OPUNTIA 503

Summer Solstice 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: Looking east along 11 Avenue SW from 14 Street, down the length of the Beltline district. In the far distance is the downtown core. The pandemic notwithstanding, skyscraper condominiums continue to rise, spreading further along the Beltline. I took this photo on June 13, a beautiful Sunday afternoon, in a month which has been quite sunny.

LICENCED TO DRIVE: PART 5

photos by Dale Speirs

[Parts 1 to 4 appeared in OPUNTIA #476, 482, 489, and 497. Previous licence plate photos were in OPUNTIAs #63.5A, 410, 421, 445, 452, 459, and 471.]

Seen around Calgary.

Above right: This plate will be funnier to western Canadians. Spuzzum is an aboriginal reserve about 50 km north of Hope, British Columbia.

A hamlet of that name was just outside the reserve and was nothing more than a service station and general store. They were wiped out by a forest fire several years ago. The settlement had been a synonym for living in the middle of nowhere.

Below: I'm guessing this was owned by a golfer.

LIFE AT CHEZ OPUNTIA
photos by Dale Speirs

At left: My yard was filled with noisy magpie fledglings squawking loudly for Mommy to bring them some food. I counted five young from a nest in an adjacent boulevard tree. Here are a couple of them on my back steps.

Below: My peonies did very well.

CURRENT EVENTS: PART 22
by Dale Speirs

[Parts 1 to 21 appeared in OPUNTIAs #474, 475, 479, 480, 483, 484, and 488 to 502.]

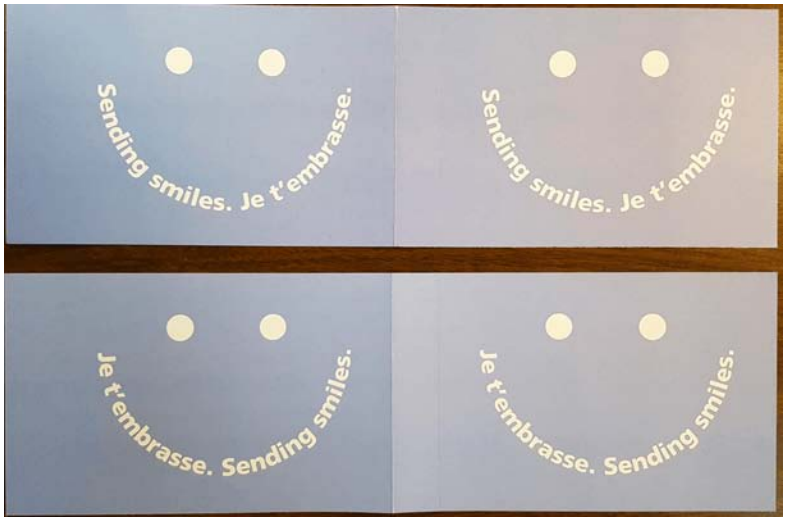
Philately.

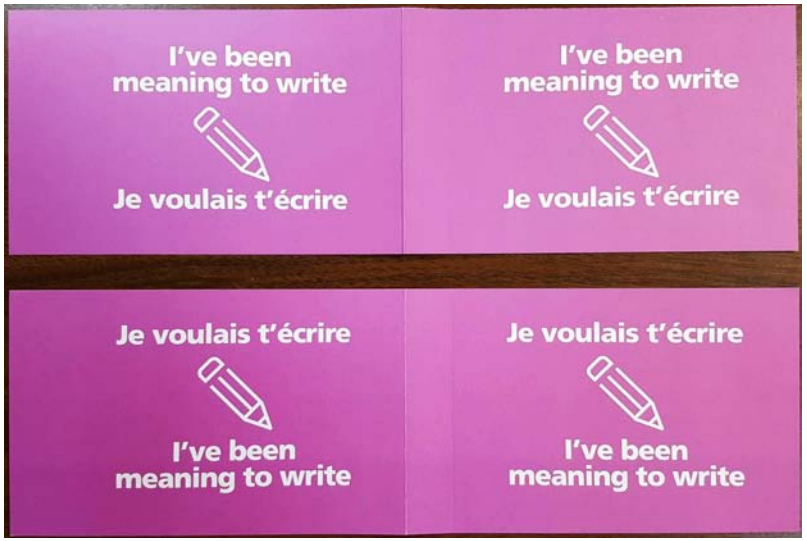
Lots of postal cards this time. As usual, not to actual size or at the same scale to each other. A postal card is not the same as a postcard. Stamps have to be added to postcards, almost all of which are privately printed. Postal cards are issued by post offices and have the postage pre-printed on them.

During March 2021, Canada Post sent a free postal card to every residence in the country. The card was a tear-off attached to an advertising blurb, and was valid for domestic use. There were six basic designs, which came in two variations, English text over French for anglophone areas and vice versa for Québec and Acadia, making twelve in total. My stamp dealer managed to get me all twelve.

The reverse was the same for all the designs, either English over French or French over English as shown below. The postage imprint was what philatelists call the Flag Over series, in this case the maple leaf flag over the Toronto headquarters of Canada Post.

The front of the designs are shown on the next page.





Hugging didn't seem like the correct message in a land where the oxymoron "social distancing" was the rule.

Was this good grammar? The common phrase "Wish you were here" is a plural but "Wish I was there" is a singular. In a country that has actual language police, this postal card seems doubtful.

One consequence of the COVID-19 pandemic is the litter of discarded masks and latex gloves on streets and parks. This was made worse because they are not biodegradable. Long after the pandemic is over, we will be seeing such litter everywhere. Spain issued a booklet containing five postal cards showing the litter in otherwise scenic parks.

The reverse side is the same except for the text in the upper left corner, so I'll only show one reverse. I don't think you have to be fluent in Spanish to figure out what bosque, campo, montana, playa, rio, and oceano mean.

Two views of the booklet a la 3-D. The one above shows the postal cards fitted into a slot.

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The same stamp imprint was used on all of them, a mask going into a bin. Below and the next page show the littered countryside of Spain. Sadly, Canada isn't any better.

And room for just one more reverse side to show the variations.

Now to some stamps. A souvenir sheet from Sri Lanka. At first glance I thought that was some sort of tropical fruit they were fishing out from the pit of coronaviruses but it is actually a map of Sri Lanka. The problem is that the rope and pulley are too short, so the virus critters will still be able to grasp the country. Also the pit is too shallow. One virus standing on another's shoulders could then pull itself out.

Seen In The COVID-19 Literature.

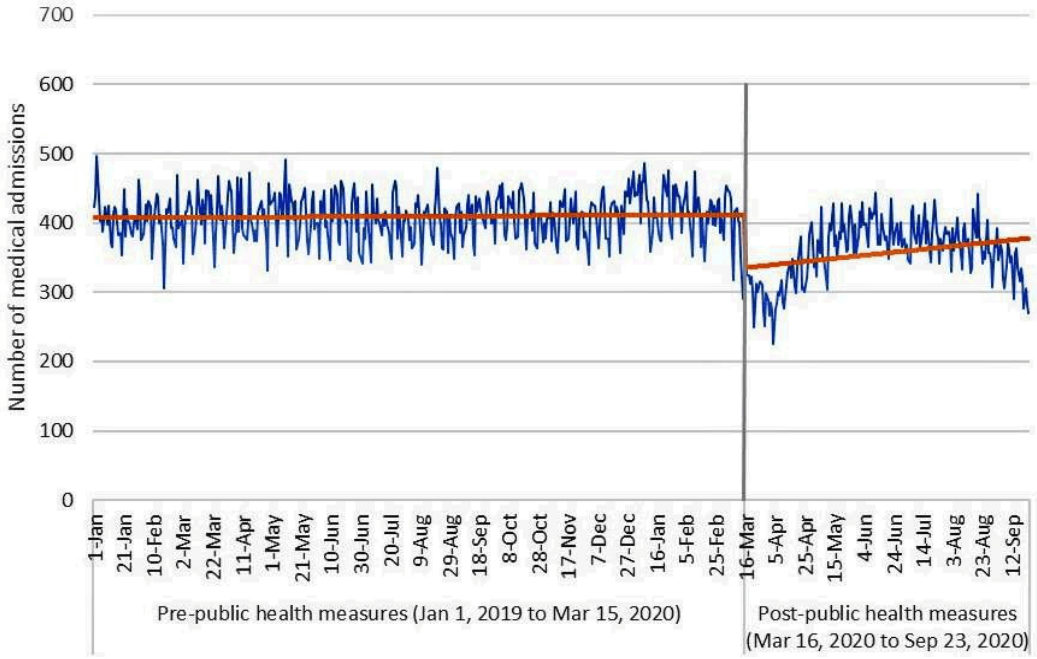
Rennert-May, E., et al (2021) **The impact of COVID-19 on hospital admissions and emergency department visits: A population-based study.** PLOS ONE 16:doi.org/10.1371/journal.pone.0252441 (available as a free pdf)

Authors' extracts: *There was a significant reduction in both daily medical and surgical admissions through the ED in Alberta post COVID-19 public health measures. There was a significant decline in daily ED visits.*

The most common medical/surgical diagnoses for hospital admissions did not vary substantially pre and post COVID-19 public health measures, though there was a significant reduction in admissions for chronic obstructive pulmonary disease and a significant increase in admissions for mental and behavioral disorders due to use of alcohol.

Alberta is a Canadian province with a population of approximately 4.4 million people that is serviced by one health care system for hospital and specialty care, Alberta Health Services (AHS). As of November 16, 2020, Alberta has had approximately 1,550 cases of COVID-19 requiring hospitalization over the past several months, and a total of approximately 36,405 cases.

[Chart is from this paper. Compulsory masking in Alberta was introduced in August 2020, which explains the second droop in admissions.]



Lakkireddy, M., et al (2021) **Impact of daily high dose oral vitamin D therapy on the inflammatory markers in patients with COVID 19 disease.** SCIENTIFIC REPORTS 11:doi.org/10.1038/s41598-021-90189-4 (available as a free pdf)

Authors' abstract: *COVID 19 is known to cause immune dysregulation and vitamin D is a known immunomodulator. This study aims to objectively investigate the impact of Pulse D therapy in reducing the inflammatory markers of COVID-19.*

Subjects were randomised into VD and NVD groups. VD group received Pulse D therapy (targeted daily supplementation of 60,000 IUs of vitamin D for 8 or 10 days depending upon their BMI) in addition to the standard treatment. NVD group received standard treatment alone. Differences in the variables between the two groups were analysed for statistical significance.

87 out of 130 subjects have completed the study (VD:44, NVD:43). Vitamin D level has increased from 16 ± 6 ng/ml to 89 ± 32 ng/ml after Pulse D therapy in VD group and highly significant reduction of all the measured inflammatory markers was noted. Reduction of markers in NVD group was insignificant. The difference in the reduction of markers between the groups (NVD vs VD) was highly significant.

Therapeutic improvement in vitamin D to 80 to 100 ng/ml has significantly reduced the inflammatory markers associated with COVID-19 without any side effects. Hence, adjunctive Pulse D therapy can be added safely to the existing treatment protocols of COVID-19 for improved outcomes.

Serious consequences of COVID-19 were attributed to the immune dysregulation leading to the enhanced production of pro inflammatory mediators (cytokine storm). In the absence of a specific vaccine or a treatment, strategies to minimize the effects of COVID-19 have become extremely important.

Recent observational studies have reported that the patients with higher levels of serum vitamin D (vit.D) had less severe symptoms and vice versa and have postulated the usefulness of vit.D in prevention and treatment of COVID-19.

The beneficial effects of vit.D in COVID-19 were attributed to be mediated through its multiple actions on the immune system. Vit.D is known to enhance

the production of various anti-microbial peptides by the immune cells and vit.D modulates the immune system according to the internal milieu.

It reduces the dysregulated production of self-damaging pro-inflammatory cytokines and promotes the expression of anti-inflammatory cytokines by immune cells. The dynamic role of vit.D can be of immense value in the context of immune dysfunction observed in COVID-19 patients with cytokine storm and acute respiratory distress syndrome.

Speirs: I was taking a daily multivitamin before the pandemic began but have now added an additional 1,000-unit Vitamin D3 tablet each day.

Broughel, J. and M. Kotrous (2021) **The benefits of coronavirus suppression: A cost-benefit analysis of the response to the first wave of COVID-19 in the United States.** PLOS ONE 16:doi.org/10.1371/journal.pone.0252729 (available as a free pdf)

Authors' abstract: *This paper estimates the benefits and costs of state suppression policies to bend the curve during the initial outbreak of COVID-19 in the United States. We employ an approach that values benefits and costs in terms of additions or subtractions to total production.*

Relative to a baseline in which only the infected and at-risk populations mitigate the spread of coronavirus, we estimate that total benefits of suppression policies to economic output are between $632.5 billion and $765.0 billion from early March 2020 to August 1, 2020. Relative to private mitigation, output lost due to suppression policies is estimated to be between $214.2 billion and $331.5 billion.

The cost estimate is based on the duration of non-essential business closures and stay-at-home orders, which were enforced between 42 and 65 days. Our results indicate that the net benefits of suppression policies to slow the spread of COVID-19 are positive and may be substantial.

During the spring and summer months of 2020, many U.S. states enforced non-pharmaceutical interventions (NPIs) that sought to suppress COVID-19 transmission among the general population, namely by closing non-essential businesses and enforcing stay-at-home orders for all residents.

According to the Institute for Health Metrics and Evaluation (IHME), between April 4, 2020, and April 24, 2020, 38 U.S. states and the District of Columbia actively enforced stay-at-home orders for their residents. During this time, almost 90 percent of the total U.S. population was required to stay at home unless engaged in essential activities.

These policies, and the pandemic generally, had substantial impacts on economic output and production, causing a recession in the United States.

Xiao, X., et al (2021) **Animal sales from Wuhan wet markets immediately prior to the COVID-19 pandemic.** SCIENTIFIC REPORTS 11:1doi.org/10.1038/s41598-021-91470-2 (available as a free pdf)

Authors' abstract: *Here we document 47,381 individuals from 38 species, including 31 protected species sold between May 2017 and November 2019 in Wuhan's markets. We note that no pangolins (or bats) were traded, supporting reformed opinion that pangolins were not likely the spillover host at the source of the current coronavirus (COVID-19) pandemic.*

While we caution against the misattribution of COVID-19's origins, the wild animals on sale in Wuhan suffered poor welfare and hygiene conditions and we detail a range of other zoonotic infections they can potentially vector.

