake Chad.

Much later they tried to return via the pyramid, but the shaft had collapsed, as did the one at Lake Chad. It was ever thus.

"The Mole Pirate" by Murray Leinster (1934 November, ASTOUNDING, available as a free pdf from www.archive.org) was about a gangster named James Durran who hijacked an experimental mole machine that could move through solid ground. It didn't tunnel, it just shifted into a slightly different dimension where all its atoms passed through ordinary matter.

The problem with the concept was that such a device would simply fall into Earth's core where it would be melted into its constituent atoms. Jack Hill, the inventor of the mole, therefore did some handwaving and coated the machine with a thin layer of thorium. This allowed the mole to move through solid rock

but still have enough resistance to stay where it was. The explanation was that the bedrock would be to the machine as if it were pudding, sticky to move through but doable.

Durran was smart. After first stealing the mole, he then used it to raid stores to stock up on living supplies, followed by a trip to Sing Sing where he liberated the rest of his gang. They then went on a rampage looting bank vaults.

Hill began building a second mole in his laboratory. When the newspapers blabbed about that, Durran visited the laboratory and destroyed the new machine and all the blueprints and machine dies. Then he went hunting for Hill, the only man who knew how to design and build the moles.

The end was subtle and very clever. Hill realized that the thorium coating would wear off as the mole traveled through the bedrock. Once enough was gone, there was nothing to offer resistance to gravity. The machine fell into the depths of Earth, taking Durran with it. This would make a good science fiction movie today.

"Buried Moon" by Raymond Z. Gallun (1936 February, ASTOUNDING) was another drilling machine story. Tod Cram had taken his superscience machine deep into Earth. It cut into a massive chamber and was damaged when it fell through to the floor. An alien race of arachnids lived there.

Millennia ago the asteroid they lived inside had plunged into the ocean. They barely survived on radioactives and subterranean microbes. They had tunneled sideways through the crust, but every time they tried to surface, they met the crushing weight of the ocean's water.

Now Cram's arrival told them there was air above, but they couldn't reach up. He was dying and couldn't help. A note of pathos, for the aliens were not evil invaders, just trying to survive.

"The Menace From Below" by Harl Vincent (1929 July, SCIENCE WONDER STORIES, available as a free pdf from www.archive.org) began with the disappearance of a packed subway train in New York City as it went through a tunnel under the East River. Then another. Then other alarums.

What it was, was a hitherto unknown civilization of apemen living far underground in an extensive network of tunnels throughout eastern USA. How this civilization had escaped detection before by miners was a matter of handwaving.

Needless to say the apemen were up to no good, led by a renegade human who had stumbled across them years before in a cavern and set himself up as a god. The expected clash between civilizations above and below was stymied by the collapse of the cavern entrance and the inability of humans to find the other tunnels by random digging.

"The Metal World" by Ed Earl Repp appeared a few months later in SCIENCE WONDER STORIES in 1929 October. This time it was California's turn to be invaded from below. A race of giant centipedes burst to the surface in drilling machines, then began beaming death rays about at the surface bipeds.

They actually had moral right on their side. Humans were drilling into Earth and stealing the metals and petroleum that belonged to the Demetrians, as they were labeled. Notwithstanding that, the scientist of the hour had drilling machines that could counter-tunnel down below and then inject poison gas to wipe out all the Demetrians in their crevices. Genocide by any other name is still genocide.

Gimme That Old Time Radio.

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. Available as free mp3s from the Old Time Radio Researchers at www.otrrlibrary.org

"The Devil's Cavern" aired on 1945-04-03. Uncle John was a speleologist in New Mexico. His two nephews Paul and Victor came to visit him, mainly to beg for an increase in their allowances upon which they lived. He declined.

John told them he had been exploring a cavern. It had shafts hundreds of feet deep and was infested with thousands of rats and as many bats. The young men went with him on his next trip.

Paul was a clever one. As they went into the cavern, he left candles at intervals. John thought them unnecessary since he knew the caves so well but his nephews pointed out they didn't. If they became separated, the candles would guide them out of the cavern.

Arriving at one of the bottomless shafts, the nephews assured themselves of an early inheritance by pushing John into his death. Walking back to the entrance, they discovered the candles going out. Rats will eat anything, including candle wax.

Blundering about in the dark, one nephew fell down a shaft. The other was swarmed by the rats and eaten alive. So much for the inheritance.

INNER SANCTUM MYSTERIES was an old-time radio anthology series that aired from 1941 to 1952. The episodes ranged from mystery to fantasy to horror. The host was a smarmy man who liked to make ghoulish puns. Available as free mp3s from www.otrrlibrary.org

"The Devil's Fortune" was written by John Roeburt and aired on 1949-01-31. Tracy was a mining engineer who was blackmailed into helping a stranger named MacNamara. El Fortuna Diablo was an abandoned Mexican mine which still had a fortune in the depths.

MacNamara restarted the mine and swindled the owner Parento out of the property. He then booby-trapped Parento and his helper Salvador down in the shafts. Parento was killed and Salvador's face mutilated horribly.

Tracy was forced to help run the mine. Four miners died mysteriously in the mine. Footprints of cloven hooves were found by the bodies. Accidents began happening. The miners rebelled because the Devil was down there. MacNamara became frantic, especially since the mine wasn't producing any gold.

Tracy and MacNamara fought it out in the depths. The former met the Devil, who turned out to be Parento, dressed in costume. He had faked his death to gain revenge on MacNamara. It was Salvador who had died, and Parento who was mutilated.

SEEN IN THE LITERATURE

Astronomy.

Whitaker, K.E., et al (2021) **Quenching of star formation from a lack of inflowing gas to galaxies.** NATURE 597:485-488

Authors' abstract: *Star formation in half of massive galaxies was quenched by the time the Universe was 3 billion years old. Very low amounts of molecular gas seem to be responsible for this, at least in some cases, although morphological gas stabilization, shock heating, or activity associated with accretion onto a central supermassive black hole are invoked in other cases.*

Recent studies of quenching by gas depletion have been based on upper limits that are insufficiently sensitive to determine this robustly, or stacked emission with its problems of averaging. Here we report 1.3 mm observations of dust emission from 6 strongly lensed galaxies where star formation has been quenched, with magnifications of up to a factor of 30.

Four of the six galaxies are undetected in dust emission, with an estimated upper limit on the dust mass of 0.0001 times the stellar mass, and by proxy (assuming a Milky Way molecular gas-to-dust ratio) 0.01 times the stellar mass in molecular gas. This is two orders of magnitude less molecular gas per unit stellar mass than seen in star forming galaxies at similar redshifts.

It remains difficult to extrapolate from these small samples, but these observations establish that gas depletion is responsible for a cessation of star formation in some fraction of high redshift galaxies.

Rodney, S.A., et al. (2021) **A gravitationally lensed supernova with an observable two-decade time delay.** NATURE ASTRONOMY 5:doi.org/10.1038/s41550-021-01450-9

Authors' abstract: *When the light from a distant object passes very near to a foreground galaxy or cluster, gravitational lensing can cause it to appear as multiple images on the sky. If the source is variable, it can be used to constrain the cosmic expansion rate and dark energy models. Achieving these cosmological goals requires many lensed transients with precise time-delay measurements.*

Lensed supernovae are attractive for this purpose because they have relatively simple photometric behaviour, with well understood light curve shapes and colours, in contrast to the stochastic variation of quasars.

Here we report the discovery of a multiply imaged supernova, AT 2016jka ('SN Requiem'). It appeared in an evolved galaxy at redshift 1.95, gravitationally lensed by a foreground galaxy cluster.

It is probably a type Ia supernova, the explosion of a low-mass stellar remnant, whose light curve can be used to measure cosmic distances. In archival Hubble Space Telescope imaging, three lensed images of the supernova are detected with relative time delays of <200 d.

We predict that a fourth image will appear close to the cluster core in the year 2037 ± 2. Observation of the fourth image could provide a time delay precision of ~7 d, <1% of the extraordinary 20 yr baseline.

Siraj, A., and A. Loeb (2021) **Interstellar objects outnumber Solar system objects in the Oort cloud.** MONTHLY NOTICES OF THE ROYAL ASTRONOMICAL SOCIETY: LETTERS 507:doi.org/10.1093/mnrasl/slab084

Authors' abstract: *Here, we show that the detection of Borisov implies that interstellar objects outnumber Solar system objects in the Oort cloud, whereas the reverse is true near the Sun due to the stronger gravitational focusing of bound objects. This hypothesis can be tested with stellar occultation surveys of the Oort cloud.*

Furthermore, we demonstrate that~1 per cent of carbon and oxygen in the Milky Way Galaxy may be locked in interstellar objects, implying a heavy element budget for interstellar objects comparable to the heavy element budget of the minimum mass Solar nebula model. There is still considerable uncertainty regarding the size distribution of the interstellar objects.

