OPUNTIA 508

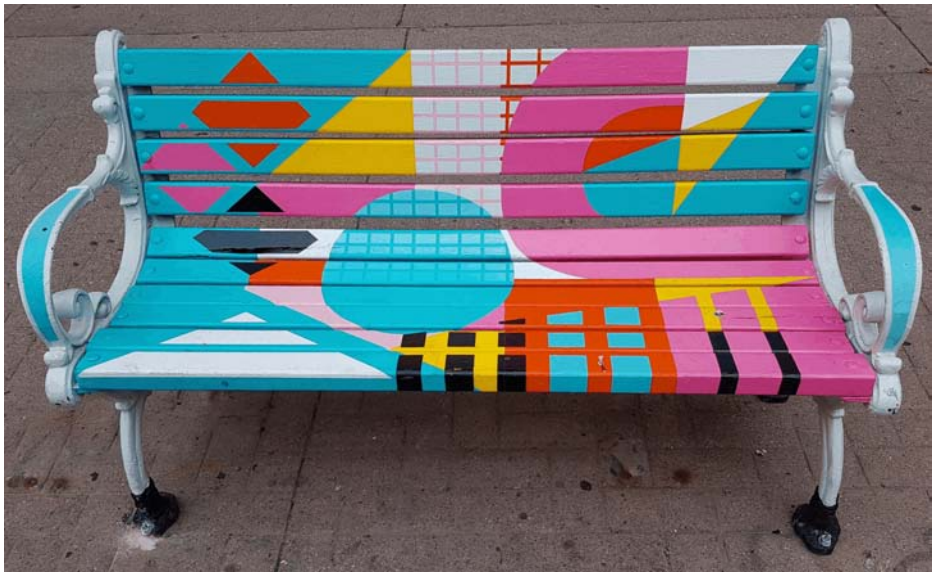
Early September 2021

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.

STEPHEN AVENUE PEDESTRIAN MALL

photos by Dale Speirs

8 Avenue South in the downtown core of Calgary is the centre of Calgary, both geographical and socially. The east end terminates at Olympic Plaza, Calgary's equivalent of Times Square, where Cowtowners go to celebrate or just hang out. The west terminates in the glass canyons of skyscrapers. Along the way are newly painted benches, shown on the cover and these pages.



The benches are colour-coordinated with the banners along the mall. The view at right is looking east. The silver building at the far end is the new City Hall, which terminates the downtown core. On the other side of it is East Village.

SIGNS, SIGNS, EVERYWHERE A SIGN
photos by Dale Speirs

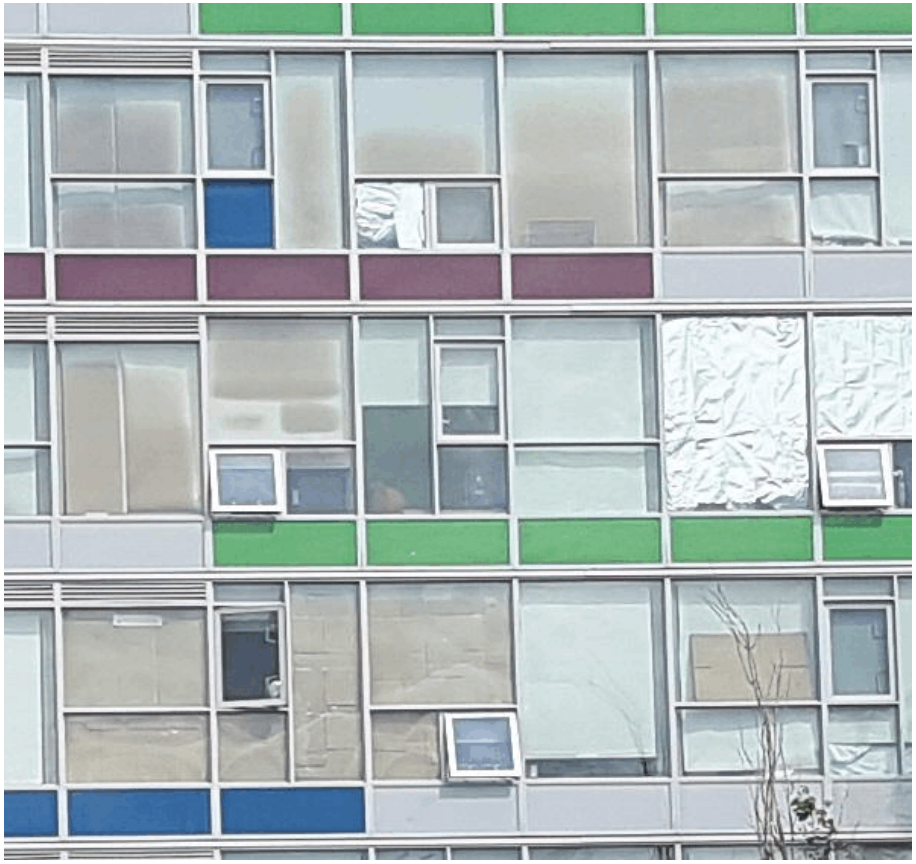
The rot began with handicapped parking, but soon enough there will be signs reserving stalls for every specific group that has a grievance. Obviously these signs are not enforced but just for show.

More understandable are these signs, a consequence of the pandemic. I wonder how long they will persist after the pandemic is over?

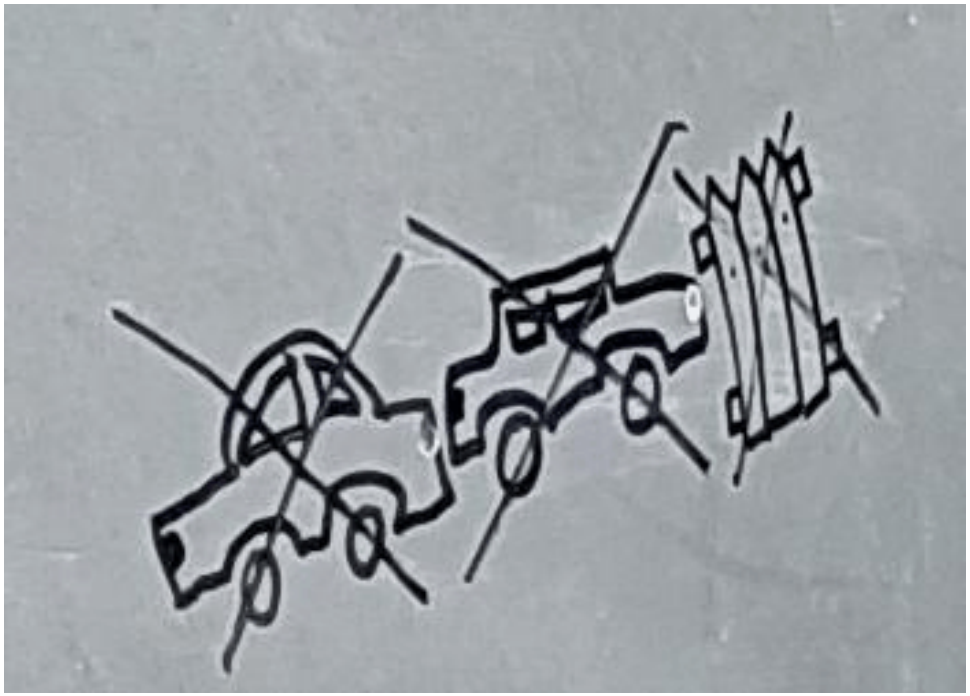
AROUND COWTOWN
photos by Dale Speirs

As the pandemic receded, for the vaccinated at least, I've been getting out and about to places I haven't been since early 2020. In early August we had a heat wave with temperatures in the high 30s. On August 22, I went up into northwest Calgary on an errand. Coming back on Crowchild Trail, stopped at a traffic light at 24 Avenue NW, I glanced over to this building across the freeway from the university campus. It faces due west from the top of a hill.

My gaze was caught by the unusual number of apartment windows that were lined with aluminum foil. A second look also showed a remarkable number of curtains that had been toasted brown by the heat of sunlight. Almost certainly this happened during the heat wave. The building is relatively young, about 15 years old.



Seen in a northwest Calgary parking lot. Battle honours on the fender for a damaged SUV.



FANAC NEWSLETTER #16: 2021-08-23
by Joe Siclari

[Extracts made by the editor. For the full newsletter, visit www.fanac.org]

FANAC is the new home for the archives of the Science Fiction Oral History Society (SFOHA). The SFOHA has been recording professionals and fans since 1975. Many thanks to SFOHA's Anne Gray for masterminding the move.

Our earliest focus was on well-known fanzine titles, and the oldest fanzines from the 1930s and 1940s simply because there was demand on the one hand, and the effects of entropy on the other. While we still eagerly scan the 30s zines, more and more are from later periods.

This week alone we added issues of Ettle (1980s, Jackie Causgrove), Glass Houses (1980s, Taral Wayne), Bete Noire (1960s-70s, Redd Boggs), Outworlds (1983, Bill Bowers), Rude Bitch (1980s, Avedon Carol and Lucy Huntzinger), and Supersonic Snail (1977, Bruce Gillespie).

Notable runs since the last newsletter include DNQ (1970s-80s, Taral Wayne and Victoria Vayne, all scanned by Sparky), and Small Friendly Dog (70s-80s, Paul and Cas Skelton). There are some rare items too, Shaver Mystery Magazine (full run of Richard Shaver's 1940s semi-pro), and Proceedings of the Institute for Twenty-First Century Studies aka PITFCS (1960s, Theodore Cogswell).

One-shots: We have been putting up some exceptional One-Shot fanzines. Of course, we have famous zines, like Laney's Ah! Sweet Idiocy!, Carr's BNF of Iz, Willis & Shaw's The Enchanted Duplicator (12 different editions) and trip reports like Willis' Harp Stateside and The Enchantment. But you should also dig into our index page on "Fanthologies, Collections and Festschrifts".

There are some great collections of material by Charles Burbee, Bob Tucker, Lucy Huntzinger, Ted White, Susan Wood, Bob Shaw, Rick Sneary, Bruce Gillespie, Sandra Miesel, Terry Carr, Walt Willis and others. We have nearly all of the "Best of the Year" collections of fannish writing that have been compiled as well as many regional Fanthologies.

Other Fandoms and Related Zines: Science fiction fans have often written about other hobbies, and often SF fandom has spawned other fanzines and

fandoms. These include fandoms around comics, mystery, SCA and Star Trek, and even early folk music. FANAC has identified and scanned zines by well-known fans that are part of such early crossovers. These are zines that started as pretty regular fanzines and became a beginning or mainstay of a related fandom. You'll see them in the Classic List under "Related".

Notable comics items include Lupoff's Xero and Thompson's Newfangles but there were also Kyle's Fantasy World (1936), May's EC Fan Journal (1953), Taurasi's Fantasy Comics (1952), Pearson's SATA, and Bronson's Scienti-Comics (1940). All of these, and others, came before the major blossoming of comic fandom and all are on FANAC.org. We're still looking for copies of Siegel and Shuster's Science Fiction.

Mystery fandom really became popular in the 1960's, although specialized groups for Sherlock Holmes and the Saint and a few others existed beforehand. Marvin Lachman in his history of mystery fandom, The Heirs of Anthony Boucher, credits the real start of mystery fandom with the creation of Bouchercon, largely due to SF fans like Len & June Moffatt and Bruce Pelz.

Early pubs on FANAC.org include the Moffats' JDM Bibliophile, Sneary's aborted John Dickson Carr Bibliophile, Lynn Hickman's The Pulp Era and its oddly named predecessor's Argassy, JD, and JD-Argassy. DAST (which stands for Detectives-Agents-Science Fiction-Thrillers) by Swedish fan Iwan Hedman is sitting on our desk waiting to be scanned.

Today's folk music fans know virtually nothing of the early connection to SF Fandom. Early fans like Lee Jacob wrote about the connection. His 1952 Influence of Science Fiction on Modern American Folk Music, reprinted in 1961, has mostly gone unnoticed. More important, and noted by such as Pete Seeger and Dave Van Ronk, were Lee Hoffman Shaw's publications.

LeeH started with a few issues of CHOOOG devoted to folk music in early 1957. She soon came out with the first issue of Caravan in August. It was published during the birth of the Washington Square folk music movement. Lee gave it out free as a fanzine at Izzy Young's Folklore Center and at sings in Washington Square. Contributors include folk legends Dave Van Ronk, Pete Seeger, Barry Kornfeld, Sandy Paton, and Billy Faier.

She parlayed her SF connections with material from music oriented fans and professionals like Dick Ellington, Michael Moorcock, including a regular column by John Brunner. It has been called the paper of record for the New York folk music revival. Caravan went from mimeo to offset and became a burgeoning business which Lee sold to Faier. She gave it up when it interfered with her own writing but didn't lose her interest in the music. So, she started another folk oriented fanzine, Gardyloo, in 1959.

All the pubs mentioned above are on FANAC.org. All the fanzines can be found at http://fanac.org/fanzines/Classic_Fanzines.html

Fancyclopedia.org: FANAC.org is a great place to browse, when you and your phone have a few minutes to spend. Fancyclopedia is too. Check out the Featured Pages at https://fancyclopedia.org/Featured_Pages . An assortment of unrelated topics and links, there's likely something you'll find of interest.

The topics on this occasionally updated page include Fanspeak, the Tucker Hotel, the List of Hugo Categories, and Which Was the First SF Convention? There's also an article on Quadrumvirs, a very intimidating piece of fanspeak.

You can also search for a decade ("1960"), a fanzine name, or look at recent changes. If that's not enough, check out WSFS or Midwestcon 5 or the article on Bob Tucker. If you look for a topic, and it's not there, you know what you should do. Write something up!

FANAC Fan History YouTube Channel: https://youtube.com/c/FANACFanHistory Woohoo, we're up to 868 subscribers. Since the last update we've added seven programs (in 11 pieces). Four are recordings of our Zoom programs and account for 7 pieces. Since we're not constrained to a one hour format, some of the Zoom sessions go a little long and when they're much more than an hour we break them up.

FANAC by the Numbers.

As of August 20, we have:

Fanzines: 15,478 issues (covering 905 titles) with more than 263,386 pages. This is up from the 14,068 fanzine issues and 236,015 pages reported in our March update.

