OPUNTIA 521

Saint Urho's Day 2022

Opuntia is published by Dale Speirs, Calgary, Alberta. It is posted on www.efanzines.com and www.fanac.org. My e-mail address is: opuntia57@hotmail.com When sending me an emailed letter of comment, please include your name and town in the message.

AROUND COWTOWN

by Dale Speirs

The cover is a photograph I took during a past summer at Century Gardens Park, on 8 Avenue SW and 8 Street in the downtown core. The sculpture was by Ukrainian-Canadian sculptor Leonid Molodozhanyn, commonly known as Leo Mol. Born in Ukraine in 1915, died in Winnipeg in 2009.

The City of Calgary has a policy of paying local artists to paint utility boxes and park garbage bins as a method of discouraging graffiti.

Here are two sides of the same electrical box at 26 Avenue SW and 33 Street in the Killarney district.

Note the dinosaur theme. More ahead about that.

And for foodies, two items seen in a local supermarket.

Let me tell you a story about the licence plate at bottom right. I photographed it about a month ago in the supermarket parking lot. I didn't have time to hang about and wait for the driver to come out. Possibly a fellow member of the Alberta Palaeontological Society.

In 1987, when I bought my first car new, rather than a rustbucket, I considered several possibilities before settling on OPUNTIA for the licence plate. One was FOSSIL, since I have done lots of fossil collecting and my mother Betty was a field palaeontologist up at Red Deer. I decided against it because passersby might misinterpret me as an old man.

PALEO 2022 2022-03-19
by Dale Speirs

[Reports of previous conventions appeared in OPUNTIA #408 and 439. There were no conventions in 2020 and 2021 due to the coronavirus pandemic.]

Introduction.

The Alberta Palaeontological Society is headquartered in Calgary at Mount Royal University. I have been a member for many years. Their annual weekend convention Paleo was held at MRU but for the third year in a row the live event was cancelled.

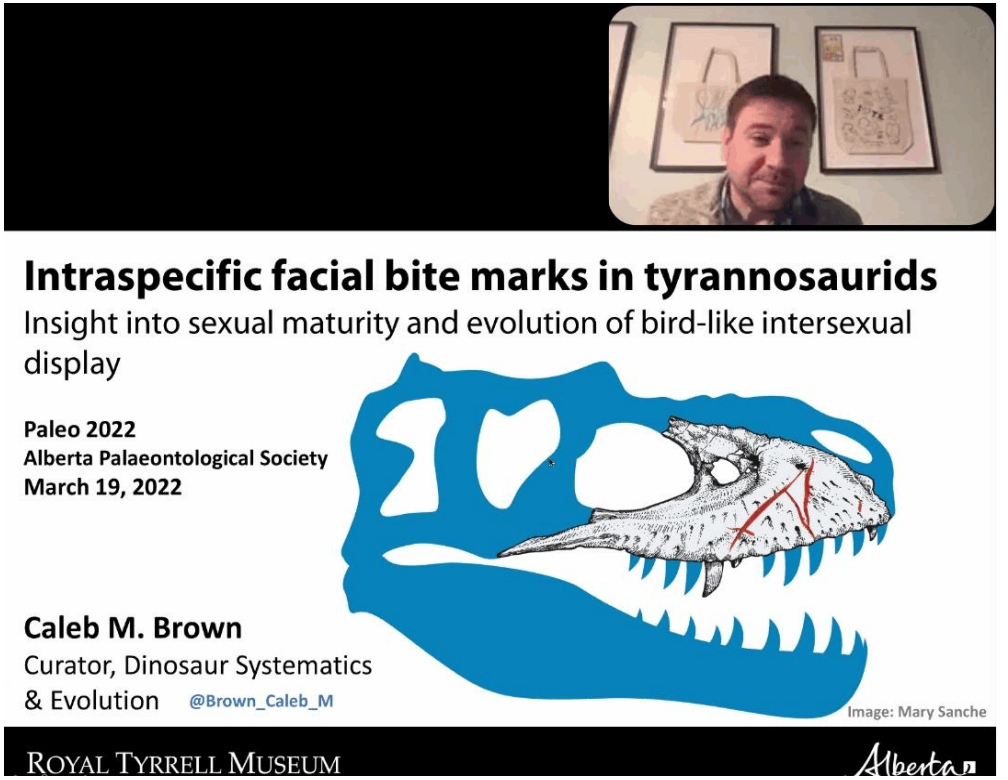
This year it was decided to have a day-long Zoom session with six speakers. Although most pandemic restrictions are off in Alberta, travel is still problematic from outside. The MRU administration were nervous about having a live conference with so many outlanders.

The Calgary Philatelic Society has resumed live meetings but we only have about 30 local people in the club room. Paleo had several hundred people before the pandemic, a large number of whom traveled from outside the province. During the Zoom sessions, participants were from across Canada and the USA.

The man in the upper right of this screenshot is Cory Gross, APS president.

Author's abstracts are in italics. Graphics are screenshots from the presentations. There were 45 participants on Zoom.

Intraspecific facial bite marks in tyrannosaurids provide insight into sexual maturity and evolution of bird-like intersexual display.
Dr. Caleb Brown (Royal Tyrrell Museum, Drumheller, Alberta)



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

Here we document the morphology, frequency, and ontogeny of intraspecific facial bite lesions (324 lesions) in a large sample of tyrannosaurids (202 specimens, 528 elements) to infer patterns of intraspecific aggression in non-avian theropods.

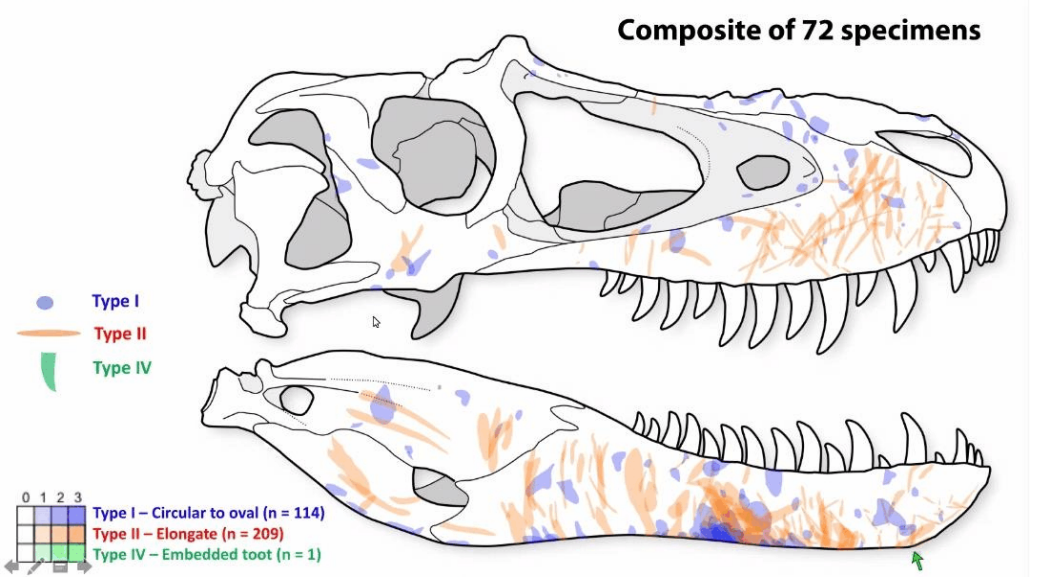
Facial scars are consistent in position and orientation across tyrannosaurid species, suggesting bites were inflicted due to repeated/postured behaviour.

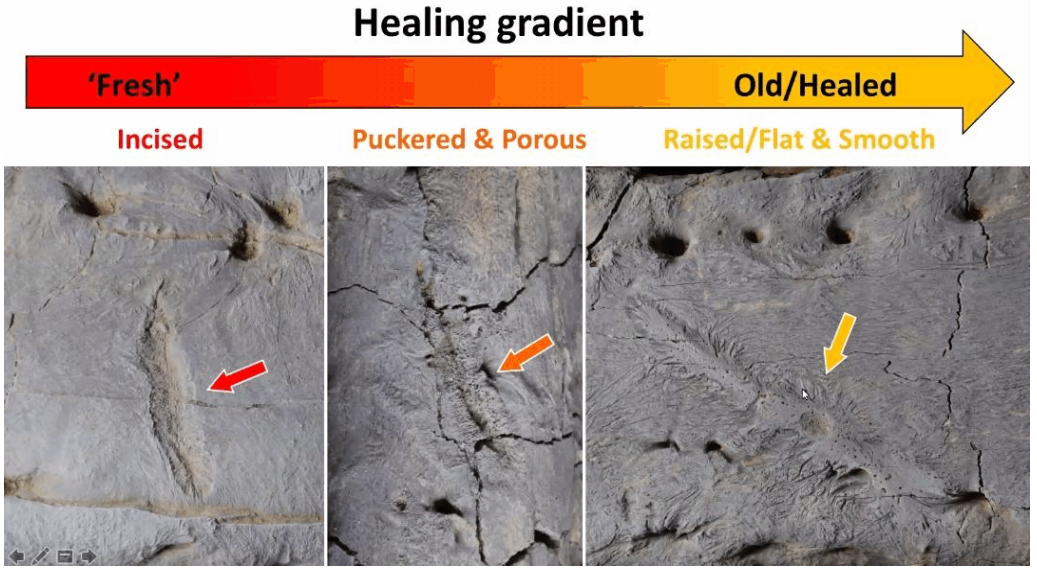
Facial scars are absent in young tyrannosaurids, first appear in immature animals (~50% adult skull length), are present in ~60% of the adult-sized specimens, and show aggressor:victim size isometry.

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

The speaker Caleb Brown was a Red Deer man like myself and is now a curator at the Royal Tyrrell Museum in Drumheller. He began by quoting Isaac Asimov: *The most exciting phrase to hear in science, the one that heralds new discoveries, is not Eureka! but rather, "hmm ... that's funny ..."*

In Brown's case, the hmm part began with the discovery of a tyrannosaurid skull with strange non-predator bite marks. A review of 202 other skulls turned up more bite marks. Bite marks are found today in extant species such as alligators, polar bears, and Australian lizards. Such marks are associated with mating seasons and territorial disputes.





Using new fossil data to solve old stratigraphic problems around the Ediacaran-Cambrian boundary, Mackenzie Mountains, Northwest Territories.

Dr. Robert MacNaughton (Geological Survey of Canada, Calgary)

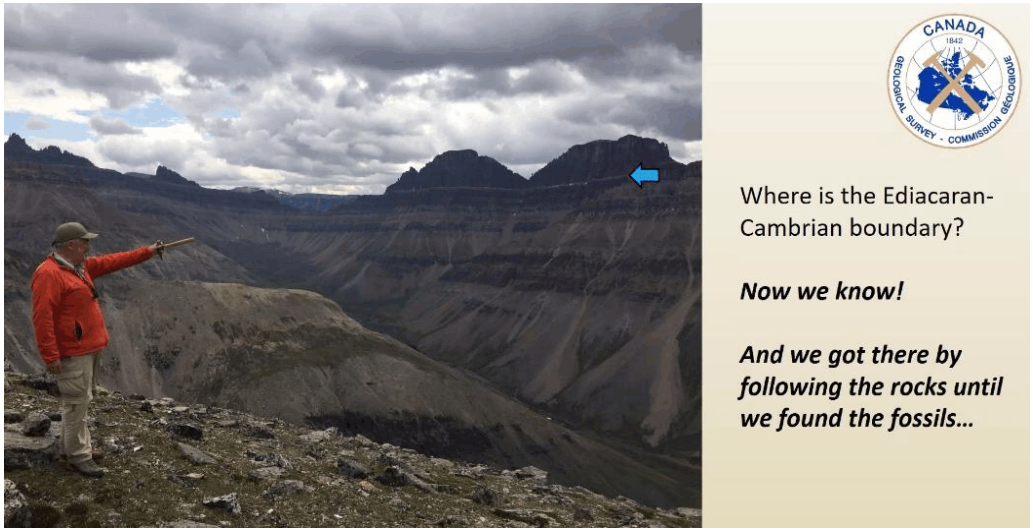
This presentation will look at the Mackenzie Mountains of northwestern Canada, where there is preserved a thick (more than 10 km) succession of late Proterozoic through Cambrian sedimentary rocks. These strata record the break-up of the supercontinent Rodinia and the early formation of the proto-Pacific Ocean.

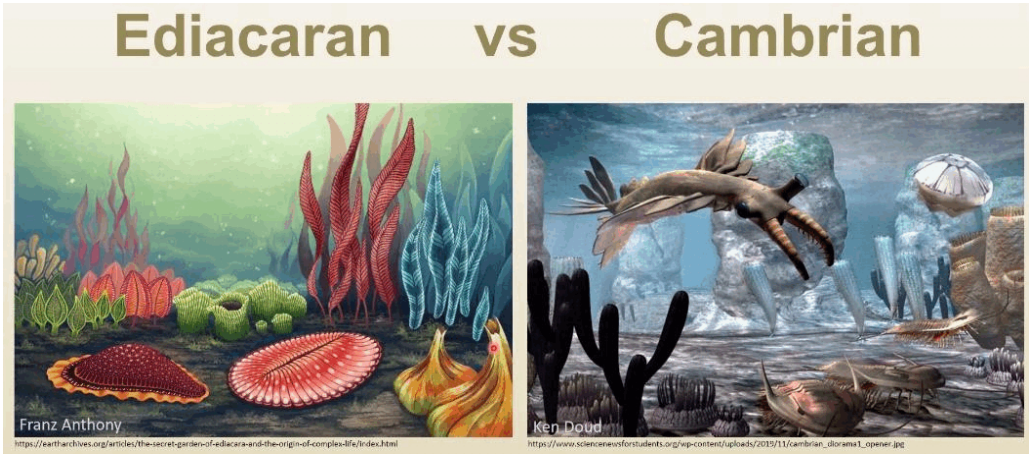
Some of these rocks accumulated on the continental shelf and slope of the ancient ocean basin. They are relatively rich in mudstone and contain a number of known fossil localities, including important Ediacaran (latest Neoproterozoic) macrofossils and biostratigraphically useful Cambrian ichnofossils (tracks, trails, burrows).