Mars.

Guo, J., et al (2021) **Radiation environment for future human exploration on the surface of Mars: the current understanding based on MSL/RAD dose measurements.** ASTRONOMY AND ASTROPHYSICS REVIEW 29:doi.org/10.1007/s00159-021-00136-5 (available as a free pdf)

Authors' abstract: *Potential deleterious health effects to astronauts induced by space radiation is one of the most important long-term risks for human space missions, especially future planetary missions to Mars which require a return-trip duration of about 3 years with current propulsion technology.*

In preparation for future human exploration, the Radiation Assessment Detector (RAD) was designed to detect and analyze the most biologically hazardous energetic particle radiation on the Martian surface as part of the Mars Science Laboratory (MSL) mission.

RAD has measured the deep space radiation field within the spacecraft during the cruise to Mars and the cosmic ray induced energetic particle radiation on Mars since Curiosity's landing in August 2012. These first-ever surface radiation data have been continuously providing a unique and direct assessment of the radiation environment on Mars.

We analyze the temporal variation of the Galactic Cosmic Ray (GCR) radiation and the observed Solar Energetic Particle (SEP) events measured by RAD from the launch of MSL until December 2020, i.e., from the pre-maximum of solar cycle 24 throughout its solar minimum until the initial year of Cycle 25.

Over the long term, the Mars's surface GCR radiation increased by about 50% due to the declining solar activity and the weakening heliospheric magnetic field.

At different time scales in a shorter term, RAD also detected dynamic variations in the radiation field on Mars. We present and quantify the temporal changes of the radiation field which are mainly caused by:

(a) heliospheric influences which include both temporary impacts by solar transients and the long-term solar cycle evolution,
(b) atmospheric changes which include the Martian daily thermal tide and seasonal CO2 cycle as well as the altitude change of the rover,

(c) topographical changes along the rover path-way causing addition structural shielding and finally
(d) solar particle events which occur sporadically and may significantly enhance the radiation within a short time period.

Quantification of the variation allows the estimation of the accumulated radiation for a return trip to the surface of Mars under various conditions. The accumulated GCR dose equivalent, via a Hohmann transfer, is about 0:65 to 0:24 sievert and 1:59 to 0:12 sievert during solar maximum and minimum periods, respectively.

The shielding of the GCR radiation by heliospheric magnetic fields during solar maximum periods is rather efficient in reducing the total GCR-induced radiation for a Mars mission, by more than 50%.

However, further contributions by SEPs must also be taken into account. In the future, with advanced nuclear thrusters via a fast transfer, we estimate that the total GCR dose equivalent can be reduced to about 0.2 sievert and 0.5 sievert during solar maximum and minimum periods respectively.

Speirs: Good reading for hard-SF authors writing about space travel.

Goudge, T.A., et al (2021) **The importance of lake breach floods for valley incision on early Mars.** NATURE 597:645-649

Authors' abstract: *The surface environment of early Mars had an active hydrologic cycle, including flowing liquid water that carved river valleys and filled lake basins. Over 200 of these lake basins filled with sufficient water to breach the confining topography, causing catastrophic flooding and incision of outlet canyons.*

Much past work has recognized the local importance of lake breach floods on Mars for rapidly incising large valleys. However, on a global scale, valley systems have often been interpreted as recording more persistent fluvial erosion linked to a distributed Martian hydrologic cycle.

Here, we demonstrate the global importance of lake breach flooding, and find that it was responsible for eroding at least 24% of the volume of incised valleys on early Mars, despite representing only approximately 3% of total valley length. We conclude that lake breach floods were a major geomorphic process responsible for valley incision on early Mars, which in turn influenced the topographic form of many Martian valley systems and the broader landscape evolution of the cratered highlands.

Bolides.

Geng, S., et al (2021) **On the capture of small stony asteroids into the Earth's orbit by atmospheric grazing.** MONTHLY NOTICES OF THE ROYAL ASTRONOMICAL SOCIETY 507:doi.org/10.1093/mnras/stab2439

Authors' abstract: *An Earth-grazing asteroid can be captured into a gravitational bound orbit around the Earth during its transitory atmospheric journey. Otherwise, it will either escape back to space or plunge to the Earth directly.*

With fragmentation taken into account, we subdivide the captured and direct impact modes, expanding the above three modes into five: escaping, captured impact with and without fragmentation, and direct impact with and without fragmentation.

We then investigate the conditions of those various impact modes of shallow-angle impacts of small stony asteroids no larger than 100 metres in diameter. Moreover, the atmospheric entry processes of captured stony asteroids are further studied.

Results show that asteroids with larger diameters are easier to fragment for less deceleration due to the smaller area-to-mass ratio, narrowing the corridor for capture.

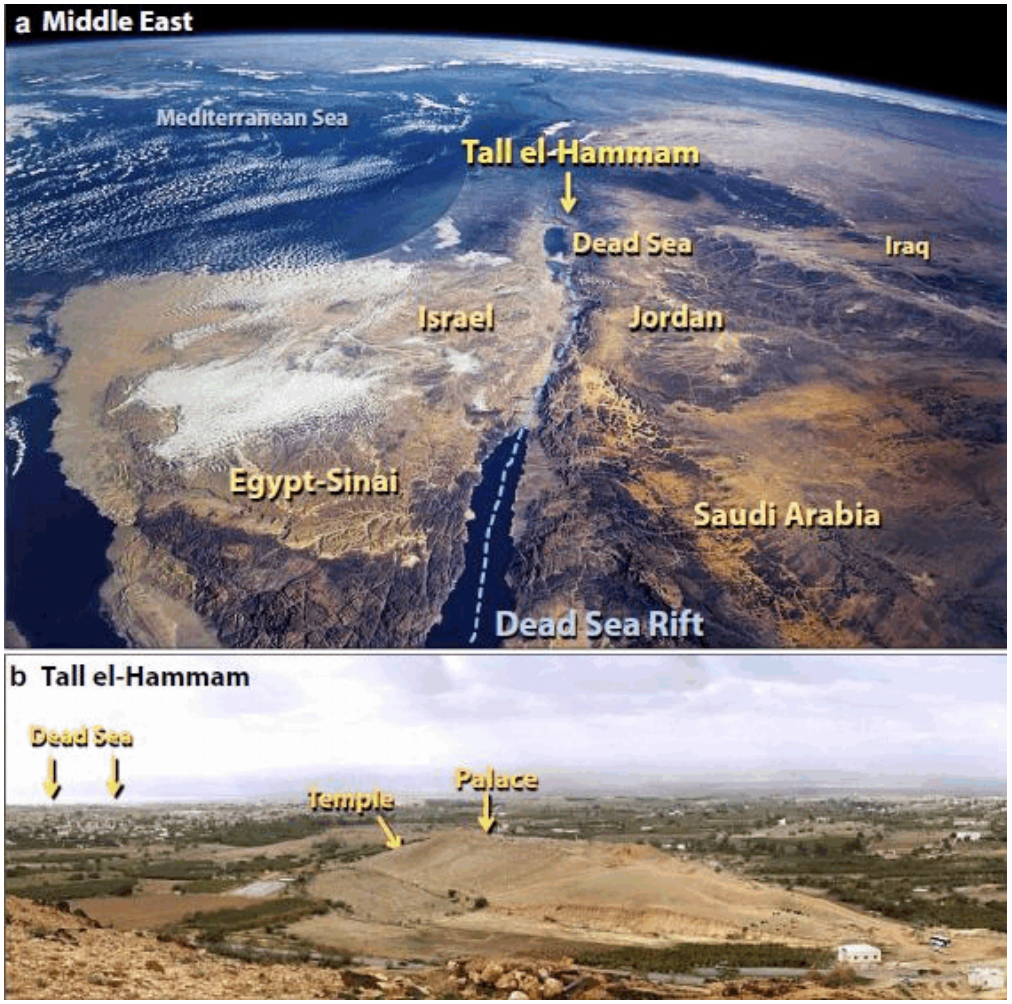
A captured asteroid can enter the atmosphere many times, highlighting itself by a series of explosive phenomena due to the shock wave it produced during every passage. The number of revolutions before its final entry increases as the theoretical perigee altitude rises.

The multi-entry phenomenon of captured impact reduces the velocity and mass of the impactor and raises the possibility of an intact landing of the object via atmospheric dissipation.

