OPUNTIA 494

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

About The Cover: I took this photo on January 30 looking downstream Nose Creek just before it empties into the Bow River.

CURRENT EVENTS: PART 13

by Dale Speirs

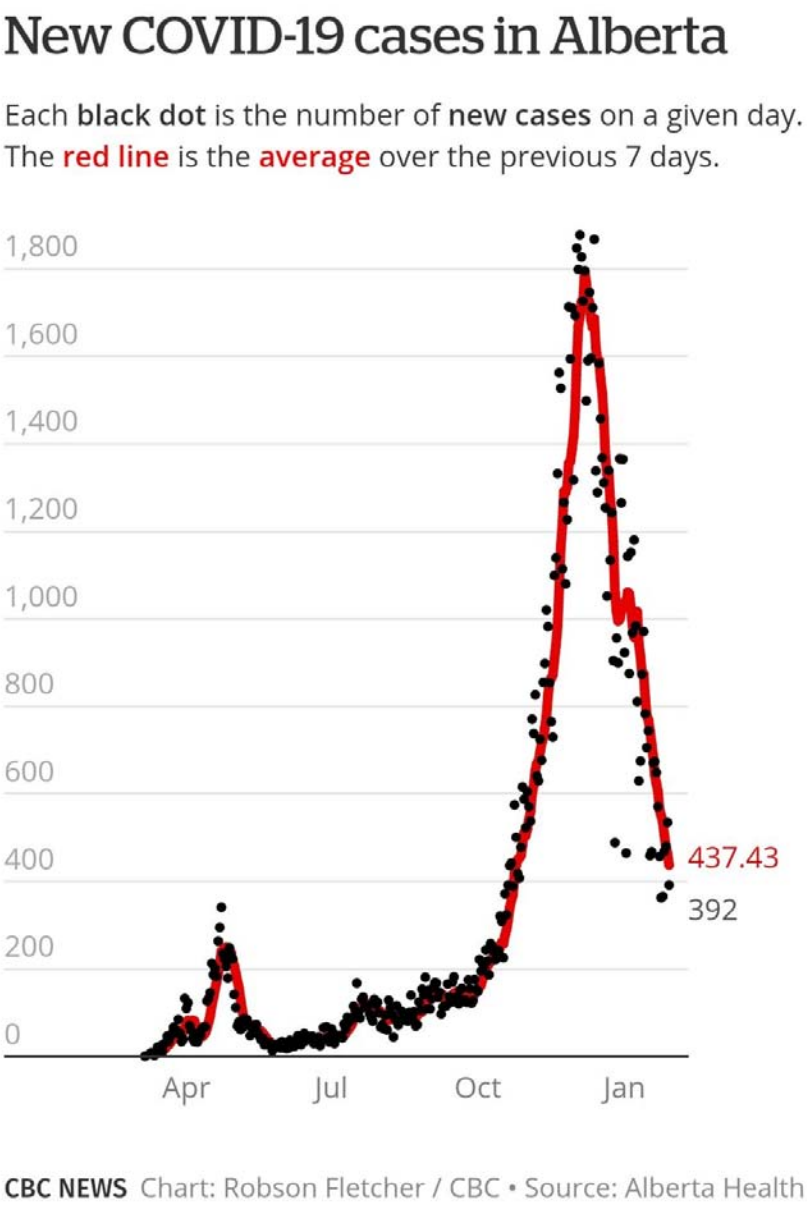
[Parts 1 to 12 appeared in OPUNTIAs #474, 475, 479, 480, 483, 484, and 488 to 493.]

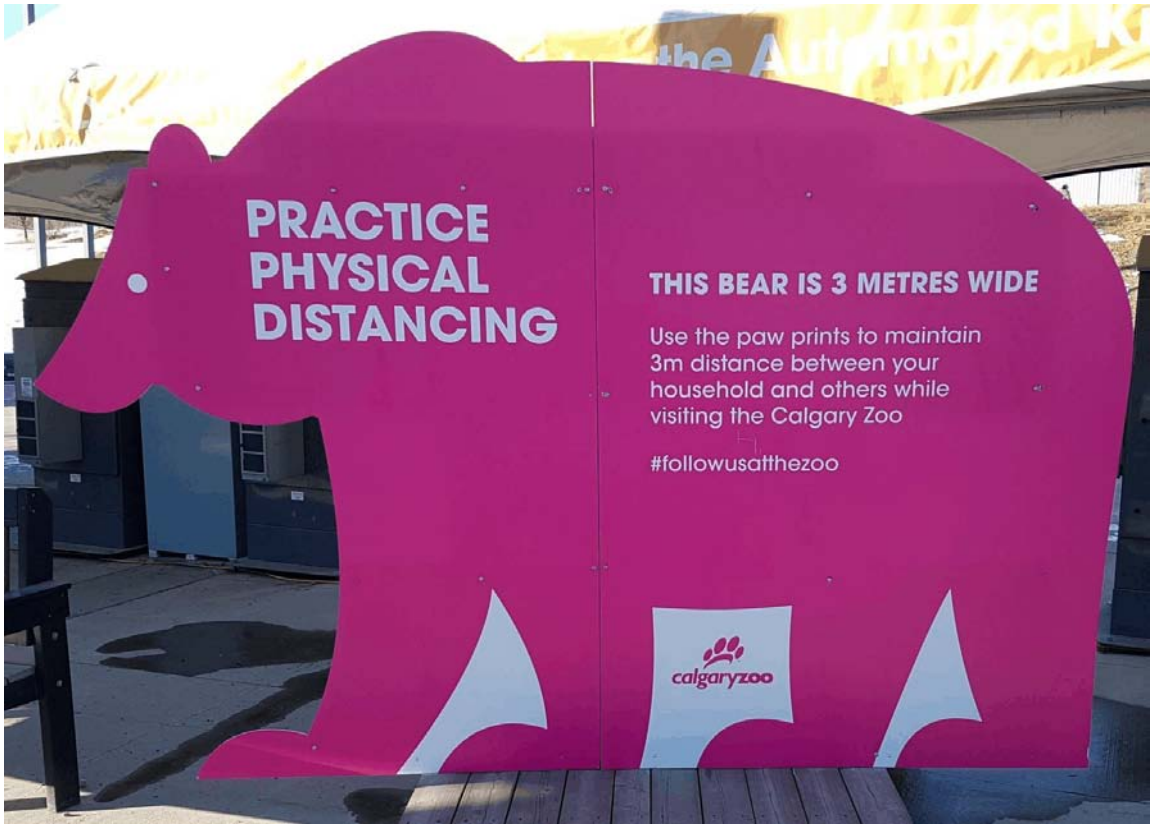
On January 31, the weather warmed up to +5°C, a beautiful day for a stroll eastward along the Stephen Avenue pedestrian mall in downtown Calgary.

I passed a small clump of protestors. They appeared to be anti-maskers but seemed to have other causes freeloading with them, such as a street church.

At far left, the woman protesting the closure of fitness centres seemed suspiciously like a shill for them, as that would be the last place anyone should want to go during a pandemic.


4.0m
TD SQUARE
TAKE ACTION TODAY
I AM FREE TO BREATHE FRESH AIR
Shouldn't health come FIRST ?¿?¿?
Why are gyms still CLOSED?!
RESIST
Holy Bible





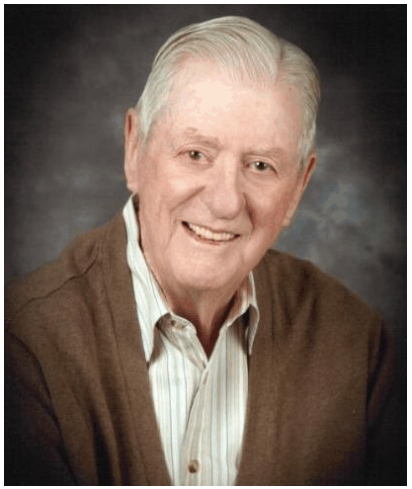
As of February 8, Canada had 804,253 cases of COVID-19, with 20,767 deaths and 1,077,172 vaccinations. Canada's population is 38,000,000.

Beginning February 5, Calgary finally got its traditional week of cold weather when temperatures went down to -30°C for a week. I mostly hibernated, just going outside to shovel the sidewalks or do a few quick errands. We've only had the one half-hearted chinook which left most of the previous snowfall behind. The Arctic ridge that settled over Alberta brought snow with it but only about 10 cm.

That was enough to snarl traffic in Calgary, causing a couple of hundred smashups. Police don't bother to count vehicles sliding into the ditches and getting stuck without any damage. Canadian drivers handle winter by denial. They figure if they can drive 80 klicks around a curve in August then by God they can do it on an icy road because they have 4WD.

Gordon Hill (1923-2021) was an old friend of mine in both senses of the word. He died on January 31 at the age of 97 from COVID-19. He was a stamp collector, which was how I came to know him, as we were both active in the Calgary Philatelic Society.

Gordon was one of the few remaining Spitfire pilots who saw combat in Europe during the war. He flew 190 sorties in the liberation of the Netherlands by Canadian forces. I once asked him what the worst part of combat was. He said it was a sore neck, because he had to keep looking over his shoulders during high-G turns against the German ME-109s.



Gordon was born on November 11 and liked to joke he would always be remembered.

COVID-19 In The Literature.

Pullano, G., et al (2021) **Underdetection of cases of COVID-19 in France threatens epidemic control.** NATURE 590:doi.org/10.1038/s41586-020-03095-6 (available as a free pdf)

Authors' abstract: *As countries in Europe gradually relaxed lockdown restrictions after the first wave, test–trace–isolate strategies became critical to maintain the incidence of coronavirus disease 2019 (COVID-19) at low levels. Reviewing their shortcomings can provide elements to consider in light of the second wave that is currently underway in Europe.*

Here we estimate the rate of detection of symptomatic cases of COVID-19 in France after lockdown through the use of virological and participatory syndromic surveillance data coupled with mathematical transmission models calibrated to regional hospitalizations.

Our findings indicate that around 90,000 symptomatic infections, corresponding to 9 out 10 cases, were not ascertained by the surveillance system in the first 7 weeks after lockdown from 11 May to 28 June 2020, although the test positivity rate did not exceed the 5% recommendation of the World Health Organization.

The median detection rate increased from 7% (95% confidence interval, 6 to 8%) to 38% (35 to 44%) over time, with large regional variations, owing to a strengthening of the system as well as a decrease in epidemic activity. According to participatory surveillance data, only 31% of individuals with COVID-19-like symptoms consulted a doctor in the study period.

This suggests that large numbers of symptomatic cases of COVID-19 did not seek medical advice despite recommendations, as confirmed by serological studies. Encouraging awareness and same-day health care seeking behaviour of suspected cases of COVID-19 is critical to improve detection.

However, the capacity of the system remained insufficient even at the low epidemic activity achieved after lockdown, and was predicted to deteriorate rapidly with increasing incidence of COVID-19 cases. Substantially more aggressive, targeted and efficient testing with easier access is required to act as a tool to control the COVID-19 pandemic.

The testing strategy will be critical to enable partial lifting of the current restrictive measures in Europe and to avoid a third wave. Surveillance and detection aim to rapidly identify and isolate cases to prevent onward transmission of SARS-CoV-2 in the community and to avoid a substantial resurgence of cases of COVID-19.