Nevertheless, in a precautionary response to COVID-19, China's Ministries temporarily banned all wildlife trade on 26th Jan 2020 until the COVID-19 pandemic concludes, and permanently banned eating and trading terrestrial wild (nonlivestock) animals for food on 24th Feb 2020.

These interventions, intended to protect human health, redress previous trading and enforcement inconsistencies, and will have collateral benefits for global biodiversity conservation and animal welfare.

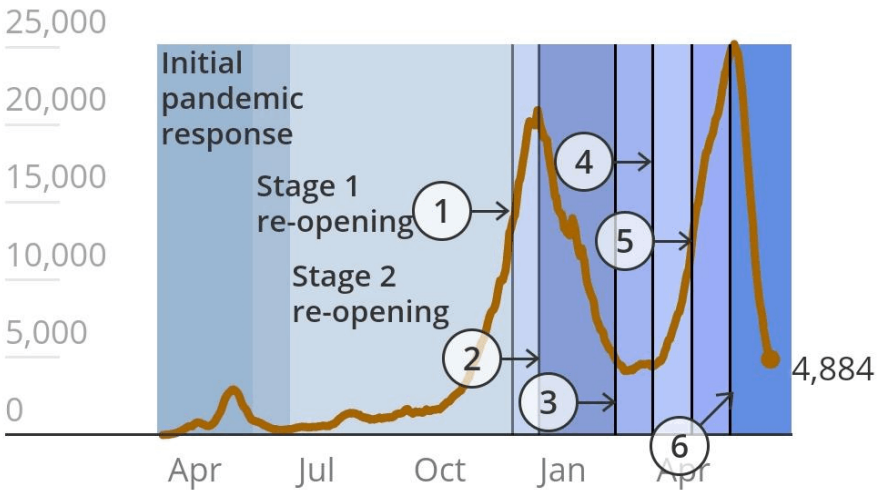
Initial media coverage suggesting that COVID-19 may have spilled-over via pangolins has been refuted, probably pangolins are simply a natural reservoir of SARS-CoV-2 along with palm civets (Paguma larvata).

Speirs: Well worth downloading. The survey of wet markets was conducted before the pandemic for unrelated reasons. The photographs of the markets are eye-opening.

As of June 21, Canada had 1,409,594 COVID-19 cases, with 26,087 deaths and 32,566,031 vaccinations including me. Canada's population is about 38,000,000.

Active COVID-19 cases in Alberta

Shading shows periods of pandemic response and levels of re-opening.



1. Modest new restrictions announced
2. Stricter restrictions take effect
3. 'Step 1' easing of restrictions
4. 'Step 2' easing
5. Return to Step 1
6. Tougher restrictions begin again

Chart: Robson Fletcher / CBC • Source: Government of Alberta

New COVID-19 cases in Alberta

Each **black dot** is the number of **new cases** on a given day. The **red line** is the **average** over the previous 7 days.

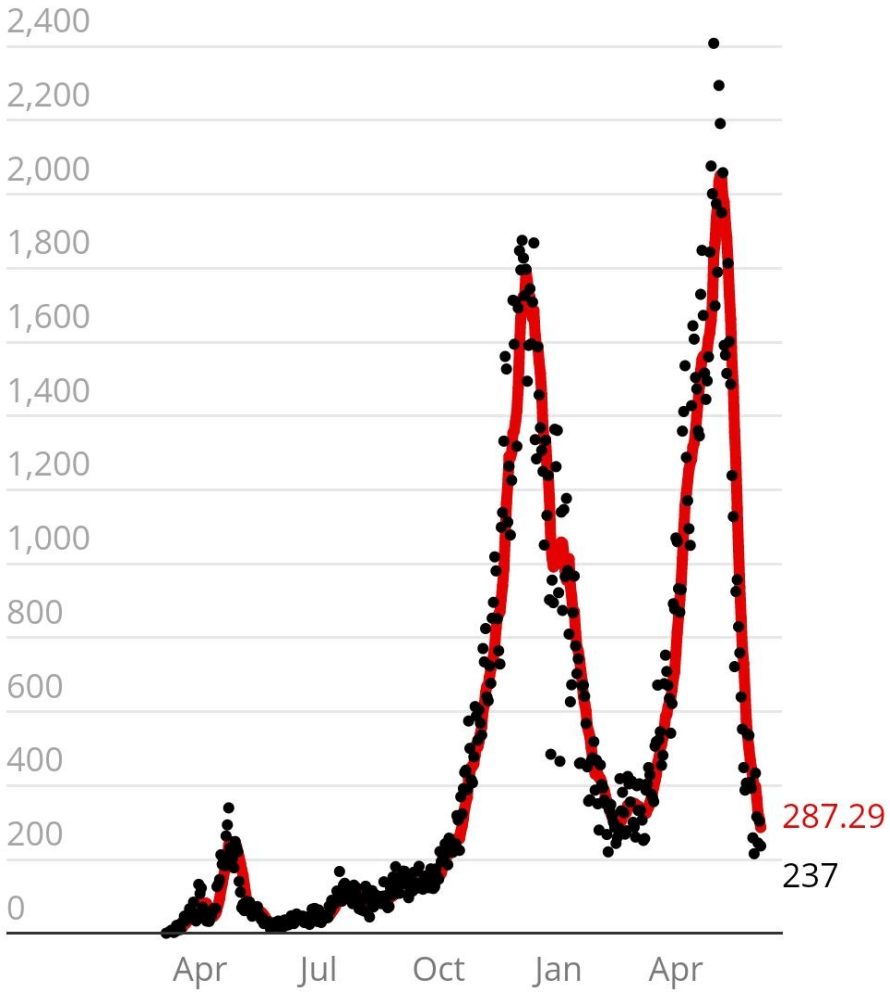


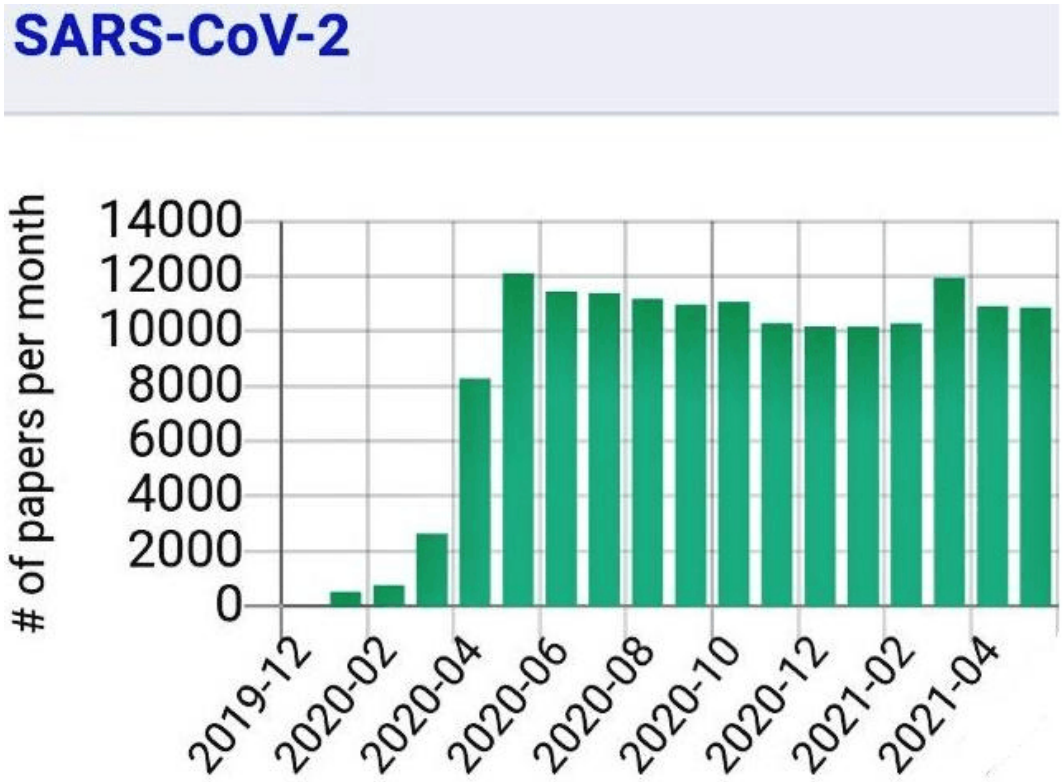
Chart: Robson Fletcher / CBC • Source: Alberta Health

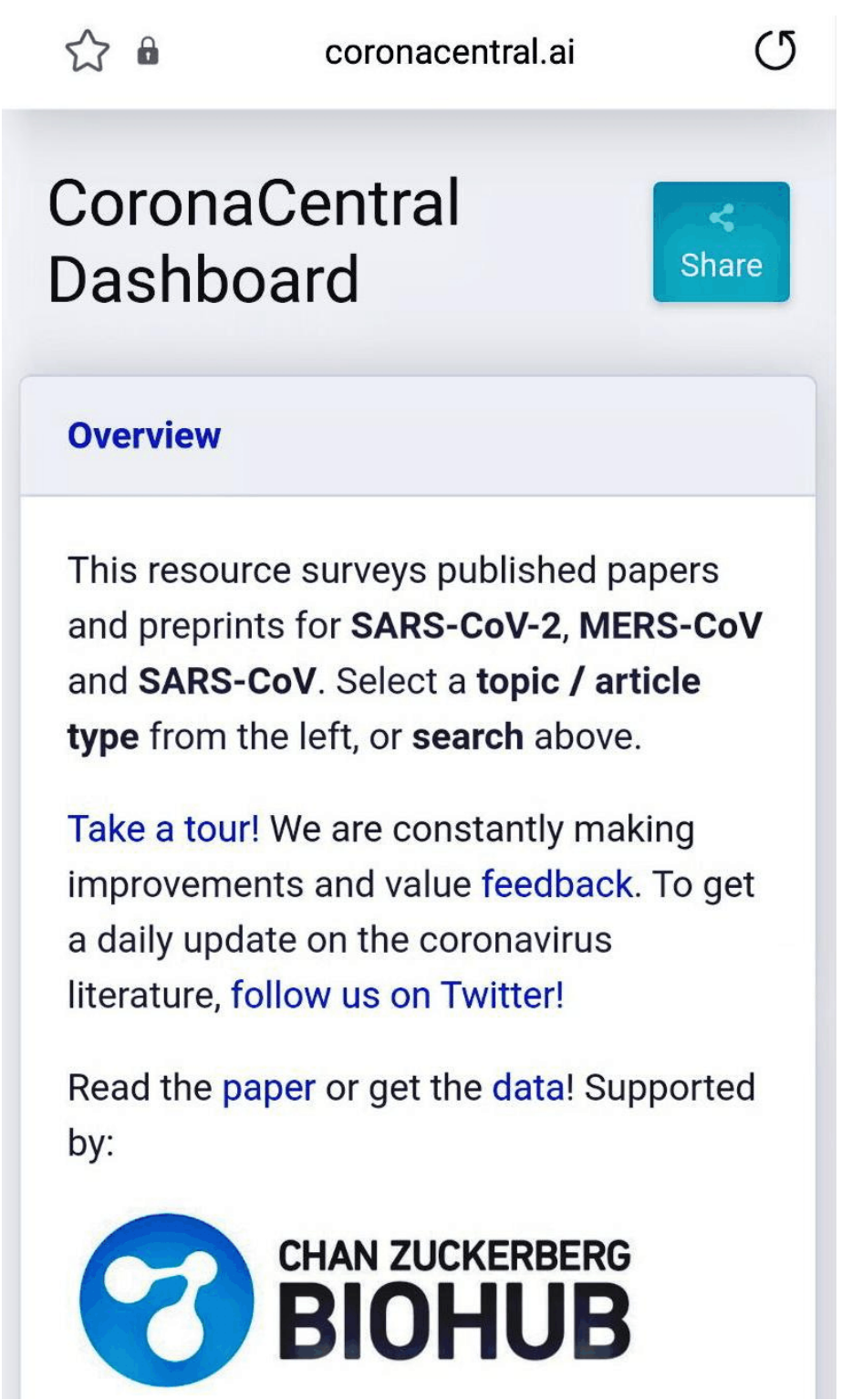
Lever, J., and Russ B. Altman (2021) **Analyzing the vast coronavirus literature with CoronaCentral.** PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES USA 118:doi.org/10.1073/pnas.2100766118

Authors' abstracts: *The SARS-CoV-2 pandemic has caused a surge in research exploring all aspects of the virus and its effects on human health. The overwhelming publication rate means that researchers are unable to keep abreast of the literature. To ameliorate this, we present the CoronaCentral resource that uses machine learning to process the research literature on SARS-CoV-2 together with SARS-CoV and MERS-CoV.*

We categorize the literature into useful topics and article types and enable analysis of the contents, pace, and emphasis of research during the crisis with integration of Altmetric data. These topics include therapeutics, disease forecasting, as well as growing areas such as "long COVID" and studies of inequality. This resource, available at https://coronacentral.ai, is updated daily.

Speirs: I had a look at the coronacentral.ai Website and it certainly seems to be a valuable resource. I took a few screenshots from this site.





Landier, J., et al (2021) C**old and dry winter conditions are associated with greater SARS-CoV-2 transmission at regional level in western countries during the first epidemic wave.** SCIENTIFIC REPORTS 11:doi.org/10.1038/s41598-021-91798-9 (available as a free pdf)

Authors' abstract: *Higher transmissibility of SARS-CoV-2 in cold and dry weather conditions has been hypothesized since the onset of the COVID-19 pandemic but the level of epidemiological evidence remains low. During the first wave of the pandemic, Spain, Italy, France, Portugal, Canada and USA presented an early spread, a heavy COVID-19 burden, and low initial public health response until lockdowns.*

In a context when testing was limited, we calculated the basic reproduction number (R_0) in 63 regions from the growth in regional death counts. After adjusting for population density, early spread of the epidemic, and age structure, temperature and humidity were negatively associated with SARS-CoV-2 transmissibility.

