OPUNTIA 489

Early December 2020

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: Thanks to the pandemic, this is about the most exciting public event in Calgary. Olympic Plaza in the downtown core is to Calgary what Times Square is to Manhattan. Skating rink activity is now but a shadow of better days. Seen on a Sunday afternoon on November 29, when normally the ice would be shoulder-to-shoulder with skaters.

LITTLE FREE LIBRARIES: PART 5

photos by Dale Speirs

[Parts 1 to 4 appeared in OPUNTIA #378, 427, 466, and 482.]

Seen on 9 Street SW at 17 Avenue in the Beltline district. At first I thought it was a LFL but when I got closer it proved to be one of those urban art objects that Calgary is afflicted with.

Below: Banff Trail district, on 23 Avenue NW
At right: Two LFLs in the Parkdale community of northwest Calgary.

RADIO FICTION: PART 13
by Dale Speirs

[Parts 1 to 12 appeared in OPUNTIAs #301, 302, 310, 319, 330, 353, 370, 377, 394, 411, 443, and 473.]

Stamping Around.

The first pre-announced scheduled radio broadcast to a mass audience was made on May 20, 1920, by a Montreal radio station, at that time XWA and later CFCF. The first American scheduled broadcast was on August 31 from Detroit by station 8MK, now called WWJ. Pittsburgh station KDKA often claimed to be the first for a broadcast November 2, but they weren't even first in the USA.

Canada Post issued a booklet of commemorative stamps in 2020, seen below. You might still be able to order them from www.canadapost.ca/shop/stamps

Weird Radio.

"The Message" by Clinton Dangerfield (1931 September, WEIRD TALES, available as a free pdf from www.archive.org) was about a man in a Death Row cell hoping for a last-minute reprieve. There was a radio which suddenly ceased the regular programming and began transmitting messages from a young woman.

She said it was the only way she could reach him. She told the condemned man she was trying to help him but events in the real world were conspiring against him. Her messages gave hope but time ran out and the man was executed. He said he would meet her in the next world.

What he didn't know was that she was already there, having just been killed in an accident. She was able to use radio waves to reach him but could not influence events. A story mainly written for pathos, with a sort of happy ending, if not in this life then the next one.

"Old Clothes" by John D. Whiting (1932 August, WEIRD TALES) was a vignette about an elderly radio experimenter who had just completed a super-sensitive device. Tuning across the frequencies, he intercepted a message from an alien who had just departed Earth bound for Saturn.

The alien talked of how it had toured Earth using the flesh clothes, which were obviously human bodies. It was glad to be free of the encumbrance of flesh and once more roaming outer space as free energy.

Nothing in the way of plot, just a short-short about aliens using human bodies as temporary disguises. The radio message ended and the old man fell asleep. That was it.

Putting On A Show.

THE HALL OF FANTASY was an anthology old-time radio series that lasted a year. "The Perfect Script", written by Robert Olsen, aired on 1947-02-13, and was the first episode of the series. It was about a horror radio series of the same title. The producer John Marchand hired a new writer named

Peter Schenk for a script. He took him to a cottage out on the coast, supposedly to allow him to write in peace and quiet.

The housekeeper Trudy was a demented woman whose husband had crashed his aircraft into the ocean years ago. She went for long walks on the beach in the belief that he would return. Marchand told her to set up Schenk with paper and typewriter.

Schenk talked to himself a lot, over-explaining events to the audience. Marchand and Trudy kept him distracted with weird goings-on, so he had to do a lot of talking. Too late he learned that previous writers only did one script before disappearing. Marchand said he found a special place for them and would do the same for Schenk.

The hint was initially missed by Schenk, who got down to typing. Eventually he figured out that he was being stage managed to a horrifying end so as to write a perfect script. Marchand waved a 45 pistol at Schenk to inspire him, plus spiked his milk with drugs.

Various alarums kept Schenk tapping away on the typewriter and talking to the listeners. He was guarded by George, an Igor character who kept saying he needed good blood. Marchand was knifed by George, who then turned his attentions to Trudy. Good blood, both of them.

Detective Fiction Weekly - 1937-03-27

Schenk managed to finish his script, as he explained at great length. At that point the episode abruptly ended, like hitting a brick wall. I hope he called the police. Somebody should do something about George.

Comedy Tonight.

I'M SORRY, I'LL READ THAT AGAIN was a comedy series that aired on BBC Radio from 1964 to 1973. It was a music hall type of show, with broad comedy and comic songs. Many of the cast members later went on to form the Monty Python troupe and other comedy series. Available as free mp3s from the Old Time Radio Researchers group at www.otrrlibrary.org

"The Story Of Radio" was a light-hearted look at the history of BBC radio, at that time 43 years old. The episode aired on 1965-12-06. It began with a series of trivia questions and answers, including that hoary old joke:
Q: How many people work in Broadcasting House?
A: About half.

From there to the news, where a male and female newsreader pair started to read the news, then segued into soap opera dialogue and began romancing each other. Eventually they remembered they were on the air and broke off their lovemaking to return to the script.

Next up was a parody of World War Two morale boosting shows. Jo Kendall sang an extended version of "Now, Now Is The Time" to an oom-pah-bah band. The microphone was adjusted to sound like it was a recording from the 1940s and was a perfect simulation of those old radio shows.

The song began as first written, then incorporated fragments from every song that Vera Lynn performed. Whenever it looked like the song was almost over, Kendall would loop back to the beginning and repeat a new variation. The live audience soon caught on and would burst into laughter as Kendall approached an ending and then kept going.

The scriptwriters took on the politicians with a drama set in a country pub. The characters remarked they were glad the BBC didn't parrot the party line of the Harold Wilson government. The lads then proceeded to do exactly that, praising the benevolence and wise guidance of the policies of the day. They explained to each other in excruciating detail why tax increases, licence fees, and speed limits were good for the common person.

Another subject was the BBC good practices committee "*devoted to censoring things you might enjoy*". Their solution was to replace doubtful words with harmless noises, which, of course, only drew the listeners' attention and made the dialogue seem naughtier than it actually was. Immediately following was an anecdote about a Yorkshireman trundling a barrel full of manure through Piccadilly Circus.

And so further through the episode. Some of the jokes will be incomprehensible to non-British listeners, and a few more will baffle young British listeners who don't know the history and political issues of those days. By and large though, much of the comedy is still enjoyable today.

"The Radiation Of The Chinese Vegetable" by C. Sterling Gleason (1929 December, SCIENCE WONDER STORIES, available as a free pdf from www.archive.org) would be considered politically incorrect today. Hollywood movie star Harold Dare was a chop suey fanatic, whose favourite establishment was a restaurant operated by the beautiful maiden Wun Look.

Came the day when the villainous Yet Un-Hung cornered the market in Chinese vegetables for his own chain of restaurants. The vegetables did not grow well in America. They were imported from deepest China where Yet had bought up the entire supply.

Dare wouldn't accede to the situation. He had the money to have a laboratory figure out how to grow the vegetables in California, using high-frequency radio waves beamed at the crop fields to speed up the growth of the plants.

Alas, another wealthy actor named Dandy Diavolo, who specialized in playing villains, owned a half-interest in the Yet Un-Hung chain. He kidnapped Dare and Wun, and in the plant laboratory strapped them into chairs rigged with high-powered diathermy equipment.

Diathermy is targeted heating by high-frequency radio emissions, often used in medical treatments or spot welding. As Diavolo pointed out, diathermy can be used to cook a steak when the power is turned way up. Which of course he proposed to do, except not to cook a steak.

Diavolo turned up the heat. Dare took a deep breath and realized the pain dropped slightly when he expanded his chest. Rather than try to summarize what happened next, I give you Dare's explanation:

Then I happened to notice that, as I breathed, the current varied with the motion. By a process of ratiocination I deduced that this effect was due to the greater resistance of the chest when expanded. I was instantly struck with the resemblance of this phenomenon to the action of a microphone.

Now, it is well known that any apparatus will act as a microphone if it will vary electrical current in proportion to the physical vibrations that constitute sound. In this case, my chest itself had to act as the diaphragm.

By using deep chest tones, I caused the voice vibrations to be centered about my chest and give a maximum displacement; thus increasing the change of intensity to a comparatively large variation.

Since the vocal vibrations caused the radio-frequency current to vary in exact accordance with the speech, the current in the circuit was modulated with the voice, just as with the carrier wave of a broadcasting station. As I had hoped, someone outside happened to pick up the radiation from the long wires running to the Chinese plants, which acted as antennae projecting the wave into space.

In other words, he used the diathermy device to transmit a radio message to the outside world. Someone heard the message for help and rescued them in the nick of time. The epilogue of the story was:

"Come, Wun Look. Let us dine on chop suey, made with vegetables raised by the same radio-frequency vibrations which have proved our savior!" And Harold Dare and the beautiful maiden went forth to a new day, of brighter dreams and a finer chop suey.

TRAIN OF EVENTS: PART 4
by Dale Speirs

[Parts 1 to 3 appeared in OPUNTIAs #403, 416, and 461.]

"Swamp Train" by Harry Walton (1940 January, UNKNOWN, available as a free pdf from www.archive.org) was about a murderer named Rister who had $50,000 in cash and was making his escape. He returned to the village where he had grown up and from there decided to take the train into the city.

The conductor told him he was hell bound, which shook Rister but didn't dissuade him. The train was a decrepit old local that had seen better days. Upon arrival, Rister took a hotel room, telling the clerk he had come in on the local. It wasn't long before the sheriff arrived and took Rister into custody. The local hadn't run in a decade, and the rails had been lifted years ago.

The plot was predictable from the moment Rister boarded the ghost train, but the story was well told. The mood was set up well. The milieu of rural village life matched my experiences as a farm boy, although passenger trains stopped running in rural Alberta long before I was born.