The time and space intervals between each entry make it difficult to identify whether the scattered impacts come from one captured impact event or just a series of different fireballs. The long path before its final hit also increases the difficulty of predicting the exact airburst position or landing site.

Bunch, T.E., et al (2021) **A Tunguska sized airburst destroyed Tall el-Hammam, a Middle Bronze Age city in the Jordan Valley near the Dead Sea.** SCIENTIFIC REPORTS 11:doi.org/10.1038/s41598-021-97778-3 (available as a free pdf)

['tall' is an Arabic/Hebrew word for a mound of ruins of an ancient settlement.]



Authors' abstract: *We present evidence that in ~ 1650 BCE (~ 3600 years ago), a cosmic airburst destroyed Tall el-Hammam, a Middle-Bronze-Age city in the southern Jordan Valley northeast of the Dead Sea. The proposed airburst was larger than the 1908 explosion over Tunguska, Russia, where a ~ 50-m-wide bolide detonated with ~ 1000× more energy than the Hiroshima atomic bomb.*

A city-wide ~ 1.5-m-thick carbon-and-ash-rich destruction layer contains peak concentrations of shocked quartz (~ 5–10 GPa); melted pottery and mudbricks; diamond-like carbon; soot; Fe- and Si-rich spherules; $CaCO_3$ spherules from melted plaster; and melted platinum, iridium, nickel, gold, silver, zircon, chromite, and quartz.

Heating experiments indicate temperatures exceeded 2000 ˚C. Amid city-side devastation, the airburst demolished 12+ m of the 4-to-5-story palace complex and the massive 4-m-thick mudbrick rampart, while causing extreme disarticulation and skeletal fragmentation in nearby humans.

An airburst-related influx of salt (~ 4 wt.%) produced hypersalinity, inhibited agriculture, and caused a ~ 300 to 600-year-long abandonment of ~ 120 regional settlements within a > 25-km radius.

Tall el-Hammam may be the second oldest city/town destroyed by a cosmic airburst/impact, after Abu Hureyra, Syria, and possibly the earliest site with an oral tradition that was written down (Genesis). Tunguska-scale airbursts can devastate entire cities/regions and thus, pose a severe modern-day hazard.

Speirs: Images are from this paper but there are many others. Well worth downloading for fascinating reading.

Origin Of Life.

Solomatova, N.V., and R. Caracas (2021) **Genesis of a CO_2-rich and H_2O-depleted atmosphere from Earth's early global magma ocean.** SCIENCE ADVANCES 7:doi.org/10.1126/sciadv.abj0406 (available as a free pdf)

Authors' abstract: *The magma ocean was a important reservoir for Earth's primary volatiles. Understanding the volatile fluxes between the early atmosphere and the magma ocean is fundamental for quantifying the volatile budget of our planet.*

Here we investigate the vaporization of carbon and hydrogen at the boundary between the magma ocean and the thick, hot early atmosphere using first-principles molecular dynamics calculations. We find that carbon is rapidly devolatilized, while hydrogen mostly remains dissolved in the magma during the existence of a thick silicate-bearing atmosphere.

In the early stages of the magma ocean, the atmosphere would have contained significantly more carbon than hydrogen, and the high concentrations of carbon dioxide would have prolonged the cooling time of early Earth.

Rimmer, P.B., et al (2021) **Timescales for prebiotic photochemistry under realistic surface ultraviolet conditions.** ASTROBIOLOGY 21:doi.org/10.1089/ast.2020.2335 (available as a free pdf)

Authors' abstract: *Ultraviolet (UV) light has long been invoked as a source of energy for prebiotic chemical synthesis, but experimental support does not involve sources of UVlight that look like the young Sun.*

Here we experimentally investigate whether the UV flux available on the surface of early Earth, given a favorable atmosphere, can facilitate a variety of prebiotic chemical syntheses. We construct a solar simulator for the UV light of the faint young Sun on the surface of early Earth, called StarLab.

We then attempt a series of reactions testing different aspects of a prebiotic chemical scenario involving hydrogen cyanide (HCN), sulfites, and sulfides under the UV light of StarLab, including hypophosphite oxidation by UV light and hydrogen sulfide, photoreduction of HCN with bisulfite, the photoanomerization of a-thiocytidine, the production of a chemical precursor of a potentially prebiotic activating agent (nitroprusside), the photoreduction of thioanhydrouridine and thioanhydroadenosine, and the oxidation of ethanol (EtOH) by photochemically generated hydroxyl radicals.

We compare the output of StarLab to the light of the faint young Sun to constrain the timescales over which these reactions would occur on the surface of early Earth. We predict that hypophosphite oxidation, HCN reduction, and photoproduction of nitroprusside would all operate on the surface of early Earth in a matter of days to weeks.

The photoanomerization of a-thiocytidine would take months to complete, and the production of oxidation products from hydroxyl radicalswould take years. The photoreduction of thioanhydrouridine with hydrogen sulfide did not succeed even after a long period of irradiation, providing a lower limit on the timescale of several years.

The photoreduction of thioanhydroadenosine with bisulfite produced 2¢-deoxyriboadenosine (dA) on the timescale of days. This suggests the plausibility of the photoproduction of purine deoxyribonucleotides, such as the photoproduction of simple sugars, proceeds more efficiently in the presence of bisulfite.

Johnson, A.C., et al (2021) **Reconciling evidence of oxidative weathering and atmospheric anoxia on Archean Earth.** SCIENCE ADVANCES 7:doi.org/10.1126/sciadv.abj0108 (available as a free pdf)

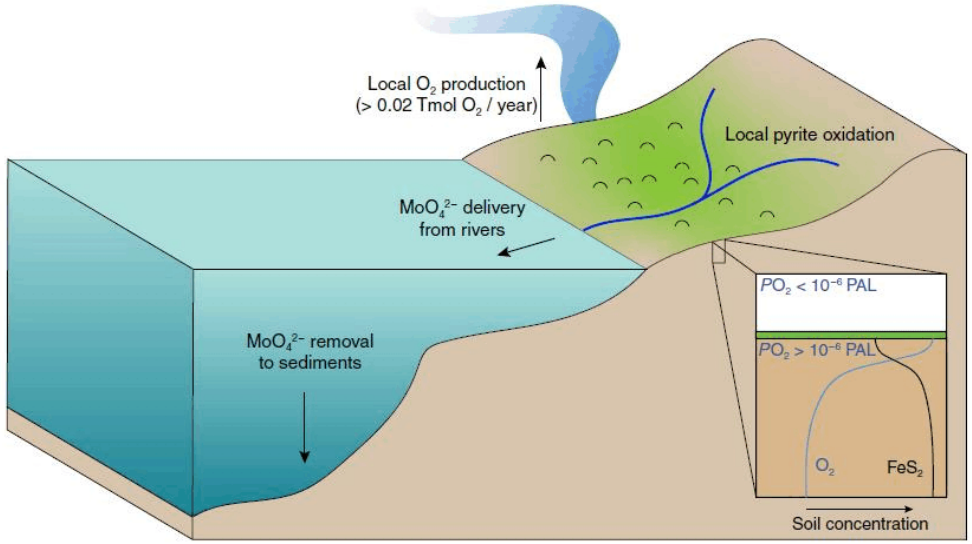
Authors' abstract: *Evidence continues to emerge for the production and low-level accumulation of molecular oxygen at Earth's surface before the Great Oxidation Event. Quantifying this early O_2 has proven difficult.*

Here, we use the distribution and isotopic composition of molybdenum in the ancient sedimentary record to quantify Archean Mo cycling, which allows us to calculate lower limits for atmospheric O_2 partial pressures (PO_2) and O_2 production fluxes during the Archean.

We consider two end-member scenarios. First, if O_2 was evenly distributed throughout the atmosphere, then $PO_2 > 10^{-6.9}$ present atmospheric level was required for large periods of time during the Archean eon.

Alternatively, if O_2 accumulation was instead spatially restricted (e.g., occurring only near the sites of O_2 production), then O_2 production fluxes >0.01 Tmol O_2/year were required. Archean O_2 levels were vanishingly low according to our calculations but substantially above those predicted for an abiotic Earth system.

Speirs: Image below is from this paper. When the earliest photosynthetic organisms began generating oxygen, they were localized patches. It took gigayears for Earth's atmosphere to become oxygenic.



Paleobiology.