By contrast, rocks deposited closer to the ancient landmass tended to be sandstone-dominated and preserved few, if any fossils.

The Mackenzie mountains of Northwest Territories straddle the boundary between the Ediacaran (multicellular soft-bodied life) and the Cambrian (sudden explosion of shelly or bony species). The problem is that most of the strata are coarse sandstones that don't preserve fossils of any kind.

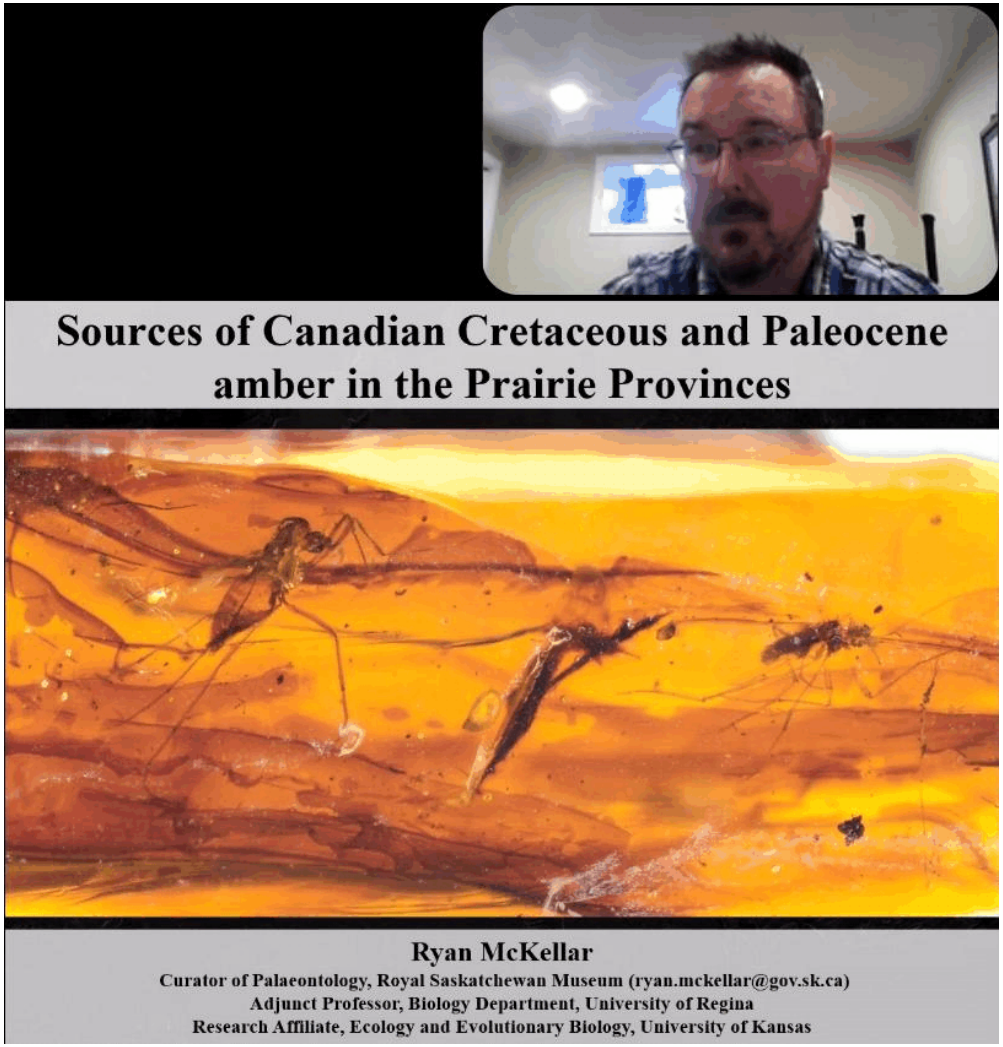
The method used was to follow the strata across the mountains and look for small lenses or deposits of fossils, whether Ediacaran or Cambrian. Not as simple as may seem, given the jagged mountain ranges soaring up into the sky. Certainly a good method of exercise!





Sources of Canadian Cretaceous and Paleocene amber in the Prairie Provinces.

Dr. Ryan McKellar (Royal Saskatchewan Museum, Regina)



In previous research, two major amber deposits have been described from Manitoba and Alberta, Cedar Lake and Grassy Lake amber. Together, these Campanian (Late Cretaceous) deposits have become known as "Canadian amber" among palaeoentomologists.

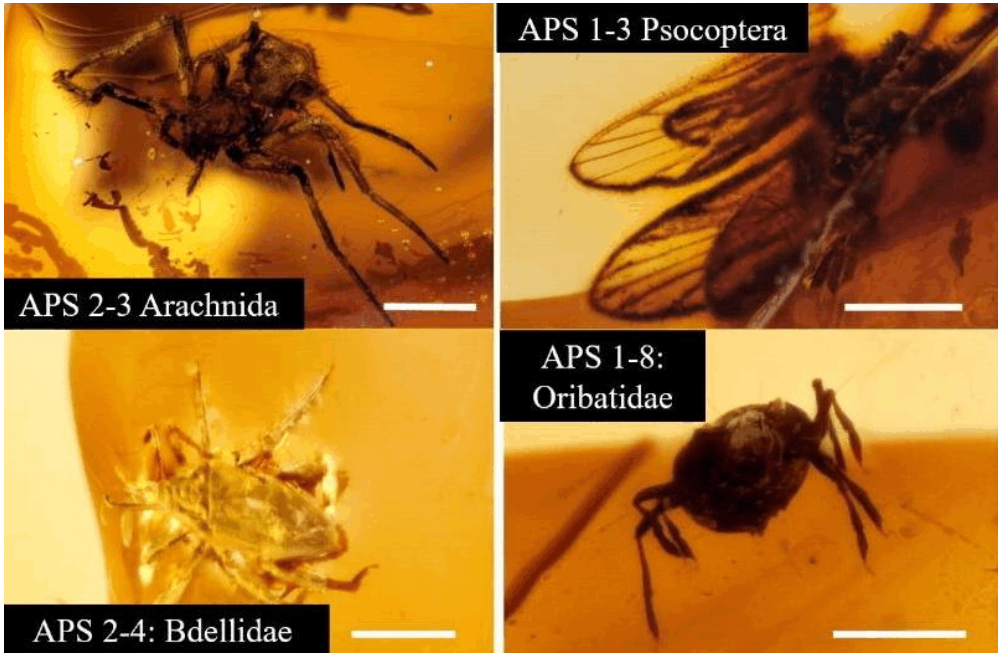
This material offers the last amber assemblage with high diversity prior to the end-Cretaceous extinction event, and a valuable source of information about insect diversity during a key time interval.

Cedar Lake amber is thought to be a secondary deposit of material transported from Alberta and likely equivalent to Grassy Lake amber. However, the stratigraphic context and palaeoenvironment of these deposits has remained elusive, because the source rocks at Grassy Lake are submerged beneath ponds in the abandoned mines that yield amber pieces.

Here, we will describe a new site discovered near Rolling Hills, Alberta, which provides an in situ example of Canadian amber and clarifies the stratigraphy of the source for this assemblage. We will examine how these deposits fit within the growing number of Late Cretaceous through Eocene amber sites that have been discovered within western Canada and the northern USA.

Amber is fossilized resin. Trees, both extinct and modern, use resin as a defense mechanism against bacteria, fungi, and herbivorous insects. The sticky stuff also traps other critters and preserves them in 3-D detail.

Until recently, amber deposits in Canada were outwash specimens transported great distances down the Saskatchewan River.. The Rolling Hills site (shown below) in southern Alberta was the first location where the amber was still in place in coal seams.



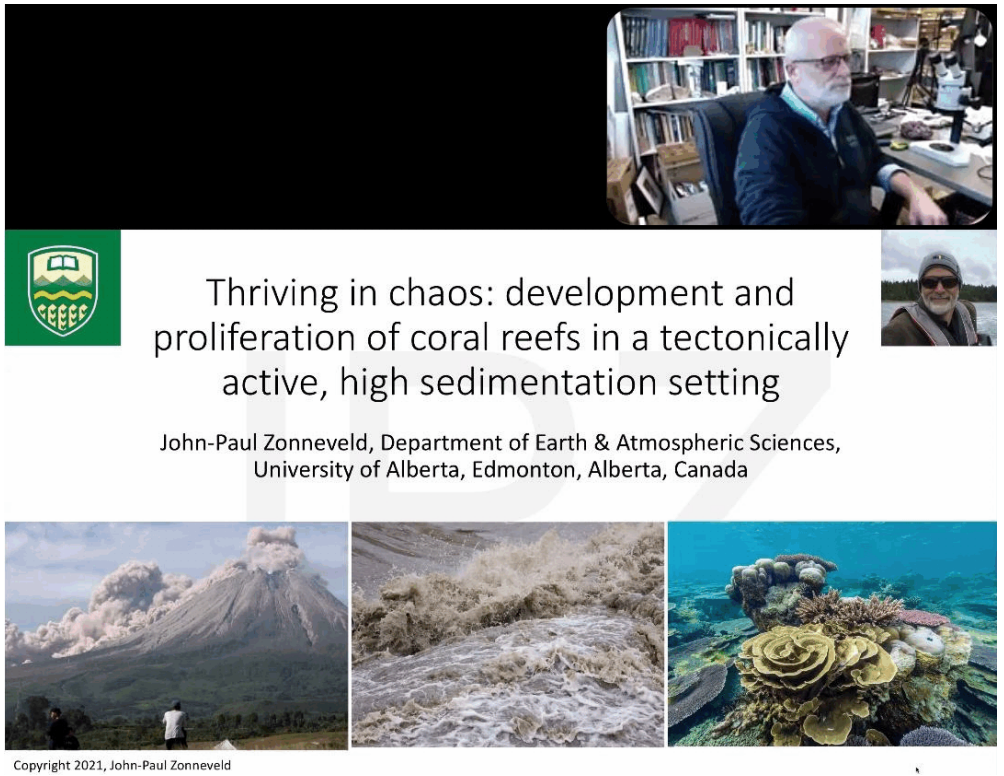
The main resin source was probably *Metasequoia*, a small redwood species still extant today. The amber is used to calibrate when different types of insects evolved. Computer scanning in 3-D has allowed for tremendous improvements in identification of species.

Thriving in chaos: Development and proliferation of coral reefs in a tectonically active, high sedimentation setting.
Dr. John-Paul Zonneveld (University of Alberta, Edmonton)

There is a generally accepted perspective that coral reefs develop their greatest diversity in stable, fully marine, clear-water settings. Furthermore, colonial corals are commonly believed to be limited to settings with minimal siliciclastic sediment input.

Despite these beliefs, the highest diversity of reef corals, and associated vertebrate and invertebrate reef faunas, occurs in the Coral Triangle, which extends from the northern Philippines to south-western Indonesia and east to the Solomon Islands, encompassing most of the country of Indonesia.

Despite the diversity of reef corals and associated faunas this area comprises one of the world's most tectonically active areas, has exceptionally high rainfall, and exceptionally high delivery of clastic sediment to the coastline. Arguably reefs and reef corals thrive here, not despite these challenges but because of them.