TERROR AT THE FAIR (2010) by Robert Goldsborough was a novel in a series about Chicago newspaper reporter Steve 'Snap' Malek, set in the 1940s. This particular story took place at the Chicago Railroad Fair in 1949, a wannbe world's fair sponsored by all the railway companies.

Someone was killing visitors to the fair at random by different methods. Interspersed through the text are brief thoughts of the killer, a psychotic who wanted revenge for something that happened to his father. In the course of time it was revealed that the father, long since died, was a locomotive engineer who had been falsely accused of negligence in a fatal accident.

A routine plot of a routine catch-the-psycho mystery. However, the author did a good job of illustrating the fair (which really did happen) and the railroads at their peak. Worth reading, either as a mystery or as a railfan.

Gimme That Old Time Radio.

BOSTON BLACKIE aired on old-time radio from 1944 to 1950, and was also a series of 14 movies. His real name was Horatio Black but everyone, including his girlfriend Mary Wesley, called him Blackie. The radio shows are leavened with humour and quips. They are available as free mp3s from the Old Time Radio Researchers at www.otrrlibrary.org

Blackie had been a jewel thief in Boston and was supposedly reformed now that he lived in New York City. Supposedly, because he had no day job and took no fees as an amateur detective, yet lived well in a nice apartment and squired Wesley around to the fanciest nightclubs.

Blackie's nemesis was NYPD Homicide Inspector Farraday. The name was originally spelt in the usual way with one 'r' but after the series got going for some reason the extra letter was added.

In the early episodes of the series, Farraday would arrest Blackie on sight, then gather evidence to fit him. Over time their relationship moderated to being sparring partners. Blackie liked to barge into hot cases and race Farraday to the solution, while Farraday always had the snappiest lines.

One amusing aspect of the series was the berserk organist who provided all the music. Scenes were punctuated, and that is the correct word, by abrupt chords on the organ. Dramatic lines spoken by the cast were followed by crescendos, although the opening and closing themes were more sedate. Writers were not credited, although the actors were.

"The Derailed Gold Train" was a 1946 episode whose title was a misnomer. The train wasn't derailed, just delayed so the bad guys could use it to create an alibi. An express carrying a gold shipment smashed into a car deliberately parked on a grade crossing near Danville.

Jump to a telephone conversation between Boston Blackie and Mary Wesley. He was on business in Danville and told her the next train home wasn't for six hours. After hanging up, he had a visit from a damsel in distress, Margaret Perkins, whose brother Harry had skipped town under suspicious circumstances. Blackie agreed to help.

His investigation began at the railroad station. The stationmaster mentioned the express halting for 20 minutes the day before after crashing into the car. Blackie suspected that Harry's absence was related to the stoppage. The wreckage was still in the ditch.

The car had no licence plate and the engine block was rusted. Blackie concluded it was a junkyard jalopy deliberately towed out and left to block the train. He tracked the vehicle identification to the car dealer, who identified Harry as the buyer, with a partner named Steve Johnson.

Blackie walked Margaret back to the Perkins house. They found Harry inside, dying from gunshot wounds. Only then did Blackie learn the express had been carrying gold. He telephoned the big city, but Inspector Farraday told him the gold had arrived safe and sound yesterday.

This flummoxed Blackie, who thought he had solved a case. Farraday said he was working on a different case, the murder of Roger Lane. Blackie took Margaret into the city to stay with Wesley, then went over to the police station to annoy Farraday.

Farraday was trying to nail Sam Baldwin for the murder of Lane but couldn't break the alibi. Baldwin claimed to have been out of town and not back until the express brought him in the following morning. He was made aware that Farraday knew about the delayed train.

That got Baldwin worried, so he called his henchman Johnson and put out a contract on Blackie. Johnson accidently met up with Margaret and Wesley while searching for Blackie. They knew each other, having grown up together, but she didn't know he had killed her brother.

The final contretemps brought everyone together, with Blackie blundering into trouble because he wouldn't shut up and let Wesley explain there was a gunman standing directly behind him. The train had been stopped so Baldwin could sneak on board and then arrive in the city supposedly having traveled on the train since before Lane's murder.

Johnson was about to clean up with mass murder to silence everyone but Farraday arrived in the nick of time. Shots were fired but to no effect. Johnson was hauled away to stand trial with Baldwin. All was well, except for the dead men of course.

INNER SANCTUM was an old-time radio mystery anthology series that aired from 1941 to 1952. (This and other episodes are available as free mp3s from www.otrrlibrary.org or www.archive.org) The host was a smarmy man who liked to make ghoulish puns.

"Death Pays The Freight" was a 1952 episode of INNER SANCTUM, no writer credited, about Joe Harris, a hobo on the trains trying to get to California for the winter. In a freight car he met his doppelganger, an insane man who thought he was a demon and tried to kill him. They fought to the death and Harris won.

On the body Harris found a draft card identifying the deceased as Martin Pell. He decided to switch draft cards and assume his identity. Harris had a criminal record so he thought he could start afresh. He jumped the train at a watering stop and went into the village for something to eat.

Going into a diner, he was shocked when the counterman, named Bliss, greeted him by name as Martin. By random chance Harris had landed in Pell's hometown. Another shock came when Bliss mentioned why Pell had left in the first place. He had robbed the bank and killed the night watchman.

Yet another shock came when Bliss thanked him for coming back to do a job for $1,000. The counterman had a wealthy uncle and was tired of waiting for his legacy, so he had hired Pell to speed up the inheritance.

Harris qua Pell was in a bind. Since he had left his draft card on Pell's body, he couldn't prove his innocence for the bank job without being sent up for Pell's murder. Therefore he had to comply or else Bliss would turn him over to the police.

The two men called on Uncle. Harris backed out of the job at the last minute so Bliss killed the old man, then knocked Harris unconscious to fix the blame on him. Harris escaped, then went after Bliss. He held a knife to Bliss and made him write a confession before killing him.

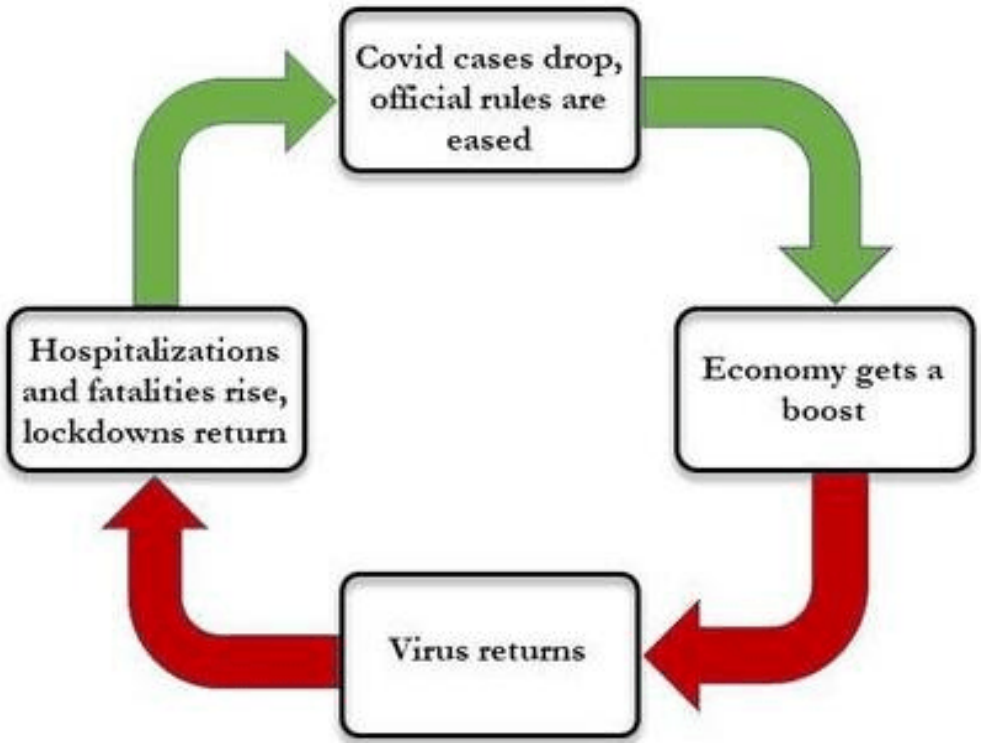
After the local police found the body, the heat was off. It was a perfect crime. Harris jumped a train. The boxcar was the same one he rode into town, and Pell's body was still there. The railroad bulls would run him in at the end of the line.

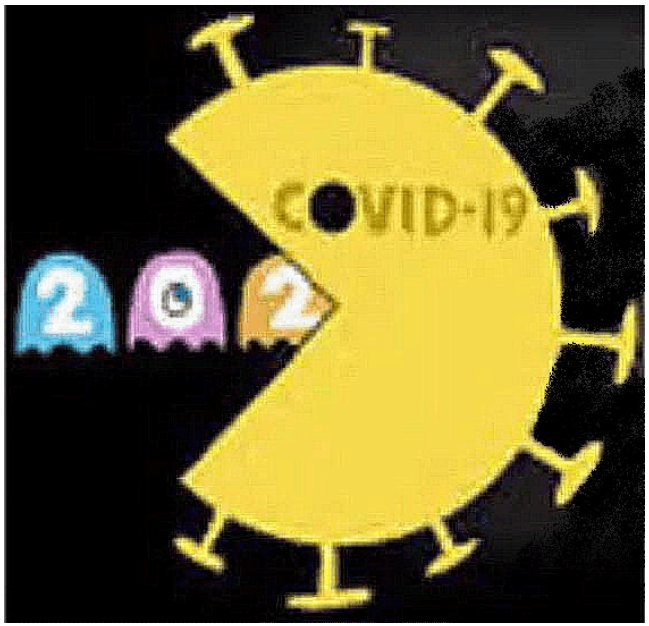
I photographed this mural on the back wall of a downtown building at Centre Street facing onto the Stephen Avenue pedestrian mall (8 Avenue South). The bearded man is George Stephen, the first president of the Canadian Pacific Railway, after whom the mall was named. (Also a mountain in the Rockies.)