After an initial period, during which, because of a limited capacity, testing for SARS-CoV-2 infections mainly focused on severely ill patients, a new testing policy was implemented in France to systematically screen for potential infections with SARS-CoV-2 and enable lifting of the lockdown restrictions on 11 May 2020.

The specific characteristics of COVID-19, however, hinder the identification of cases. Large proportions of asymptomatic infectious individuals, and the presence of mild or paucisymptomatic infections that easily go unobserved, present serious challenges to the detection and control of SARS-CoV-2. Missing a substantial portion of infectious individuals compromises the control effort, enabling the virus to silently spread.

Lopreite, M., et al (2021) **Early warnings of COVID-19 outbreaks across Europe from social media.** SCIENTIFIC REPORTS 11:doi.org/10.1038/s41598-021-81333-1 (available as a free pdf)

Authors' abstract: *We analyze data from Twitter to uncover early-warning signals of COVID-19 outbreaks in Europe in the winter season 2019-2020, before the first public announcements of local sources of infection were made. We show evidence that unexpected levels of concerns about cases of pneumonia were raised across a number of European countries.*

Whistleblowing came primarily from the geographical regions that eventually turned out to be the key breeding grounds for infections. These findings point to the urgency of setting up an integrated digital surveillance system in which social media can help geolocalize chains of contagion that would otherwise proliferate almost completely undetected.

Public health surveillance plays a critical role in helping national governments to monitor the emergence of infectious diseases, promptly identify a state of emergence, and propose effective measures to curb an outbreak.

Since January 2020, when the severe acute respiratory syndrome-coronavirus 2 (SARS-CoV-2), which causes the Coronavirus disease 2019 (COVID-19), began to spread from China to Europe and the United States, criticism has intensified over the ways in which public health authorities across many countries managed to face the urgency of the threat and devise appropriate mitigation strategies.

Lapses in identifying early-warning signals left many national governments largely blind to the unprecedented scale of a looming public health emergency and unable to spur a no-holds-barred timely defense, with severe consequences in terms of mortality rates.

Different surveillance strategies have been used to monitor the spread of a disease, including sentinel surveillance systems, household surveys, laboratory-based surveillance, community-based surveillance practices, wastewater surveillance, and the Integrated Disease Surveillance and Response (IDSR) framework.

More recently, social media have begun to gain a prominent role as complementary surveillance systems for monitoring epidemics and informing the judgements and decisions of public health officials and experts.

For instance, recent work has relied upon multiple digital data streams to uncover early-warning indicators of variations in state-level US COVID-19 activity that may facilitate the detection of impending COVID-19 outbreaks. Leveraging social media to detect early-warning signals of an upcoming pandemic is indeed a good example of epidemiological monitoring.

Stadlbauer, D., et al (2021) **Repeated cross-sectional sero-monitoring of SARS-CoV-2 in New York City.** NATURE 590:doi.org/10.1038/s41586-020-2912-6 (available as a free pdf)

Authors' abstract: *In late 2019, severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) was first detected in China and has since caused a pandemic of coronavirus disease 2019 (COVID-19). The first case of COVID-19 in New York City was officially confirmed on 1 March 2020 followed by a severe local epidemic. Here, to understand seroprevalence dynamics, we conduct a retrospective, repeated cross-sectional analysis of anti-SARS-CoV-2 spike antibodies in weekly intervals from the beginning of February to July 2020*

using more than 10,000 plasma samples from patients at Mount Sinai Hospital in New York City.

We describe the dynamics of seroprevalence in an 'urgent care' group, which is enriched in cases of COVID-19 during the epidemic, and a 'routine care' group, which more closely represents the general population. Seroprevalence increased at different rates in both groups; seropositive samples were found as early as mid-February, and levelled out at slightly above 20% in both groups after the epidemic wave subsided by the end of May.

From May to July, seroprevalence remained stable, suggesting lasting antibody levels in the population. Our data suggest that SARS-CoV-2 was introduced in New York City earlier than previously documented and describe the dynamics of seroconversion over the full course of the first wave of the pandemic in a major metropolitan area.

The first case of COVID-19 in New York City (NYC) was identified at Mount Sinai Hospital on 29 February 2020 and confirmed on 1 March 2020. A sharp rise in infections occurred shortly afterwards during the week ending on 8 March, followed by a strong increase in the number of COVID-19-related deaths during the week ending on 15 March.

New York State implemented a stay-at-home order on 22 March 2020, after which daily case numbers in NYC started to plateau and then decrease in April and May 2020. There was little capacity for nucleic acid amplification testing at the beginning of the local epidemic in early March, and many asymptomatic and mild-to-moderate cases probably went undetected.

Walrand, S. (2021) **Autumn COVID-19 surge dates in Europe correlated to latitudes, not to temperature-humidity, pointing to vitamin D as contributing factor.** SCIENTIFIC REPORTS 11:doi.org/10.1038/s41598-021-81419-w (available as a free pdf)

Author's abstract: *To determine the factor triggering the sudden surge of daily new COVID-19 cases arising in most European countries during the autumn of 2020. The dates of the surge were determined using a fitting of the two last months of reported daily new cases in 18 European countries with latitude ranging from 39˚ to 62˚.*

The study proves no correlation between the country surge date and the 2 weeks preceding temperature or humidity but shows an impressive linear correlation with latitude. The country surge date corresponds to the time when its sun UV daily dose drops below ~ 34% of that of 0˚ latitude.

Introducing reported seasonal blood 25-hydroxyvitamin D (25(OH)D) concentration variation into the reported link between acute respiratory tract infection risk and 25(OH)D concentration quantitatively explains the surge dynamics.

Several studies have already substantiated a 25(OH)D concentration impact on COVID-19 severity. However, by comparing different patient populations, discriminating whether a low 25(OH)D concentration is a real factor underlying COVID-19 severity or only a marker of another weakness that is the primary severity factor can be challenging.

The date of the surge is an intrapopulation observation and has the benefit of being triggered only by a parameter globally affecting the population, i.e. decreases in the sun UV daily dose.

The results indicate that a low 25(OH) D concentration is a contributing factor to COVID-19 severity, which, combined with previous studies, provides a convincing set of evidence.

Speirs: Vitamin D doesn't prevent COVID-19 infection or cure it but does reduce the severity of the disease. Take your vitamins.

O'Driscoll, M., et al (2021) **Age-specific mortality and immunity patterns of SARS-CoV-2.** NATURE 590:doi.org/10.1038/s41586-020-2918-0 (available as a free pdf)

Authors' abstract: *Estimating the size of the coronavirus disease 2019 (COVID-19) pandemic and the infection severity of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) is made challenging by inconsistencies in the available data.*

The number of deaths associated with COVID-19 is often used as a key indicator for the size of the epidemic, but the observed number of deaths represents only a minority of all infections. In addition, the heterogeneous burdens in nursing homes and the variable reporting of deaths of older individuals can hinder direct comparisons of mortality rates and the underlying levels of transmission across countries.

Here we use age-specific COVID-19-associated death data from 45 countries and the results of 22 seroprevalence studies to investigate the consistency of infection and fatality patterns across multiple countries. We find that the age distribution of deaths in younger age groups (less than 65 years of age) is very consistent across different settings and demonstrate how these data can provide robust estimates of the share of the population that has been infected.

We estimate that the infection fatality ratio is lowest among 5 to 9-year-old children, with a log-linear increase by age among individuals older than 30 years. Population age structures and heterogeneous burdens in nursing homes explain some but not all of the heterogeneity between countries in infection fatality ratios.

Among the 45 countries included in our analysis, we estimate that approximately 5% of these populations had been infected by 1 September 2020, and that much higher transmission rates have probably occurred in a number of Latin American countries.

Galanti, M., et al (2021) **Social distancing remains key during vaccinations.** SCIENCE 371:473-474 (available as a free pdf)

Authors' extracts: *As vaccinations progress, the public must continue to social distance, limit large gatherings, wear masks, and engage in other non-pharmaceutical interventions (NPIs) to curb the spread of COVID-19. Both the Pfizer/BioNTech and Moderna vaccines use mRNA technology and require two doses administered 3 and 4 weeks apart, respectively, to reach the full 90 to 95% efficacy.*

Relaxing NPIs before attaining adequate distribution would enable infection of many more people before their vaccination than would occur if NPIs were to be maintained or increased. Locally, relaxation of NPIs increases the reproduction number, R_e, which enables greater transmission of the virus and a larger overall attack rate. These changes lead to a faster and larger accumulation of infections that could greatly outpace vaccination distribution efforts.

Matrajt, L., et al (2021) **Vaccine optimization for COVID-19: Who to vaccinate first?** SCIENCE ADVANCES 7:doi.org/10.1126/sciadv.abf1374 (available as a free pdf)

Authors' abstract: *Vaccines, when available, will likely become our best tool to control the COVID-19 pandemic. Even in the most optimistic scenarios, vaccine shortages will likely occur. Using an age-stratified mathematical model paired with optimization algorithms, we determined optimal vaccine allocation for four different metrics (deaths, symptomatic infections, and maximum non-ICU and ICU hospitalizations) under many scenarios.*

We find that a vaccine with effectiveness about 50% would be enough to substantially mitigate the ongoing pandemic, provided that a high percentage of the population is optimally vaccinated. When minimizing deaths, we find that for low vaccine effectiveness, irrespective of vaccination coverage, it is optimal to allocate vaccine to high-risk (older) age groups first.

In contrast, for higher vaccine effectiveness, there is a switch to allocate vaccine to high-transmission (younger) age groups first for high vaccination coverage. While there are other societal and ethical considerations, this work can provide an evidence-based rationale for vaccine prioritization.

ALIEN INVASIONS: PART 6
by Dale Speirs

[Parts 1 to 5 appeared in OPUNTIA #407, 424, 460, 474, and 479.]

Stopping The Aliens.

Edmond Hamilton was always good for ideas back in the pulp age of science fiction. An example is his story "The Space Visitors" (1930 March, AIR WONDER STORIES, available as a free pdf from www.archive.org). Think of Earth's atmosphere as an ocean of air. Just as humans trawl the ocean floor, so it is that aliens might decide to trawl the surface of Earth.

It being 1930 and too soon for spacecraft, when gigantic trawls began scraping cities up into space, the question was how to stop them. Since the trawls were at random over the planet, simply setting bombs to go off at altitude was not an answer. The solution was aerial mines that would float to the top of the atmosphere where the alien spaceships were hovering.

KILLERS FROM SPACE was a 1954 B-movie written by Myles Wilder and William Raynor. It is available from Mill Creek Entertainment on the 50-movie DVD boxed set "Sci-Fi Classics". The movie was made as the Cold War went into top gear, and combined the fears of nuclear war, invasion, and subversion.

The protagonist was physicist Dr Douglas Martin, who was collecting data on a test atomic explosion at Soledad Flats, Nevada. His plane crashed as it circled the mushroom cloud. This opening segment was about 90% stock shots from USAF and bomb test newsreels.

Martin survived but his behaviour was suspicious, putting him under FBI surveillance. Matters eventually came to a head and he was put under truth serum. Under the influence, he babbled about alien invaders from Astron Delta hiding underground in the desert waiting for Der Tag.

They were going to use giant insects and reptiles created by the radiation. The premise of all sci-fi films is that radioactivity creates superbeings and monsters, as opposed to reality, where radiation only gives you cancer.