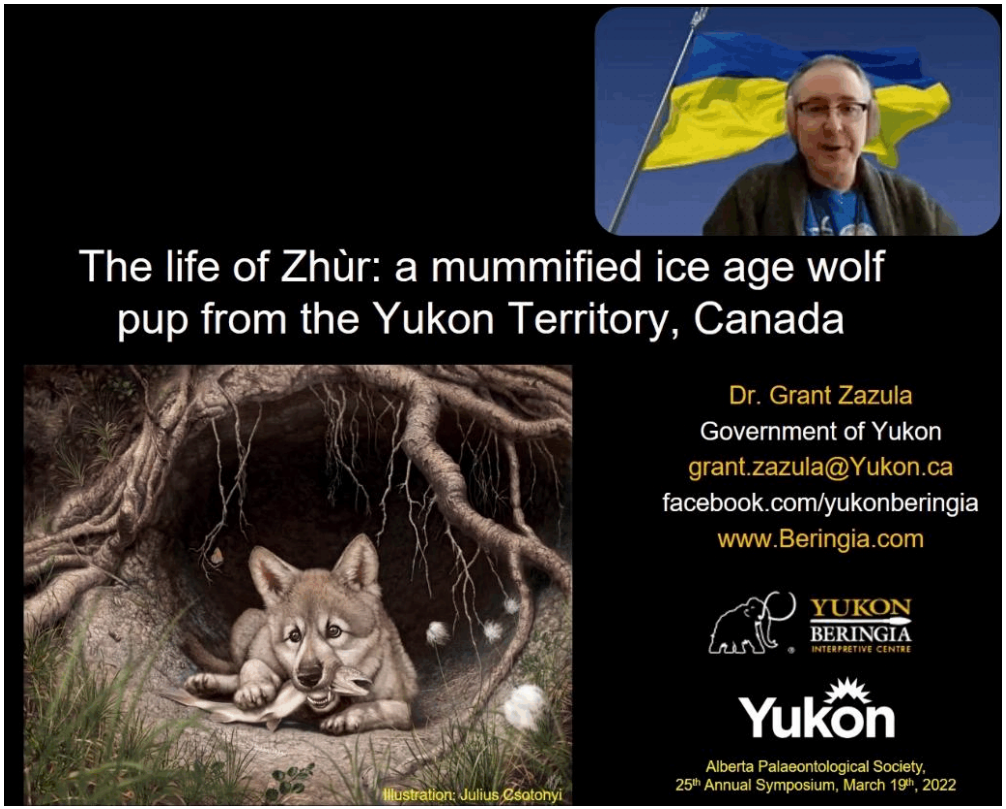
Coral reefs do not necessarily require pure seawater or other ideal conditions. 76% of all coral species are in Australasian waters, in the most tectonically active zone in the world. They live with frequent volcanic ashfalls and big earthquakes. Highest rainfalls in the world continually wash huge amounts of sediments into the sea.

Zonneveld is working in Indonesia on fossil reefs which were uplifted during the Pleistocene into island terraces. Lots of marine fossils in the bedrock of Sumba Island. A Stegodon tusk was also found, washed in from what was then higher land, as well as rusting WW2 Japanese armaments and tunnels.

There have been numerous coral reef die-offs over millions of years but reefs come back. The declines are commonly caused by flood sediments or volcanic ash smothering reefs.

The life of Zhùr: a mummified Pleistocene wolf pup from the Yukon permafrost.

Dr. Grant Zazula (Yukon Palaeontology Program, Whitehorse, Yukon Territory)



Placer gold miners in the Klondike region of central Yukon Territory made a remarkable discovery of a mummified carcass when excavating through the permafrost in the summer of 2016. Close examination and subsequent interdisciplinary analyses reveal this mummy represents an ancient Pleistocene gray wolf (Canis lupus) which was named Zhùr in the Hän language of the local Tr'ondëk Hwëch'in people.

Detailed morphometric, isotopic and genetic analyses of Zhùr reveal details of her appearance, evolutionary relationships with other wolves and her short-life history and ecology.

Ancient DNA preserved in ice is used to infer ecosystems of the Pleistocene. Some species thought long extinct such as mammoths left DNA in Yukon sediments from as recently as 5,000 years ago.

Zazula has teams of students and volunteers who visit the hundreds of Yukon placer gold mines each summer and salvage bones and mummified animals washed out by hydraulic cannons. In 2016, a miner washed out a mummified wolf pup. Zhur was found in a collapsed den, which indicated she died when the roof caved in suddenly.

Studies showed Zhur was six weeks old and lived 57,000 years ago. She was related to Russian wolves of Beringia, not the later wolves of North America. Her species ate salmon when young, and horses as adults. After horses became extinct in North America, modern wolves switched to deer and elk.

Successful efforts to refind lost 100+ year old dinosaur quarries in the badlands of southern Alberta with updates on two Euoplocephalus ankylosaur relocation projects.

Darren Tanke (Royal Tyrrell Museum, Drumheller, Alberta)

Starting in 1997, the author has conducted a successful solo campaign to relocate historical but lost dinosaur quarries and other fossil sites in the province. Others have since followed suit, finding more lost sites, but 150+ more, including type specimen localities, remain missing province-wide.

Beginning in the mid-1930s, some of the more significant sites in today’s Dinosaur Provincial Park were marked in the field with a numbered metal quarry stake set in concrete. However not all were marked and in light of new research, the scientific significance of some of these unmarked sites has only increased with the passage of time.

Another aspect of this campaign is the identification of unstaked mystery quarries. These are sites that are realized as old quarries by evidence of digging but especially the discovery of sometimes dateable (i.e., newspaper) trash on site.

The original thrust of these relocation efforts was the simple relocation of the sites for spatial and stratigraphic context and preserving the same for future workers. However, an unexpected and surprising added bonus to this work has manifested in the recovery of new skeletal elements from some of these old quarries.

The speaker Darren Tanke had emergency sedation dental surgery on the morning of Paleo 2022 so the night before he recorded his presentation. The moderator showed his slides in synchronization with his talk.

Field collectors were usually vague as to where their quarries were. From the 1930s, most palaeontologists embedded survey stakes at quarries. However, much of the data were garbled in later publications. Tanke used old photographs as indicators . Erosion over a century often changed sites dramatically. Printers occasionally reversed photos which made relocation impossible if the flip wasn’t known.

Dating unrecorded quarries was often done by the garbage the collectors left behind, such as newspapers to wrap specimens or used as toilet paper. Stoneware jugs were used for shellac for preserving bones, then tossed as so much dead weight. People collect jugs and have published catalogues on them, so Tanke could date them.

Another problem was incomplete collecting where only parts of skeletons were collected at the time. Going back to old quarries enabled excavation of the remaining bones.

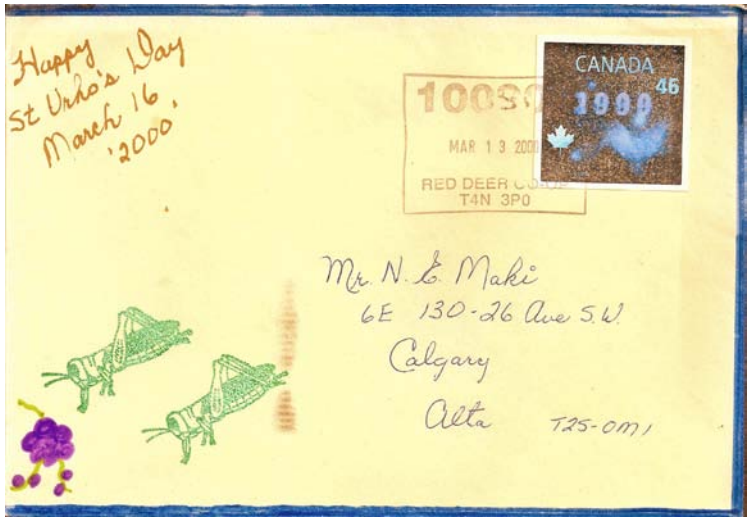
MAIL ART OF BETTY SPEIRS: PART 5
by Dale Speirs

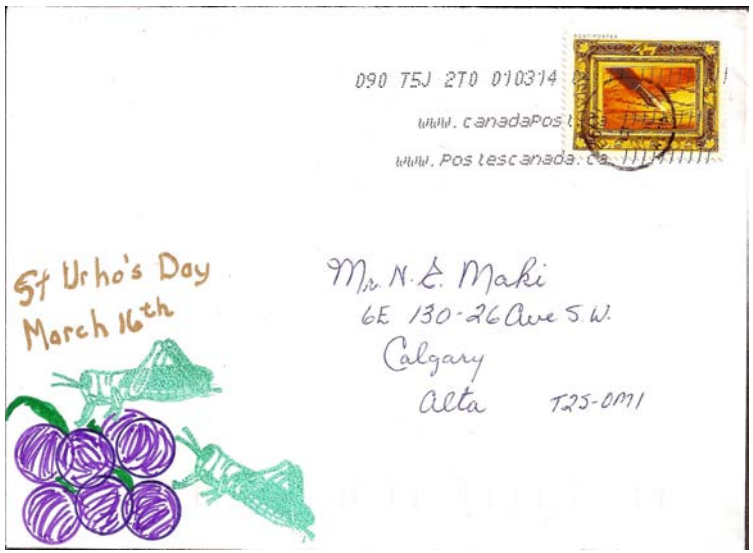
[Parts 1 to 4 appeared in OPUNTIAs #511, 514, 517, and 519.]

My mother Betty was born in Alberta but she was a pure-blood Finn from both sides of her family, all of whom came to Canada in the early years of the 1900s. Her mother's family homesteaded north of the village of Eckville, and her father was a blacksmith.

Saint Urho's Day is a celebration by the Finnish diaspora but not a national day in Finland itself. Saint Urho, who didn't actually exist, drove the grasshoppers out of Finland and saved the grape crop. We celebrated the day in our family and in later years when Betty got into mail art, she would create covers for the event.

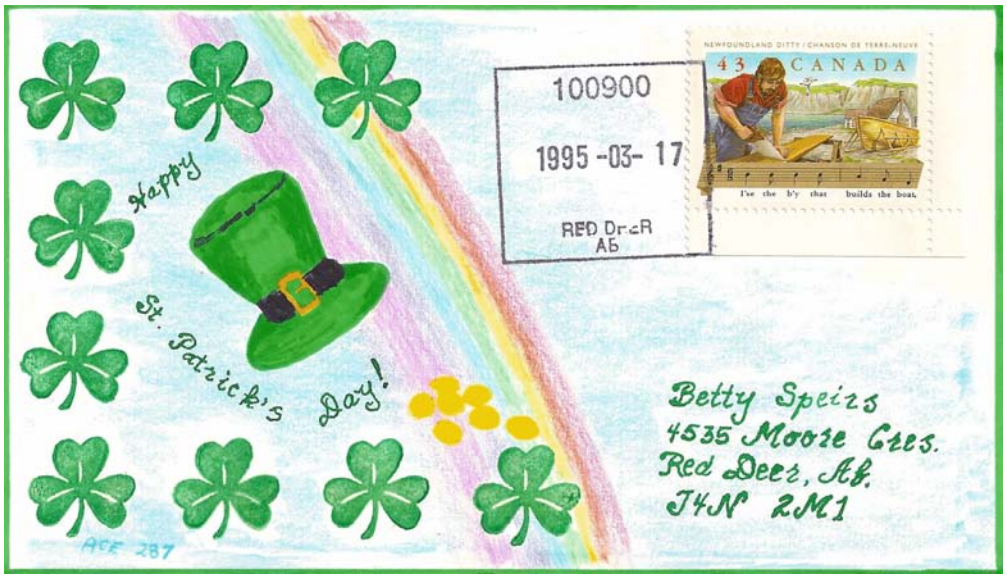
Her brother Norman lived in Calgary, so she mailed him homemade cards as shown here. Hallmark didn't sell ready-made Urho cards for some reason. I only found four Urho covers, two of which actually came from Norman's estate. (I was executor for both of them.)



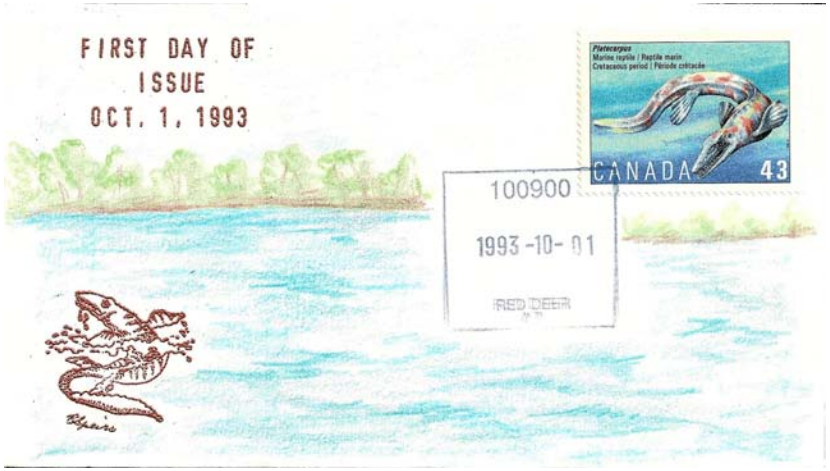


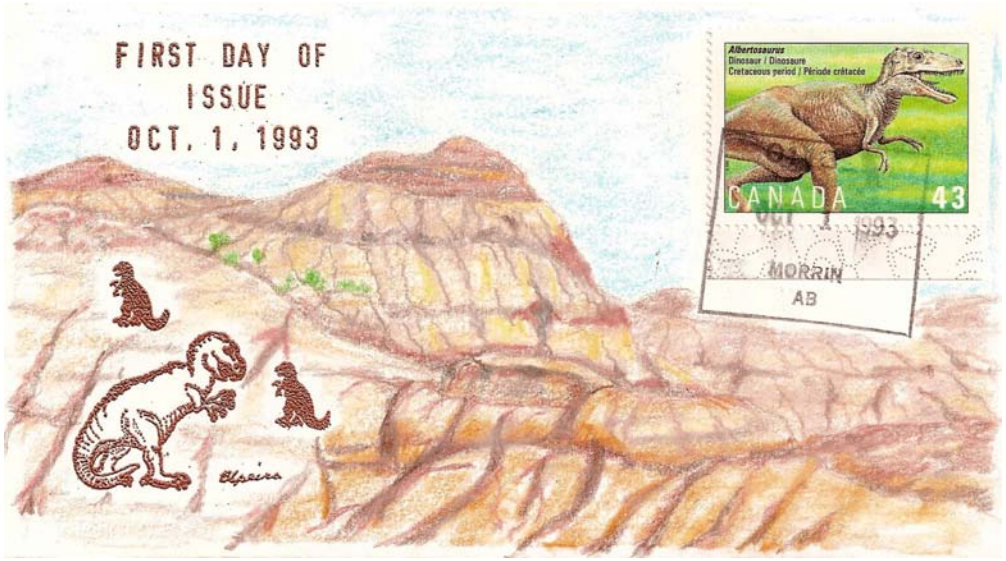
No Irish blood anywhere on either side of my family. The Speirs ancestors were Lowland Scots who came to Canada in the early 1830s. Nonetheless, Betty made Saint Patrick's Day covers.

