

# OPUNTIA 520





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

**ABOUT THE COVER**

2022-03-05

photos by Dale Speirs

Canadians of Ukrainian descent are the fifth largest ethnic group, about 3%, but that statistic is national and doesn't reflect that the majority of immigrants settled on the prairies. Canada does, however, have the third largest group of Ukrainians after Ukraine itself and Russia.

The Canadian prairies were colonized in the late 1800s and early 1900s by organized groups of Ukrainian homesteaders. Even today, Alberta, Saskatchewan, and Manitoba have 10% to 15% of their population descended from Ukrainians.

Prime Minister Justin Trudeau bumbled his way with the Ukrainian war the same as he did with the pandemic, utterly incompetent. However, the Finance Minister Chrystia Freeland has been providing some backbone for the Liberal government.

She was born in Alberta of a Ukrainian mother, speaks the language fluently, and lived in Ukraine during the late 1980s. She was an activist in the liberation movement that saw Ukraine become independent in 1991, but was expelled by the Soviets in 1989 for her activities.

The photos show a protest in Olympic Plaza in downtown Calgary. Masks, by the way, are no longer required except in hospitals and public transit, but many people still use them elsewhere.





**LIFE AT CHEZ OPUNTIA**

photos by Dale Speirs

Before the pandemic (there’s a phrase that people will be using for decades to come) my neighbourhood had two or three bottle drives per year. Instead of putting bottles in the blue bin, I saved them for local groups such as the high school marching band or charity groups.

No bottle drives during the pandemic, so for two years they piled up in my basement, almost filling a spare room. Finally though, the Girl Guides had a drive on February 19. Hauling them up the stairs and out onto the driveway took about 30 minutes, but the task was done.

Here they are, stacked next to the Opuntiamobile. Not until I saw the final pile did I realize how much diet pop and milk I drank over two years.





QR codes were no longer required in Alberta as of February 8, and building capacity rules were relaxed. Masks were still mandatory, but as hospitalizations declined, they were removed as of March 1 except for public transit..

I enjoyed being able to eat in restaurants again without the COVID-19 rigamarole. I took the opportunity to have a sit-down meal at Bourbon Street, with my favourite combination. Fried rice, corn, salt-and-pepper chicken, and fish were nice to eat piping hot. Photo below.

I never used Skip The Dishes during the pandemic (Canada’s major food delivery service) as the service charges were too much for lukewarm meals, and confined myself to breakfast at McDonald’s, and burgers at A&W or Fatburger, occasionally splurging at Kentucky Fried Chicken.

Eating in meant trips to Safeway but I found I gained weight that way, as any food in the house would be consumed, all of it, for an evening snack. Fast-food meals are portion-controlled, so at least I kept my weight under control that way.



My local Safeway made beautiful chocolate cake squares, with wonderful icing roses. Now you see why I gained weight.



# LIGHTS, CAMERA, MURDER!: PART 7

by Dale Speirs

[Parts 1 to 6 appeared in OPUNTIA's #394, 413, 429, 451, 478, and 495.]

## Supping With A Long Spoon.

“The Horror In The Studio” by Dorothy Quick (1935 June, WEIRD TALES, available as a free pdf from [www.archive.org](http://www.archive.org)) was a deal-with-the devil story, only not directly.

Actor Bryant Holden was a leading man signed to a movie THE DEVIL’S GIFTS, which was about Giulio, an historical character who tried to get out of a deal with Satan for his soul. He succeeded but at tremendous cost.

As the filming progressed at the movie studio, Holden began to take on the evil behaviour of Giulio and became the character off-stage as well as in front of the cameras. An actress he used and then spurned committed suicide on the stage. Holden almost killed another actor because he couldn’t distinguish between fiction and reality.

The script had been based on a Renaissance manuscript. As Holden went out of control, his costume designer realized where the malign influence was coming from. She burned the manuscript to liberate him. The plot was predictable but the story was written well enough to be worth reading once.

“Hollywood Horror” by Paul Ernst (1935 October, WEIRD TALES) followed on with the evil supervillain Doctor Satan, part of a series. The R-G-R Motion Picture Company was shooting scenes for their latest epic.

Leading lady Joan Harwell was subjected to a superscience device that turned her head into a grinning skull, even though she was still alive and talking. She committed suicide with a pair of scissors when she saw what happened to her. The president of the studio was next. He was made of sterner stuff.

The medics said the flesh was still there but had been made transparent to show the bones. Who did it was soon revealed when Doctor Satan sent a ransom note demanding hundreds of thousands of dollars from assorted movie actors. Call it millions in today’s depreciated currency.

Amateur detective Ascott Keane leaped into the fray. He found Doctor Satan’s superscience machine hidden in an unused and forgotten basement in a studio warehouse.

Many alarums and much confusion, but the evil mastermind was routed. Not defeated, mind you, for there were more installments to come. Doctor Satan didn’t give up easily, at least not as long as the editor bought the stories.

## A Short Step To A Long Fall.

THE ADVENTURES OF THE FALCON aired on radio from 1943 to 1954. It was based on a popular series of movies which in turn were based on a story by Michael Arlen. The series is available as free mp3s from the Old Time Radio Researchers at [www.otrr.org/OTRRLibrary](http://www.otrr.org/OTRRLibrary)

Each episode opened with Michael Waring answering the telephone as The Falcon. It was a different woman each time, to whom he would explain that he couldn’t keep their date because he just received a case. He would give a one or two sentence blurb about the episode, and so to the opening credits.

“The Case Of The Falling Star” was written by Eugene Wang and aired on 1952-05-18. This time it was Doris who had to be disappointed, as Michael Waring told her he was dealing with a movie actor. Ken Marlowe was the actor, who was drinking heavily as he slid down the slope, and who owed gangster Jackie Howard \$19,000 in gambling debts.

Ken’s wife Laura wasn’t happy with him. When she said so, he gave her a black eye. His publicity man Steve Nichols was also unhappy. Ken suggested they fake up a threat on his life to get him back in the public eye.

Because the police take a dim view of false reports, Ken had the idea of hiring The Falcon as a bodyguard. The publicity might goad the studio into picking up Ken’s option. If so, the renewal came with an advance which would pay off Howard.

They tried to buffalo Waring into taking the job. Ken claimed he had gotten threatening telephone calls and someone had taken a potshot at him out on a golf course. He lied blatantly when Waring asked if he had extramarital affairs or if he owed money. Waring refused the case.

Ken staged a fake attempt but it backfired when police found a shell casing that proved to be a blank. Waring visited Ken to reprimand him with his fists. Later the police made their own visit, but to Waring. Ken had been found dead from blunt trauma. The movie option was now moot.

As the halfway mark had been reached in the episode, it was time for a commercial. This was a public service announcement warning that weekends were the most dangerous time for driving. Drive as if your life depended on it because it does. Out of curiosity, I looked up the episode air date on the Internet and by golly, it was a Sunday.

The police took Waring for a ride. The good news was they got Waring to the crime scene in good order. They were safe drivers. The blunt instrument was found and Waring was absolved. Ken had his head bashed in from behind, hardly the result of a couple of fisticuffs.

Waring interviewed Nichols, who had an unrequited platonic love for Laura. She was the only reason he stayed with Ken. Waring next visited Laura, who was in full denial. Then on to Howard, who claimed Ken had paid off his debts that morning. Waring didn't believe him since the police said Ken had only \$800 in his chequing account.

Howard did his own visiting, going to see Nichols and beating him up. After a minute of thuds and gasps as Howard worked him over, there was a sudden break to another commercial. The announcer said that 300,000 people were killed in traffic accidents over the last decade, and 11 million people were injured. That certainly put Nichols' injuries in their place.

Two hours later, Nichols was being administered to by Waring and Laura. Waring accused Nichols of the murder, who immediately confessed. A tower of jelly, that man. He said he couldn't bear to see Laura suffer. As Waring observed, maybe his love for her wasn't just platonic.

### **Never Trust A Producer.**

BOSTON BLACKIE aired on old-time radio from 1944 to 1950, and was also a series of 14 movies. His real name was Horatio Black but everyone, including his girlfriend Mary Wesley, called him Blackie. The radio shows are leavened with humour and quips. Writers were not credited, although the actors were.

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

Blackie's nemesis was NYPD Homicide Inspector Farraday. The name was originally spelt in the usual way with one 'r' but after the series got going for some reason the extra letter was added. The tag line in the opening credits was "*Boston Blackie: Enemy to those who make him an enemy, friend to those who have no friend.*"

"The Boat The Viking Was On" aired on 1949-01-19. Police found a corpse in a boat well inside Manhattan on dry land. They didn't know it was a publicity stunt by Gregory Thompson, a publicity agent for Imperial Studios on their forthcoming seafaring epic "High And Dry".

Inspector Farraday called in Boston Blackie. He figured that if Blackie was going to barge in on his cases then he might as well be stuck with this one. A detective named Barton found the deceased and also brought in Blackie and Mary Wesley.

Thompson bought a corpse from a medical student at the local morgue. What he didn't know was the deceased was the movie's director Bernetti. He called upon the producer Jules Arnold and demanded \$10,000 in cash, then fled the city.

Bernetti had a wife in Hollywood and a girlfriend in New York City. Blackie and Wesley went to visit the latter. They found her shot dead.

Blackie called a J'accuse! meeting at police headquarters. He blamed Arnold and provided some shaky evidence based on tracing telephone calls. Arnold pulled a gun, a foolish thing to do in a police station.

Pat and Jean Abbott were latecomers to the married sleuths subgenre, based on the novels by Frances Crane. On radio, ABBOTT MYSTERIES aired from 1945 to 1947. The series was revived for the 1954-55 season as THE ADVENTURES OF THE ABBOTTS.

"The Burnt Copper Powder" was written by Howard Merrill and aired on 1955-02-27. Pat Abbott's client was Mrs Carrier, who offered him a \$100,000

cheque to get her off a murder charge for killing her husband George. The cheque would be about \$1 million in today's money.

She didn't proclaim her innocence but stated forthrightly that she wanted Pat to frustrate the police investigation. He declined the offer. However the evening newspaper changed his mind.

Jean was out of town visiting her father, so her conversations with Pat were over a long-distance telephone line. He recited the details. George had been stabbed to death on a Hollywood studio lot. He was not a nice man, being alcoholic, abusive to his teenaged daughter Margaret, and trashing the careers of several actors.

His wife, whose name was never given, stabbed him in a fight. She said they were arguing on a stage set. In the heat of the moment, she picked up a prop knife and used it.

Leonard Benedict was George's partner. Margaret told Pat the two men seemed to get along okay. She also said she liked older men and wondered if Pat was available.

Visiting the studio late at night, Pat pocketed some evidence and got himself slugged unconscious. He woke up in a motel room with Benedict holding a gun on him, who interrogated him and vice versa.

Benedict wanted Margaret's mother (his words; no one in the episode would say her first name) convicted of the murder. He pointed out she would inherit \$500,000.

Pat was impressed. That was big money in those days. Margaret wasn't mentioned in the will. Pat then hypothesized that Margaret murdered her father and her mother was covering for her. He investigated Margaret again, which got Jean upset at the idea of him romancing a teenager. Not to mention the laws, then and now, about consenting adults and minors.

There was a touch of burnt copper face powder on George's suit. Pat managed to get a sample used by Margaret by taking her on a date and getting close and personal. He told Benedict that if the samples matched, she would go to the electric chair.

No she wouldn't. Firstly she was a teenager and wouldn't be tried in adult court. Secondly she could claim self-defense since there were signs of a struggle at the death scene.

Benedict pulled his gun again and confirmed Margaret had killed her father. She was in love with Benedict, he being an older man. The next victim would be her mother, after which Margaret would inherit.

The two lovers would then flee to Canada. American scriptwriters weren't aware that Canada and the USA have mutual extradition treaties for felonies. In any event, that didn't matter. The final scene was at the Carrier home where mother and daughter traded accusations.

There was a struggle. Benedict shot at Mrs Carrier but missed and killed Margaret. Not a happy ending. Jean wasn't happy either when she learned her husband had been canoodling with a teenaged girl.

### **The Reality Of Television.**

A SECOND CHANCE AT MURDER (2016) by Diana Orgain was about Georgia Thornton and her boyfriend Scott. They earned their living on reality television shows. In a previous series, they had won big money but it was spent shortly after their fifteen minutes of fame was over.

The couple were now competing in Expedition Improbable, an athletic competition taking them across the Spanish Pyrenees in a race against other teams. While camped for the night, Scott disappeared and a woman was murdered. They were near Basque country, so there was concern ETA terrorists were involved.