Caxito, F., et al (2021) **Goldilocks at the dawn of complex life: mountains might have damaged Ediacaran-Cambrian ecosystems and prompted an early Cambrian greenhouse world.** SCIENTIFIC REPORTS 11:doi.org/10.1038/s41598-021-99526-z (available as a free pdf)

Authors' abstract: *We combine U-Pb in-situ carbonate dating, elemental and isotope constraints to calibrate the synergy of integrated mountain-basin evolution in western Gondwana. We show that deposition of the Bambuí Group coincides with closure of the Goiás-Pharusian (630 to 600 megayears ago) and Adamastor (585 to 530 Ma) oceans.*

Metazoans thrived for a brief moment of balanced redox and nutrient conditions. This was followed, however, by closure of the Clymene ocean (540 to 500 Ma), eventually landlocking the basin.

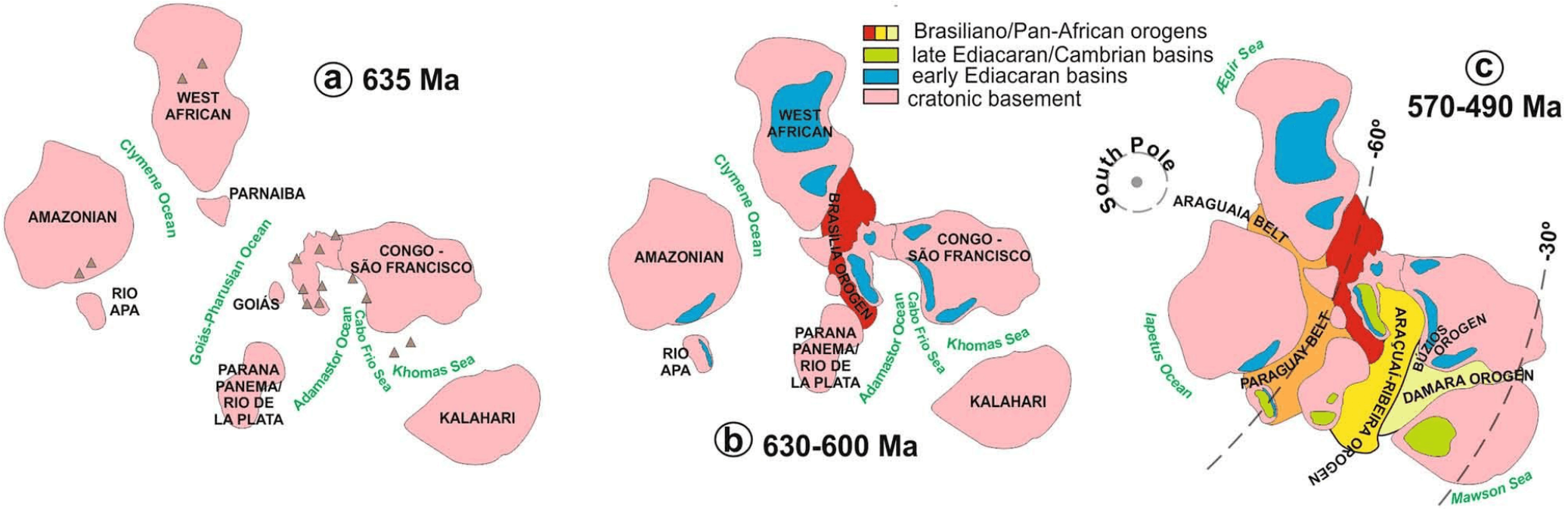
This hindered seawater renewal and led to uncontrolled nutrient input, shallowing of the redoxcline and anoxic incursions, fueling positive productivity feedbacks, and preventing the development of typical Ediacaran-Cambrian ecosystems.

Thus, mountains provide the conditions, such as oxygen and nutrients, but may also preclude life development if basins become too restricted, characterizing a Goldilocks or optimal level effect.

During the late Neoproterozoic-Cambrian fan-like transition from Rodinia to Gondwana, the newborn marginal basins of Laurentia, Baltica and Siberia remained open to the global sea, while intracontinental basins of Gondwana became progressively landlocked.

The extent to which basin restriction might have affected the global carbon cycle and climate, e.g. through the input of gases such as methane that could eventually have collaborated to an early Cambrian greenhouse world, needs to be further considered.

[Image on next page shows the formation of the supercontinent and how it crushed oceans.]


Brasiliano/Pan-African orogens
late Ediacaran/Cambrian basins
early Ediacaran basins
cratonic basement
ⓐ 635 Ma
WEST AFRICAN
PARNAIBA
AMAZONIAN
Clymene Ocean
Goiás-Pharusian Ocean
CONGO - SÃO FRANCISCO
RIO APA
GOIÁS
PARANA PANEMA/ RIO DE LA PLATA
Adamastor Ocean
Cabo Frio Sea
Khomas Sea
KALAHARI
ⓑ 630-600 Ma
BRASILIA OROGEN
ⓒ 570-490 Ma
Ægir Sea
South Pole
-60°
-30°
ARAGUAIA BELT
PARAGUAY BELT
ARAÇUAÍ-RIBEIRA OROGEN
BÚZIOS OROGEN
DAMARA OROGEN
Iapetus Ocean
Mawson Sea

Evans, S., et al (2021). **Ediacara growing pains: Modular addition and development in *Dickinsonia costata*.** PALEOBIOLOGY 47:doi.org/10.1017/pab.2021.31

Authors' abstract: *Constraining patterns of growth using directly observable and quantifiable characteristics can reveal a wealth of information regarding the biology of the Ediacara biota, the oldest macroscopic, complex community-forming organisms in the fossil record.*

However, these rely on individuals captured at an instant in time at various growth stages, and so different interpretations can be derived from the same material.

Here we leverage newly discovered and well-preserved Dickinsonia costata from South Australia, combined with hundreds of previously described specimens, to test competing hypotheses for the location of module addition. We find considerable variation in the relationship between the total number of modules and body size that cannot be explained solely by expansion and contraction of individuals.

Patterns derived assuming new modules differentiated at the anterior result in numerous examples in which the oldest module(s) must decrease in size with overall growth, potentially falsifying this hypothesis.

Observed polarity as well as the consistent posterior location of defects and indentations support module formation at this end in D. costata. Regardless, changes in repeated units with growth share similarities with those regulated by morphogen gradients in metazoans today, suggesting that these genetic pathways were operating in Ediacaran animals.

[Image is from Wikipedia.]

Rodríguez-Tovar, F.J., et al (2021) **Response of macrobenthic trace maker community to the end-Permian mass extinction in Central Spitsbergen, Svalbard.** PALAEOGEOGRAPHY, PALAEOCLIMATOLOGY, PALAEOECOLOGY 581:doi.org/10.1016/j.palaeo.2021.110637

[Ichnology is the study of animal tracks and other trace fossils. Bioturbation is the mixing of sediments by burrowing animals.]

Authors' abstract: *The End Permian Mass Extinction (EPME, ca. 252 Ma) is considered as the most severe biodiversity crisis in the Phanerozoic, affecting more than 90% of marine species and 75% of terrestrial species.*

In recent years, ichnological analysis has emerged as a proxy to better understand the paleoenvironmental changes associated with this event, as well as their effect(s) on the biota and its recovery.

This study focuses on the ichnological analysis of an extended upper Permian-Lower Triassic succession from the DD-1 core, drilled in Deltadalen, Central Spitsbergen. Variations in degree of bioturbation and ichnodiversity across the Permian-Triassic transition allow for the characterization of pre-, syn-, and post-EPME phases.

Pre-EPME is characterized by a high degree of bioturbation (BI = 5), and a diverse trace fossil assemblage (13 ichnotaxa) with abundant Nereites, frequent Planolites and Phycosiphon, and the more or less local record of Asterosoma, Bergaueria, Chondrites, Macaronichnus, Palaeophycus, Taenidium, Teichichnus, Thalassinoides, Zoophycos, meniscate horizontal burrows and

undifferentiated vertical traces, indicative of oxygenated bottom and porewaters, as well as high nutrient availability in the benthic habitat.

The EPME was followed by an interval characterized by the scarcity (BI = 1) or even absence (BI = 0) of trace fossils. The decrease in ichnodiversity was abrupt at first and more progressive subsequently, as the conditions were inhospitable (i.e., very low oxygenation) in the benthic habitat. In this context, short-lasting episodes of improved paleoenvironmental conditions (from anoxia to dysoxia) allowed for intermittent colonization of the substrate.

The post-EPME interval is characterized by a gradual recovery of the trace maker community in terms of abundance (BI from 1 to 5) and ichnodiversity (total of 10 ichnotaxa), revealing a relatively rapid reestablishment of favourable paleoenvironmental conditions for the benthic habitat, with better-oxygenated bottom and pore-waters, as well as improved nutrient availability at or just below the seafloor.