Conpubs:2,491 publications, with 50418 pages, representing 605 conventions

Fancyclopedia: 28,240 pages which include 6,092 for people, 4,368 for fans (a subset of people), 7,819 for fanzines, another 1,433 for clubs and apas, and 5,993 for conventions.

YouTube: 118,930 views, 868 subscribers and 111 recordings.

PEARLS OF GREAT PRICE: PART 2
by Dale Speirs

[Part 1 appeared in OPUNTIA #450.]

THE ADVENTURES OF PHILIP MARLOWE was based on the character created by Raymond Chandler. It aired on radio from 1947 to 1951, changing networks in midstream. The series was slightly darker than most mystery shows, although never as dark as the noir novels upon which it was based.

"The Long Rope" was written by Mel Dinelli, Robert Mitchell, and Gene Levitt, and aired on 1949-02-05. Sydney Venetta hired Philip Marlowe to courier a $30,000 pearl necklace to a buyer in Chicago. He said the money would go to his niece Vivian Russell, his only heir.

When Marlowe arrived at the mansion to pick up the pearl rope (as most referred to it), he found Venetta dead from a heart attack. The old man had told Marlowe that he had fired his nurse but that a replacement would be there by the time Marlowe arrived. No one else was in the mansion though. The new nurse never did show.

A moment later, Bruce Temple arrived, identifying himself as Venetta's business agent. He wasn't surprised Venetta was dead because he had a heart condition. What was surprising was that his medication was on a sideboard out of his reach, instead of on the end table next to his chair. Temple said that Venetta had always made a point of keeping his medicine within reach.

The pearls were kept in a key-locked safe. The two men got the key off Venetta's body and opened the safe. The pearls were gone. Marlowe found a cash register receipt with a telephone number on the back. Vanetta apparently had food delivered. Marlowe told Temple to call the police and then went off to investigate.

He visited Russell, who wasn't surprised at the news. When she learned the pearls were missing, she hired him to recover the rope. Going to Temple's house, Marlowe was accosted by a lowlife who wanted Temple as well. They exchanged hearty fisticuffs and then went their separate ways. Temple wasn't home. All told, it wasn't a good evening for either of them.

Dusting himself off, Marlowe then contemplated the missing nurse. He dialed the number on the cash register receipt and got a police detective. Homicide was investigating the death of Betty Larson, who was a waitress murdered there in her apartment for no apparent reason.

The orchestra crashed into a crescendo and the action broke for a commercial. It was a network house ad for the Jack Benny show. The announcer burbled that Benny's next show would be one of the funniest ever, with Claudette Colbert and Vincent Price as guest stars.

The listening audience having been cheered up with anticipation of good times, Marlowe returned. He went to Larson's apartment where he learned she was working at a café on the other side of town. The place happened to be just around the corner from Vanetta's mansion.

Marlowe went to the café and met the owner, named Ryan. He broke the news to him about Vanetta, then Larson. The latter item shook Ryan, who dashed off to her apartment, as if he could do something. Marlowe let him go, since he knew the police could handle the guy.

Mitzy the waitress gave Marlowe an unspecified clue. He dashed after Ryan and got another unspecified clue. From there, he accused Temple. There was a contretemps which was solved when Larson's brother showed up for revenge. The remaining four minutes of the episode was a lengthy exposition by Marlowe tying up loose threads and explaining who did what where and when.

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

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

In the radio series, most of his schemes seemed to fall through, yet he always had money to live well and go gambling in casinos. Lime narrated all the episodes as if he were a god speaking from Olympus, complacent in his

superiority over the lumpenproletariat while oblivious of the fact that he lost more often than he won.

"The Pearls Of Bohemia" aired on 1952-05-30. The police in Milan had mistaken ideas about Harry Lime, or so he said. Rather than debate with them, Lime decided it would be simpler to depart town immediately. Thus it was that he arrived in Genoa.

Lime noticed a classified ad in a newspaper asking for a multi-lingual publicist for a young lady of 23. She was Melody Johnson, an American who had been stranded after the stage company she was with went bust. She now worked as a taxi dancer in a music hall.

Lime agreed to promote her as a beauty queen and actress. He suspected there was more than that but accepted the job. She said he must be prepared to travel, which was no problem for him. Especially so after a Milan police detective arrived in Genoa and began asking around for Harry Lime.

Lime and Johnson left town en route to Naples and Cairo. She had enough money to buy first-class cabins for them, which struck Lime as being odd for a woman who worked as a taxi dancer. Lime made friends with the cabin steward Paul, a Bohemian who fled Czechoslovakia after the Soviets annexed it in 1948.

Someone was watching Johnson on the ship. Lime's cabin was searched. In Naples their cab was followed by a man Lime recognized as Minelli. It was then that she confessed she was carrying The Pearls of Bohemia. (The listener can hear the capital letters.)

Johnson had fallen in love with the roulette wheel. She fell into the clutches of Ziki, a Bohemian serving the Count of Bohemia. Both were refugees. All the Count had left was his pride and the pearls. Soon enough he didn't have the pearls.

Ziki stole them but could only find a buyer in Cairo. Johnson became the courier after Ziki bought up her markers from the casinos. Minelli was spotted on board the ship. Paul was spotted searching Johnson's room. He provided an infodump to Lime and revealed he was the Count.

Lime made a deal with Minelli for Egyptian £2,000 to deliver the pearls after the ship docked in Egypt. Lime delivered a set of imitation pearls and the Count kept the originals. Lime did not neglect his duties as a publicist either. He got Johnson voted as Miss Pyramids of Giza, the prize money of which paid off her gambling debts.

RICH GIFTS WAX POOR WHEN GIVERS PROVE UNKIND: PART 4
by Dale Speirs

[Parts 1 to 3 appeared in OPUNTIAs #392, 456, and 486.]

Waxworks museums have always had a special appeal for use in horror and murder mysteries. As a judge might say, it is stipulated that they are creepy by definition.

MYSTERY IN THE AIR was a summer replacement series which aired on radio in 1945 and again in 1947. No episodes of the first series are known but several of the second series are available as free mp3s from the Old Time Radio Researchers Website at www.otrrlibrary.org The first series was apparently about a private detective, while the second series was an anthology with Peter Lorre as the lead actor in each episode of unrelated stories.

"The Mask Of Medusa" aired 1947-09-04, based on a story by Nelson Bond. It was set in a wax museum which, among other exhibits, displayed the effigies of 47 murderers. Peter Lorre was one of those figures, and narrated how he came to be immobilized as a wax figure, still alive but trapped as a statue. He was able to see and hear but could not move.

His story began after he had just committed a murder and ducked into the wax museum to evade the police. The proprietor Aristide Zweig explained the statues were real criminals in suspended animation. Zweig said he had the original head of Medusa. Lorre didn't believe him but found out the truth the hard way.

Zweig knew quickly that Lorre was the next exhibit. The murderers had some psychic ability and plotted to free themselves by telepathy. They picked a woman who seemed susceptible to their thoughts and brainwashed her to set the museum on fire.

The heat freed all 47 walking dead (Lorre's phrase), who then tried to flee the flames after revival. They formed an angry mob and went after Zweig. During the fracas, the mask of Medusa was exposed and returned all 47 murderers back into statues, plus Zweig.

In the end credits, one of the supporting actors named was Stanley Waxman. I am not making that up.

High Camp.

From the 1960s television series BATMAN, was a two-part episode "The Ring Of Wax" and "Give 'Em The Axe". They were aired in 1966 March, written by Jack Partiz and Bob Rodgers.

The series was played as a mixture of melodrama, comedy, and slapstick, basically the only way that superheroes can be played. The idea of masked vigilantes barging into police or military work is risible, much less that they would long remain anonymous or their secret headquarters unknown.

Be that as it may, this story opened at Madame Soleil's Wax Museum, where a ceremony was underway to unveil a waxwork of Gotham City's favourite crime fighter, Batman. Except that when the curtain was pulled back, what was revealed was a waxwork of supervillain The Riddler. It sprayed the audience with red syrup as his way of announcing he was back in business.

The Riddler always left corny riddles as clues to his next escapade. Batman and Robin would puzzle out the answer for several minutes, giving the audience time to guess the answer. A few sample riddles:

Q: What is always coming but never arrives?
A: Tomorrow, because when it arrives it is today.

Q: What is the beginning of eternity, the end of time and space, the beginning of every end, and the end of every race?
A: The letter 'e'

This time around the Riddler's lair was a candle factory, with lots of vats filled with boiling wax. He had obtained a universal solvent, with which to dissolve combination locks or penetrate vaults by spraying it on the wall to create a large hole. That created an opportunity for him to send the jest:

Q: What grows larger, the more of it you take away.
A: A hole.

Before anyone could ask the obvious question of what container could hold a universal solvent, the answer was that it was stabilized in a special wax. If the wax was melted, then the solvent would be activated.

The Riddler's first target was a rare book about lost treasures of the Incas. The dynamic duo tried to intercept him and his gang at the Gotham City Library but lost the fight. He was carrying a spray can of Instant Forever Stick Invisible Wax Emulsion, which stuck their feet solidly to the floor. Fortunately Batman carried a laser in his utility belt and was eventually able to melt the wax and free themselves.

The action eventually moved back to Madame Soleil's museum. The duo were ambushed by the gang as they walked through the museum. The Riddler and his henchmen were dressed as waxworks, and got the duo while in plain sight. The pair were trussed up and hauled to the candle factory. The first episode ended with them slowly being lowered into a vat of wax.

As per supervillain tradition, the Riddler didn't stay to watch their demise but left the room. The duo, as usual, escaped through a ridiculous circumstance. Why supervillains never just shoot the hero dead with a handgun is one of the mysteries of the genre. Nor did the Riddler bother to unmask them, which by itself would have been a coup.

Assuming they were dead, the Riddler left for the Gotham City Museum, where the star attraction was the sarcophagus of Incan emperor Hualpo Cuisi. The jewels had been hidden inside the coffin but the Riddler didn't get them, thanks to the timely arrival of Batman and Robin.

GET SMART was a spy spoof which aired from 1965 to 1970. Maxwell Smart was the blithering idiot who worked as a spy for CONTROL, assisted by the beauteous Agent 99 (name never given in the series) who was the sensible one. Their adversaries were KAOS, a Delaware corporation. The series mainly parodied James Bond but also had fun with other hit movies.

"The Wax Max" aired on 1968-02-24 during Season 3, and was written by James Komack. Maxwell Smart and Agent 99 strolled about a carnival when they inadvertently discovered a plutonium smuggling operation run by KAOS.

They had been playing a midway game. By accident Smart mentioned a code phrase used by KAOS couriers picking up the plutonium, which was hidden in kewpie dolls used as prizes. The carny gave them one of the dolls, thinking they were KAOS agents.

After they left, the man realized his mistake. The pursuit had to be subtle because the carnival was crowded. As Smart and 99 went about the grounds, each ride became increasingly dangerous as KAOS agents tried to pick them off.

They finally discovered the source of their danger when 99's makeup compact, with a built-in Geiger counter, sounded an alarm. Well, she was a spy, so why wouldn't she have one in her purse?

From there, a pursuit that ended in the carnival's wax museum. The KAOS agents, whose boss was named Waxman, tried to make Smart and 99 into permanent exhibits. Since the series had three more seasons to go, the duo survived and Waxman departed.

ROBOTNIKS: PART 2
by Dale Speirs

[Part 1 appeared in OPUNTIA #480.]

The word 'robot' only dates back to 1920, originating from Karel Capek's famous play R.U.R., although he himself gave credit for the word to his brother Josef. It was a modification of a Slavic root word for forced labour or slavery.

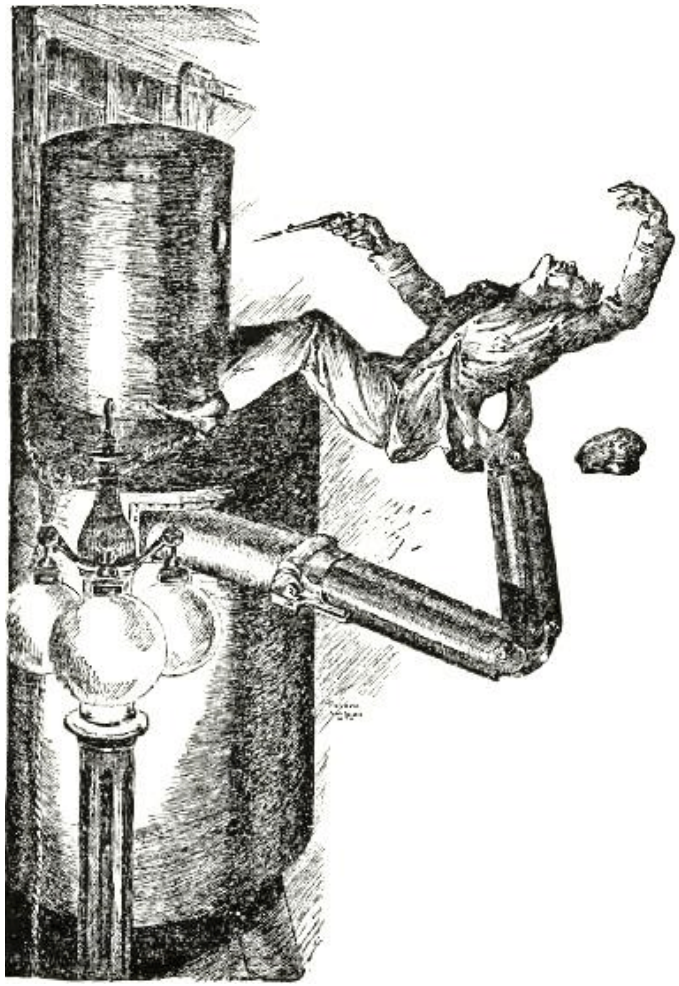
In fiction, mechanical men were nothing new but prior to 1922 (when Capek's play was translated into English) they were generally referred to as automatons or androids. See OPUNTIA #4 (available as a free pdf from www.fanac.org or www.efanzines.com) for the detailed etymology. Modern science fiction didn't get going until 1926 when Hugo Gernsback published the first SF magazine.