Stephen was in charge of the first transcontinental railroad, which reached Calgary in August 1883. At that time it was a hamlet attached to Fort Calgary, an outpost of the Mounties. The railway began the transformation of the hamlet into a city. Don't ask me what the lizard on the mural represents.

CURRENT EVENTS: PART 8
by Dale Speirs

[Parts 1 to 7 appeared in OPUNTIAs #474, 475, 479, 480, 483, 484, and 488.]





2020 was the Year When Everything Was Cancelled.

While some jurisdictions locked down everyone indiscriminately, the Alberta government had preferred a targeted approach.

Contact tracing showed the second wave of the pandemic was due to Thanksgiving dinners where families gathered from different areas. All it took was one asymptomatic spreader to give the diseases to the grandparents, aunts and uncles, cousins, and other relatives come from away. By mid-October this had started an exponential slope. Halloween parties poured fuel on the fire.

The Alberta government issued a ban on November 24 prohibiting all social gatherings, including families who did not live together under one roof. The restaurants and taverns were already restricted, closing at 22h00. I photographed this sign on Stephen Avenue pedestrian mall on November 25.

A couple of days later, the government confirmed the restrictions with an emergency alert sent to all text-message enabled devices, such as my smartphone.

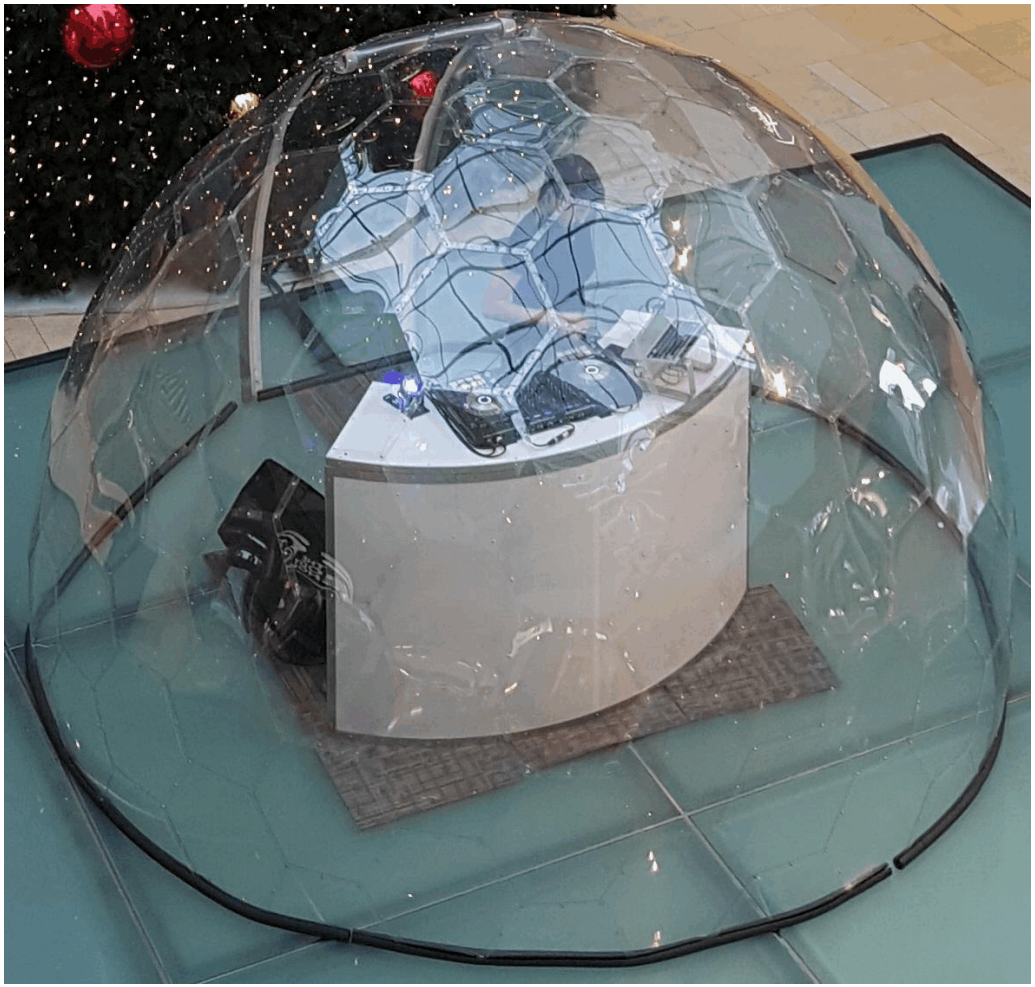
This appeared on smartphone displays a few days later.

I saw this store on Centre Street North. Alas, they meant computer viruses.

As of November 30, the national statistics for Canada were 378,139 active cases plus 12,130 deaths.

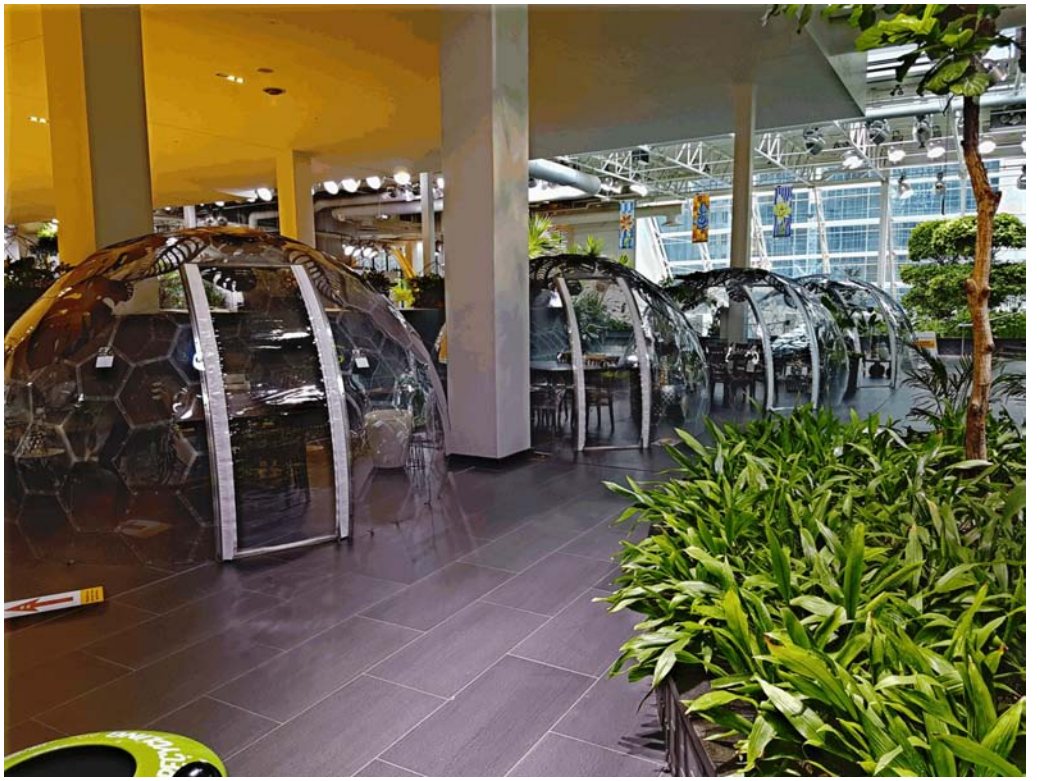
The TD Square atrium normally had choral singers during the Christmas season. This year they had a DJ in a plastic bubble. Trying to photograph her was almost impossible because no matter from what angle I tried, the reflections from the bubble obscured her.

She only had five viewers (hidden beneath the balcony from where I took this photo) when I walked by on November 27 during the middle of the lunch hour. That was probably about half the people in the entire shopping mall, and I do not exaggerate. Notice how empty the levels are during what normally would have been heavy pedestrian traffic. The retailers will not have a Merry Christmas.



The fourth floor of TD Square covers three city blocks, of which two are the Devonian Gardens, the only indoor ornamental park operated by the City of Calgary Parks Dept. (The other block is the food court.)

Normally the park was often booked for private functions which paid the extra maintenance costs, but like every other operation took a massive hit to revenues. These fine-dining domes were an attempt to work around the problem and at least get some revenues flowing.



LICENCED TO DRIVE: PART 3
photos by Dale Speirs

[Parts 1 to 2 appeared in OPUNTIA #476 and 482. Previous licence plate photos were in OPUNTIAs #63.5A, 410, 421, 445, 452, 459, and 471.]

Alberta has special licence plate designs for those willing to pay the extra fee.

LETTERS TO THE EDITOR

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

FROM: Lloyd Penney 2020-11-24
Etobicoke, Ontario

OPUNTIA #485: Great pathways [in Calgary], and I'd love to explore them. But, I suspect the grounds you photographed here are much like the ground around here, covered in snow. We are expecting warmer weather shortly, and it will melt, but we know much more is in the offing.

[Calgary's typical winter alternates between light snow (about 15 cm or so) and chinooks (hot winds from the adjacent mountains which strip away the snow in a day). If we have more snow days than bare ground, the winter is considered a hard one. If the chinooks are constant, then we are smug. Usually in late December or January we get a week of cold weather in the -20° to -30°C range but normally temperatures are mild in the 0° to -10° range, which is what November has been so far.]

