OPUNTIA 458

Halloween 2019

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NOSE HILL PARK: PLATEAU AND NORTH SLOPES

photos by Dale Speirs

In the previous issue were photos taken from the eastern end of Nose Hill Park, Calgary's largest municipal park. It is approximately 4 km east-west and 5 km north-south, a flat-topped foothill that dominates the sprawling suburbs that now surround it.

The cover photo was taken from the central plateau looking southeast, with a few of the taller skyscrapers of the downtown core peeping over the horizon. On this page is the northwestern slope, giving an idea of how the hill is ringed by suburbs.

Autumn foliage on the north-central slope.

HALLOWEEN FICTION: PART 2
by Dale Speirs

[Part 1 appeared in OPUNTIA #427.]

THE PUMPKIN MURDERS (2010) by Judith Alguire was set in the cottage country of Ontario, where Trevor and Margaret Rudley operated a tourist inn. Two men appeared, fleeing a drug deal gone wrong in Montreal and hoping to avoid the consequences. No such luck, so the pumpkin patch was fertilized with blood. Halloween was scarier than usual. The hitmen sent to clean up the messy details were good detectives in themselves. They had no sense of humour when on the trail.

Autumn was foggy and leafy at the resort. Halloween preparations were impeded by the characters who all had something to hide. An optometrist turned funeral director was at the centre of the maelstrom, but others muddied the water. Everyone talked as if they were in one of Woody Allen's grimmer movies.

The resident Miss Marple, Elizabeth Miller, solved the case, although I suspect in real life she would have quickly been cleaned up by the hitmen to avoid any loose threads. Justice was done at the end. Some mobsters learned the hard way not to do things the hard way. The novel read well and was a change of pace from the regular sort of cozy.

STIRRING THE PLOT (2014) by Daryl Wood Gerber was a novel in a cozy series about Jenna Hart, operator of a bookstore called The Cookbook Nook, in Crystal Cove, California. As Halloween approached, a group called the Winsome Witches were involved in the festivities, a fund-raising group for literacy. Hart was the village Miss Marple, so when Pearl Thornton, the Head Priestess of the witches, was murdered, into the affray she leapt.

Hart had a sales booth at the Winsome Witches Faire and afterwards took their Haunted Tour. The final stop of the coach party was the mansion and grounds of the Thorntons. (The rich don't have yards, they have grounds.) After the tour group departed for their homes, Thornton departed for the next world.

Thornton had a messy family life with greedy relatives waiting for her to die. Lots of gossip the next day at The Cookbook Nook. The Halloween festivities rolled on, for there were too many tourist dollars at stake to let a little thing like murder disrupt the flow of cash. The sleuthing by Hart turned up a medley of interconnected motives, suspects, and plot threads.

The one that counted was Thornton's refusal to give a cancer patient a magical potion to cure her. Desperate people do desperate things. After the final confrontation, when justice was served, the Halloween parties continued without missing a beat.

The Winsome Witches saw no reason to shut down their activities. The Black Cat parade was exactly that. The mayor of the village co-operated with a decree that no dogs were allowed near the parade, for good and sufficient reason.

Hart's Halloween party was a big success. She couldn't lose with recipes like Witchy Woman Cocktails (rum and fruit liqueurs) and Dark Chocolate Laced With Cayenne Pepper.

TRICK OR DECEIT (2015) by Shelley Freydont was a novel in a series about Liv Montgomery of Celebration Bay, upstate New York. The village had a haunted house competition for a $10,000 prize and official status. The winner was the Museum of Yankee Horrors. Someone was a sore loser, not only vandalizing the museum but murdering one of the contest judges, leaving her body on the museum floor.

Montgomery had invited Jonathon Preston to the village. He was a director of a philanthropic foundation thinking of donating funds to the new community centre. She was a busy woman, giving him the grand tour of the village and investigating the murder.

Adding spice to the pumpkin pie was a church group protesting Halloween festivities. They were provoked, it must be said in fairness, by the arrival of a self-proclaimed witch who opened a shop called the Mystic Eye. It sold what you think it would.

Montgomery was also provoked, by the police who seemed to think that they should do the investigating, and by trying to humour Preston into coughing up the money for the village. The denouement wrapped up in a hurry in the last few pages. The murder was due to a failed love triangle, and the vandalism was intended to distract the police and Miss Marple. A rushed finish but a reasonably good novel judged as a cozy.

KILLER PAPER CUT (2015) by Joanna Campbell Slan was a novel in a cozy series about Kiki Lowenstein, who operated a scrapbook and crafts store called Time In A Bottle in Saint Louis, Missouri. She was seven months pregnant, had two other children, ran the store, and had committed to planning the Halloween Crafting Spook-tacular. To add to the sense of occasion, the landlord served notice of eviction because his daughter wanted her apartment.

The Spook-tacular was a bloody one. Shop assistant Laurel Wilkins was stabbed by an unknown assailant lurking in the back. The event continued because the fees couldn't be refunded and the speakers had been booked. As the forensic technicians mopped up in the back rooms, the customers were cutting and gluing in the front rooms.

Lowenstein added Marpleing to her list of things to do, scraping out the back stories. Wilkins eventually came out of her coma and survived. The would-be murderer had a history with her and blamed her for his setbacks in life, including sending inappropriate emails.

The final scrapbook event was Halloween Décor, but it did not finish the book. Several threads, including the landlord problem, were not only left dangling but were made obvious continuations for future novels.

Seen at Purdy's in downtown Calgary.

WEIRD FICTION: PART 2
by Dale Speirs

[Part 1 appeared in OPUNTIA #412.]

Trying to define weird fiction is like trying to define science fiction or fantasy. The debate goes back to palaeo-fandom in the 1930s and will never be settled. The best definition is the pragmatic one, that is, weird fiction is what I point to.

On The Air.

THE HERMIT'S CAVE was an old-time radio anthology series which aired from 1937 to 1950. About 800 episodes of mystery, fantasy, science fiction, and weird fiction were produced. No writers were credited to the show, which was a syndication rather than a network series. It is mostly forgotten today because very few episodes were preserved. (This and other OTR shows are available as free mp3s from www.otrrlibrary.org.)

"The Nameless Day" was a 1940 episode. Harden Wilgen was a sharp practice businessman who had an inventor Stanley Creighton working in secret for him. After the invention was perfected, Wilgen poisoned Creighton, stripped the body of identification, and filed for the patent as his own.

The body was eventually found and brought to the city morgue, where the attendant told the police officer that it would be filed under the name of John Doe #9. If no one claimed it, it would be buried in Potter's Field.

The ghost arose from the body and left for the morgue, thinking of itself only as John Doe #9. He went to Wilgen's office and walked through the door to confront him. Through the door as in not opening it first, just simply fading in through it and out the other side. He confronted Wilgen and killed him. The medical examiner said it was a heart attack, induced by some sort of terror, judging by the look on Wilgen's face.

Creighton qua John Doe #9 returned to the morgue and settled back into his corpse, ready for the trip to Potter's Field. A routine plot but well produced and worth listening to once.

"The Professor's Elixir" was another 1940 episode. A jealous wife asked a freelance chemist to prepare what they called an elixir but which was described and used as a sort of scrying method. Sort of like a crystal ball but a fluid. It affected the person being watched, and created a blue flame.

They used it to spy on her husband, who was however, just playing cards with a friend. The elixir caused him to suffer a heart attack, and turn his face and hands blue. Before he died, he asked his friend to have a toxicology test done on his body. The wife was arrested but got off because no poison was found.

The professor visited the wife later at her home and demanded she pay him for his services, but she didn't have the money. He threatened to use the elixir on her, but was pre-empted by the ghost of her husband. The room they were in was lined with blue flames when the ghost appeared, who then killed them the same way he died. The police were baffled to find their bodies had bright blue faces and hands.

The story didn't make much sense, mainly because the word 'elixir' was misused, and the mode of action didn't follow logically.

DARK FANTASY was a short-lived but good quality old-time radio series which originated out of Oklahoma City. It specialized in weird fiction, was written by Scott Bishop, and aired from November 1941 to June 1942.

"Pennsylvania Turnpike" was a 1942 episode that began with an old man, strangely dressed in archaic clothes of the late 1700s, walking into a roadside diner in rural Pennsylvania. He talked to the diner owner but was not forthcoming with a lot of information. He said he was looking to repay a debt.

The old-timer, as everyone was to call him, said he was hitchhiking but would only accept a ride from a red-haired man. He tried to pay for his coffee with a worn gold coin, but the diner owner told him it was illegal. (Americans could not legally own gold coins from 1934 to 1973.)