The movie was slow paced, with lots of talking to save on SFX and location shooting. At a guess, about 25% of the film was stock shots. This movie is most famous for the el cheapo aliens, who were bug-eyed humanoids with egg carton eyes. (Not ping pong balls as some believe.) The aliens didn't appear until late in the movie, which was just as well.

Like all aliens, they were dressed in identical jumpsuits. There were no rank insignia on them, so they weren't wearing military uniforms. It reminds me of Jerry Seinfeld's stand-up routine about why people in the future always wear identical togas or silver jumpsuits.

Also following tradition, the alien leader loved the sound of his own voice and gave lengthy infodumps about their society. The video he showed of their cities, with gleaming 200-storey skyscrapers and aircars, looked like stock shots from some 1930s sci-fi serial.

Their planet was dying, so they were preparing to invade Earth and make it their replacement home. Martin stymied them by shutting off the electricity they had been tapping from a local electric station.

The final atomic blast in the desert took place. The cast watched through a barracks window in awe, as well they might, for the stock shot was the Bikini Atoll bomb out in the Pacific Ocean. In the Nevada desert, remember. I was awestruck myself. But not enough to ever watch this movie a second time.

Who is to say the aliens won't suffer more in an invasion of Earth? "The Margenes" by Miriam Allen de Ford (1956 February, WORLDS OF IF, available as a free pdf from www.archive.org) began with a new, palm-sized life form washing up on the beaches of California and invading the land in countless numbers.

They had been in the ocean depths but over-populated down below, so they came ashore. The trouble was, they tasted delicious to humans. Not only that, they were a good source of protein and vitamins, so the rush was on to harvest them as fast as they came ashore.

The invasion was not stopped until some surviving aliens managed to get back into the depths and warn their home base not to attempt the land.

PIXELS was a 2015 comedy movie written by Tim Herlay and Timothy Dowling. Aliens had mis-interpreted video game transmissions of the 1980s as messages challenging them to a duel. Now they had come, ready to conquer the world with giant pixelated critters such as Pac-man or Centipede.

The hero would of course save the world because he was a video game player of the top rank. The plot was predictable but the movie was saved by the SFX, which were of top quality. The movie was mostly a parody of INDEPENDENCE DAY.

Assorted video game creatures roamed the streets. They turned their victims into shattered piles of 3-D pixels, bright cubes with internal strobes.

The movie worked its way through attacks by Pac-man, Donkey Kong, Galaga, Centipede, and Space Invaders. The aliens were never seen directly, just the giant 3-D critters from the video games. The mothership eventually arrived, dropping a flood of pixelators on Washington, D.C.

The heroic nerds began the final defense inside the mothership in a giant 3-D version of Donkey Kong. Overall the movie was a good comedy, worth watching once.

Revival Radio.

THEATER FIVE was a short-lived attempt at reviving drama shows on radio. It aired for the 1964-65 season but the war against television was lost a decade prior, so it failed. The episodes were generally well written and produced, and are worth downloading from the Old Time Radio Researchers Website at www.otrrlibrary.org. (They are the radio fan equivalent of www.fanac.org). The episodes were a mixture of science fiction, fantasy, mystery, and weird fiction.

I've been working my way through the episodes. Not all are worthy of reviews. In particular, when I began listening to "Terror From Beyond" (1964, written by Robert Newman) the opening narrative seemed awfully familiar.

The plot was about a military project sending radar beams into space. Evil aliens caught the beams and slid down them to Earth, where they took over human minds and got up to the usual rubbish of invading aliens.

I already reviewed this story in OPUNTIA #460. It originally aired in 1947 as "Terror Out Of Space" on the old-time radio series MURDER AT MIDNIGHT. Newman had simply dusted off his old script, made a few changes that did little to improve it, and resold it to the network. In the days before home recording, it was doubtful that after two decades anyone would have remembered the story. Listen to one or the other but don't bother with both.

"Rebellion Next Week" aired on 1964-08-10, written by Robert Cenedela. The narrator was a high school teacher named Miller. One of his students Mary Newhall had complained about an assignment, to do a book report. She whined about having to read a whole book in three weeks, then flounced out of the classroom.

Newhall forgot to take with her a notebook. When her teacher looked inside, he found a list of names and addresses from around the world. Miller lived near the Newhalls, so on his way home he stopped by to deliver the notebook.

He interrupted her while she talking on the telephone. She was arguing with someone about postponing the revolution. The jig was up. Newhall said she was one of a group of evolutionarily advanced humans. She proved it, using telekinesis to trap Miller inside her house.

A vanguard of mutants was preparing to take over the world. Miller tried to talk them out of it. When that failed, he dived out of a window, pursued by two of them. The police wouldn't listen to his warning about the pod people, pardon me, the mutants.

Miller lost his job and went out into the streets, preaching to passersby about the danger coming next week. For some reason, no one would listen to him. The mutants are coming! The mutants are coming! If you've already seen that movie about pod people, then you don't need to bother with this episode.

ACTION ADVENTURE ON THE AIR: PART 5
by Dale Speirs

[Parts 1 to 4 appeared in OPUNTIAs #426, 447, 476, and 487.]

Knights Of Yore.

THE LAST TEMPLAR originally aired in 2009 January as a 4-hour television miniseries and was later available on DVD as a movie. It was based on the novel by Raymond Khoury, with screenplay by Suzette Couture. The storyline was a quest and race for treasure in the Mediterranean.

The movie certainly got off to a spectacular beginning. As the opening credits rolled, there was a gala event in a museum across the street from Central Park in Manhattan. The occasion was the opening of a new exhibit "The Treasures Of The Vatican".

While the glittering people walked the red carpet, four horsemen came riding along the avenue, up the stairs, and into the museum. They were dressed as Knights Templar, in full armour, swords, and flowing robes.

A policeman challenged them because they didn't have a permit and got his head chopped off by way of reply. (A few scenes later, as the callous paramedics were hauling away the body, a detective ordered them to keep the head with the torso "*for old time's sake*".)

The knights charged around the exhibits, smashing the display cases and helping themselves to selected treasures, one of which was a clockwork, probably the only thing that wasn't solid gold and encrusted with jewels.

One of the guests at the opening was the leading lady, an archaeologist Tess Chaykin. The leading man was an FBI agent Sean Daley. The thieves led them on a merry chase across the Atlantic and down to the Mediterranean. At first the MacGuffin was thought to be treasure, boundless treasure, whose location would be revealed by the stolen items.

Said location, after many alarums and excursions, was a Crusades-era shipwreck. The ship had carried Knights Templar returning to Europe. The sole survivor marked the location and passed the secret on to headquarters. Alas, their organization was suppressed about 700 years ago, and the knowledge was left hidden in the artefacts.

The Roman Catholic Church wanted its artefacts back, and a rogue cleric within wanted to intercept part of that treasure, a hitherto unknown gospel that would apparently rock the foundations of the Church.

That gospel was the real MacGuffin. All the interested parties wound up on a salvage ship in the middle of the Mediterranean Sea. The wreck was located just as a storm blew up, but the treasure, both gold and parchment, was lifted. Alas, the salvage ship was wrecked and Chaykin washed ashore. All seemed lost, and the action was to no avail.

Much later, after she had recuperated, Chaykin went for a walk on the beach and discovered the treasure washed into a small cove. She had her priorities straight and only took a scroll that had been sealed inside a waterproof container for the last millennium or so.

It was the new gospel. As she was reading it, one of the Church hirelings arrived. The scroll was in Aramaic, which she knew and which was the language that Jesus and most of the Middle East spoke back then. She read aloud the title: "The Gospel Of Yeshua Of Nazareth". That was enough for everyone, both on screen and viewers watching the DVD.

The two struggled for it, but the scroll fell off a cliff into the ocean. Just as well, most people would agree. All that action for no net gain.

Bogie And Baby.

BOLD VENTURE was a syndicated old-time radio series that aired during the 1951-52 season. It was a star vehicle for Humphrey Bogart and Lauren Bacall, with all episodes written by Morton Fine and David Friedkin. The series was transcribed and then marketed to independent radio stations.

The radio series was two steps removed from Ernest Hemingway's novel TO HAVE AND HAVE NOT via the 1944 movie version starring Bogart and Bacall. The radio series was vaguely similar to the book and somewhat similar to the movie, although it actually owed as much to CASABLANCA.

The setting was Havana, Cuba, long before the Communist takeover. Slate Shannon (played by Bogart) owned a boat called Bold Venture and did odd jobs with it to earn his living. His other business was a cheap hotel called Shannon's Place. His sort-of girlfriend was Sailor Duval (Bacall).

A calypso singer King Moses interpolated songs every so often. The dialogue was spoken more harshly in early episodes than it would be later in the series after the actors found their way. The plots were basic and often owed something to Hemingway.

"Six Crates Of Apple Juice" aired on 1951-04-26. Slate Shannon and Sailor Duval were sitting in his empty bar. King Moses sang a calypso about bankruptcy, not an upbeat subject. A couple entered. She was under duress from him, who wanted some papers from her.

His rough behaviour drew Shannon's attention and got the man thrown out. The hooligan went to a ship whose captain was very angry. The woman Dolores had bills of lading that would enable the captain to unload his cargo of apple juice, plus the opium hidden with it, $250,000 worth in 1951 currency.

Dolores palmed the papers off onto Shannon for safety. Thereafter followed a predictable parade of alarums and excursions. The bills of lading were the MacGuffin.

Whenever the shooting and fistfights got to be too much, there was a timeout for the sponsor, Log Cabin white bread. Yes, no matter how stressful your life, there's nothing better than white bread to calm you down.

Everyone got exercise running about Havana, except Dolores, who spent most of the episode quivering and weeping. Duval was unmoved and rather stern with her, as well she might be. There was the usual gunpoint confrontation, with no suspense since Shannon and Duval were booked for the series and the captain wasn't.

Afterward King Moses sang a calypso for Log Cabin cracked wheat bread. And so back to the empty tavern.

"He Who Laughs Last" aired on 1951-04-30. Slate Shannon got himself mixed up with Franny Lane, who worked in the comedy team of Dixon and Lane. Her husband Tommy Carver was in a Havana prison and she was there to liberate his hidden loot. Sailor Duval was jealous because Shannon was dating Lane.

Hal Dixon told awful jokes even for vaudeville. Shannon and Duval had much better lines. When Shannon returned from an extended lunch with Lane, he said they had a ball. Replied Duval, "*What did you do for four hours, dribble it?*"

Dixon learned of the cash and tried to cut himself into the deal. He accidently killed Lane in the argument over the money. A Cuban prison was no place to be on a murder rap, so Dixon tried to frame Shannon for her death.

His plan failed because simultaneously that night and unknown to him, Carver escaped prison. The police naturally suspected Carver had killed his wife, and had no reason to put the blame on Shannon.

Using his underworld contacts, Shannon investigated. He found Carver, who despite being in hiding had heard the gossip about his wife canoodling with Shannon. Carver pulled a gun and prepared to execute him.

At that point the episode broke for a commercial. It returned not to Shannon but to King Moses, who then sang a calypso ditty to expostulate the next bit of plot, segueing into a conversation with Duval. She had been doing her own investigation and found an envelope from Miami addressed to Lane. It contained a baggage check.

Meanwhile, back at the gunpoint, Shannon managed to convince Carver that he wasn't the murderer. During their chat, Carver mentioned that he had rigged the suitcase of cash with an antipersonnel bomb. The conversation ended there when someone leaned in through an open window and shot Carver dead.