I have seen that $100 trillion note from Zimbabwe before. With the debts being incurred from the relief programmes from our governments and other countries' governments, because of the COVID-19 pandemic, I wonder how our own currencies will fare? Last I looked, the Canadian dollar was still worth about 75¢ US, so there may not be much change.

[That's because other currencies are valued against the American dollar. If all currencies go into the toilet together, including the US$, then they keep the same ratio against each other. The only good measurement is the real inflation rate (not the fictitious Consumer Price Index). In Calgary, a good quality hamburger, French fries, and a soda pop now cost at least $12 at fast-food outlets. That's how I measure inflation. I am old enough to remember buying that meal as a teenager in the late 1960s for under a dollar.]

Stocking up? Our pantry is well-stocked, not because of hoarding or panic-buying, but because of regular purchases made, especially if the item was on sale.

[I do the same thing. Safeway is currently having a sale on 1-litre bottles of Coke Zero for 69¢ each, so I have been carting home a half-dozen each time I'm there. I have them lined all the way along my kitchen counter in a double row. I keep an eye out for TV dinners at $2.99 as well.]

I should look up some of the steampunk stories you mention, although I have found that as interesting (to me) as the premises are, the writing can be ponderous.

[I skip a lot of modern steampunk because the author insisted on introducing magic or fairies, or dragged in every famous historical character who went near the place. Worse yet are the ones which introduce massive changes, such as the Tunguska bolide taking out the centre of continental USA instead of Siberia, yet all the subsequent historical characters are exactly the same.]

So many great radio series, and so little time to spare for it all.

[I average about one episode a day. Old-time radio mp3s are great for listening while doing monotonous work around the house.]

My previous letter: When our folks moved from Orillia, Ontario to go out to Victoria, we did take the train, and we did go through Calgary. And, that was in 1977.

Toronto and neighbouring Peel Region are in Code Red lockdown, mostly because there are too many children in adult bodies to fail to listen to the premier and scientists who are telling them to stay home. Too many who declare, "You can't tell ME what to do! It's all a hoax, anyway!" We also have demonstrations against the wearing of a mask, and all we can do is shake our heads. We wear our masks any time we go out, but few in our building pay attention to the masks are required signage everywhere.

[The day I got your letter, November 24, the Alberta government announced targeted bans, such as all social gatherings, including family dinners with relatives who do not live in the same house. Contact tracing showed the second wave began in middle October after Thanksgiving, and then was boosted further by Halloween parties. There was no surge in the summer when the first lockdown ended.]

[Many doctors and nurses are signing petitions or open letters calling for a second lockdown. Premier Jason Kenney pointed out their hypocrisy because they still get paid during any lockdown. Millions were shut out of their jobs during the first lockdown and still haven't got back to their previous income.]

OPUNTIA #486: I think Toronto may be getting those electric scooters. We have thousands of civic rental bicycles, but the scooters could be fun, too.

[Calgary had the rental bicycles first, a year before the scooters were introduced. They were popular but when the scooters arrived, the bicycle rentals fell off a cliff, so they were discontinued. Apparently it was too much work pedaling. No wonder we have an obesity crisis.]

Hmmm…famous for being famous. Too much of that happening. Not that such fame had much value to begin with, but that kind of fame can't be worth much, unless you license out your famous life to be covered in regular reality programme, which, I suspect, can put millions in your bank account. I wonder what the exchange rate for your privacy is these days.

[The exchange rate is zero. The proof is Facebook, where people gladly give away personal information to corporate data mining.]

Our Halloween wasn't much, and neither was our Thanksgiving. When it comes to Christmas, we are already bombarded with carols and sales, and too much Christmas 'cheer'. I suspect our gifts will be minimal, and we are actually spending more money on Christmas cards this year than anything else. Hope you got yours.

[No Speirs family gathering this year, even before Kenney lowered the boom. My brother and his wife normally host the big family gatherings but her 88-year-old mother is sheltering with them, so there will be no Christmas dinner.]

OPUNTIA #487: What wildlife could we ever get in Toronto? Raccoons galore, plus squirrels, chipmunks, deer, foxes, coyotes, birds of dozens of species, much more, and they are smart enough to live and thrive in the large green areas this city enjoys.

I have to wonder if we will have any conventions or other events to enjoy in 2021. This year has been the year of the pandemic, and I suspect 2021 will be the year of the vaccine. Billions of doses of vaccine will be needed, and I think I have heard the USA has spent billions of dollars on a pre-emptive purchase of all available doses up to a large amount. As Canadians, I suspect we will be waiting for our turn for a few months afterwards. Seeing how America deals with the vaccine, plus the rampaging of the anti-vaxxers and anti-maskers, may be educational.

[2020, The Year Everything Was Cancelled, is a reminder of how to make God laugh by telling him your plans for the future. I think the first half of 2021 won't be much better because distributing the vaccine will not be any easy task.]

SEEN IN THE LITERATURE

The Borexino Collaboration (2020) **Experimental evidence of neutrinos produced in the CNO fusion cycle in the Sun.** NATURE 587:577-582

Authors' abstract: *For most of their existence, stars are fuelled by the fusion of hydrogen into helium. Fusion proceeds via two processes that are well understood theoretically: the proton-proton (pp) chain and the carbon-nitrogen-oxygen (CNO) cycle.*

Neutrinos that are emitted along such fusion processes in the solar core are the only direct probe of the deep interior of the Sun. A complete spectroscopic study of neutrinos from the pp chain, which produces about 99 per cent of the solar energy, has been performed previously. However, there has been no reported experimental evidence of the CNO cycle.

Here we report the direct observation, with a high statistical significance, of neutrinos produced in the CNO cycle in the Sun. This experimental evidence was obtained using the highly radiopure, large volume, liquid-scintillator detector of Borexino, an experiment located at the underground Laboratori Nazionali del Gran Sasso in Italy.

The main experimental challenge was to identify the excess signal, only a few counts per day above the background per 100 tonnes of target, that is attributed to interactions of the CNO neutrinos. Advances in the thermal stabilization of the detector over the last five years enabled us to develop a method to constrain the rate of bismuth-210 contaminating the scintillator.

In the CNO cycle, the fusion of hydrogen is catalysed by carbon, nitrogen and oxygen, and so its rate, as well as the flux of emitted CNO neutrinos, depends directly on the abundance of these elements in the solar core. This result therefore paves the way towards a direct measurement of the solar metallicity using CNO neutrinos.

Our findings quantify the relative contribution of CNO fusion in the Sun to be of the order of 1 per cent; however, in massive stars, this is the dominant process of energy production. This work provides experimental evidence of the primary mechanism for the stellar conversion of hydrogen into helium in the Universe.

Hirota, T., et al (2020) **The first VERA astrometry catalog.** PHYSICS PREPRINTS www.arXiv.org:2002.03089v1 [astro-ph.GA] (available as a free pdf)

Authors' abstract: *We present the first astrometry catalog from the Japanese VLBI (very long baseline interferometer) project VERA (VLBI Exploration of Radio Astrometry). We have compiled all the astrometry results from VERA, providing accurate trigonometric annual parallax and proper motion measurements.*

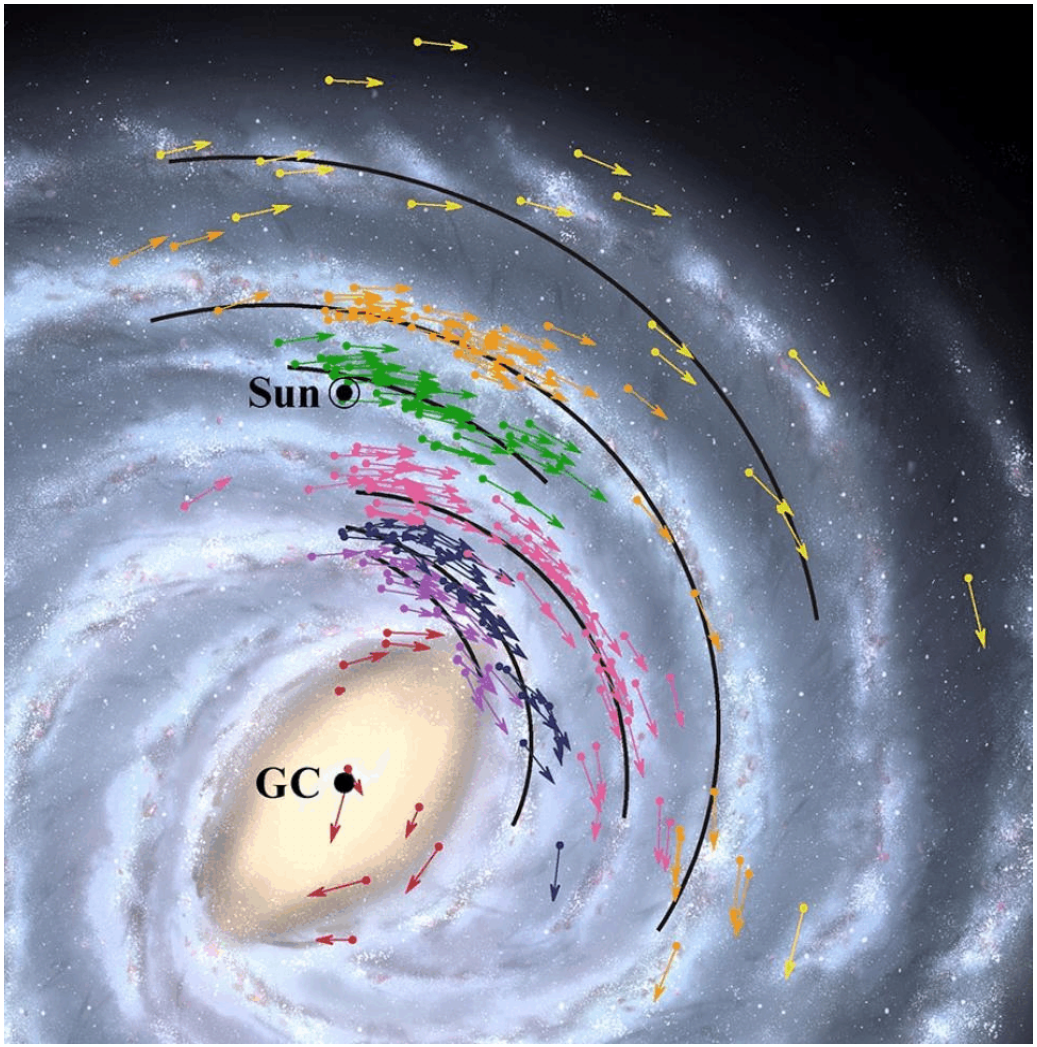
We have confirmed that most of the astrometry results are consistent with each other, and the largest error sources are due to source structure of the maser features and their rapid variation, along with the systematic calibration errors and different analysis methods.