A reduction of mean absolute humidity by 1 g/m^3 was associated with a 0.15-unit increase of R_0. Below 10˚C, a temperature reduction of 1˚C was associated with a 0.16-unit increase of R_0. Our results confirm a dependency of SARS-CoV-2 transmissibility to weather conditions in the absence of control measures during the first wave.

The transition from summer to winter, corresponding to drop in temperature associated with an overall decrease in absolute humidity, likely contributed to the intensification of the second wave in north-west hemisphere countries. Non-pharmaceutical interventions must be adjusted to account for increased transmissibility in winter conditions.

Cooke, S.J., et al (2021) **Ten considerations for conservation policy makers for the post-COVID-19 transition.** ENVIRONMENTAL REVIEWS 29:doi.org/10.1139/er-2021-0014 (available as a free pdf)

Authors' abstract: *Public health and safety concerns around the SARS-CoV-2 novel coronavirus and the COVID-19 pandemic have greatly changed human behaviour. Such shifts in behaviours, including travel patterns, consumerism, and energy use, are variously impacting biodiversity during the human-dominated geological epoch known as the Anthropocene. Indeed, the dramatic reduction in human mobility and activity has been termed the "Anthropause".*

COVID-19 has highlighted the current environmental and biodiversity crisis and has provided an opportunity to redefine our relationship with nature. Here we share 10 considerations for conservation policy makers to support and rethink the development of impactful and effective policies in light of the COVID-19 pandemic.

There are opportunities to leverage societal changes as a result of COVID-19, focus on the need for collaboration and engagement, and address lessons learned through the development of policies (including those related to public health) during the pandemic.

The pandemic has had devastating impacts on humanity that should not be understated, but it is also a warning that we need to redefine our relationship with nature and restore biodiversity.

The considerations presented here will support the development of robust, evidence-based, and transformative policies for biodiversity conservation in a post-COVID-19 world.

1. Leverage interest in evidence-informed decisions.
2. Capitalize on positive human connections with nature.
3. Leverage the restructuring of society after COVID-19 to benefit biodiversity and people for today and tomorrow.
4. Create conservation policies that are living and adaptive.
5. Consult and engage with stakeholders and rights holders.
6. Recognize the complexities involved in compliance and cooperation.
7. Account for slow or reluctant adopters in policy design.
8. Create proactive and adaptive policy frameworks that consider unintended negative consequences.
9. Support collaborative monitoring by both scientists and communities to allow for better decisions in the face of unexpected events.
10. Refocus conservation action and policy through the lens of intersectional environmentalism.

Miyazaki, K., et al (2021) **Global tropospheric ozone responses to reduced NO_x emissions linked to the COVID-19 worldwide lockdowns.** SCIENCE ADVANCES 7:doi.org/10.1126/sciadv.abf7460 (available as a free pdf)

[Tg = teragrammes, that is 10^{12} grammes or 1 billion kg. O_3 is ozone, and NO_x are various nitrogen oxides.]

Authors' abstract: *Efforts to stem the transmission of coronavirus disease 2019 (COVID-19) led to rapid, global ancillary reductions in air pollutant emissions. Here, we quantify the impact on tropospheric ozone using a multi-constituent chemical data assimilation system.*

Anthropogenic NO_x emissions dropped by at least 15% globally and 18 to 25% regionally in April and May 2020, which decreased free tropospheric ozone by up to 5 parts per billion, consistent with independent satellite observations.

The global total tropospheric ozone burden declined by 6 Tg O_3 (~2%) in May and June 2020, largely due to emission reductions in Asia and the Americas that were amplified by regionally high ozone production efficiencies (up to 4 TgO_3/TgN).

Our results show that COVID-19 mitigation left a global atmospheric imprint that altered atmospheric oxidative capacity and climate radiative forcing, providing a test of the efficacy of NO_x emissions controls for co-benefitting air quality and climate.

LIFE ON THE BROADCAST WAVES: PART 4

by Dale Speirs

[Parts 1 to 3 appeared in OPUNTIAs #268 339, and 420. Related articles appeared in #260, 263, and 271. Radio fiction reviews appeared in #301, 302, 310, 319, 330, 353, 370, 377, 394, 411, 443, 473, and 489.]

Art Linkletter is forgotten today but during the golden age of radio in the 1930s and 1940s, he was one of the best-known comperes in the business. He didn't invent game shows or audience participation contests but he was among the earliest who built them up into top-rated series.

Boomers may remember him touting something or other in television commercials during the 1970s, but he was talking to the previous generation who knew him from old-time radio. Some of his shows are available from www.otrrlibrary.org

Linkletter's biography PEOPLE ARE FUNNY was first published as a Doubleday hardcover in 1947 and re-issued as a revised paperback in 1961. For serious collectors of OTR who might want it, the paperback was issued as a Cardinal imprint #C-384, unabridged and updated from the hardcover.

I had the paperback, which was in my mother's library and which I read several times as a teenager because Linkletter was a good storyteller. After she died, I inherited her library and for the final time recently re-read the book. The book was falling apart and all the pages were loose, with a quarter of the spine split away. After writing this review, I consigned it to the blue bin, another part of my life gone as I pass age 65 and begin simplifying my remaining years on my way to the graveyard.

The book began with his greatest success, the audience participation show PEOPLE ARE FUNNY. He would pick random people out of the studio audience and have them do stunts either on stage or out in the field. The autobiography then jumped back to his beginnings in radio, detailing the misadventures and struggles of a young man trying to make it big in radio.

Linkletter never mentioned his childhood in this book. His reticence was understandable when decades later it was revealed that he had been born illegitimate in Moose Jaw, Saskatchewan, and immediately abandoned by his mother.

He was adopted by the Linkletter family and given their name. He never met his biological mother, sister, or two brothers. The Linkletters moved to California when he was five years old. He lived to be 97, dying in 2010. Unusually for Hollywood, he was married 75 years to his wife Lois, one of the longest marriages recorded anywhere. Only death parted them.

The book began on stage at the PEOPLE ARE FUNNY radio show. Linkletter brought out a live pig. He asked the audience if anyone would be willing to kiss the pig for $50 (which would be about $500 in today's depreciated currency). A hundred people waved their hands, and Linkletter picked out a contestant. He then bargained the man down, who was willing to kiss the pig for $40, then $30. But he wouldn't do it for $25.

Linkletter then asked the audience if someone would do it for $25. Not as many hands went up, but he selected a woman and got her down to $17. She refused to kiss the pig for $15. Once more, another audience member was selected. He would do it for $15 but wouldn't go past $7. By this time the audience was shouting "Don't do it!". A Marine was willing to do it for $5. Down, down, down, to ever increasing bedlam. He kissed the pig for 5 cents.

Each episode began with an outside stunt, where a contestant was dispatched into the streets of Hollywood, followed at a distance by a stage manager who had to bail him out if necessary and get him back to the studio for the wrap-up. In the meantime there would be briefer stunts on stage with other audience members.

One outside stunt had a mild-mannered florist leading a Brahma bull into a china shop to test the old saying. The bull quietly walked up and down the aisles but didn't disturb any of the china. So much for that simile.

In another stunt, a contestant was selected to test how much of a racket he could create in a library. He was given a book and told to smuggle it into the reading room. As he read the book, he was to tear out pages and throw them in the air, screaming derogatory remarks. The idea, he was told, was to flummox the librarian when he showed her it was his own book and not a library book.

Linkletter double-crossed him though. Libraries put their identification stamp on an inside page, such as page 100. The prop man put a fake library marking inside the book which the contestant didn't know about. The studio then sent a couple of actors dressed as policemen to follow him from a distance and burst into the reading room after the librarian had identified the book. You can guess the rest of the stunt.

From those anecdotes, Linkletter backed up to his origins in radio. He started as a spot announcer on the graveyard shift, worked his way into street interviews, and was host of various talk shows. He took a detour as a promoter of broadcasts at state fairs and other big events.

Linkletter wrote that he died a thousand deaths on stage along the way as things went wrong. Props didn't work, he was heckled, microphones failed, or, even more dangerous, they worked at the wrong time and broadcast what shouldn't have gone out on the waves.

"The show must go on" wasn't just a saying. Linkletter had the advantage in that the radio listening audience at home only had his word for what was happening. Once he was assigned to report on the return of the U.S. Navy Pacific Fleet to San Diego. Had all gone well, the crowd of thousands of spectators would have seen a great armada of battleships and frigates sail into harbour.

Fog rolled in, keeping the fleet at sea. Linkletter was on a national hook-up so he had to fill the time. He was simultaneously speaking to the crowd along the pier. Undaunted, despite the fact that no one could see past the end of the pier, he began describing the mighty ships rolling into the harbour and docking.

The spectators began to murmur and back away from this crazy announcer. The Admiral of the Fleet was listening out at sea and shouting imprecations at Linkletter's voice. The Navy remained quiet though, because they didn't want to admit they couldn't handle a bit of fog.

Linkletter built up a good reputation as an ad-libber and a Master of Ceremonies who could handle any crisis. He finally began getting his own shows. HOUSE PARTY was a daytime kiddies show. He liked to ask the little tykes "*What did your parents tell you not to say?*" Since the kids had been programmed by their parents on what they shouldn't mention, they instinctively repeated what had been drummed into them.

PEOPLE ARE FUNNY was his greatest success. He wrote about the practicalities of such shows. A warmup man was needed to put the audience in a good mood. Sometimes he had a tough crowd and had to resort to slapstick

instead of cleverness. He had to be able to switch his routines instantly if he wasn't getting laughs on the original subject.

Television destroyed imagination, because viewers want to be shown instead of picturing in their own minds. Linkletter lamented the failings of television, which are just as bad today as they were in the early 1950s. He faded out and save for the few OTR fans who download some of his shows on mp3s, has been forgotten.

THE MAN FROM MONTENEGRO: PART 22
by Dale Speirs

[Parts 1 to 21 appeared in OPUNTIAs #252, 253, 275, 278, 279, 289, 304, 307, 319, 332, 335, 337, 344, 355, 364, 365, 382, 415, 445, 473, and 479.]

The private detective Nero Wolfe was created by Rex Stout. There was a long-running successful series of novels and short stories from 1934 until Stout's death in 1975. The original stories are referred to as the corpus, while stories by other authors are pastiches.

Nero Wolfe was a morbidly obese middle-aged man who had been a dashing young buck in his birthplace of Montenegro. The Balkan Wars, which were the prelude to World War One, had sent him adrift across Europe in the service of the Serbian army. After the war he made a fortune in unexplained dealings and emigrated to New York City in 1930.

Becoming a private investigator, he engaged Archie Goodwin as his legman. Wolfe seldom left his brownstone in Manhattan, which had a rooftop greenhouse filled with orchids. He had a gourmet cook named Fritz Brenner, who along with Goodwin lived in the house. His office was on the ground floor, where many a J'accuse! meeting was held. His nemesis was NYPD Homicide Inspector Cramer, the equivalent of Inspector Lestrade.

Pastiches.

Since Stout died relatively recently, there were few pastiches until after the Millennium because his copyrights were still in effect.

"Murder At A Military Funeral" by Marvin Kaye (2018, SHERLOCK HOLMES MYSTERY MAGAZINE #26, available from www.wildsidepress.com or Amazon) sent Archie Goodwin to Florida for his uncle's funeral. Uncle Joe had been an army sergeant, so the American Legion arranged a guard of honour.

The graveside ceremony was small, with a few civilians, old friends and coworkers. One of them had a grudge. When the guard of honour fired three volleys in salute, and everyone was looking at them, a murderer acted on his grudge. He shot one of the mourners dead with a handgun, then tossed it away.

The police found the gun soon enough but there were no recoverable fingerprints. Goodwin put in a telephone call to Nero Wolfe in New York City, who thought a moment and then solved the case. One of the mourners had to be a veteran with advance notice about the funeral from the Legion, and therefore the murderer.

Old-Time Radio.

Nero Wolfe aired as several different radio series from 1943 to 1951. Rex Stout received royalty cheques but farmed out the episodes to various script writers. The first two series only have one episode of each preserved, but there is a good run of the third and final series available as free mp3s from www.otrrlibrary.org.

That series, THE NEW ADVENTURES OF NERO WOLFE, was considered the best because Sydney Greenstreet played Wolfe. He was typecast but was true to his character. His distinctive speaking voice certainly helped.

"The Impolite Corpse" was a 1950 episode, written by William Kendall Clark. The standard opening was used, that of Archie Goodwin answering the telephone while Nero Wolfe dozed in a chair. As the announcer always said, Wolfe was "*engaged in deep thought*".

A business magnate Walter Channing was working late in his office, dictating memos to his secretary Brenda Barkley. That wasn't the only dictating he did, for he was a tyrannical boss who announced a series of cutbacks and restrictive rules. The memo included a notice that there would be no more daily shoeshines in the office. Channing didn't like Kelly the shoeshine boy drumming up business in the office and chased him out.

He fired a 14-year employee named Tom Bennett, who vowed revenge. Mrs Channing was estranged from him, although they still lived together. He was also estranged from Barkley, they once having had an affair. He was trying to drive her out of the company, but she had some stock options coming due and wasn't leaving until after she got them.

Channing was so upset that he knocked over an ink bottle on his desk, this being the days of fountain pens. Note that, for Wolfe would, after Channing was murdered at his desk, and not a moment too soon for those who knew him. The night porter and Kelly found the body. A handgun was lying on the floor. Channing had been shot through the heart at close range, with powder burns on his chest. The police initially said suicide.

Barkley wanted Wolfe to investigate because she felt they would eventually learn the gossip and try to pin the rap on her. Goodwin and Wolfe interviewed the office staff and quickly learned how unpopular Channing was. The office politics were tangled. More than a few employees would liked to have seen a coworker charged with the murder.

Goodwin went down to the morgue and inspected the body, noting an ink stain on his trouser leg partly rubbed out by cleaning fluid. He visited the scene of the crime and noticed a spot on the carpet where Channing had sat. Wolfe had the police analyse the stains. Another piece of evidence was the memo Channing had been dictating, which was circulated to the staff the next morning.

Wolfe mentioned "the sanctity of deskhood", the fact that few people at their desk would let a stranger walk in behind them. They would stand up to face the intruder into their psychological territory, not remain seated. The bullet that killed Channing passed through his heart in a horizontal line into the chair, indicating he was seated and the killer was kneeling down.