In yet another meanwhile, Duval and Dixon met up again. It was his turn to point a gun and demand the baggage check. Taking Duval with him, Dixon went to get what was coming to him. Shannon pursued and shots were fired. Dixon grabbed the money out of the suitcase and had about two seconds to enjoy the loot before he was shredded into pulp by the bomb. Another moon-lit night in Havana.

Sharp Practice.

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

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

In the radio series, most of his schemes seemed to fall through, yet he always had money to live well and go gambling in casinos. Lime narrated all the episodes as if he were a god speaking from Olympus, complacent in his superiority over the lumpenproletariat while oblivious of the fact that he lost more often than he won.

The most distinctive part of the radio series, and what set it apart from other radio shows, was the theme and incidental music, played on a zither by Anton Karas. Even today it would stand out on a television series.

As part of the radio episodes, the music could be considered as important as Welles' rich voice. The existing mp3s are somewhat distorted from old tape recordings but allowing for that they cannot fail to impress.

"Voodoo" aired on 1951-08-31, a point to be considered because Harry Lime arrived in Haiti as a political refugee. Well, not exactly a refugee, as he had been assisting a general in a nearby unnamed republic fomenting a revolution. Probably not the adjacent Dominican Republic, since it was relatively stable at the time. He specifically referred to a banana republic, so it was likely a Central American country.

The revolution failed but Lime escaped with sufficient cash on hand to enjoy life in Haiti for a while. When his cash ran out, so did his enjoyment of life. He met up with an old friend Dorna, who was also in the sharp practice trade. He asked what she was doing, then corrected himself and asked who she was doing. Pretty racy dialogue for 1951.

She introduced Lime to her present target, Sam Torquin, a jovial moneybags on vacation from the USA. Casting about for a scheme, Lime offered to help Torquin buy souvenirs to remember his trip, say perhaps antiquities or jewels. For a small retainer, of course.

Lime came up with the idea of a jeweled sceptre once owned by a king of Haiti. It was now owned by a voodoo cult. Lime moved among Haitians who spoke with Hollywood's idea of a French accent. Needless to say, they were not inclined to give up their sceptre. A Haitian friend with less scruples than Lime, if such a thing were possible, got the sceptre for him.

The cult did not bother with the police, but used voodoo to rectify the matter. Lime sold the sceptre to Torquin for $50,000. This miffed Dorna, who had been hoping to get a cut of the deal. All seemed well until the drums started up in the hills.

Lime went up to investigate and saw the cult dancing around Torquin's body. They had recovered the sceptre and were now taking their revenge. Alarums and excursions followed, gunshots resounded, and so forth. Lime and Dorna

hastily left Haiti together, the agreement being that she would stay with him until the $50,000 was used up.

The epilogue had a twist ending. In all the excitement up in the hills, Lime grabbed the sceptre and eventually sold it to a collector in Brussels. As to where Dorna was, Lime had no idea.

"Operation Music Box" aired on 1951-10-05 and began with Harry Lime in London, England. While browsing at a shop he met a woman named Myrna Chatwick looking for specific antique music boxes. She bought one and smashed it. Nothing inside, so she bought the names and addresses of several people who had the same music boxes over the past year.

Lime tagged along and found out that she was searching for a music box filled with emeralds in a secret compartment. He joined the search hither and yon across London. Some of the boxes had since changed hands. Lime and Chatwick were contestants in the chase but they did combine on occasion.

Some boxes were bought for ridiculous sums, while Lime had to resort to break-and-enter for another. They tracked down the last one which had since been donated to an orphanage.

Alas, a child playing with it had dropped it on the floor, causing the secret compartment to spring open. Lime and Chatwick arrived in time for a public announcement that the jewels had been discovered and would pay for orphanage improvements. Lime fainted, and so to the zither music. An amusing ending which gave a bit of personality to Lime.

Over The Bounding Main.

THE VOYAGE OF THE SCARLET QUEEN aired on old-time radio for a short run from 1947-07-03 until 1948-02-14. Episodes can be downloaded as free mp3s from www.otrrlibrary.org The series was about the adventures of the sailing ship Scarlet Queen in the 1940s. All the episodes were written by Gil Doud and Robert Tallman.

Even then the ship was obsolete although it had the advantage that it was cheaper to operate. The stories were set in contemporary times, that is, the late 1940s. The Scarlet Queen was a tramp ship, sailing from port to port looking for cargo. The sails saved money on fuel, when every penny counted.

The master of the vessel was Philip Carney, who began each week's adventure by reciting from his captain's log, at intervals after each commercial break, and for the epilogue. So as you see, Captain Kirk's intros were nothing new in broadcast fiction.

"Hattie McCormick And The Patient Stowaway" aired on 1947-22-31. A stowaway named George Craven was discovered en route to Pango Pango. He managed to jump ship when it docked.

Craven had told Carney he was going to kill three people when he got to port, beginning with Hattie McCormick. She operated a tavern on the waterfront in partnership with the bartender Lester Norris.

The trouble began eleven years prior when she broke up Craven's marriage to her niece Viola. He was a violent man and subsequently got ten years in prison on an unrelated matter elsewhere.

Carney called upon McCormick, as a result of which she hired him and his crew as bodyguards. The McCormick house had a troubled night. Norris was the first victim, done in by a piece of pipe. Carney spent most of the night running hither and yon. Craven wasn't difficult to find since he checked into a hotel under his own name.

Craven was disagreeable but Carney won the fistfight. Carney didn't have long to celebrate because just after the fight concluded, Viola entered the room and sapped him with a pipe, the same one that killed Norris. When Carney regained consciousness, Viola was lying dead beside him. Someone else had bashed her with the same pipe, hard enough to kill.

Back to the McCormick house for the final confrontation. Hattie had killed both for $140,000 loot left over from the deal that had sent Craven to prison. His arrival had triggered all the events as she rushed to get the money to safety before he could grab it. Now it would be her turn to do hard time in prison.

And so to New Guinea with a load of copra. The shouting and alarums would no doubt begin again at the next port.

CRIME AND PUBLISHMENT: PART 5
by Dale Speirs

[Parts 1 to 4 appeared in OPUNTIAs #61.1, 391, 422, and 471.]

Literary Problems.

OUR MISS BROOKS began as an old-time radio comedy series and aired from 1948 to 1957. (Available as free mp3s from the Old Time Radio Researchers at www.otrrlibrary.org) The show successfully made the transition to television in the 1950s.

The setting was Madison High School, where Constance Brooks was the lead character and narrator. She taught English under the dictatorship of school principal Osgoode Conklin (played by Gale Gordon, who specialized in roles as pompous blowhards).

Brooks roomed with the widow Margaret Davis, a dear old lady. Philip Boynton was the biology teacher and Brooks' unrequited love. Conklin's teenaged daughter Harriet was a student at the school, as was her boyfriend Walter Denton, whom her father loathed.

"Writing For True Family Romances" aired on 1955-04-17 and was written by Arthur Alsberg and Lou Derman. The magazine of that name paid $50 for articles about interesting family situations. That caught the attention of Connie Brooks, who submitted a story about bringing up a genius-level son while a single mother. She published it under the pseudonym of Dorothy Kimberly, since the school board had a strict policy against teachers moonlighting.

In the same issue was a story by Conklin about bring up a mentally retarded son, under his pseudonym of Sarah Dolittle. Conklin and Brooks did not know about each other's articles. The problem arose when Joshua Nemo, of TRUE FAMILY ROMANCES, arrived in town to deliver the $50 cheques. There had been accusations that the magazine's stories were fakes, so a policy was instituted of fact checking.

Nemo telephoned Brooks and trapped her into an appointment at her place at 20h00, then likewise for Conklin at his house for 21h00. Conklin successfully explained he used his wife's name as a pseudonym but both he and Brooks had the serious problem of not being able to show Nemo a teenaged son.

The two still didn't know of each other's writing, and Nemo had no reason to know they were teachers at the same school. In desperation, they each latched on to Denton to play the parts. He didn't tell one about the other. Came the evening, and Denton mixed up his parts. Arriving at Brooks' residence just after Nemo, he began playing the part of a dopey kid instead of the quiz kid.

Conklin, unaware of his impending doom, arrived shortly thereafter with some school business he wanted to discuss with Brooks. Denton called him Daddy, and since Nemo was to have met later with Conklin in any event, the jig was up. Neither got their cheques. Nemo's parting words were "*I can't remember enjoying a night at the theatre as much.*" before he left in a huff.

In the aftermath, Conklin at first tried to bluff and threaten Brooks with disciplinary action. She reminded him of his part in the affair and told him that she would take him down with her. He suddenly became a man of reason and agreed that no one else need know of their extracurricular literary work.

THE MAN FROM UNCLE aired on television from 1964 to 1968. It was a spy action-adventure series designed to capitalize on the success of the James Bond movies. The two main characters were Napoleon Solo and Ilya Kuryakin, UNCLE agents who worked out of the New York City offices against the evil forces of THRUSH. See OPUNTIAs #361 to 364, and 462 for a more detailed look at the series.

"The Pieces Of Fate Affair" (1967) was a Season 3 episode written by Harlan Ellison and Yale Udoff. A schoolteacher named Jacqueline Midcult had published her first novel, a bestseller about spies countering the evil organization Killjoy. Soon enough, both UNCLE and THRUSH noticed remarkable similarities to their cold cases.

Charles Coltrane had been a THRUSH agent who had kept diaries for years, a 10-volume set at the time of his death that could heavily damage THRUSH if they were made available to UNCLE. Those diaries became the MacGuffin of the episode.

Somehow Midcult got access to the diaries without knowing what they really were about. She thinly paraphrased them for her novel. THRUSH tried to assassinate her but botched the job. She survived with partial amnesia. UNCLE latched on to her in the quest to obtain the diaries.

Napoleon Solo and Ilya Kuryakin took Midcult on a chase from pillar to post and from Manhattan to rural Ohio. Many twists and turns in the episode, culminating with the discovery that the diaries had been burned. The script writers took the opportunity to poke fun at the New York City publishing establishment, particularly publicity events and critics. An amusing episode, particularly if you know recognize some of Ellison's touches.

Forgeries.

DUFFY'S TAVERN was a sitcom that aired on old-time radio from 1941 to 1952. The owner of the tavern was Patrick Duffy, never heard but only talking with Archie the manager in one-sided telephone conversations. The tavern was on Third Avenue in a part of Manhattan the tourist brochures failed to mention and for good reason. The food was bad, the liquor was watered, and the service was lousy.

Archie spoke with a Noo Yawk accent. He was lazy but always looking for a fast buck in schemes that failed. Other characters were Miss Duffy, ugly daughter of the proprietor, and a recurring character The Mad Russian, played by character actor Bert Gordon, who originated him on Eddie Cantor's show and then took him to various other series.

"The Diary Of Peter Stuyvesant" was written by Larry Rhine (husband of the actress who played Miss Duffy) and Al Johansen, and aired on 1951-03-02. It began with a contretemps when the health inspector fell through the rotten floor into the basement. Archie had just hired Arthur Treacher, playing himself as a down-and-out British actor reduced to waiting tables in a cheap dive.

After the inspector was hauled away, Treacher went into the basement to clean up. He found a diary dated AD 1670 with the name Peter Stuyvesant on it. Archie, despite being born and raised in the city, didn't know who Stuyvesant was. Treacher was the one who had to tell him about New Amsterdam.