Priorities were priorities though, and filming continued for the series. The producer figured, rightly so, that the murder would be good for ratings. Certainly better than one task the competitors were set, milking sheep.

Fortunately additional murders, assaults, and other dastardly deeds would keep up viewer interest. In the denouement, the woman had been murdered by a jealous lover, and Scott survived, reappearing in a hospital. All that was left was to wait for the ratings.



DOUGH OR DIE (2020) by Winnie Archer was the fifth novel in a food cozy series about Ivy Culpepper of Santa Sofia, California. The village was on the beach, so that made her a Jessica Fletcher but with warmer weather than Cabot Cove. Culpepper worked at the Yeast Of Eden bread shop.

A television crew from a food cable channel visited, to feature the bakery in a new series Bread For Life. The show was to be an uplifting look at women in the baking business. Cameraman Ben Nader was the victim of a hit-and-run driver, which didn't do much for the uplifting.

Ben barely survived but was in the hospital in a bad way. Culpepper began digging out back stories around the village, of which there were plenty, well laced with melodrama. The driver and would-be murderer had issues with the Nader family and took action against Ben for revenge, a dish best served cold.

The recipes appendix featured two types of bread, East African Spiced, and Rosemary.

**Unreal Movies.**

“All For Five Cents” by Leo Crane (1913 December, THE BLACK CAT, available as a free pdf from [www.archive.org](http://www.archive.org)) was about a movie producer named Quigg, back in the days of silent films. Out west somewhere, he found a tribal reserve whose inhabitants dreamed of the glory days of scalping. At a town fete nearby, he found a militia unit who were bored with just parading.

Quigg offered the aboriginals a chance to restore their lost honour by staging a re-enactment. Likewise he convinced the reservists to participate, ensuring first that they were using blank bullets. He let the aboriginals know that if they were a little too realistic, then he certainly wouldn't say anything.

The camera was set up and photographed the too, too realistic action. As the last survivors stumbled about the battlefield, Quigg departed town at high speed in a fast wagon, connected to an express train, and was soon in the big city. The film was praised for its highly realistic effects.

“The Theater Upstairs” by Manly Wade Wellman (1936 December, WEIRD TALES) began with two friends strolling about Manhattan when they came across a hole-in-the-wall movie theater. Luther and the unnamed narrator went inside.

They found the show was THE HORLA but not any version known to reality. The actors had all died before the advent of talking pictures, so how could they be in this one? The narrator exclaimed to Luther that it couldn't be, only to have one of the screen actors turn and face him down.

Luther knew one of the actresses, a woman he had scorned and who subsequently committed suicide. She recognized him, borrowed a gun from one of the other actors, then leaned out of the screen and shot him dead.

The narrator ran to get a policeman but couldn't relocate the theater. Luther was never seen again. One feels safe in saying the film never came out on VHS or DVD.

LIGHTS OUT aired from 1934 to 1947, and was an anthology radio series specializing in fantasy, weird fiction, and horror.

“Familiar Suddenly Unfamiliar” was written by Arch Oboler and aired on 1943-04-06. A movie producer Mike Gibson took a copy of his blue film to a stag group in a rural village. He was an abrasive boss to his underling Lou and talked like a Noo Yawk gangster.

The strategy was that Lou would burgle the houses of the group while they were watching the film. Lou failed because the sheriff tailed him the entire time. Gibson decided to try again the next night. This time the plan worked.

After the audience departed, Gibson told Lou to stop running the projector. Lou told him it was already stopped. Yet a monster movie was still showing on the screen. The monster climbed out of the film and came up the aisle toward them.

A gong clashed. An announcer said it was a sad fact that most people suffered from a lack of vitamins and iron. Not to worry, as Ironized Yeast Tablets would pep up anyone. The gong banged again.

The good news was that the monster ignored the two men and the gongs, and exited the building. When Gibson and Lou finally left the building, they were met by an angry mob, who blamed Lou for the monster's depredations. He ran for the swamp with them in hot pursuit.

Meanwhile Gibson fled town in his vehicle. He saw the monster and stepped on the gas pedal to run it down. Too late he saw it was a projection on a wall.



He smashed full speed into the wall. A final Aaaargh! and a gong sounded to end the show.

**How To Get Ahead In Movies.**

“What Would Pacino Do?” by Steve Shrott (2018, SHERLOCK HOLMES MYSTERY MAGAZINE #26), available from [www.wildsidepress.com](http://www.wildsidepress.com) or Amazon) was about an aspiring actor named Jonathan Levy who had been aspiring for far too long. He had once again auditioned, this time for a Mafioso part in a Al Pacino movie, but was told he wasn’t menacing enough.

Levy’s uncle-in-law Earl was a retired Mafioso, so he went to him for advice. Earl set him up for a hit which Levy thought was fake but turned out to be real. But Uncle returned the favour. The next day the director of the movie, lying on his deathbed after a savage beating, insisted that Levy get the part.

**The Play’s The Thing.**

The idea of pretending to film a movie to cover up crime is no new thing. “The Irrepressible Jerry” by G.P. Wilson (1915 August, THE BLACK CAT, available as a free pdf from [www.archive.org](http://www.archive.org)) used the plot. Two grifters rented a movie camera, one dressed as a clichéd burglar, and they went to work in broad daylight.

They chose the mansion of a millionaire they knew was traveling and successfully bluffed the policeman who patrolled that beat. Unfortunately they encountered another crook who was looting the place the old-fashioned way.

The owner of the mansion unexpectedly returned and summoned the policeman. Since the other crook was the only one with loot in his pockets, the two men escaped time in the local hoosegow.

“Talent” by Robert Bloch (1960 July, WORLDS OF IF, available as a free pdf from [www.archive.org](http://www.archive.org)) began at an orphanage where a foundling, eventually named Andrew Benson, grew up. He was slow-growing and didn’t learn to speak until a group outing to a Marx Brothers movie. Thereafter he suddenly began speaking in Groucho’s voice.

He proved to be an excellent mimic, but more dangerously behaved the way screen characters behaved. Despite his problems with reality, he grew to

adulthood. No one understood he was a shapechanger. To one acquaintance he looked and spoke like Peter Lorre, to another like Boris Karloff. Then he saw a movie about a giant monster destroying Los Angeles.

**MISCELLANEOUS SCIENCE FICTION REVIEWS**

by Dale Speirs

**Computers.**

THE ZERO HOUR was an anthology series, one of several which attempted to revive radio drama in the early 1970s. Rod Serling narrated the intro and the outro in the same style as his television series, although the series was produced by Elliott Lewis. It is available as free mp3s from the Old Time Radio Researchers at [www.otrr.org/OTRRLibrary](http://www.otrr.org/OTRRLibrary)

“Bend, Spindle, And Mutilate”, written by Sue Dunham, aired on 1974-07-01. The setting was an office where the recent installation of a computer, nicknamed Henry, had resulted in a mass layoff, leaving only a few humans to do its bidding. The leading man was Bob Crane, no longer in Stalag 13 and now playing the part of Dominic Yale, a private investigator.

The office manager Klaus Waxman went on vacation and was never seen again. His wife had previously died in a suspicious car accident. They hadn’t been getting along. The business had previously been hers. The company called in Yale to investigate.

His assistant was Reggie, a blithering fool. Those who met him were led to believe that somewhere a village was missing its idiot. Waxman supposedly telephoned the office and told them he was extending his vacation in Mexico. Yale didn’t believe it since the voice could have been anyone.

Reggie and Yale found some computer punchcards in the Waxman house. The techies told them the punchcards were from an obsolete computer. Henry was one such. The cards had been used to plan the murders, the first one by Waxman against his wife and the second by Waxman’s mistress, a fellow office worker, against him for subsequently dumping her.

The plot was, of course, obsolete within a decade, at least as far as punchcards went. I suppose it could be updated by using a memory stick. One wonders though, why a computer would be needed to plan a mundane murder.

## **Blobs.**

The revenge of the amoebas has long been a popular trope in science fiction. Bullets cannot stop them. But there are ways to deal with them.

“The Immeasurable Horror” by Clark Ashton Smith (1931 September, WEIRD TALES, available as a free pdf from [www.archive.org](http://www.archive.org)) began with explorers on the planet Venus. Set before we knew otherwise, they were in those Carboniferous jungles conducting an aerial survey when they discovered a gigantic protoplasmic blob munching its way through the jungle.

The blob was the size of a city, and when it saw the airplane pass overhead, it reached up a tentacle to snatch the Earthlings. It didn’t succeed but almost did. Most of the story was about the blob’s efforts to bring down the morsel, including secreting sedative gases. The protagonists survived but were not the same, mainly because they wondered when the blob would come again for them.

“The Wand Of Creation” by Raymond Z. Gallun (1934 September, ASTOUNDING, available as a free pdf from [www.archive.org](http://www.archive.org)) was about a crew drilling in a mole machine down into the depths of Earth. They hit a cavern which contained mysterious radioactive elements like nothing ever seen (if I may borrow a phrase from Mr Spock).

Taking a sample inside the mole, they found it turned anything organic into protoplasmic blobs. They quickly lost their food supply. As the blobs continued to grow, the crew did the only thing they could. After sending a message to the surface, warning them not to drill again, the mole was blown up to collapse the shaft and flood the pieces with lava.

The topside boss didn’t believe the message. Nothing for it but to send another manned drilling machine down to see what happened to the first one.

“The Crawling Horror” by Thorp McClusky (1936 November, WEIRD TALES, available as a free pdf from [www.archive.org](http://www.archive.org)) began with a shapechanger blob on a farm. First it came for the rats in the walls, then the cats that ate the rats, then the dogs that chased the cats.

The blob worked its way up the evolutionary scale to cattle and finally humans. When it began absorbing humans on the sly and then changing its shape to mimic them, the villagers noticed. The farmer decided that with willpower he could absorb the blob within himself and then sacrifice himself to save the world.

“Quicksilver, Unlimited” by Harry Walton (1937 July, ASTOUNDING) began with a pair of prospectors landing on a promising planetoid. The rock proved to be the habitat of electrically-charged cells made of pure mercury with insulating layers around blobs or pools of the stuff to allow multicellular life. Not sentient by any means, only at the level of primitive algae.

The two humans stuck out in the electrical field of the planetoid like pyrotechnic flares. The mercury blobs began closing in and it looked like the end for the prospectors. They found a way to short-circuit the cells and make it back to their spaceship for escape.

They recognized that the mercury-based life should be preserved, and the best method to do that was to say nothing about the planetoid. Write it off as another worthless rock of no interest to mining companies, and leave the mercury blobs to continue evolving unmolested.

“Genesis!” by R.R. Winterbotham (1941 Summer, PLANET STORIES, available as a free pdf from [www.gutenberg.org](http://www.gutenberg.org)) was about a mad scientist returning to Venus after his previous expedition had discovered azoic blobs of protoplasm scattered about in a desert. They lay there doing nothing but Dr Harry Renzu had a plan.

His plan was one that he failed to communicate to others, paranoia being normal for his kind, as a result of which he made trouble for himself unnecessarily. With silver rods to serve as bones, moulding the protoplasm over them, and shooting a jolt of electricity into them, hey presto! he had humanoid life. They were not well behaved since they were created *de novo* with no instincts or intelligence, but Renzu considered those to be fussy details.

His intent was to create life on Venus to remake the planet, no matter what the details were to get the job done. His downfall was a decision to use human bones for the skeletons. Understandably the humans still using them objected, and there were several alarms.



The spaceship left Venus, leaving Renzu behind to develop his plans. That was, however, based on the assumption that his creations didn't render him into elements.

“Contamination Crew” by Alan E. Nourse (1958 February, WORLDS OF IF, available as a free pdf from [www.archive.org](http://www.archive.org)) began as an ordinary blob story when a spaceship returning to Earth discovered they had a blob on board. The critter was a standard eats-everything blob, not discovered until it had eaten through most of the ship's food reserves.

It seemed unstoppable until someone discovered that hydrochloric acid dissolved the blob. The problem was that a spaceship generally doesn't carry much in the way of the acid. However a genius on board found the solution. Humans digest their food with hydrochloric acid in their stomachs. In a rather neat turning-the-tables trick, they began eating the blob faster than it could eat them.

From that same issue of IF came Arthur C. Clarke's classic story “Out From The Sun”. Scientists watching the Sun saw a giant blob of energy evicted from deep inside the star. As it flew out into space, they realized it was a living creature in great distress, for it was not adapted to the cold of space. It died when it splashed against Mercury, which was blazing hot to humans but an icy grave to the energy blob.