Combined with the BeSSeL results, we estimate the up-to-date fundamental Galactic parameter of R_0 = 7.92 kiloparsecs and Omega diameter = 30.17 km s^{-1} kpc^{-1}, where R_0 and Omega diameter are the distance from the Sun to the Galactic center and the Sun's angular velocity of the Galactic circular rotation, respectively.

Speirs: One parsec equals 3.26 light years. An R_0 of 7.92 kiloparsecs means the Earth is 25,819 light years from the supermassive black hole Sagittarius A*, which is the centre of the Milky Way galaxy around which all the stars, including the Sun, revolve.

All galaxies revolve around supermassive black holes but that doesn't mean the stars will all fall into the black holes. The angular velocity, Omega diameter, keeps most of stars outside the capture zone. One less thing to worry about.

[Image is from the VERA project. GC is the black hole at the galactic centre.]



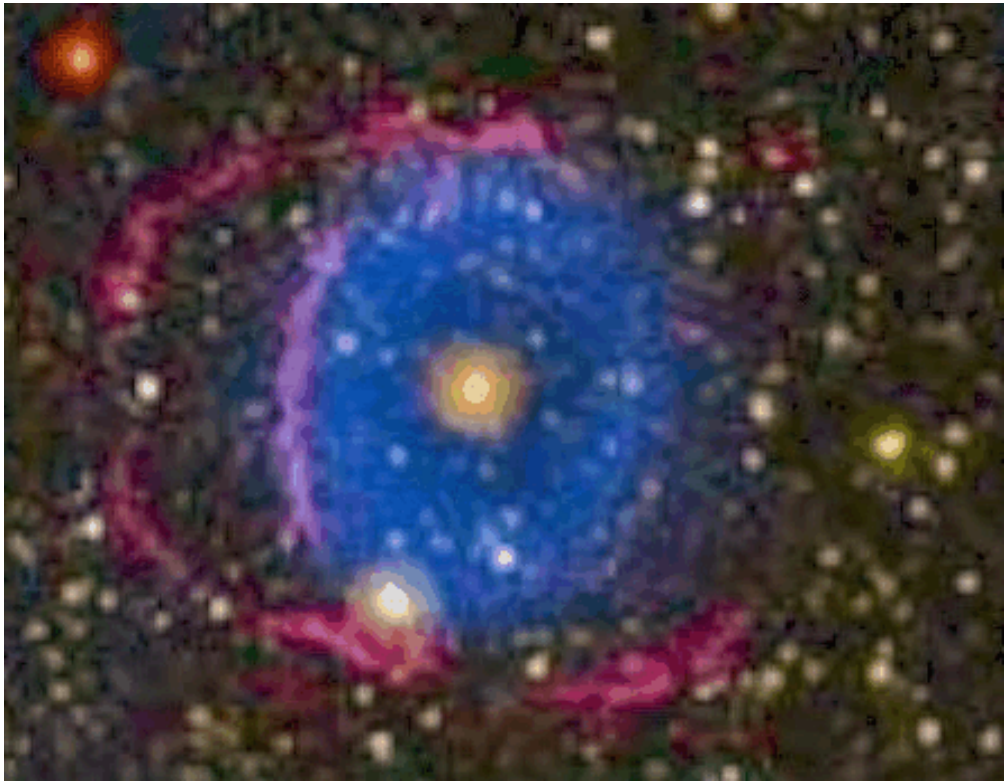
Hoadley, K., et al (2020) **A blue ring nebula from a stellar merger several thousand years ago.** NATURE 587:387-391

Authors' abstract: *Stellar mergers are a brief but common phase in the evolution of binary star systems. These events have many astrophysical implications.*

For example, they may lead to the creation of atypical stars (such as magnetic stars, blue stragglers, and rapid rotators), they play an important part in our interpretation of stellar populations and they represent formation channels of compact-object mergers.

Although a handful of stellar mergers have been observed directly, the central remnants of these events were shrouded by an opaque shell of dust and molecules, making it impossible to observe their final state (for example, as a single merged star or a tighter, surviving binary).

Here we report observations of an unusual, ring-shaped ultraviolet ('blue') nebula and the star at its centre, TYC 2597-735-1. The nebula has two opposing fronts, suggesting a bipolar outflow of material from TYC 2597-735-1.



The spectrum of TYC 2597-735-1 and its proximity to the Galactic plane suggest that it is an old star, yet it has abnormally low surface gravity and a detectable long-term luminosity decay, which is uncharacteristic for its evolutionary stage.

TYC 2597-735-1 also exhibits Ha emission, radial velocity variations, enhanced ultraviolet radiation and excess infrared emission, signatures of dusty circumstellar disks, stellar activity and accretion. Combined with stellar evolution models, the observations suggest that TYC 2597-735-1 merged with a lower-mass companion several thousand years ago.

[Image from NASA]

Shevchenko, I.I. (2020) **Habitable worlds of merging stars.** INTERNATIONAL JOURNAL OF ASTROBIOLOGY 19:500-504

Author's abstract: *It is shown that W UMa-type and SX Phe-type stellar populations are both perfectly and uniquely suited for maintaining hyper-effective biopolymer chain reactions (BCR) on their planets once the planet is in the stellar habitable zone. W UMa-type stars are known to be contact binaries, and SX Phetype stars are presumably post-binaries, i.e., products of stellar mergers.*

In case of the contact binaries, the eclipse-driven periodic heating/cooling of planetary surfaces has period-amplitude parameters that perfectly satisfy stringent conditions for maintaining BCR-like reactions. In case of the post-binaries, the stars pulsate with periods and amplitudes also perfectly suited for maintaining the reactions.

Therefore, the 'W UMa – SX Phe' metamorphosis (from a contact binary to a postbinary, via the merger) seems to provide a potential biosystem reboot on planets in these systems.

Sinclair, C.A., et al (2020) **Evolution of the Earth's atmosphere during Late Veneer accretion.** MONTHLY NOTICES OF THE ROYAL ASTRONOMICAL SOCIETY 499:5334-5362

[The Late Veneer was the final stage of Earth's formation when heavier elements such as iron sank into the core and lighter elements formed the mantle around it.]

Authors' abstract: *Recent advances in our understanding of the dynamical history of the Solar system have altered the inferred bombardment history of the Earth during accretion of the Late Veneer, after the Moon-forming impact. We investigate how the bombardment by planetesimals left-over from the terrestrial planet region after terrestrial planet formation, as well as asteroids and comets, affects the evolution of Earth's early atmosphere.*

We develop a new statistical code of stochastic bombardment for atmosphere evolution, combining prescriptions for atmosphere loss and volatile delivery derived from hydrodynamic simulations and theory with results from dynamical modelling of realistic populations of impactors.

We find that for an initially Earth-like atmosphere, impacts cause moderate atmospheric erosion with stochastic delivery of large asteroids, giving substantial growth (×10) in a few per cent per cent of cases.

The exact change in atmosphere mass is inherently stochastic and dependent on the dynamics of the left-over planetesimals. We also consider the dependence on unknowns including the impactor volatile content, finding that the atmosphere is typically completely stripped by especially dry left-over planetesimals (<0.02 per cent volatiles).

Remarkably, for a wide range of initial atmosphere masses and compositions, the atmosphere converges towards similar final masses and compositions, i.e. initially low-mass atmospheres grow, whereas massive atmospheres deplete.

While the final properties are sensitive to the assumed impactor properties, the resulting atmosphere mass is close to that of current Earth. The exception to this is that a large initial atmosphere cannot be eroded to the current mass unless the atmosphere was initially primordial in composition.

Sossi, P.A., et al (2020) **Redox state of Earth's magma ocean and its Venus-like early atmosphere.** SCIENCE ADVANCES 6:doi.org/10.1126/sciadv.abd1387 (available as a free pdf)

Authors' abstract: *Exchange between a magma ocean and vapor produced Earth's earliest atmosphere. Its speciation depends on the oxygen fugacity (fO_2) set by the Fe^{3+}/Fe^{2+} ratio of the magma ocean at its surface.*

Cooling and condensation of H_2O would have led to a prebiotic terrestrial atmosphere composed of CO_2-N_2, in proportions and at pressures akin to those observed on Venus. Present-day differences between Earth's atmosphere and those of her planetary neighbors result from Earth's heliocentric location and mass, which allowed geologically long-lived oceans, in turn facilitating CO_2 drawdown and, eventually, the development of life.

Condamine, F.L., et al (2020) **The rise of angiosperms pushed conifers to decline during global cooling.** PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES USA 117:28867-28875 (available as a free pdf)

[Angiosperms are flowering plants. Gymnosperms are cone-bearing plants such as spruce, pine, and cycads.]