In R.U.R. and many works that followed, the robot was represented as a threat to humans. It wasn't until Isaac Asimov that they became friendly helpmates under his Three Laws of Robotics (a word he invented). The standard story about robots was the runamok machine that got out of control.

With One Robot To Rule Them All.

An early use of robots by that name was "The Robot Master" by O. Beckwith (1929 October, AIR WONDER STORIES, available as a free pdf from www.archive.org). The master was Prof. Hyle L. Benning, who in 1937 invented free-roaming robots that could operate from a distance under a central control. All the other scientists laughed at him, so with a final bwah-ha!-ha! he dropped out of sight.

In 1965, New York City came under attack by robot armies and aerial fleets. The hero was Arnid Benning, young nephew of the Professor. His uncle had a soft spot for him, and urged him to come over to the dark side. Arnid played along until he could get into the command-and-control centre. There followed a struggle in which Arnid killed his uncle, then destroyed the command circuits. All was well with the world, at least until the next robot master came along.



Another example of such fiction was "The Iron Man" by Paul Ernst (1933 June, WEIRD TALES, available as a free pdf from www.archive.org). The plot could be predicted from the opening illustration.

Amos Klegg was the misguided engineer in question. He had two experiments going in his laboratory. There was a two-storey tall mechanical man controlled by thought waves. In a glass case nearby was the brain, eyes, and heart of a mass murderer, kept alive by infusions.

The narrator returned to the laboratory the next day to find Klegg crushed to death, the brain and organs in the glass case gone, and likewise the metal man. *Gory death as it tramped the city under the control of a criminally insane brain.* The police were smart enough to fire at the eye holes to smash the glass case inside, but the holes were two-storeys up on a moving object. The best sniper in the world couldn't do it.

A brave young man lassoed the cyborg from behind, then climbed up to the head. He managed to get the barrel of a handgun into an eye slot and finish off the brain. With that, the story ended.

THE MYSTERIOUS TRAVELER was an anthology radio series which aired from 1943 until 1952 as half-hour episodes. The shows always opened with the sound of a train whistling its way through the night. The narrator introduced himself as The Mysterious Traveler on board the train. He urged the listener to "*settle back, get a good grip on your nerves, and be comfortable, if you can*".

All episodes were written by Robert A. Arthur and David Kogan. Only about one-quarter of the episodes still exist on tape or mp3 via www.otrrlibrary.org Many episodes or scripts were later clipped down to 15 minutes for the series THE SEALED BOOK and THE STRANGE DR WEIRD.

"Beware Of Tomorrow" aired on 1944-04-09. The episode began with Dr Richard Dale receiving a letter from his former supervisor Prof. Clarke to visit him in his isolated laboratory out on a farm. So he did, learning along the way that villagers were suspicious of the goings-on, almost to the point of getting out their pitchforks and torches.

The professor and his laboratory assistant Barton introduced Dale to their house servant Alpha, a cyborg robot made of aluminium alloys with cultured brain tissue from an executed criminal. After demonstrating its ability to pour tea and act as a butler, Clarke went off to bed.

Barton spoke privately to Dale. A cultured man with a smooth voice, he asked if Dale would be willing to stay and help their research. They were working on a second robot. Barton was worried about Alpha going berserk, running amok, terrorizing the village, and all those sorts of things. The usual Frankenstein routine.

The next morning they found Clarke dead, apparently murdered by Alpha. Setting that aside, Barton divulged there was a second robot Beta. It was a supergenius, smarter than anyone, but from an insane brain. Barton said it wanted to rule the world, so the professor dismantled it.

Alpha returned, and admitted the murder. It said it acted in self-defence because Clarke wanted to dismantle it. The local Deppity Dawg was close behind, Alpha having killed a farmer. The villagers were en route as an angry mob, now well equipped with the traditional pitchforks and torches.

There was a hot time tonight. More alarums a la Frankenstein. Barton turned out to be Beta and escaped the mob. Didn't see that coming did you? Somewhere out there, Beta was building duplicates.

THEATER FIVE was a short-lived attempt at reviving drama shows on radio. It aired for the 1964-65 season but the war against television was lost a decade prior, so it failed. The episodes were generally well written and produced, and are worth downloading from www.otrrlibrary.org. The episodes were a mixture of science fiction, fantasy, murder, and sometimes plain drama.

"The New Order" was written by Don Haring and aired on 1964-08-18. This was a basic "robots take over the world" plot but more interesting because Asimov's laws of robotics were a central part of the story.

Robots Unlimited was testing humanoid robots which resembled humans so closely that the general public had become alarmed. Robots were widespread but looked like robots, so people didn't worry over them anymore than they did vacuum cleaners. Humanoid robots were a different matter.

Government investigators John Clemans and Sam Winston were sent because of an even more disquieting rumour. They heard that Robots Unlimited were designing human simulacra without the First Law of Robotics programmed into them. The potential to use them as infiltrators and soldiers was obvious.

The head of Robots Unlimited said pshaw and nonsense. Mr Garson assured Clemans and Winston that there was no cause for alarm. He showed off the latest model Adam C and gave them the grand tour. They inadvertently came across a grand conspiracy and were taken into custody.

The obvious plot came to the fore, that the robots were going to take over the world. Garson blandly assured Clemans and Winston that the robots were programmed with Asimov's Laws. For now. He went on to explain the additional fillip was that the robots could manufacture their own kind. Soon he would rule the world, bwah-ha!-ha!

Winston emptied a handgun into Garson who did not die. Garson was a robot, modeled in the image of the human Garson, long since dead. It explained to Winston and Clemans that they would likewise be replaced by robot doppelgangers. That was the real plan, not a war but a usurpation, as the robots would replace humans by infiltration.

TRANSIT FANNING IN CALGARY: PART 29
by Dale Speirs

[Parts 1 to 28 appeared in OPUNTIAs #256, 258, 260, 264, 269, 275, 283, 298, 302, 327, 333, 341, 348, 357, 359, 365, 369, 371, 392, 394, 396, 407, 412, 426, 435, 445, 462, and 484.]

A Cat May Look Upon A Bus Driver.

I was on the #7 bus on August 27 when a young woman got on board with a stroller. A common enough occurrence, and at first I paid no attention. Then I took a closer look and saw the cat inside, not a baby. It was a chocolate marmalade, so the smartphone photo I took was dark but a bit of computer processing brought out the cat.

Fiction.

THE HAUNTING HOUR was an anthology series that aired on radio from 1944 to 1946. No credits of any kind were ever given. This series is available as free mp3s from the Old Time Radio Researchers at www.otrrlibrary.org

"The Uptown Express" aired 1945-07-21. The episode was narrated by a woman Linda Damon, who fell asleep on a subway and woke up five years later. She was still on the train but now had a husband Johnny Vincent sitting beside her. They made their way home to a cheap apartment, she in a daze. Johnny mentioned how they had first met on the subway when he asked directions.

He lived on the wrong side of the law. Her brother Sid was an assistant district attorney trying to prove Johnny guilty of murdering a gambler. Linda perjured

herself to provide an alibi for Johnny. Things went wrong the hard way and Johnny got himself shot. As he died, she held him in his arms.

After he was dead, she panicked and ran for a subway train to go home to her mother. She fell asleep, then woke up back in her original time. A stranger was sitting beside her. He was Johnny. Instead of answering him and starting a conversation, she made her excuses and left at the next stop.

CURRENT EVENTS: PART 24
by Dale Speirs

[Parts 1 to 23 appeared in OPUNTIAs #474, 475, 479, 480, 483, 484, 488 to 503, and 507.]

Philately.

Not too many new stamps to add to my COVID-19 topical collection. The rush seems to have abated for the time being.

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Takeout

1 Orig ChBcn Cb4	11.29
Orig ChBcn	
Rings - Rg	
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Dr. Pepper	
Cash CDN	20.00
Subtotal	11.29
GST	0.56
Payment	11.85
Change Due	8.15

Rounded if Paying Cash $11.85

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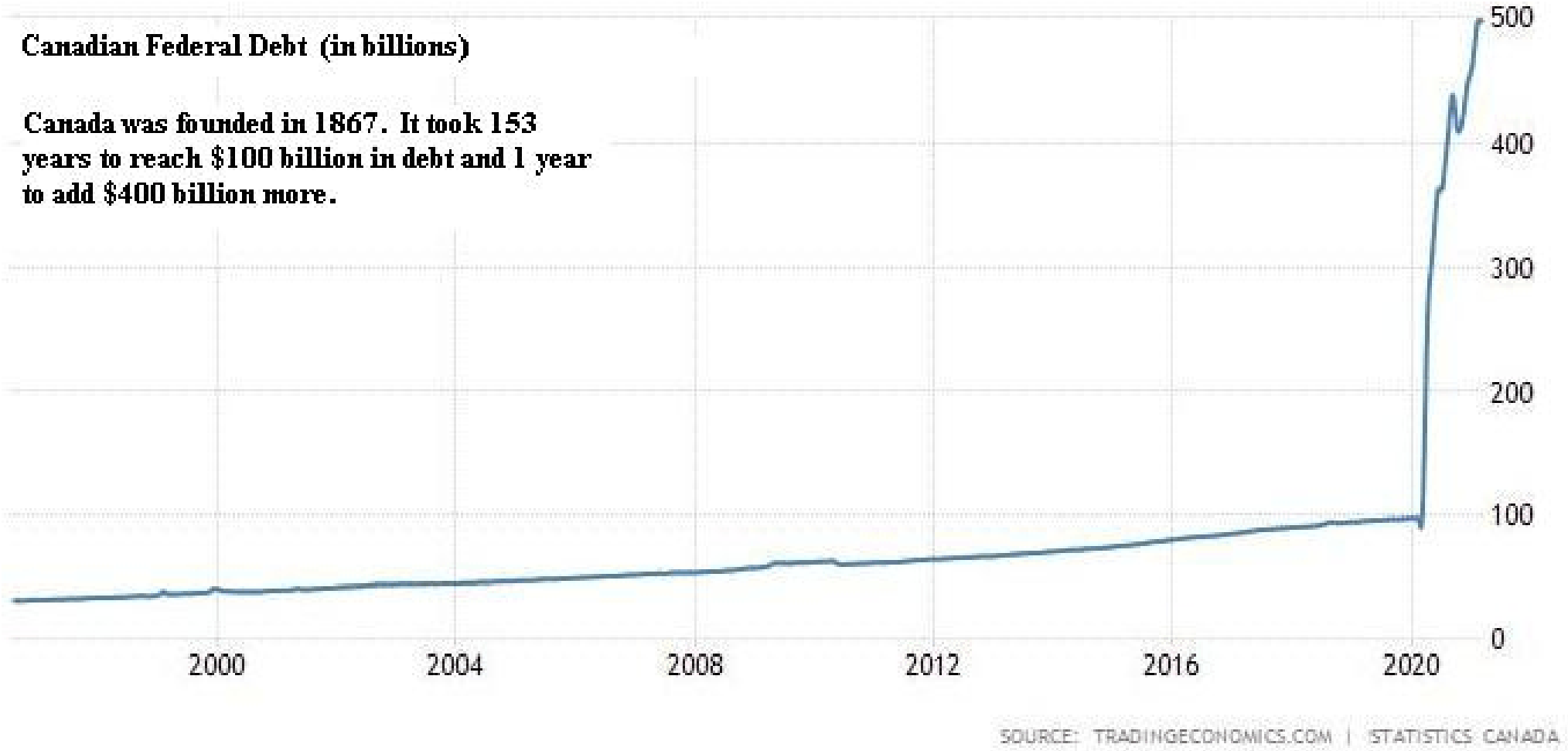
For the first time since the pandemic began, I was able to eat a hamburger in a dine-in restaurant. The receipt showed how times have change.



As of September 2, there were 1,507,087 cases of COVID-19 in Canada, with 26,991 deaths. 53,438,506 vaccinations had been administered. Canada's population is about 38,000,000.

THE CALGARY PHILATELIC SOCIETY

RELEASE OF LIABILITY, WAIVER OF CLAIMS ASSUMPTION OF RISK and INDEMNITY. By signing this document, you waive certain legal rights, including the right to sue. Please read carefully! In consideration of permission, granted now or in the future by The Calgary Philatelic Society ("CPS"), to participate in any in-person meetings, auctions, shows, exhibitions, or any other events held by the CPS during the 2021-2022 membership year, I agree and acknowledge that: 1. I have met all the prerequisites required for participation in any in-person meetings, auctions, shows, exhibitions or any other events and will abide by its rules and regulations. 2. In-person participation has risks and hazards including risks associated with the novel coronavirus, COVID-19 and any Covid variants. As a participant, I may suffer property damage, personal injury, illness, and even death. I freely and voluntarily assume all the risks and hazards of in-person participation, including any legal risks. This means that I am giving up my right to sue The CPS for any reason, including The CPS's negligence, if I suffer any damage, injury, illness, loss, or death by in-person participation. 3. I waive any claim I may have against The CPS arising from my in-person participation however it is caused, and I agree to indemnify and hold harmless The CPS from any and all claims arising from my in-person participation. 4. This RELEASE OF LIABILITY, WAIVER OF CLAIMS INCLUDING CLAIMS ASSOCIATED WITH THE NOVEL CORONAVIRUS AND COVID-19 and any COVID VARIANTS, ASSUMPTION OF RISK and INDEMNITY is binding on myself, my heirs, my executors, administrators, personal representatives and assigns. DATED at Calgary, Alberta this _____ day of _____, 20__

Name of Participant (Please Print) _____

Signature of Participant _____

The Calgary Philatelic Society has resumed live meetings, the first of which was held on August 28. Masks were compulsory, everyone had to sign in for contact tracing, and sign a liability waiver.

The CPS will celebrate its centennial in April 2022. Dr Edward George Mason called together a group of stamp collectors in April 1922 and they agreed to form a club. The CPS has been in continuous existence ever since, and today has about 130 members.

A free pdf of the CPS history, written by yours truly, is available from the club website at: www.calgaryphilatelicsociety.com

Seen In The COVID-19 Literature.