The story wraps up: *One day they may discover us, by whatever strange senses they possess, as we circle round their mighty, ancient home, proud of our knowledge and thinking ourselves lords of creation. They may not like what they find, for to them we should be no more than maggots, crawling upon worlds too cold to cleanse themselves from the corruption of organic life.*

*And then, if they have the power, they will do what they consider necessary. The Sun will put forth its strength and lick the faces of its children; and thereafter the planets will go their way once more, as they were in the beginning, clean, and bright . . . and sterile.*

**Aliens.**

DARK FANTASY was an old-time radio anthology series with 31 episodes aired from 1941 to 1942. It is available as free mp3s from [www.archive.org](http://www.archive.org). Unusual for the times, it was a national show on the NBC network aired out of

Oklahoma City. All the episodes were written by Scott Bishop. They were a mixture of science fiction, fantasy, weird, and twist mysteries.

“Cup Of Gold” aired on 1942-05-08. The episode began with an announcer reporting in hushed tones the play-by-play of a championship golf game. Truman Davis had a five-year run as a golf champion before being defeated by Jan Mason. At the final hole, Mason was handed the gold trophy and was promptly shot dead.

A reporter Lee Saunders tracked down the woman who handed the trophy to the victim. Ruth Kendish said she had received a package with three incense cones. She lit one and knew nothing more. She had woken up in her hotel room holding the murder gun.

They lit a second cone and quickly found themselves on the planet Vento. An alien named Molta explained at length the planet was formed from a glancing collision between Venus and Pluto. He said no one could see Vento because the planet was 10 million miles from Earth.

Scott Bishop was obviously ignorant of astronomy, as that distance was basically next door. Vento could not orbit without being seen from Earth. Setting that aside, Molta explained that reincarnation was real but the souls were revived on a different planet.

Davis, Mason, and Kendish were all Ventoians who were reincarnated on Earth. They were acting out a love triangle they had formed back on Vento. Not much more to discuss, so Saunders lit the third incense cone and took Kendish back to Earth.

**Anthologies And Collections.**

An anthology is a group of stories by different authors, and a collection is a group of stories by one author.

ECLIPSE FOUR (2011) was an Australian anthology edited by Jonathan Strahan. I'll just pick out a couple of stories I liked. The rest were average. “Slow As A Bullet” by Andy Duncan was about a foolish bet Cliffert Corbett made with his fellow country yokels, that he could outrun a bullet. After realizing what he had done in the heat of the moment, he stalled for time, specifying his gun and bullet was to be used, with a year to get ready.

He had to slow the bullet down by altering the gunpowder. Came the day, his plan worked. The bullet came slowly out of the barrel and anyone could walk past it as it slowly moved through the air. It kept going and could not be deflected. The bullet went into the woods, and in the lowering dusk, no one could see or guess what happened to it.

Thoughtful people began wondering. The force of a projectile is its momentum, which is mass times velocity, as you will recall from high-school physics. The momentum of the bullet was the same as a normal bullet. Therefore the small velocity meant the mass had to increase astronomically to balance the equation. How long would it keep going, and would it hit anyone far, far away?

“Old Habits” by Nalo Hopkinson was a narrative by a ghost who died in a shopping mall and still haunted it. There were other ghosts who died there as well, all from accidental or medical deaths.

Even so, that mall seemed a charnel house. Shoppers and staff could not see the ghosts, who each day had to relive their deaths. The ghosts saw only blackness outside the mall, which swallowed them up without a trace if they tried to leave.

REASSURING TALES: EXPANDED EDITION (2021) by T.E.D. Klein is a revised version of an earlier collection of short stories. Included in the update are some essays and two additional stories. I won’t review everything, but here are a few selections. My copy was an Amazon print-on-demand but you can also order directly from [www.pickmanspress.com](http://www.pickmanspress.com)

“The Events At Porothe Farm” led off the collection. The narrator Jeremy had rented a house deep in the wilds of New Jersey. The farmers were a young couple Deborah and Sarr Porothe. Eldritch events began happening.

Time suddenly stopped for a heartbeat, then resumed. A cat died from something that burrowed out from inside, yet the feline revived and healed its wounds in a day. The creature inside made its way into the Porothes, and death claimed them. Then it began stalking Jeremy.

“One Size Eats All” gave away the ending in the first few paragraphs. The concept of a carnivorous shapeshifting alien masquerading as a sleeping bag was interesting. Beyond that, even a twist ending failed to redeem the story.

“Camera Shy” reflected, you’ll pardon the expression, on what happened after a wedding photographer tried to take a portrait of the groom. The new husband didn’t appear in any of the photos. Vampires have that problem.

“Renaissance Man” was a story I’ve seen done before but nonetheless it read well. University scientists used a time machine to snatch someone from the future at the same location. To their jubilation, he was a scientist but alas, he specialized in plant cell biology and could explain nothing about the wonders that will be.

He said there was a cure for cancers but knew nothing of how it worked. The doctor gave the patient an injection of something or other and that cured the disease. Communication devices were small and easy to use but he couldn’t explain their inner workings any more than we as individuals today know how to make computer chips.

As someone in the story remarked, if any of us were sent back in time, could we synthesize nylon or design a passenger jet?

## LETTERS TO THE EDITOR

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

FROM: Lloyd Penney  
Etobicoke, Ontario

2022-02-20

OPUNTIA #516: We’ve been getting similar weather to Calgary, extremely cold temperatures, -30°C or so, and then the warmth returns and melts everything, and then the cold returns to freeze all the slush. We’re getting a little warmer now, and the snow is starting to melt.

[Calgary’s extended chinooks throughout February were briefly interrupted by a polar ridge as you sent your email, and we had a few days of -25°C weather. One advantage of chinooks is that they don’t melt snow but sublimate it directly into the air, so Calgary rarely has slush.]



The CBC says it's getting back into radio drama, but it's experimental. The show is done, but instead of going on Radio One, it's on Gem. I haven't yet tried to find it.

[The younger generation thinks of radio and television as things that are streamed, not broadcast.]

One comedy show I remember was the Vancouver-based "Dr. Bundolo's Pandemonium Medicine Show" on Radio One. With some of the jokes they told, they couldn't possibly broadcast it today. I have noticed along the way that on Facebook, there is an audience for the CBS Radio Mystery Theatre, hosted by E.G. Marshall.

[There are all kinds of fan groups for specific shows, although they have little original content, just gosh-wow and cut-and-paste quotes.]

Sounds like Boris Karloff may have been a bit of a frustrated ham, talking about roles he wouldn't take, but doing so in all the roles he did take. Of course, one role not mentioned here was as the narrator and the main character voice for the grinchy original, *How The Grinch Stole Christmas*.

I wish Winnipeg luck in getting the NASFiC for 2023, but given how many foreign Worldcons there have been in the last decade or so, I think the average American fan would like to attend a Worldcon or NASFiC in their own country.

[Foreign conventions do frustrate the workers and cancellers, who have no influence with them.]

OPUNTIA #517: Lunar New Year has come and gone, and tiger motifs are still everywhere. I don't know if there is a Chinese Cultural Centre in Toronto (probably is one here), but I do know the Japanese Cultural Centre is in North York, and it is a great building. Because of the interest in anime, small anime events are usually held there.

My previous letter: The pandemic rules will change at the end of the month, but we all suspect that the only reason for doing so is for our illustrious premier to gain an advantage in the upcoming June provincial election.

As I write, it is Family Day and Third Monday, and we will be going out to our regular pub/restaurant, but it will be for the last time. Our Third Monday haunt

for the past 25 years, Orwell's Pub, will be closing its doors forever on February 26, so we need to find a new place.

[Every shopping plaza and mall in Calgary that I've been into since the rules were relaxed has about one-third to one-half the store fronts papered over with "For Lease" signs. The downtown core is even worse.]

The COVID-19 worldwide death toll has crossed 5.8 million, and so many are acting like it's nearly done. We've decided to keep our QR codes, and will carry them around long after the governments say we don't have to. Some restaurants have announced they will continue to check.

[Likewise for me.]

OPUNTIA #518: The Freedom Convoys have been dispersed in Toronto, Coutts (Alberta), Emerson (Manitoba), Quebec City and Ottawa. However, we always hear about new demonstrations cropping up, and this tactic has been exported to New Zealand and France. There have been rumours that some truckers may try this tactic in Washington.

[There is no doubt that the convoys were financed with American money. Finance Minister Chrystia Freeland froze their bank accounts but too little, too late.]

Most are learning that the truckers are almost all unvaccinated, and most of the truckers are not truckers at all, but members of QAnon, Sons of Odin and other white supremacist and alt-right groups. I am glad that Ottawa has been mostly cleared, but these Freedom Convoys could return at any time. Let's see how this Emergencies Act controversy turns out.

[Prime Minister Justin Trudeau is not his father's son. He ran away when the convoy arrived in Ottawa and had to be shamed into coming back and taking action. I never liked his father Pierre but I respected him. When the October Crisis developed, Pierre sent in the army. Justin wobbled.]

**CURRENT EVENTS: PART 36**

by Dale Speirs

[Parts 1 to 35 appeared in OPUNTIA's #474, 475, 479, 480, 483, 484, 488 to 503, and 507 to 519.]

As of March 4, Canada had 3,312,713 cases of COVID-19 reported. However, provincial health ministries stopped recording non-hospitalization cases several weeks ago, so the actual number is higher. 36,912 people have died from the virus, out of a total population of 38,000,000. Fully vaccinated Canadians were 80.5% of the adult population.

**Seen In The COVID-19 Literature.**

Zeberg, H., et al (2022) **The major genetic risk factor for severe COVID-19 is associated with protection against HIV.** PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES USA 119:doi.org/10.1073/pnas.2116435119 (available as a free pdf)

Author's abstract: *There are genetic risk factors that influence the outcome of COVID-19. The major genetic risk factor for severe COVID-19 resides on chromosome 3 and is inherited from Neandertals.*

*The risk-associated DNA segment modulates the expression of several chemokine receptors, among them CCR5, a coreceptor for HIV which is down-regulated in carriers of the COVID-19 risk haplotype. Here I show that carriers of the risk variant have an ~27% lower risk of HIV infection.*

*The major genetic risk factor for severe COVID-19 was introduced into modern human populations via gene flow from Neandertals 50,000 to 70,000 y ago. Although there is no direct evidence for positive selection on the risk haplotype, it has increased in frequency since the Last Glacial Maximum and is unusually common today, reaching carrier frequencies of 16% and 50% in Europe and South Asia, respectively.*

*Given the prevalence of this genetic variant, it is of interest to consider whether it may offer protection against some pathogen other than severe acute respiratory syndrome coronavirus 2, either today or in the past.*

*One of the most well-studied genetic variants modulating infectious disease risk is a 32-base pair deletion that introduces a premature stop codon in CCR5,*

*resulting in a nonfunctional receptor. This mutation, CCR5-Δ32, which confers protection against HIV-1 infection and likely also against smallpox, has been positively selected.*

Pekar, J.E., et al (2022) **SARS-CoV-2 emergence very likely resulted from at least two zoonotic events.** ZENODO doi.org/10.5281/zenodo.6291628

Authors' abstract: *Here, we analyze the pattern and origin of genomic diversity of SARS-CoV-2 early in the COVID-19 pandemic. We show that the SARS-CoV-2 genomic diversity prior to February 2020 comprised only two distinct viral lineages, denoted A and B, with no transitional haplotypes.*

*Novel phylodynamic rooting methods, coupled with epidemic simulations, indicate that these two lineages were the result of at least two separate cross-species transmission events into humans.*

*The first zoonotic transmission likely involved lineage B viruses and occurred in late-November/early-December 2019 and no earlier than the beginning of November 2019, while the introduction of lineage A likely occurred within weeks of the first event.*

*These findings define the narrow window between when SARS-CoV-2 first jumped into humans and when the first cases of COVID-19 were reported. Hence, as with SARS-CoV-1 in 2002 and 2003, SARS-CoV-2 emergence likely resulted from multiple zoonotic events.*

Worobey, M., et al (2022) **The Huanan market was the epicenter of SARS-CoV-2 emergence.** ZENODO doi.org/10.5281/zenodo.6299600 (available as a free pdf)

Authors' abstract: *Despite strong epidemiological links and the documented presence of SARS-CoV-2 susceptible animals, the role of the Huanan Seafood Wholesale Market in the COVID-19 pandemic remains controversial.*

*Using spatial analyses we show that the earliest known COVID-19 cases diagnosed in December 2019 were geographically distributed near to, and centered on, this market.*



*This distribution cannot be explained by high densities of elderly people at greater risk of symptomatic COVID-19. This pattern was stronger in cases without, rather than with, identified epidemiological links to the Huanan market, consistent with SARS-CoV-2 community transmission starting in the surrounding area.*

*By combining spatial and genomic data, we show that both the two early lineages of SARS-CoV-2 have a clear association with the Huanan market. We also report that live mammals, including raccoon dogs, were sold at the market in late 2019 and geospatial analyses within the market show that SARS-CoV-2-positive environmental samples were strongly associated with vendors selling live animals.*

*Together, these analyses provide dispositive evidence for the emergence of SARS-CoV-2 via the live wildlife trade and identify the Huanan market as the unambiguous epicenter of the COVID-19 pandemic.*

[Images are from this paper. Photos were taken in 2019 inside the Huanan live market. Here and at that time was where the pandemic began.]