At that point, a car pulled in, and a red-haired stranger asked the way to Pine Knob. The diner owner never heard of it, but the old-timer said he knew the way and would ride with him out there. Off they went down the turnpike.

Some distance later, the old-timer told the driver to turn right onto the next road, which materialized out of nothing. It was a wagon track, and the driver was amazed. The two men began to argue about the nature of time, whether it was linear or, as the old-timer said, all of one and only seemed to be linear.

They reached the hamlet of Pine Knob and saw a stagecoach being loaded with, among other things, a box of gold. They followed it until it was stopped by a red-haired highwayman, the ancestor of the car driver. The stage driver was the old-timer, shot dead by the highwayman. The spirit of the old-timer, for that was what it was riding in the car, said he was taking his revenge. It grabbed the steering wheel and sent the car over the cliff, killing the red-haired man.

The story developed slowly but pulled the listener along to the weird mixture of past, present, and future. Well worth listening to.

"The Sea Phantom" began with a ship's crewman finding a strange man on board a ship, sitting in the captain's locked cabin. The stranger was a skeleton and writing on a slate. When the captain came to see, the skeleton had vanished, but left a message on the slate to change course. It was signed by Jonathan Strange, a captain whose ship vanished two centuries ago in the Atlantic Ocean.

The ship was on a treasure hunt, looking for a fortune in sunken gold. The captain decided to change the course. As they approached the co-ordinates, they spotted a ghost ship, the one Strange commanded. Two men sent by the captain boarded the ship and found the skeleton again, and a mass of gold it was carrying.

A ghost told them to stay away from the gold as it was cursed. The ship burst into flame, and they had to run for it. A somewhat illogical ghost story, but then they all are. Worth listening to once.

LIGHTS OUT was an old-time radio series that aired from 1934 to 1947. It was a mixture of horror, weird, and fantasy stories, written and produced by either Wyllis Cooper or Arch Oboler.

"He Dug It Up" was a 1943 episode written by Arch Oboler. An Englishman was planting a tree in his garden when he hit a stone coffin while digging the hole. It appeared to be Roman, but being too heavy to move by one man, he hired a contractor to hoist it out and bring it into his house.

His housekeeper got all hysterical, shouting about the usual there are things we were not meant to know, and tried to stop the men as they lifted the sarcophagus up high with block-and-tackle. She jarred the coffin loose, causing it to fall on top of her and crush her to death.

While her funeral was being arranged, the Englishman examined the coffin closely. Upon shifting its lid, within was discovered a stone statue of a lion-headed woman. The stone was warm, so the man got a chisel and began cutting through.

Others tried to stop him. The village constable and the vicar remonstrated in vain, but he would not be denied and kept chiseling. Finally he punched into the central hollow of the statue. He leaned over to look inside and was immolated by a giant gout of flame. The statue was a goddess of fire.

Another Oboler episode from 1943 was "Ball Paris Macabre". Two college boys visiting Paris were looking for excitement and managed to get tickets to a masked ball.

I suspect this episode was originally written before World War Two because in 1943 there was no way two American kids could be touring occupied France. The episode was obviously inspired by Edgar Allan Poe's similar story about the red death.

The boys constantly prattled like the adolescents they were. They were excited to get into one of those outre events but it was not the wild sex party they were expecting. The music was strange, and everyone danced quietly. A woman warned them to leave before midnight but they wanted to see the action.

At midnight, the guests all unmasked. The boys were horrified to see that none had heads. They were the ghosts of Madame Guillotine. One of the boys was seized, hustled into the next room, and decapitated. The other fled in terror out into the street, where he was run over by a car and decapitated.

It wasn't Oboler's fault, but several times through the episode it was interrupted for commercials about Ironized Yeast Tablets. Each time, the announcer went into a spiel about how taking the pills would supply vitamins and lead to an improvement in health. Rather ironic considering the plot.

THE HAUNTING HOUR was another OTR anthology series and aired from 1944 to 1946. No credits were given to anyone. "Ptolemy's Grave" was a 1945 episode that began as a standard curse of the mummy plot but with some differences. William Cartwright was an Egyptologist who bought the mummy of Ptolemy III and had it delivered to his house. (There was such a king, from 284 to 222 BC.)

The dealer who sold it to him was named Crow, and advised the mummy had a curse. Not long after, Cartwright went missing. He came to his wife Martha in a dream and told her to look at the mummy. She did and became hysterical when she saw it had William's face. She called Crow and asked him to come and take it away.

She also called her shrink Dr. John Crandall, who later took her to see the mummy in Crow's shop. Crandall stalled Crow and sent Martha to call the police because he realized William had been murdered and substituted for the real mummy.

The plot became ridiculous at this point. Crandall revealed he was actually a detective on the trail of Crow, who had been imprisoned in the past for selling fake mummies. William had testified against him and Crow got his revenge.

Firstly, why didn't William recognize Crow? Secondly, it was stated that Martha had been going to Crandall for psychiatric treatment. Assuming he actually did have a medical degree and was licenced while simultaneously working for the police, one wonders how he maneuvered himself into being her doctor long before Crow sold the mummy to William.

Crow tried to poison Crandall, who switched the drinks when Crow wasn't looking and let him die instead. Justice was served. With that, the end music swelled up, although no credits.

Anthologies.

YEAR'S BEST WEIRD FICTION: VOLUME 1 is a 2014 anthology edited by Laird Barron and Michael Kelly, covering works published in 2013. I won't review all the stories but will pick out a few.

The anthology opened with the story "The Nineteenth Step" by Simon Strantzas, about a young couple renovating a fixer-upper. They eventually noticed that the staircases kept changing the number of steps. Sometimes the upstairs staircase had 18 steps, sometimes it had 19. Then the husband walked down the basement steps ...

"Dr Blood And The Ultra Fabulous Glitter Squadron" by A.C. Wise parodied mad scientist stories. A group of drag queens and trannies was sent to Mars to deal with Dr Blood, who wanted to rule the world and all that bwah-ha!ha! stuff. They were actually good fighters and brought the doctor to justice. Rocky Horror in Barsoom.

"Bor Urus" by John Langan was narrated by a man obsessed since childhood with the idea that very severe storms with lots of lightning could open up passageways to parallel universes. Every time such a storm hit, he would drive out into it, hoping to find a passage to elsewhere. On one such occasion, he glimpsed a strange animal, near the size of an elephant but looking like a bull. For years thereafter, he constantly searched for it, and eventually found it again the hard way. Barely surviving the encounter, he gave up the chase, a sadder if not wiser man.

An anthology such as this one is more or less obligated to throw in something Lovecraftian, which brings us to "A Quest Of Dream" by W.H. Pugmire. You have to know Lovecraft to appreciate this pastiche, about the voyage of its narrator into the Dreamlands. Not quite the way HPL would have written it, but then again he lived in a different time. Pugmire caught the florid style of HPL and sharpened it, but not to excess.

If I may digress, I find that most Poe or Lovecraft pastiche writers have difficulty imitating the true style of these two authors. The vocabulary can be copied but the phraseology and cadence of their stories is difficult to catch.

"The Krakatoan" by Maria Dahvana Headley is set at Mount Palomar, narrated by a girl whose father was an astronomer and their next-door neighbour Mr Loury an ex-astronomer. Loury went crazy, trying to turn the telescope upside-down to see into the Earth, then later digging a hole in his backyard to start a volcano. She was caught up in the fantasy and thought she made contact with the underground world. It came to nothing, to her lasting regret.

Volume 2 of YEAR'S BEST WEIRD FICTION (2015) was edited by Kathe Koja and Michael Kelly. In general I didn't like as many of the stories as in the first volume. Too many of them were in the avant-garde style popular in small-press literary magazines of the first half of the 1900s.

"Observations About Eggs From The Man Sitting Next To Me On A Flight From Chicago, Illinois, to Cedar Rapids, Iowa" by Carmen Maria Machado is what the title suggests. A litany of facts, such as dragons hatched from eggs in an incubator cannot survive long because they need their mother's care. Or the mountain village where egg smashing was an important annual contest.

"A Stretch Of Highway Two Lanes Wide" by Sarah Pinsker is about a farmer who got a prosthetic arm and a brain chip to control it after an accident. The problem was that the chip couldn't decide if it was in Saskatchewan or Colorado. A cautionary tale as we move into a brave new world.

Magazines.

THE BLACK CAT short story magazine was published from 1895 to 1922 out of Boston, Massachusetts. (Not to be confused with the later mystery magazine THE BLACK MASK.) It carried many mystery, horror, and weird fiction stories. A large number of issues are available as free pdfs from www.archive.org. Whoever scanned them didn't know how to standardize the size of the pages, so the reader will have to keep zooming in and out, but that is a nuisance and not a serious obstacle.