The inevitable J'accuse! meeting in Wolfe's office worked through all the possibilities. Suspicion was aimed at each office worker in turn, particularly Kelly, since he would kneel down to shine the shoes. However that suspicion was based on a memo circulated after the murder, a memo Wolfe realized was designed to draw attention to Kelly.

Barkley was the culprit. Wolfe realized that she was always the one who was drawing his attention to clues pointing to others. The story cut off abruptly. No gun fight in Wolfe's office nor a sobbing confession, just straight to the end credits. The plot was a bit clichéd but at least there were no gunfights or confessions.

"The Killer Cards" was a 1951 episode, no writer credited. Steven Denby tried to hire Nero Wolfe to watch a card game, at which Denby expected someone to be killed. Wolfe refused, so the game went on anyway without him.

The players were four partners in a nightclub who disputed who should take over sole ownership. They were Denby, a woman named Jean (of no fixed surname, as one of the others sneered), and two other men, Piper and Lacastro. A buyout deal failed. Therefore the partners decided to settle the matter by dealing one hand of five-card draw poker, with high score getting the nightclub.

Denby's bodyguard Chuck stood sentinel outside the only door into the room. Just as the cards were turned over, the room lights suddenly went out, two gunshots sounded, and Piper definitely terminated his partnership. He had a pair of kings, better than Jean or Lacastro. Denby's hand hadn't been announced when the lights went out.

Jump cut to Archie Goodwin strolling down the sidewalk a short time later. Chuck poked a revolver in his back and Denby made Goodwin an offer he couldn't refuse, that is, to accompany the pair to Denby's house.

The three remaining partners wanted the case solved quickly before calling the police. Wolfe seldom left his brownstone, so kidnapping Goodwin seemed an ideal method of drawing out the great detective.

The idea worked. Denby sugared the inconvenience with a cheque for $2,500, so Wolfe got down to business. The murderer had to be one of the three partners. He did some deducing and declared Lacastro the killer. As Wolfe and Goodwin prepared to leave, Goodwin leaned over to Jean and propositioned her. "*Now that my life expectancy has increased, what are you doing tomorrow night?*"

After the two detectives returned home, Wolfe told Goodwin that Lacastro was not the murderer. He said he had no proof against the real killer. Had he identified the culprit, the two men would not have made it out of the house alive. Lacastro in jail would be safe for the time being.

On that note, Goodwin took Jean out to dinner. The meal was interrupted when a gunman fired shots at her. He missed. The couple went to the brownstone, where Wolfe told them Lacastro had escaped and Denby was expected as a house guest.

The J'accuse! meeting turned up the heat on Jean and Denby. Chuck was an uninvited guest who resented being implicated. He settled the matter by shooting Denby dead. Chuck didn't long outlive Denby and got his comeuppance a moment later from Lacastro, who had been eavesdropping from the hallway.

The loose threads, and there were many, were hurriedly tied up in the last two minutes of the episode. Goodwin went off to squire Jean, if I may use an euphemism.

WORLD WIDE PARTY #28

Founded by Benoit Girard (Quebec) and Franz Miklis (Austria) in 1994, the World Wide Party is held on June 21st every year. 2021 was the 28th year of the WWP. The party is held at 21h00 local time, the idea being to get a wave of fannish celebrations circling the globe. At the appointed time, everyone is encouraged to raise a glass and toast their fellow zinesters and SF fans around the world.

I followed my traditional observance. I used Coke Zero to toast everyone, being a teetotaler and also constantly dieting. First I face to the east and toasted those who had already celebrated. Then, in quick succession, I faced south and north for those in Mountain Daylight Time. Finally I looked to the west and saluted those who were yet to celebrate.

LET MARS DIVIDE ETERNITY IN TWAIN: PART 16

by Dale Speirs

[Parts 1 to 15 appeared in OPUNTIAs #310, 321, 328, 332, 337, 354, 357, 369, 372, 384, 401, 429, 437, 466, and 495. Reviews of the WAR OF THE WORLDS movies appeared in #289.]

Mars At War.

The Belanger brothers Brian and Derrick have been attracting attention for their anthologies since they began publishing in 2015. They specialize in pastiches, mainly of Sherlock Holmes and Solar Pons. They have published an anthology of Edgar Allan Poe pastiches which I reviewed in OPUNTIA #492 and another of steampunk (issue #485). Those two were well done and I recommend them heartily.

Another of their series was A TRIBUTE TO H.G. WELLS. Volume 1 was issued in 2019, subtitled MARS: BRINGER OF WAR, and contains 10 stories.

Leading off the anthology was "The Fall Of Denver" by Richard Paolinelli. The story was set in 1897, the original timeline of the Martian invasion as per Wells. The plot was contemporary with events in England as the Martian spaceships crash-landed across the USA.

Near Denver the U.S. Army detachments struggled against the invaders, to no avail against the superior technology. As in the canon, the invaders fell to Earth's bacteria, not massed calvary or field guns.

"The Day The Martians Came" by Michael D. Winkle was an hilarious parody written as if by the humourist James Thurber when he was a young boy. His age was close enough to match an 1897 invasion. Winkle got Thurber's style down perfectly.

James and his brothers Herman and Roy were playing in their back yard when a Martian spaceship landed near them. They rushed to investigate and saw the Martians assembling a tripod.

The boys managed to scramble on board the machine and fire its beam into an open hatch of the spacecraft, thereby destroying it and the Martians. Their parents didn't believe their story.

"Behind The Orange Window" by Kevin M. Folliard was an updated rewrite of the Martian invasion, circa now. A young couple at a lakeside cottage witnessed one of the landers, and soon suffered the consequences.

When they saw the fireball of the inbound spaceship, their first instinct was to whip out their smartphones and get a video. There was no doubt that as the Martians spread out over Earth, humans would be hurriedly posting to YouTube or TikTok.

"The Aurora Affair" by Matthew Kresal was set in the original time of the invasion. Reports had come in from around the world of slow-moving airships which, however, seemed not to be an immediate threat.

A pair of investigators were dispatched to frontier Texas. One of the airships had slowly wobbled down to ground. Not a full-speed crash, but more like a fender-bender. The investigators recovered the wreck and the tentacled bodies for shipment to head office.

The conclusion was that the spaceship was just a scout. Nothing to worry about. About that time, astronomers observed green flashes on Mars. Nothing to worry about, just more scouts.

"The Last Of The Martians" by David Tallerman took place a year after the invasion, when the world was settling back into complacency. The war was already old news, just as the September 11 attacks are and the pandemic will be.

The narrator was asked by military intelligence to help interrogate a sole surviving Martian. The alien had survived the Earth bacteria by natural resistance and was now housed in a top-secret installation. Attempts to communicate were slow and uncertain, but the narrator made some progress before the Martian died. It was a conscript. It knew as little about the technology and grand strategy as a ship's cook.

"The Republic Strikes Back" by Robert Stapleton was a speech made by the supreme leader of the Martians more than a century after the initial invasion. They lived underground, which was why all the Earth probes since the 1960s had failed to find them.

Since 1897 the Martians had improved their technology, developed antigens to protect themselves against Earth microbes, and visited other planets to recruit those civilizations as allies. They had intensely studied radio and television broadcasts to learn about Earth. Now they were coming back.

"The Traveler Returns" by C. Edward Davis refers to H.G. Wells most famous traveler, who brought his time machine back to whence it came. George Wellesley visited his friend Edwin Hillyer and brought him up to date. Most of the story was taken up by a discussion of time paradoxes.

Wellesley mentioned he had seen tripods destroying England as he came back, but he didn't know who controlled them. He thought perhaps the Ottoman Empire. Hillyer suggested the Martians, as the newspapers that day had reported flashes of light on the planet. Wellesley pointed out that if Hillyer went to the authorities with such a story, he would be scorned or locked into an asylum.

The two men instead rebuilt the time machine into a bigger and better model. They departed for the far future to carry out a campaign of genocide against the Morlocks. Just as the time machine winked out of the present, the first Martian cylinder landed in England.

"Prospero's Daughter" by Michael Siverling was set in the aftermath of the Martian invasion. Jammed into the mashup was an invisible man (but not the Invisible Man) and assorted half-humans from Moreau's island. The plot was to break up a spy ring trying to steal secrets of the Martian war machines from British investigators. Everyone agreed a European war was coming, and everyone wanted to use the Martian technology.

"The Peace Of The Worlds" by Derrick Belanger was a continuous infodump. The Martian invaders were meat puppets controlled by energy beings who wanted to absorb all the human minds into one collective being. The convoluted explanations took up most of the story. The ending was utopian. Basically a wish-fulfillment fantasy based on Revelation 21:4.

Murder On Mars.

THE MARTIAN MENACE (2020) by Eric Brown was a novel in the series "The Further Adventures Of Sherlock Holmes" published by Titan Books. I could also file this under Sherlockiana but I'll put it in with the Mars stuff since the pastiche was more that than mundane sleuthing.

The premise was that the Martians returned six years after the first invasion but this time chastened and coming in peace. As the novel opened in 1910, Holmes and Watson received a Martian client at 221B.

The Martian ambassador had been murdered in his bedroom at the embassy. Two Martians and two humans on staff had access. Of the humans, one was Herbert Wells, a failed author who now worked as a scientific advisor, and his fiancée Cicely Fairfield, who worked as a secretary. (Google her name if you never took litcrit in university.)

The case was solved in the first chapter but Holmes let the murderer go on the grounds of self-defence. From there was a jump of two years and the main novel. The new ambassador visited 221B and asked Holmes and Watson to investigate the murder of a Martian philosopher.

On Mars. They could not refuse such an opportunity. The trip to the red planet took a week on a Martian liner. Just before, and after arrival, the narrative took time to name-check a variety of characters both real and fictional.

On Earth, George Bernard Shaw and G.K. Chesterton were leading the Martians-go-home movement. A fellow passenger to Mars was Professor Challenger, looking forward to climbing Olympus Mons.

Once on Mars, Holmes and Watson were soon embroiled in the politics of different factions and races. The Martians were no more a monolithic society than humans. An aggressive group was planning the subjugation of Earth, having learned from the mistakes of the first invasion.

The first alarum began with the kidnapping of Holmes, Watson, and Challenger. From there, assorted excursions were made back and forth across Mars. There was a rebel base, and the governing faction wanted them out of the way preparatory for the next invasion.

Much to-ing and fro-ing in what was basically an action-adventure. Trust no one, and all that. The second round of invaders, besides developing vaccines and antibiotics, were engaged in a more subtle plan. They were substituting world leaders with simulacra, did so with Challenger, and planned on doing so with Holmes and Watson.

The next invasion would not be a hot war but an infiltration, step by quiet step. The humans would be worked as slaves, then their population reduced bit by bit. More Martians would arrive and eventually would predominate.

When the plot slowed a bit, Prof. James Moriarty was introduced into plot as a traitor working for the Martians. Excursions were made about London and Woking. Alarums were received about the Martians establishing a military base in the Kenyan desert. They imported simulacra manufacturing machines to speed up the infiltration of the world's leadership.

The conclusion of the novel was a bit too pat. Moriarty repented of his sins. The Resistance sprang into action on Earth and with the aid of superscience weapons began the revolution. Civil war broke out on Mars to distract the aggressive faction. A brighter and shinier tomorrow would soon be nigh.

Old Mars.

Once upon a time Mars was inhabited by Martians. Or perhaps it was lifeless but humans could live on it without spacesuits. Alas, all those orbiters and rovers have forever obliterated the old Mars. But the stories are still fun to read.

“You’ll Like It On Mars” by Tom W. Harris (1958 August, IMAGINATION, available as a free pdf from www.archive.org) was about a movie producer who made an incredibly lifelike action-adventure film on Mars.

Actors were eaten alive by bug-eyed monsters in scenes realistic beyond doubt. The protagonist was sent by a rival studio to learn how it was done. He did; the scenes actually happened but the Martians could re-synthesize the dead actors from bits and pieces.

Tsukui, T., and S. Iguchi (2021) **Spiral morphology in an intensely star-forming disk galaxy more than 12 billion years ago.** SCIENCE 372:doi.org/10.1126/science.abe9680

Authors' abstract: *The early assembly of galaxies is thought to have produced disturbed and asymmetric objects. Morphological features seen in nearby galaxies, such as stellar disks, bulges, and spiral arms, require time to form and would be disturbed by the frequent galaxy mergers that occurred at early times.*

We identified a distant galaxy containing a disk of gas with a spiral morphology. The galaxy also has a compact central mass concentration due to a combination of a supermassive black hole and a possible stellar bulge. These features must have formed within 1.4 billion years after the Big Bang.

Spiral galaxies have distinct internal structures, including a stellar bulge, a disk, and spiral arms. It is unknown when in cosmic history these structures formed. In this study, we analyzed observations of BRI 1335–0417, an intensely star-forming galaxy in the distant Universe, at a redshift of 4.41.

The [C II] gas kinematics shows a steep velocity rise near the galaxy center and has a two-armed spiral morphology, which extends from about 2 to 5 kiloparsecs in radius. We interpret these features as due to a central compact structure such as a bulge, a rotating gas disk, and either spiral arms or tidal tails. These features had formed within 1.4 billion years after the Big Bang, long before the peak of cosmic star formation.

Montargès, M., et al (2021) **A dusty veil shading Betelgeuse during its Great Dimming.** NATURE 594:365-368

Authors' abstract: *Red supergiants are the most common final evolutionary stage of stars that have initial masses between 8 and 35 times that of the Sun. During this stage, which lasts roughly 100,000 years, red supergiants experience substantial mass loss.*

However, the mechanism for this mass loss is unknown. Mass loss may affect the evolutionary path, collapse, and future supernova light curve of a red supergiant, and its ultimate fate as either a neutron star or a black hole.

From November 2019 to March 2020, Betelgeuse, the second-closest red supergiant to Earth (roughly 220 parsecs, or 724 light years, away), experienced a historic dimming of its visible brightness. Usually having an apparent magnitude between 0.1 and 1.0, its visual brightness decreased to 1.614 ± 0.008 magnitudes around 7 to 13 February 2020, an event referred to as Betelgeuse's Great Dimming.