Marcotte, H., et al (2022) **Immunity to SARS-CoV-2 up to 15 months after infection.** iSCIENCE 25:doi.org/10.1016/j.isci.2022.103743 (available as a free pdf. Do not confuse this journal with SCIENCE.)

Authors' abstract: *Here, we monitored the SARS-CoV-2 specific immune response in COVID-19 patients followed up to 15 months after symptoms onset. Following a peak at day 15 to 28 postinfection, the IgG antibody response and plasma neutralizing titers gradually decreased over time but stabilized after 6 months.*

*Compared to G614, plasma neutralizing titers were more than 8-fold lower against variants Beta, Gamma, and Delta. SARS-CoV-2-specific memory B and T cells persisted in the majority of patients up to 15 months although a significant decrease in specific T cells, but not B cells, was observed between 6 and 15 months.*

*Antiviral specific immunity, especially memory B cells in COVID-19 convalescent patients, is long-lasting, but some variants of concern may at least partially escape the neutralizing activity of plasma antibodies.*

*Recent studies have shown that although the Pfizer-BioNTech and AstraZeneca vaccines were effective in reducing the risk of infection and COVID-19 hospitalization caused by Delta, these effects on infection appeared to be diminished when compared to those with the Alpha variant.*

*Our neutralization data suggest that immunity develops during earlier waves of infection may not be fully protective against reinfection with Delta and other VOCs (and most likely against the recently isolated Omicron), indicating that convalescent patients may still benefit from vaccination.*

Mello, V.M., et al (2022) **Effectiveness of face masks in blocking the transmission of SARS-CoV-2: A preliminary evaluation of masks used by SARS-CoV-2-infected individuals.** PLOS ONE 17:doi.org/10.1371/journal.pone.0264389 (available as a free pdf)

Authors' abstract: *Although the effectiveness of face masks to prevent the transmission of SARS-CoV-2 is debated, no study has evaluated the virus-blocking efficacy of masks used by patients. We aimed to evaluate this efficacy of masks used by SARS-CoV-2-infected individuals.*

*Data, masks used, and nasopharyngeal swab samples were obtained from these patients. Forty-five paired samples of nasopharyngeal swabs and masks were obtained and processed; the majority of masks were woven.*

*Viral RNAs were amplified using quantitative reverse-transcription polymerase chain reaction and detected only on the inner parts of masks. Median viral load (VL) values of swabs and masks were  $1.954 \times 10^6$  and  $2.51 \times 10^3$ , respectively.*

*Statistically, there was a difference of approximately 1,000 RNA copies/mL between swabs and masks and no significant difference in VL values among different types of masks. There were statistically significant differences in VL values between men and women and between symptomatic and asymptomatic patients.*

*Our findings suggest the blocking of virus transmission by different types of masks and reinforce the use of masks by both infected and non-infected individuals.*

Kaplan, E.H., et al (2022) **Scaling SARS-CoV-2 wastewater concentrations to population estimates of infection.** SCIENTIFIC REPORTS 12:doi.org/10.1038/s41598-022-07523-7 (available as a free pdf)

Authors' abstract: *Monitoring the progression of SARS-CoV-2 outbreaks requires accurate estimation of the unobservable fraction of the population infected over time in addition to the observed numbers of COVID-19 cases, as the latter present a distorted view of the pandemic due to changes in test frequency and coverage over time.*

*The objective of this report is to describe and illustrate an approach that produces representative estimates of the unobservable cumulative incidence of infection by scaling the daily concentrations of SARS-CoV-2 RNA in wastewater from the consistent population contribution of fecal material to the sewage collection system.*

*This approach circumvents problems with non-representative sampling inherent in observable COVID-19 cases, hospitalizations, or deaths, and in principle can be applied in any location where continuous wastewater sampling over time is possible.*

# SEEN IN THE LITERATURE

## Astronomy.

Yusofi, E., et al (2022) **Surface tension of cosmic voids as a possible source for dark energy.** MONTHLY NOTICES OF THE ROYAL ASTRONOMICAL SOCIETY: LETTERS 511:doi.org/10.1093/mnrasl/slac006

[The cosmological constant is the overall energy density of the universe. Dark energy is the opposite of gravity and is responsible for the expansion of the universe.]

Authors' abstract: *The cosmological constant is estimated by considering the surface tension of supervoids in a void-dominated cosmic fluid by which we can get a possible source of dark energy.*

*Looking at voids as bubbles, we define the concept of surface tension which is shown to have an almost constant value for supervoids that are enclosed by superclusters.*

*The surface tensions of voids are computed by dimensional method for galaxies and superclusters with different values for each group. At large scale which vast voids are dominant the positive cosmological constants obtained of order ( $\sim 10^{-52} \text{ m}^{-2}$ ), which are very close to those given by Planck.*

Piatti, A.E., and K. Malhan (2022) **First evidence of a collision between two unrelated open clusters in the Milky Way.** MONTHLY NOTICES OF THE ROYAL ASTRONOMICAL SOCIETY: LETTERS 511:doi.org/10.1093/mnrasl/slab130

Authors' abstract: *We report the first evidence of an ongoing collision between two star clusters in our galaxy, namely IC 4665 and Collinder 350. These are open clusters located at a distance of  $\sim 330$  parsecs from the Sun and  $\sim 100$  parsecs above the galactic plane. They both have prograde motions with only a small difference in their velocities (Collinder 350 moves  $\sim 5 \text{ km s}^{-1}$  faster than IC 4665); as inferred from ESA/Gaia based catalogue.*

*Interestingly, the two clusters are physically separated by only  $\sim 36$  parsecs in space; a distance that is smaller than the sum of their respective radii.*

*Furthermore, the clusters exhibit signatures of elongated stellar density distributions, and we also detect an onset of an intercluster stellar bridge.*

*Moreover, the orbit analysis suggests that the younger cluster IC 4665 (age = 53 megayears) must have formed at a distance  $> 500$  parsecs away from Collinder 350 (age = 617 megayears).*

*These findings together imply that the two clusters do not represent merging of two objects in a binary system; rather, what we are witnessing is an actual collision between two independently formed star clusters.*

Yusef-Zadeh, F., et al (2022) **Statistical properties of the population of the galactic center filaments: The spectral index and equipartition magnetic field.** arXiv:2201.10552v1 [astro-ph.GA] www.arxiv.org (available as a free pdf)

[Sgr A\* is the black hole at the centre of our galaxy, the Milky Way.]

Authors' abstract: *We present high-pass filtered continuum images of the inner  $3.5'' \times 2.5''$  of the Galactic center at 20 cm with  $6.4''$  resolution. These mosaic images are taken with MeerKAT and reveal a large number of narrow filaments, roughly an order of magnitude increase in their numbers compared to past measurements.*

*A large-scale cosmic-ray driven wind has recently been proposed to explain the origin of filaments and the large-scale 430 pc bipolar radio and X-ray structure. This favors the possibility that the large-scale bipolar radio/X-ray structure is produced by past activity of Sgr A\* rather than coordinated burst of supernovae.*

*A trend of steeper indices is also noted with increasing distance from the Galactic plane. This could be explained either by synchrotron cooling or weak shocks accelerating cosmic-ray particles in the context of the cosmic-ray driven wind. The mean magnetic field strengths along the filaments ranges from 100 to 400  $\mu\text{G}$  depending on the assumed ratio of cosmic-ray protons to electrons.*

*Given that there is a high cosmic ray pressure in the Galactic center, the large equipartition magnetic field implies that the magnetic field is weak in most of the interstellar volume of the Galactic center.*

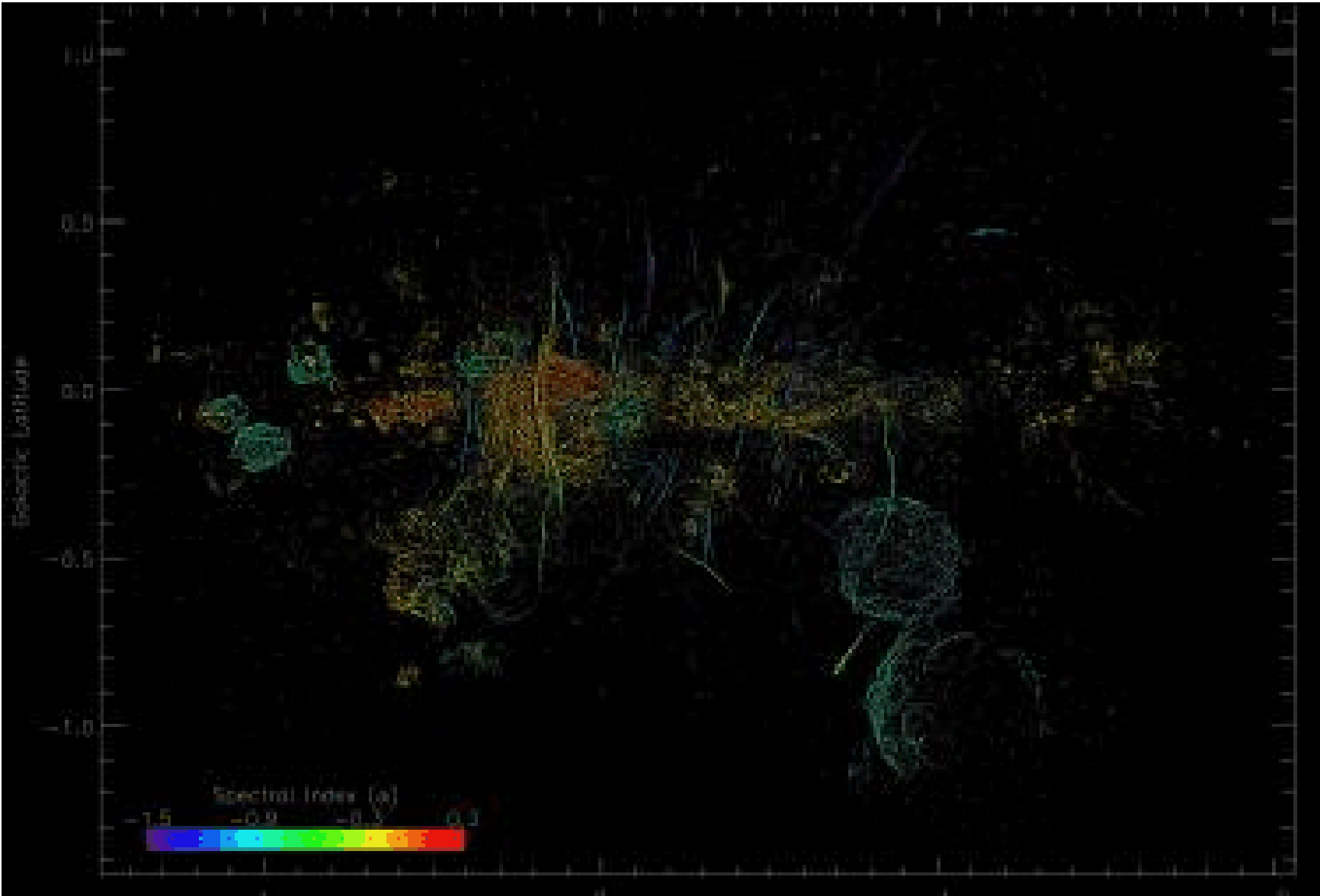


*More than 35 years have passed since the discovery of the magnetized radio filaments associated with the Galactic center Radio Arc near  $l \approx 0.2^\circ$ . These observations showed linear, magnetized features running mainly perpendicular to the Galactic plane.*

*Their morphology was unique and different than shell-like or jet-like nonthermal radio continuum sources that had been observed. This was the first indication that the nucleus of our Galaxy harbors energetic activity that produces relativistic particles along straight filaments with no obvious source of acceleration.*

*Dozens of nonthermal radio filaments with similar characteristics to the prototype filaments in the Radio Arc have been discovered in the intervening years indicating narrow synchrotron structures and are confirmed by polarization measurements.*

[Image is from this paper, and shows the straight filaments extending up and down from the galactic plane.]