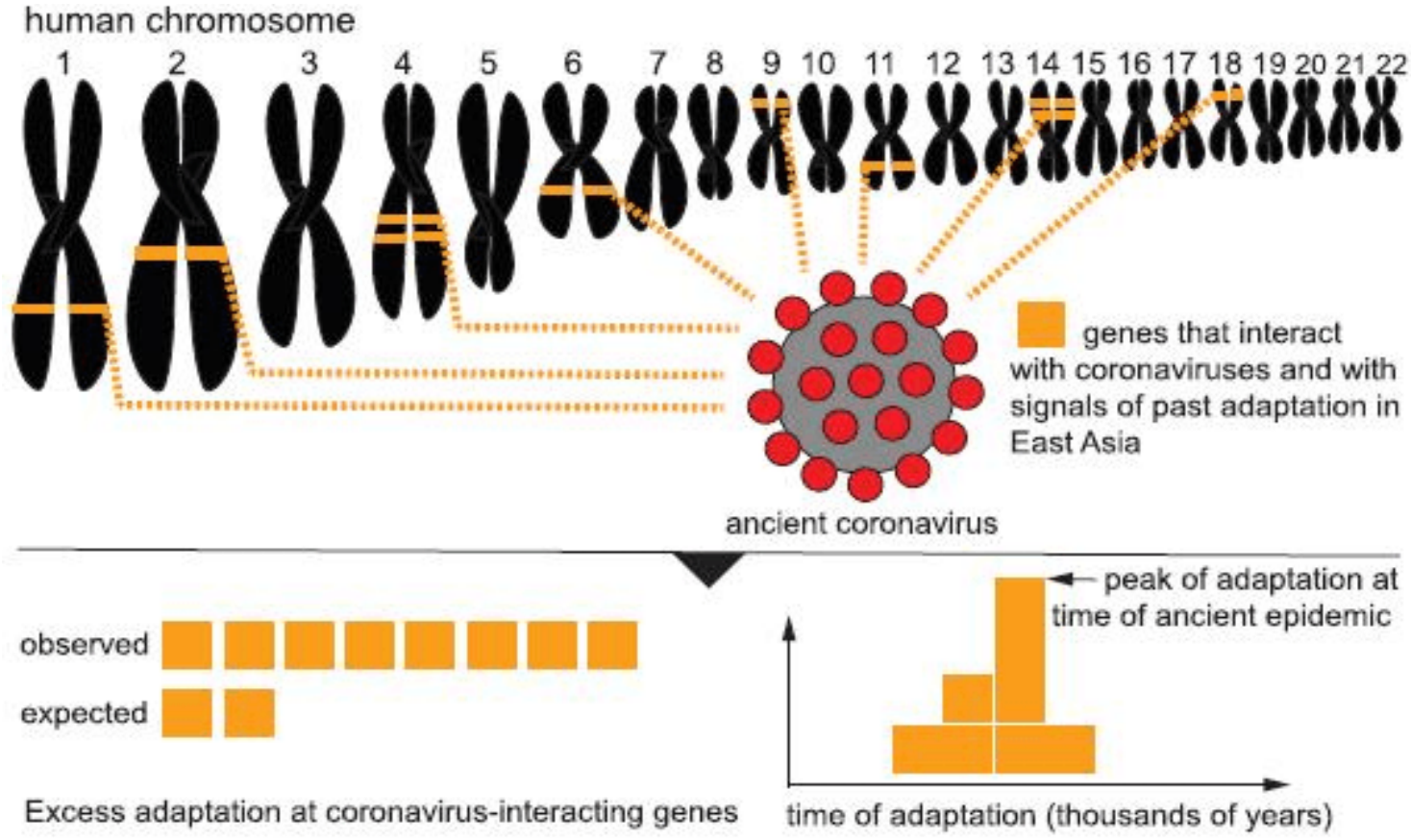
Souilmi, Y., et al (2021) **An ancient viral epidemic involving host coronavirus interacting genes more than 20,000 years ago in East Asia.** CURRENT BIOLOGY 31:doi.org/10.1016/j.cub.2021.05.067 (available as a free pdf)

Authors' abstract: *Here, we apply evolutionary analyses to human genomic datasets to recover selection events involving tens of human genes that interact with coronaviruses, including SARS-CoV-2, that likely started more than 20,000 years ago. These adaptive events were limited to the population ancestral to East Asian populations.*

Multiple lines of functional evidence support an ancient viral selective pressure, and East Asia is the geographical origin of several modern coronavirus epidemics. An arms race with an ancient coronavirus, or with a different virus that happened to use similar interactions as coronaviruses with human hosts, may thus have taken place in ancestral East Asian populations.

Importantly, adaptation to ancient viral epidemics in specific human populations does not necessarily imply any difference in genetic susceptibility between different human populations, and the current evidence points toward an overwhelming impact of socioeconomic factors in the case of coronavirus disease 2019 (COVID-19).

[Image is from this paper.]



Su, F., et al (2021) **Rapid greening response of China's 2020 spring vegetation to COVID-19 restrictions: Implications for climate change.** SCIENCE ADVANCES 7:doi.org/10.1126/sciadv.abe8044 (available as a free pdf)

Authors' abstract: *Lockdowns and travel restrictions to contain COVID-19 resulted in reduced human activity and decreased anthropogenic emissions. However, the secondary effects of these restrictions on the biophysical environment are uncertain. Using remotely sensed big data, we investigated how lockdowns and traffic restrictions affected China's spring vegetation in 2020.*

Our analyses show that travel decreased by 58% in the first 18 days following implementation of the restrictions across China. Subsequently, atmospheric optical clarity increased and radiation levels on the vegetation canopy were augmented. Furthermore, the spring of 2020 arrived 8.4 days earlier and vegetation 17.45% greener compared to 2015-2019.

Reduced human activity resulting from COVID-19 restrictions contributed to a brighter, earlier, and greener 2020 spring season in China. This study shows that short-term changes in human activity can have a relatively rapid ecological impact at the regional scale.

Guerette, J., et al (2021) **The absence of fans removes the home advantage associated with penalties called by National Hockey League referees.** PLOS ONE 16doi.org/10.1371/journal.pone.0256568 (available as a free pdf)

Authors' abstract: *The COVID-19 pandemic has had a major impact on professional sports, notably, forcing the National Hockey League to hold its 2020 playoffs in empty arenas. This provided an unprecedented opportunity to study how crowds may influence penalties awarded by referees in an ecological context.*

Using data from playoff games played during the COVID-19 pandemic and the previous 5 years (n = 547), we estimate the number of penalties called by referees depending on whether or not spectators were present. The results show an interaction between a team's status (home; away) and the presence or absence of crowds.

Posthoc analyses reveal that referees awarded significantly more penalties to the away team compared to the home team when there is a crowd present. However, when there are no spectators, the number of penalties awarded to the away and home teams are not significantly different.

Again, using data from the National Hockey League (n = 1639), but also expanding our sample to include Canadian Hockey League games (n = 1709), we also find that the advantage given to the home team by referees when in front of a crowd fades in the absence of spectators.

These findings provide new evidence suggesting that social pressure does have an impact on referees' decision-making, thus contributing to explain the phenomenon of home advantage in professional ice hockey.

Marani, M., et al (2021) **Intensity and frequency of extreme novel epidemics.** PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES USA 118:doi.org/10.1073/pnas.2105482118

Authors' abstract: *The rate of occurrence of epidemics varies widely in time, but the probability distribution of epidemic intensity assumes a constant form with a slowly decaying algebraic tail, implying that the probability of extreme epidemics decreases slowly with epidemic intensity.*

Together with recent estimates of increasing rates of disease emergence from animal reservoirs associated with environmental change, this finding suggests a high probability of observing pandemics similar to COVID-19 (probability of experiencing it in one's lifetime currently about 38%), which may double in coming decades. A global dataset of historical epidemics from 1600 to present is here compiled and examined using novel statistical methods to estimate the yearly probability of occurrence of extreme epidemics.

The slow decay of probability with epidemic intensity implies that extreme epidemics are relatively likely, a property previously undetected due to short observational records and stationary analysis methods.

Using recent estimates of the rate of increase in disease emergence from zoonotic reservoirs associated with environmental change, we estimate that the yearly probability of occurrence of extreme epidemics can increase up to threefold in the coming decades.

Rivera-Valentin, E.G., et al (2021) **First billion years: Habitability.** ASTROBIOLOGY 21:10.1089/ast.2020.2314 (available as a free pdf)

Authors' extracts: *The First Billion Years (FBY) Habitability conference was the fourth and final installment of the Lunar and Planetary Institute's The FBY series, which summarized building and evolving planets from accretion to habitability. ... The discussion was principally guided by three key questions:*

1. What prebiotic reactions were possible during the period when life emerged on Earth and, conversely, what environmental conditions were needed on early Earth to foster key prebiotic reactions? The geologic record has established that life arose on Earth sometime during its FBY.

2. Did the timing of habitable environments on Earth coincide with the timing of potentially habitable environments on other planetary bodies (e.g., Mars, Venus, Europa), as well as the timing of global-scale processes, such as a Late Heavy Bombardment?

Planetary-scale events in our Solar System may have altered the pathway for the emergence and evolution of life on Earth and elsewhere.

Indeed, environmental conditions on Earth and elsewhere drastically changed during the FBY, which not only impacts the establishment of life but also the potential for biosignature preservation and thus the search for life on other worlds.

3. What are the defining factors that influence the habitability of exoplanets through time and what future technologies are required to identify habitable worlds?

Constraints from the time when life emerged on Earth, the FBY, along with context from our own Solar System allow us to elucidate the conditions needed for planetary habitability beyond our Solar System.

Conversely, the myriad of exoplanet detections provides important context for the evolution of our own Solar System. Indeed, the now numerous exoplanet detections are challenging our notions of the diversity of planets and their potential habitability.

To detect habitable exoplanets, however, we must first understand the conditions and processes under which Earth and other solar system worlds became habitable, and develop the technology required to observe them both by spacecraft missions (within our Solar System) and astronomical observations (beyond).

Since life, as we know it, is now highly evolved, it is conceivable that early metabolism and replication were not based on the same chemical mechanisms as in modern life. The paradigm is akin to an example of technological development.

A modern state-of-the-art television set differs considerably from its historic precursor based on cathode-ray technology. If one is given only a modern light emitting diode television and asked to figure out the origin of television technology without any historical information, the analysis is unlikely to trace the origin of television technology back to cathode ray sets.

Lyons, T.W., et al (2021) **Oxygenation, life, and the planetary system during Earth's middle history: An overview.** ASTROBIOLOGY 21:10.1089/ast.2020.2418 (available as a free pdf)

Authors' abstract: *The long history of life on Earth has unfolded as a cause-and-effect relationship with the evolving amount of oxygen (O_2) in the oceans and atmosphere. Oxygen deficiency characterized our planet's first two billion years, yet evidence for biological O_2 production and local enrichments in the surface ocean appear long before the first accumulations of O_2 in the atmosphere roughly 2.4 to 2.3 billion years ago.*

Some data suggest O_2 was higher but still mostly low for another billion and a half years before increasing again around 800 million years ago, potentially setting a challenging course for complex life during its initial development and ecological expansion. The apparent rise in O_2 around 800 million years ago is coincident with major developments in complex life.

Multiple geochemical and paleontological records point to a major biogeochemical transition at that time, but whether rising and still dynamic biospheric oxygen triggered or merely followed from innovations in eukaryotic ecology, including the emergence of animals, is still debated.

Turner, E.C. (2021) **Possible poriferan body fossils in early Neoproterozoic microbial reefs.** NATURE 596:doi.org/10.1038/s41586-021-03773-z (available as a free pdf)

Author's abstract: *Molecular phylogeny indicates that metazoans (animals) emerged early in the Neoproterozoic era1, but physical evidence is lacking. The search for animal fossils from the Proterozoic eon is hampered by uncertainty about what physical characteristics to expect.*

Sponges are the most basic known animal type. It is possible that body fossils of hitherto-undiscovered Proterozoic metazoans might resemble aspect(s) of Phanerozoic fossil sponges. Vermiform microstructure, a complex petrographic feature in Phanerozoic reef and microbial carbonates, is now known to be the body fossil of nonspicular keratosan demosponges.

This article presents petrographically identical vermiform microstructure from approximately 890-million-year-old reefs. The millimetric-to-centimetric vermiform-microstructured organism lived only on, in and immediately beside reefs built by calcifying cyanobacteria (photosynthesizers), and occupied microniches in which these calcimicrobes could not live.

If vermiform microstructure is in fact the fossilized tissue of keratose sponges, the material described here would represent the oldest body-fossil evidence of animals known to date, and would provide the first physical evidence that animals emerged before the Neoproterozoic oxygenation event and survived through the glacial episodes of the Cryogenian period.

Benthic microbial structures (stromatolites and other microbialites) provide conspicuous evidence of pre-Phanerozoic life, but are difficult to understand because they rarely preserve recognizable evidence of the organisms involved.

Stromatolitologists have struggled for over a century to decipher their microscopic laminae and clots, which are assumed to have been produced or influenced by in vivo and/or post-mortem biogeochemical activity, and to formalize the 'taxonomy' of their morphology and microstructure.

The existence of metazoans by the Ediacaran period (the last period of the Neoproterozoic) is indicated by bilaterian 'body' and trace fossils, and geochemical evidence (biomarkers) provides disputed, indirect evidence for Cryogenian poriferans.

The search for definitive physical evidence of pre-Cryogenian metazoans is confounded by uncertainty about what to look for, but preserved physical evidence should be small, subtle and possibly altogether unfamiliar.

Given that sponges are the most basic of known animals, physical evidence of Neoproterozoic sponges could be sought, but effort focused on the characteristics of mineralized sponge skeletons (siliceous or calcareous spicules) overlooks sponges with only proteinaceous (spongin or keratin) skeletons.

Early metazoan evidence might instead resemble taphonomic (preservational) products of sponge soft tissue rather than mineralized sponge skeletal components.

Although molecular clock data suggest that sponges emerged in the early Neoproterozoic, the oldest undisputed sponge body fossils are from the Cambrian period.

Recent work has shown that vermiform microstructure, an unusual microscopic feature in Phanerozoic reefs and stromatolites that was initially interpreted as being related to algae or protozoans, is instead a keratose sponge body fossil comprising complexly anastomosing cement-filled microtubules enclosed in carbonate microspar.