This new ichnological information highlights (i) the absence of a total extinction of the trace-maker community, despite a marked reduction in abundance and ichnodiversity during the EPME, and (ii) the rapid recovery of the benthic fauna during the Induan Age, ca. 150 kiloyears after the EPME occurred.

Schoenemann, B., et al (2021) **A 390 million-year-old hyper-compound eye in Devonian phacopid trilobites.** SCIENTIFIC REPORTS 11:doi.org/10.1038/s41598-021-98740-z (available as a free pdf)

Authors' abstract: *Trilobites, extinct arthropods that dominated the faunas of the Palaeozoic, since their appearance circa 523 million years ago, were equipped with elaborate compound eyes.*

While most of them possessed apposition compound eyes (in trilobites called holochroal eyes), comparable to the compound eyes of many diurnal crustaceans and insects living today, trilobites of the suborder Phacopina developed atypical large eyes with wide lenses and wide interspaces in between (schizochroal eyes).

Here, we show that these compound eyes are highly sophisticated systems, hyper-compound eyes hiding an individual compound eye below each of the big lenses. Thus, each of the phacopid compound eyes comprises several tens, in cases even hundreds of small compound eye systems composing a single visual surface.

We discuss their development, phylogenetic position of this hyper-compound eye, and its neuronal infrastructure. A hyper-compound eye in this form is unique in the animal realm.

Bengtson, S., et al (2021) **Eocene animal trace fossils in 1.7-billion-year-old metaquartzites.** PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES USA 118:doi.org/10.1073/pnas.2105707118

Authors' abstract: *Strained 1.7-billion-year-old metasedimentary rocks in southwestern Australia contain traces of burrowing animals, structures only known from the last half billion years of Earth history. As metamorphic events had made the sediment too hard for burrowing by ~1.2 billion years ago, it has been suggested that the burrows were made during the Paleoproterozoic by early animals with no other fossil record.*

We found, however, that the quartzite had been deeply weathered by about 50 megayears ago, allowing burrowing during an Eocene flooding. Subsequent rehardening of the sediment by silica precipitation restored the impenetrable quartzite with its metamorphic fabric. However, the burrows lack that fabric and contain detrital grains that are much younger than the matrix in which they occur.

The Paleoproterozoic (1.7 Ga [billion years ago]) metasedimentary rocks of the Mount Barren Group in southwestern Australia contain burrows indistinguishable from ichnogenera Thalassinoides, Ophiomorpha, Teichichnus, and Taenidium, known from firm grounds and soft grounds.

The metamorphic fabric in the host rock is largely retained, and because the most resilient rocks in the sequence, the metaquartzites, are too hard for animal burrowing, the trace fossils have been interpreted as predating the last metamorphic event in the region. Since this event is dated at 1.2 gigayears ago, this would bestow advanced animals an anomalously early age.

We have studied the field relationships, petrographic fabric, and geochronology of the rocks and demonstrate that the burrowing took place during an Eocene transgression over a weathered regolith. At this time, the metaquartzites of the

inundated surface had been weathered to friable sandstones or loose sands (arenized), allowing for animal burrowing.

Subsequent to this event, there was a resilicification of the quartzites, filling the pore space with syntaxial quartz cement forming silcretes. Where the sand grains had not been dislocated during weathering, the metamorphic fabric was seemingly restored, and the rocks again assumed the appearance of hard metaquartzites impenetrable to animal burrowing.

Dinosaurs.

[Image from Wikipedia shows North America as it was during the Late Cretaceous at the height of the dinosaurs. Alberta was at about the word Interior. The western half of the province was outwash swamp from the rising Rockies and the eastern half was ocean.

Bishop, P.J., et al (2021) **Predictive simulations of running gait reveal a critical dynamic role for the tail in bipedal dinosaur locomotion.** SCIENCE ADVANCES 7:doi.org/10.1126/sciadv.abi7348 (available as a free pdf)

Authors' abstract: *Locomotion has influenced the ecology, evolution, and extinction of species throughout history, yet studying locomotion in the fossil record is challenging. Computational biomechanics can provide novel insight by mechanistically relating observed anatomy to whole-animal function and behavior.*

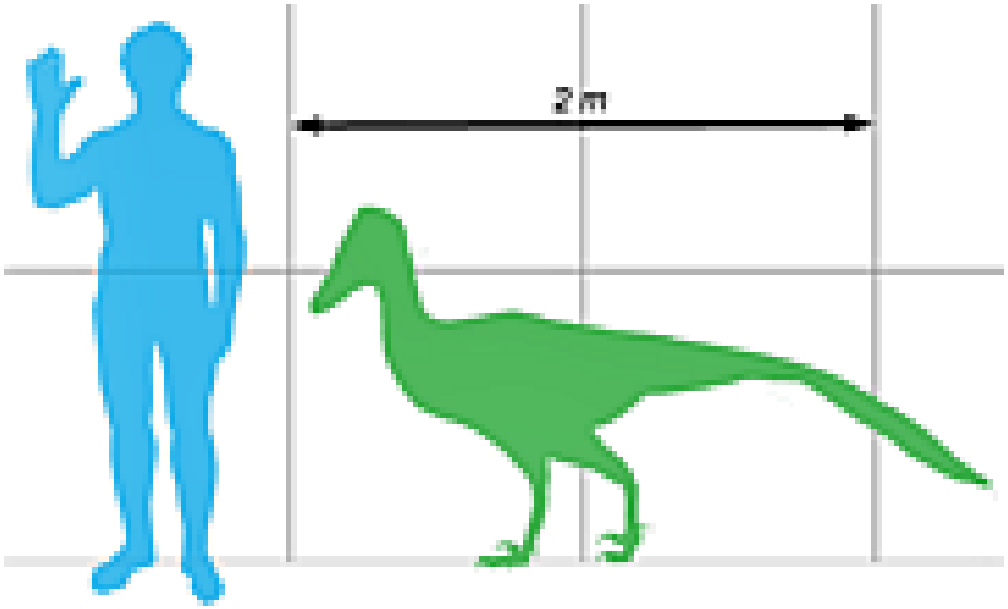
Here, we leverage optimal control methods to generate the first fully predictive, three-dimensional, muscle-driven simulations of locomotion in an extinct terrestrial vertebrate, the bipedal non-avian theropod dinosaur Coelophysis.

Unexpectedly, our simulations involved pronounced lateroflexion movements of the tail. Rather than just being a static counterbalance, simulations indicate that the tail played a crucial dynamic role, with lateroflexion acting as a passive, physics-based mechanism for regulating angular momentum and improving locomotor economy, analogous to the swinging arms of humans.

We infer this mechanism to have existed in many other bipedal non-avian dinosaurs as well, and our methodology provides new avenues for exploring the functional diversity of dinosaur tails in the future.

Varricchio, D.J., et al (2021) **Revisiting Russell's troodontid: autecology, physiology, and speculative tool use.** CANADIAN JOURNAL OF EARTH SCIENCES 58:doi.org/10.1139/cjes-2020-

[The late Dale Russell was a Canadian paleontologist who speculated that had non-avian dinosaurs not become extinct after the asteroid, the troodontid group might have developed into tool-using civilizations. Image is from Wikipedia and shows scale of troodontids to humans.]



Authors' abstract: *Dale Russell described the osteology, morphology, and ecology of the small theropod "Stenonychosaurus inequalis" in two papers, speculating on its life habits, brain power, vision, movement, feeding, and hand capabilities. Russell even pondered a tool-using dinosauroid, the hypothetical troodontid descendant if the lineage had survived the Cretaceous-Paleogene extinction event.*

We revisit the life habits of the North American troodontids Troodon formosus and Latenivenatrix mcmasterae in part by reviewing various trace fossils of T. formosus discovered in Montana. These fossils include egg clutches, a nest, and recently discovered regurgitalites.

We also contemplate the possibility of dinosaur tool use. Troodon likely constructed earthen nests in the same way that ratites and other birds did to create their nesting scrapes through backward hindlimb kicks. The more complex clutch architecture suggests dexterous movement of the eggs, potentially requiring manual manipulation.

Functionally, reproductive traces support elevated body temperatures and a metabolic output that approach but do not equal that of modern birds. Brooding would require very high energy investment from the adult.

The regurgitalites largely contain multi-individual aggregations of the marsupialiform Alphadon and support Russell's hypotheses of troodontids as crepuscular to nocturnal, intelligent, small game hunters with elevated metabolism and enhanced vision.