**Planets.**

Borg, L.E., et al (2022) **The origin of volatile elements in the Earth-Moon system.** PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES USA 119:doi.org/10.1073/pnas.2115726119 (available as a free pdf)

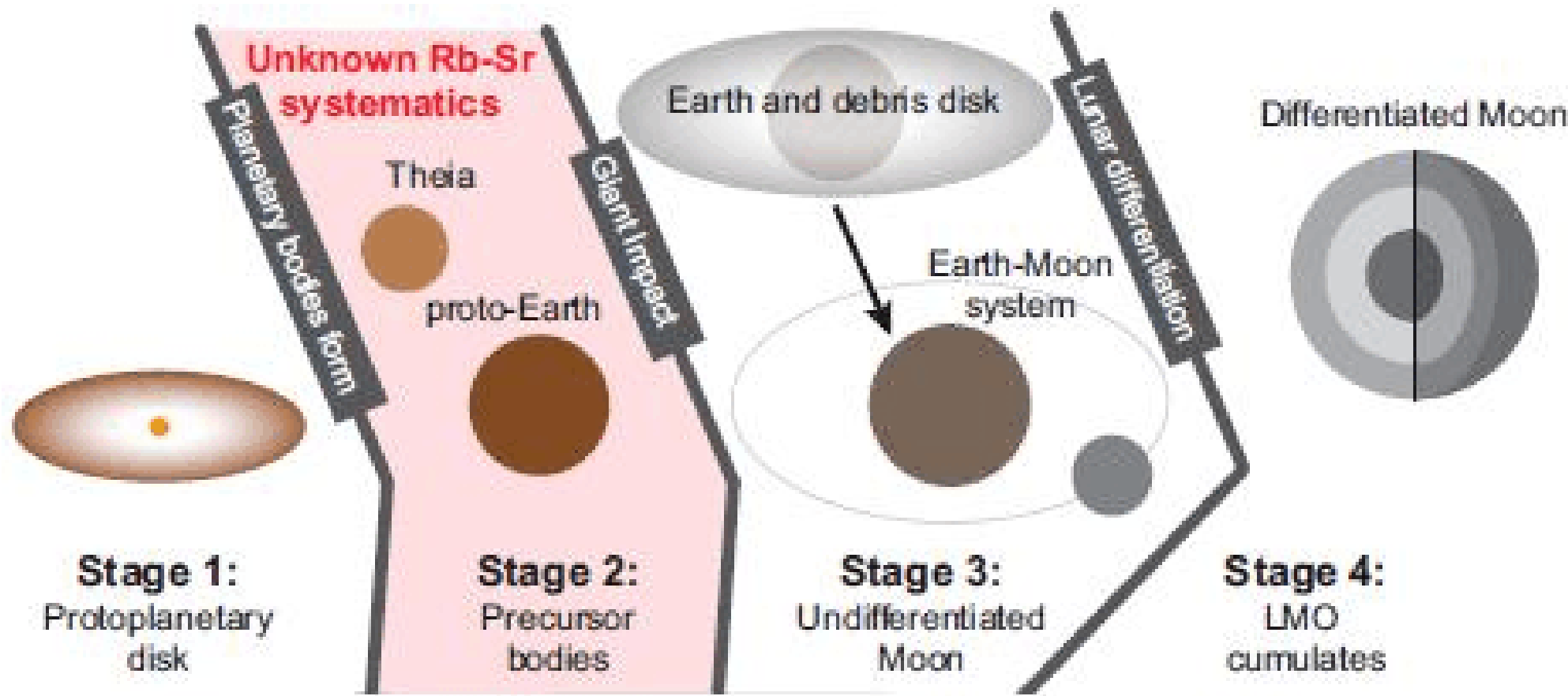
Authors’ abstract: *The origin of volatile species such as water in the Earth-Moon system is a subject of intense debate but is obfuscated by the potential for volatile loss during the Giant Impact that resulted in the formation of these bodies.*

*One way to address these topics and place constraints on the temporal evolution of volatile components in planetary bodies is by using the observed decay of  $^{87}\text{Rb}$  to  $^{87}\text{Sr}$  because Rb is a moderately volatile element, whereas Sr is much more refractory.*

*Here, we show that lunar highland rocks that crystallized ~4.35 billion years ago exhibit very limited ingrowth of  $^{87}\text{Sr}$ , indicating that prior to the Moon-forming impact, the impactor commonly referred to as “Theia” and the proto-Earth both must have already been strongly depleted in volatile elements relative to primitive meteorites.*

- These results imply that*
- 1) the volatile element depletion of the Moon did not arise from the Giant Impact,*
  - 2) volatile element distributions on the Moon and Earth were principally inherited from their precursors,*
  - 3) both Theia and the proto-Earth probably formed in the inner solar system, and*
  - 4) the Giant Impact occurred relatively late in solar system history.*

[Image is from this paper.]



Miyazaki, Y., and J. Korenaga (2022) **A wet heterogeneous mantle creates a habitable world in the Hadean.** NATURE 603:86-90

[The Hadean eon is greater than 3,800 megayears ago, before life originated.]

Authors' abstract: *The Hadean eon, following the global-scale melting of the mantle, is expected to be a dynamic period, during which Earth experienced vastly different conditions. Geologic records, however, suggest that the surface environment of Earth was already similar to the present by the middle of the Hadean.*

*Under what conditions a harsh surface environment could turn into a habitable one remains uncertain. Here we show that a hydrated mantle with small-scale chemical heterogeneity, created as a result of magma ocean solidification, is the key to ocean formation, the onset of plate tectonics and the rapid removal of greenhouse gases, which are all essential to create a habitable environment on terrestrial planets.*

*When the mantle is wet and dominated by high-magnesium pyroxenites, the removal of carbon dioxide from the atmosphere is expected to be more than ten times faster than the case of a pyrolitic homogeneous mantle and could be completed within 160 million years.*

*Such a chemically heterogeneous mantle would also produce oceanic crust rich in olivine, which is reactive with ocean water and promotes serpentinization. Therefore, conditions similar to the Lost City hydrothermal field may have existed globally in the Hadean seafloor.*

**Origin Of Life.**

[Earth's atmosphere was methane-ammonia even after photosynthetic algae evolved and began producing oxygen. The reason was that the oxygen reacted with countless minerals and formed oxides. Only after everything that could be oxidized was, did oxygen begin accumulating in the atmosphere. This is called the Great Oxidation Event.]

O'Neill, C., and S. Aulbach (2022) **Destabilization of deep oxidized mantle drove the Great Oxidation Event.** SCIENCE ADVANCES 8:doi/10.1126/sciadv.abg1626 (available as a free pdf)

Authors' abstract: *The rise of Earth's atmospheric O<sub>2</sub> levels at ~2.4 gigayears was driven by a shift between increasing sources and declining sinks of oxygen. Here, we compile recent evidence that the mantle shows a significant increase in oxidation state leading to the Great Oxidation Event, linked to sluggish upward mixing of a deep primordial oxidized layer.*

*We simulate this scenario by implementing a new rheological model for this oxidized, bridgmanite-enriched viscous material and demonstrate slow mantle mixing in simulations of early Earth's mantle. The eventual homogenization of this layer may take ~2 Ga, in line with the timing of the observed mantle redox shift, and would result in the increase in upper mantle oxidation of >1 log(fO<sub>2</sub>) unit.*

*Such a shift would alter the redox state of volcanic degassing products to more oxidized species, removing a major sink of atmospheric O<sub>2</sub> and allowing oxygen levels to rise at ~2.4 Ga.*

**Paleobiology.**

Bicknell, R.D.C., and J.R. Paterson (2022) **Cambrian carnage: Trilobite predator-prey interactions in the Emu Bay Shale of South Australia.** PALAEOGEOGRAPHY, PALAEOCLIMATOLOGY, PALAEOECOLOGY 591:doi.org/10.1016/j.palaeo.2022.110877

Authors' abstract: *The Cambrian explosion represents the rapid emergence of complex marine ecosystems on Earth. The propagation of predator-prey interactions within these systems was almost certainly one of the major drivers of this evolutionary event, sparking an arms race that promoted the proliferation of biomineralised exoskeletons and shells, and the evolution of the first durophagous (shell-crushing) predators.*

*The most commonly documented evidence of Cambrian durophagous predation comes from injured trilobites. However, quantitative analysis based on multiple specimens from single localities is lacking.*



*This study documents injured specimens of two trilobite species, Redlichia takooensis and Redlichia rex, from the Emu Bay Shale Konservat-Lagerstätte (Cambrian Series 2, Stage 4) on Kangaroo Island, South Australia.*

*A total of 38 injured specimens exhibiting various healed cephalic and thoracic injuries are documented, in addition to the mangled remains of two individuals that probably resulted from the activities of a durophagous predator or scavenger.*

*Specimens of both species show that most injuries are located on the posterior portion of the thorax, indicating that predators preferentially attacked from behind and/or prey individuals presented the posterior of the trunk towards the predator when threatened or fleeing.*

*The larger sample of injured R. takooensis shows that while unilateral injuries are more common than bilateral ones, there is no evidence for a left- or right-side bias, contrasting with previous suggestions that Cambrian trilobites exhibit right-sided injury stereotypy.*

*Comparing the position of injured and non-injured R. takooensis and R. rex in bivariate space, we illustrate that injured specimens of both species typically represent some of the largest individuals of these taxa.*

*This suggests that smaller individuals were completely consumed during an attack and/or larger individuals were more likely to survive an attack and thus record a healed injury.*

*We argue that R. rex, rather than radiodonts, was likely the chief producer of exoskeletal injuries and large shelly coprolites in the Emu Bay Shale biota, and represents one of the earliest cannibalistic trilobites.*

Giuliani, A., et al (2022) **Perturbation of the deep-Earth carbon cycle in response to the Cambrian Explosion.** SCIENCE ADVANCES 8:doi.org/10.1126/sciadv.abj1325 (available as a free pdf)

[The Cambrian Explosion occurred 542 megayears ago when the fossil record suddenly expanded dramatically after multicellular organisms began using calcium for body parts. Previous life forms were soft bodied and seldom preserved as fossils.]

Authors' abstract: *Earth's carbon cycle is strongly influenced by subduction of sedimentary material into the mantle. The composition of the sedimentary subduction flux has changed considerably over Earth's history, but the impact of these changes on the mantle carbon cycle is unclear.*

*Here, we show that the carbon isotopes of kimberlite magmas record a fundamental change in their deep-mantle source compositions during the Phanerozoic Eon.*

*The  $^{13}\text{C}/^{12}\text{C}$  of kimberlites before ~250 Ma preserves typical mantle values, whereas younger kimberlites exhibit lower and more variable ratios, a switch coincident with a recognized surge in kimberlite magmatism.*

*We attribute these changes to increased deep subduction of organic carbon with low  $^{13}\text{C}/^{12}\text{C}$  following the Cambrian Explosion when organic carbon deposition in marine sediments increased significantly.*

*These observations demonstrate that biogeochemical processes at Earth's surface have a profound influence on the deep mantle, revealing an integral link between the deep and shallow carbon cycles.*

Haig, D.W., and C. Thomas (2022) **Methane seeps following Early Permian (Sakmarian) deglaciation, interior East Gondwana, Western Australia: Multiphase carbonate cements, distinct carbon-isotope signatures, extraordinary biota.** PALAEOGEOGRAPHY, PALAEOCLIMATOLOGY, PALAEOECOLOGY 591:doi.org/10.1016/j.palaeo.2022.110862

[The Carboniferous ended 299 megayears ago with glaciation. The Permian followed with a cooler climate.]