"The Mysterious Card" by Cleveland Moffett (1896 February) was about Richard Burwell, a hapless man who was visiting Paris. He took in a nightclub and while there, an elegant woman on her way out of the club left a card on his table. He couldn't read French, so he later asked the manager at his hotel to translate for him. That worthy read the card and instantly asked Burwell to depart and never darken their doorstep again.

Burwell tried to get a translation from several people, each of whom reacted in horror without telling him what the card meant and immediately broke off relations. He bought a French-English dictionary but couldn't get the sense of the words, now regretting that he had never studied the language in school.

He then hired a private detective, who informed the Sureté and had him arrested. Burwell managed to get the American embassy to release him, but the condition was he had to leave France within 24 hours and never return.

Back in America, his subsequent life was one catastrophe after another whenever he showed anyone the card. No one would translate it for him. Finally by random chance he found the woman who had given him the card. She was on her deathbed. Just as she rose to tell him what it meant, she died. When he looked at the card, it had become blank.

I photographed this quilt in the Arts and Crafts competition of the Calgary Stampede this year.

VENUS IN HER GLIMMERING SPHERE: PART 7
by Dale Speirs

[Parts 1 to 6 appeared in OPUNTIAs #324, 329, 368, 373, 381, and 413.]

Whence Old Venus?

The idea of Venus as a Carboniferous swamp world reached the general public and later the science fiction writers through the writings of the Swedish astronomer Svante Arrhenius. A distinguished scholar, he won the 1903 Nobel Prize in chemistry. In 1915 he published a best-selling book in Sweden which was translated into English and published in 1918 as THE DESTINIES OF THE STARS. The book is available as a free download from www.gutenberg.org

The title is a misnomer as the book dealt with the planets and the Moon. Arrhenius used all the latest available scientific information but unfortunately the interpretations were mostly wrong. In a passage brief enough for me to quote in its entirety, he formulated his interpretation of the little data known about Venus. His conclusion was that if the clouds were water vapour, then the planet would be covered in swamps inhabited by aquatic life.

From this source, countless Old Venus stories were developed. Not until the late 1960s was it demonstrated by space probes that the surface of Venus was not a swamp but an inferno. It was fun while it lasted.

Here is what Arrhenius wrote:

Very different conditions obtain on our neighbour planet, which is closer both to the Sun and to ourselves, the radiant Venus, an object of interested human attention already in ancient times. The average temperature there is calculated to about 47˚C, assuming the sun constant to two calories per cubic centimeter per minute.

The humidity is probably about six times the average of that on the Earth, or three times that in Congo where the average temperature is 26˚C. The atmosphere of Venus holds about as much water vapour 5 km above the surface as does the atmosphere of the Earth at the surface.

We must therefore conclude that everything on Venus is dripping wet. The rainstorms on the other hand do not necessarily bring greater precipitation than with us. The cloud-formation is enormous and dense rainclouds travel as high up as 10 km. The heat from the Sun does not attack the ground but the dense clouds, causing a powerful external circulation of air which carries the vapour to higher strata where it condenses into new clouds. Thus, an effective barrier is formed against horizontal air currents in the great expanses below.

At the surface of Venus, therefore, there exists a complete absence of wind both vertically, as the Sun's radiation is absorbed by the ever present clouds above, and horizontally due to friction. Disintegration takes place with enormous rapidity, probably about eight times as fast as on the Earth, and the violent rains carry the products speedily downhill where they fill the valleys and the oceans in front of all river mouths.

A very great part of the surface of Venus is no doubt covered with swamps, corresponding to those on the Earth in which the coal deposits were formed, except that they are about 30˚C warmer. No dust is lifted high into the air to lend it a distinct colour.

Only the dazzling white reflex from the clouds reaches the outside space and gives the planet its remarkable, brilliantly white, lustre. The powerful air currents in the highest strata of the atmosphere equalize the temperature difference between poles and equator almost completely so that a uniform climate exists all over the planet analogous to conditions on the Earth during its hottest periods.

The temperature on Venus is not so high as to prevent a luxuriant vegetation. The constantly uniform climatic conditions which exist everywhere result in an entire absence of adaptation to changing exterior conditions. Only low forms of life are therefore represented, mostly no doubt belonging to the vegetable kingdom, and the organisms are nearly of the same kind all over the planet.

The vegetative processes are greatly accelerated by the high temperature. Therefore, the lifetime of the organisms is probably short. Their dead bodies, decaying rapidly, if lying in the open air, fill it with stifling gases; if embedded in the slime carried down by the rivers, they speedily turn into small lumps of coal, which, later, under the pressure of new layers combined with high temperature, become particles of graphite. Fossils proper are not formed as was also the case in the early periods of the Earth.

The temperature at the poles of Venus is probably somewhat lower, perhaps about 10˚C than the average temperature on the planet. The organisms there should have developed into higher forms than elsewhere, and progress and culture, if we may so express it, will gradually spread from the poles toward the equator.

Later, the temperature will sink, the dense clouds and the gloom disperse, and some time, perhaps not before life on the Earth has reverted to its simpler forms or has even become extinct, a flora and a fauna will appear, similar in kind to those that now delight our human eye, and Venus will then indeed be the "Heavenly Queen" of Babylonian fame, not because of her radiant lustre alone, but as the dwelling place of the highest beings in our solar system.

Life On Old Venus.

Jack Williamson, one of the great science fiction writers of the middle 1900s, was raised on a homestead out west and knew about the practicalities of farm life. Undoubtedly he drew on that for his story "The Cosmic Express" (1930 November, AMAZING STORIES, available as a free pdf from www.archive.org).

The story was about a young couple in the far future who dreamed of escaping the city life and living free on a Venusian homestead. They got their chance and quickly learned what life was really like in the Carboniferous jungles of Old Venus.

Fortunately they managed to escape and returned to the simple quiet life in the big city. I suspect that Williamson was writing from life, as in his day just as in rural Alberta, where I grew up, there were many tragedies of city slickers who found out the hard way what farming was really like.

From the 1934 October issue of AMAZING STORIES was "Eighty-Five And Eighty-Seven" by Eando Binder (a pseudonym of two brothers). It was about Johann Haupt, a professor who discovered two new elements, which had atomic numbers (protons) of 85 and 87.

At the time this story was written, those were hypothetical elements. They have since been isolated but the bad news is they are short-lived unstable elements. Element 85 is astatine, most isotopes (different numbers of neutrons) are only stable a few seconds and the longest lived about 8.1 hours. Element 87 is francium, the longest-lived isotope surviving for 22 minutes. The Binder brothers couldn't have known.

Haupt managed to synthesize enough of element 85 to make a superscience telescope lens that could penetrate the cloud cover of Venus and reveal a civilization with cities of skyscrapers. Element 87 was an anti-gravity substance, so Haupt packed the nose cone of a spaceship with it. His assistant Karl Marienfeldt jumped the gun and went traveling to Venus, leaving Haupt behind. The two elements were so rare that it would take years for more to be produced and others to follow Marienfeldt out to Venus.

Old Venus Rebels.

"The Globoid Terror" by R.F. Starzl (1930 November, AMAZING STORIES) was a standard the-natives-are-restless action-adventure story set on a Venus colonized by humans who don't think much of the local Injuns, pardon me, Venusians. The story began with natives trying to assassinate a human with black mould that even a speck will cause extremely rapid and painful death.

Matters developed from there but strangely veered off to the beach. Old Venus had oceans where it didn't have steaming Carboniferous jungles, and that was where the heroes fought the giant amoeboid jellyfish thingy that came up on the beach.

They saved the damsel in distress, but surprisingly the story ended on a different note when all the brave heroes were gobbled up and digested by the globoid monster. They found out the hard way that the beams from their ray guns passed harmlessly through the transparent beast.

Old Venus Invades.

We never worried about Venus as much as we did the Martians, but the Venusians needed watching.

"Space Rocket Murders" by Edmond Hamilton (1932 October, AMAZING STORIES) was about the mysterious deaths of scientists and engineers around the world working on the development of rockets. Their life spans were being shortened suddenly by fires or accidents. Someone was determined that Earthlings would never develop space travel.

Eventually the killers were exposed. They were Venusian agents who had surgery to look like humans. The inhabitants of that planet were paranoid about what Earth might do to them. On the principle that the best defense is a strong offense, the Venusians landed quietly and stealthily to forestall any space programme.

With Earth learning of them, the Venusians had to retreat and prepare for any possible invasion. The story more or less fizzled out there, as the cloudy planet built up its munitions in preparation for its greatest fear. But the protagonist wondered if it would be possible for Earth to approach them as friends instead of native tribes to be evicted.