The thought immediately crossed Archie's mind that he could sell the diary. He accepted the offer of a Third Avenue bookseller for $5 and counted himself pleased, until he learned the bookseller had immediately resold the diary to a museum for $1,000.

This gave him the idea of forging another diary for bigger bucks. Stuyvesant didn't speak Noo Yawk English, much less write a diary in the language in 1656, but Archie was oblivious as to how phony his version would be. Lines he wrote included:
"*Today I took Pocahontas for a walk over the Brooklyn Bridge.*"
"*Ye Pilgrims have arrived from Plymouth Rock.*"
"*Went to burlesque to see ye Minnehaha.*"
"*A sad thing happened today. I passed peacefully away at the ripe old age of 81.*"

One passage indicated a more liberal attitude than might be expected for those days when aboriginals were referred to as Injuns and savages: "*Held pow-wow today with Indians to protest their inhuman use of bows and arrows. They said they'd quit using bows and arrows if we quit using muskets and cannons. We will need strength and courage to deal with such barbarians.*"

Archie telephoned a museum and they agreed to send an assistant curator to look at the diary. He worried they might not accept his say-so and therefore got the Mad Russian to pretend to be an Indian. Every Hollywood cliché about aboriginals was trotted out to comedic effect, as it was obvious the curator wasn't going to be convinced. As the show ended, Archie lamented he had lost $995 on the day. So much for forgery.

BARRIE CRAIG, CONFIDENTIAL INVESTIGATOR was probably the only private detective series whose star had actually been a private detective in real life. William Gargan had worked in an investigator's office as a young man, and professed amusement at how script writers depicted private detectives at variance with the real ones.

This series aired from 1951 to 1955. Craig narrated most of each episode. The plots often tangled up, but there were several summations during each episode so the listener wouldn't get lost. The episodes are worth listening to once, and the series grows on the listener.

"Dead On Arrival", written by John Roeburt, aired on 1951-11-14. A woman Peggy Palmer hired Barrie Craig after her brother George found a diary of George Washington hidden in an old wall clock.

After word got out, the family was afflicted by treasure hunters wanting to buy or steal the diary. George figured he could get $100,000 for the book from a collector named Grant Tyler. Call it $1 million in today's depreciated currency.

She stole the diary and showed it to Craig in his office. It seemed authentic but he pointed out that he couldn't negotiate the deal since George had title and needed to give his consent. Craig telephoned him. As they argued, someone shot George dead.

A quick trip to the Palmer mansion revealed George's body. Peggy was quite perturbed at her brother's death. Craig examined the wall clock for clues. He really should have called the police first. A costumed bandit with an antique dueling pistol arrived to rob them of the diary. He was also perturbed when he spotted George's body.

Craig overcame the robber, who said his multiple greats grandfather was a colleague of Washington and was probably mentioned in the diary. Having disposed of him, Craig and Peggy took the time for a romantic interlude. One has to admire his savoire faire in canoodling with the woman while an unreported corpse lay in the room and a lunatic gunman was tied up.

But finally the police were notified. With the body and the lunatic out of the way, attention returned to the diary. Craig telephoned Tyler and verified the offer was still good. He drove to Tyler's house but was hijacked en route by another diary hunter who slugged him unconscious.

After awakening, Craig continued to the Tyler residence sans diary. Considering how many times he had been slugged in previous episodes, Craig should have been a drooling idiot by now from all those concussions. Instead he was up and about with nothing worse than a sore spot on the back of his skull and a headache.

Tyler was annoyed that Craig was late but said there was no reason to proceed since he didn't have the diary. Craig asked the obvious question as to how Tyler knew the diary was gone. The reply was that the antiques dealer Hollins, who had sold George the clock, claimed he had the diary, and was asking only $10,000. Hollins arrived but said he didn't have the diary. His colleague, the hijacker, had betrayed him and failed to deliver the diary.

Retracing his path tot the Palmer mansion, Craig was surprised when the hijacker returned his car and the diary, saying the book was a fake. These things happen, Craig mused out loud to Peggy. The diary was planted in the clock after George bought it from Hollins. Everyone chased after it thinking it was real. The question was who put the diary inside the clock and why.

His deduction was that Peggy killed her brother for the insurance money. He dropped her off at the police station and she burst into tears. That's one way to get to the end credits.

Another forged diary appeared a few months later. "Diary Of Death" was written by John Roeburt and aired on 1952-02-06. This episode took Barrie Craig off Manhattan and into the primeval wilderness, that is, Seneca, upstate New York. He didn't like to leave his island for the mainland but Harold Samuels offered him a big fee.

A murderer had slashed Doc Tyler with some sort of garden tool. Robbery did not appear to be the motive, although an old iron paperweight was missing from Tyler's desk. The village, population stated as 300, had no police department. (I googled Seneca and its present day population is said to be 2,700.)

Instead of calling in the state police the citizen's committee decided to hire a private detective. Not all were happy to see a big-city detective come to show them how it was done. Strangely, there was no Miss Marple or Jessica Fletcher to show them or him how it was done.

Taking a room in Miss Pringle's boarding house, Craig began investigating. As he was inspecting his room, someone slugged him from behind. The tradition of rendering a detective unconscious at least once per episode apparently was honoured by country folk as well.

Craig gave chase but found only the village idiot named Harmony. He went back to his room, where Pringle determined the only thing out of place was a print of a whaling ship. She said an antiques dealer named Fred Stanley had offered her $100 for it but she refused.

Craig met up with Briggs, recently fired from the village public works department and feeling nasty about it. He wrote out a list of antiques that might be related to the case, and gave it to Craig.

Threats, alarums, gun shots, and various other excursions followed, including one more spell of unconsciousness. Stanley was nasty and uncooperative. He was evidently treasure hunting for something but declined to say what.

Pringle didn't survive the next scene. Samuels departed in the following scene, and it seemed as if the village would be extirpated at the rate the murders were

piling up. Taking the law into his own hands, Craig shot Harmony and made a citizen's arrest of Stanley.

Stanley confessed after Craig worked him over, and said he had been using an old diary to trace the treasure. Diary? As it was now the 24-minute mark in the episode, it was nice of the script writer to finally match up the plot with the title.

The diary said the treasure map was in parts in the stolen knickknacks. In the epilogue, Craig noticed the diary was in the same handwriting as Brigg's list of antiquities, information that had been withheld from the listener. The forgery was part of an elaborate plot by Briggs to use Stanley as a cat's paw to thin out his enemies. Too, too clever by half.

Writer's Block.

"The Sale Of Shakespeare's Ghost" by Don Mark Lemon (1908 May, THE BLACK CAT, available as a free pdf from www.archive.org) began with a classified ad in a newspaper. It offered the use of Shakespeare's ghost to stymied authors who had writer's block.

The salesman seemed to have something, as he demonstrated automatic spirit writing that produced poems in the Shakespearean style. He was challenged by two critics who wanted to see the process in action. At first he had them stymied, as he produced literary works in a notebook.

Fate caught him out though. He accidently broke off the nib of his fountain pen, causing the ink to gush out. The ink flowed as if by magic to produce lines of poetry. The gimmick he had been using was to write the poetry ahead of time in invisible magnetic ink, then use a pen filled with magnetic ink that flowed into the lines.

BOX 13 was possibly the only series devoted to a writer who was blocked. Dan Holiday had resigned from his newspaper job to write great works, then discovered he couldn't think of any plots. To solve the problem, he took a continuing classified advertisement in his old newspaper which read: *Adventure wanted. Will go anywhere, do anything.* Replies were to be sent to Box 13 at the newspaper.

Initially he worked by himself but Suzy, the newspaper clerk who handled the classifieds, quit her job and joined him as a secretary. Her main function was to have the plot explained to her at intervals, especially in the denouement when the loose ends were tied off. The episodes opened with a letter being read aloud by the character seeking help, whose voice was then blended into Suzy reading it to Holiday.

"Speed To Burn" was written by Albert Wagner and Bernard Feins, and aired on 1949-06-26. The letter writer was Nancy Peters, who was searching for her brother Tom. He was an ex-con who worked for a service station as a mechanic, then dropped out of sight. She thought he was involved with some sort of syndicate.

Dan Holiday infiltrated the service station by applying for a job. He was refused but it happened that a police car pulled up to the pumps just then, so he made a big show of ducking inside and hiding. That impressed the owner, who hired him.

After a couple of weeks working there, Holiday was offered a job with a busier garage. Once he passed their muster, they introduced him to their other operation, a stolen car shop. The cars were repainted, given new serial numbers, and shipped far away.

The other specialty of the shop was preparing sleeper getaway cars for armed robbers. These were older models refitted with high-powered engines, heavy-duty suspension, armour plate, and bulletproof glass. They looked quite ordinary but could outrun any police car.

Holiday found Tom in the shop. Later he contacted Nancy to tell her about Tom, but a gang member spotted him. The jig was up, but not before Holiday managed to tip off the police. There was panic in the shop and the thieves scattered in the stolen cars.

The boss took Holiday for a ride in the armoured car. The police couldn't stop it with gunfire but the car ground to a stop. Holiday had earlier been told it was to be used for a bank robbery, so he dumped some sugar into the gas tank to stymie the robbers. That saved his life.

It was his good fortune that the kingpin took that particular car. The car soon spluttered to a halt. After everyone had been rounded up, Holiday went back to his office. Suzie poured him some coffee. Holiday asked for sugar in it.

SEEN IN THE LITERATURE

Fukui, Y., et al (2021) **Cloud-cloud collisions and triggered star formation.** PUBLICATIONS OF THE ASTRONOMICAL SOCIETY OF JAPAN 73:doi.org/10.1093/pasj/psaa103

Authors' abstract: *Star formation is a fundamental process for galactic evolution. One issue over the last several decades has been determining whether star formation is induced by external triggers or self-regulated in a closed system. The role of an external trigger, which can effectively collect mass in a small volume, has attracted particular attention in connection with the formation of massive stellar clusters, which in extreme cases may lead to starbursts.*

Recent observations have revealed massive cluster formation triggered by cloud-cloud collisions in nearby interacting galaxies, including the Magellanic system and the Antennae Galaxies as well as almost all well-known high-mass star-forming regions in the Milky Way, such as RCW 120, M 20, M 42, NGC 6334, etc.

Della-Giustina, D.N., et al (2021) **Exogenic basalt on asteroid (101955) Bennu.** NATURE ASTRONOMY 5:31-38

Authors' abstract: *When rubble-pile asteroid 2008 TC_3 impacted Earth on 7 October 2008, the recovered rock fragments indicated that such asteroids can contain exogenic material. However, spacecraft missions to date have only observed exogenous contamination on large, monolithic asteroids that are impervious to collisional disruption.*

Here, we report the presence of metre-scale exogenic boulders on the surface of near-Earth asteroid (101955) Bennu, the 0.5-km-diameter, rubble-pile target of the OSIRIS-REx mission that has been spectroscopically linked to the CM carbonaceous chondrite meteorites.

Hyperspectral data indicate that the exogenic boulders have the same distinctive pyroxene composition as the howardite-eucrite-diogenite (HED) meteorites that come from (4) Vesta, a 525-km-diameter asteroid that has undergone differentiation and extensive igneous processing. Delivery scenarios include the infall of Vesta fragments directly onto Bennu or indirectly onto Bennu's parent body, where the latter's disruption created Bennu from a mixture of endogenous and exogenic debris.