Authors' abstract: *Shallow-marine methane seeps, described here for the first time from the Australian Upper Paleozoic, are among few reported globally from the Carboniferous-Permian. Carbonate-cement fabrics,  $\delta^{13}\text{C}$  values and biota indicate that concentrations of nodules scattered in a narrow stratigraphic interval within the lower Holmwood Shale in the Irwin Basin formed in methane seeps.*

*A biota preserved in nodules of the seep deposits includes representatives of three ecosystems: seep, pelagic, and coastal plain. The seep biota, new to the*

*Australian Permian, consists of small thickets with a framework of tubeworms, less common algal-like Tubiphytes, and problematica (? algae or sponges).*

*Other components include microbial mats, macrophyte alga Litostroma (first report from Gondwana); foraminifers; sponges with siliceous monaxon spicules; a new group of small, lightly ornamented rostroconchs; microgastropods and rare larger types; ostracods and minute scolecodonts from polychaete jaws.*

*Elements of the pelagic ecosystem are ammonoids (abundant in enclosing shale) and marine microphytoplankton. Probable vertebrate bone (possibly amphibians) and diverse spores and pollen from land plants come from the adjoining coastal plain. The surrounding mudstone lacks benthic macrofauna but includes an unusual assemblage of siliceous agglutinated foraminifers.*

*The seeps were oases of high organic productivity on an otherwise barren muddy seafloor. The Holmwood Shale's seep carbonates have close similarities to modern seep deposits in shallow-marine settings.*

*They more closely resemble the modern deposits than some of the few others interpreted elsewhere from the Carboniferous-Permian, but seem close to equivalents in shale of latest Pennsylvanian (Gzhelian) age overlying glaciogenic deposits in the Namibian sector of East Gondwana.*

*In both regions, deglaciation of Pennsylvanian ice sheets that covered large parts of East Gondwana, dewatering of melt-water from the glaciogenic sediment pile after burial, and associated release of probable biogenic methane seems to have coincided with formation of seeps.*

**Geology.**

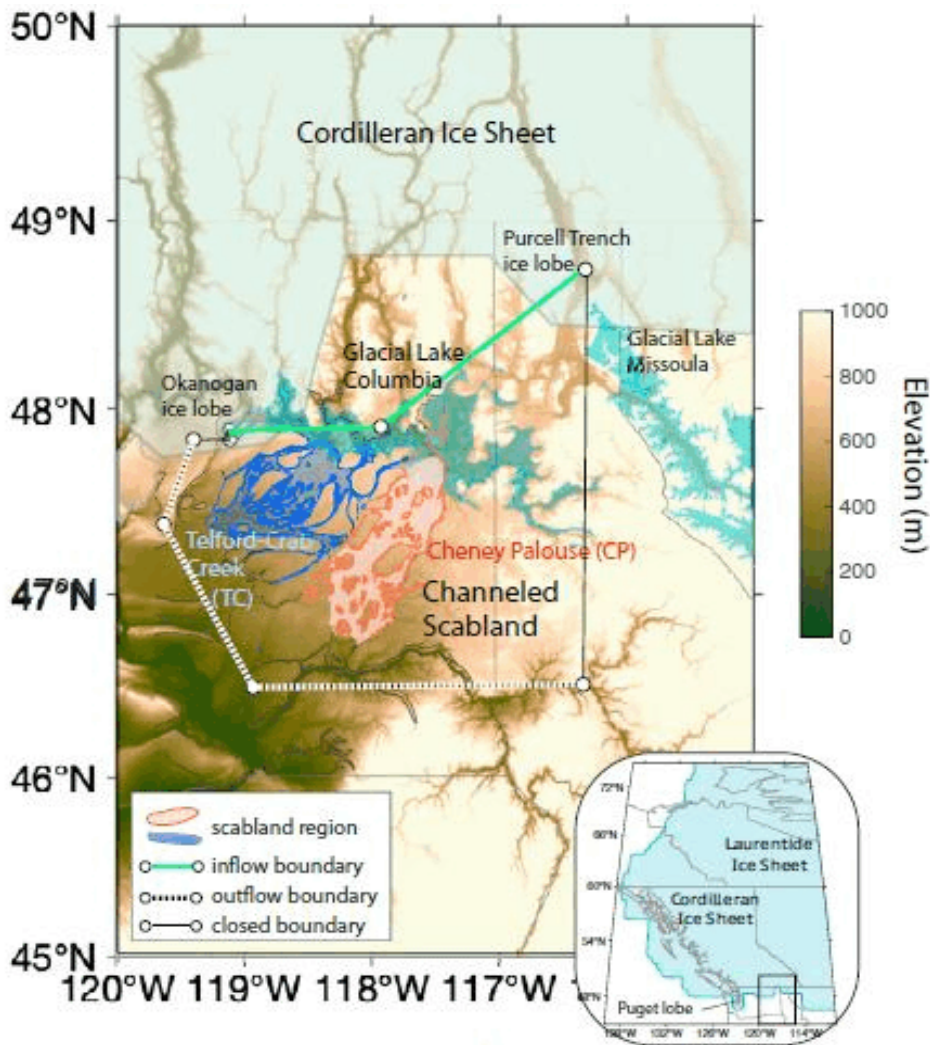
Pico, T., et al (2022) **Glacial isostatic adjustment directed incision of the Channeled Scabland by Ice Age megafloods.** PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES USA 119:doi.org/10.1073/pnas.2109502119 (available as a free pdf)

[During the Ice Ages, the weight of the continental ice sheets was so heavy that they depressed the crust of North America. As the glaciers melted away, the reduction in weight caused the continent to lift up. This is called post-glacial

isostatic rebound and is still ongoing even today. It is also why predictions of rising sea levels haven't come true, because the continents are floating higher as the ice melts away.]

Authors' abstract: *The glacial Lake Missoula outburst floods are among the largest known floods on Earth. Dozens of these floods scoured the landscapes of eastern Washington during the last Ice Age, from 18 to 15.5 thousand years ago, forming what is known as the Channeled Scabland.*

*We explored how changes in topography due to the solid Earth's response to ice sheet loading and unloading influenced the history of megaflood routing over the Channeled Scabland. We found that deformation of Earth's crust played an important role in directing the erosion of the Channeled Scabland.*



Here, we investigated whether glacial isostatic adjustment affected routing of the Missoula floods and incision of the Channeled Scabland from an impounded, glacial Lake Columbia.

We used modern topography corrected for glacial isostatic adjustment as an input to flood models that solved the depth-averaged, shallow water equations and compared the results to erosion constraints. Results showed that floods could have traversed and eroded parts of two major tracts of the Channeled Scabland, Telford-Crab Creek and Cheney-Palouse, near 18 kiloyears ago, whereas glacial isostatic adjustment limited flow into the Cheney-Palouse tract at 15.5 ka.

Partitioning of flow between tracts was governed by tilting of the landscape, which affected the filling and overspill of glacial Lake Columbia directly upstream of the tracts. These results highlight the impact of glacial isostatic adjustment on megaflood routing and landscape evolution.

[Image is from this paper.]

Dinosaurs.

Jagielska, N., et al (2022) **A skeleton from the Middle Jurassic of Scotland illuminates an earlier origin of large pterosaurs.** CURRENT BIOLOGY 32:doi.org/10.1016/j.cub.2022.01.073 (available as a free pdf)

Authors’ abstract: *Pterosaurs were the first vertebrates to evolve flight and include the largest flying animals in Earth history.*

*While some of the last-surviving species were the size of airplanes, pterosaurs were long thought to be restricted to small body sizes (wingspans ca. <1.8 to 1.6 m) from their Triassic origins through the Jurassic, before increasing in size when derived long-skulled and short-tailed pterodactyloids lived alongside a diversity of birds in the Cretaceous.*

*We report a new spectacularly preserved three-dimensional skeleton from the Middle Jurassic of Scotland, which we assign to a new genus and species: Dearc sgiathanach gen. et sp. nov.*

*Its wingspan is estimated at >2.5 m, and bone histology shows it was a juvenile-subadult still actively growing when it died, making it the largest known Jurassic pterosaur represented by a well-preserved skeleton.*

*A review of fragmentary specimens from the Middle Jurassic of England demonstrates that a diversity of pterosaurs was capable of reaching larger sizes at this time but have hitherto been concealed by a poor fossil record.*

*Phylogenetic analysis places D. sgiathanach in a clade of basal long-tailed non-monofenestratan pterosaurs, in a subclade of larger-bodied species (Angustinaripterini) with elongate skulls convergent in some aspects with pterodactyloids.*

*Far from a static prologue to the Cretaceous, the Middle Jurassic was a key interval in pterosaur evolution, in which some non-pterodactyloids diversified and experimented with larger sizes, concurrent with or perhaps earlier than the origin of birds.*

[Images are from this paper.]





# TRIASSIC

# JURASSIC

# CRETACEOUS

201MA

145MA

1

CARNIAN

NORIAN

RHAETIAN

HETTANGIAN

SINEMURIAN

PIELENBACHIAN

TOARCIC

ALENIAN

BALOCIC

BATHONIAN

CALLOVIC

OXFORDIAN

KIMMERIDGIAN

TITHONIAN

BERRIASIAN

VALANGINIAN

BARREMIAN

APTIAN

ALBIAN

Lagerpetidae

*Raeticodactylus filisurenensis*

*Preondactylus bufarinii*

*Eudimorphodon ranzii*

*Dimorphodon macronyx*

*Caelestiventus hanseni*

*Campylognathoides zitteli*

*Fenghuangopterus lili*

*Jianchangnathus robustus*

*Scaphognathus crassirostris* (a)

*Dorygnathus banthensis* (b)

*Cacibupteryx caribensis*

*Parapsicephalus purdoni*

*Rhamphorhynchus muensteri* (c)

*Angustinaripterus longicephalus* (d)

*Sericipterus wucaiwansensis*

*Deiropachopterus* (e)

*Changchengopterus pani*

*Kunpengopterus sinensis*

*Cuspicephalus scarfi*

*Darwinopterus modularis*

*Vesperopteryx lamadongensis*

*Sinomacrops bondei*

*Jeholopterus ninchengensis*

*Anurognathus ammoni*

*Painten pro-pterodactylid*

*Germanodactylus cristatus*

*Pterodactylus antiquus*

*Pterodaustro guinazui*

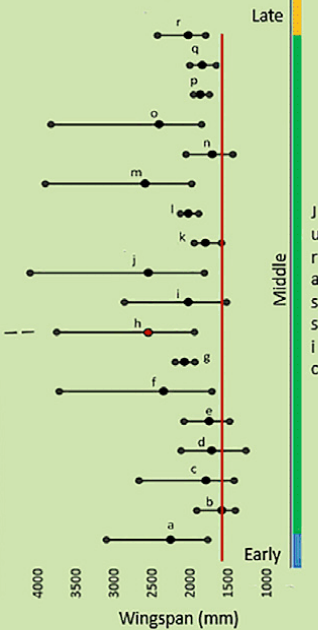
*Tapejara wellnhoferi*

*Dsungaripterus weii*

Non-pterodactylids

Pterodactylids

2



Castanera, D., and J.M. Gasca (2022) **New ornithopod tracks from the Lower Cretaceous El Castellar Formation (Spain): Implications for track preservation and evolution of ornithopod footprints.** PALAEOGEOGRAPHY, PALAEOCLIMATOLOGY, PALAEOECOLOGY 591:doi.org/10.1016/j.palaeo.2022.110866

Authors’ abstract: *Dinosaur tracks have been identified in several Upper Jurassic-Lower Cretaceous sedimentary units across the Maestrazgo Basin in eastern Iberia, which are preserved in a variety of transitional and continental paleoenvironments.*

*Here, we described the lower Barremian San Benón tracksite with the first occurrence of clear dinosaur tracks in the El Castellar Formation within the Galve subbasin.*

*This palustrine-lacustrine formation has yielded a rich osteological record although dinosaur tracks are notably scarce. The new footprints represent an uncommon case of dinosaur track preservation since the site has yielded several non contemporary tracks (part of different ichnoassemblages) preserved as carbonate casts at the base of a limestone bed forming a composite ichnofabric.*

*The track site shows a complex history of sedimentation, track production and preservation linked to the lake level variations. The ornithopod tracks are identified to belong to the ornithopod ichnogenus Caririchnium, concretely to the ichnospecies C. magnificum.*

*The studied tracks represent the oldest occurrence of this ichnotaxa in the Maestrazgo Basin and are coherent with other coeval (or almost coeval) occurrences in the Iberian Peninsula.*

*The presence of C. magnificum in the El Castellar Formation fills a gap between the oldest (Tithonian-early Valanginian?) and younger (Barremian) occurrences of ornithopod tracks within the Maestrazgo Basin, being one of the most complete successions of ornithopod tracks in Europe.*

*Interestingly, the underlying formations have ichnoassemblages with Dinehichnus-like and Iguanodontipus-like tracks, whereas Caririchnium is mainly found in El Castellar Formation and other Barremian units.*

*These changes in the ichnoassemblages reflect the ornithopod faunal changes shown by osteological data in the Iberian Peninsula recording a Late Jurassic-earliest Cretaceous stage dominated by basal iguanodontians followed by an Early Cretaceous stage with abundance of more derived and large-sized iguanodontians.*

[Images are from this paper.]