Authors' abstract: *Competition for common resources can make some species groups thrive and others decline. Flowering plants rose to dominance between 125 and 80 megayears ago, undergoing an explosive radiation that is believed to have impacted long-established plant groups like gymnosperms.*

Here, we show that the decline of conifers is strongly and directly linked to the increasing diversity of flowering plants. Both the fossil record and molecular data converge in clarifying the effects of abiotic or biotic factors on the speciation and extinction rates of conifers.

These results imply that long-term biological interactions through clade competition can play a more important role in the rise and demise of major organism groups than mass extinctions. Competition among species and entire clades can impact species diversification and extinction, which can shape macroevolutionary patterns. The fossil record shows successive biotic turnovers such that a dominant group is replaced by another.

One striking example involves the decline of gymnosperms and the rapid diversification and ecological dominance of angiosperms in the Cretaceous. It is generally believed that angiosperms outcompeted gymnosperms, but the macroevolutionary processes and alternative drivers explaining this pattern remain elusive.

Using extant time trees and vetted fossil occurrences for conifers, we tested the hypotheses that clade competition or climate change led to the decline of conifers at the expense of angiosperms.

Here, we find that both fossil and molecular data show high congruence in revealing
1) low diversification rates, punctuated by speciation pulses, during warming events throughout the Phanerozoic and
2) that conifer extinction increased significantly in the Mid-Cretaceous (100 to 110 megayears ago) and remained high ever since.

Their extinction rates are best explained by the rise of angiosperms, rejecting alternative models based on either climate change or time alone. Our results support the hypothesis of an active clade replacement, implying that direct competition with angiosperms increased the extinction of conifers by pushing their remaining species diversity and dominance out of the warm tropics.

Bishop, P.J., et al (2020) **Relationships of mass properties and body proportions to locomotor habit in terrestrial Archosauria.** PALEOBIOLOGY 46:550-568 (available as a free pdf)

Authors' abstract: *Throughout their 250 megayear history, archosaurian reptiles have exhibited a wide array of body sizes, shapes, and locomotor habits, especially in regard to terrestriality. These features make Archosauria a useful clade with which to study the interplay between body size, shape, and locomotor behavior, and how this interplay may have influenced locomotor evolution.*

Here, digital volumetric models of 80 taxa are used to explore how mass properties and body proportions relate to each other and locomotor posture in archosaurs. One-way, nonparametric, multivariate analysis of variance, based on the results of principal components analysis, shows that bipedal and quadrupedal archosaurs are largely distinguished from each other on the basis of just four anatomical parameters ($p < 0.001$): mass, center of mass position, and relative forelimb and hindlimb lengths. This facilitates the development of a quantitative predictive framework that can help assess gross locomotor posture in understudied or controversial taxa, such as the crocodile-line Batrachotomus (predicted quadruped) and Postosuchus (predicted biped).

Compared with quadrupedal archosaurs, bipedal species tend to have relatively longer hindlimbs and a more caudally positioned whole-body center of mass, and collectively exhibit greater variance in forelimb lengths.

These patterns are interpreted to reflect differing biomechanical constraints acting on the archosaurian Bauplan in bipedal versus quadrupedal groups, which may have shaped the evolutionary histories of their respective members.

Bonsor, J.A., et al (2020) **Dinosaur diversification rates were not in decline prior to the K-Pg boundary.** ROYAL SOCIETY OPEN SCIENCE 7:dx.doi.org/10.1098/rsos.201195 (available as a free pdf)

[The Cretaceous-Paleogene (K/Pg) extinction is the one that wiped out the non-avian dinosaurs. Not all dinosaurs became extinct, because birds are technically dinosaurs.]

Authors' abstract: *Determining the tempo and mode of non-avian dinosaur extinction is one of the most contentious issues in palaeobiology. Extensive disagreements remain over whether their extinction was catastrophic and geologically instantaneous or the culmination of long-term evolutionary trends.*

These conflicts have arisen due to numerous hierarchical sampling biases in the fossil record and differences in analytical methodology, with some studies identifying long-term declines in dinosaur richness prior to the Cretaceous-Palaeogene (K-Pg) boundary and others proposing continued diversification.

Here, we use Bayesian phylogenetic generalized linear mixed models to assess the fit of 12 dinosaur phylogenies to three speciation models (null, slowdown to asymptote, downturn). We do not find strong support for the downturn model in our analyses, which suggests that dinosaur speciation rates were not in terminal decline prior to the K-Pg boundary and that the clade was still capable of generating new taxa.

Stiles, E., et al (2020) **Cretaceous-Paleogene plant extinction and recovery in Patagonia.** PALEOBIOLOGY 46:445-469 (available as a free pdf)

Authors' abstract: *The Cretaceous-Paleogene (K/Pg) extinction* [the one that wiped out the non-avian dinosaurs] *appears to have been geographically heterogeneous for some organismal groups. Southern Hemisphere K/Pg palynological records have shown lower extinction and faster recovery than in the Northern Hemisphere, but no comparable, well-constrained Southern Hemisphere macrofloras spanning this interval had been available.*

Here, macrofloral turnover patterns are addressed for the first time in the Southern Hemisphere, using more than 3,500 dicot leaves from the latest Cretaceous (Maastrichtian) and the earliest Paleocene (Danian) of Argentine Patagonia.

A maximum ca. 90% macrofloral extinction and ca. 45% drop in rarefied species richness is estimated across the K/Pg, consistent with substantial species-level extinction and previously observed extirpation of host-specialized leaf mines.

However, prior palynological and taxonomic studies indicate low turnover of higher taxa and persistence of general floral composition in the same sections. High species extinction, decreased species richness, and homogeneous Danian macrofloras across time and facies resemble patterns often observed in North America, but there are several notable differences.

When compared with boundary-spanning macrofloras at similar absolute paleolatitudes (ca. 50˚S or 50˚N) from the Williston Basin (WB) in the Dakotas, both Maastrichtian and Danian Patagonian species richnesses are higher, extending a history of elevated South American diversity into the Maastrichtian. Despite high species turnover, our analyses also reveal continuity and expansion of leaf morphospace, including an increase in lobed and toothed species unlike the Danian WB.

Watson, D.M. (2020) **Did mammals bring the first mistletoes into the treetops?** AMERICAN NATURALIST 196:769-774

Author's abstract: *The growth habit of mistletoes, the only woody, parasitic plants to infect host canopies, represents a key innovation. How this aerially parasitic habit originated is unknown. Mistletoe macrofossils are relatively recent, from long after they adapted to canopy life and evolved showy, bird-pollinated flowers; sticky, bird-dispersed seeds; and woody haustoria diverting water and nutrients from host branches.*

Since the transition to aerial parasitism predates the origin of mistletoes' contemporary avian seed dispersers by 20 to 40 million years, this leaves unanswered the question of who the original mistletoe dispersers were.

By integrating fully resolved phylogenies of mistletoes and aligning the timing of historic events, I identify two ancient mammals as likely candidates for planting Viscaceae and Loranthaceae in the canopy.

Just as modern mouse lemurs and galagos disperse viscaceous mistletoe externally (grooming the sticky seeds from their fur), Cretaceous primates (e.g., Purgatorius) may have transported seeds of root-parasitic understory shrubs up into the canopy of Laurasian forests.

In the Eocene, ancestors of today's mistletoe-dispersing marsupials, Dromiciops, likely fed on the nutritious fruit of root-parasitic loranthaceous shrubs, depositing the seeds atop western Gondwanan forest crowns. Once mistletoes colonized the canopy, subsequent evolution and diversification coincided with the rise of nectar- and fruit-dependent birds.

Meltzer, D,J, (2020) **Overkill, glacial history, and the extinction of North America's Ice Age megafauna.** PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES USA 117:28555-28563

Author's abstract: *The end of the Pleistocene in North America saw the extinction of 38 genera of mostly large mammals. As their disappearance seemingly coincided with the arrival of people in the Americas, their extinction is often attributed to human overkill, notwithstanding a dearth of archaeological evidence of human predation.*

Moreover, this period saw the extinction of other species, along with significant changes in many surviving taxa, suggesting a broader cause, notably, the ecological upheaval that occurred as Earth shifted from a glacial to an interglacial climate.

But, overkill advocates ask, if extinctions were due to climate changes, why did these large mammals survive previous glacial-interglacial transitions, only to vanish at the one when human hunters were present? This question rests on two assumptions: that previous glacial-interglacial transitions were similar to the end of the Pleistocene, and that the large mammal genera survived unchanged over multiple such cycles.

Neither is demonstrably correct. Resolving the cause of large mammal extinctions requires greater knowledge of individual species' histories and their adaptive tolerances, a fuller understanding of how past climatic and ecological changes impacted those animals and their biotic communities, and what changes occurred at the Pleistocene-Holocene boundary that might have led to those genera going extinct at that time.

Then we will be able to ascertain whether the sole ecologically significant difference between previous glacial-interglacial transitions and the very last one was a human presence.

Nava, A., et al (2020) **Early life of Neanderthals.** PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES USA 117:28719-28726

Authors' abstract: *The extent to which Neanderthals differ from us is the focus of many studies in human evolution. There is debate about their pace of growth and early-life metabolic constraints, both of which are still poorly understood. Here we use chemical and isotopic patterns in tandem with enamel growth rates of three Neanderthal milk teeth from northeastern Italy to explore the early life of these individuals.*

Our study shows that these Neanderthals started to wean children at 5 to 6 months, akin to modern humans, implying similar energy demands during early infancy. Dental growth rates confirm this and follow trajectories comparable with modern humans. Contrary to previous evidence, we suggest that differences in weaning age did not contribute to Neanderthals' demise.