Our findings demonstrate that rubble-pile asteroids can preserve evidence of inter-asteroid mixing that took place at macroscopic scales well after planetesimal formation ended. Accordingly, the presence of HED-like material on the surface of Bennu provides previously unrecognized constraints on the collisional and dynamical evolution of the inner main belt.

Santos-Sanz, P., et al (2021) **The 2017 May 20 stellar occultation by the elongated centaur (95626) 2002 GZ_{32}.** MONTHLY NOTICES OF THE ROYAL ASTRONOMICAL SOCIETY 501:6062-6075 (available as free pdf)

[Centaur asteroids are those which orbit between Jupiter and Neptune. An occultation occurs when an astronomical body such as an asteroid or planet passes in front of a star.]

[If dozens or even hundreds of astronomers, both professional and amateur, observe the occultation, their collective results will tell how big a distant asteroid is and what shape. Plotting the time the occultation begins and ends gives an idea of size. If the times vary from one latitude of astronomer to the next, it is possible to map the shape of the asteroid.]

Authors' abstract: *We predicted a stellar occultation of the bright star Gaia DR1 4332852996360346368 (UCAC4 385-75921) (mV = 14.0 mag) by the centaur 2002 GZ_{32} for 2017 May 20. Our latest shadow path prediction was favourable to a large region in Europe. Observations were arranged in a broad region inside the nominal shadow path.*

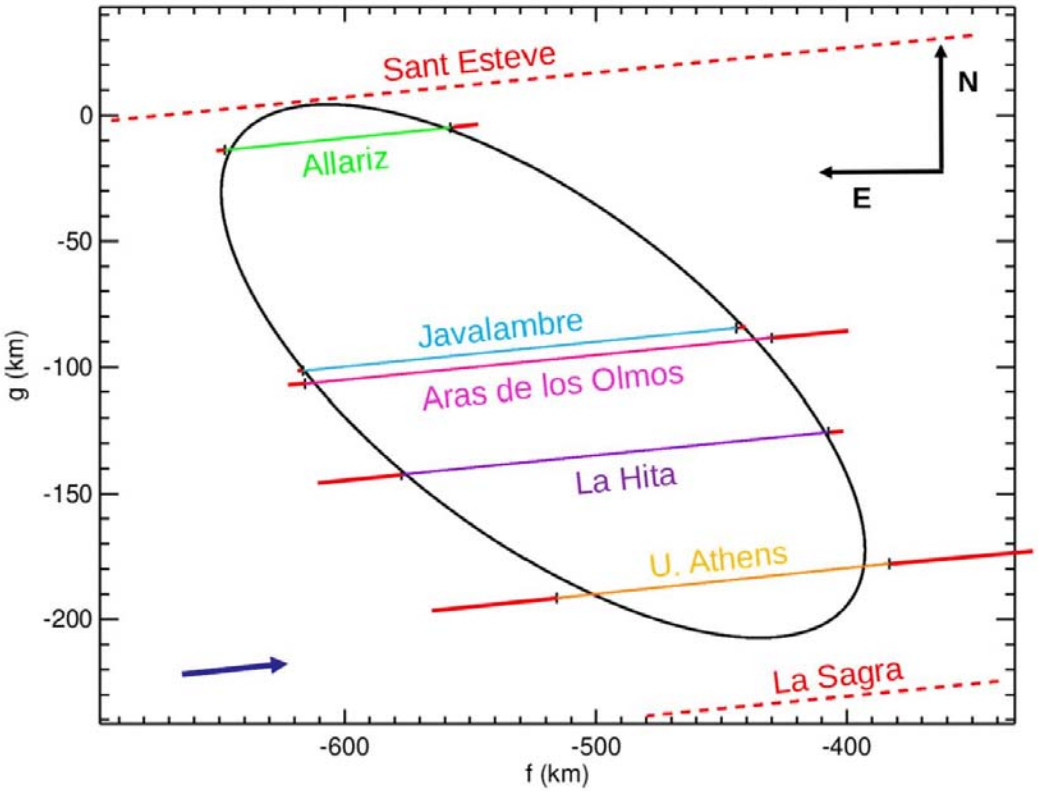
Series of images were obtained with 29 telescopes throughout Europe and from six of them (five in Spain and one in Greece) we detected the occultation. This is the fourth centaur, besides Chariklo, Chiron, and Bienor, for which a multichord stellar occultation is reported. By means of an elliptical fit to the occultation chords, we obtained the limb of 2002 GZ_{32} during the occultation, resulting in an ellipse with axes of 305 ± 17 km × 146 ± 8 km.

From this limb, thanks to a rotational light curve obtained shortly after the occultation, we derived the geometric albedo of 2002GZ_{32} (pV =0.043±0.007)

and a 3D ellipsoidal shape with axes 366km×306km×120 km. This shape is not fully consistent with a homogeneous body in hydrostatic equilibrium for the known rotation period of 2002 GZ_{32}.

The size (albedo) obtained from the occultation is respectively smaller (greater) than that derived from the radiometric technique but compatible within error bars. No rings or debris around 2002 GZ_{32} were detected from the occultation, but narrow and thin rings cannot be discarded.

[Image is from this paper and shows how the plot lines from different observatories at different latitudes can map an asteroid's shape out at the edge of the Solar System. The lines show when the star winked out as the asteroid passed in front of it and re-appeared after the transit. Thus this asteroid is elongated. The Sant Esteve and La Sagra observatories did not observe an occultation, thereby showing each end of the asteroid.]



Tatsumi, E., et al (2021) **Collisional history of Ryugu's parent body from bright surface boulders.** NATURE ASTRONOMY 5:39-45

Authors' abstract: *The asteroid (162173) Ryugu and other rubble-pile asteroids are likely re-accumulated fragments of much larger parent bodies that were disrupted by impacts. However, the collisional and orbital pathways from the original parent bodies to subkilometre rubble-pile asteroids are not yet well understood.*

Here we use Hayabusa2 observations to show that some of the bright boulders on the dark, carbonaceous (C-type) asteroid Ryugu are remnants of an impactor with a different composition as well as an anomalous portion of its parent body. The bright boulders on Ryugu can be classified into two spectral groups.

Most are featureless and similar to Ryugu's average spectrum, while others show distinct compositional signatures consistent with ordinary chondrites, a class of meteorites that originate from anhydrous silicate-rich asteroids.

The observed anhydrous silicate-like material is likely the result of collisional mixing between Ryugu's parent body and one or multiple anhydrous silicate-rich asteroid(s) before and during Ryugu's formation.

In addition, the bright boulders with featureless spectra and less ultraviolet upturn are consistent with thermal metamorphism of carbonaceous meteorites. They might sample different thermal-metamorphosed regions, which the returned sample will allow us to verify. Hence, the bright boulders on Ryugu provide new insights into the collisional evolution and accumulation of subkilometre rubble-pile asteroids.

Ertem, G. (2021) **The role of minerals in events that led to the origin of life.** ASTROBIOLOGY 21:doi.org/10.1089/ast.2020.2245

Author's abstract: *The role of minerals in the events that led to the origin of life is discussed with regard to*
(1) their catalytic role for the formation of RNA-like oligomers from their monomers and
(2) their protective role for organic molecules formed in space that were delivered to planetary surfaces.

Results obtained in the laboratory demonstrate that minerals do catalyze the oligomerization of ribonucleic acid (RNA) monomers to produce short RNA chains. Furthermore, and more importantly, these synthetic RNA chains formed by mineral catalysis serve as a template for the formation of complementary RNA chains, which is a significant finding that demonstrates the role of minerals in the origin of life.

Simulation experiments run under Mars-like conditions have also shown that Mars analog minerals can shield the precursors of RNA and proteins against the harmful effects of UV and gamma radiation at the martian surface and 5 cm below the surface.

Carlisle, E.M., et al (2021) **Experimental taphonomy of organelles and the fossil record of early eukaryote evolution.** SCIENCE ADVANCES 7:doi.org/10.1126/sciadv.abe9487 (available as a free pdf)

[Organelles are internal organs of cells, such as chloroplasts, the nucleus, and mitochondria.]

Authors' abstract: *The timing of origin of eukaryotes and the sequence of eukaryogenesis are poorly constrained because their fossil record is difficult to interpret. Claims of fossilized organelles have been discounted on the unsubstantiated perception that they decay too quickly for fossilization.*

We experimentally characterized the pattern and time scale of decay of nuclei, chloroplasts, and pyrenoids in red and green algae, demonstrating that they persist for many weeks postmortem as physical substrates available for preservation, a time scale consistent with known mechanisms of fossilization.

Chloroplasts exhibit greater decay resistance than nuclei; pyrenoids are unlikely to be preserved, but their presence could be inferred from spaces within fossil chloroplasts. Our results are compatible with differential organelle preservation in seed plants.

Claims of fossilized organelles in Proterozoic fossils can no longer be dismissed on grounds of plausibility, prompting reinterpretation of the early eukaryotic fossil record and the prospect of a fossil record of eukaryogenesis.

Nghiem, J., et al (2021) **Early plant organics increased global terrestrial mud deposition through enhanced flocculation.** SCIENCE 371:526-529

Authors' abstract: *Rock such as slate and shale, which form from mud, suddenly start appearing in the geologic record around 450 million years ago.*

Their appearance at about the same time as certain plants seems to implicate plant roots in the formation of these ubiquitous rocks. There is a different route for creating the flocculation required for mudrock.

Using analog experiments, the authors found that organic matter from plants alone was sufficient for the formation of flocs, aggregates of small silt and clay particles, which are required to deposit mudrock. This observation could explain the appearance of these rocks in places where the plants did not have deep roots.

An irreversible increase in alluvial mudrock occurred with the Ordovician-Silurian evolution of bryophytes [mosses and liverworts], *challenging a paradigm that deep-rooted plants were responsible for this landscape shift.*

We tested the idea that increased primary production and plant organics promoted aggregation of clay into flocs in rivers and facilitated mud deposition on floodplains. In experiments, we observed that clay readily flocculated for organic and clay concentrations common to modern rivers, yielding settling velocities three orders of magnitude larger than those without organics.

Using a transport model, we found that flocculation substantially increased mud deposition, resulting in muddier floodplains. Thus, organic-induced flocculation may have been more critical than deep-rooted plants in the proliferation of muddy floodplains.

Mazeed, M., et al (2021) **Recruitment of archaeal DTD is a key event toward the emergence of land plants.** SCIENCE ADVANCES 7:doi.org/10.1126/sciadv.abe8890 (available as a free pdf)

[Anaerobic means soil or soil water lacking free oxygen gas. Land plants with roots evolved about 470 megayears ago from streptophyte algae.]

Authors' abstract: *The root is a critical architectural innovation in land plants, which is essential for anchorage, nutrient, and water uptake. Plants being sedentary in their lifestyle, roots have to survive in the oxygen-deprived environment of soil and face multiple stresses, including major anaerobic stress.*

Thus, roots are the primary sites of acetaldehyde production, an intermediate of ethanol fermentation. Environmental assaults such as floods, waterlogging, and parasite infection worsen the situation by creating prolonged anoxic conditions, which eventually produce excess acetaldehyde.

Acetaldehyde is also an ever-present metabolite in plants and involved in multistress response. Moreover, important processes such as seed germination and pollen development are highly dependent on ethanol fermentation. Anomalies in this pathway lead to failure in seed vigor and male fertility.