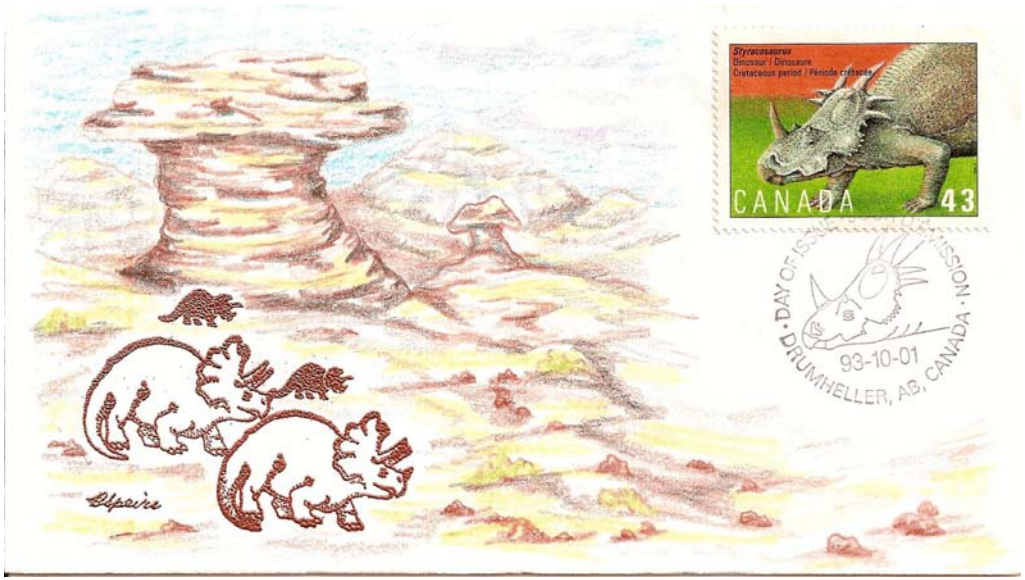
The stamp on the cover below was a personalized stamp, what Canada Post now calls Picture Postage and is still offered today. I took the photo of her in front of the house in Red Deer.

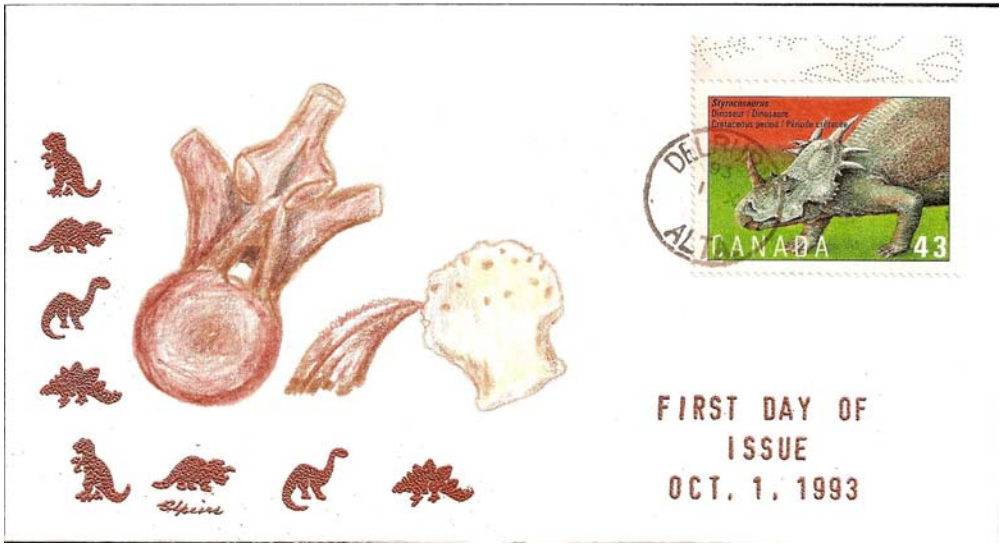


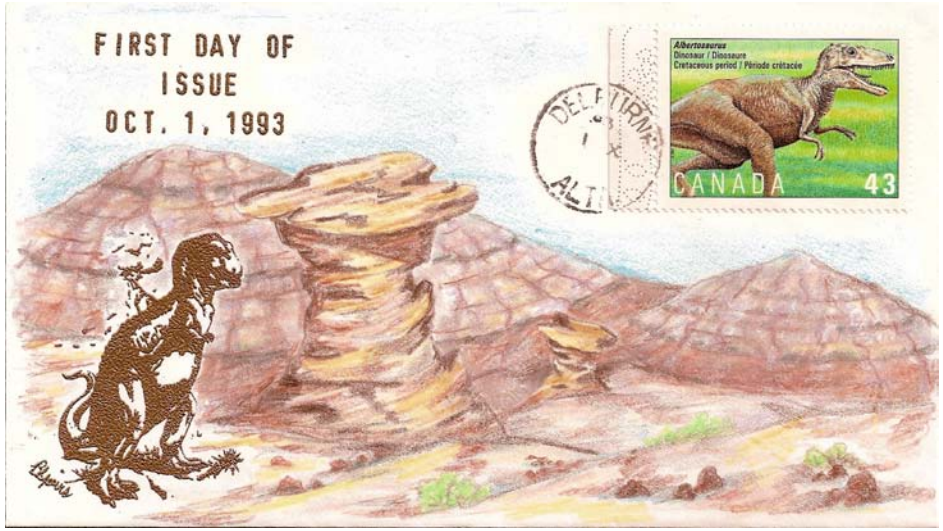
After us kids left home, Betty became a field palaeontologist for the University of Alberta. The bedrock surrounding the Red Deer city area is Palaeocene in age, just after the asteroid. She had several fossil species named after her, and incorporated the subject in her mail art. Here are first-day-of-issue covers she prepared.