It is produced taphonomically in nonspicular keratose demosponges through post-mortem calcification of soft tissue to produce carbonate microspar (automicrite), which surrounds the tough spongin fibres of the 'skeleton' of the sponge. Decay of the spongin then produces a network of complexly anastomosing tubular moulds that eventually become passively filled with sparry calcite cement.

Although questioned, the association between vermiform microstructure and sponges has been confirmed in undisputed body fossils of Phanerozoic sponges.

Three-dimensional reconstruction of vermiform microstructure has shown that tubule shape and branching configuration are too consistent and complex to be abiogenic (for example, compacted peloids), do not resemble the branching style of other possible organism types (microbial or fungal) and are identical to the spongin meshworks of keratose sponges.

Strother, P.K., and C. Foster (2021) **A fossil record of land plant origins from charophyte algae.** SCIENCE 373:doi.org/10.1126/science.abj2927

Authors' abstract: *Until now, the first fossil evidence of land plants was from the Devonian era 420 million years ago. However, molecular phylogenetic evidence has suggested an earlier origin in the Cambrian. We describe an assemblage of fossil spores from Ordivician deposits in Australia dating to approximately 480 million years ago.*

These spores are of intermediate morphology between confirmed land plant spores and earlier forms of uncertain relationship. This finding may help to resolve discrepancies between molecular and fossil data for the timing of land plant origins.

Molecular time trees indicating that embryophytes originated around 500 million years ago (Ma) during the Cambrian are at odds with the record of fossil plants, which first appear in the mid-Silurian almost 80 million years later. This time gap has been attributed to a missing fossil plant record, but that attribution belies the case for fossil spores.

Here, we describe a Tremadocian (Early Ordovician, about 480 Ma) assemblage with elements of both Cambrian and younger embryophyte spores that provides a new level of evolutionary continuity between embryophytes and their algal ancestors.

This finding suggests that the molecular phylogenetic signal retains a latent evolutionary history of the acquisition of the embryophytic developmental genome, a history that perhaps began during Ediacaran-Cambrian time but was not completed until the mid-Silurian (about 430 Ma).

Klime, A., et al (2021) **Evolution of herbs: key to the conundrum might be tolerance not avoidance.** JOURNAL OF PLANT ECOLOGY 14:doi.org/10.1093/jpe/rtab042

Authors' abstract: *Woody plants represent the ancestral growth form in angiosperms with herbs evolving repeatedly from them. While there are a number of hypotheses about drivers of the evolution of the herbaceous habit, the ability to avoid frost damage in winter by discarding their aboveground biomass has often been invoked as the main force in their evolution.*

We propose instead that any unpredictable disturbance might have been much more important than the seasonal frost, as herbs easily survive repeated disturbance.

We tested this hypothesis by comparing herbs and woody plants in their ability to deal with three types of simulated disturbances, more predictable winter freezing, less predictable spring freezing and herbivory. Comparison was made in an experimental common garden setup with 20 species differing in woodiness. We evaluated the effects of these disturbances on mortality and regrowth of plants.

Herbs did not have an advantage over woody plants in survival when exposed to winter freezing. In less predictable conditions of spring freezing herbs survived the treatment better than woody plants and this advantage was even larger in case of the simulated herbivory treatment.

The advantage of herbs over woody plants in less predictable conditions suggests that herbaceous growth form might be an adaptation to unpredictable disturbance, which herbs are able to tolerate thanks to their ability to survive loss of aboveground biomass. Consequently, factors such as mammal herbivory or fire might have been the most likely factors in the transition from woody species to herbs.

Qvarnstrom, M., et al (2021) **Exceptionally preserved beetles in a Triassic coprolite of putative dinosauriform origin.** CURRENT BIOLOGY 31:3374-3381 (available as a free pdf)

[Coprolites are fossilized excrements. The Triassic age was 251 to 199.6 megayears ago.]

Authors' abstract: *The Triassic was a crucial period for the early evolution and diversification of insects, including Coleoptera, the most diverse order of organisms on Earth. The study of Triassic beetles, however, relies almost exclusively on flattened fossils with limited character preservation.*

Using synchrotron microtomography, we investigated a fragmentary Upper Triassic coprolite, which contains a rich record of 3D-preserved minute beetle remains of Triamyxa coprolithica gen. et sp. nov. Some specimens are nearly complete, preserving delicate structures of the legs and antennae.

Most of them are congruent morphologically, implying that they are conspecific. Phylogenetic analyses suggest that T. coprolithica is a member of Myxophaga, a small suborder of beetles with a sparse fossil record, and that it represents the only member of the extinct family Triamyxidae fam. nov.

Our findings highlight that coprolites can contain insect remains, which are almost as well preserved as in amber. They are thus an important source of information for exploring insect evolution before the Cretaceous-Neogene ''amber time window.'' Treated as food residues, insect remains preserved in coprolites also have important implications for the paleoecology of insectivores, in this case, likely the dinosauriform Silesaurus opolensis.

Heckert, A.B., et al (2021) **A new short-faced archosauriform from the Upper Triassic *Placerias*/Downs' quarry complex, Arizona, USA, expands the morphological diversity of the Triassic archosauriform radiation.** THE SCIENCE OF NATURE 108:doi.org/10.1007/s00114-021-01733-1 (available as a free pdf)

Authors' abstract: *Birds and crocodylians represent the two surviving lineages of the spectacularly diverse clade Archosauria and its larger group Archosauromorpha, which includes non-avian dinosaurs, pterosaurs, and a variety of other extinct taxa representing a wide range of morphologies that occupied diverse ecological niches.*

Most, if not all, of these lineages have their roots in the Triassic Period, when crown-group Archosauria emerged as part of the larger radiation of archosauromorph reptiles. That clade rose from relative rarity in the Permian Period to dominate the mid- and large-body size (>10 kg) guilds in terrestrial and freshwater aquatic realms by the end of the Triassic

The Placerias/Downs' Quarry complex in eastern Arizona, USA, is the most diverse Upper Triassic vertebrate locality known. We report a new short-faced archosauriform, Syntomiprosopus sucherorum gen. et sp. nov., represented by four incomplete mandibles, that expands that diversity with a morphology unique among Late Triassic archosauriforms.

The Placerias Quarry is Adamanian (Norian, maximum depositional age ~219 Ma), and this specimen appears to be an early example of shortening of the skull, which occurs later in diverse archosaur lineages, including the Late Cretaceous crocodyliform Simosuchus. This is another case where Triassic archosauriforms occupied morphospace converged upon by other archosaurs later in the Mesozoic and further demonstrates that even well-sampled localities can yield new taxa.

Bolet, A., et al (2021) **Unusual morphology in the mid-Cretaceous lizard *Oculudentavis*.** CURRENT BIOLOGY 31:3303-3314 (available as a free pdf)

Authors' abstract: *Oculudentavis khaungraae was described based on a tiny skull trapped in amber. The slender tapering rostrum with retracted narial openings, large eyes, and short vaulted braincase led to its identification as the smallest avian dinosaur on record, comparable to the smallest living hummingbirds.*

Despite its bird-like appearance, Oculudentavis showed several features inconsistent with its original phylogenetic placement. Here, we describe a more complete specimen that demonstrates Oculudentavis is actually a bizarre lizard of uncertain position.

The new specimen is described as a new species within the genus Oculudentavis. The new interpretation and phylogenetic placement highlight a rare case of convergent evolution in skull proportions but apparently not in morphological characters.

Druckenmiller, P.S., et al (2021) **Nesting at extreme polar latitudes by non-avian dinosaurs.** CURRENT BIOLOGY 31:doi.org/10.1016/j.cub.2021.05.041 (available as a free pdf)

Authors' abstract: *The unexpected discovery of non-avian dinosaurs from Arctic and Antarctic settings has generated considerable debate about whether they had the capacity to reproduce at high latitudes, especially the larger bodied, hypothetically migratory taxa. Evidence for dinosaurian polar reproduction remains very rare, particularly for species that lived at the highest paleolatitudes (>75).*

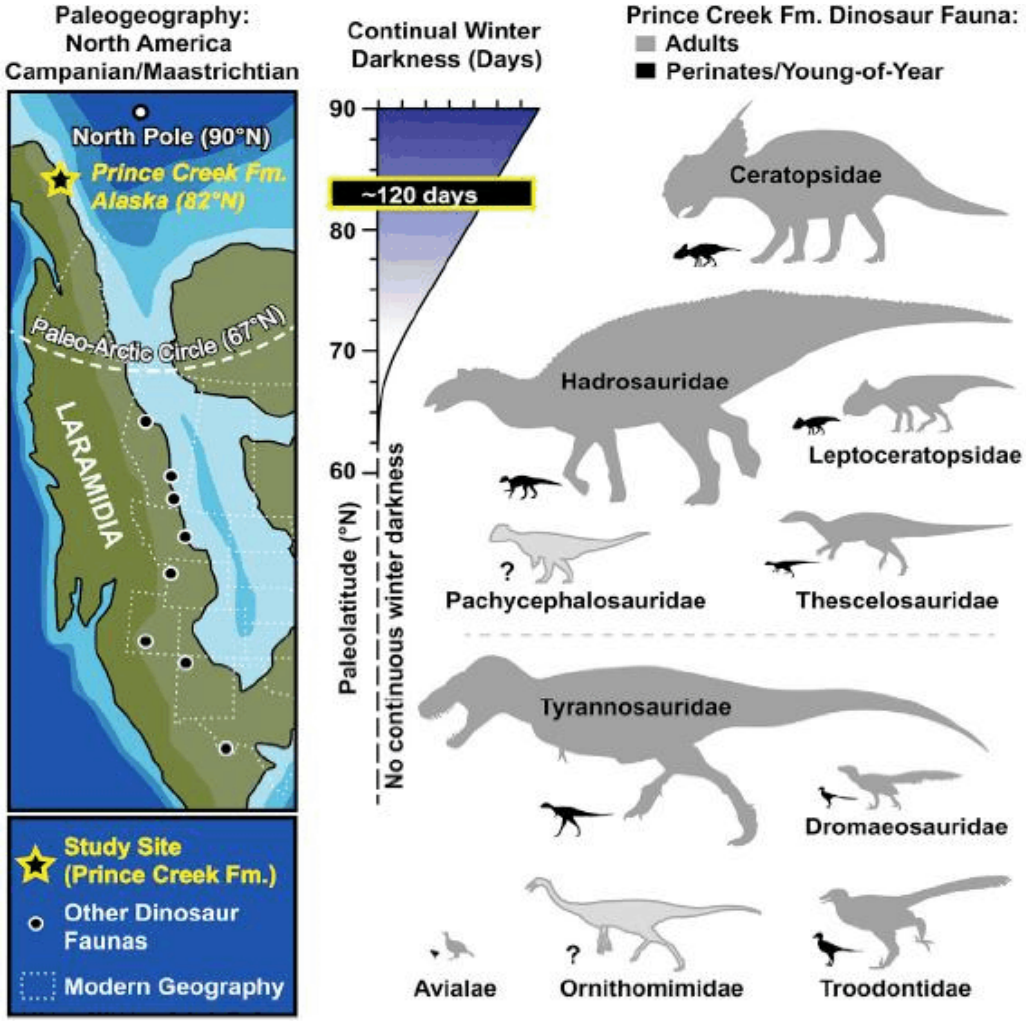
Here we report the discovery of perinatal and very young dinosaurs from the highest known paleolatitude for the clade, the Cretaceous Prince Creek Formation (PCF) of northern Alaska. These data demonstrate Arctic

reproduction in a diverse assemblage of large- and small-bodied ornithischian and theropod species.

In terms of overall diversity, 70% of the known dinosaurian families, as well as avialans (birds), in the PCF are represented by perinatal individuals, the highest percentage for any North American Cretaceous formation.

These findings, coupled with prolonged incubation periods, small neonate sizes, and short reproductive windows suggest most, if not all, PCF dinosaurs were nonmigratory year-round Arctic residents.

Notably, we reconstruct an annual chronology of reproductive events for the ornithischian dinosaurs using refined paleoenvironmental/plant phenology data and new insights into dinosaur incubation periods.



Seasonal resource limitations due to extended periods of winter darkness and freezing temperatures placed severe constraints on dinosaurian reproduction, development, and maintenance, suggesting these taxa showed polar-specific life history strategies, including endothermy.

[Image is from this paper.]

Ke, Y., et al (2021) **A large and unusually thick-shelled turtle egg with embryonic remains from the Upper Cretaceous of China.** PROCEEDINGS OF THE ROYAL SOCIETY OF LONDON 288B:doi.org/10.1098/rspb.2021.1239 (available as a free pdf)

Authors' abstract: *Turtle eggs containing embryos are exceedingly rare in the fossil record. Here, we provide the first description and taxonomic identification, to our knowledge, of a fossilized embryonic turtle preserved in an egg, a fossil recovered from the Upper Cretaceous Xiaguan Formation of Henan Province, China.*

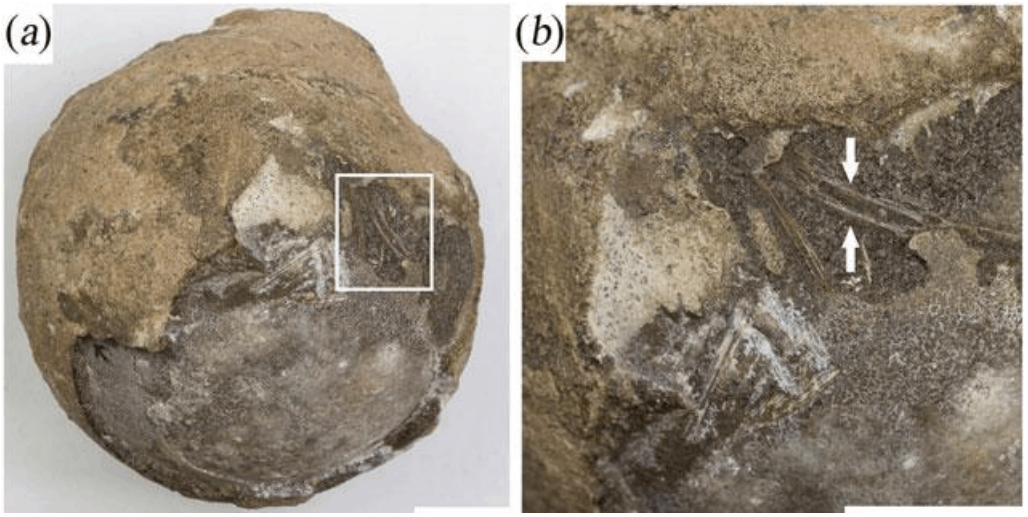
The specimen is attributed to the Nanhsiungchelyidae (Pan-Trionychia), an extinct group of large terrestrial turtles (possibly the species Yuchelys nanyangensis). The egg is rigid, spherical, and is one of the largest and thickest shelled Mesozoic turtle eggs known.