Tool use in a few crocodilians and widely among extant birds suggests a reasonable possibility of this behavior in nonavian dinosaurs. Whether an avian-comparable encephalization quotient and freed forelimbs would make North American troodontids good candidates for exhibiting such behavior remains an open and speculative question.

However, given the minimal modification made to tools by modern archosaurs, recognition of fossil tools poses a challenging problem.

Funston, G.F., et al (2021) **Baby tyrannosaurid bones and teeth from the Late Cretaceous of western North America.** CANADIAN JOURNAL OF EARTH SCIENCES 58:doi.org/10.1139/cjes-2020-0169

Authors' abstract: *Tyrannosaurids were the apex predators of Late Cretaceous Laurasia and their status as dominant carnivores has garnered considerable interest since their discovery, both in the popular and scientific realms. As a result, they are well studied and much is known of their anatomy, diversity, growth, and evolution.*

In contrast, little is known of the earliest stages of tyrannosaurid development. Tyrannosaurid eggs and embryos remain elusive, and juvenile specimens, although known, are rare. Perinatal tyrannosaurid bones and teeth from the Campanian-Maastrichtian of western North America provide the first window into this critical period of the life of a tyrannosaurid.

An embryonic dentary (cf. Daspletosaurus) from the Two Medicine Formation of Montana, measuring just 3 cm long, already exhibits distinctive tyrannosaurine characters like a "chin" and a deep Meckelian groove, and reveals the earliest stages of tooth development.

When considered together with a remarkably large embryonic ungual from the Horseshoe Canyon Formation of Alberta, minimum hatchling size of tyrannosaurids can be roughly estimated. A perinatal premaxillary tooth from the Horseshoe Canyon Formation likely pertains to Albertosaurus sarcophagus and it shows small denticles on the carinae.

This tooth shows that the hallmark characters that distinguish tyrannosaurids from other theropods were present early in life and raises questions about the ontogenetic variability of serrations in premaxillary teeth.

Sedimentary and taphonomic similarities in the sites that produced the embryonic bones provide clues to the nesting habits of tyrannosaurids and may help to refine the prospecting search image in the continued quest to discover baby tyrannosaurids.

Brown, C., et al (2021). **Intraspecific facial bite marks in tyrannosaurids provide insight into sexual maturity and evolution of bird-like intersexual display.** PALEOBIOLOGY 47:doi.org/10.1017/pab.2021.29

Authors' abstract: *Intraspecific aggression, or agonism, is a widespread intrasexual selective behavior important to understanding animal behavioral ecology and reproductive systems. Such behavior can be studied either by direct observation or inferred from wound/scar frequency in extant species but is difficult to document in extinct taxa, limiting understanding of its evolution.*

Among extant archosaurs, crocodylians display extensive intrasexual aggression, whereas birds show extreme visual/vocal intersexual display. The evolutionary origin of this behavioral divergence, and pattern in non-avian dinosaurs, is unknown.

Here we document the morphology, frequency, and ontogeny of intraspecific facial bite lesions (324 lesions) in a large sample of tyrannosaurids (202 specimens, 528 elements) to infer patterns of intraspecific aggression in non-avian theropods. Facial scars are consistent in position and orientation across tyrannosaurid species, suggesting bites were inflicted due to repeated/postured behavior.

Facial scars are absent in young tyrannosaurids, first appear in immature animals (~50% adult skull length), are present in ~60% of the adult-sized specimens, and show aggressor:victim size isometry.

The ontogenetic distribution of bite scars suggests agonistic behavior is associated with the onset of sexual maturity, and scar presence in approximately half the specimens may relate to a sexual pattern.

Considered in a phylogenetic context, intraspecific bite marks are consistent and widely distributed in fossil and extant crocodyliforms and non-maniraptoriform theropods, suggesting a potential plesiomorphic behavior in archosaurs.

Their absence in maniraptoriform theropods, including birds, may reflect a transition from boney cranial ornamentation and crocodylian-like intrasexual aggression to avian-like intersexual display with the evolution of pennaceous feathers.

Therrien, F., et al (2021) **Mandibular force profiles and tooth morphology in growth series of Albertosaurus sarcophagus and Gorgosaurus libratus (Tyrannosauridae: Albertosaurinae) provide evidence for an ontogenetic dietary shift in tyrannosaurids.** CANADIAN JOURNAL OF EARTH SCIENCES 58:doi.org/10.1139/cjes-2020-0177

Authors' abstract: *The albertosaurines Albertosaurus sarcophagus and Gorgosaurus libratus are among the best represented tyrannosaurids, known from nearly complete growth series. These specimens provide an opportunity to study mandibular biomechanical properties and tooth morphology to infer changes in feeding behaviour and bite force through ontogeny in tyrannosaurids.*

Mandibular force profiles reveal that the symphyseal region of albertosaurines is consistently stronger in bending than the mid-dentary region, indicating that the anterior extremity of the jaws played an important role in prey capture and handling through ontogeny.

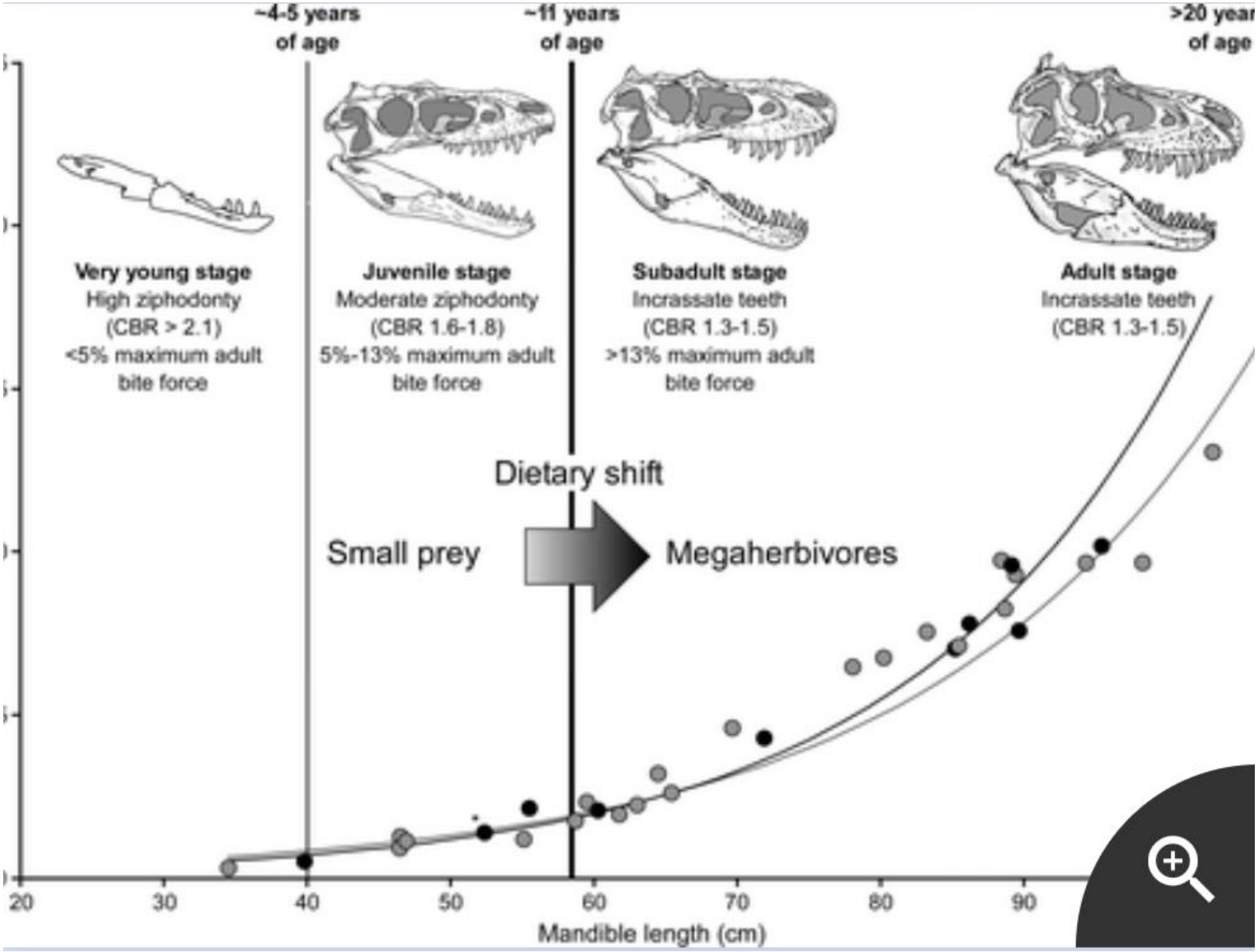
The symphyseal region was better adapted to withstand torsional stresses than in most non-avian theropods, but not to the extent seen in Tyrannosaurus rex, suggesting that albertosaurine feeding behaviour may have involved less bone crushing or perhaps relatively smaller prey than in Tyrannosaurus rex.