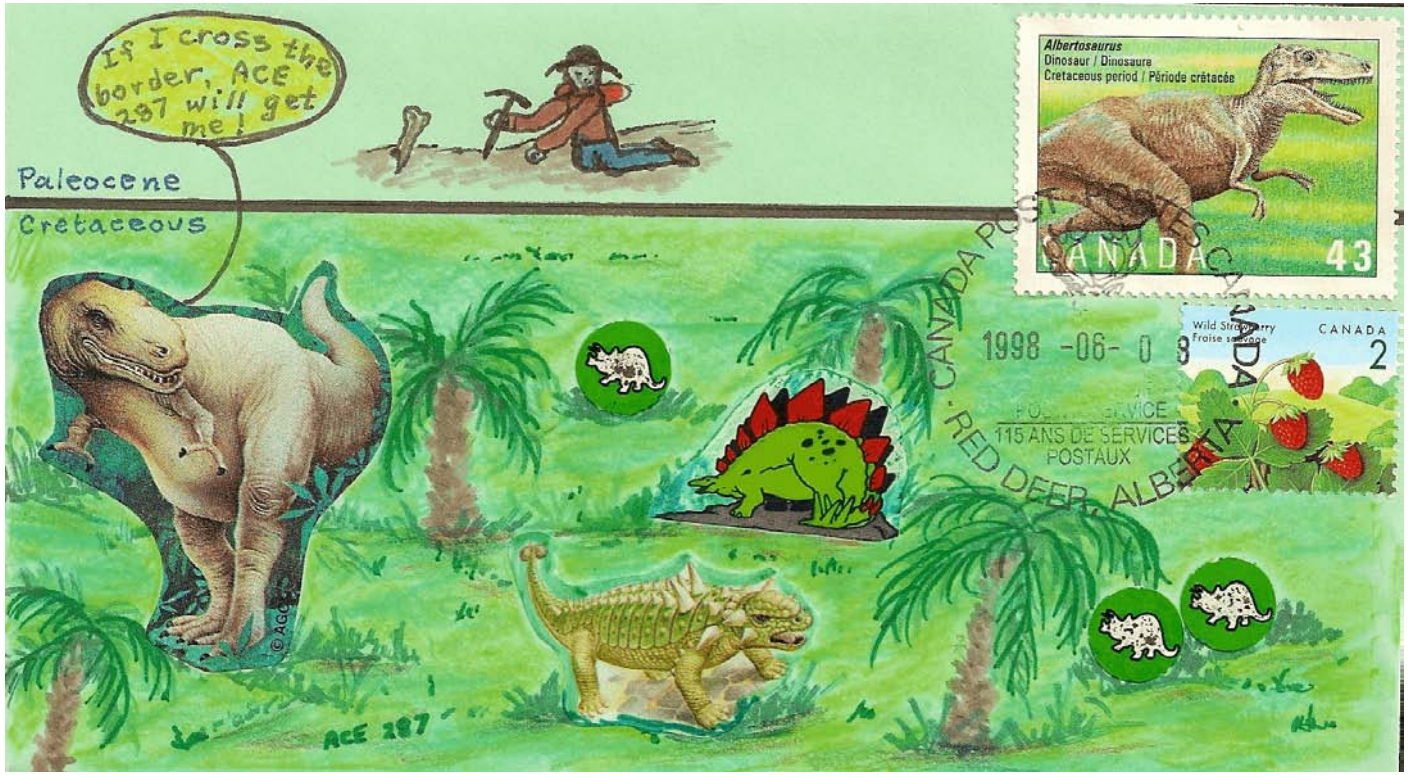






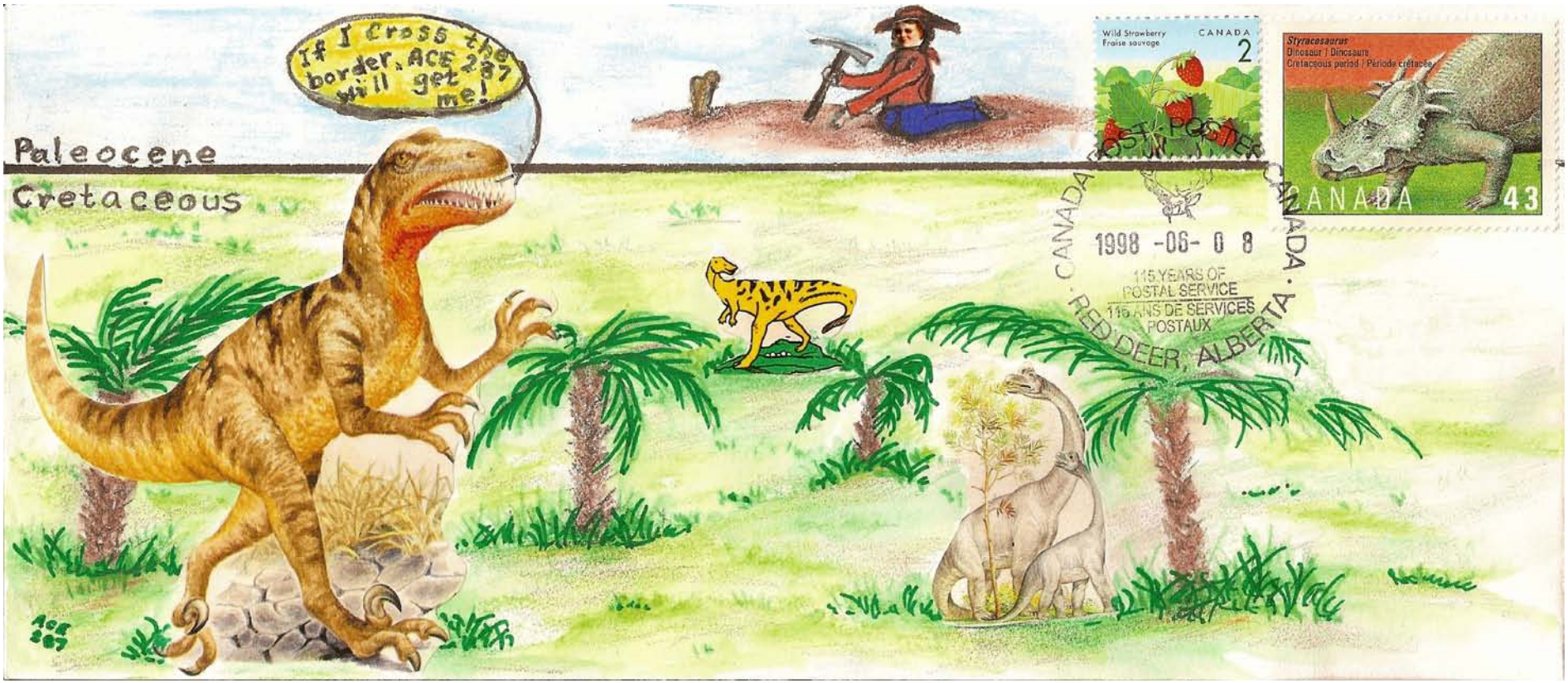






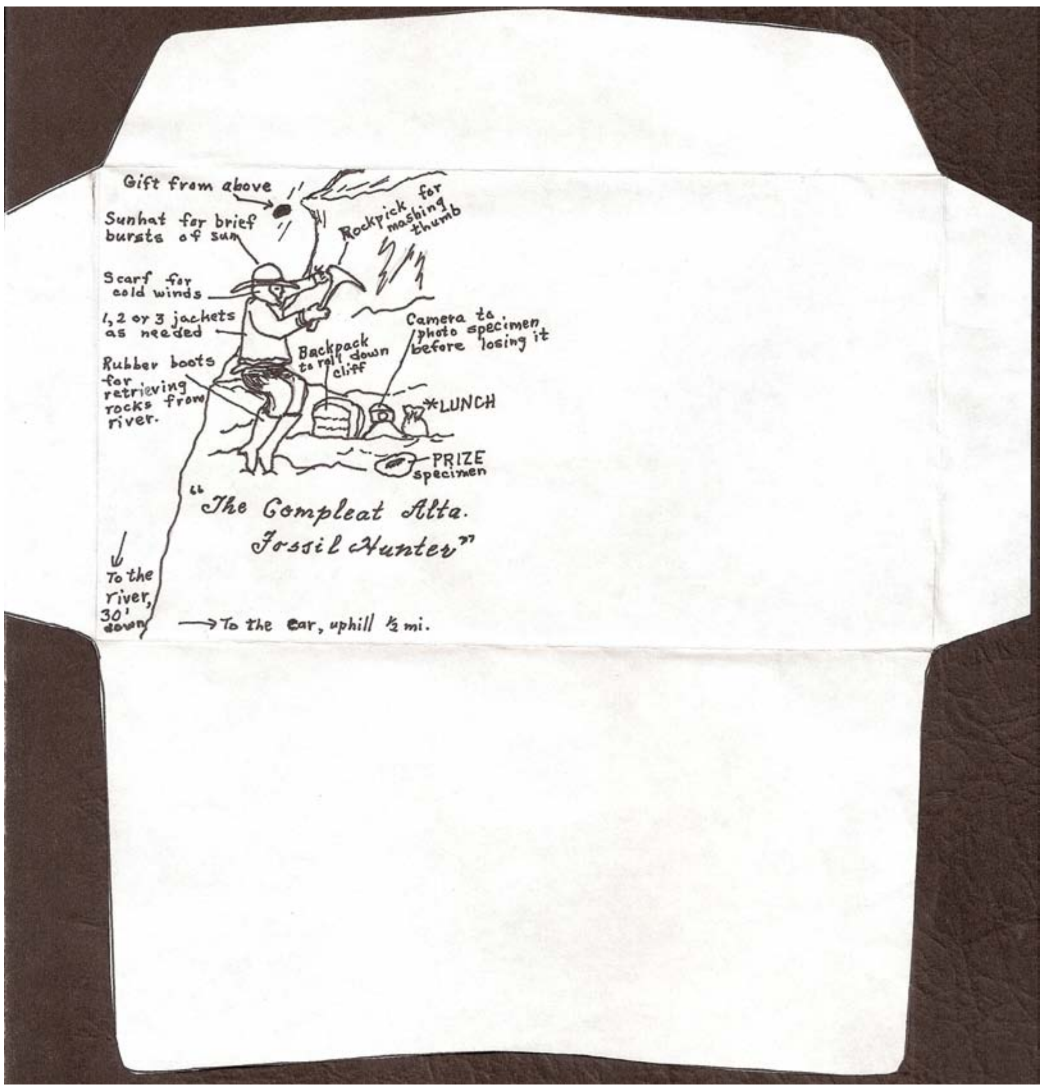
The boundary line between the Cretaceous era of dinosaurs and the Palaeocene after the asteroid is further east in Alberta. The significance of these covers is that she very seldom collected Cretaceous material from the Drumheller badlands.

"ACE 287" was Betty's membership number in the Art Cover Exchange group. These were duplicates of mail art covers she sent to ACE members south of the border.

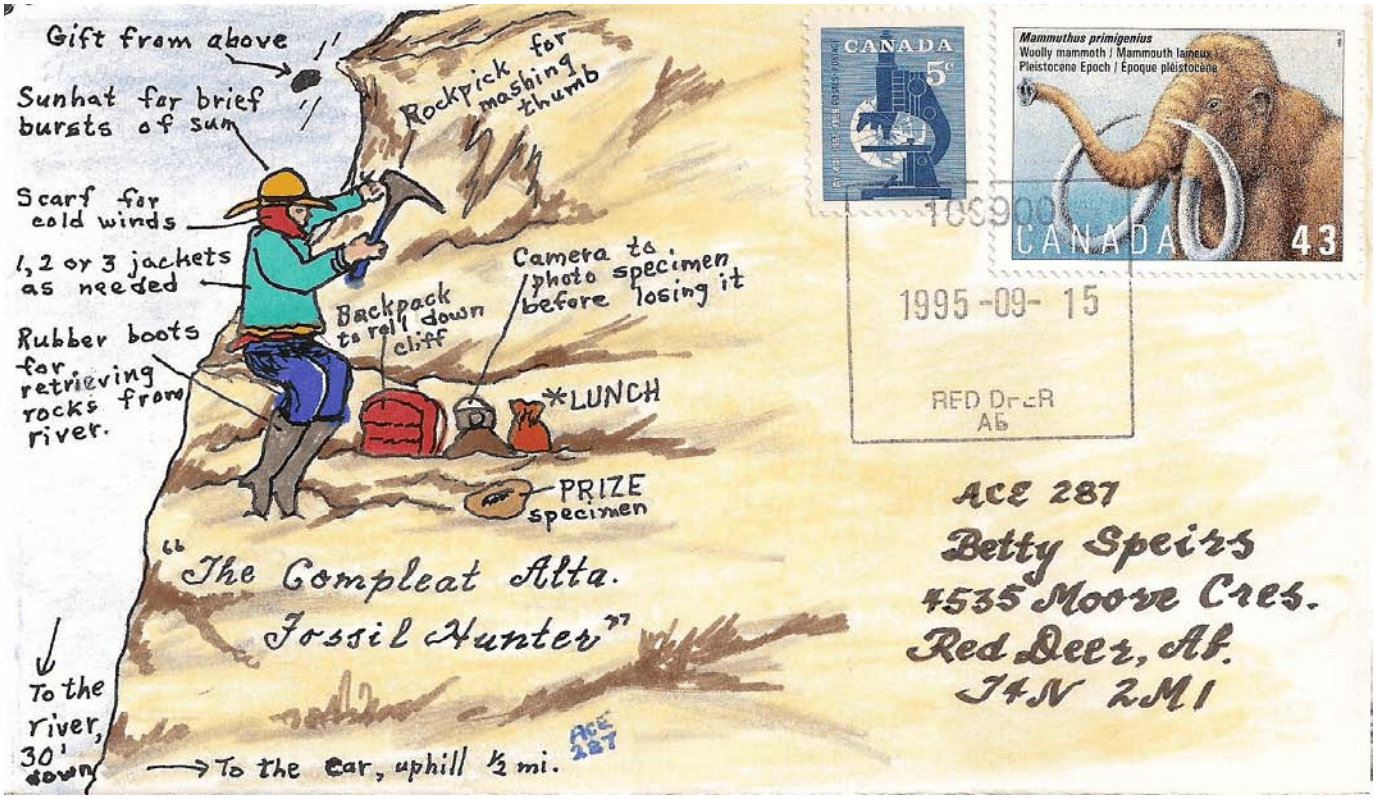


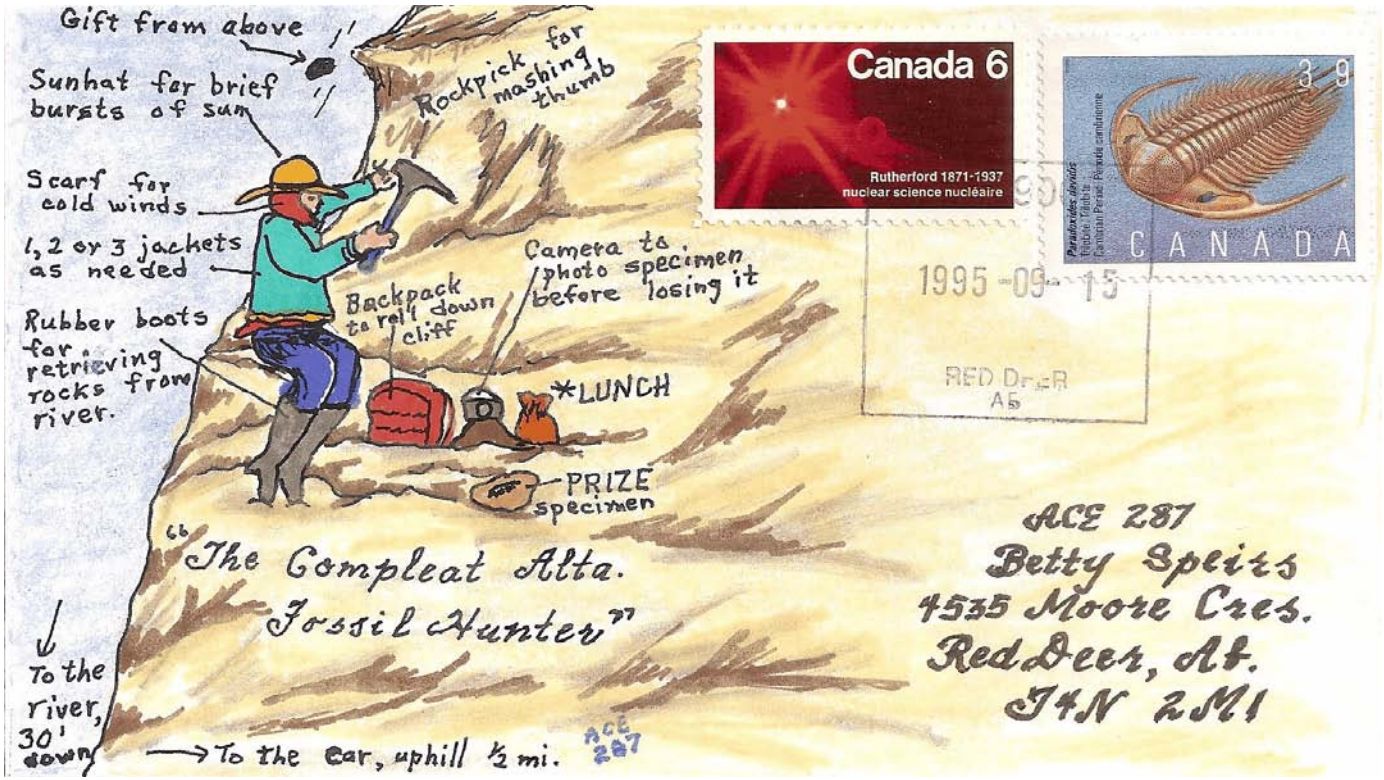
Betty's artwork was a mixture of hand drawing, rubber stamps, and hand colouring. For complicated covers, she would make a master copy of the line drawings and text, then photocopy it and hand colour. Below is the template. The covers, some unfinished, at first glance look identical but if you look closely they are hand coloured differently.

Most of the Palaeocene exposures she collected from were cliff faces along the Red Deer or Blindman rivers, so she was speaking from the heart with these covers.



The two covers above were spares for future use if Canada Post issued more fossil stamps. The next page has some of her produced covers.





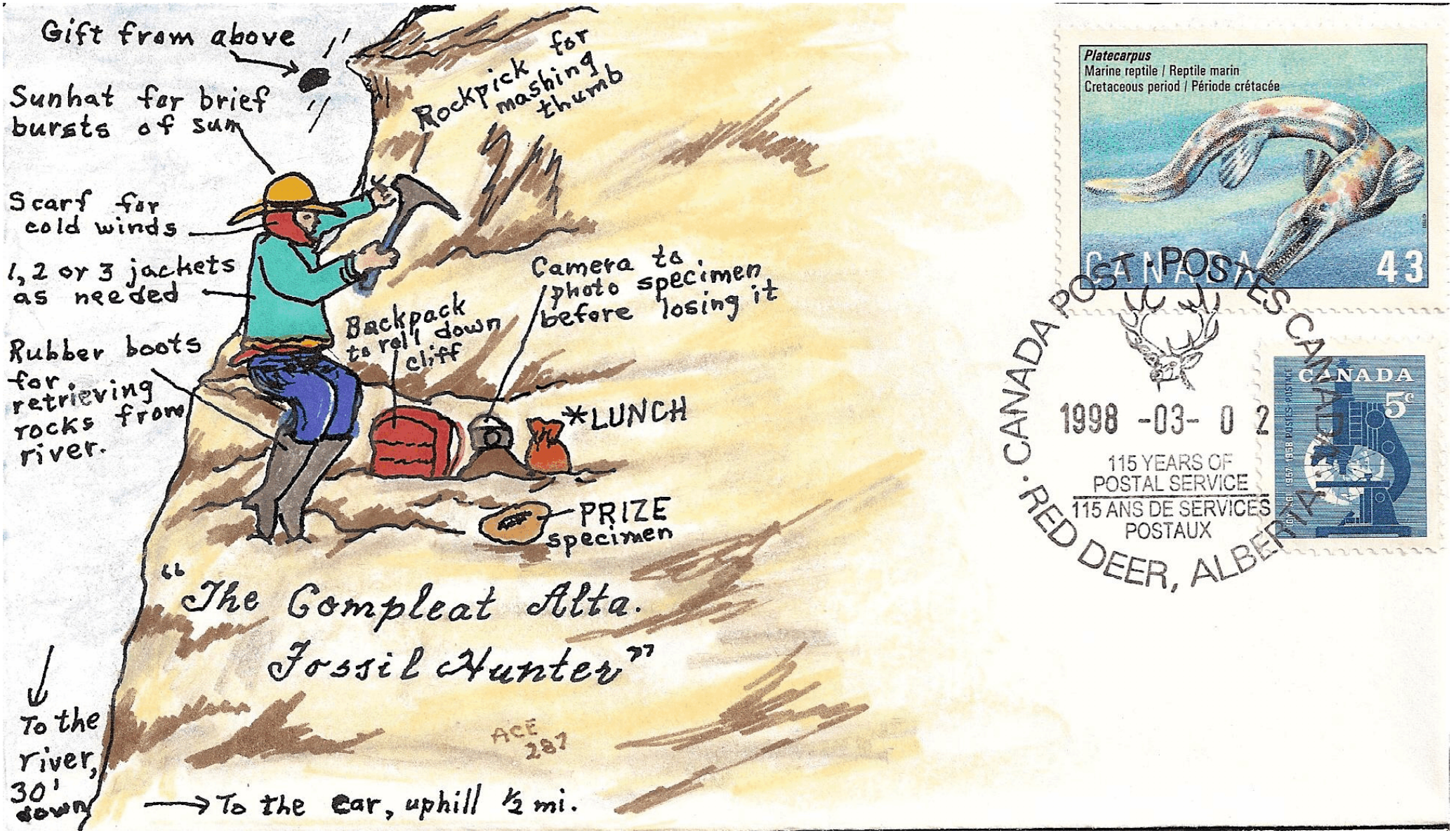
Some basic rules of fossil hunting:

The best fossils are the heaviest and are always found at the bottom of the cliff when your car is parked at the top. If you can park at the bottom, only a few pocket-sized specimens will be found that day.

The further you have to walk in to the fossil site, the greater the likelihood it will begin raining a few minutes after you get there. After working for hours in a drizzle and then walking back, the rain will stop just as you reach the car.

Always, always, use the toilet before you go and don't drink anything for several hours before the hunt.

If you are working in an isolated area and no one came by for hours, any attempt to take a leak off the cliff will immediately result in a group of young children escorted by nuns walking by on a nature trip. They will stop and pester you with questions, then settle there for an extended picnic lunch.


Gift from above
Sunhat for brief bursts of sun
Rockpick for mashing thumb
Scarf for cold winds
1, 2 or 3 jackets as needed
Backpack to roll down cliff
Camera to photo specimen before losing it
Rubber boots for retrieving rocks from river.
*LUNCH
PRIZE specimen
"The Compleat Alta. Fossil Hunter"
ACE 287
To the river, 30' down
To the car, uphill ½ mi.

Platecarpus
Marine reptile / Reptile marin
Cretaceous period / Période crétacée
CANADA POSTAGE
43

CANADA POSTES CANADA
1998 -03- 0 2
115 YEARS OF POSTAL SERVICE
115 ANS DE SERVICES POSTAUX
RED DEER, ALBERTA
CANADA
5¢

CURRENT EVENTS: PART 37
by Dale Speirs

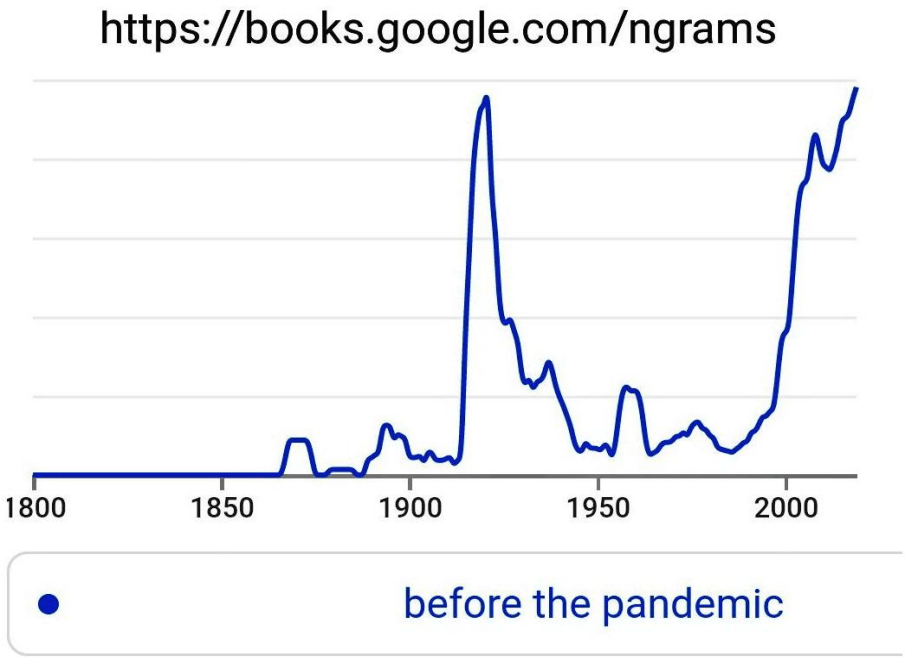
[Parts 1 to 36 appeared in OPUNTIAs #474, 475, 479, 480, 483, 484, 488 to 503, and 507 to 520.]

As of March 18, there were 3,388,461 cases of COVID-19 in Canada. This is understated because a couple of months ago the provinces stopped reporting non-hospitalization cases. 37,150 Canadians died of the disease over the past two years. 80.8% of the population was fully vaccinated.

There's A Word For It.

Ngram is a free feature of Google which allows you to find out how many times a word or phrase had been used in the past two centuries. This is based on a keyword search of the millions of books and magazines scanned by Google. It is a surprisingly useful feature when researching history.

Out of curiosity, I ran an Ngram search for the phrase "before the pandemic". The two big spikes are the 1918 influenza and the 2020 COVID-19 pandemics. The bump between them that looks like it wanted to be a pandemic was the 1957-58 influenza epidemic. It almost took off into the stratosphere but fortunately a vaccine was developed and distributed in time to choke it off. There were no anti-vaxxers in those days.



Fiction.

Comedians George Burns and his wife Gracie Allen were very successful in their radio careers. From 1932 to 1950, under a variety of sponsorship names, they were among the earliest to perform in sitcoms.

As was the custom, the shows were officially named after the sponsors, but the general public always referred to them as "The Burns And Allen Show". She played what was known in those days as a Dumb Dora part, while her husband was the straight man.

Bill Goodwin was the announcer and took part in the sketches, usually to insert a plug for the sponsor's product. As with most entertainers, the show went on USO tours to military camps.

A running gag throughout the series was that George was very vain about his singing voice even though he was terrible. He (and Gracie) had started in vaudeville, and he would sing old chestnuts that were long obsolete. His rhythm and timbre were adapted to stage singing through a megaphone, and came across as ridiculous for radio.

"George Prepares To Entertain Troops" aired on 1945-06-25, written by a stable of scriptwriters. George and Gracie were packing for a tour of camps within continental USA.

A colonel stopped by to see them. When George mentioned he intended to sing in their performances, the colonel asked for a sample. After hearing him, he told George to keep it a secret and not to advertise in advance that he would sing.

After the colonel left, Bill Goodwin arrived. George told him about the tour, including the fact that he would sing. Gracie was mortified, and feared George would be shot for revealing a military secret.

There was a jump cut to a military base, where the colonel called in a medical officer. He told the captain that there was a chance that George would be sent overseas after the general heard him singing. He asked the doctor to visit the Burns residence and give George an inoculation.

When the captain arrived, Gracie answered the door. She was already in a tizzy and her worst fears were confirmed when the captain said he was there to shoot George. She went into the den to get George and warned him of his impending doom. George was used to her ways and laughed her off.

Going out into the living room, he jokingly asked the captain if he was there to shoot him. When the captain calmly said yes, George was staggered. The captain admonished him for wasting time. He said he was a busy man and wanted to be done with the shot. Eventually the misunderstanding was cleared up and George got his inoculation.

The captain asked in a conversational manner what kind of act they did. George began singing and the captain drew his sidearm. As Gracie and Bill struggled to stop the captain, the show faded out to the final commercial. There were no anti-vaxxers in those days.

The Psychology Of COVID-19.

The damage done by the pandemic has been as much psychological as it was medical.

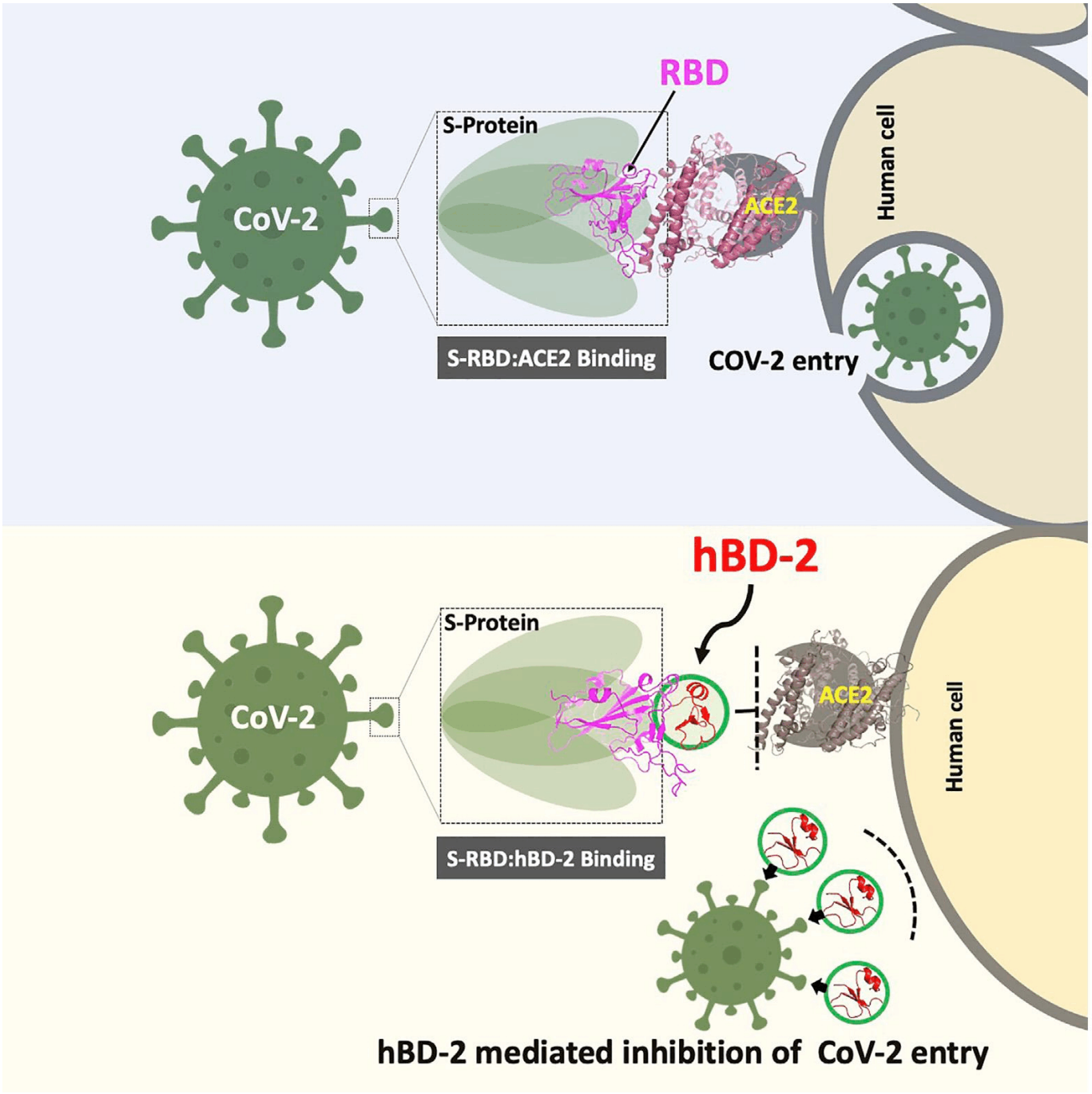
The Calgary Public Library set up this display in the New Central branch.

The monster was a paper shredder and its contents piled up behind it in purple bags.

Seen In The COVID-19 Literature.

Zhang, L., et al (2022) **HBD-2 binds SARS-CoV-2 RBD and blocks viral entry: Strategy to combat COVID-19.** iSCIENCE 25:doi.org/10.1016/j.isci.2022.103856 (available as a free pdf)

Authors' abstract: *Human beta defensin 2 (hBD-2) is a naturally occurring epithelial cell-derived host defense peptide that has anti-viral properties. Our comprehensive in-silico studies demonstrate that hBD-2 binds the site on the CoV-2-RBD that docks with the ACE2 receptor.*



Biophysical measurements confirm that hBD-2 indeed binds to the CoV-2-receptor-binding domain, preventing it from binding to ACE2-expressing cells.

Importantly, hBD-2 shows specificity by blocking CoV-2/spike pseudoviral infection, but not VSVG-mediated infection, of ACE2-expressing human cells.

These promising findings offer opportunities to develop hBD-2 and/or its derivatives and mimetics to safely and effectively use as agents to prevent SARS-CoV-2 infection.