Importantly, this specimen allowed identification of other nanhsiungchelyid egg clutches and comparison to those of Adocidae, as Nanhsiungchelyidae and Adocidae form the basal extinct clade Adocusia of the Pan-Trionychia (includes living soft-shelled turtles).

Despite the differences in habitat adaptations, nanhsiungchelyids (terrestrial) and adocids (aquatic) shared several reproductive traits, including relatively thick eggshells, medium size clutches and relatively large eggs, which may be primitive for trionychoids (including Adocusia and Carrettochelyidae).

The unusually thick calcareous eggshell of nanhsiungchelyids compared to those of all other turtles (including adocids) may be related to a nesting style adaptation to an extremely harsh environment.

[Image on next page is from this paper.]



Schwarzhans, W., and G. Carnevale (2021) **The rise to dominance of lanternfishes (Teleostei: Myctophidae) in the oceanic ecosystems: a paleontological perspective.** PALEOBIOLOGY 47:doi.org/10.1017/pab.2021.2 (available as a free pdf)

Authors' abstract: *Lanternfishes (Myctophidae) are one of the dominant group of fishes in the mesopelagic zone of the oceans, together with the bristlemouths (Gonostomatidae) of the genus Cyclothone. Due to their abundance, myctophids constitute amajor part of the oceanic biomass and to a large extent are responsible for the deep scattering sonar layers in the oceans.*

Lanternfishes currently represent one of the dominant groups of mesopelagic fishes in terms of abundance, biomass, and diversity. Their otolith record dominates pelagic sediments below 200 metres in dredges, especially during the entire Neogene. Here we provide an analysis of their diversity and rise to dominance primarily based on their otolith record.

The earliest unambiguous fossil myctophids are known based on otoliths from the late Paleocene and early Eocene. During their early evolutionary history, myctophids were likely not adapted to a high oceanic lifestyle but occurred over shelf and upper-slope regions, where they were locally abundant during the middle Eocene. A distinct upscaling in otolith size is observed in the early Oligocene, which also marks their earliest occurrence in bathyal sediments.

We interpret this transition to be related to the change from a halothermal deep-ocean circulation to a thermohaline regime and the associated cooling of the deep ocean and rearrangement of nutrient and silica supply.

The early Oligocene myctophid size acme shows a remarkable congruence with diatom abundance, the main food resource for the zooplankton and thus for myctophids and whales. The warmer late Oligocene to early middle Miocene period was characterized by an increase in disparity of myctophids but with a reduction in their otolith sizes.

A second and persisting secular pulse in myctophid diversity (particularly within the genus Diaphus) and increase in size begins with the "biogenic bloom" in the late Miocene, paralleled with diatom abundance and mysticete gigantism.

Mahé, K., et al (2021) **New scale analyses reveal centenarian African coelacanths.** CURRENT BIOLOGY 31:doi.org/10.1016/j.cub.2021.05.054

Authors' abstract: *A new aging method using scales reveals coelacanths may live a centenarian life. We revise coelacanth's life history based on 27 specimens sampled across 80 years. For its size, its growth is among the slowest of marine fish with deep-sea sharks. Its life history is among the slowest of marine fish with sharks and roughies.*

The extant coelacanth was discovered in 1938; its biology and ecology remain poorly known due to the low number of specimens collected. Only two previous studies have attempted to determine its age and growth. They suggested a maximum lifespan of 20 years, placing the coelacanth among the fastest growing marine fish.

These findings are at odds with the coelacanth's other known biological features including low oxygen-extraction capacity, slow metabolism, ovoviviparity, and low fecundity, typical of fish with slow life histories and slow growth. In this study, we use polarized light microscopy to study growth on scales based on a large sample of 27 specimens.

Our results demonstrate for the first time nearly imperceptible annual calcified structures (circuli) on the scales and show that maximal age of the coelacanth was underestimated by a factor of 5. Our validation method suggests that

circuli are indeed annual, thus supporting that the coelacanth is among the longest-living fish species, its lifespan being probably around 100 years.

Like deep-sea sharks with a reduced metabolism, the coelacanth has among the slowest growth for its size. Further reappraisals of age at first sexual maturity (in the range 40 to 69 years old) and gestation duration (of around 5 years) show that the living coelacanth has one of the slowest life histories of all marine fish and possibly the longest gestation.

As long-lived species with slow life histories are extremely vulnerable to natural and anthropogenic perturbations, our results suggest that coelacanths may be more threatened than previously considered.

Wooller, M.J., et al (2021) **Lifetime mobility of an Arctic woolly mammoth.** SCIENCE 373:doi.org/10.1126/science.abg1134

Authors' abstract: *We examined isotopes collected from the tusk of a 17,000-year-old mammoth to elucidate its movements from birth to death. This included its time, likely with a herd, as an infant and juvenile, then as a prime-age adult, and then as a declining senior over its approximately 28-year life span.*

Little is known about woolly mammoth (Mammuthus primigenius) mobility and range. Here we use high temporal resolution sequential analyses of strontium isotope ratios along an entire 1.7-meter-long tusk to reconstruct the movements of an Arctic woolly mammoth that lived 17,100 years ago, during the last ice age.

We use an isotope-guided random walk approach to compare the tusk's strontium and oxygen isotope profiles to isotopic maps. Our modeling reveals patterns of movement across a geographically extensive range during the animal's ~28-year life span that varied with life stages.

Maintenance of this level of mobility by megafaunal species such as mammoth would have been increasingly difficult as the ice age ended and the environment changed at high latitudes.

Hamilton, R., et al (2021) **Non-uniform tropical forest responses to the 'Columbian Exchange' in the Neotropics and Asia-Pacific.** NATURE ECOLOGY AND EVOLUTION 5:1174-1184 (available as a free pdf)

Authors' abstract: *It has been suggested that Iberian arrival in the Americas in 1492 and subsequent dramatic depopulation led to forest regrowth that had global impacts on atmospheric CO_2 concentrations and surface temperatures.*

Despite tropical forests representing the most important terrestrial carbon stock globally, systematic examination of historical afforestation in these habitats in the Neotropics is lacking. Additionally, there has been no assessment of similar depopulation-afforestation dynamics in other parts of the global tropics that were incorporated into the Spanish Empire.

Here, we compile and semi-quantitatively analyse pollen records from the regions claimed by the Spanish in the Atlantic and Pacific to provide pan-tropical insights into European colonial impacts on forest dynamics.

Our results suggest that periods of afforestation over the past millennium varied across space and time and depended on social, economic and biogeographic contexts.

We argue that this reveals the unequal and divergent origins of the Anthropocene as a socio-political and biophysical process, highlighting the need for higher-resolution, targeted analyses to fully elucidate pre-colonial and colonial era human-tropical landscape interactions.

Speirs: The Amazon is not natural and never has been since the earliest humans arrived millennia ago. They cut down the forests for agricultural land. After the Europeans arrived, the genocide caused the land to be abandoned and forests to reappear. Now the cycle is turning again as land is once more cleared for agriculture.

Vesely, P., et al (2021) **Predation by avian predators may have initiated the evolution of myrmecomorph spiders.** SCIENTIFIC REPORTS 11:doi.org/10.1038/s41598-021-96737-2 (available as a free pdf)

Authors' abstract: *Myrmecomorphy is a specific type of visual mimicry residing in the visual resemblance of an animal to an ant. Spiders are common*

myrmecomorphs, with myrmecomorph species occurring in 13 families with most species in the family Salticidae.

The resemblance to the ant model may vary in perfection. There are some stunning examples of perfect resemblance, especially within a predominately tropical genus of salticid spiders, Myrmarachne.

These spiders co-occur with ants, they build their nest close to the ant nests and encounter them daily. Aggressive interactions between them are rare, as Myrmarachne spiders usually prey on small invertebrates and their eggs and they adopt a behaviour resembling the interspecific communication of ants to avoid being attacked by them.

Within the genus, the spiders display a variability in the level of similarity to their ant models, with e.g., Myrmarachne bakeri being seen as an imperfect mimic. Even spiders with significantly lower levels of myrmecomorphy than M. bakeri are called myrmecomorphs.

Their body and leg shapes differ from ants, but they may be confused with ants according to colouration and means of locomotion. Phrurolithus festivus may be a good example. Similarly as in the genus Myrmarachne, it commonly forages within ant swarms and usually preys on small invertebrates flushed out by foraging ants.

Myrmecomorphy is a strategy utilized by a variety of species, among which spiders are the most common. It is supposed that myrmecomorphy tends to be selected by predator avoidance of preying on ants rather than by blind ant workers. To date, this hypothesis has been tested mainly on invertebrate predators (mantises and spiders).

We are the first to test whether an imperfect myrmecomorph spider (Phrurolithus festivus) gains protection against avian predators (wild adult great tits, Parus major) through its appearance. In a set of preferential trials, we showed that the ant model and the myrmecomorph spider are equally well protected against attack, though the attacked myrmecomorphs are usually eaten.

This suggests that the mimicry of the myrmecomorph spiders is effective against avian predators and works in a Batesian manner. In this study, we have provided evidence toward the evolution of myrmecomorphy in response to selective pressure elicited by visually-oriented predators like birds.

Foster, B.J., et al (2021) **Anthropogenic evolution in an insect wing polymorphism following widespread deforestation**. BIOLOGY LETTERS 17:doi.org/10.1098/rsbl.2021.0069

Authors' abstract: A*nthropogenic environmental change can underpin major shifts in natural selective regimes, and can thus alter the evolutionary trajectories of wild populations. However, little is known about the evolutionary impacts of deforestation, one of the most pervasive human-driven changes to terrestrial ecosystems globally. Absence of forest cover (i.e. exposure) has been suggested to play a role in selecting for insect flightlessness in montane ecosystems.*

Here, we capitalize on human-driven variation in alpine treeline elevation in New Zealand to test whether anthropogenic deforestation has caused shifts in the distributions of flight-capable and flightless phenotypes in a wing-polymorphic lineage of stoneflies from the Zelandoperla fenestrata species complex.

Transect sampling revealed sharp transitions from flight-capable to flightless populations with increasing elevation. However, these phenotypic transitions were consistently delineated by the elevation of local treelines, rather than by absolute elevation, providing a novel example of human-driven evolution in response to recent deforestation.

The inferred rapid shifts to flightlessness in newly deforested regions have implications for the evolution and conservation of invertebrate biodiversity.

Smith, M.L., et al (2021) **Imperfect comb construction reveals the architectural abilities of honeybees.** PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES USA 118:doi.org/10.1073/pnas.2103605118

Authors' abstract: *Honeybees are renowned for constructing perfect hexagonal lattices, but this paper showcases them as similarly skilled architects when fitting perfect lattices is impossible. Using automated image analysis, we quantified building challenges that bees face during natural construction and the methods they use to solve them.*

We found that workers preemptively change their building behavior in constrained geometries to make space for larger hexagonal cells, that irregular

cell shapes come in regular combinations, and that bees change both tilt, size, and number of walls to meet different building challenges.

Using automated image analysis to extract the irregularities in natural comb building, we show that some building configurations are more difficult for the bees than others, and that workers overcome these challenges using a combination of building techniques, such as: intermediate-sized cells, regular motifs of irregular shapes, and gradual modifications of cell tilt.

Remarkably, by anticipating these building challenges, workers achieve high-quality merges using limited local sensing, on par with analytical models that require global optimization. Unlike automatons building perfectly replicated hexagons, these building irregularities showcase the active role that workers take in shaping their nest and the true architectural abilities of honeybees.

Matsushima, N., et al (2021) **Assessing the impact of large-scale farmland abandonment on the habitat distributions of frog species after the Fukushima nuclear accident.** OECOLOGIA 196:1219-1232

Authors' abstract: *Rice paddies function as wetlands; therefore, abandoned paddy fields cause a loss of habitats for aquatic species, such as amphibians. Following the accident at the Fukushima Daiichi Nuclear Power Plant in 2011, paddy fields around the plant were abandoned and rapidly dried.*

To identify the impact of large-scale abandonment of paddy fields on the habitats of frogs, we investigated changes in the distributions of four frogs that breed in paddy fields using niche modeling and field surveys. The spatial distributions of suitable habitats before and after the accident for each frog were created using MaxEnt.

In the area where rice cropping was restricted due to radioactive contamination, the areas of suitable habitats decreased for Pelophylax porosus porosus but increased or remained unchanged for other frogs after the accident.

Additionally, field surveys conducted in 2014 indicated that the ratios of breeding sites in the area where rice cropping was restricted were significantly lower for P. p. porosus and Hyla japonica than outside this area. Thus, 3 years after the accident, one species strongly dependent upon paddy fields rapidly disappeared over a large area.

Although amphibian populations or monitoring data were not available to examine changes directly after the accident in the study area, this research showed that the combination of niche modeling and field survey was effective for predicting species response after an accident and revealed that large-scale disasters sufficient to disrupt agricultural activity could markedly change the distribution of species reliant on habitats created by human activity.