The constancy of these biomechanical properties at all known growth stages indicates that although albertosaurines maintained a similar feeding strategy through ontogeny, prey size/type had to change between juvenile and mature individuals.

This ontogenetic dietary shift likely happened when individuals reached a mandibular length of ~58 cm, a size at which teeth shift from ziphodont to incrassate in shape and bite force begins to increase exponentially.

The fact that large albertosaurines were capable of generating bite forces equivalent to similar-sized tyrannosaurines suggests that no significant differences in jaw-closing musculature existed between the two clades and that the powerful bite of Tyrannosaurus rex is the result of its large body size rather than of unique adaptations related to a specialized ecology.

[Chart is from this paper.]



Holtz, T.R. Jr (2021) **Theropod guild structure and the tyrannosaurid niche assimilation hypothesis: implications for predatory dinosaur macroecology and ontogeny in later Late Cretaceous Asiamerica.** CANADIAN JOURNAL OF EARTH SCIENCES 58:doi.org/10.1139/cjes-2020-0174

Author's abstract: *Well-sampled dinosaur communities from the Jurassic through the early Late Cretaceous show greater taxonomic diversity among larger (>50 kg) theropod taxa than communities of the Campano-Maastrichtian, particularly to those of eastern/central Asia and Laramidia.*

The large carnivore guilds in Asiamerican assemblages are monopolized by tyrannosaurids, with adult medium-sized (50 to 500 kg) predators rare or absent.

In contrast, various clades of theropods are found to occupy these body sizes in earlier faunas, including early tyrannosauroids. Assemblages with "missing middle-sized" predators are not found to have correspondingly sparser diversity of potential prey species recorded in these same faunas.

The "missing middle-sized" niches in the theropod guilds of Late Cretaceous Laramidia and Asia may have been assimilated by juvenile and subadults of tyrannosaurid species, functionally distinct from their adult ecomorphologies.

It is speculated that if tyrannosaurids assimilated the niches previously occupied by mid-sized theropod predators, we would expect the evolution of distinct transitions in morphology and possibly the delay of the achievement of somatic maturity in species of this taxon.

Speirs: After the tyrannosaurids evolved fully by the late Cretaceous, their success at all ages displaced other carnivores. This explains why there was a gap in middle-sized species, because the young tyrannosaurids outcompeted them. Compare with the chart from the previous paper.

Human Pre-History.

Pederzani, S., et al (2021) **Subarctic climate for the earliest Homo sapiens in Europe.** SCIENCE ADVANCES 7:doi.org/10.1126/sciadv.abi4642 (available as a free pdf)

Authors' abstract: *The expansion of Homo sapiens across Eurasia marked a major milestone in human evolution that would eventually lead to our species being found across every continent. Current models propose that these expansions occurred only during episodes of warm climate, based on age correlations between archaeological and climatic records.*

Here, we obtain direct evidence for the temperatures faced by some of these humans through the oxygen isotope analysis of faunal remains from Bacho Kiro Cave, Bulgaria, the earliest clear record of H. sapiens in Europe. The results indicate that humans ~45,000 years ago experienced subarctic climates with far colder climatic conditions than previously suggested.

This demonstrates that the early presence of H. sapiens in Europe was not contingent on warm climates. Our results necessitate the revision of key models of human expansion and highlight the need for a less deterministic role of climate in the study of our evolutionary history.

Bennett, A.R., et al (2021) **Evidence of humans in North America during the Last Glacial Maximum.** SCIENCE 373:doi.org/10.1126/science.abg7586

Authors' abstract: *Despite a plethora of archaeological research over the past century, the timing of human migration into the Americas is still far from resolved. In a study of exposed outcrops of Lake Otero in White Sands National Park in New Mexico, we reveal numerous human footprints dating to about 23,000 to 21,000 years ago.*

These finds indicate the presence of humans in North America for approximately two millennia during the Last Glacial Maximum south of the migratory barrier created by the ice sheets to the north.

This timing coincided with a Northern Hemispheric abrupt warming event, Dansgaard-Oeschger event 2, which drew down lake levels and allowed

humans and megafauna to walk on newly exposed surfaces, creating tracks that became preserved in the geologic record.

Archaeologists and researchers in allied fields have long sought to understand human colonization of North America. Questions remain about when and how people migrated, where they originated, and how their arrival affected the established fauna and landscape.

Here, we present evidence from excavated surfaces in White Sands National Park, where multiple in situ human footprints are stratigraphically constrained and bracketed by seed layers that yield calibrated radiocarbon ages between ~23 and 21 thousand years ago.

These findings confirm the presence of humans in North America during the Last Glacial Maximum, adding evidence to the antiquity of human colonization of the Americas and providing a temporal range extension for the coexistence of early inhabitants and Pleistocene megafauna.

[Image is from this paper.]

McConnell, J.R. et al (2021) **Hemispheric black carbon increase after the 13th-century Maori arrival in New Zealand.** NATURE 598:82-85

Authors' abstract: *New Zealand was among the last habitable places on earth to be colonized by humans. Charcoal records indicate that wildfires were rare prior to colonization and widespread following the 13th- to 14th-century Maori settlement, but the precise timing and magnitude of associated biomass-burning emissions are unknown, as are effects on light-absorbing black carbon aerosol concentrations over the pristine Southern Ocean and Antarctica.*

Here we used an array of well-dated Antarctic ice-core records to show that while black carbon deposition rates were stable over continental Antarctica during the past two millennia, they were approximately threefold higher over the northern Antarctic Peninsula during the past 700 years.

Aerosol modelling demonstrates that the observed deposition could result only from increased emissions poleward of 40˚ S, implicating fires in Tasmania, New Zealand and Patagonia, but only New Zealand palaeofire records indicate coincident increases.

Rapid deposition increases started in 1297 (±30 s.d.) in the northern Antarctic Peninsula, consistent with the late 13th-century Maori settlement and New Zealand black carbon emissions of 36 (±21 2 s.d.) gigagrammes per year during peak deposition in the 16th century.

While charcoal and pollen records suggest earlier, climate modulated burning in Tasmania and southern Patagonia, deposition in Antarctica shows that black carbon emissions from burning in New Zealand dwarfed other preindustrial emissions in these regions during the past 2,000 years, providing clear evidence of large-scale environmental effects associated with early human activities across the remote Southern Hemisphere.

Kocher, A., et al** (2021) **Ten millennia of hepatitis B virus evolution.** SCIENCE 374:182-188

** In this paper, 170 co-authors were listed. "et al" means "and others", which I use because each issue of OPUNTIA would be double the size if I listed all the authors.

Authors' abstract: *Hepatitis B virus (HBV) infections represent a worldwide human health concern. To study the history of this pathogen, we identified 137 human remains with detectable levels of virus dating between 400 and 10,000 years ago. Sequencing and analyses of these ancient viruses suggested a common ancestor between 12,000 and 20,000 years ago.*

There is no evidence indicating that HBV was present in the earliest humans as they spread out of Africa; however, HBV was likely present in human populations before farming. Furthermore, the virus was present in the Americas by about 9,000 years ago, representing a lineage sister to the viral strains found in Eurasia that diverged about 20,000 years ago.

Hepatitis B virus (HBV) has been infecting humans for millennia and remains a global health problem, but its past diversity and dispersal routes are largely unknown. We generated HBV genomic data from 137 Eurasians and Native Americans dated between ~10,500 and ~400 years ago.

We date the most recent common ancestor of all HBV lineages to between ~20,000 and 12,000 years ago, with the virus present in European and South American hunter-gatherers during the early Holocene.

After the European Neolithic transition, Mesolithic HBV strains were replaced by a lineage likely disseminated by early farmers that prevailed throughout western Eurasia for ~4000 years, declining around the end of the 2nd millennium BCE. The only remnant of this prehistoric HBV diversity is the rare genotype G, which appears to have re-emerged during the HIV pandemic.

Human History.