CoV-2 expresses the spike protein, which is responsible for binding to the receptor ACE 2 (ACE2), followed by fusion of the viral and cellular membranes.

To engage ACE2, the receptor-binding domain (RBD) of the spike protein undergoes hinge-like conformational movements that transiently hide or expose its determinants for receptor binding.

Because this is a critical initial event in the infection cascade, the RBD is a key target for therapeutic strategies. The high degree of dynamics of the RBD:ACE2 complex suggests that binding of small flexible peptides may inhibit spike protein:host cell receptor interactions, which can be interrogated by computational modeling and simulations most suitable for exploring these interactions

[Images are from this paper.]

You Will Be Surprised To Hear From Me.

What did surprise me was that I didn't receive my first COVID-19 spam email until March 17. A steady stream of Nigerian bankers want me to deposit their money for them, and I still get an occasional appeal from one of Mu'ammar Gaddafi's children, but for some reason it wasn't until now that I got a pandemic appeal. I append it herewith, unedited as received.

hello dear

I am Mrs Yu. Ging Yunnan, and i have Covid-19 and the doctor said I will not survive it because all vaccines has been given to me but to no avian, am a China woman but I base here in France because am married here and I have no child for my late husband and now am a widow.

My reason of communicating you is that i have $10.2million USD which was deposited in BNP Paribas Bank here in France by my late husband which am the next of kin to and I want you to stand as the beneficiary for the claim now that am about to end my race according to my doctor.

I will want you to use the fund to build an orphanage home in my name there in country, please kindly reply to this message urgently if willing to handle this project. God bless you and i wait your swift response asap.

Yours fairly friend,
Mrs Yu. Ging Yunnan.

FREE STUFF ONLINE

You will have noticed that I provide sources for the pdfs and mp3s reviewed in this zine. Here is a summary of some good resources, all of which are free.

In particular, the Seen In The Literature column cites only peer-reviewed papers. For topics such as COVID-19 or social media effects, more people should be reading these papers instead of blogs where commentators confuse their opinions as being facts.

For scientific papers for which free pdfs are available, the easiest method is to Google either the title of the paper or its digital object identifier, the phrase beginning with doi.org. Most papers are behind a paywall, so unless you have access to a university library computer, you can only get the abstract. However, the abstract is often enough to understand the gist of the article.

For zines, www.efanzines.com provides current pdf zines as well as some older ones. A club called Fanac at www.fanac.org does the reverse; they provide thousands of old zines from the 1930s to date, with a few current zines. Both sites have a free email notification service you can subscribe to.

The Old Time Radio Researchers have thousands of old-time radio shows (1930s to 1950s) covering all the genres, such as comedy, science fiction, fantasy, and mystery. Visit www.otrr.org/OTRRLibrary.

They also publish a bulletin OLD RADIO TIMES, available at www.otrr.org/?c=times, with a free email notification service. Don't pay money for audio books and listen to a droning voice when you can listen for free to full-cast shows such as Jack Benny or Inner Sanctum from the OTRR.

For pulp fiction magazines from all genres, visit www.archive.org/details/pulpmagazinearchive?&sort=-downloads&page=2
Books in the public domain are free from www.gutenberg.org

SEEN IN THE LITERATURE

Astronomy.

Kenny, G.G., et al (2022) **A Late Paleocene age for Greenland's Hiawatha impact structure.** SCIENCE ADVANCES 8:doi.org/10.1126/sciadv.abm2434 (available as a free pdf)

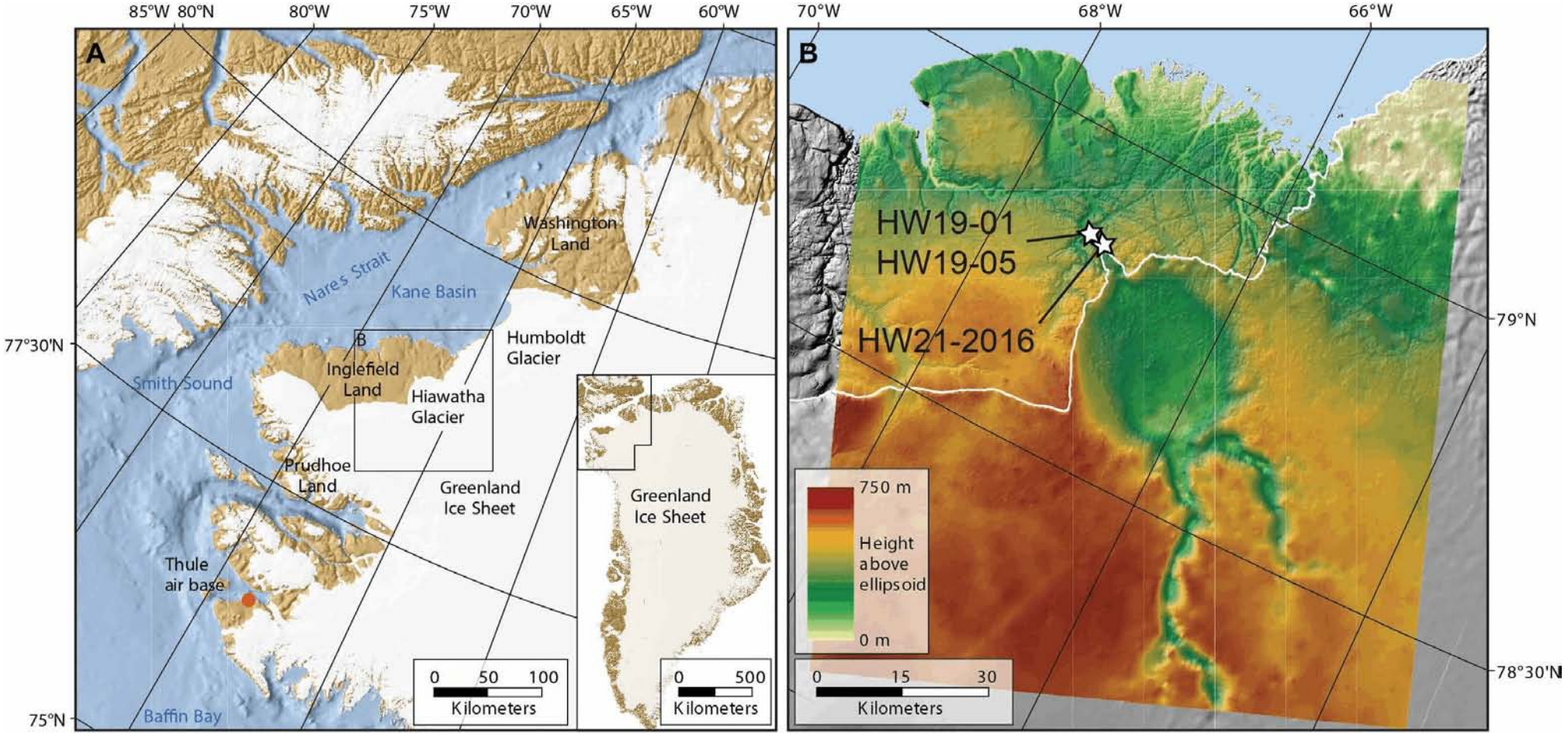
Authors' abstract: *The ~31-km-wide Hiawatha structure, located beneath Hiawatha Glacier in northwestern Greenland, has been proposed as an impact structure that may have formed after the Pleistocene inception of the Greenland Ice Sheet.*

To date the structure, we conducted $^{40}Ar/^{39}Ar$ analyses on glaciofluvial sand and U-Pb analyses on zircon separated from glaciofluvial pebbles of impact melt rock, all sampled immediately downstream of Hiawatha Glacier.

Unshocked zircon in the impact melt rocks dates to ~1,915 million years (Ma), consistent with felsic intrusions found in local bedrock. The $^{40}Ar/^{39}Ar$ data indicate Late Paleocene resetting and shocked zircon dates to 57.99 ± 0.54 Ma, which we interpret as the impact age.

Consequently, the Hiawatha impact structure far predates Pleistocene glaciation and is unrelated to either the Paleocene-Eocene Thermal Maximum or flood basalt volcanism in east Greenland. However, it was contemporaneous with the Paleocene Carbon Isotope Maximum, although the impact's exact paleoenvironmental and climatic significance awaits further investigation.

[Images are from this paper.]



Palaeobiology.

Gilbert, P., et al (2022) **Biomineralization: Integrating mechanism and evolutionary history.** SCIENCE ADVANCES 8:doi.org/10.1126/sciadv.abl9653 (available as a free pdf)

Authors' abstract: *Calcium carbonate ($CaCO_3$) biomineralizing organisms have played major roles in the history of life and the global carbon cycle during the past 541 megayears.*

Both marine diversification and mass extinctions reflect physiological responses to environmental changes through time. An integrated understanding of carbonate biomineralization is necessary to illuminate this evolutionary record and to understand how modern organisms will respond to 21st century global change.

Biomineralization evolved independently but convergently across phyla, suggesting a unity of mechanism that transcends biological differences. In this review, we combine $CaCO_3$ skeleton formation mechanisms with constraints from evolutionary history, omics, and a meta-analysis of isotopic data to develop a plausible model for $CaCO_3$ biomineralization applicable to all phyla.

While predation likely played a major role in the evolution of biomineralized structures, a variety of other functions accrued, including locomotion, buoyancy, grinding, reproduction, and detection of gravity, magnetic fields, or light.

Biominerals may even have multiple functions at once, such as calcium carbonate ($CaCO_3$) armors that also serve as lenses in chitons, microbial shields in ants, or detoxification in most phyla. The establishment of genetic recipes for complex functional biominerals from the same basic ingredients is a remarkable product of evolution.

Diedrich, C.G. (2022) **Thick skin cutters of Siberian frozen mummies: The coevolutionary adaptation of Eurasian Ice Age spotted hyenas.** ACTA ZOOLOGICA 103:doi.org/10.1111/azo.12366

Author's abstract: *Siberian extinct top predators, Ice Age spotted hyenas, are discovered in the permafrost of Yakutia in-between frozen mammoth, rhinoceros, bison or horse carcasses, such as in Mongolia at new open air sites. Historic described European holotypes and new crania from Siberia, Mongolia, and Europe allow presenting the monophyly of Crocuta reaching back 2.53 megayears (Late Pliocene).*

Spotted hyenas coevolved in dental change and body size to their largest prey, thick-skinned elephants and rhinoceroses. The Late Pleistocene Crocuta crocuta spelaea is proven to have scavenged Siberian woolly rhinoceros Coeleodonta antiquitatis carcasses.

Rhino mummy skins have scavenging signs attributable only to hyenas. Chew cuts of breaking-cutting scissor dentition are found at mummy skins. The last Eurasian hyenas left always similar chew-damaged woolly rhinoceroses' crania with braincase openings and damaged mandibles, whereas their deep bite scratches are often found on the distal joints of long bones.

Strongest rhino bone damage is found at natal den sites (cave or open air), to which hyenas imported prey to their cubs. The recently known Ice Age spotted hyena palaeobiogeography overlaps exactly with those of woolly rhinoceros and mammoths. All reached Bering Straits.

Botany.

Pérez-Escobar, O.A., et al (2022) **The Andes through time: evolution and distribution of Andean floras.** TRENDS IN PLANT SCIENCE 27:doi.org/10.1016/j.tplants.2021.09.010 (available as a free pdf)

Authors' abstract: *The Andes are the world's most biodiverse mountain chain, encompassing a complex array of ecosystems from tropical rainforests to alpine habitats.*

We provide a synthesis of Andean vascular plant diversity by estimating a list of all species with publicly available records, which we integrate with a phylogenetic dataset of 14,501 Neotropical plant species in 194 clades. [A clade is an evolutionary line of descent.]

We find that
(i) the Andean flora comprises at least 28 691 geo-referenced species documented to date,

(ii) Northern Andean mid-elevation cloud forests are the most species-rich Andean ecosystems,
(iii) the Andes are a key source and sink of Neotropical plant diversity, and
(iv) the Andes, Amazonia, and other Neotropical biomes have had a considerable amount of biotic interchange through time.

Uplift of the Andes varied across time and space. Particularly, the fast uplift rates between 8 and 5 Ma in the Northern Andes may have favoured plant diversification.

Santangelo, J.S., et al (2022) **Global urban environmental change drives adaptation in white clover.** SCIENCE 375:doi.org/10.1126/science.abk0989

Authors' abstract: *Urban development alters the local environment, potentially driving rapid evolution. We collected data on white clover populations from 160 cities to test for consistent responses to urban environments. The production of an antiherbivore chemical defense increased with greater distance from the urban center in many cities.*

Genomic data suggest that this trend is adaptive, likely in response to lowered drought stress and herbivory pressure in urban centers. This study from the Global Urban Evolution Project provides evidence of widespread adaptation to urbanization.

Urbanization transforms environments in ways that alter biological evolution. We examined whether urban environmental change drives parallel evolution by sampling 110,019 white clover plants from 6,169 populations in 160 cities globally.

Plants were assayed for a Mendelian antiherbivore defense that also affects tolerance to abiotic stressors. Urban-rural gradients were associated with the evolution of clines in defense in 47% of cities throughout the world.