Lynch, T.P., et al (2021) M**istaken identity may explain why male sea snakes (A*ipysurus laevis*, Elapidae, Hydrophiinae) "attack" scuba divers.** SCIENTIFIC REPORTS 11:/doi.org/10.1038/s41598-021-94728-x (available as a free pdf)

Authors' abstract: *Scuba-divers on tropical coral-reefs often report unprovoked "attacks" by highly venomous Olive sea snakes (Aipysurus laevis). Snakes swim directly towards divers, sometimes wrapping coils around the diver's limbs and biting.*

Based on a focal animal observation study of free-ranging Olive sea snakes in the southern Great Barrier Reef, we suggest that these "attacks" are misdirected courtship responses. Approaches to divers were most common during the breeding season (winter) and were by males rather than by female snakes. Males also made repeated approaches, spent more time with the diver, and exhibited behaviours (such as coiling around a limb) also seen during courtship.

Agitated rapid approaches by males, easily interpreted as "attacks", often occurred after a courting male lost contact with a female he was pursuing, after interactions between rival males, or when a diver tried to flee from a male. These patterns suggest that "attacks" by sea snakes on humans result from mistaken identity during sexual interactions. Rapid approaches by females occurred when they were being chased by males.

Divers that flee from snakes may inadvertently mimic the responses of female snakes to courtship, encouraging males to give chase. To prevent escalation of encounters, divers should keep still and avoid retaliation.

Potvin, D.A., et al (2021) **Use of anthropogenic-related nest material and nest parasite prevalence have increased over the past two centuries in Australian birds.** OECOLOGIA 196:1207-1217

Authors' abstract: *Global plastic production has increased exponentially since the 1940s, resulting in the increased presence of anthropogenic debris in the environment. Recent studies have shown that birds incorporate anthropogenic debris into their nests, which can reduce nest ectoparasite loads. However, we know little about the long-term history of interactions among birds, anthropogenic debris, and ectoparasites.*

Our study took a unique approach to address this issue by determining the prevalence of anthropogenic debris and ectoparasitic nest flies (Protocalliphora and Passeromyia spp.) in 893 bird nests from 224 species between 1832 and 2018, which were sourced from Australian museum collections.

The prevalence of anthropogenic material increased from approximately 4% in 1832 to almost 30% in 2018. This change was driven by an increase in the incorporation of synthetic rather than biodegradable anthropogenic debris (by 2018 ~ 25% of all nests contained synthetics), with the first synthetic item being found in a nest from 1956 in the city of Melbourne.

Nest parasite prevalence increased over time but contrary to other studies, there was no relationship between habitat type or anthropogenic material and parasite presence. Our study is the first to use museum specimens to quantify temporal and spatial impacts of anthropogenic material on birds, the results of which justifies contemporary concerns regarding the ubiquitous nature of human impacts on terrestrial wildlife.

Southern, L.M., et al (2021) **Lethal coalitionary attacks of chimpanzees (*Pan troglodytes troglodytes*) on gorillas (*Gorilla gorilla gorilla*) in the wild.** SCIENTIFIC REPORTS 11:doi.org/10.1038/s41598-021-93829-x (available as a free pdf)

Authors' abstract: *Intraspecies violence, including lethal interactions, is a relatively common phenomenon in mammals. Contrarily, interspecies violence has mainly been investigated in the context of predation and received most research attention in carnivores.*

Here, we provide the first information of two lethal coalitionary attacks of chimpanzees (Pan troglodytes troglodytes) on another hominid species, western lowland gorillas (Gorilla gorilla gorilla), that occur sympatrically in the Loango National Park in Gabon.

In both events, the chimpanzees significantly outnumbered the gorillas and victims were infant gorillas. We discuss these observations in light of the two most widely accepted theoretical explanations for interspecific lethal violence, predation and competition, and combinations of the two-intraguild predation and interspecific killing.

Given these events meet conditions proposed to trigger coalitional killing of neighbours in chimpanzees, we also discuss them in light of chimpanzees' intraspecific interactions and territorial nature.

Concerning our closest living relatives, the great apes, intraspecific killing has frequently been reported across multiple chimpanzee (Pan troglodytes) communities and gorilla (Gorilla gorilla) groups.

However, it is nearly absent in bonobos (Pan paniscus) and orangutans (Pongo ssp.). Rates of intraspecific killings vary considerably among chimpanzee communities, with adult males being both the main attackers and the main victims.

The majority of killings involve intercommunity rather than intracommunity attacks, and most often are made by coalitions of males during territorial boundary patrols. During these patrols, chimpanzees travel to the periphery of the territory to search for signs of members of other communities or may even make deep incursions into neighbouring communities involving lethal coalitionary attacks.

The latter has been associated with fission-fusion social systems and has spurred considerable research attention, suggesting functional parallels and evolutionary continuities between chimpanzee violence and lethal intergroup raiding in humans.

In contrast, intraspecific killings in gorillas have almost exclusively been observed in intergroup encounters. Gorillas (genus Gorilla) are as genetically distant from chimpanzees (genus Pan) as they are from humans (genus Homo), and are thought to have separated from a shared ancestor around eight million

years ago. Across their geographic range, gorillas live in cohesive social groups consisting of one or more adult males, adult females, and their offspring.

Unlike chimpanzees, the home ranges of neighbouring gorilla groups overlap greatly, but intergroup encounters also range from non-agonistic affiliative encounters to coalitionary agonistic interactions involving physical violence, infanticide, and occasionally even fatal injuries to adult males.

Lin, Q., et al (2021) **A new carnivorous plant lineage (*Triantha*) with a unique sticky-inflorescence trap.** PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES USA 118:doi.org/10.1073/pnas.2022724118

Authors' abstract: *Since Darwin's ground-breaking monograph on carnivorous plants, scientists have recognized only 11 independent origins of plant carnivory. We report the discovery of a new lineage of carnivorous plants, represented by the North American flowering plant Triantha occidentalis.*

Among monocots, Triantha represents the only instance of a sticky-trap mechanism and a clearly documented case of holocarnivory, marked by enzymatic secretion consistent with prey digestion. Its trap is unique among carnivorous plants and, unexpected based on theory, in placing all of its prey-capture sites next to its insect-pollinated flowers.

Given the existence of Triantha in close proximity to major urban centers on the Pacific coast, our study serves as a vivid reminder that other cryptic carnivores may yet remain to be discovered.

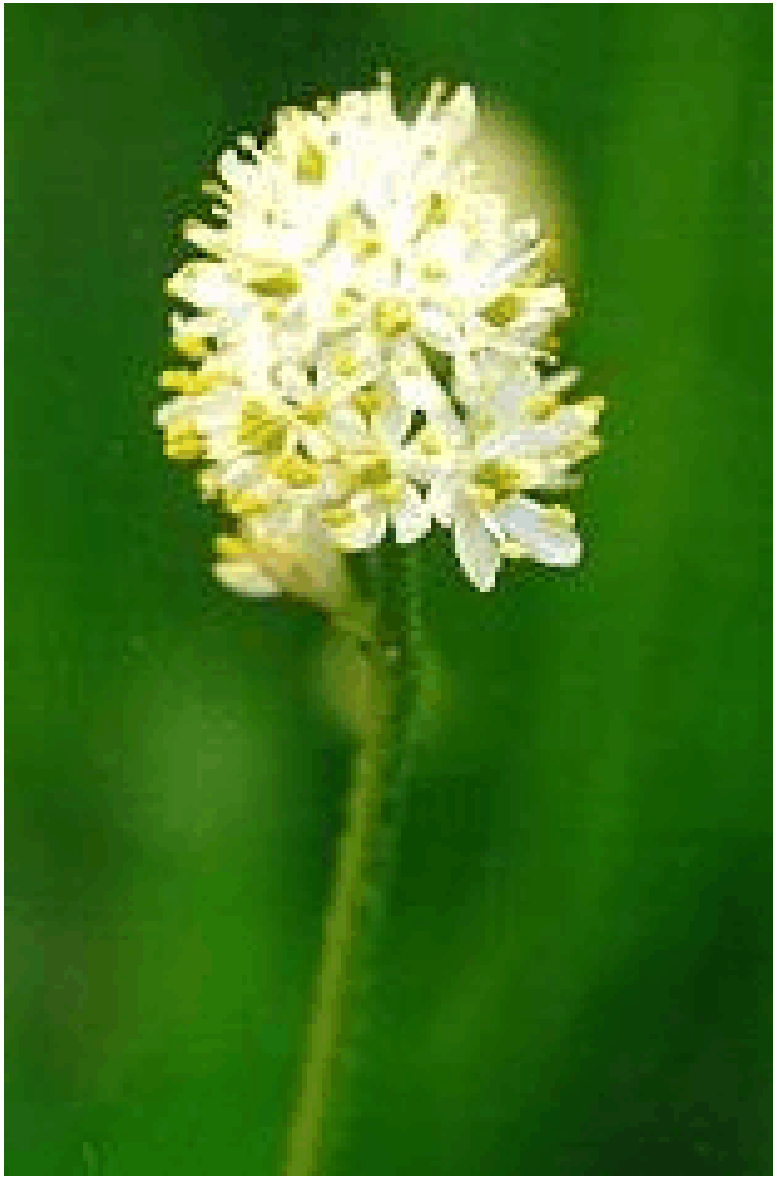
Carnivorous plants consume animals for mineral nutrients that enhance growth and reproduction in nutrient-poor environments. Here, we report that Triantha occidentalis (Tofieldiaceae) represents a previously overlooked carnivorous lineage that captures insects on sticky inflorescences.

Field experiments, isotopic data, and mixing models demonstrate significant nitrogen transfer from prey to Triantha, with an estimated 64% of leaf N obtained from prey capture in previous years, comparable to levels inferred for the cooccurring round-leaved sundew, a recognized carnivore.

N obtained via carnivory is exported from the inflorescence and developing fruits and may ultimately be transferred to next year's leaves. Glandular hairs on flowering stems secrete phosphatase, as seen in all carnivorous plants that directly digest prey.

Triantha is unique among carnivorous plants in capturing prey solely with sticky traps adjacent to its flowers, contrary to theory. However, its glandular hairs capture only small insects, unlike the large bees and butterflies that act as pollinators, which may minimize the conflict between carnivory and pollination.

[Image of *Triantha occidentalis* is from Wikipedia.]



Tripodi, P., et al (2021) **Global range expansion history of pepper (*Capsicum* spp.) revealed by over 10,000 genebank accessions.** PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES 118:doi.org/10.1073/pnas.2104315118 (available as a free pdf)

Authors' abstract: *The Capsicum gene pool comprises domesticated and wild species with highly variable morphology and flavor and characterized by variable levels of pungency due to the presence of capsaicinoids that made peppers a staple cultural component in cuisines across the globe.*

This broad diversity is due to evolutionary and domestication processes that occurred in the centers of origin located in Mesoamerica and the Andes and to subsequent selective pressures associated with cultivation in tropical and temperate environments across all major equatorial continents, leading to the domestication of five Capsicum species (Capsicum annuum L., Capsicum frutescens L., Capsicum chinense Jacq., Capsicum baccatum L., and Capsicum pubescens Ruiz and Pav.), of which C. annuum is globally the most cultivated.

Historical records suggest that pepper was brought by Columbus from the New World to Europe and was thenceforth traded along most major maritime and overland trade routes.

This study provides a deep population genomic analysis of 10,000 Capsicum accessions held in genebanks and representing a frame of the global diversity of the genus.

By combining single nucleotide polymorphisms (SNPs) based data and passport information, we investigated the genomic diversity and population structure of wild and domesticated peppers, tracing back to routes of evolution and providing a model of Capsicum annuum distribution, which reflects human trade and historical/cultural influences.

Our results highlight west-east routes of expansion, shedding light on the links between South and Mesoamerica, Africa, and East/South Asia, the latter two constituting important diversification centers of pepper diversity.

Genebanks collect and preserve vast collections of plants and detailed passport information, with the aim of preserving genetic diversity for conservation and breeding.

Genetic characterization of such collections has the potential to elucidate the genetic histories of important crops, use marker-trait associations to identify loci controlling traits of interest, search for loci undergoing selection, and contribute to genebank management by identifying taxonomic misassignments and duplicates.

We conducted a genomic scan with genotyping by sequencing (GBS) derived single nucleotide polymorphisms (SNPs) of 10,038 pepper (Capsicum spp.) accessions from worldwide genebanks and investigated the recent history of this iconic staple.

Genomic data detected up to 1,618 duplicate accessions within and between genebanks and showed that taxonomic ambiguity and misclassification often involve interspecific hybrids that are difficult to classify morphologically.

We deeply interrogated the genetic diversity of the commonly consumed Capsicum annuum to investigate its history, finding that the kinds of peppers collected in broad regions across the globe overlap considerably.

The results reflect a vision of pepper as a highly desirable and tradable cultural commodity, spreading rapidly throughout the globe along major maritime and terrestrial trade routes.

Marker associations and possible selective sweeps affecting traits such as pungency were observed, and these traits were shown to be distributed nonuniformly across the globe, suggesting that human preferences exerted a primary influence over domesticated pepper genetic structure.

MacDonald, K., et al (2021) **Middle Pleistocene fire use: The first signal of widespread cultural diffusion in human evolution.** PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES USA 118:doi.org/10.1073/pnas.2101108118 (available as a free pdf)

Authors' abstract: *Control of fire is one of the most important technological innovations within the evolution of humankind. The archaeological signal of fire use becomes very visible from around 400,000 years ago onward. Interestingly, this occurs at a geologically similar time over major parts of the Old World, in Africa, as well as in western Eurasia, and in different subpopulations of the wider hominin metapopulation.*

We interpret this spatiotemporal pattern as the result of cultural diffusion, and as representing the earliest clear-cut case of widespread cultural change resulting from diffusion in human evolution. This fire-use pattern is followed slightly later by a similar spatiotemporal distribution of Levallois technology, at the beginning of the African Middle Stone Age and the western Eurasian Middle Paleolithic.

These archaeological data, as well as studies of ancient genomes, lead us to hypothesize that at the latest by 400,000 years ago, hominin subpopulations encountered one another often enough and were sufficiently tolerant toward one another to transmit ideas and techniques over large regions within relatively short time periods.

Furthermore, it is likely that the large-scale social networks necessary to transmit complicated skills were also in place. Most importantly, this suggests a form of cultural behavior significantly more similar to that of extant Homo sapiens than to our great ape relatives.