Here we report high-angular resolution observations showing that the southern hemisphere of Betelgeuse was ten times darker than usual in the visible spectrum during its Great Dimming. Observations and modelling support a scenario in which a dust clump formed recently in the vicinity of the star, owing to a local temperature decrease in a cool patch that appeared on the photosphere.

The directly imaged brightness variations of Betelgeuse evolved on a timescale of weeks. Our findings suggest that a component of mass loss from red supergiants is inhomogeneous, linked to a very contrasted and rapidly changing photosphere.

Bagheri, A., et al (2021) **Dynamical evidence for Phobos and Deimos as remnants of a disrupted common progenitor.** NATURE ASTRONOMY 5:539-543

Authors' abstract: *The origin of the Martian moons, Phobos and Deimos, remains elusive. While the morphology and their cratered surfaces suggest an asteroidal origin, capture has been questioned because of potential dynamical difficulties in achieving the current near-circular, near-equatorial orbits.*

To circumvent this, in situ formation models have been proposed as alternatives. Yet, explaining the present location of the moons on opposite sides of the synchronous radius, their small sizes and apparent compositional differences with Mars has proved challenging.

Here, we combine geophysical and tidal-evolution modelling of a Mars-satellite system to propose that Phobos and Deimos originated from disintegration of a common progenitor that was possibly formed in situ.

We show that tidal dissipation within a Mars-satellite system, enhanced by the physical libration of the satellite, circularizes the post-disrupted eccentric

orbits in <2.7 gigayears and makes Phobos descend to its present orbit from its point of origin close to or above the synchronous orbit.

Our estimate for Phobos's maximal tidal lifetime is considerably less than the age of Mars, indicating that it is unlikely to have originated alongside Mars. Deimos initially moved inwards, but never transcended the co-rotation radius because of insufficient eccentricity and therefore insufficient tidal dissipation.

Whereas Deimos is very slowly receding from Mars, Phobos will continue to spiral towards and either impact with Mars or become tidally disrupted on reaching the Roche limit in about 39 megayears.

Wright, J.T., et al (2021) **The dynamics of the transition from Kardashev Type II to Type III galaxies favor technosignature searches in the central regions of galaxies.** RESEARCH NOTES OF THE AMERICAN ASTRONOMICAL SOCIETY 5:doi.org/10.3847/2515-5172/ac0910 (available as a free pdf, with an embedded video)

Authors' abstract: *We present a video of a simulation showing the expansion front of a technological species settling a Milky Way-like galaxy. It illustrates how even very conservative rates of settlement ship launches and ship ranges can quickly lead to a galaxy endemic with technology, and how the rotational and peculiar motions of stars contributes to the expansion. This video confirms and validates previous work showing that the centers of galaxies are promising search directions for SETI.*

Speirs: Well worth reading if you are interested in the Fermi Paradox or looking for ideas for your Great Science Fiction Novel. Don't forget to play the embedded video.

Herwartz, D., et al (2021) **A CO_2 greenhouse efficiently warmed the early Earth and decreased seawater $^{18}O/^{16}O$ before the onset of plate tectonics.** PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES USA 118:doi.org/10.1073/pnas.2023617118

Authors' abstract: *Due to the lower luminosity of the young Sun, climate modelers struggle to explain why the climate on early Earth was not freezing cold. This "faint young Sun paradox" is in conflict with apparently hot Archean ocean temperatures (~70 ˚C) that can be estimated from the $^{18}O/^{16}O$ stable isotope ratio of chemical sediments.*

We show that the later temperatures had been overestimated because the $^{18}O/^{16}O$ of seawater also changed over time due to intense carbonatization and silicification of the oceanic crust, which consumes heavy ^{18}O. Because these processes require high fluxes of CO_2, greenhouse warming by a CO_2-rich atmosphere appears most feasible to explain all observations.

The low $^{18}O/^{16}O$ stable isotope ratios ($d^{18}O$) of ancient chemical sediments imply ~70 ˚C Archean oceans if the oxygen isotopic composition of seawater (sw) was similar to modern values. Models suggesting lower $d^{18}O$ sw of Archean seawater due to intense continental weathering and/or low degrees of hydrothermal alteration are inconsistent with the triple oxygen isotope composition (delta'^{17}O) of Precambrian cherts.

We show that high CO_2 sequestration fluxes into the oceanic crust, associated with extensive silicification, lowered the $d^{18}O$ sw of seawater on the early Earth without affecting the delta'^{17}O. Hence, the controversial long-term trend of increasing $d^{18}O$ in chemical sediments over Earth's history partly reflects increasing $d^{18}O$ sw due to decreasing atmospheric pCO_2.

We suggest that $d^{18}O$ sw increased from about -5‰ at 3.2 gigayears ago to a new steady-state value close to -2‰ at 2.6 Ga, coinciding with a profound drop in pCO_2 that has been suggested for this time interval. Using the moderately low $d^{18}O$ sw values, a warm but not hot climate can be inferred from the $d^{18}O$ of the most pristine chemical sediments.

Our results are most consistent with a model in which the "faint young Sun" was efficiently counterbalanced by a high-pCO_2 greenhouse atmosphere before 3 Ga.

Pickersgill, A.E., et al (2021) **The Boltysh impact structure: An early Danian impact event during recovery from the K-Pg mass extinction.** SCIENCE ADVANCES 7:doi.org/10.1126/sciadv.abe6530 (available as a free pdf)

Authors' abstract: *Both the Chicxulub and Boltysh* [Ukraine] *impact events are associated with the K-Pg boundary. While Chicxulub is firmly linked to the*

end-Cretaceous mass extinction, the temporal relationship of the ~24-km-diameter Boltysh impact to these events is uncertain, although it is thought to have occurred 2 to 5 ka before the mass extinction.

Here, we conduct the first direct geochronological comparison of Boltysh to the K-Pg boundary. Our 40Ar/39Ar age of 65.39 ± 0.14/0.16 Ma shows that the impact occurred ~0.65 Ma after the mass extinction. At that time, the climate was recovering from the effects of the Chicxulub impact and Deccan trap flood volcanism.

This age shows that Boltysh has a close temporal association with the Lower C29n hyperthermal recorded by global sediment archives and in the Boltysh crater lake sediments. The temporal coincidence raises the possibility that even a small impact event could disrupt recovery of the Earth system from catastrophic events.

Terfelta, F., and B. Schmitz (2021) **Asteroid break-ups and meteorite delivery to Earth the past 500 million years.** PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES USA 118:doi.org/10.1073/pnas.2020977118 (available as a free pdf)

Authors' abstract: *The standard view of meteorite delivery to Earth is that of the cascading model where large asteroid break-ups generate new fragment populations that feed the inner solar system with material for extended time periods. Our investigated time windows, stretching from the Cambrian to the present, do not support this model.*

In fact, of 70 major family-forming breakups the past ~500 megayears ago, only 1 appears to have given rise to a strongly enhanced flux to Earth. We argue that meteorites and small asteroids delivered to Earth in deep time are not primarily linked to the sequence of asteroid family-forming events.

The meteoritic material falling on Earth is believed to derive from large break-up or cratering events in the asteroid belt. The flux of extraterrestrial material would then vary in accordance with the timing of such asteroid family-forming events.

In order to validate this, we investigated marine sediments representing 15 time windows in the Phanerozoic for content of micrometeoritic relict chrome-spinel grains (>32 μm). We compare these data with the timing of the 15 largest break-up events involving chrome-spinel bearing asteroids (S- and V-types).

Unexpectedly, our Phanerozoic time windows show a stable flux dominated by ordinary chondrites similar to today's flux. Only in the mid-Ordovician, in connection with the breakup of the L-chondrite parent body, do we observe an anomalous micrometeorite regime with a two to three orders-of-magnitude increase in the flux of L-chondritic chrome-spinel grains to Earth.

This corresponds to a one order-of-magnitude excess in the number of impact craters in the mid-Ordovician following the L-chondrite break-up, the only resolvable peak in Phanerozoic cratering rates indicative of an asteroid shower.

We argue that meteorites and small (<1-km-sized) asteroids impacting Earth mainly sample a very small region of orbital space in the asteroid belt. This selectiveness has been remarkably stable over the past 500 Ma.

Brückner, M.Z.M., et al (2021) **Muddying the waters: Modeling the effects of early land plants in Paleozoic estuaries.** PALAIOS 36:doi.org/10.2110/palo.2020.073

Authors' abstract: *The Paleozoic evolution of vegetation transformed terrestrial landscapes, facilitating novel sedimentary processes and creating new habitats. This transformation left a permanent mark on the sedimentary record, perhaps most strikingly via an upsurge in preserved terrestrial mudrock.*

Whereas feedbacks between evolving vegetation and river structure have been widely studied, Paleozoic estuaries have so far received scant attention. Located at the interface between the land and sea, the co-adjustment of estuarine morphology and plant traits are fundamentally tied to a varied range of geochemical cycles, and determine how global silicate weathering patterns may have varied over time.

Here we employ an eco-morphodynamic model with an in-built vegetation code to simulate estuarine morphology through five key stages in plant evolution. An abiotic model (early Precambrian?) saw mud deposition restricted to fortuitous instances of limited erosion along bar flanks.

Estuaries colonized by microbial mats (Precambrian onwards) facilitated mud accretion that sufficiently stabilized bar surfaces to promote extensive mudflat development. Small-stature, rootless vegetation (Silurian to Early Devonian) introduced novel above-ground baffling effects which led to notable mud accumulation in lower-energy environments.

The incorporation of roots (Early Devonian) strengthened these trends, with root structures decreasing the mortality of the occupying plants. Once the full complement of modern vascular plant architectures had evolved (Middle Devonian), dense colonization promoted the formation of in-channel islands accompanied with system-wide mud accumulation.

These simulations suggest estuaries underwent profound change during the Paleozoic, with the greening of the continents triggering processes and feedbacks which render all previous source-to-sink sediment pathways non-uniformitarian.

Xiao, L., et al (2021) **Florivory of Early Cretaceous flowers by functionally diverse insects: implications for early angiosperm pollination.** PROCEEDINGS OF THE ROYAL SOCIETY OF LONDON 288B:doi.org/10.1098/rspb.2021.0320 (available as a free pdf)

Authors' abstract: *Flowers are the most successful plant reproductive structures ever to evolve on land and angiosperms (flowering plants) presently are the most abundant and diverse clade of vascular plants, currently consisting of over 369,000 described species. This lineage probably originated very early during the Cretaceous, with robust molecular phylogenies placing the origins of the clade at 139.35 to 136 megayears ago.*

This timing is consistent with the earliest documented appearance of angiosperm pollen around 136 Ma and earliest known intact flowers at 125 Ma, from the Early Cretaceous of northeastern China. The best documented and earliest known bisexual flower, the 'Rose Creek Flower', from the Early Cretaceous Dakota Formation of the United States, examined in this report, is approximately 103 million years in age.

Florivory (flower consumption) occurs worldwide in modern angiosperms, associated with pollen and nectar consumption. However, florivory remains unrecorded from fossil flowers since their Early Cretaceous appearance.

We test hypotheses that earliest angiosperms were pollinated by a diverse insect fauna by evaluating 7858 plants from eight localities of the latest Albian Dakota Formation from midcontinental North America, in which 645 specimens (8.2%) were flowers or inflorescences.

Well-preserved specimens were categorized into 32 morphotypes, nine of which displayed 207 instances of damage from 11 insect damage types by four functional-feeding groups of hole feeding, margin feeding, surface feeding and piercing-and-sucking.

We assessed the same damage types inflicted by known florivores on modern flowers that also are their pollinators, and associated insect mouthpart types causing such damage. The diverse, Dakota florivore-pollinator community showed a local pattern at Braun's Ranch of flower morphotypes having piercing-and-sucking as dominant and margin feeding as minor interactions, whereas Dakotanthus cordiformis at Rose Creek I and II had an opposite pattern.

We found no evidence for nectar robbing. These data support the rapid emergence of early angiosperms of florivore and associated pollinator guilds expressed at both the local and regional community levels.

Lim, J.Y., et al (2021) **Ecological and evolutionary significance of primates' most consumed plant families.** PROCEEDINGS OF THE ROYAL SOCIETY OF LONDON 288B:/doi.org/10.1098/rspb.2021.0737 (available as a free pdf)

[Angiosperms are the flowering plants that produce fruits. The Fabaceae are the legumes such as beans and peas, and the Moraceae includes plants such as figs, mulberries, and breadfruit.]

Authors' abstract: *Angiosperms have been essential components of primate diets for millions of years, but the relative importance of different angiosperm families remains unclear.*

Here, we assess the contribution and ecological and evolutionary significance of plant families to diets of wild primates by compiling an unprecedented dataset of almost 9,000 dietary records from 141 primary sources covering 112 primate species.

Of the 205 angiosperm plant families recorded in primate diets, only 10 were consumed by more than half of primate species. Plants of the Moraceae and Fabaceae families were the most widely and frequently consumed, and they likely represent keystone resources for primates. Over 75% of species fed on these two families, and together they made up a median of approximately 13% of primate diets.

By analysing the relative proportion of different plant parts consumed, we found that Moraceae was mainly eaten as fruit and Fabaceae as non-fruit parts, with the consumption of these two families not showing a significant phylogenetic signal across primate species.

Moraceae consumption was associated with small home range sizes, even though more frugivorous primates tended to have larger home ranges compared to more folivorous species, possibly due to the year-round availability of moraceous fruits and the asynchrony in their phenology.

Our results suggest that primates may be intricately and subtly shaped by the plant families that they have consumed over millions of years, and highlight the importance of detailed dietary studies to better understand primate ecology and evolution.

O'Hara, T.D., et al (2021) **Relict from the Jurassic: new family of brittle-stars from a New Caledonian seamount.** PROCEEDINGS OF THE ROYAL SOCIETY OF LONDON 288B:doi.org/10.1098/rspb.2021.0684 (available as a free pdf)

Authors' abstract: *The deep-seafloor in the tropical Indo-Pacific harbours a rich and diverse benthic fauna with numerous palaeoendemics. Here, we describe a new species, genus and family of brittle-star (Ophiuroidea) from a single eight-armed specimen collected from a depth between 360 and 560 m on Banc Durand, a seamount east of New Caledonia.*

Leveraging a robust, fossil calibrated (265 kbp DNA) phylogeny for the Ophiuroidea, we estimate the new lineage diverged from other ophiacanthid families in the Late Triassic or Jurassic (median = 187 to 178 Myr, 95% CI = 215 to 143 Myr), a period of elevated diversification for this group.