Posth, C., et al (2021) **The origin and legacy of the Etruscans through a 2000-year archeogenomic time transect.** SCIENCE ADVANCES 7:doi.org/10.1126/sciadv.abi7673 (available as a free pdf)

Authors' abstract: *The Etruscan civilization occupied a large area of central Italy during the Iron Age, including the modern-day regions of Tuscany, Lazio, and Umbria, with local expansions into neighboring Italian regions throughout its existence.*

This culture is renowned for its outstanding skills in metallurgy, its sophisticated cultural representations, and its extinct language, a non–Indo-European language not yet fully understood.

Given the peculiarities distinguishing this culture from its contemporary neighbors, the geographical origins of populations associated with the Etruscan civilization have long been a topic of intense debate as far back as ancient times with two main competing hypotheses.

The first proposes an Anatolian/Aegean origin as indicated by the ancient Greek writers Herodotus and Hellanicus of Lesbos. This hypothesis is supported by the presence of Ancient Greek cultural elements in Etruria during the so-called Orientalizing Period, between the eighth and sixth century BCE.

The second advocates for an autochthonous development as described in the first century BCE by the historian Dionysius of Halicarnassus. According to this hypothesis, the Etruscan population originated locally from people associated with the late Bronze Age (Proto-)Villanovan culture around 900 years BCE.

While the current consensus among archeologists favors the latter hypothesis, the persistence of a probable non–Indo-European language isolate surrounded by Italic Indo-European–speaking groups (such as the Latins) is an intriguing and still unexplained phenomenon that requires further archeological, historical linguistic, and genetic investigations.

Here we report a genomic time transect of 82 individuals spanning almost two millennia (800 BCE to 1000 CE) across Etruria and southern Italy. During the Iron Age, we detect a component of Indo-European–associated steppe ancestry

and the lack of recent Anatolian-related admixture among the putative non–Indo-European–speaking Etruscans.

Despite comprising diverse individuals of central European, northern African, and Near Eastern ancestry, the local gene pool is largely maintained across the first millennium BCE. This drastically changes during the Roman Imperial period where we report an abrupt population-wide shift to ~50% admixture with eastern Mediterranean ancestry.

Last, we identify northern European components appearing in central Italy during the Early Middle Ages, which thus formed the genetic landscape of present-day Italian populations.

The Modern Life Of Humans.

Many animal species have done well with humans, such as Richardson ground squirrels, very common on the Canadian prairies. Parks and freeway boulevards are ideal habitats for them. I took the photo below a couple of blocks from my house in 2018 March.

Fisher, R.J., et al (2021) **Richardson's ground squirrels (Urocitellus richardsonii) are associated primarily with intermediate levels of grassland, clay loam soils, and human development in Canadian mixed-grass prairies.** CANADIAN JOURNAL OF ZOOLOGY 99:doi.org/10.1139/cjz-2021-0059

Authors' abstract: *Richardson's ground squirrel (Urocitellus richardsonii) is a widespread burrowing mammal on the northern Great Plains. This species is a prominent prey item for a variety of predators and its burrows provide important habitat for other wildlife; however, Richardson's ground squirrel is also considered an economically damaging agricultural pest.*

Despite the ecological importance of Richardson's ground squirrels and their status as pests, there are gaps in our knowledge about large scale habitat associations for this species.

In 2011 and 2012, we conducted 1,840 roadside surveys in a 130,000 km2 area of southern Saskatchewan, Canada, to understand which habitat features are associated with Richardson's ground squirrel occurrence. Ground squirrels were observed on 8% of the surveys.

Probability of ground squirrel occurrence was highest in areas with moderate amounts of grassland (approximately 30%), areas that were developed by humans (>30%), and had a high proportion of clay loam soils, presumably for burrowing.

Our study highlights the importance of heterogeneous landscapes and that areas disturbed by humans may provide suitable vegetation structure for ground squirrels. This information can help to identify important habitat for species that rely on Richardson's ground squirrels and identify areas where Richardson's ground squirrels could come into conflict with agriculture.

Kim, B.H., et al (2021) **Three-dimensional electronic microfliers inspired by wind-dispersed seeds.** NATURE 597:503-510

Authors' abstract: *Large, distributed collections of miniaturized, wireless electronic devices may form the basis of future systems for environmental monitoring, population surveillance, disease management, and other applications that demand coverage over expansive spatial scales.*

Aerial schemes to distribute the components for such networks are required, and inspired by wind-dispersed seeds, we examined passive structures designed for controlled, unpowered flight across natural environments or city settings.

Techniques in mechanically guided assembly of three-dimensional (3D) mesostructures provide access to miniature, 3D fliers optimized for such purposes, in processes that align with the most sophisticated production techniques for electronic, optoelectronic, microfluidic and microelectromechanical technologies.

Here we demonstrate a range of 3D macro-, meso- and microscale fliers produced in this manner, including those that incorporate active electronic and colorimetric payloads.

Analytical, computational and experimental studies of the aerodynamics of high-performance structures of this type establish a set of fundamental considerations in bio-inspired design, with a focus on 3D fliers that exhibit controlled rotational kinematics and low terminal velocities.

An approach that represents these complex 3D structures as discrete numbers of blades captures the essential physics in simple, analytical scaling forms, validated by computational and experimental results. Battery-free, wireless devices and colorimetric sensors for environmental measurements provide simple examples of a wide spectrum of applications of these unusual concepts.

Speirs: The phrase "population surveillance" in the first sentence sent a chill through me.

Bouriga, S., and T. Olive (2021) **Is typewriting more resources-demanding than handwriting in undergraduate students?** READING AND WRITING 34:2227-2255

Authors' abstract: *The present study investigated cognitive effort of handwriting and typing of undergraduate students. In Experiment 1, we used a secondary reaction time task to assess the cognitive effort required by undergraduates when carrying out handwriting and typing copying tasks. Students had longer reaction times, indicating greater cognitive effort, when typing than when handwriting.*

In experiments 2a and 2b, we investigated whether the additional cost of typing affected an ongoing activity. Participants performed a short-term memory task that required them to type or write by hand words to recall. As Experiment 1 suggested that typewriting was more effortful than handwriting, so it should leave fewer resources to devote to memorizing words, which would result in a better handwritten than typed recall.

Overall, handwriting led to better recall than typing, particularly with the longest lists of words. This implies that, even in undergraduates, typing is still more effortful than handwriting and therefore has a negative impact on performance on an ongoing activity.

Morando, A., et al (2021) **A model for naturalistic glance behavior around Tesla Autopilot disengagements.** ACCIDENT ANALYSIS AND PREVENTION 161:doi.org/10.1016/j.aap.2021.106348 (available as a free pdf)

Authors' abstract: *Drivers may become inattentive when using partially-automated driving systems. The safety effects associated with inattention are unknown until we have a quantitative reference on how visual behavior changes with automation.*

The model is based on glance data from 290 human initiated Autopilot disengagement epochs. Glance duration and transition were modelled with Bayesian Generalized Linear Mixed models. The model replicates the observed glance pattern across drivers.

The model's components show that off- road glances were longer with AP active than without and that their frequency characteristics changed. Driving-related off-road glances were less frequent with AP active than in manual driving, while non-driving related glances to the down/center-stack areas were the most frequent and the longest (22% of the glances exceeded 2 seconds). Little difference was found in on-road glance duration.

Visual behavior patterns change before and after AP disengagement. Before disengagement, drivers looked less on road and focused more on non-driving related areas compared to after the transition to manual driving. The higher proportion of off-road glances before disengagement to manual driving were not compensated by longer glances ahead.

Tesla Autopilot (AP) is a supervised automation system (classified as a SAE Level 2 automated driving feature; SAE, 2018) that assists drivers in the lateral (Autosteer) and longitudinal control of the vehicle (traffic- aware cruise control, T-ACC). It is considered to be one of the most capable systems commercially available and it is used extensively.

AP is primarily a comfort system (e.g., to reduce the effort of continuous vehicle control) but it can also reduce the exposure to critical situations by increasing safety margins. For example, adaptive cruise control (ACC) alone was shown to reduce the frequency of too short (i.e., critical) time headway.

While Tesla's safety reports suggest that many consumers are using AP safely, high-profile crashes have occurred within the operational design domain (i.e., limited access highways), resulting in calls for more research on the unintended effects on driver behavior of AP and other automated systems.

For example, there is evidence that drivers may not be using AP as recommended. They become less attentive (longer eyes off-road glances) and relax direct control (hands-free driving). This change in behavior could be caused by a misunderstanding of what the system can do and its limitations, which is reinforced when automation performs relatively well.

CUPCAKES

A space filler here and a stomach filler at Casa Opuntia. What else to say?

Thanksgiving has come and gone, and so have these cupcakes.