"The Metamorphosis Of The World" by Clark Ashton Smith (1951 September, WEIRD TALES, and anthologized many times since) was about the invasion of Earth by Venusians. No battle fleets or bombardments, but instead a slow systematic reformation of Earth's environment to fit the standards of Venus.

Using superscience devices, the Venusian engineers transformed large patches of land, such as the Siberian tundra, Saharan deserts, and the state of Missouri (there's a joke in there somewhere). Each patch was converted into an uninhabitable environment in which Earthlings could not survive but which were a home away from home for Venusians. The plan was obviously to colonize Earth one step at a time.

Venusian scientists landed in silver globular spaceships and took specimens of the flora and fauna for study. They dissected humans in the same manner as human scientists would dissect a frog. Earthlings eventually managed to rally and fight back, but it was going to be a long war of decades or centuries, and would not reverse the changes.

2000 PLUS was an early old-time radio pure science fiction series that ran from 1950 to 1952. The stories were set in the far future, the year 2000 plus, which is our present day. (This and other OTR shows are available as free mp3s from www.otrrlibrary.org.) "The Green Thing" was a 1950 episode written by Edgar Marvin about an attempt by Venusians to invade Earth.

The story was set in the year 2000 plus 175, which was how the dates were announced on the show. At a sanitarium, a psychiatrist had developed a device that could photograph the dreams of patients and play them back on film. He discovered that some patients were having the same dream with the exact same details in them, a green thing calling out to them. The patients had nothing in common, and because they were held in different locked wards, hadn't met each other.

The medics began speculating. It must be thought projection or telepathy. Patients who had the dreams began to vanish into thin air. The search was on. Local villagers told the doctors of stories about a green thing haunting caves by the river, so they went down to investigate.

The green thing was real and trapped them. It had been using mind control to convert the patients into Venusian-controlled zombies. They were the vanguard of an army that would do the fighting for the Venusians and help conquer Earth. The ending was stereotypical, a last-minute destruction of the cave, crushing the green thing and saving Earth. A pulp story from the 1930s is what it was.

"Black Eyes And The Daily Grind" by Milton Lesser (1952 March, WORLDS OF IF, available as a free pdf from www.archive.org) was a take on Venusian pest control. Specifically a cute fuzzy little animal in the Carboniferous jungles of Venus which survived by making predators sleepy or distracted.

A couple of Earthlings brought one back. It soon began collapsing the local economy by making humans quiet down, a thing that if done in the big city quickly meant no one delivering food to stores, manufacturing goods, or keeping the utility systems running.

Nor could it be killed, since anyone trying it would fall asleep. The hero took it out to the "Canadian Northwoods" (as the author put it in a way that no Canuck would), hoping it would eventually die of old age. Except it was a pregnant female, about to give birth to a litter of 35.

Old Venus Comes In Peace.

I never liked superhero fiction, nor aliens who had come to save us from ourselves. An early example of the latter was ""The Master Minds Of Venus" by William K. Sonnemann (1934 September, AMAZING STORIES). It was about techie James Lee, in the days when radio broadcasting was just being born and it was all very cutting edge.

Lee was testing his new static eliminator when he made first contact with Venusians. They were broadcasting with telepathy too weak to be heard by

ordinary radios. In gratitude for making contact, they taught Lee how to mind read by broadcast telepathy.

He put his skill to practical use. In no time at all, gangsters and politicians were trying to eliminate him. It all worked out well, especially with the Venusians watching his back. An evil foreign nation was about to saturate the USA with poison gas. Needless to say their plans were stymied. Peace, order, and good government descended on the world. All that was needed was the toga-clad tour guide explaining how Utopia worked.

MISCELLANEOUS SCIENCE FICTION REVIEWS
by Dale Speirs

First we had cyberpunk, then steampunk, followed by dieselpunk. No horsepunk unless you count Westerns but I wasn't surprised to come across an anthology of stories billed as solarpunk.

SUNVAULT (2017) was edited by Phoebe Wagner and Bronte Christopher Wieland and contains 36 stories and poems. I'll review a couple here but most of the stories did not inspire.

Many of them are not related to any particular theme and were obviously written by authors with little or no knowledge of past science fiction, and in particular what the name Bat Durston means. However, youth must have its head, in this case a utopia where everyone lives in shiny condos and rides bicycles to work. The theme was not so much solar as it was a brave new world where the politically correct have mostly won.

"Solar Child" by Camille Meyers is about a solarsaurus project, which had produced something like a photosynthetic pterodactyl. From there to genetically engineered children who has photosynthetic symbionts in their skin which released glucose directly into their bloodstream. They still had to eat to get their vitamins, minerals, and amino acids, but not as much as long as they stayed out in the sunshine.

"A Catalogue Of Sunlight At The End Of The World" by A.C. Wise was exactly that, produced by the narrator as a generation starship prepared to leave Earth. Those on the starship would not again see sunlight in its myriad forms. The narrator's children were going on the ship, leaving behind their parents forever.

WHY I HUNT FLYING SAUCERS AND OTHER FANTASTICALS (2016) is a collection of 13 stories by Hugh A.D. Spencer, with author's commentary for each story. Excepting a couple of stories, most are humourous, a different treatment of the usual science fiction tropes. I'll just pick out two stories. Well recommended.

The book leads off with "Why I Hunt Flying Saucers" which posits that the reason the Grays are doing rectal probes and raping rednecks has nothing to do with DNA extraction. They're alien perverts who are into S&M. It backfired when they kidnapped the wrong human, someone who really was into that stuff.

"Mormonism And The Saskatoon Space Programme" will be funnier to those who live on the Canadian prairies. For example, there are no rats in Alberta but our province was the second diaspora of the Mormons after Utah, leading to the joke here:
Q: Why does Saskatchewan have rats and Alberta has Mormons?
A: Saskatchewan had first choice.

In any event, the narrator and his uncle, using potash-uranium fusion technology, were able to reach the Celestial Kingdom of the Latter-Day Saints, the highest level of their Heaven. Just a matter of flying up in old fighter jets equipped with puff drives (Potash-Uranium Fusion).

ZINE LISTINGS

[I only list zines I receive from the Papernet. If the zine is posted on www.efanzines.com or www.fanac.org, then I don't mention it since you can read it directly.]

THE FOSSIL #381 (US$10 per year from The Fossils Inc, c/o Tom Parson, 157 South Logan Street, Denver, Colorado 80209) Devoted to the history of zinedom and apas, this issue has an account of the Metcalf brothers at an 1885 zine convention, where they impressed the female zinesters with their good looks.

Also an extended discussion about the spread and archiving of electronic zines from the late 1990s to date. There was quite the disagreement as to whether ezines constituted acceptable publishing activity in apas. Before the advent of the pdf, many ezines were in formats that became obsolete and had to be rescued by techies using emulator software.

ELECTION 2019
photos by Dale Speirs

On September 11, Prime Minister Justin Trudeau called a federal election for October 21, which meant Canadians had to suffer through six weeks of campaigning. I generally avoid politics in the pages of this zine, and the inept performance of the candidates confirmed why.

Both the Conservative and Liberal parties pandered to voters by promising tens of billions of slush funds to subsidize everything. Trudeau himself admitted that 40% of Canadians already don't pay income tax.

Trudeau was staggering under an influence-peddling scandal, and as the campaign progressed he had to explain why as a young man he liked to perform in blackface. The Tory leader Andrew Scheer managed to stay under the radar until a few weeks later when it was revealed he had dual American-Canadian citizenship. He quickly promised to renounce the American side of his family.

As for the Greens and the NDP, they were led by lunatics whose policies appear to have been lifted from the Natural Law Party. NDP leader Jagmeet Singh was so far over the edge that the Alberta Dippers, led by former premier Rachel Notley, did not want to support their federal counterparts.

All politics is local. While coastal British Columbia and Quebéc opposed pipelines, on the prairies even the Liberals had to come out in favour.

Alberta has 34 seats in the House of Commons, of which 4 were Liberal when the election was called, 3 in Edmonton and 1 in Calgary (Kent Hehr).

The morning after the night before produced a minority Liberal government. As usual, eastern Canada went red, Ontario split the seats, and western Canada was blue. The Liberals are an eastern party and the Tories historically do better out west. Alberta was a sea of blue and Kent Hehr lost his riding as all of Calgary went Conservative. The table below shows seats and the popular vote.