We further report very similar microfossil remains from Early Jurassic (180 Myr) sediments of Normandy, France. The discovery of a new ancient lineage in the relatively well-known Ophiuroidea indicates the importance of ongoing taxonomic research in the deep-sea, an environment increasingly threatened by human activities.

Rossi, G.S., and P.A. Wright (2021) **Does leaving water make fish smarter? Terrestrial exposure and exercise improve spatial learning in an amphibious fish.** PROCEEDINGS OF THE ROYAL SOCIETY OF LONDON 288B:doi.org/10.1098/rspb.2021.0603

Authors' abstract: *Amphibious fishes transition between aquatic and terrestrial habitats, and must therefore learn to navigate two dramatically different environments. We used the amphibious killifish Kryptolebias marmoratus to test the hypothesis that the spatial learning ability of amphibious fishes would be altered by exposure to terrestrial environments because of neural plasticity in the brain region linked to spatial cognition (dorsolateral pallium).*

We subjected fish to eight weeks of fluctuating air-water conditions or terrestrial exercise before assessing spatial learning using a bifurcating T-maze, and neurogenesis in the dorsolateral pallium by immunostaining for proliferating cell nuclear antigen.

In support of our hypothesis, we found that air-water fluctuations and terrestrial exercise improved some markers of spatial learning. Moreover, air-water and exercised fish had 39% and 46% more proliferating cells in their dorsolateral pallium relative to control fish, respectively.

Overall, our findings suggest that fish with more terrestrial tendencies may have a cognitive advantage over those that remain in water, which ultimately may influence their fitness in both aquatic and terrestrial settings.

More broadly, understanding the factors that promote neural and behavioural plasticity in extant amphibious fishes may provide insights into how ancestral fishes successfully colonized novel terrestrial environments before giving rise to land-dwelling tetrapods.

Zhou, X., et al (2021) **A new darwinopteran pterosaur reveals arborealism and an opposed thumb.** CURRENT BIOLOGY 31:doi.org/10.1016/j.cub.2021.03.030

Authors' abstract: *Opposed thumbs are adaptations to arborealism and rare for non-mammal vertebrates. A new pterosaur shows the oldest record of such a feature, the first for the group. It shared a complex forest habitat with close relatives through niche partitioning.*

Pterosaurs, which lived during the Mesozoic, were the first known vertebrates to evolve powered flight. Arboreal locomotion has been proposed for some taxa, and even considered to have played a role in the origin of pterosaur flight. Furthermore, skeletal adaptations correlated to specialized lifestyles are often difficult to recognize and interpret in fossils.

Here we report on a new darwinopteran pterosaur that inhabited a unique forest ecosystem from the Jurassic of China. The new species exhibits the oldest record of palmar (or true) opposition of the pollex, which is unprecedented for pterosaurs and represents a sophisticated adaptation related to arboreal locomotion.

Principal-coordinate analyses suggest an arboreal lifestyle for the new species but not for other closely related species from the same locality, implying a possible case of ecological niche partitioning.

Zverkov, N.G., et al (2021) **Early Jurassic palaeopolar marine reptiles of Siberia.** GEOLOGICAL MAGAZINE 158:doi.org/10.1017/S0016756820001351

Authors' abstract: *Marine reptile occurrences are rare in the Lower Jurassic Series outside of Europe. Here we describe diverse marine reptile faunas from the Lower Jurassic Series (Pliensbachian and Toarcian stages, including the Toarcian-Aalenian boundary interval) of Eastern Siberia.*

The taxonomic composition of Toarcian marine reptile assemblages of Siberia highlight their cosmopolitan nature, with the presence of taxa previously known nearly exclusively from coeval strata of Europe, such as ichthyosaurians Temnodontosaurus and Stenopterygius, microcleidid plesiosaurians (including the genus Microcleidus), rhomaleosaurids and basal pliosaurids.

The palaeogeographic reconstruction places these faunas to the palaeopolar region, north of the 80th northern parallel and up to the palaeo north pole (upper value within the 95% confidence interval for some of the localities). The materials include remains of both mature and juvenile (or even infant, judging by their very small size and poor ossification) animals, indicating a possibility that these polar seas may serve as a breeding area.

The diversity and abundance of plesiosaurians and ichthyosaurians, along with a lack of thalattosuchian remains (considering their wide distribution elsewhere at low latitudes), is an additional argument that plesiosaurians and neoichthyosaurians were able to live and reproduce in a polar environment.

There is no certainty whether these animals lived in polar seas permanently, or whether they were taking seasonal migrations. However, given the polar night conditions at high latitudes, the latter seems more plausible, and both these scenarios are further indirect evidence that these groups likely had a high metabolism.

Yu, T., et al (2021) **First freshwater gastropod preserved in amber suggests long-distance dispersal during the Cretaceous period.** GEOLOGICAL MAGAZINE 158:doi.org/10.1017/S0016756821000285

Authors' abstract: *Burmese amber continues to provide unique insights into the terrestrial biota inhabiting tropical equatorial forests during mid-Cretaceous time. In contrast to the large amount and great diversity of terrestrial species retrieved so far, aquatic biota constitute rare inclusions.*

Here we describe the first freshwater snail ever preserved in amber. The new species Galba prima sp. nov. belongs in the family Lymnaeidae, today a diverse and near globally distributed family. Its inclusion in terrestrial amber is probably a result of the amphibious lifestyle typical of modern representatives of the genus.

The finding of a freshwater snail on the Burma Terrane, back then an island situated at some 1,500 km from mainland Asia, has implications for the dispersal mechanisms of Mesozoic lymnaeids. The Cenomanian species precedes the evolution of waterfowl, which are today considered a main vector for long-distance dispersal. In their absence, we discuss several hypotheses to explain the disjunct occurrence of the new species.

Scott, C.S. (2021) **First mammal from the Willow Creek Formation: a new early Paleocene ptilodontid (Mammalia, Multituberculata) from near Calgary, Alberta, Canada.** Canadian Journal of Earth Sciences 58:doi.org/10.1139/cjes-2020-0151

[Multituberculates were the third major group of mammals, along with marsupials and placentals. They were the longest lived group of mammals from the Jurassic to the Oligocene (35 megayears), a total span about 160 megayears. They couldn't compete against placentals and died out.]

[Multituberculates ranged from squirrel size to beaver size, had opposed thumbs for climbing and handling food, and were herbivores. They are distinguished from other vertebrates by their teeth, which had large tubercles on them, and their premolars, which were giant single knife teeth on either side of the back of the jaw which sliced food such as large nuts.]

Author's abstract: *Although multituberculates are among the best-represented mammals of the Late Cretaceous and early Paleogene in North America, their evolution during the first several tens to hundreds of thousands of years following the Cretaceous-Paleogene (K-Pg) impact event is largely obscure.*

A better understanding of the early Paleogene record of multituberculates is crucial, for their dominance in early Paleocene mammalian faunas is unquestionably a result of rapid evolution during the immediate post-impact interval, and they accordingly played an important role in the evolution of mammalian communities more generally.

I report on a new multituberculate from the early Paleocene of southwestern Alberta, in rocks of the Willow Creek Formation, the first such occurrence in this otherwise poorly known unit. T

he new multituberculate, Aenigmamys aries gen. et sp. nov., most closely resembles the ptilodontid Kimbetohia campi in comparable parts of the dentition and sheds light on the early evolution of Ptilodontidae, one of the major cimolodontan families that diversified during the Paleocene.

The presence of Aenigmamys in mammalian faunas that lived soon after the K-Pg boundary implies a still-deeper evolutionary history for Ptilodontidae that may have extended into the Late Cretaceous. Aenigmamys is part of a new mammalian fauna from southwestern Alberta, the taxonomic composition of which includes a diversity of multituberculates, cimolestans, primates, and condylarths.

The fauna correlates with those of middle Puercan age from other parts of the Western Interior of North America, and its high taxonomic diversity further corroborates previous hypotheses that multituberculate recovery, and mammalian recovery more generally, occurred relatively quickly after the K-Pg extinction event.

Sibert, E.C., et al (2021) **An early Miocene extinction in pelagic sharks.** SCIENCE 372:doi.org/10.1126/science.aaz3549

Authors' abstract: *Shark populations have been decimated in recent decades because of overfishing and other anthropogenic stressors; however, the long-term impacts of such changes in marine predator abundance and diversity are poorly constrained.*

We present evidence for a previously unknown major extinction event in sharks that occurred in the early Miocene, ~19 million years ago. During this interval, sharks virtually disappeared from open-ocean sediments, declining in abundance by >90% and morphological diversity by >70%, an event from which they never recovered.

This abrupt extinction occurred independently from any known global climate event and ~2 million to 5 million years before diversifications in the highly migratory, large-bodied predators that dominate pelagic ecosystems today, indicating that the early Miocene was a period of rapid, transformative change for open-ocean ecosystems.

Reynolds, A.R., et al (2021) ***Smilodon fatalis* siblings reveal life history in a saber-toothed cat.** iSCIENCE 24:doi.org/10.1016/j.isci.2020.101916 (available as a free pdf)

[Don't confuse this journal iSCIENCE with the other title SCIENCE.]

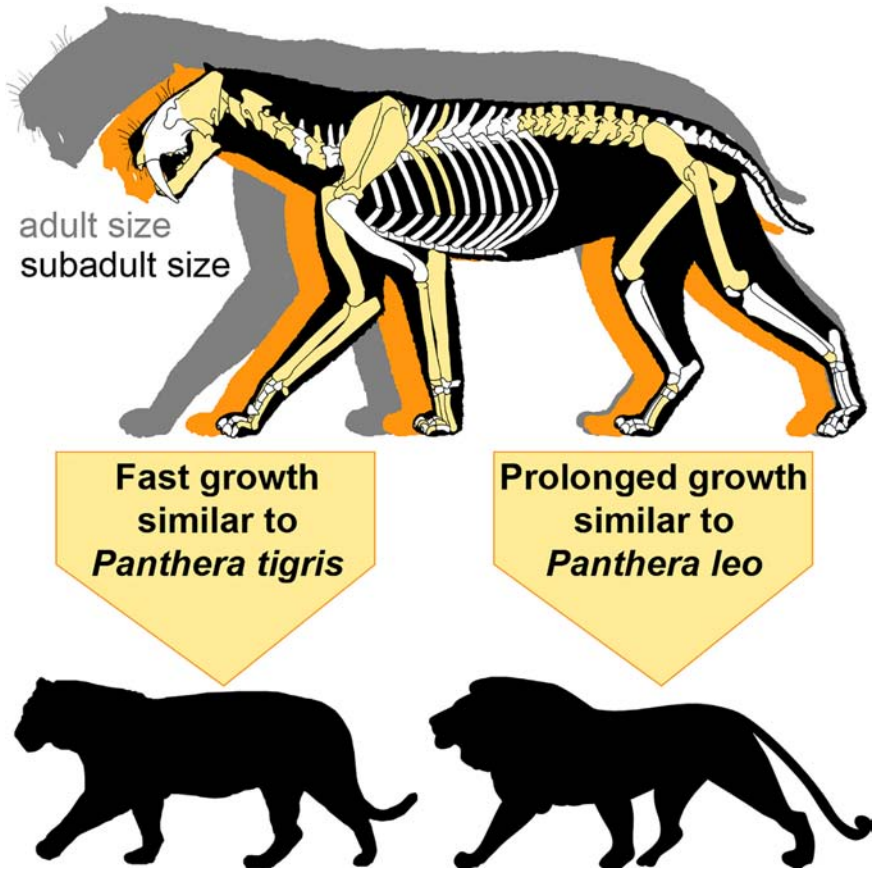
Authors' abstract: *The saber-toothed cat Smilodon occurred throughout North America and South America during the Pleistocene. Of the three recognized species, S. fatalis is the most completely known, with thousands of*

well-preserved specimens in collections from asphalt seep deposits (=''tar pits''). The saber-toothed cat Smilodon fatalis is known predominantly from ''predator trap'' deposits, which has made many aspects of its life history difficult to infer. Here, we describe an association of at least two subadult and one adult S. fatalis from Pleistocene coastal deposits in Ecuador.

The assemblage likely derived from a catastrophic mass mortality event, and thereby provides insights into the behavior of the species. The presence of a P3 in the subadult dentaries suggests inheritance, a rare instance of familial relatedness in the fossil record.

The siblings were at least two years old and were associated with an adult that was likely their mother, indicating prolonged parental care in S. fatalis. Comparison with the growth of pantherine cats suggests that S. fatalis had a unique growth strategy among big cats that combines a growth rate that is similar to a tiger and the extended growth period of a lion.

[Image is from this paper.]



Paiva, E.A.S. (2021) **Do calcium oxalate crystals protect against herbivory?** THE SCIENCE OF NATURE 108:doi.org/10.1007/s00114-021-01735-z

Author's abstract: *Calcium oxalate (CaOx) crystals have challenged human curiosity since the advent of microscopy. These crystals are linked to the control of calcium levels in plant cells, but they have also been attributed several other functions, including protection against herbivory.*

However, the protection offered by CaOx crystals against herbivory may be overstated, as claims have been mainly based on their shapes and hard and indigestible nature rather than on experimental evidence. I contend that it is improbable that a constitutive defense, present since very early in the evolution of plants, has not been superseded by herbivores, especially insects.

Here, I present arguments and evidence that suggest that these crystals have low efficiency in protecting plants against herbivores. First, I argue that insects with chewing mouthparts possess a semipermeable structure that protects their midgut, minimizing damage from crystals.

Second, the action of CaOx crystals is purely mechanical and similar to other inert materials such as sand. Therefore, CaOx crystals only provide effective protection from herbivory in very particular cases and should not be considered an effective defense without supporting experimental evidence.