Streptophyte algae emerged as a land plant with adaptations that eventually led to terrestrialization. Land plants encounter a range of biotic and abiotic stresses that elicit anaerobic stress responses.

Here, we show that acetaldehyde, a toxic metabolite of anaerobic stress, targets and generates ethyl adducts on aminoacyl-tRNA, a central component of the translation machinery.

Thus, the study provides the molecular basis of ethanol and acetaldehyde hypersensitivity in DTD2 knockout plants. We uncovered an important gene transfer event from methanogenic archaea to the ancestor of land plants. While missing in other algal lineages, DTD2 is conserved from streptophyte algae to land plants, suggesting its role toward the emergence and evolution of land plants.

Perry, G.L.W. (2021) **How far might plant-eating dinosaurs have moved seeds?** BIOLOGY LETTERS 17:doi.org/10.1098/rsbl.2020.0689 (available as a free pdf)

Author's abstract: *Fossilized gut contents suggest that seeds consumed by dinosaurs may have remained intact in their stomachs, and since seed dispersal distance increases with body-mass in extant vertebrates, dinosaurs may have moved seeds long distances.*

I simulated seed dispersal by dinosaurs across body-masses from 1×10^1 to 8×10^4 kg using allometric random walk models, informed by relationships between (i) body mass and movement speed, and (ii) body mass and seed retention time.

Seed dispersal distances showed a hump-shaped relationship with body-mass, reflecting the allometric relationship between maximum movement speed and body-mass. Across a range of assumptions and parameterizations, the simulations suggest that plant-eating dinosaurs could have dispersed seeds long distances.

Geibert, W., et al (2021) **Glacial episodes of a freshwater Arctic Ocean covered by a thick ice shelf.** NATURE 590:97-102

Authors' abstract: *Following early hypotheses about the possible existence of Arctic ice shelves in the past, the observation of specific erosional features as deep as 1,000 metres below the current sea level confirmed the presence of a thick layer of ice on the Lomonosov Ridge in the central Arctic Ocean and elsewhere.*

Recent modelling studies have addressed how an ice shelf may have built up in glacial periods, covering most of the Arctic Ocean. So far, however, there is no irrefutable marine-sediment characterization of such an extensive ice shelf in the Arctic, raising doubt about the impact of glacial conditions on the Arctic Ocean.

Here we provide evidence for at least two episodes during which the Arctic Ocean and the adjacent Nordic seas were not only covered by an extensive ice shelf, but also filled entirely with fresh water, causing a widespread absence of thorium-230 in marine sediments. We propose that these Arctic freshwater intervals occurred 70,000 to 62,000 years before present and approximately 150,000 to 131,000 years before present, corresponding to portions of marine isotope stages 4 and 6.

Alternative interpretations of the first occurrence of the calcareous nannofossil Emiliania huxleyi in Arctic sedimentary records would suggest younger ages for the older interval. Our approach explains the unexpected minima in Arctic thorium-230 records that have led to divergent interpretations of sedimentation rates and hampered their use for dating purposes.

About nine million cubic kilometres of fresh water is required to explain our isotopic interpretation, a calculation that we support with estimates of hydrological fluxes and altered boundary conditions.

A freshwater mass of this size, stored in oceans, rather than land, suggests that a revision of sea-level reconstructions based on freshwater-sensitive stable oxygen isotopes may be required, and that large masses of fresh water could be delivered to the north Atlantic Ocean on very short timescales.

Rull, Valenti (2021) **Contributions of paleoecology to Easter Island's prehistory: A thorough review.** QUATERNARY SCIENCE REVIEWS 252:doi.org/10.1016/j.quascirev.2020.106751

Author's abstract: *Easter Island (Rapa Nui) is well known for the enigmas surrounding its unique megalithic statues, the moai, and the prehistoric (i.e., pre-European contact) Rapanui society that built them.*

These enigmas include, among others, the time of the island's settlement, the geographical origin of the first settlers, the technology associated with moai transportation and emplacement, the occurrence (or not) of an ecological and cultural collapse linked to the island's deforestation, and the potential influence of climatic shifts on ecological and cultural changes.

Until recently, most explanations for prehistoric developments invoked anthropogenic causes, but the progressive development of paleoecological studies has incorporated a new perspective in which climate change and climate-human synergies have gained momentum.

This paper reviews all paleoecological studies published to date and their contribution to a better understanding of Easter Island's prehistory, with a focus on four main aspects:
(i) the discovery and settlement of the island,
(ii) the eventual occurrence of climatic changes and its potential influence on landscape changes,
(iii) spatiotemporal deforestation patterns, and
(iv) the relationship between environmental, ecological and cultural shifts.

Paleoecological research on Easter Island has proceeded through three main phases: a pioneer phase (1977 to 1992), a transitional phase (1993 to 2004) and a revival phase (2005 to 2020). During the pioneer and transitional phases, the paradigm of a self-induced prehistoric socioecological collapse known as the "ecocidal" hypothesis dominated the scene.

However, new empirical evidence obtained during the revival phase highlighted the potential importance of climate change in prehistoric ecological and cultural developments. In addition, paleoecological records have provided novel insights into the initial discovery and occupation of Easter Island before Polynesian settlement.

Paleoecological evidence has suggested or supported that
(i) the island would have been discovered and sporadically/intermittently settled, possibly by Amerindian cultures, long before Polynesian colonization;
(ii) climatic changes, especially centennial-scale droughts that occurred during the Medieval Climate Anomaly (MCA) and the Little Ice Age (LIA), would have influenced ecological trends and cultural developments;
(iii) deforestation was not a synchronous island-wide process but occurred at different times and at different rates according to the catchment considered; and
(iv) both climatic and anthropogenic drivers, along with feedbacks between them, would have been responsible for the prehistoric socioecological developments on Easter Island.

Fernandes, D.M., et al (2021) **A genetic history of the pre-contact Caribbean.** NATURE 590:103-110

Authors' abstract: *Humans settled the Caribbean about 6,000 years ago, and ceramic use and intensified agriculture mark a shift from the Archaic to the Ceramic Age at around 2,500 years ago.*

Here we report genome-wide data from 174 ancient individuals from The Bahamas, Haiti and the Dominican Republic (collectively, Hispaniola), Puerto Rico, Curaçao and Venezuela, which we co-analysed with 89 previously published ancient individuals.

Stone-tool-using Caribbean people, who first entered the Caribbean during the Archaic Age, derive from a deeply divergent population that is closest to Central and northern South American individuals.

Contrary to previous work, we find no support for ancestry contributed by a population related to North American individuals. Archaic-related lineages were >98% replaced by a genetically homogeneous ceramic-using population related to speakers of languages in the Arawak family from northeast South America.

These people moved through the Lesser Antilles and into the Greater Antilles at least 1,700 years ago, introducing ancestry that is still present. Ancient Caribbean people avoided close kin unions despite limited mate pools that reflect small effective population sizes, which we estimate to be a minimum of 500 to 1,500 and a maximum of 1,530 to 8,150 individuals on the combined islands of Puerto Rico and Hispaniola in the dozens of generations before the individuals who we analysed lived.

Census sizes are unlikely to be more than tenfold larger than effective population sizes, so previous pan-Caribbean estimates of hundreds of thousands of people are too large. Confirming a small and interconnected Ceramic Age population, we detect 19 pairs of cross-island cousins, close relatives buried around 75 km apart in Hispaniola and low genetic differentiation across islands.

Genetic continuity across transitions in pottery styles reveals that cultural changes during the Ceramic Age were not driven by migration of genetically differentiated groups from the mainland, but instead reflected interactions within an interconnected Caribbean world.

Murata, K., et al (2021) **Cometary records revise Eastern Mediterranean chronology around 1240 CE.** PUBLICATIONS OF THE ASTRONOMICAL SOCIETY OF JAPAN 73:197-204

Authors' abstract: *Eirene Laskarina, Empress of John III Batatzes of the exiled Byzantine Empire of Nicaea (1204 to 1261 CE), was an important Eastern Mediterranean figure in the first half of the thirteenth century.*

We reassess the death day of Eirene, which has been variously dated during the years between the end of 1239 and 1241, with the understanding that narrowing the range in which this event occurred contributes much to understanding the political situation in the area around 1240.

George Akropolites, a famous official of the Empire, gives an account that connects Eirene's death to a comet that appeared "six months earlier", thus pointing to two comet candidates that were visible from the Eastern Mediterranean during the years 1239 and 1241, one recorded on "1239 June 3" and the other on "1240 January 31."

Recent historians prefer the former, based on historical circumstances and without a critical assessment of the comet records. We revisit the historical records and reveal that the 1239 June 3"candidate was not a comet.

On the other hand, the other candidate was a comet, as supported by multiple historical records in multiple regions, and is also a good fit with Akropolites' narrative.

Therefore, we conclude that Eirene died six months after the comet that was seen on 1240 January 31, which places her death in the summer of 1240. Given that her death day is crucial for determining some other contemporary events across the Eastern Mediterranean, our results offer a solid basis for further research on the thirteenth-century Eastern Mediterranean.

Sanders, D., et al (2021) **A review of clothing microbiology: the history of clothing and the role of microbes in textiles.** BIOLOGY LETTERS 17:doi.org/10.1098/rsbl.2020.0700 (available as a free pdf)

Authors' abstract and extracts: *While much consideration has been given to the broad environmental impacts of the textile and laundering industries, little is known about the impact wearing clothing has had on the human microbiome, particularly that of the skin, despite our long history with clothing.*

This review discusses the history of clothing and the evolution of textiles, what is and is not known about microbial persistence on and degradation of various fibres, and what opportunities for the industrial and environmental application of clothing microbiology exist for the future.

In the context of the spread of the virus that causes COVID-19, the global public has become hyper-aware of one instance in which clothing and microbes are related, the use of masks to prevent pathogens (in the case of COVID-19, viruses) from travelling from one person to another.

Laundering, along with the rising interest in maintaining the efficacy of laundering for the removal of soils and microorganisms, while minimizing its environmental impacts by means such as reducing water temperatures, is another instance in which people have become acquainted with the notion of microbes in textiles.

However, the relationship between clothing and microbes is far broader. Each garment worn by a person since the very first garment is likely to have hosted some microbes, served as a mechanism for the transfer of others and, simultaneously, created conditions on the body that have favoured still other microbes.

The relationship between microbes and clothing is of great significance to palaeo-history, history, fashion, medicine and public health. The oldest well-documented clothing is surprisingly recent and comes in the form of clothing carved onto Palaeolithic figures, and remnants of clothing found at archaeological sites.

These bits of clothing are associated with early modern humans in Europe. However, because the clothing materials were invariably subject to deterioration, it is likely that the first clothing considerably pre-dates these pieces of evidence.

Recent scholarship suggests that Neanderthals (Homo neanderthalensis) likely began to use clothing when they spread into cold habitats in Europe several hundred thousand years ago. In the most often cited scenario, Neanderthals used skins of animals, with the fur still attached, as loose-fitting cloak-like clothing.

Multi-layered clothing is then hypothesized to have been invented by early modern humans (Homo sapiens) with their own migration into cold realms. However, it is also possible that clothing use is much older and began not in cold realms but instead with simple coverings in warm habitats that are sometimes cool.

Cross-culturally, the use of clothing, even if piecemeal, is widespread not only in cold regions but also in most warm regions. Regardless, it is clear that the relationship between clothing and microbes is at least a hundred thousand years old and potentially much more ancient.