Liberal	157	33.1 %
Conservative	121	34.4 %
Bloc Québécois	32	7.7 %
New Democratic Party	24	15.9 %
Green	3	6.5 %
Independent	1	0.8 %

FOOD COZIES: PART 14
by Dale Speirs

[Parts 1 to 13 appeared in OPUNTIAs #432, 433, 434, 436, 438, 441, 442, 444, 447, 450, 454, 456, and 457.]

Most cozies are worth reading once if you like mysteries, although it is doubtful any of them will stand the test of time. Recipes are generally included, if not at the back of the book, then in between chapters or sometimes integrated into the text. Don't read these books if you have an appetite. I have learned from experience to read these novels on a full stomach.

Chocolate And Fudge.

Nancy Coco (pseudonym of Nancy J. Parra) wrote a cozy series about Allie McMurphy of Mackinac Island, Michigan. She operated a fudge shop and in her spare time Marpled all the murders she had triggered. The recipes were interspersed between chapters.

McMurphy wasn't the only fudge store operator. The streets of the village were lined with fudge stores for the tourist trade. They were crowded with as many fudgies (yes, that's a category of foodies) as there were sailors. McMurphy had a prime location near the ferry dock where she demonstrated fudge making in the window of her store. It was a living.

ALL FUDGED UP (2013) was the first novel in the series. It began with Allie McMurphy inheriting the McMurphy Hotel and Fudge Shop from a relative. She found the body in a hotel closet on page 3 and from there the book rocketed away. She immediately became immersed in a family feud, as well as being boycotted by villagers as an outsider.

After assuaging her hurt with Dark Chocolate Rum Cherry Fudge at the end of Chapter 7, she had to deal with the hotel start-up, sabotage, a bit of Marpleing, prejudice against fudgies, shaky finances, and police constantly barging in as if they were in charge of criminal investigations. The fudge recipes interpolated into the text included Pina Colada Fudge and Strawberry Daiquiri Fudge.

The killers, and there were two of them, ran up the body count as they acted out a delayed revenge for something that happened decades ago. For the grand finale, there was just plain Chocolate Fudge, which seemed a bit of a letdown.

TO FUDGE OR NOT TO FUDGE (2014) was the sequel. It began with the traditional finding of the body by Miss Marple, played by Allie McMurphy. Scattered human bones were uncovered on page 2, so it was up to her to race police to a successful denouement.

McMurphy had a busy time of it. The Lilac Fest was underway, plus she had a hotel and fudge shop to run. A television crew arrived on the island. Superstar chef Peter Thomas was there to show everyone how it's done, and he brought along with him a cooking competition to be filmed as episodes. McMurphy found herself under lights.

After a quick halt for Grandma's Million-Dollar Fudge recipe (chocolate and marshmallow creme), Chapter 2 began the Marpleing and police investigation. More bones were found. The reality show was rough.

I'll be frank about this, the fudge recipes alternating with the chapters were mostly average. One of those recipes had a touch of poison added by a person unknown, causing the death of a competitor.

McMurphy was blamed of course, but since this was a series, the reader will not be too worried. Once the final recipe was out of the way, Chocolate Nougat Fudge, the murderer appeared. She was a crazed old woman who wanted to purify the island of those she disapproved of. Her intended third victim was McMurphy at the Lilac Fest. There was no suspense over who would survive the knife fight.

OH SAY CAN YOU FUDGE (2015) was the third novel in the series. It was about a bloody Fourth of July, as we knew it would be, since Allie McMurphy hired the fireworks contractor Rodney Rivers. She got a call from him to come by his warehouse. She did and found his body and lots of flames.

The first police officer on the scene called his dispatcher and the following conversation ensued:
"What makes you think we need a crime scene investigator?'
"Allie McMurphy's there, right?"
"Yes."
"Then there's a ninety-eight percent chance she found another dead body."

You may have heard the old joke that if you see bomb technicians and firemen running away from a building, try to keep up with them. It was like that once

the flames warmed up the fireworks. The good news was that the fire was contained to a quarter-mile radius. The bad news was that the explosion had been rigged to go off when a fireman hit a tripwire.

From there the fudge recipes alternated with chapters of fudge making, Marpleing, and trying to get replacement fireworks. The fudge making was slightly more complicated than usual since McMurphy wanted red, white, and blue fudge for the holiday. Red velvet fudge, white chocolate, and, it being Michigan, blueberries.

The bomber continued, including setting up traps at the fudge store and hotel fire escape. He was a pyromaniac, not a revenge killer or ordinary murderer. The final confrontation took place just after the Lemon Meringue Fudge recipe, and all was well.

ALL YOU NEED IS FUDGE (2016) began with Allie McMurphy finding a body floating in the marina, that of wealthy socialite Carin Moore. The annual yacht race was happening and the Moore family had long been noted for their sailing.

McMurphy was busy making chocolate centrepieces and fudge for the tourist trade brought in by the race. After a pause for Coconut Caramel Fudge, the police and Marple investigations began. The Moores were big names on the island but that didn't save them from the back stories to be dredged up.

There were political corruption and shady real estate deals, which were what had triggered the murder. The Almond Butter Fudge recipe segued into the denouement. All ended well for the fudgies, if not for the yachters.

FOREVER FUDGE (2018) brought a television crew to the island just after the tourist season ended. This time they were filming the pilot of a murder mystery series. A real murder occurred behind the fudge shop. Allie McMurphy not only found the body but the killer left a note addressed to her.

All kinds of temperamental people were about, one of whom was the murderer. He was one of the actors, who wanted to do very realistic research on how murder investigations were done. Not so much fun and not so many recipes. Events culminated in Gingerbread Fudge and the standard last-minute rescue of McMurphy from the clutches of the murderer.

Purdy's Chocolates had saskatoon creams on special this summer.

DEATH BY CHOCOLATE CHERRY CHEESECAKE (2018) by Sarah Graves was the first novel in a food cozy series that directly descended from a home renovation cozy series. Set in Eastport, Maine, the protagonists were Jacobia Tiptree and Ellie White. They had been the protagonists in a lengthy cozy series about drywall and death, but were tired of hammering nails and bodies and so decided to open a bakery.

The bakery was called The Chocolate Moose. There was no respite for the village of Eastport, as the murders continued unabated, in fact within the first few pages. Tiptree opened up the bakery one morning and found a dead man in the kitchen, his head in a large pot full of melted chocolate. White came along a moment later. Her response was: "*Now we're going to have to throw out all that good chocolate.*" An understandable remark, given that the women had seen umpty-dozen murders.

The defunct was Matt Muldoon, a health inspector. The Marpleing went into top gear, albeit hampered by a variety of nuisances. An approaching hurricane was predicted to hit the village on a holiday weekend. People were disappearing left and right. There were a number of crimes and misdemeanors, committed by about as many suspects, which made it difficult to sort out the killer.

The denouement revealed a gang was smuggling diamonds into the country via chocolate syrup. The rest of the action in this novel was basically clutter. All ended well, with one recipe in the appendix. Go ahead, guess what it was.

DEATH BY CHOCOLATE MALTED MILKSHAKE (2019) was the sequel. The Chocolate Moose was catering the wedding reception of Sharon Sweetwater and Andy Devine. They lost the contract when Toby Moran, the ex-boyfriend of Sweetwater, drank a poisoned milkshake.

Devine was arrested, on the classical grounds that the two men had argued just before the death. The wedding was canceled, which was just as well because a short time later the bride was arrested.

Jacobia Tiptree and Ellis White didn't want to take a financial hit, so they began sleuthing to find the real culprit. Lots of family histories were uncovered, and Tiptree herself had a few events in her past she preferred to be forgotten. The stress was relieved at intervals by baking chocolate cakes and discussing at length the theory and practice of wedding cakes.

Finally on to the penultimate chapter, the one where Miss Marple always got trapped with the murderer. Tiptree survived of course, an essential point because she needed the entire final chapter to explain who did what to whom and why. Moran had been both a womanizer and a blackmailer, so there was no shortage of suspects.

After the killer was taken down, the wedding was on again. The cake was a success, so all ended well. No recipes for milkshakes in the appendix, as such might have been offputting. Nor for cakes, just a single recipe for Ginger Chocolate Biscotti.

CHOCOLATE A LA MURDER (2019) by Kirsten Weiss was a novel in a cozy series about Maddie Kosloski of San Benedetto, California. She was the proprietor of a paranormal museum. The local festival, a weekend called Wine and Chocolate Days, was nigh and she had set up a special exhibit "The Magic Of Chocolate".

Kosloski had ordered chocolate goodies to sell to museum visitors but they hadn't been delivered when promised. She went over to the chocolate store and found the body of one of the owners, lying on the kitchen floor and covered in melted chocolate. The shop specialized in ethically sourced chocolate but the death wasn't ethical, it was murder.