The early onset of weaning in modern humans has been linked to the high nutritional demand of brain development that is intimately connected with infant physiology and growth rate. In Neanderthals, ontogenetic patterns in early life are still debated, with some studies suggesting an accelerated development and others indicating only subtle differences vs. modern humans.

Here we report the onset of weaning and rates of enamel growth using an unprecedented sample set of three late (~70 to 50 kiloyears ago) Neanderthals and one Upper Paleolithic modern human from northeastern Italy via spatially resolved chemical/isotopic analyses and histomorphometry of deciduous teeth.

Our results reveal that the modern human nursing strategy, with onset of weaning at 5 to 6 mo, was present among these Neanderthals. This evidence, combined with dental development akin to modern humans, highlights their similar metabolic constraints during early life and excludes late weaning as a factor contributing to Neanderthals' demise.

Li, Y., et al (2020) **Early evidence for mounted horseback riding in northwest China.** PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES USA 117:29569-29576

Authors' abstract: *This study provides insights into the emergence and adoption of equestrian technologies in China. Analysis of ancient horse bones from Shirenzigou and Xigou in eastern Xinjiang demonstrates that pastoralists along China's northwest frontier practiced horseback riding and mounted archery by the fourth century BCE.*

This region may have played a key role in the initial spread of equestrian technologies from the Altai region into the heartland of China's early settled states, where they eventually facilitated the rise of the first united empires in China and triggered extensive social, political, and economic exchanges between China and its neighbors on the Eurasian Steppes.

Horseback riding was a transformative force in the ancient world, prompting radical shifts in human mobility, warfare, trade, and interaction. In China, domestic horses laid the foundation for trade, communication, and state infrastructure along the ancient Silk Road, while also stimulating key military, social, and political changes in Chinese society.

Nonetheless, the emergence and adoption of mounted horseback riding in China is still poorly understood, particularly due to a lack of direct archaeological data. Here we present a detailed osteological study of eight horse skeletons dated to ca. 350 BCE from the sites of Shirenzigou and Xigou in Xinjiang, northwest China, prior to the formalization of Silk Road trade across this key region.

Our analyses reveal characteristic osteological changes associated with equestrian practices on all specimens. Alongside other relevant archaeological evidence, these data provide direct evidence for mounted horseback riding, horse equipment, and mounted archery in northwest China by the late first millennium BCE.

Most importantly, our results suggest that this region may have played a crucial role in the spread of equestrian technologies from the Eurasian interior to the settled civilizations of early China, where horses facilitated the rise of the first united Chinese empires and the emergence of transcontinental trade networks.

Chen, C., et al (2020) **Biophysical impacts of Earth greening largely controlled by aerodynamic resistance.** SCIENCE ADVANCES 6:doi.org/10.1126/sciadv.abb1981 (available as a free pdf)

Authors' abstract and extracts: *Satellite observations show widespread increasing trends of leaf area index (LAI), known as the Earth greening. However, the biophysical impacts of this greening on land surface temperature (LST) remain unclear. Here, we quantify the biophysical impacts of Earth greening on LST from 2000 to 2014 and disentangle the contributions of different factors using a physically based attribution model.*

We find that 93% of the global vegetated area shows negative sensitivity of LST to LAI increase at the annual scale, especially for semiarid woody vegetation. Further considering the LAI trends (P = 0.1), 30% of the global vegetated area is cooled by these trends and 5% is warmed.

Aerodynamic resistance is the dominant factor in controlling Earth greening's biophysical impacts. The increase in LAI produces a decrease in aerodynamic resistance, thereby favoring increased turbulent heat transfer between the land and the atmosphere, especially latent heat flux.

We find that the widespread Earth greening leads to a cooling effect on LST across the globe at the annual scale, which is predominantly attributed to the decrease in aerodynamic resistance. While these small perturbations in LAI tend to alter turbulent processes more than radiative processes globally, radiative processes remain critical in a small proportion of regions in the Arctic and some sparsely vegetated areas.

If the Earth greening continues, the aerodynamic resistance to turbulent transfer will continue to decrease, resulting in stronger instabilities in the atmospheric boundary layer. In the meantime, surface resistance will also decrease, possibly leading to more water vapor into the atmosphere, thus affecting the hydrologic cycle.

Zanil, D., et al (2020) **Increased growing-season productivity drives earlier autumn leaf senescence in temperate trees.** SCIENCE 370:1066-1071

Authors' abstract: *The length of the growing season in temperate forests has been increasing under recent climate change because of earlier leaf emergence and later leaf senescence. However, we show that this trend might be reversed as increasing photosynthetic productivity begins to drive earlier autumn leaf senescence.*

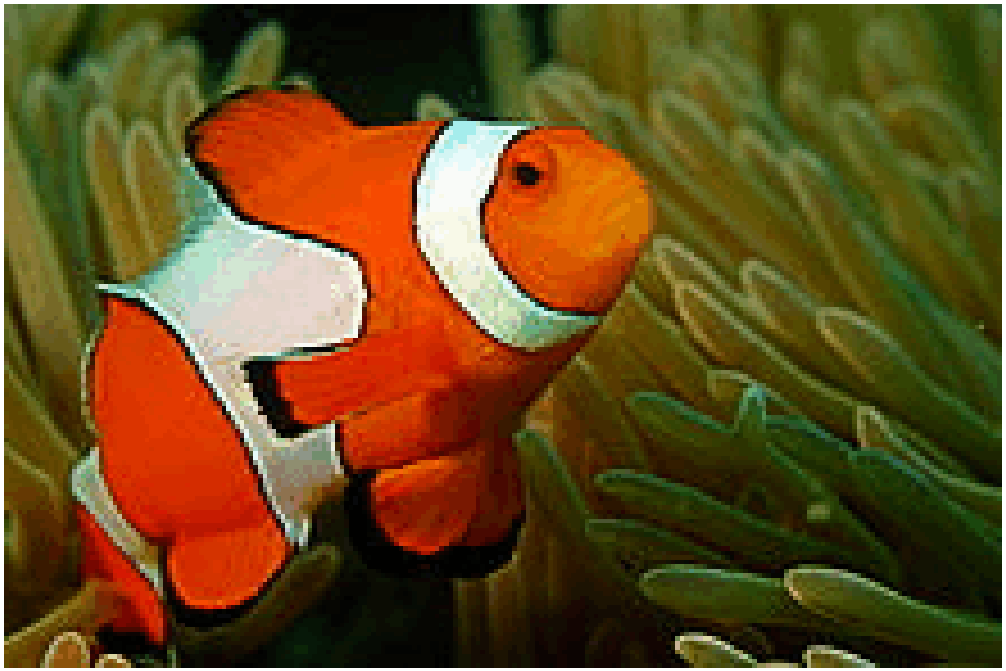
Using a combination of experimental, observational, and modeling studies based on European forest trees, the researchers conclude that leaf senescence will advance by 3 to 6 days by the end of the 21st century rather than lengthening by 1 to 3 weeks as current phenological models have predicted. In turn, this predicted phenological pattern will limit the capacity of temperate forests to mitigate climate change through carbon uptake.

Changes in the growing-season lengths of temperate trees greatly affect biotic interactions and global carbon balance. Yet future growing-season trajectories remain highly uncertain because the environmental drivers of autumn leaf senescence are poorly understood. Using experiments and long-term observations, we show that increases in spring and summer productivity due to elevated carbon dioxide, temperature, or light levels drive earlier senescence.

Accounting for this effect improved the accuracy of senescence predictions by 27 to 42% and reversed future predictions from a previously expected 2- to 3-week delay over the rest of the century to an advance of 3 to 6 days.

These findings demonstrate the critical role of sink limitation in governing the end of seasonal activity and reveal important constraints on future growing-season lengths and carbon uptake of trees.

Steinberg, R.K., et al (2020) **Keep your friends close and your anemones closer: ecology of the endemic wideband anemonefish, *Amphiprion latezonatus*.** ENVIRONMENTAL BIOLOGY OF FISHES 103:1513-1526



Authors' abstract: *Endemic marine species often exist as metapopulations distributed across several discrete locations, such that their extinction risk is dependent upon population dynamics and persistence at each location. The anemonefish Amphiprion latezonatus is a habitat specialist, endemic to two oceanic islands (Lord Howe and Norfolk) and the adjacent eastern Australian coast from the Sunshine Coast to Southwest Rocks.*

To determine how extinction risk varies across the limited number of locations where A. latezonatus occurs, we quantified ecological, biological, and behavioural characteristics at six locations and four reef zones.

The abundance of A. latezonatus and its host anemones varied considerably throughout its range, with A. latezonatus abundance being very low at Sunshine Coast and Elizabeth Reef, low at Lord Howe Island and Norfolk Island, and moderate at North Solitary Island. This species was not detected at Middleton Reef, despite local abundance of their host anemones. Abundance of A. latezonatus was generally correlated with depth and host anemone abundance, from which we infer that extirpation risk is directly proportional to their host anemone population's size. Consistent with this, A. latezonatus social group size was positively correlated with the number of anemones inhabited.

A. latezonatus may be impacted by interactions and competition with other anemonefish species in shallow (<10 m) waters, but competition has little effect in deeper water where population abundances are highest. Significant differences in population characteristics demonstrate a need for location-specific conservation strategies and identify the Sunshine Coast population as most vulnerable.

[Image from Wikipedia]

Ropars, J., et al (2020) **Domestication of the emblematic white cheese-making fungus *Penicillium camemberti* and its diversification into two varieties.** CURRENT BIOLOGY 30:4441-4453 (available as a free pdf)

Authors' abstract: *Domestication involves recent adaptation under strong human selection and rapid diversification and therefore constitutes a good model for studies of these processes. We studied the domestication of the emblematic white mold Penicillium camemberti, used for the maturation of soft cheeses, such as Camembert and Brie, about which surprisingly little was known, despite its economic and cultural importance.*

Whole genome-based analyses of genetic relationships and diversity revealed that an ancient domestication event led to the emergence of the gray-green P. biforme mold used in cheese making, by divergence from the blue-green wild P. fuscoglaucum fungus. Another much more recent domestication event led to the generation of the P. camemberti clonal lineage as a sister group to P. biforme.