During, M.A.D., et al (2022) **The Mesozoic terminated in boreal spring.** NATURE 603:doi.org/10.1038/s41586-022-04446-1 (available as a free pdf)

[See also OPUNTIA #456, page 20, for a paper on the first day of the asteroid impact.]

Authors' abstract: *The Cretaceous-Palaeogene mass extinction around 66 million years ago was triggered by the Chicxulub asteroid impact on the present-day Yucatán Peninsula. This event caused the highly selective extinction that eliminated about 76% of species, including all non-avian dinosaurs, pterosaurs, ammonites, rudists and most marine reptiles.*

*The timing of the impact and its aftermath have been studied mainly on millennial timescales, leaving the season of the impact unconstrained. Here, by studying fishes that died on the day the Mesozoic era ended, we demonstrate that the impact that caused the Cretaceous-Palaeogene mass extinction took place during boreal spring.*

*Osteohistology together with stable isotope records of exceptionally preserved perichondral and dermal bones in acipenseriform fishes from the Tanis impact-induced seiche deposits reveal annual cyclicity across the final years of the Cretaceous period.*

*Annual life cycles, including seasonal timing and duration of reproduction, feeding, hibernation and aestivation, vary strongly across latest Cretaceous biotic clades.*

*We postulate that the timing of the Chicxulub impact in boreal spring and austral autumn was a major influence on selective biotic survival across the Cretaceous-Palaeogene boundary.*

*Direct consequences of the impact, including impact glass fallout, large-scale forest fires and tsunamis, are geologically documented more than 3,500 km from the Chicxulub impact crater.*

*Although direct effects of the impact devastated a vast geographical area, the global mass extinction probably unfolded during its aftermath, which involved rapid climatic deterioration estimated to have lasted up to several thousands of years.*

*Whether seasonal timing of the onset of these marked changes affected the selectivity of the K-Pg extinction could not yet be established owing to the lack of suitable records.*

*The Tanis event deposit in North Dakota (USA) is an exceptional seiche deposit preserving a rich thanatocoenosis (that is, a mass death assemblage) of latest Cretaceous biota at the top of the Hell Creek Formation.*

*The majority of macrofossils encountered at the Tanis locality represent direct casualties of the K-Pg bolide impact that were buried within the impact-induced seiche deposit. Tens of minutes after the impact, the seiche agitated large volumes of water and soil in the estuary of the Tanis river.*

*As the seiche proceeded upstream, it advected bones, teeth, bivalves, ammonites, benthic foraminifera and plant matter in the suspended load while impact spherules rained down from the sky.*

*Within the thanatocoenotic accumulation, abundant acipenseriforms, sturgeons and paddlefishes, became oriented along the seiche flow directions and buried alive with numerous impact spherules in their gills.*

*During the Maastrichtian (that is, the last age of the Cretaceous), the climate of present-day North Dakota involved four seasons that were documented in tree-ring records recovered from other Upper Cretaceous sites in the Hell Creek Formation.*

*Tanis was located at approximately 50° N during the latest Cretaceous and experienced distinct seasonality in rainfall and temperature. Regional air temperatures were reconstructed to range from 4 to 6 °C in winter up to an average of about 19 °C in summer.*

*To uncover the season of the K-Pg bolide impact, we analysed osteohistological records of acipenseriform bone apposition in three paddlefish dentaries and three sturgeon pectoral fin spines that were excavated at the Tanis site in 2017.*

*These skeletal elements preserve unaltered growth records from embryonic development up to death, making them highly suitable for life history reconstruction.*



Wilson Mantilla, G.P., and J.A. Wilson Mantilla (2022) **New mammals from the Naskal intertrappean site and the age of India's earliest eutherians.** PALAEOGEOGRAPHY, PALAEOCLIMATOLOGY, PALAEOECOLOGY 591:doi.org/10.1016/j.palaeo.2022.110857

Authors' abstract: *The first Cretaceous mammals described from India were recovered from the Naskal locality, on the southeastern edge of the Deccan Traps Volcanic Province (DTVP), where it is preserved between two basalt flows.*

*Because the DTVP eruptions spanned the Cretaceous-Paleogene boundary (KPB), it is often unknown whether trap-associated fossil sites are latest Cretaceous (Maastrichtian) or early Paleocene in age.*

*The Naskal locality accounts for nearly half of published mammal records from DTVP-associated sediments as well as a host of other vertebrate microfossils. Its age takes on singular importance in the context of mammalian evolution in India and the effects of the end-Cretaceous mass extinction and subsequent evolutionary radiation of placentals.*

*Here we describe two new mammal species, Indoclemensia naskalensis gen. et sp. nov. and I. magnus sp. nov., from Naskal and present evidence from 40Ar/39Ar geochronology, magnetostratigraphy, and chemostratigraphy of the over- and underlying basalt flows to refine the age of the Naskal locality and nearby Rangapur locality.*

*In conjunction with palynostratigraphy and vertebrate biostratigraphy, these sites can be confidently restricted to a <100 kyr interval spanning the KPB. The most probable 40Ar/39Ar age is latest Cretaceous (66.136 to 66.056 Ma), but an earliest Paleogene age cannot be ruled out.*

*We explore the implications of this age assignment for Deccan chemostratigraphy and Deccan volcanism, Cretaceous-Paleogene (K/Pg) mass extinction, Indian mammalian faunal evolution, and the timing of the origin of placental mammals.*

**Zoology.**

Chiriboga-Paredes, Y., et al (2022) **Discovery of a putative scalloped hammerhead shark Sphyrna lewini (Carcharhiniformes: Sphyrnidae) nursery site at the Galapagos Islands, Eastern Tropical Pacific.** ENVIRONMENTAL BIOLOGY OF FISHES 105:181-192

Authors' abstract: *Sphyrna lewini is a viviparous shark that pups in shallow coastal waters. Given dramatic declines in the S. lewini Eastern Pacific population, it is essential to identify nursery grounds that could potentially increase the resilience of adult populations. Here, we provide evidence of a putative nursery ground for S. lewini at an oceanic island in the Galapagos Marine Reserve.*

*A fortuitous finding of hammerhead shark pups in 2017 led to a series of focused surveys from 2018 onwards, using experimental fishing, baited remote underwater videos stations, and acoustic telemetry, to assess presence and residency patterns of this species at Puerto Grande: a shallow bay at the island of San Cristobal.*

*We caught 66 individuals, of which we measured 54 (mean TL = 52.13 cm). Four individuals were fitted with ultrasonic tags and were detected on an array of 14 receivers in the bay for up to 93 days, showing a high residency index of at least 89%.*

*We actively tracked a single individual for 3 hours at night and a further hour a week later. Our results suggest that Puerto Grande is a key habitat for the development of the critically endangered S. lewini.*

Uccheddu, S., et al (2022) **Domestic dogs (Canis familiaris) grieve over the loss of a conspecific.** SCIENTIFIC REPORTS 12:doi.org/10.1038/s41598-022-05669-y (available as a free pdf)

Authors' abstract: *Behavioural reactions towards a dead conspecific have been observed rarely in wild canids and there is no documented scientific evidence of grief in pet dogs.*

*A quantitative analysis of grief related responses in both dogs and owners was conducted, using the validated online Mourning Dog Questionnaire. The survey*

*was completed by 426 Italian adults who had owned at least two dogs, one of whom died while the other was still alive.*

*This research aims to explore whether, how and what a dog may experience over the loss of a companion dog. Multiple logistic regression indicates that both a friendly or parental relationship between two dogs but also the fact that dogs used to share food and the owner's grief and anger are principal predictors of negative behavioural changes.*

*According to dog owners' answers, the surviving dog after the death of the companion dog changed both in terms of activities ("playing", "sleeping", and "eating") and emotions (fearfulness), which occurred as a function of the quality of the relationship between the two animals.*

*By contrast, the time the two dogs had spent together had no effect on the behaviours of surviving dog. Owner perceptions about their dog's reactions and emotions were not related to the memory or suffering of the event that tended to diminish over time.*

*These findings indicate that a dog may show grief-related behavioural and emotional patterns when a close conspecific dies, with aspects of the latter possibly related to the owner's emotional status.*

*Grief responses are widely reported in social species such as great apes, whales, dolphins, elephants and birds, which have been described to engage in death rituals, including touching and investigating a conspecific's carcass.*

*In primates and cetaceans, individuals have been observed physically supporting and/or carrying a deceased conspecific (usually a young animal) for periods ranging from hours to more than a month.*

*Seeing the corpse might be useful for an animal as it might learn about death from specific features, including the total lack of responsiveness or animacy.*

*Indeed, different animal species exhibit complex responses towards their dead, probably, not only as a consequence of several sensory characteristics but also from changes in biological motion perception.*

*The ability to mourn has been suggested for a variety of other animal species, including dogs, but evidence is currently sparse and numerous limitations have*

*to be considered, including the risk of interpreting anthropocentrically and the difficulty to design replicable and representative scientific experiments.*

*If seeing the corpse is part of the death ritual, considering that domestic dogs have no access or only a brief access to the corpse, then only the reaction to separation from the bonded individual might be evaluated.*

**Human Prehistory.**

Dulias, K., et al (2022) **Ancient DNA at the edge of the world: Continental immigration and the persistence of Neolithic male lineages in Bronze Age Orkney.** PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES USA 119:doi.org/10.1073/pnas.2108001119 (available as a free pdf)

*Authors' abstract: Orkney was a major cultural center during the Neolithic, 3800 to 2500 BC. Farming flourished, permanent stone settlements and chambered tombs were constructed, and long-range contacts were sustained.*

*From ~3200 BC, the number, density, and extravagance of settlements increased, and new ceremonial monuments and ceramic styles, possibly originating in Orkney, spread across Britain and Ireland. By ~2800 BC, this phenomenon was waning, although Neolithic traditions persisted to at least 2500 BC.*

*Unlike elsewhere in Britain, there is little material evidence to suggest a Beaker presence, suggesting that Orkney may have developed along an insular trajectory during the second millennium BC. We tested this by comparing new genomic evidence from 22 Bronze Age and 3 Iron Age burials in northwest Orkney with Neolithic burials from across the archipelago.*

*We identified signals of inward migration on a scale unsuspected from the archaeological record. As elsewhere in Bronze Age Britain, much of the population displayed significant genome-wide ancestry deriving ultimately from the Pontic-Caspian Steppe.*

*However, uniquely in northern and central Europe, most of the male lineages were inherited from the local Neolithic. This suggests that some male descendants of Neolithic Orkney may have remained distinct well into the Bronze Age, although there are signs that this had dwindled by the Iron Age.*

Furthermore, although the majority of mitochondrial DNA lineages evidently arrived afresh with the Bronze Age, we also find evidence for continuity in the female line of descent from Mesolithic Britain into the Bronze Age and even to the present day.

Struck, J., et al (2022) **Central Mongolian lake sediments reveal new insights on climate change and equestrian empires in the Eastern Steppes.** SCIENTIFIC REPORTS 12:doi.org/10.1038/s41598-022-06659-w (available as a free pdf)

Authors' abstract: *The repeated expansion of East Asian steppe cultures was a key driver of Eurasian history, forging new social, economic, and biological links across the continent.*

*Climate has been suggested as important driver of these poorly understood cultural expansions, but paleoclimate records from the Mongolian Plateau often suffer from poor age control or ambiguous proxy interpretation.*

*Here, we use a combination of geochemical analyses and comprehensive radiocarbon dating to establish the first robust and detailed record of paleohydrological conditions for Lake Telmen, Mongolia, covering the past ~ 4000 years.*

*Our record shows that humid conditions coincided with solar minima, and hydrological modeling confirms the high sensitivity of the lake to paleoclimate changes.*

*Careful comparisons with archaeological and historical records suggest that in the vast semi-arid grasslands of eastern Eurasia, solar minima led to reduced temperatures, less evaporation, and high biomass production, expanding the power base for pastoral economies and horse cavalry.*

*Our findings suggest a crucial link between temperature dynamics in the Eastern Steppe and key social developments, such as the emergence of pastoral empires, and fuel concerns that global warming enhances water scarcity in the semi-arid regions of interior Eurasia.*

**Humans: Historical And Modern.**

Matsui, T., et al (2022) **The manufacture and origin of the Tutankhamen meteoritic iron dagger.** METEORITICS AND PLANETARY SCIENCE doi.org/10.1111/maps.13787 (available as a free pdf)

Authors' abstract: *The Iron Age was the time when people acquired iron processing technology and is generally thought to have begun after 1200 B.C. Some prehistoric iron artifacts made of iron meteorites are dated from the Bronze Age.*

*A nicely preserved meteoritic iron dagger was found in the tomb of King Tutankhamen (1361 to 1352 B.C.) of ancient Egypt. Yet, its manufacturing method and origin remain unclear. Here, we report nondestructive two-dimensional chemical analyses of the Tutankhamen iron dagger, conducted at the Egyptian Museum of Cairo.*

*Elemental mapping of Ni on the dagger blade surface shows discontinuous banded arrangements in places with cubic symmetry and a bandwidth of about 1 mm, suggesting a Widmanstätten pattern. The intermediate Ni content with the presence of the Widmanstätten pattern implies the source meteorite of the dagger blade to be octahedrite.*

*The randomly distributed sulfur-rich black spots are likely remnants of troilite (FeS) inclusions in iron meteorite. The preserved Widmanstätten pattern and remnant troilite inclusion show that the iron dagger was manufactured by low-temperature (<950°C) forging.*



*The gold hilt with a few percent of calcium lacking sulfur suggests the use of lime plaster instead of gypsum plaster as an adhesive material for decorations on the hilt.*

*Since the use of lime plaster in Egypt started during the Ptolemaic period (305 to 30 B.C.), the Ca-bearing gold hilt hints at its foreign origin, possibly from*



*Mitanni, Anatolia, as suggested by one of the Amarna letters saying that an iron dagger with gold hilt was gifted from the king of Mitanni to Amenhotep III, the grandfather of Tutankhamen.*

[Image is from this paper.]