Gelabert, P., et al (2021) **Genome-scale sequencing and analysis of human, wolf, and bison DNA from 25,000-year-old sediment.** CURRENT BIOLOGY 31:doi.org/10.1016/j.cub.2021.06.023 (available as a free pdf)

Authors' abstract: *Cave sediments have been shown to preserve ancient DNA but so far have not yielded the genome-scale information of skeletal remains. We retrieved and analyzed human and mammalian nuclear and mitochondrial environmental ''shotgun'' genomes from a single 25,000-year-old Upper Paleolithic sediment sample from Satsurblia cave, western Georgia.*

First, a human environmental genome with substantial basal Eurasian ancestry, which was an ancestral component of the majority of post-Ice Age people in the Near East, North Africa, and parts of Europe;

second, a wolf environmental genome that is basal to extant Eurasian wolves and dogs and represents a previously unknown, likely extinct, Caucasian lineage;

and third, a European bison environmental genome that is basal to present-day populations, suggesting that population structure has been substantially reshaped since the Last Glacial Maximum.

Marti, A.P., et al (2021) **The symbolic role of the underground world among Middle Paleolithic Neanderthals.** PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES USA 118:doi.org/10.1073/pnas.2021495118

Authors' abstract: *The emergence of symbolic behavior in our genus is a controversial issue. The dating of paintings in three caves from the Iberian Peninsula supports the view that Neanderthals developed a form of cave art more than 20,000 years before the emergence of anatomical modernity in Europe.*

In this study, we confirm that the paintings on a large speleothem from one of these sites, Cueva de Ardales, were human made, and we show that the pigments do not come from the outcrops of colorant material known inside the cave. Variations in the composition of the paint correspond to differences in the age of the paintings, supporting the hypothesis that Neanderthals used the speleothems symbolically over an extended time span.

Cueva de Ardales in Málaga, Spain, is one of the richest and best-preserved Paleolithic painted caves of southwestern Europe, containing over a thousand graphic representations. Here, we study the red pigment in panel II.A.3 of "Sala de las Estrellas," dated by U-Th to the Middle Paleolithic, to determine its composition, verify its anthropogenic nature, infer the associated behaviors, and discuss their implications.

Using optical microscopy, scanning electron microscopy coupled with energy dispersive X-ray spectroscopy, micro-Raman spectroscopy, and X-ray diffraction, we analyzed a set of samples from the panel and compared them to natural coloring materials collected from the floor and walls of the cave.

The conspicuously different texture and composition of the geological samples indicates that the pigments used in the paintings do not come from the outcrops of colorant material known in the cave. We confirm that the paintings are not the result of natural processes and show that the composition of the paint is consistent with the artistic activity being recurrent.

Our results strengthen the hypothesis that Neanderthals symbolically used these paintings and the large stalagmitic dome harboring them over an extended time span.

Soncin, S., et al (2021) **High-resolution dietary reconstruction of victims of the 79 CE Vesuvius eruption at Herculaneum by compound-specific isotope analysis.** SCIENCE ADVANCES 7:doi.org/10.1126/sciadv.abg5791 (available as a free pdf)

Authors' abstract and extracts: *The remains of those who perished at Herculaneum in 79 CE offer a unique opportunity to examine lifeways across an ancient community who lived and died together. Historical sources often allude to differential access to foodstuffs across Roman society but provide no direct or quantitative information.*

By determining the stable isotope values of amino acids from bone collagen and deploying Bayesian models that incorporate knowledge of protein synthesis, we were able to reconstruct the diets of 17 adults from Herculaneum with unprecedented resolution.

Significant differences in the proportions of marine and terrestrial foods consumed were observed between males and females, implying that access to food was differentiated according to gender.

The approach also provided dietary data of sufficient precision for comparison with assessments of food supply to modern populations, opening up the possibility of benchmarking ancient diets against contemporary settings where the consequences for health are better understood.

The estimated marine protein consumption at Herculaneum is notably higher than the relative amounts of marine protein supplied to mid- and late-20th century Mediterranean populations, which are consistently below 10%.

Males were more likely to be directly engaged in fishing and maritime activities. They generally occupied more privileged positions in society and were freed from slavery at an earlier age, providing greater access to expensive commodities, such as fresh fish.

However, here, we were able to quantify the gender gap more accurately within the group, with males, on average, obtaining 1.6 times more dietary protein from seafood compared with females. Males also obtained a higher proportion of protein from cereals compared with their female contemporaries, whereas females obtained a greater proportion of protein from terrestrial animal products or locally grown plant foods.

Although these estimates do not reflect the absolute quantities of protein consumed, which also may have varied considerably by gender, such a quantitative approach is likely to be immensely useful for studying nutritional health in ancient societies, especially when used in conjunction with historical sources.

[Image is from this paper.]

Pontzer, H., et al (2021) **Daily energy expenditure through the human life course.** SCIENCE 373:doi.org/10.1126/science.abe5017

Authors' abstract: *Measurements of total and basal energy in a large cohort of subjects at ages spanning from before birth to old age document distinct changes that occur during a human lifetime. We report that energy expenditure (adjusted for weight) in neonates was like that of adults but increased substantially in the first year of life.*

It then gradually declined until young individuals reached adult characteristics, which were maintained from age 20 to 60 years. Older individuals showed reduced energy expenditure. Tissue metabolism thus appears not to be constant but rather to undergo transitions at critical junctures.

Total daily energy expenditure ("total expenditure") reflects daily energy needs and is a critical variable in human health and physiology, but its trajectory over the life course is poorly studied. We analyzed a large, diverse database of total expenditure measured by the doubly labeled water method for males and females aged 8 days to 95 years.

Total expenditure increased with fat-free mass in a power-law manner, with four distinct life stages. Fat-free mass-adjusted expenditure accelerates rapidly in neonates to ~50% above adult values at ~1 year; declines slowly to adult levels by ~20 years; remains stable in adulthood (20 to 60 years), even during pregnancy; then declines in older adults.

Escobar, C., et al (2021) **Chocolate for breakfast prevents circadian desynchrony in experimental models of jet-lag and shift-work.** SCIENTIFIC REPORTS 10:doi.org/10.1038/s41598-020-63227-w 1 (available as a free pdf)

Authors' abstract: *Night-workers, transcontinental travelers and individuals that regularly shift their sleep timing, suffer from circadian desynchrony and are at risk to develop metabolic disease, cancer, and mood disorders, among others.*
Experimental and clinical studies provide evidence that food intake restricted to the normal activity phase is a potent synchronizer for the circadian system and can prevent the detrimental metabolic effects associated with circadian disruption.

As an alternative, we hypothesized that a timed piece of chocolate scheduled to the onset of the activity phase may be sufficient stimulus to synchronize circadian rhythms under conditions of shift-work or jet-lag. In Wistar rats, a daily piece of chocolate coupled to the onset of the active phase (breakfast) accelerated re-entrainment in a jet-lag model by setting the activity of the suprachiasmatic nucleus (SCN) to the new cycle.

Furthermore, in a rat model of shift-work, a piece of chocolate for breakfast prevented circadian desynchrony, by increasing the amplitude of the day-night c-Fos activation in the SCN. Contrasting, chocolate for dinner prevented re-entrainment in the jet-lag condition and favored circadian desynchrony in the shift-work models.

Moreover, chocolate for breakfast resulted in low body weight gain while chocolate for dinner boosted up body weight. Present data evidence the relevance of the timing of a highly caloric and palatable meal for circadian synchrony and metabolic function.

Wang, Y., et al (2021) **Structured fabrics with tunable mechanical properties.** NATURE 596:238-243

Authors' abstract: *Structured fabrics, such as woven sheets or chain mail armours, derive their properties both from the constitutive materials and their geometry. Their design can target desirable characteristics, such as high impact resistance, thermal regulation, or electrical conductivity. Once realized, however, the fabrics' properties are usually fixed.*

Here we demonstrate structured fabrics with tunable bending modulus, consisting of three-dimensional particles arranged into layered chain mails. The chain mails conform to complex shapes, but when pressure is exerted at their boundaries, the particles interlock and the chain mails jam.

We show that, with small external pressure (about 93 kilopascals), the sheets become more than 25 times stiffer than in their relaxed configuration. This dramatic increase in bending resistance arises because the interlocking particles have high tensile resistance, unlike what is found for loose granular media. We use discrete-element simulations to relate the chain mail's micro-structure to macroscale properties and to interpret experimental measurements.

We find that chain mails, consisting of different non-convex granular particles, undergo a jamming phase transition that is described by a characteristic power-law function akin to the behaviour of conventional convex media. Our work provides routes towards lightweight, tunable and adaptive fabrics, with potential applications in wearable exoskeletons, haptic architectures and reconfigurable medical supports.

Speirs: Steampunks and SCAers take notice.

Iannuzzi, G. (2021) **'Qu'il est question d'une langue sauvage': Phrasebooks for European travellers in Eighteenth-Century North America.** HISTORY 106:doi.org/10.1111/1468-229X.13138 (available as a free pdf)

Author's extracts: *Ever since their first contacts with the peoples of North America, the accounts of European travellers included vocabularies, dictionaries, and lists of words and/or phrases of common use as sections within the text, or as appendices. ...*

Through what appeared in them and, above all, through what did not appear, these vocabularies represent the linguistic companion piece to the conceptualisation of the Indigenous Americans as 'primitives'.

As Lahontan and Lawson made quite clear with their remarks, the language of these 'savages', still to be civilised, was interpreted as a reflection of their extraneousness to the arts and sciences, of their inability to think in abstract terms, and of an ability to reason as yet uncultivated.

From this perspective, during the eighteenth century, the vocabularies were simply the continuation of long-lasting, pre-existing stereotypes which led to the temporal collocation of the First Peoples of America in a stage of development located in the past with respect to the European one.

Weber, L. (2021) **Doom and gloom: The future of the world at the end of the Eighteenth Century.** HISTORY 106:409-428 (available as a free pdf)

Author's abstract: *This article challenges the widely held assumption that Thomas Robert Malthus was a lonely pessimist in the late eighteenth century. Interpreting the sources that Malthus had used to write his Essay on the Principle of Population as predictions of the future, the article argues that Malthus inherited a sense of looming doom from his predecessors.*

In the second half of the eighteenth century, David Hume, Adam Smith, Richard Price, and Thomas Paine predicted Britain's ruin through national bankruptcy. Although Malthus, too, expressed anxiety about excessive growth, he changed the parameters by worrying about overpopulation, rather than overspending.

By considering Malthus in the context in which he originally formulated his famous principle of population, this article sheds new light on what he was doing when he first published his Essay in 1798.

Tellman, B., et al (2021) **Satellite imaging reveals increased proportion of population exposed to floods.** NATURE 596:80-86

Authors' abstract: *Flooding affects more people than any other environmental hazard and hinders sustainable development. Investing in flood adaptation strategies may reduce the loss of life and livelihood caused by floods. Where and how floods occur and who is exposed are changing as a result of rapid urbanization, flood mitigation infrastructure and increasing settlements in floodplains.*

Previous estimates of the global flood-exposed population have been limited by a lack of observational data, relying instead on models, which have high uncertainty. Here we use daily satellite imagery at 250-metre resolution to estimate flood extent and population exposure for 913 large flood events from 2000 to 2018.

We determine a total inundation area of 2.23 million square kilometres, with 255 to 290 million people directly affected by floods. We estimate that the total population in locations with satellite-observed inundation grew by 58 to 86 million from 2000 to 2015.

This represents an increase of 20 to 24 per cent in the proportion of the global population exposed to floods, ten times higher than previous estimates. Climate change projections for 2030 indicate that the proportion of the population exposed to floods will increase further.

The global flood database generated from these observations will help to improve vulnerability assessments, the accuracy of global and local flood models, the efficacy of adaptation interventions and our understanding of the interactions between landcover change, climate and floods.

Bollen, J., et al (2021) **Historical language records reveal a surge of cognitive distortions in recent decades.** PROCEEDINGS OF THE NATIONAL ACADEMY OS SCIENCES USA 118:/doi.org/10.1073/pnas.2102061118 (available as a free pdf)

Authors' abstract: *Can entire societies become more or less depressed over time? Here, we look for the historical traces of cognitive distortions, thinking patterns that are strongly associated with internalizing disorders such as depression and anxiety, in millions of books published over the course of the last two centuries in English, Spanish, and German.*

We find a pronounced "hockey stick" pattern: Over the past two decades the textual analogs of cognitive distortions surged well above historical levels, including those of World War I and II, after declining or stabilizing for most of the 20th century.

Our results point to the possibility that recent socioeconomic changes, new technology, and social media are associated with a surge of cognitive distortions.

Individuals with depression are prone to maladaptive patterns of thinking, known as cognitive distortions, whereby they think about themselves, the world, and the future in overly negative and inaccurate ways. These distortions are associated with marked changes in an individual's mood, behavior, and language.

We hypothesize that societies can undergo similar changes in their collective psychology that are reflected in historical records of language use. Here, we investigate the prevalence of textual markers of cognitive distortions in over 14 million books for the past 125 years and observe a surge of their prevalence since the 1980s, to levels exceeding those of the Great Depression and both World Wars.

This pattern does not seem to be driven by changes in word meaning, publishing and writing standards, or the Google Books sample. Our results suggest a recent societal shift toward language associated with cognitive distortions and internalizing disorders.

Brady, W.J., et al (2021) **How social learning amplifies moral outrage expression in online social networks.** SCIENCE ADVANCES 7:doi.org/10.1126/sciadv.abe5641 (available as a free pdf)

Authors' abstract: *Moral outrage shapes fundamental aspects of social life and is now widespread in online social networks. Here, we show how social learning processes amplify online moral outrage expressions over time. In two preregistered observational studies on Twitter (7,331 users and 12.7 million total tweets) and two preregistered behavioral experiments (N = 240), we find that positive social feedback for outrage expressions increases the likelihood of future outrage expressions, consistent with principles of reinforcement learning.*

In addition, users conform their outrage expressions to the expressive norms of their social networks, suggesting norm learning also guides online outrage expressions. Norm learning overshadows reinforcement learning when normative information is readily observable.

In ideologically extreme networks, where outrage expression is more common, users are less sensitive to social feedback when deciding whether to express outrage. Our findings highlight how platform design interacts with human learning mechanisms to affect moral discourse in digital public space.