As a Miss Marple, Kosloski was rather inept. She found a number of suspects, and no matter where she went, always seemed to manage to get chocolate smeared on her. Someone tried to run her over with a truck, then phoned in a bomb threat into her museum, and then attempted to drown her. Miss Marples are very hardy women though and can't be killed.

Another murder was committed. Kosloski identified the killer as a woman scorned seeking revenge, and then had the traditional held-at-gunpoint confrontation with her. She survived by knocking the murderer unconscious with a 10-lb block of chocolate. Well, it was a food cozy.

Candy Is Dandy.

ASSAULTED CARAMEL (2017) by Amanda Flower was the first novel in a cozy series set in Harvest, Ohio, in Amish country. There is an entire subgenre of cozies about Amish. I'm not certain why.

However this series was about a candy shop called Swissmen Sweets, run by Jebediah and Clara King, who were Amish. He wasn't in good health, so Clara called her granddaughter Bailey King home from Manhattan. Bailey's parents were traveling in Europe and unable to help (her father was a lapsed Amish).

Jebediah had problems with a pushy local developer Tyson Colton, who was pressuring the old man to sell the property. The pressure was off from him after he was stabbed to death in the kitchen of the candy store. Instead, the pressure was now on Jebediah as the prime suspect, so Bailey became an amateur sleuth.

The kitchen was off limits as a crime scene but there was enough candy out front in the display counters that the Kings could keep operating the store for a while. The murder set off a chain reaction in the village among the Amish and Gentiles alike, will all sorts of family connections and old feuds.

Bailey was in the midst of that, but not so busy that she couldn't help plan a catering contract for a wedding reception. The groom was the son of Colton, but didn't seem to mourn his father much.

The denouement was complicated, with a headfake false ending followed by the arrest of the real murderer. The cause was an attempt to shorten the lines of succession for the Colton estate, plus some past family history.

Alas, grandfather Jebediah didn't make it to the end, carried off by his heart trouble. Granny couldn't run the shop by herself, so Bailey gave up the bright

lights of Manhattan for the fudge of Amish Ohio. Once the explanations were over, it was on to the recipe, only one, for Salted Caramel Fudge.

LETHAL LICORICE (2018) was the sequel. Bailey King was contemplating entering the annual Amish Confectionery Competition with such delicacies as Lavender Blueberry Fudge and Chocolate Cherry Ganache Truffles. She got into a feud with a candy maker from the next village, Josephine Weaver, a devout Amish who objected to Bailey being in the contest because she was lapsed.

Someone poisoned Josephine with licorice, to which she was allergic. Her body was dumped inside a church organ. Her niece Charlotte and Bailey were the two main suspects, the former because she played the organ and was an apostate Amish, and the latter because she didn't play the organ but was an apostate Amish.

The Weaver family had its past, including a death fifteen years prior that was thought to be a horse-and-buggy accident and was now revealed as criminal negligence. Josephine was forced to drink licorice extract by someone who knew of her allergy and also knew of her past sins. As is so often the case, a sinner becomes a vengeful judge after repenting. The killer had to do some further cleanup but didn't succeed.

Meanwhile, the competition went on. Bailey briefly contemplated entering Mango Fudge on the grounds that her Amish competitors had no experience with that sort of fruit. In the end, she settled for Chocolate Peanut Butter Fudge.

The recipe in the appendix, and again there was only one, was for Black Licorice. Considering that its sole mention in the novel was to kill someone, it seemed untoward to use that one. I would have liked to have seen what Lavender Blueberry Fudge looked like.

The third installment in the Amish candy shop series was PREMEDITATED PEPPERMINT (2018), which continued the rising death toll in Harvest, Ohio. It was the Christmas season, Bailey King had been in the village less than a year, and the third murder was about to occur. The villagers had not yet caught on to the devastation that a Miss Marple can spread.

It was not the season for Bailey to be jolly. Her ex-boyfriend Eric Sharp, now a celebrity chef with his own television show, arrived from Manhattan to do an episode about an authentic Amish Christmas. Bailey was not happy about either. One wonders though about how many Amish would be watching the episode on television.

Matters got worse when the television producer Rocky Rivers (a woman) was strangled in the village square gazebo. The murderer might have been on the production crew, or might have been an Amish doing God's work to prevent the sacrilege by the show. The police suspected Sharp. Bailey's main worry was getting enough peppermint candy in stock for the Christmas market. Peppermint Bark, Sticks, Ribbon, Patties, Fudge, and Taffy. Everything one needs to clear the sinuses.

The murderer was an ex-boyfriend of Rivers. She had dumped him in her climb up the network ladder. The final confrontation was livened up by a gun battle which included a granny who had been taught well about how to use a shotgun. The recipe was for Peppermint Bark

Getting Pickled On Spicy Stories.

TOWN IN A SWEET PICKLE (2015) by B.B. Haywood (pseudonym of Robert and Beth Ann Feeman) was a novel in the saga of blueberry farmer Candy Holliday. She was the resident Jessica Fletcher of Cape Willington, Maine. As the novel opened, she had organized a cooking competition, one category of which was for pickled foods.

Residents soon discovered that someone was spreading poisoned pickles about. The pickle jars were all labeled Sweet Pickle Deli, whose owner Maurice Soufflé (if that was his real name) had disappeared years ago, leaving behind numerous large debts and a bad reputation.

This was the sixth novel in the series, and the townfolk were becoming suspicious as to why there had been so many murders and contretemps in the last few years. They hadn't yet realized that Holliday was the murder magnet but that seemed a matter of time.

She did a lot of sleuthing and uncovered a complicated plan by the villain to gain revenge against the absent Soufflé. The culprit was from an older generation who didn't understand that modern smartphones have built-in video cameras that could record her confession. These days a murderer has to be careful about bwah-ha!-ha!-ing in a public place.

The recipes appendix began with Pickled Red Beet Eggs. If anyone tried to serve them to me, I'd swear out a warrant against them. The Frozen Cucumber Salad and Cranberry Applesauce weren't much better. Some people will eat anything.

GUILTY AS CINNAMON (2015) by Leslie Budewitz was a novel in a cozy series about Pepper Reece and her spice shop in Seattle, Washington State. She was working with a potential client Tamara Langston, who was about to open a new restaurant nearby and would be a regular buyer of herbs and spices.

She never got to open the place. Reece found her dead in the midst of the renovations. Langston had apparently died of acute ingestion of ghost chili, an extremely hot pepper not suitable for beginners. That was difficult for Reece or the reader to accept but not the police, who executed a search warrant on the spice shop.

The Seattle news media followed Reece about. It was a hot story, pardon the expression. Reece mentioned in one interview that the hottest jalapeno peppers went to 25,000 Scoville units, while ghost chili peppers start at 1,000,000 Scoville units.

Investigations by both Miss Marple and the police revealed Langston was operating under a false identity and hiding a past that might or might not be criminal. Her past had come back to haunt her in the worst way when she moved into town.

The recipes appendix was prefaced with a legal disclaimer about ghost chili. A variety of spiced foods followed, none of which used ghost chili. One can imagine the conversations in the publisher's office with their legal counsel.

WHEN WORDS COLLIDE

The tenth annual When Words Collide will return to the Delta South Marriott Hotel on the weekend of August 14 to 16, 2020. It will incorporate the Aurora Awards and Canvention 40. WWC always sells out by June, as do the banquet and hotel. Details from www.whenwordscollide.org

SEEN IN THE LITERATURE

Mackey, D., et al (2019) **Two major accretion epochs in M31 from two distinct populations of globular clusters.** NATURE 574:69-71

Authors' abstract: *Large galaxies grow through the accumulation of dwarf galaxies. In principle it is possible to trace this growth history via the properties of a galaxy's stellar halo. Previous investigations of the galaxy Messier 31 (M31, Andromeda) have shown that outside a galactocentric radius of 25 kiloparsecs the population of halo globular clusters is rotating in alignment with the stellar disk, as are more centrally located clusters.*

The M31 halo also contains coherent stellar substructures, along with a smoothly distributed stellar component. Many of the globular clusters outside a radius of 25 kiloparsecs are associated with the most prominent substructures, but some are part of the smooth halo.

Here we report an analysis of the kinematics of these globular clusters. We find two distinct populations rotating perpendicular to each other. The rotation axis for the population associated with the smooth halo is aligned with the rotation axis for the plane of dwarf galaxies that encircles M31.

We interpret these separate cluster populations as arising from two major accretion epochs, probably separated by billions of years. Stellar substructures from the first epoch are gone, but those from the more recent second epoch still remain.