Variation in the strength of clines was explained by environmental changes in drought stress and vegetation cover that varied among cities. Sequencing 2,074 genomes from 26 cities revealed that the evolution of urban-rural clines was best explained by adaptive evolution, but the degree of parallel adaptation varied among cities. Our results demonstrate that urbanization leads to adaptation at a global scale.

Zoology.

Dong, S., et al (2022) **Identification of giant hornet *Vespa mandarinia* queen sex pheromone components.** CURRENT BIOLOGY 32:R197-R212 (available as a free pdf)

Authors' extracts: *Recently, the world's largest hornet, Vespa mandarinia Smith (Hymenoptera: Vespidae), which occurs naturally in the Indomalayan region, has been found in Canada and the United States.*

Some simulations indicate that it could rapidly spread throughout Washington and Oregon in the western US, as well as some eastern parts of the country, threaten native bees and honeybees, and harm bee-pollinated crop production worth over $100 million annually.

We identified V. mandarinia queen produced sex pheromone from the 5th and 6th intersegmental sternal glands of virgin queens. The major active compounds were hexanoic acid, octanoic acid, and decanoic acid. When placed in field traps, the synthetic compounds and a queen equivalent mixture rapidly attracted hundreds of males but no females or other species.

Invasive vespid species are difficult to eliminate because they are all eusocial, benefit from division of labor, have large colonies, and can have hidden nests. At present, traplining followed by manual nest removal is the primary control strategy for V. mandarinia but is laborious and depends mainly upon the visual detection of hornets.

Given the urgent need to monitor the spread of V. mandarinia in North America and to control its reproduction, we suggest that immediate testing of these sex pheromone components and their mixture would be beneficial, while studies to identify additional queen sex pheromone components are being carried out.

Human Prehistory.

Gosling, W.D., et al (2022) **The climate and vegetation backdrop to hominin evolution in Africa.** PHILOSOPHICAL TRANSACTIONS OF THE ROYAL SOCIETY OF LONDON 377B:doi.org/10.1098/rstb.2020.0483

Authors' abstract: *The most profound shift in the African hydroclimate of the last 1 million years occurred around 300 thousand years (ka) ago. This change in African hydroclimate is manifest as an east-west change in moisture balance that cannot be fully explained through linkages to high latitude climate systems.*

The east-west shift is, instead, probably driven by a shift in the tropical Walker Circulation related to sea surface temperature change driven by orbital forcing.

Comparing records of past vegetation change, and hominin evolution and development, with this breakpoint in the climate system is challenging owing to the paucity of study sites available and uncertainties regarding the dating of records. Notwithstanding these uncertainties we find that, broadly speaking, both vegetation and hominins change around 300 ka.

The vegetative backdrop suggests that relative abundance of vegetative resources shifted from western to eastern Africa, although resources would have persisted across the continent.

The climatic and vegetation changes probably provided challenges for hominins and are broadly coincident with the appearance of Homo sapiens (ca 315 ka) and the emergence of Middle Stone Age technology. The concomitant changes in climate, vegetation and hominin evolution suggest that these factors are closely intertwined.

Humans: Modern.

Samantha Montano, S., and J. Carr (2022) **The landscape of disaster film, 2000-20.** DISASTERS 46:doi.org/10.1111/disa.12482

Authors' abstract: *The general public's understanding of disasters is influenced by the portrayal of such events in popular culture. Disaster films have remained a core attraction in this regard.*

A systematic assessment of the most recent disaster film cycle (that is, from January 2000 to December 2019) is warranted, therefore, to gain insights into the current landscape of the genre and to comprehend better the imagery that people encounter onscreen.

This study evaluated 173 disaster films and found that most depict natural hazards and global catastrophes despite films about monsters and smaller scale disasters being the most popular. It provides a foundation for future research on the relevance of disaster films to disaster scholarship and emergency management practice.

And it offers a starting point to analyse the role of disaster films in shaping the meaning and experience of disasters, generally, and the layperson's understanding of disasters and emergency management, including expectations of responder agencies and organisations.

Shah, A.K., and Michael LaForest (2022) **Knowledge about others reduces one's own sense of anonymity.** NATURE 603:297-301

Authors' abstract: *Social ties often seem symmetric, but they need not be. For example, a person might know a stranger better than the stranger knows them. We explored whether people overlook these asymmetries and what consequences that might have for people's perceptions and actions.*

Here we show that when people know more about others, they think others know more about them. Across nine laboratory experiments, when participants learned more about a stranger, they felt as if the stranger also knew them better, and they acted as if the stranger was more attuned to their actions.

As a result, participants were more honest around known strangers. We tested this further with a field experiment in New York City, in which we provided residents with mundane information about neighbourhood police officers.

We found that the intervention shifted residents' perceptions of officers' knowledge of illegal activity, and it may even have reduced crime. It appears that our sense of anonymity depends not only on what people know about us but also on what we know about them.

Dobs, K., et al (2022) **Brain-like functional specialization emerges spontaneously in deep neural networks.** SCIENCE ADVANCES 8:doi.org/10.1126/sciadv.abl8913 (available as a free pdf)

Authors' abstract: *The human brain contains multiple regions with distinct, often highly specialized functions, from recognizing faces to understanding language to thinking about what others are thinking. However, it remains unclear why the cortex exhibits this high degree of functional specialization in the first place.*

Here, we consider the case of face perception using artificial neural networks to test the hypothesis that functional segregation of face recognition in the brain reflects a computational optimization for the broader problem of visual recognition of faces and other visual categories.

We find that networks trained on object recognition perform poorly on face recognition and vice versa and that networks optimized for both tasks spontaneously segregate themselves into separate systems for faces and objects.

We then show functional segregation to varying degrees for other visual categories, revealing a widespread tendency for optimization (without built-in task-specific inductive biases) to lead to functional specialization in machines and, we conjecture, also brains.

Environment.

van Marle, M.J.E., et al (2022) **New land-use-change emissions indicate a declining CO_2 airborne fraction**. NATURE 603:doi.org/10.1038/s41586-021-04376-4

Authors' abstract: *About half of the anthropogenic CO_2 emissions remain in the atmosphere and half are taken up by the land and ocean. If the carbon uptake by land and ocean sinks becomes less efficient, for example, owing to warming oceans or thawing permafrost, a larger fraction of anthropogenic emissions will remain in the atmosphere, accelerating climate change.*

Changes in the efficiency of the carbon sinks can be estimated indirectly by analysing trends in the airborne fraction, that is, the ratio between the atmospheric growth rate and anthropogenic emissions of CO_2.

However, current studies yield conflicting results about trends in the airborne fraction, with emissions related to land use and land cover change (LULCC) contributing the largest source of uncertainty.

Here we construct a LULCC emissions dataset using visibility data in key deforestation zones. These visibility observations are a proxy for fire emissions, which are in turn related to LULCC.

Although indirect, this provides a long term consistent dataset of LULCC emissions, showing that tropical deforestation emissions increased substantially (0.16 Pg C decade^{-1}) since the start of CO_2 concentration measurements in 1958.

So far, these emissions were thought to be relatively stable, leading to an increasing airborne fraction. Our results, however, indicate that the CO_2 airborne fraction has decreased by 0.014 ± 0.010 decade^{-1} since 1959. This suggests that the combined land-ocean sink has been able to grow at least as fast as anthropogenic emissions.

Technology.

Assael, Y., et al (2022) **Restoring and attributing ancient texts using deep neural networks**. NATURE 603:doi.org/10.1038/s41586-022-04448-z (available as a free pdf)

Authors' abstract: *Ancient history relies on disciplines such as epigraphy, the study of inscribed texts known as inscriptions, for evidence of the thought, language, society and history of past civilizations1.*

However, over the centuries, many inscriptions have been damaged to the point of illegibility, transported far from their original location and their date of writing is steeped in uncertainty.

Here we present Ithaca, a deep neural network for the textual restoration, geographical attribution and chronological attribution of ancient Greek inscriptions. Ithaca is designed to assist and expand the historian's workflow. The architecture of Ithaca focuses on collaboration, decision support and interpretability.

While Ithaca alone achieves 62% accuracy when restoring damaged texts, the use of Ithaca by historians improved their accuracy from 25% to 72%, confirming the synergistic effect of this research tool.

Ithaca can attribute inscriptions to their original location with an accuracy of 71% and can date them to less than 30 years of their ground-truth ranges, redating key texts of Classical Athens and contributing to topical debates in ancient history.

When restoring damaged inscriptions, epigraphers rely on accessing vast repositories of information to find textual and contextual parallels. These repositories primarily consist of a researcher's mnemonic repertoire of parallels and, more recently, of digital corpora for performing 'string matching' searches.

However, differences in the search query can exclude or obfuscate relevant results, and it is almost impossible to estimate the true probability distribution of possible restorations. Attributing an inscription is equally problematic.

If it was moved, or if useful internal dating elements are missing, historians must find alternative criteria to attribute the place and date of writing (such as letterforms, dialects). Inevitably, a high level of generalization is often involved (chronological attribution intervals can be very long).

Here we overcome the constraints of current epigraphic methods by using state-of-the-art machine learning research. Inspired by biological neural networks, deep neural networks can discover and harness intricate statistical patterns in vast quantities of data.

Recent increases in computational power have enabled these models to tackle challenges of growing sophistication in many fields, including the study of ancient languages.

Ithaca, which was named after the Greek island that eluded the hero Odysseus' homecoming, was trained on inscriptions written in the ancient Greek language and across the ancient Mediterranean world between the seventh century BC and the fifth century AD.

Qi, L., et al (2022) **A review of vibration energy harvesting in rail transportation field.** iSCIENCE 25:doi.org/10.1016/j.isci.2022.103849 (available as a free pdf)

Authors' abstract: *In this paper, we review, compare, and analyze previous studies on vibration energy harvesting and related technologies. First, the paper introduces the basic aspects of vibration energy acquisition in the railway environment, including vibration frequency, train speed, energy flow in the train, and vibration energy harvesting potential.*

Generally, the methods for scavenging vibration energy caused by passing trains can be divided into four categories: electromagnetic harvesters, piezoelectric harvesters, triboelectric harvesters, and hydraulic harvesters.

The structure, output performance, merits, and disadvantages of different energy harvesting strategies are summarized and compared. The application of vibration energy harvesters is explained as supplying power to monitoring sensors on the line side and the vehicle side.

Finally, the paper addresses the challenges and difficulties that have not been completely resolved in the current research literature, including system stability, durability, and economy.

LETTERS TO THE EDITOR

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

FROM: Lloyd Penney 2022-03-19
Etobicoke, Ontario

OPUNTIA #519: [Re: Chinook Blast winter festival] I like the freshly-cast steel dominoes on the front cover. Or, they get plugged in. Interesting neon displays.

I collected rubber stamps at one point, but there were more of them than dollars I had. I still have many of them, but some have dried up and broken apart. I gather they weren't that well made.

Carnivorous plants are always of interest, one aunt has a number of flytraps to keep the houseflies at bay.

As I write, the Toronto Comicon is on downtown. Not our speed, we have elsewhere to be tomorrow. This is the first local big comic con in more than two years, yet, I see on Facebook that many are not there, not quite confident that such crowds wouldn't give them COVID-19.

[The Calgary Philatelic Society has resumed live meetings. I am in charge of our centennial birthday party on April 6, where cake will be served and a good time will be had by all. I'll have a report in the next issue of this zine.]

The first vent we will be going to is in June, so we hope things will ease even more. Wherever we might go, having a mask and QR vaccination record handy will be wise. People are starved for events they can actually attend, but some events are rolled over to 2023. I think our assorted conservative provincial governments are relaxing the pandemic rules a little too much and a little too fast.

[The attitude of most Albertans, myself included, is that COVID-19 will be with us indefinitely, like influenza. Those of us who are vaccinated have nothing to fear than a very bad cold, and the anti-vaxxers will gradually be eliminated from the gene pool. We simply cannot maintain pandemic precautions anymore. They were needed before the vaccines but now that 81% of Canadians are fully vaccinated the time has come to return to normality. I keep my QR code on my smartphone.]

OPUNTIA #520: The war in Ukraine: I suspect that Etobicoke may make Toronto one of the largest cities of Ukrainians outside of Ukraine. Our member of Parliament is Ukrainian, and accompanied Trudeau overseas recently. More madness has gripped us, like rampant inflation and the pandemic aren't enough.

My previous letter: Ah, the warmth of spring is almost here. The snow is gone, and the temperatures are in the double-digits. For the moment, anyway, but it has been welcome.

I had to laugh that the same Freedumb Convoy in Washington had to be cancelled due to lack of interest. I think Justin waited too long, but the Convoy was broken up without injury. In New Zealand, the truckers were tear-gassed and arrested.

[Justin Trudeau was a coward, plain and simple, and ran from Ottawa to leave local officials to cope.]

Third Monday is coming, and we have found a new place to hold them, if indeed we like the new place. The Red Cardinal Inn is just up the street from us, so we can walk there, and stagger home afterwards. We will see how people like it, and after the lockdowns, all restaurants are eager for the business.

FROM: Theo Nelson
Calgary, Alberta

2022-03-20

[Theo's quarterly postcard marking the change of the seasons. View side is on the next page.]

tnelson@bexx.com

The start of Spring,
The start of Fall,
It all depends
On where you are.

New and old,
It's such a delight,
to watch the seasons
Come and pass.

This voyage called Life,
It's so very special,
We follow the rhythms
Of our planet's journey.

"Seasonal Greetings!"

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To:

Dale -

Little things show where

the love is.