Riesgo, A., et al (2021) **Recycling resources: silica of diatom frustules as a source for spicule building in Antarctic siliceous demosponges.** ZOOLOGICAL JOURNAL OF THE LINNEAN SOCIETY 192:259-276

Authors' abstract: *Dissolved silicon (DSi) is biologically processed to produce siliceous skeletons by a variety of organisms including radiolarians, silicoflagellates, choanoflagellates, plants, diatoms and some animals. In the photic ocean, diatoms are dominant consumers over competing other silicifiers. In Antarctica, where DSi is not particularly limiting, diatoms and sponges coexist in high abundances.*

Interestingly, diatom ingestion by sponges is a regular feeding strategy there. Although it was known that the diatom organic nutrients are readily metabolized by the sponges, what happened to the inorganic diatom silica

skeleton remained unexplored. Here, we have conducted a multi-analytical approach to investigate the processing of diatom silica and whether it is reconverted into sponge silica.

We have documented widespread diatom consumption by several demosponges, identifying storage vesicles for the diatom-derived silica by electron microscopy and microanalysis.

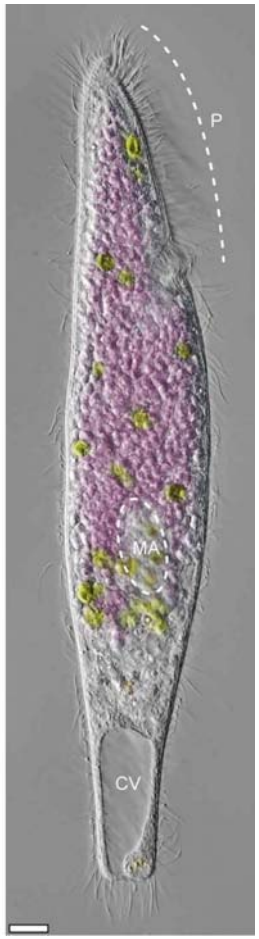
Diatom consuming sponges showed upregulation of silicatein and silicase genes, which in addition to the d30Si values of their silica, supports that the sponges are converting the ingested diatom silica into sponge silica without much further Si fractionation.

Our multidisciplinary approach suggests that the reutilization of diatom silica by sponges is a common feature among Antarctic sponges, which should be further investigated in other latitudes and in other silicifiers.

Muñoz-Gómez, S.A., et al (2021) **A microbial eukaryote with a unique combination of purple bacteria and green algae as endosymbionts.** S C I E N C E A D V A N C E S 7:doi.org/10.1126/sciadv.abg4102 (available as a free pdf)

Authors' abstract: *Oxygenic photosynthesizers (cyanobacteria and eukaryotic algae) have repeatedly become endosymbionts throughout evolution. In contrast, anoxygenic photosynthesizers (e.g., purple bacteria) are exceedingly rare as intracellular symbionts. Here, we report on the morphology, ultrastructure, lifestyle, and metagenome of the only "purple-green" eukaryote known.*

The ciliate Pseudoblepharisma tenue harbors green algae and hundreds of genetically reduced purple bacteria. The latter represent a new candidate species of the Chromatiaceae that lost known genes for sulfur dissimilation.



The tripartite consortium is physiologically complex because of the versatile energy metabolism of each partner but appears to be ecologically specialized as it prefers hypoxic sediments.

The emergent niche of this complex symbiosis is predicted to be a partial overlap of each partners' niches and may be largely defined by anoxygenic photosynthesis and possibly phagotrophy. This purple-green ciliate thus represents an extraordinary example of how symbiosis merges disparate physiologies and allows emergent consortia to create novel ecological niches.

[Image is from this paper.]

Rosas-Ramos, N., et al (2021) **Proctodeal extrusion as a defensive behavioral response in blister beetles (Coleoptera: Meloidae).** THE SCIENCE OF NATURE 108:doi.org/10.1007/s00114-021-01728-y

Authors' abstract: *Defensive mechanisms in blister beetles (Coleoptera: Meloidae) include a wide variety of behavioral responses, chemical defense, and conspicuous external colorations. Although some of these mechanisms have been previously described, proctodeal extrusion, a defensive behavior involving the extrusion of inner abdominal membranes from the proctodeal region which appear intensely red or orange colored when the hemolymph is seen through them, has not been reported to date.*

Here, we tested the ability to display proctodeal extrusion in response to threat stimuli in wild populations of three blister beetle species inhabiting Central Spain: Berberomeloe majalis, Berberomeloe comunero, and Physomeloe corallifer. In addition, we observed and recorded various other defensive behaviors such as immobility, antennal threat display, autohemorrhage (reflex bleeding), defecation, and thanatosis (death feigning).

The frequency at which proctodeal extrusion was observed differed among species, as did the stress intensity needed for extrusion and the probability of proctodeal extrusion in response to a particular threatening stimulus.

Our findings indicate that, although proctodeal extrusion might be a widespread potential defensive mechanism in Meloidae, the ability to elicit it is not generalized across lineages.

Physomeloe and Berberomeloe are endemic to the semiarid Mediterranean region, and species adapted to such a climate would have developed strategies that limit hydric stress such as proctodeal extrusion, which mirrors the effect of autohemorrhage but without the fluid loss.

Mulder, T., et al (2021) **Dynamic environments do not appear to constrain spider web building behaviour.** THE SCIENCE OF NATURE 108:doi.org/10.1007/s00114-021-01725-1 (available as a free pdf)

Authors' abstract: *Many laboratory experiments demonstrate how orb-web spiders change the architecture of their webs in response to prey, surroundings and wind loading. The overall shape of the web and a range of other web parameters are determined by frame and anchor threads.*

In the wild, unlike the lab, the anchor threads are attached to branches and leaves that are not stationary but move, which affects the thread tension field. Here we experimentally test the effect of a moving support structure on the construction behaviour and web-parameters of the garden cross spider Araneus diadematus.

We found no significant differences in building behaviour between rigid and moving anchors in total time spent and total distance covered nor in the percentage of the total time spent and distance covered to build the three major web components: radials, auxiliary and capture spirals. Moreover, measured key parameters of web-geometry were equally unaffected.

These results call for reevaluation of common understanding of spider webs as thread tensions are often considered to be a major factor guiding the spider during construction and web-operation.

Testard, C., et al (2021) **Rhesus macaques build new social connections after a natural disaster.** CURRENT BIOLOGY 31:doi.org/10.1016/j.cub.2021.03.029 (available as a free pdf)

Authors' abstract: *In 2017, Puerto Rico suffered its worst natural disaster, Hurricane Maria, which left 3,000 dead and provoked a mental health crisis. Cayo Santiago island, home to a population of rhesus macaques (Macaca mulatta), was devastated by the same storm.*

We compared social networks of two groups of macaques before and after the hurricane and found an increase in affiliative social connections, driven largely by monkeys most socially isolated before Hurricane Maria.

Further analysis revealed monkeys invested in building new relationships rather than strengthening existing ones. Social adaptations to environmental instability might predispose rhesus macaques to success in rapidly changing anthropogenic environments.

[Image is from this paper and shows the island before and after the hurricane.]

PRE-HURRICANE

POST-HURRICANE

Püschel, H.P., et al (2021) **Divergence-time estimates for hominins provide insight into encephalization and body mass trends in human evolution.** NATURE ECOLOGY AND EVOLUTION 5:808-819

Authors' abstract: *Quantifying speciation times during human evolution is fundamental as it provides a timescale to test for the correlation between key evolutionary transitions and extrinsic factors such as climatic or environmental change. Here, we applied a total evidence dating approach to a hominin phylogeny to estimate divergence times under different topological hypotheses.*

The time-scaled phylogenies were subsequently used to perform ancestral state reconstructions of body mass and phylogenetic encephalization quotient (PEQ). Our divergence-time estimates are consistent with other recent studies that analysed extant species.

We show that the origin of the genus Homo probably occurred between 4.30 and 2.56 million years ago. The ancestral state reconstructions show a general trend towards a smaller body mass before the emergence of Homo, followed by a trend towards a greater body mass. PEQ estimations display a general trend of gradual but accelerating encephalization evolution.

Wibowo, M.C., et al (2021) **Reconstruction of ancient microbial genomes from the human gut**. NATURE 594:doi.org/10.1038/s41586-021-03532-0

Authors' abstract: *Loss of gut microbial diversity in industrial populations is associated with chronic diseases, underscoring the importance of studying our ancestral gut microbiome. However, relatively little is known about the composition of pre-industrial gut microbiomes.*

Here we performed a large-scale de novo assembly of microbial genomes from palaeofaeces. From eight authenticated human palaeofaeces samples (1,000 to 2,000 years old) with well-preserved DNA from southwestern USA and Mexico, we reconstructed 498 medium- and high-quality microbial genomes.

Among the 181 genomes with the strongest evidence of being ancient and of human gut origin, 39% represent previously undescribed species-level genome bins.

Tip dating suggests an approximate diversification timeline for the key human symbiont Methanobrevibacter smithii. In comparison to 789 present-day human gut microbiome samples from eight countries, the palaeofaeces samples are more similar to non-industrialized than industrialized human gut microbiomes.

Functional profiling of the palaeofaeces samples reveals a markedly lower abundance of antibiotic-resistance and mucin-degrading genes, as well as enrichment of mobile genetic elements relative to industrial gut microbiomes.

Previous studies have shown that industrial lifestyles are correlated with both a lower diversity in the gut microbiome and increased incidence of chronic diseases, such as obesity and autoimmune diseases.

Srain, H.S., et al (2021) **Pharmaceuticals and personal care products and their sublethal and lethal effects in aquatic organisms.** ENVIRONMENTAL REVIEWS 29:doi.org/10.1139/er-2020-0054 (available as a free pdf)

Authors' abstract: *Pharmaceuticals and personal care products (PPCPs) include over-the-counter and prescription drugs, veterinary drugs, fragrances, and cosmetics. PPCPs have been detected in aquatic environments at low concentrations and are emerging as contaminants of concern.*

PPCPs are primarily released into aquatic environments via untreated sewage, wastewater treatment plants, landfill leachate, and can affect aquatic life through persistence, bioaccumulation, and toxicity.

However, there are limited reviews of lethal and sublethal effects of PPCP exposures on aquatic organisms. To understand PPCP toxicity on aquatic organisms, a literature review was conducted that identified aquatic organisms known to be affected by PPCPs; concentrations of PPCPs reported as producing sublethal and lethal effects in aquatic organisms; and research gaps on PPCP aquatic toxicity.

Twelve PPCPs were selected from three seminal studies for review, including bisphenol A, carbamazepine, erythromycin, fluoxetine, linear alkylbenzene sulfonate, metoprolol, naproxen, nonylphenol, ofloxacin, sertraline, sulfamethoxazole, and triclosan.

Many aquatic species were affected by PPCPs at sublethal and lethal exposures, including sublethal effects at environmentally relevant concentrations. Because lethal effects were seldom observed at environmentally relevant concentrations, many studies considered PPCPs non-toxic.

Few studies have compared effects of PPCPs on the same organisms for identical exposure parameters (time and concentration), resulting in wide variation in reported toxicity levels with limited consensus in the academic literature.

Consensus in lethal concentrations was reported for Daphnia magna with 48 hours exposure for bisphenol A and triclosan and Vibrio fischeri with 15 minutes exposure to carbamazepine.

Environmentally relevant sublethal concentrations were higher than water quality guidelines developed for Canada and predicted no-effect concentrations derived globally. Species sensitivity distributions for some PPCPs show that aquatic species are affected lethally at environmentally relevant concentrations.

Messager, M.L., et al (2021) **Global prevalence of non-perennial rivers and streams.** NATURE 594:391-397

Authors' abstract: *Flowing waters have a unique role in supporting global biodiversity, biogeochemical cycles and human societies. Although the importance of permanent watercourses is well recognized, the prevalence, value and fate of non-perennial rivers and streams that periodically cease to flow tend to be overlooked, if not ignored. This oversight contributes to the degradation of the main source of water and livelihood for millions of people.*

Here we predict that water ceases to flow for at least one day per year along 51 to 60 per cent of the world's rivers by length, demonstrating that non-perennial rivers and streams are the rule rather than the exception on Earth. Leveraging global information on the hydrology, climate, geology and surrounding land cover of the Earth's river network, we show that non-perennial rivers occur within all climates and biomes, and on every continent.

Our findings challenge the assumptions underpinning foundational river concepts across scientific disciplines. To understand and adequately manage the world's flowing waters, their biodiversity and functional integrity, a paradigm shift is needed towards a new conceptual model of rivers that includes flow intermittence.

Norman, L.J., et al (2021) **Human click-based echolocation: Effects of blindness and age, and real-life implications in a 10-week training program.** PLOS ONE 16:doi.org/10.1371/journal.pone.0252330 (available as a free pdf)

Authors' abstract: *We report a training study investigating the effects of blindness and age on the learning of a complex auditory skill: click-based echolocation. Blind and sighted participants of various ages (21 to 79 yrs; median blind: 45 yrs; median sighted: 26 yrs) trained in 20 sessions over the course of 10 weeks in various practical and virtual navigation tasks.*

Blind participants also took part in a 3-month follow up survey assessing the effects of the training on their daily life. We found that both sighted and blind people improved considerably on all measures, and in some cases performed comparatively to expert echolocators at the end of training.

Somewhat surprisingly, sighted people performed better than those who were blind in some cases, although our analyses suggest that this might be better explained by the younger age (or superior binaural hearing) of the sighted group.

Importantly, however, neither age nor blindness was a limiting factor in participants' rate of learning (i.e. their difference in performance from the first to the final session) or in their ability to apply their echolocation skills to novel, untrained tasks.

Furthermore, in the follow up survey, all participants who were blind reported improved mobility, and 83% reported better independence and wellbeing. Overall, our results suggest that the ability to learn click-based echolocation is not strongly limited by age or level of vision. This has positive implications for the rehabilitation of people with vision loss or in the early stages of progressive vision loss.

Echolocation is a particular spatial hearing skill, namely the ability to use reflected sound to get information about the environment. Even though echolocation is primarily associated with bats, it is by now well established that humans are able to use it as well. A distinction can be made between passive and active echolocation.

For passive echolocation, one listens to emissions and echoes where emissions have been made by sources other than oneself, e.g., ambient sound fields, or another person speaking, making mouth-clicks etc. For active echolocation, one makes their own emissions and uses echoes arising from those, e.g., echoes from one's own mouth clicks, footsteps, cane taps, etc.