Kokaia, G., and M.B. Davies (2019) **Stellar encounters with giant molecular clouds.** MONTHLY NOTICES OF THE ROYAL ASTRONOMICAL SOCIETY 489:5165-5180

Authors' abstract: *Giant molecular clouds (GMCs) are believed to affect the biospheres of planets as their host star passes through them. We simulate the trajectories of stars and GMCs in the Galaxy and determine how often stars pass through GMCs. We find a strong decreasing dependence with Galactocentric radius, and with the velocity perpendicular to the Galactic plane, Vz. The XY-component of the kinematic heating of stars was shown to not affect the GMC hit rate, unlike the Z-dependence (Vz) implies that stars hit fewer GMCs as they age.*

Giant molecular clouds are locations of star formation, therefore we also determine how often stars pass near supernovae. For the supernovae the decrease with Vz is steeper as how fast the star passes through the GMC determines the probability of a supernova encounter.

We then integrate a set of Sun-like trajectories to see the implications for the Sun. We find that the Sun hits 1.6 ± 1.3 giant molecular clouds per billion years (Gyr) which results in 1.5 ± 1.1 or (with correction for clustering) 0.8 ± 0.6 supernova closer than 10 parsecs (pc) per Gyr. The different supernova frequencies are from whether one considers multiple supernovae per GMC crossing (few Myr) as separate events.

We then discuss the effect of the GMC hits on the Oort cloud, and the Earth's climate due to accretion. We also discuss the records of distant supernova. Finally, we determine Galactic Habitable Zone using our model. For the thin disc, we find it to lie between 5.8 and 8.7 kpc and for the thick disc to lie between 4.5 and 7.7 kpc.

Fuchs, E.C., et al (2019) **Solar eclipses and the surface properties of water.** EARTH, MOON, AND PLANETS 123:15-43

Authors' abstract: *During four solar eclipse events (two annular, one total and one partial) a correlation was observed between a change in water surface tension and the magnitude of the optical coverage. During one eclipse, evaporation experiments were carried out which showed a reduction in water evaporation at the same time as a rise in the surface tension.*

The changes did not occur on a day without a solar eclipse and are not correlated to changes in temperature, pressure, humidity of the environment. The effects are delayed by 20, 85, 30 and 37 min, respectively, compared to the maximum eclipse.

Possible mechanisms responsible for this effect are presented, the most likely hypothesis being reduced water/muon interaction due to solar wind and cosmic radiation blocking during an eclipse. As an alternative hypotheses, we propose a novel neutrino/water interaction and overview of other, less likely mechanisms. These findings support the hypothesis that the absence of muons is the source for the surface tension rise shortly after a solar eclipse.

If the solar wind and the cosmic radiation are blocked by the Moon during a solar eclipse event, the muon production in the upper atmosphere should be reduced as well. Fewer muons then impact on the water/air interface, which leads to fewer disruptions and a higher surface tension, and a lower evaporation rate as observed during the Puerto Chacabuco eclipse.

Kahana, A., et al (2019) **Enceladus: First observed primordial soup could arbitrate origin-of-life debate.** ASTROBIOLOGY 19:doi.org/10.1089/ast.2019.2029

Authors' abstract: *A recent breakthrough publication has reported complex organic molecules in the plumes emanating from the subglacial water ocean of Saturn's moon Enceladus (Postberg et al., 2018, Nature 558:564-568). Based on detailed chemical scrutiny, the authors invoke primordial or endogenously synthesized carbon-rich monomers (<200 u) and polymers (up to 8000 u). This appears to represent the first reported extraterrestrial organics-rich water body, a conceivable milieu for early steps in life's origin (''prebiotic soup'').*

One may ask which origin of life scenario appears more consistent with the reported molecular configurations on Enceladus. The observed monomeric organics are carbon-rich unsaturated molecules, vastly different from present-day metabolites, amino acids, and nucleotide bases, but quite chemically akin to simple lipids. The organic polymers are proposed to resemble terrestrial insoluble kerogens and humic substances, as well as refractory organic macromolecules found in carbonaceous chondritic meteorites.

The authors posit that such polymers, upon long-term hydrous interactions, might break down to micelle-forming amphiphiles. In support of this, published detailed analyses of the Murchison chondrite are dominated by an immense diversity of likely amphiphilic monomers.

Our specific quantitative model for compositionally reproducing lipid micelles is amphiphile-based and benefits from a pronounced organic diversity. It thus contrasts with other origin models, which require the presence of very specific building blocks and are expected to be hindered by excess of irrelevant compounds. Thus, the Enceladus finds support the possibility of a pre-RNA Lipid World scenario for life's origin.

Reynolds, A.R., et al (2019) **Late Pleistocene records of felids from Medicine Hat, Alberta, including the first Canadian record of the sabre-toothed cat Smilodon fatalis.** CANADIAN JOURNAL OF EARTH SCIENCES 56:1052-1060

Authors' abstract: *In the late 1960s, a team led by C.S. Churcher and A. MacS. Stalker collected over 1000 vertebrate fossils, mostly representing large herbivorous mammals, from bluffs along the South Saskatchewan River near Medicine Hat, Alberta, Canada. The records from this area also include the only documented case of the sabre-toothed cat Smilodon fatalis, but these specimens have not been described or illustrated, and therefore, their identification has never been verified.*

Here, all felid fossils recovered from the Medicine Hat bluffs are described and identified. We confirm the presence of the machairodontine S. fatalis and three additional taxa: the feline Lynx and the pantherines Panthera cf. P. atrox (American lion) and Panthera cf. P. spelaea (cave lion). Notably, this record of S. fatalis is its first confirmed occurrence in Canada and is a significant northerly range expansion, bringing the global distribution of this species in line with what is typical for a large felid.

Should the tentative record of Panthera cf. P. spelaea be correct, this would represent its first occurrence in Alberta and a southeastern range extension, bringing it into the range of P. atrox. The possible presence of both P. atrox and P. spelaea suggests that Late Pleistocene pantherine biogeography in North America may be more complex than previously believed, particularly during relatively warm interglacial periods.

Thackeray, J.F., L. Scott, and P. Pieterse (2019) **The Younger Dryas interval at Wonderkrater (South Africa) in the context of a platinum anomaly.** PALAEONTOLOGIA AFRICANA 54:30-35

[The Younger Dryas was a mini-ice age that lasted from 12,800 BC until 11,500 BC, caused by an asteroid impact. The climatic changes altered human evolution.]

Authors' abstract: *Wonderkrater in the Limpopo Province in South Africa is a late Quaternary archaeological site with peat deposits extending back more than 30,000 years before the present. Palaeoclimatic indices based on multivariate analysis of pollen spectra reflect a decline in temperature identifiable with the Younger Dryas (YD).*

A prominent spike in platinum is documented in a Wonderkrater sample (5614) with a mean date of 12,744 cal yr BP using a Bayesian model, preceding the onset of the YD cooling event.

The YD platinum spike at Wonderkrater is the first to be observed in Africa in the southern hemisphere, supplementing new discoveries from Patagonia in South America, in addition to more than 25 sites with such platinum anomalies in the northern hemisphere.

The observations from South Africa serve to strengthen ongoing assessments of the controversial YD Impact Hypothesis, whereby it is proposed that a meteorite or cometary impact contributed to a decline in temperature, associated inter alia with dispersion of atmospheric dust, mammalian extinctions and cultural changes.

Blasco, R., et al (2019) **Bone marrow storage and delayed consumption at Middle Pleistocene Qesem Cave, Israel (420 to 200 ka).** SCIENCE ADVANCES 6:doi.org/10.1126/sciadv.aav9822

Authors' abstract: *Bone marrow and grease constitute an important source of nutrition and have attracted the attention of human groups since prehistoric times. Marrow consumption has been linked to immediate consumption following the procurement and removal of soft tissues.*

Here, we present the earliest evidence for storage and delayed consumption of bone marrow at Qesem Cave, Israel (~420 to 200 ka). By using experimental series controlling exposure time and environmental parameters, combined with chemical analyses, we evaluated bone marrow preservation. The combination of archaeological and experimental results allowed us to isolate specific marks linked to dry skin removal and determine a low rate of marrow fat degradation of up to 9 weeks of exposure.

This is the earliest evidence of such previously unidentified behavior, and it offers insights into the socio-economy of the human groups who lived at Qesem and may mark a threshold to new modes of Palaeolithic human adaptation.