We hypothesize that the consistent wearing of animal skins and plants is likely to have led to the transfer of microbes from those animals and plants to human skin. It is possible that such transfers left a persistent legacy on the human skin microbiota, which is an intriguing, yet unexplored question.

Speirs: A fascinating article, with much more about microbes and humans. Well worth reading.

Hariraveendra, M., et al (2021) **Prey-predator interaction suggests sacred groves are not functionally different from neighbouring used lands.** JOURNAL OF TROPICAL ECOLOGY 36:220-224

Authors' abstract: S*acred groves (SG) of south India are either relics of primary or secondary forests or swamps, worshipped by the local communities, and distributed in the countrysides (CS) and forest landscapes of India.*

Studies suggest that SGs harbour a biodiversity different from that of adjoining CS and have a structural similarity to protected forests. Studies also suggest a negative effect of structural complexity of forests on predation.

Considering these two expectations, we compared the predation of artificial caterpillars inside SGs and CSs with the hypothesis that predation will be less in SG than in CS. Examining the predation marks, we identified the likely predator and scored the intensity of predation.

Bite marks of arthropods, birds, lizards and mammals were observed on caterpillars of both habitats. The predation rate and predation intensity were similar for overall predators and for each predator taxon in both habitats, despite the fact that mammal predation was mostly encountered in SGs.

Because the proportion of predated caterpillars is not different between habitats and the intensity of predation is high in SGs, we conclude that SGs may not have a quality of the expected standard.

Glaw, F., et al (2021) **Extreme miniaturization of a new amniote vertebrate and insights into the evolution of genital size in chameleons.** SCIENTIFIC REPORTS 11:doi.org/10.1038/s41598-020-80955-1 (available as a free pdf)

Authors' abstract: *Evolutionary reduction of adult body size (miniaturization) has profound consequences for organismal biology and is an important subject of evolutionary research. Based on two individuals we describe a new, extremely miniaturized chameleon, which may be the world's smallest reptile species.*

The male holotype of Brookesia nana sp. nov. has a snout-vent length of 13.5 mm (total length 21.6 mm) and has large, apparently fully developed hemipenes, making it apparently the smallest mature male amniote ever recorded.

The female paratype measures 19.2 mm snout-vent length (total length 28.9 mm) and a micro-CT scan revealed developing eggs in the body cavity, likewise indicating sexual maturity. The new chameleon is only known from a degraded montane rainforest in northern Madagascar and might be threatened by extinction.

Molecular phylogenetic analyses place it as sister to B. karchei, the largest species in the clade of miniaturized Brookesia species, for which we resurrect Evoluticauda Angel, 1942 as subgenus name. The genetic divergence of B. nana sp. nov. is rather strong (9.9?14.9% to all other Evoluticauda species in the 16S rRNA gene).

A comparative study of genital length in Malagasy chameleons revealed a tendency for the smallest chameleons to have the relatively largest hemipenes, which might be a consequence of a reversed sexual size dimorphism with males substantially smaller than females in the smallest species.

The miniaturized males may need larger hemipenes to enable a better mechanical fit with female genitals during copulation. Comprehensive studies of female genitalia are needed to test this hypothesis and to better understand the evolution of genitalia in reptiles.

Numerous vertebrate lineages have achieved extremely small body sizes, especially among the ectothermic fish, amphibians, and reptiles. Extremely miniaturized animals are generally thought to face physiological challenges that limit further size reductions.

Yet, miniaturization has independently evolved many times. The repeated evolution of such an extreme phenotype suggests that selection can often favour its emergence, but currently our understanding of miniaturization and the underlying evolutionary pressures is far from complete.

Morphologically, miniaturization is often associated with an evolutionary loss of phalangeal elements, with modifications of the skull and other features like relatively larger eyes and braincases, which often might reflect functional constraints and paedomorphosis.

[Image is from this paper.]

Zschokke, S., et al (2021) **Spiders in space: orb-web-related behaviour in zero gravity.** THE SCIENCE OF NATURE 108:doi.org/10.1007/s00114-020-01708-8 (available as a free pdf)

Authors' abstract: *Gravity is very important for many organisms, including web-building spiders. Probably the best approach to study the relevance of gravity on organisms is to bring them to the International Space Station.*

Here, we describe the results of such an experiment where two juvenile Trichonephila clavipes (L.) (Araneae, Nephilidae) spiders were observed over a 2-month period in zero gravity and two control spiders under otherwise identical conditions on Earth. During that time, the spiders and their webs were photographed every 5 minutes.

Under natural conditions, Trichonephila spiders build asymmetric webs with the hub near the upper edge of the web, and they always orient themselves downwards when sitting on the hub whilst waiting for prey. As these asymmetries are considered to be linked to gravity, we expected the spiders experiencing no gravity to build symmetric webs and to show a random orientation when sitting on the hub.

We found that most, but not all, webs built in zero gravity were indeed quite symmetric. Closer analysis revealed that webs built when the lights were on were more asymmetric (with the hub near the lights) than webs built when the lights were off.

In addition, spiders showed a random orientation when the lights were off but faced away from the lights when they were on. We conclude that in the absence of gravity, the direction of light can serve as an orientation guide for spiders during web building and when waiting for prey on the hub.

Duarte, C.M., et al (2021) **The soundscape of the Anthropocene ocean.** SCIENCE 371:doi.org/10.1126/science.aba4658

Authors' abstract: *Sound is the sensory cue that travels farthest through the ocean and is used by marine animals, ranging from invertebrates to great whales, to interpret and explore the marine environment and to interact within and among species.*

Ocean soundscapes are rapidly changing because of massive declines in the abundance of sound-producing animals, increases in anthropogenic noise, and altered contributions of geophysical sources, such as sea ice and storms, owing to climate change.

As a result, the soundscape of the Anthropocene ocean is fundamentally different from that of preindustrial times, with anthropogenic noise negatively impacting marine life.

We find evidence that anthropogenic noise negatively affects marine animals. Strong evidence for such impacts is available for marine mammals, and some studies also find impacts for fishes and invertebrates, marine birds, and reptiles.

Noise from vessels, active sonar, synthetic sounds (artificial tones and white noise), and acoustic deterrent devices are all found to affect marine animals, as are noise from energy and construction infrastructure and seismic surveys.

Although there is clear evidence that noise compromises hearing ability and induces physiological and behavioral changes in marine animals, there is lower confidence that anthropogenic noise increases the mortality of marine animals and the settlement of their larvae.

Anthropogenic noise is a stressor for marine animals. Thus, we call for it to be included in assessments of cumulative pressures on marine ecosystems.

Smith, H.B., et al (2021) **Seeding biochemistry on other worlds: Enceladus as a case study.** ASTROBIOLOGY 21:doi.org/10.1089/ast.2019.2197 (available as a free pdf)

Author's abstract: *Visionaries dream of terraforming planets while program officers fret over contaminating them. Prospective terraformers tend to believe that seeding another planet with life will require careful human or robotic (and usually Earth-assisted) cultivation.*

By contrast, planetary protection officers adopt a more conservative stance and assume a small, semi-sterilized spacecraft from Earth could spill life onto a planet, transforming it to a living world, in the same way that a small perturbation to a super cooled liquid would cause the entire volume to quickly crystallize.

Both cases adopt an implicit assumption that Earth-life is viable outside the Earth. However, this need not necessarily be the case, particularly given how the biochemistry of life on Earth appears so intimately coupled to its geochemistry.

The Solar System is becoming increasingly accessible to exploration by robotic missions to search for life. However, astrobiologists currently lack well-defined

frameworks to quantitatively assess the chemical space accessible to life in these alien environments.

Such frameworks will be critical for developing concrete predictions needed for future mission planning, both to determine the potential viability of life on other worlds and to anticipate the molecular biosignatures that life could produce.

Here, we describe how uniting existing methods provides a framework to study the accessibility of biochemical space across diverse planetary environments. Our approach combines observational data from planetary missions with genomic data catalogued from across Earth and analyzed using computational methods from network theory.

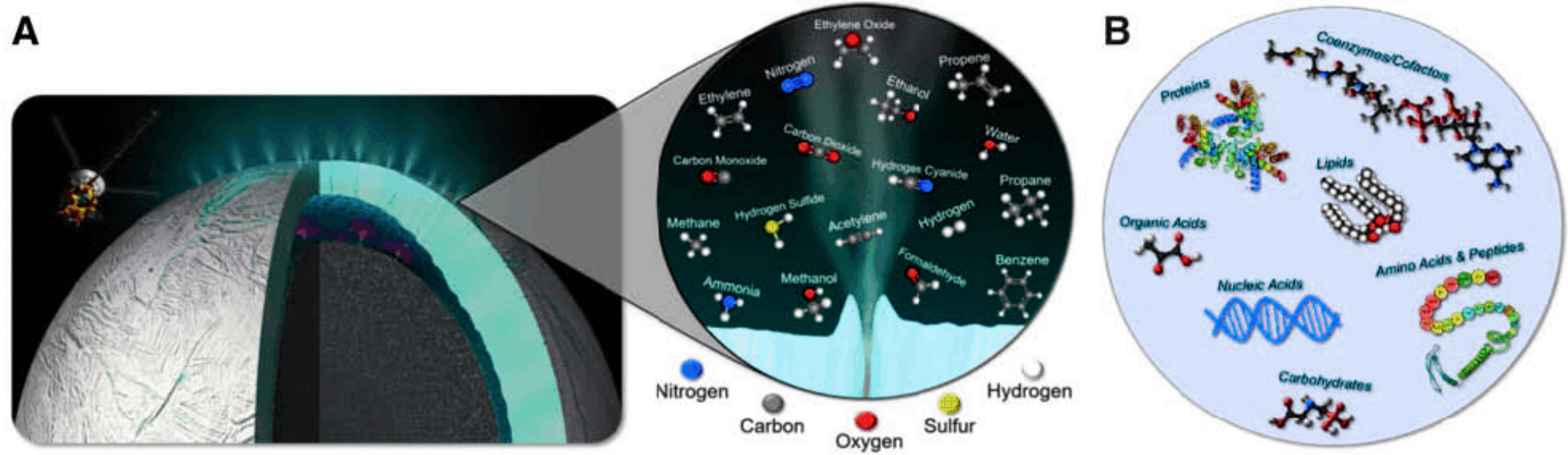
To demonstrate this, we use 307 biochemical networks generated from genomic data collected across Earth and seed these networks with molecules confirmed to be present on Saturn's moon Enceladus.

By expanding through known biochemical reaction space starting from these seed compounds, we are able to determine which products of Earth's biochemistry are, in principle, reachable from compounds available in the environment on Enceladus, and how this varies across different examples of life from Earth (organisms, ecosystems, planetary-scale biochemistry).

While we find that none of the 307 prokaryotes analyzed meet the threshold for viability, the reaction space covered by this process can provide a map of possible targets for detection of Earth-like life on Enceladus, as well as targets for synthetic biology approaches to seed life on Enceladus.

In cases where biochemistry is not viable because key compounds are missing, we identify the environmental precursors required to make it viable, thus providing a set of compounds to prioritize for detection in future planetary exploration missions aimed at assessing the ability of Enceladus to sustain Earthlike life or directed panspermia.

[Image is from this paper.]



Enceladus seed set compounds

Target compounds