Laboratory research has shown that click-based echolocation provides sensory advantages above and beyond passive echolocation via ambient sound fields or active echolocation using footsteps or cane-taps.

Here we used click-based echolocation to investigate if blindness and age are relevant factors for acquiring a complex spatial hearing skill. We chose

click-based echolocation for this purpose, because people rarely use this skill, and it can therefore provide a good baseline from which to start.

It is an open question if blindness per se may put people at an advantage for click-based echolocation or if instead experience with this skill is most important. There have been studies investigating how sighted people learn click-based echolocation across multiple sessions. Yet, a training study involving people who are blind is still missing, and it is an open question if blindness is a relevant factor for acquiring a complex spatial hearing skill such as echolocation.

Furthermore, in an increasingly ageing population, age-related vision loss affects more people now than ever before and, in fact, about 80% of people with vision loss are 50 years or older. Whilst the older human brain might nonetheless adapt to new challenges, the neuroplastic processes involved may differ between older and younger people.

Katz-Rosene, R.M. (2021) **A not-so-green choice? The high carbon footprint of long-distance passenger rail travel in Canada.** CANADIAN GEOGRAPHER 65:141-151

Author's abstract: *It is commonly assumed that taking the train serves as a more climate-friendly means of travel than flying by commercial aircraft. Nevertheless, in Canada, long-distance rail services are powered by aging and inefficient diesel locomotives.*

Moreover, long-haul passenger trains are not typically loaded to capacity, and they must travel longer distances than equivalent air routes (which are able to benefit from more direct flight paths).

This viewpoint considers whether traveling long distance by train generates a larger climatic footprint than flying by commercial aircraft, and offers a basic carbon footprint analysis and modal comparison of three long-distance routes in Canada.

It finds that taking the train does indeed generate a larger climatic impact than flying, in the cases of VIA Rail's trips between Toronto and Vancouver and between Montreal and Halifax, even when taking air travel's additional non-CO_2 warming impact into account. While travelling by train within the modernized Quebec City-Windsor Corridor generates a smaller climatic footprint than flying, VIA Rail's greenhouse gas emissions factor within the Corridor is still far higher than international rail comparisons.

Benford, James (2021) **A Drake equation for alien artifacts.** ASTROBIOLOGY 21:doi.org/10.1089/ast.2020.2364

[Yes, the science fiction writer, whose day job is a physicist specializing in microwave technology.]

Author's abstract: *I propose a version of the Drake equation to include searching for alien artifacts, which may be located on the Moon, Earth Trojans, and Earth co-orbital objects. The virtue of searching for artifacts is their lingering endurance in space, long after they go dead.*

I compare a search for extraterrestrial artifacts (SETA) strategy with the existing listening to stars search for extraterrestrial intelligence (SETI) strategy. I construct a ratio of a SETA Drake equation for artifacts to the conventional Drake equation so that most terms cancel out. This ratio is a good way to debate the efficacy of SETI versus SETA.

The ratio is the product of two terms: one is the ratio of the length of time that probes from extraterrestrial (ET) civilizations could be present in the near-Earth region to the length of time that ET civilizations transmit signals to the Solar System. The second term is the ratio of the respective origin volumes: the volume from which probes can come, which is affected by the long-term passage of stars near the Sun, to the volume of transmitting civilizations.

Scenarios are quantified that suggest that looking for alien artifacts near Earth is a credible alternative approach relative to listening to stars. This argues for emphasis on artifact searches, ET archeology.

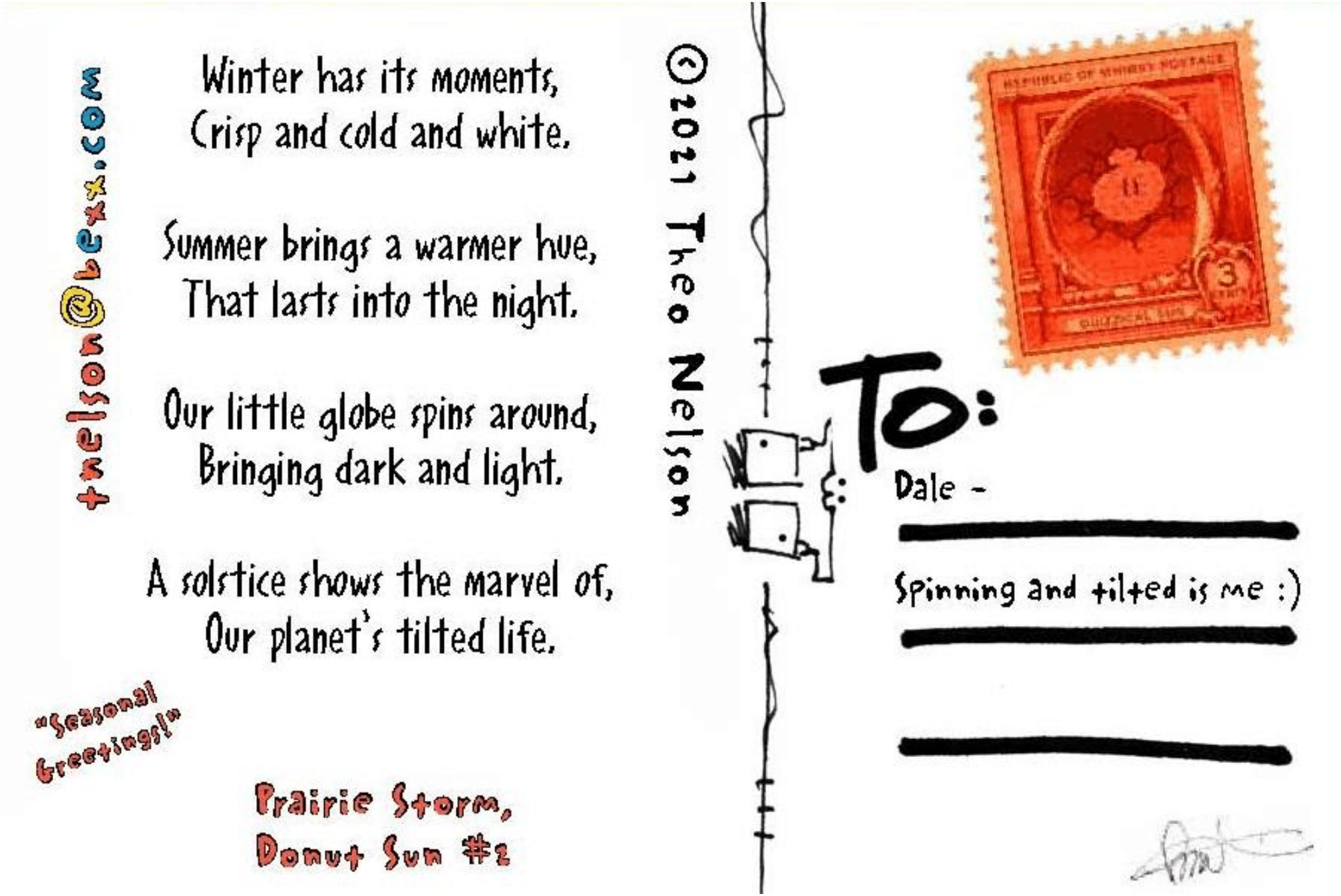
I suggest study of existing high resolution images of the Moon, imaging of the Earth Trojans and Earth co-orbitals, and probe missions to the latter two. Close inspection in these near-Earth regions, which also may hold primordial remnants of the early Solar System, yields concrete astronomical research.

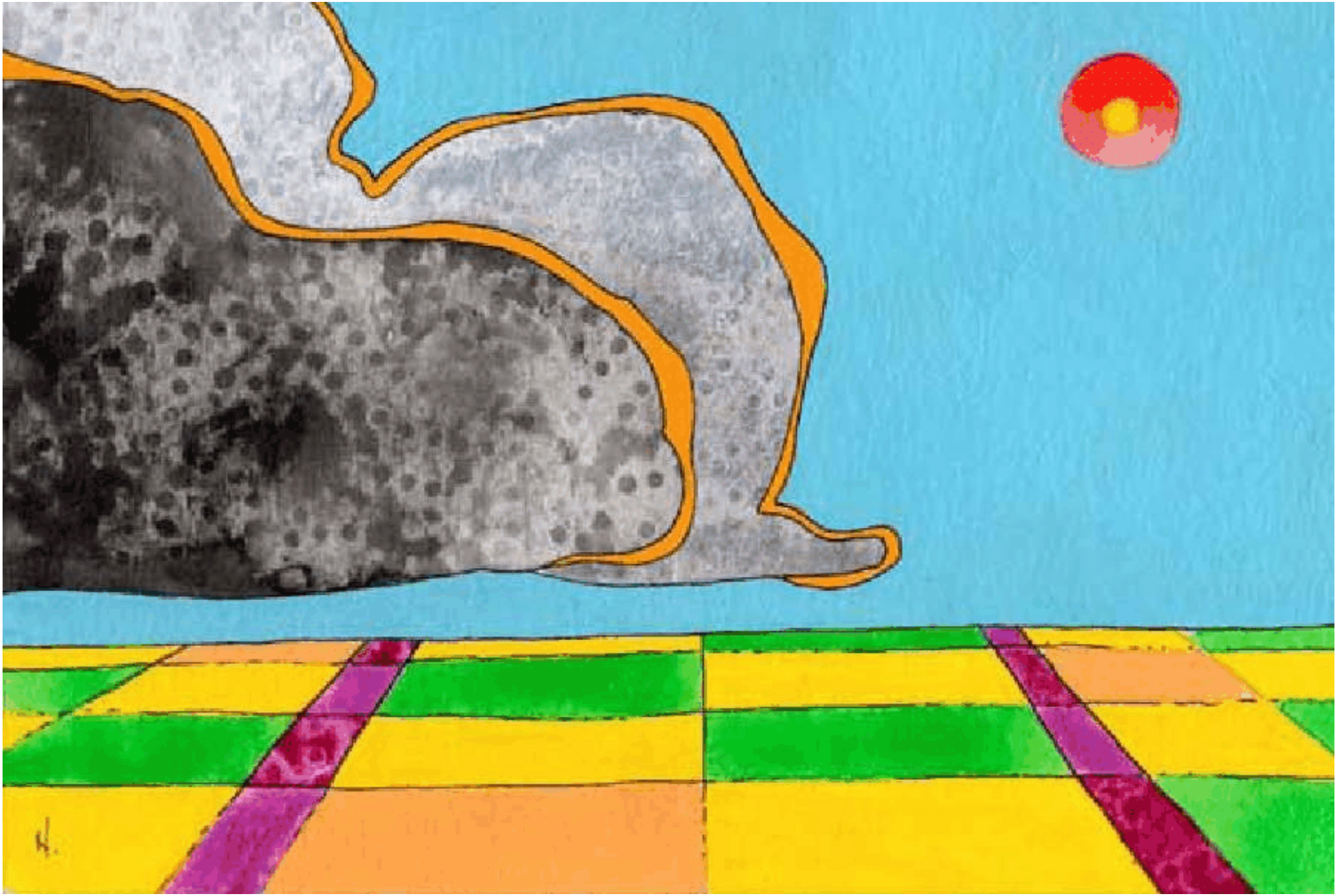
FROM: Theo Nelson
Calgary, Alberta

2021-06-21

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

[Theo sends his quarterly postcard. View side on next page.]





FROM: Lloyd Penney 2021-06-21
Etobicoke, Ontario

It was indeed the day of the World Wide Party, and there was so much that we did for the event, I might as well write it all down, and see what we did, and try to place it all in the right order. This morning saw an unexpected adventure. Yvonne and I were out in Dennis Flynn Park, across The West Mall from us in Etobicoke. I spotted something I didn't expect to find in the park, a wandering turtle.

Yvonne made a few calls to see how we handle this little guy. I thought he was a box turtle, and we were getting ready to find a creek to put him in, but Yvonne's calls finally paid off. I went back home to get a big plastic container for him. We took him home, took a few pictures, and sent them to one of the few people Yvonne was able to reach.

The little one was a red-eared slider turtle, the species of turtle usually sold as a pet. It is an invasive species, and would usually kill local species and eat them. We all figured that it had been dumped as a pet that got a little too big. We got him to Etobicoke Animal Services on The East Mall, and left him with staff there who can re-home him, or send him somewhere where he can't do the local fauna any damage. All the phone calls made meant that all of this took up a good portion of the day.

After that, today was also the Third Monday of the month, and we usually have a local fan pubnight at Orwell's Pub in the Bloor/Islington area of Toronto. Of course, the pandemic has made sure we can't do that, but we have stayed loyal to Orwell's, and we get takeout whenever they can't open to sitting patrons. We brought home something good, and each had a hard apple cider to wash it all down with.

[I've been buying takeout several times a week but have to eat it in a park, since I can't sit down with my friends in a restaurant or someone's house.]

So, with good food in front of us, and good drink to go with it, we observed this year's World Wide Party, and toasted the health of not only all of the fanzine fans around the world, but all the fans who create and consume, edit and write, or simply watch and enjoy science fiction, for I suspect our numbers are going down.

With some luck, the end of the pandemic will bring lots of people back. We also toasted the memory of the fans and friends we have all lost during this horrible pandemic.

Finishing off the night were short stints with two Zoom sessions, the Third Monday Zoom (Bell Canada is not my friend right now, for wifi basically broke for a while), and my time at Graeme Cameron's Zoom session was short as well. I certainly prefer to meet in person, and conventions will be really popular with me and many more as soon as the pandemic is roughly done. Zoom, to be honest, IMHO, is a poor substitute for being there with your friends.

We had a surprisingly adventurous day, and to be honest, I am glad it's over. Tomorrow brings some foot travel and a few other commitments. I hope our adventures will be suitable for a future edition of OPUNTIA. See you then!

[You make me feel guilty. All I did was drive out to the village of Black Diamond in the foothills for a business errand. There and back again in an hour.]

[The good news in Cowtown today was that Mayor Naheed Nenshi announced the compulsory mask bylaw will be repealed effective July 5.]

[I'll still have to wear my bandana for Canada Day but it is a patriotic design. I have never worn a surgical mask during all the pandemic, but the law only said "face covering". I'm an old cowhand from the Red Deer River.]