Izdebski, A., et al (2022) **Palaeoecological data indicates land-use changes across Europe linked to spatial heterogeneity in mortality during the Black Death pandemic.** NATURE ECOLOGY AND EVOLUTION doi.org/10.1038/s41559-021-01652-4 (available as a free pdf)

Authors’ abstract: *The Black Death (1347 to 1352 ce) is the most renowned pandemic in human history, believed by many to have killed half of Europe’s population.*

*However, despite advances in ancient DNA research that conclusively identified the pandemic’s causative agent (bacterium Yersinia pestis), our knowledge of the Black Death remains limited, based primarily on qualitative remarks in medieval written sources available for some areas of Western Europe.*

*Here, we remedy this situation by applying a pioneering new approach, ‘big data palaeoecology’, which, starting from palynological data, evaluates the scale of the Black Death’s mortality on a regional scale across Europe. We collected pollen data on landscape change from 261 radiocarbon-dated coring sites (lakes and wetlands) located across 19 modern-day European countries.*

*We used two independent methods of analysis to evaluate whether the changes we see in the landscape at the time of the Black Death agree with the hypothesis that a large portion of the population, upwards of half, died within a few years in the 21 historical regions we studied. While we can confirm that the Black Death had a devastating impact in some regions, we found that it had negligible or no impact in others.*

*These inter-regional differences in the Black Death’s mortality across Europe demonstrate the significance of cultural, ecological, economic, societal and climatic factors that mediated the dissemination and impact of the disease. The complex interplay of these factors, along with the historical ecology of plague, should be a focus of future research on historical pandemics.*

*Cereal trade is thought to have been instrumental for the introduction of the pandemic to Mediterranean Europe, and along established conduits of commerce and communication, ecological factors, associated contingency effects and historical path dependency mattered from the outset.*

*Before the pandemic arrived in the Crimea, the volume of cereal trade between Italy and the Black Sea was sizable, yet blocked by embargo. High demand in southern Europe for Black Sea cereals from 1345 onwards was associated with a period of excessive precipitation and cooling negatively affecting cereal supplies in Italy and beyond.*

*Cereal imports from Black Sea Cereal trade is thought to have been instrumental for the introduction of the pandemic to Mediterranean Europe, and along established conduits of commerce and communication, ecological factors, associated contingency effects and historical path dependency mattered from the outset.*

Vicente, R., et al (2022) **Enhanced interplay of neuronal coherence and coupling in the dying human brain.** FRONTIERS IN AGING NEUROSCIENCE 14:doi.org/10.3389/fnagi.2022.813531 (available as a free pdf)

Authors’ abstract: *Here, we present continuous electroencephalography (EEG) recording from a dying human brain, obtained from an 87-year-old patient undergoing cardiac arrest after traumatic subdural hematoma.*

*Albeit the influence of neuronal injury and swelling, our data provide the first evidence from the dying human brain in a non-experimental, real-life acute care clinical setting and advocate that the human brain may possess the capability to generate coordinated activity during the near-death period.*

*Given that cross-coupling between alpha and gamma activity is involved in cognitive processes and memory recall in healthy subjects, it is intriguing to speculate that such activity could support a last “recall of life” that may take place in the near-death state.*

**Environmental Ecology.**

Lark, T.J., et al (2022) **Environmental outcomes of the US Renewable Fuel Standard.** PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES USA 119:doi.org/10.1073/pnas.2101084119 (available as a free pdf)

Authors’ abstract: *The Renewable Fuel Standard (RFS) specifies the use of biofuels in the United States and thereby guides nearly half of all global biofuel production, yet outcomes of this keystone climate and environmental regulation remain unclear.*

*Here we combine econometric analyses, land use observations, and biophysical models to estimate the realized effects of the RFS in aggregate and down to the scale of individual agricultural fields across the United States.*

*We find that the RFS increased corn prices by 30% and the prices of other crops by 20%, which, in turn, expanded US corn cultivation by 2.8 Mha (8.7%) and total cropland by 2.1 Mha (2.4%) in the years following policy enactment (2008 to 2016).*

*These changes increased annual nationwide fertilizer use by 3 to 8%, increased water quality degradants by 3 to 5%, and caused enough domestic land use change emissions such that the carbon intensity of corn ethanol produced under the RFS is no less than gasoline and likely at least 24% higher.*

*These tradeoffs must be weighed alongside the benefits of biofuels as decision-makers consider the future of renewable energy policies and the potential for fuels like corn ethanol to meet climate mitigation goals.*

Zhao, X., et al (2022) **Potential greenhouse gas risk led by renewable energy crowding out nuclear power.** iSCIENCE 25:doi.org/10.1016/j.isci.2022.103741 (available as a free pdf)

Authors’ abstract: *Increasing variable renewable energy (VRE) is one of the main approaches for greenhouse gas (GHG) mitigation. However, we find a GHG increase risk associated with increasing VRE. VRE crowds out nuclear power (VRECON) but cannot fully obtain the left market share, which is obtained by fossil energy.*

*We developed an integrated dispatch-and-investment model to estimate the VRECON GHG-boosting effect in the Pennsylvania-New Jersey-Maryland Interconnection and the Electric Reliability Council of Texas. In the above two markets, VRECON could increase the annual GHG emission by up to 136 MTCO<sub>2eq</sub> totally.*

*Furthermore, we find that the VRECON GHG-boosting effect can be mitigated by combining wind and solar power. We argue that, for GHG abatement, policymakers should require the proper mix of wind and solar power in renewable portfolio standards and control nuclear power’s retirement pace to match the progress of VRE growth.*

Wilkinson, J.L., et al (2022) **Pharmaceutical pollution of the world’s rivers.** PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES USA 119:doi.org/10.1073/pnas.2113947119 (available as a free pdf)

Authors’ abstract: *Here, we present a global-scale study of API pollution in 258 of the world’s rivers, representing the environmental influence of 471.4 million people across 137 geographic regions.*

*Samples were obtained from 1,052 locations in 104 countries (representing all continents and 36 countries not previously studied for API contamination) and analyzed for 61 APIs.*

*Highest cumulative API concentrations were observed in sub-Saharan Africa, south Asia, and South America. The most contaminated sites were in low- to middle-income countries and were associated with areas with poor wastewater and waste management infrastructure and pharmaceutical manufacturing.*

*The most frequently detected APIs were carbamazepine, metformin, and caffeine (a compound also arising from lifestyle use), which were detected at over half of the sites monitored.*

*Concentrations of at least one API at 25.7% of the sampling sites were greater than concentrations considered safe for aquatic organisms, or which are of concern in terms of selection for antimicrobial resistance. Therefore, pharmaceutical pollution poses a global threat to environmental and human health, as well as to delivery of the United Nations Sustainable Development Goals.*

Willmott, N.J., et al (2022) **Wildlife exploitation of anthropogenic change: Interactions and consequences.** QUARTERLY REVIEW OF BIOLOGY 97:doi.org/10.1086/718748

Authors’ abstract: *Anthropogenic environmental change is continuing to accelerate globally and has important ecological consequences for virtually all life on Earth.*

*There is extensive knowledge of the costs of anthropogenic change across many taxa, but there are also disparate examples of animals exploiting these changes and increasing their fitness.*

*Species may benefit from novel or enhanced resources, variation in physical conditions, or from shifting biotic interactions arising from anthropogenic impacts. Here, we explore the breadth of examples, drawn from different biomes and fields of research, of animals that exploit anthropogenic change.*

**Technology.**

Pavletic, B., et al (2022) **Spaceflight virology: What do we know about viral threats in the spaceflight environment?** ASTROBIOLOGY 22:doi.org/10.1089/ast.2021.0009 (available as a free pdf)

Authors’ abstract: *Viruses constitute a significant part of the human microbiome, so wherever humans go, viruses are brought with them, even on space missions.*

*In this mini review, we focus on the International Space Station as the only current human habitat in space that has a diverse range of viral genera that infect microorganisms from bacteria to eukaryotes.*

*Inside the ISS, there is constant air circulation and filtration with high-efficiency particulate air (HEPA) filters. They have been reported to efficiently filter out small aerosols (98% efficiency, particles 0.3 to 10 mm diameter).*

*Even though virus sizes are in nanometer range, they travel in air-suspended droplets and aerosols that are micrometer-sized, being efficiently filtered by HEPA filters. Therefore, they protect the astronauts.*

*Multiple studies have detected reactivation and shedding of viruses in human space and analog missions and environments. Due to the prevalence of herpesviruses in the general population, reactivation events cannot be reliably avoided in space either by isolation or by medical treatment.*

*Therefore, developing spaceflight countermeasures to attenuate viral reactivation outcomes such as preflight immunity enhancement to inhibit viruses is a factor to be considered.*

Smith, O., et al (2022) **The effect of renewable energy incorporation on power grid stability and resilience.** SCIENCE ADVANCES 8:10.1126/sciadv.abj6734 (available as a free pdf)

Authors’ abstract: *Contemporary proliferation of renewable power generation is causing an overhaul in the topology, composition, and dynamics of electrical grids. These low-output, intermittent generators are widely distributed throughout the grid, including at the household level.*

*It is critical for the function of modern power infrastructure to understand how this increasingly distributed layout affects network stability and resilience. This paper uses dynamical models, household power consumption, and photovoltaic generation data to show how these characteristics vary with the level of distribution.*

*It is shown that resilience exhibits daily oscillations as the grid’s effective structure and the power demand fluctuate. This can lead to a substantial decrease in grid resilience, explained by periods of highly clustered generator output.*

*Moreover, the addition of batteries, while enabling consumer self-sufficiency, fails to ameliorate these problems. The methodology identifies a grid’s susceptibility to disruption resulting from its network structure and modes of operation.*



Nightingale, S.J., and H. Farid (2022) **AI-synthesized faces are indistinguishable from real faces and more trustworthy**. PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES USA 119:doi.org/10.1073/pnas.2120481119 (available as a free pdf)

Authors' abstract: *Artificial intelligence (AI)-synthesized text, audio, image, and video are being weaponized for the purposes of nonconsensual intimate imagery, financial fraud, and disinformation campaigns.*

*Our evaluation of the photorealism of AI-synthesized faces indicates that synthesis engines have passed through the uncanny valley and are capable of creating faces that are indistinguishable, and more trustworthy, than real faces.*

*We, therefore, encourage those developing these technologies to consider whether the associated risks are greater than their benefits. If so, then we discourage the development of technology simply because it is possible.*

*If not, then we encourage the parallel development of reasonable safeguards to help mitigate the inevitable harms from the resulting synthetic media. Safeguards could include, for example, incorporating robust watermarks into the image and video synthesis networks that would provide a downstream mechanism for reliable identification.*

*Because it is the democratization of access to this powerful technology that poses the most significant threat, we also encourage reconsideration of the often laissez-faire approach to the public and unrestricted releasing of code for anyone to incorporate into any application.*

[Images are from this paper.]



Fig. 3. The four most (Top) and four least (Bottom) trustworthy faces and their trustworthy rating on a scale of 1 (very untrustworthy) to 7 (very trustworthy). Synthetic faces (S) are, on average, more trustworthy than real faces (R).