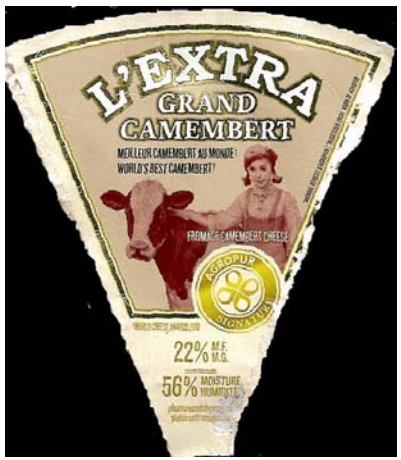
Penicillium biforme displayed signs of phenotypic adaptation to cheese making relative to P. fuscoglaucum, in terms of whiter color, faster growth on cheese medium under cave conditions, lower amounts of toxin production, and greater ability to prevent the growth of other fungi. The P. camemberti lineage displayed even stronger signs of domestication for all these phenotypic features.

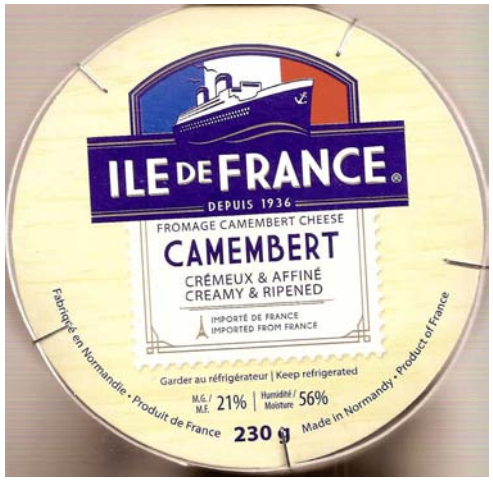
We also identified two differentiated P. camemberti varieties, apparently associated with different kinds of cheeses and with contrasted phenotypic features in terms of color, growth, toxin production, and competitive ability.

We have thus identified footprints of domestication in these fungi, with genetic differentiation between cheese and wild populations, bottlenecks, and specific phenotypic traits beneficial for cheese making. This study has not only fundamental implications for our understanding of domestication but can also have important effects on cheese making.

Speirs: I dare say I have eaten cheese almost every day of my life, and often the different types of blue cheeses such as Camembert. Not so much the soft cheeses such as Brie, which I find bland and tasteless, but the tangier types. The calcium is good for you and builds bones, plus the benefit of protein.

I don't collect cheese labels per se but do scan them. These are some of the types of blue cheese that I have enjoyed over the years.





McInturff, A., et al (2020) **Fence ecology: frameworks for understanding the ecological effects of fences.** BIOSCIENCE 70:971-985 (available as a free pdf)

Authors' abstract: *Investigations of the links between human infrastructure and ecological change have provided eye-opening insights into humanity's environmental impacts and contributed to global environmental policies. Fences are globally ubiquitous, yet they are often omitted from discussions of anthropogenic impacts.*

In the present article, we address this gap through a systematic literature review on the ecological effects of fences. Our overview provides five major takeaways:
1) an operational definition of fencing to structure future research,
2) an estimate of fence densities in the western United States to emphasize the challenges of accounting for fences in human-footprint mapping,
3) a framework exhibiting the ecological winners and losers that fences produce, 4) a typology of fence effects across ecological scales to guide research, and
5) a summary of research trends and biases that suggest that fence effects have been underestimated.

Fences are one of the most widespread manmade features on Earth, and they may outstretch roads by an order of magnitude. Although recent popular attention on border fences has made headlines. Europe, for example, now has more kilometers of border fencing than it did during the Cold War.

These barriers represent only a tiny fraction of a rapidly spreading global network of fences. Unlike roads and other forms of linear infrastructure, there exists no formal research synthesis on the fences that encircle our planet. However, recent case studies have charted local explosions of fencing and the dangerous social and ecological collapses that can follow.

In Africa, numerous publications have made the case both for and against fencing for conservation, whereas in North America and Europe, researchers have proposed innovative forms of fencing with the goal of reducing wildlife-vehicle collisions. Throughout the world, land managers and restoration ecologists have successfully employed fences to protect and rehabilitate fragile habitats, especially from the impacts of livestock and invasive species.

Fences therefore have the ability to both benefit and harm the ecosystems in which they occur, making the absence of systematic studies of their ecological effects all the more glaring.

Conservation fencing has been the subject of greatest study, and has received disproportionate attention considering its rarity relative to other fence types. Although livestock fencing has been the subject of the second largest number of studies, it is likely the most common fence type throughout the world and, therefore, has proportionately few studies relative to its abundance.

Speirs: I'm an old cowhand from the Red Deer River. Having grown up on a cattle ranch in west-central Alberta, I had more than a passing interest in this article. One regular chore of farming is fence riding, checking the countless kilometres of barbed wire fences to make sure they are in good order and the cattle won't escape out onto the road or into the neighbour's pasture.

As a young lad, I helped my father install new barbed wire. The method was to secure one end of a roll of wire to the corner post, then attach the roll to the bumper of the pickup truck and scroll it out. Then we worked back on foot, tacking the wire to the posts.

We used four strands of wire along the fence. I can't remember how long a roll of wire was, but the roll was about the size of a breadbox and damned heavy. Tacking endless rolls of wire was a boring job.

The average pasture in western Canada is a quarter-section of land. In the 1800s, land on the prairies was surveyed ahead of the settlers into sections, which were a mile on each side. Homesteaders were granted a quarter-section of land, which would be a half-mile on each side.

That meant an awful lot of barbed wire. One side of the property would be a half-mile multiplied four times, or two miles of barbed wire.

The rule was that fences separating two homesteads were the equal responsibility of the settlers. The usual method was to face each other halfway along the boundary. Each landowner was then responsible for the half to their right. Fencing was hard enough on flat land, but a logistical nightmare in rolling hills cut by gullies and steep banks.

It was easy to tell who overgrazed their land and who stocked cattle at a sustainable rate. On overgrazed land, everything was mowed down like a golf course putting green and thistles were rampant.

The other problem was when herds were pastured in adjacent fields. Each herd had one bull. If they got to fighting, they would tear up barbed wire like it was tissue paper. I well remember one instance when our bull got into such a fight with the neighbour bull. It took us all day to re-string the barbed wire, working in a cold wind.

We had lots of white-tailed deer on the ranch, who hardly noticed the fences and would hop over them with ease. We had one bull who was a born athlete and got the nickname Jumper. He was a registered purebred Charolais with a fancy name I don't think I ever knew.

My father finally got sick and tired of being sick and tired. He was fed up with constantly heading Jumper back where he belonged, so he sold the bull to the packing plant. The problem was that behavioural traits can be inherited, and Jumper's calves were often the same.

The fences in the barnyard and corrals were solid board fences. Our barn cats used the top rails to travel out to the edge of the corrals before having to drop

down to the ground. The dogs, on the other hand, were stuck on the ground and had to travel through the muck or snow. The cats would sun themselves on top of the fenceposts. There would be a whole row of furballs crouched along the corral fences at geometrically precise distances, enjoying the sun.

My mother took this photo in 1970 June of one of our corrals. I don't know where the cats were. Probably out hunting field mice.

Kipping, D., et al (2020) **Contact inequality: first contact will likely be with an older civilization.** INTERNATIONAL JOURNAL OF ASTROBIOLOGY 19:430-437

Authors' abstract: *First contact with another civilization, or simply another intelligence of some kind, will likely be quite different depending on whether that intelligence is more or less advanced than ourselves.*

If we assume that the lifetime distribution of intelligences follows an approximately exponential distribution, one might naively assume that the pile-up of short-lived entities dominates any detection or contact scenario. However, it is argued here that the probability of contact is proportional to the age of said intelligence (or possibly stronger), which introduces a selection effect. We demonstrate that detected intelligences will have a mean age twice that of the underlying (detected + undetected) population, using the exponential model.

We find that our first contact will most likely be with an older intelligence, provided that the maximum allowed mean lifetime of the intelligence population, T_{max}, is greater than or equal to e times larger than our own.

Older intelligences may be rare but they disproportionately contribute to first contacts, introducing what we call a 'contact inequality', analogous to wealth inequality. This reasoning formalizes intuitional arguments and highlights that first contact would likely be one-sided, with ramifications for how we approach SETI.

Haliki, E. (2020) **Dyson swarms of von Neumann probes: prospects and predictions.** INTERNATIONAL JOURNAL OF ASTROBIOLOGY 19:474-481

Author's abstract: *According to the Kardashev scale, possible Type-II and above civilizations could use energy sources of the universe in different ways. Self-replicator von Neumann probes believed to invade any galaxies in various studies could also have uses for gaining energy, in which Dyson swarm structures are likely to consist of probes that could emit energy from any luminous celestial object is to be considered first.*

On addressing some possible dynamical properties of probes, the study has examined in which size and populations they could enfold a star and how they could have observational evidences according to relevant star's energy output. On the basis of our solar system, it has also been shown using a weighted-directed network structure what kind of population and route they could have in case of spreading to the nearest-neighbouring stars.

Speirs: The science fiction television series LEXX addressed this issue. Over a number of episodes, self-replicating von Neumann machines multiplied to the point where they could surround a star and suck out all its energy.