Dunne, J., et al (2019) **Milk of ruminants in ceramic baby bottles from prehistoric child graves.** NATURE 574:246-248

Authors' abstract: *The earliest known clay vessels that were possibly used for feeding infants appear in Neolithic Europe, and become more common throughout the Bronze and Iron Ages. However, these vessels, which include a spout through which liquid could be poured, have also been suggested to be feeding vessels for the sick or infirm.*

Here we report evidence for the foods that were contained in such vessels, based on analyses of the lipid 'fingerprints' and the compound-specific carbon values of the major fatty acids of residues from three small, spouted vessels that were found in Bronze and Iron Age graves of infants in Bavaria.

The results suggest that the vessels were used to feed infants with milk products derived from ruminants. This evidence of the foodstuffs that were used to either feed or wean prehistoric infants confirms the importance of milk from domesticated animals for these early communities, and provides information on the infant feeding behaviours that were practised by prehistoric human groups.

Sano, K., et al (2019) **The earliest evidence for mechanically delivered projectile weapons in Europe.** NATURE ECOLOGY AND EVOLUTION 3:1409-1414

Authors' abstract: *Microscopic analysis of backed lithic pieces from the Uluzzian technocomplex (45 to 40 thousand yr ago) at Grotta del Cavallo (southern Italy) reveals their use as mechanically delivered projectile weapons, attributed to anatomically modern humans.*

Use-wear and residue analyses indicate that the lithics were hunting armatures hafted with complex adhesives, while experimental and ethnographic comparisons support their use as projectiles. The use of projectiles conferred a hunting strategy with a higher impact energy and a potential subsistence advantage over other populations and species.

Evans, J., and C.C. Carman (2019) **Babylonian solar theory on the Antikythera mechanism.** ARCHIVE FOR HISTORY OF EXACT SCIENCES 73:619-659

[For more on the Antikythera mechanism, see OPUNTIA 291:18-19.]

Authors' abstract: *This article analyzes the angular spacing of the degree marks on the zodiac scale of the Antikythera mechanism and demonstrates that over the entire preserved 88˚ of the zodiac, the marks are systematically placed too close together to be consistent with a uniform distribution over 360˚. Thus, in some other part of the zodiac scale (not preserved), the degree marks have been spaced farther apart.*

By contrast, the day marks on the Egyptian calendar scale are spaced uniformly, apart from minor errors. A solar equation of center is apparent which rises by nearly 2.7˚ over the preserved portion of the zodiac.

The placement of the degree marks indicates that, in the preserved portion of the zodiac, the Sun was considered to run at a uniform pace of about 30˚ per synodic month, which is consistent with the Sun's speed in the fast zone of the Babylonian solar theory of System A.

Ossa, C.G., et al (2019) **Response of xerophytic plants to glacial cycles in southern South America.** ANNALS OF BOTANY 124:15-26

[Xerophytes are desert plants.]

Authors' abstract: *Quaternary glaciations strongly affected the distribution of species from arid and semi-arid environments, as temperature drops were accompanied by strong fluctuations in rainfall.*

In this study, we examined the response of xerophytic species to glacial cycles, determining the genetic patterns and climatic niche of Echinopsis chiloensis var. chiloensis, an endemic columnar cactus of arid and semi-arid regions of Chile.

Our results suggest that the cactus E. chiloensis experienced range contraction and fragmentation during the wet-cold conditions of the last glaciation. Range fragmentation may have facilitated differentiation of southern and northern

populations in several ecological traits, including climatic requirements, phenology and pollinators. Future studies are needed to examine whether differentiation in pollinators and flower phenology could drive incipient speciation in E. chiloensis.

For example, in the Sonora Desert, where conditions were wetter than at present during the Last Glacial Maximum (LGM), the widespread cactus species Lophocereus schottii and Pachycereus pringlei show a marked decrease in genetic diversity with latitude and an isolation-by-distance pattern (IBD) concordant with the classical scenario of glacial contraction-postglacial expansion.

In the Tehuacan-Cuitlán Valley, there is evidence of a bottleneck for Neobuxbaumia macrocephala, N. mezcalensis and N. tetetzo (Esparza-Olguín, 2005), which could also support the hypothesis of contraction-expansion.

In contrast, high levels of population divergence have been documented for Pilosocereus machrisii of central South America that today grow in small and isolated patches of xerophytic vegetation that are thought to have functioned as refugia during the wet-warm conditions of interglacial periods (interglacial refugia).

Ryan, S.F., et al (2019) **Global invasion history of the agricultural pest butterfly Pieris rapae revealed with genomics and citizen science.** PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES USA 116:20015-20024

Authors' abstract: *Over the last few thousand years, the seemingly inconspicuous cabbage white butterfly, Pieris rapae, has become one of the most abundant and destructive butterflies in the world.*

Here, we assessed variation at thousands of genetic markers from butterflies collected across 32 countries by over 150 volunteer scientists and citizens to reconstruct the global spread of this agricultural pest.

Our results suggest this butterfly spread out from eastern Europe to occupy every continent except South America and Antarctica, with the timing of many of these events coinciding with human activities, migration, trade, and the development of crop cultivars that serve as food plants for the butterfly larvae. Interestingly, many of these invasions were hugely successful despite repeated losses of genetic diversity.

The small cabbage white butterfly, Pieris rapae, is a major agricultural pest of cruciferous crops and has been introduced to every continent except South America and Antarctica as a result of human activities. In an effort to reconstruct the near-global invasion history of P. rapae, we developed a citizen science project, the "Pieris Project," and successfully amassed thousands of specimens from 32 countries worldwide.

We then generated and analyzed nuclear (double-digest restriction site-associated DNA fragment procedure) and mitochondrial DNA sequence data for these samples to reconstruct and compare different global invasion history scenarios. Our results bolster historical accounts of the global spread and timing of P. rapae introductions.

We provide molecular evidence supporting the hypothesis that the ongoing divergence of the European and Asian subspecies of P. rapae (~1,200 y B.P.) coincides with the diversification of brassicaceous crops and the development of human trade routes such as the Silk Route (Silk Road).

The further spread of P. rapae over the last ~160 y was facilitated by human movement and trade, resulting in an almost linear series of at least 4 founding events, with each introduced population going through a severe bottleneck and serving as the source for the next introduction.

Management efforts of this agricultural pest may need to consider the current existence of multiple genetically distinct populations. Finally, the international success of the Pieris Project demonstrates the power of the public to aid scientists in collections-based research addressing important questions in invasion biology, and in ecology and evolutionary biology more broadly.

Cerceau, I., et al (2019) **The cost of fidelity: foraging oligolectic bees gather huge amounts of pollen in a highly specialized cactus-pollinator association.** BIOLOGICAL JOURNAL OF THE LINNEAN SOCIETY 128:30-43

Authors' abstract: *We studied the association of Parodia neohorstii (Cactaceae) and its bee pollinators focusing on pollinator foraging behaviour, flower functioning, female and male reproductive success, and pollen fate.*

Parodia neohorstii showed synchronized flower opening and pollen presentation but discontinuous blooming.

The apparently generalized flowers partition pollen through thigmonastic stamen movements that function as a mechanical filter against generalist bees by restricting access to the major pollen reservoir to bees that show flower handling 'know-how', thereby favouring the oligolectic bee Arhysosage cactorum.

This pollinator adjusted its pollen foraging to flower opening, removed pollen hurriedly, and promoted maximal fruit and seed set, which was minimal in its absence. Estimates of pollen fate revealed that a huge amount of pollen flows to specialized pollinators (86.5%), and only 0.9% reaches conspecific stigmas.

The specialized interaction between P. neohorstii and Arhysosage cactorum, both threatened species, is efficient but fragile. Any environmental modification that causes a mismatch between the partners is likely to result in reproductive failure.

Needham, D.M., et al (2019) **A distinct lineage of giant viruses brings a rhodopsin photosystem to unicellular marine predators.** PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES USA 116:doi.org/10.1073/pnas.1907517116

Authors' abstract: *Although viruses are well-characterized regulators of eukaryotic algae, little is known about those infecting unicellular predators in oceans. We report the largest marine virus genome yet discovered, found in a wild predatory choanoflagellate sorted away from other Pacific microbes and pursued using integration of cultivation-independent and laboratory methods.*

The giant virus encodes nearly 900 proteins, many unlike known proteins, others related to cellular metabolism and organic matter degradation, and 3 type-1 rhodopsins.

The viral rhodopsin that is most abundant in ocean metagenomes, and also present in an algal virus, pumps protons when illuminated, akin to cellular rhodopsins that generate a proton-motive force. Giant viruses likely provision multiple host species with photoheterotrophic capacities, including predatory unicellular relatives of animals.

Giant viruses are remarkable for their large genomes, often rivaling those of small bacteria, and for having genes thought exclusive to cellular life. Most isolated to date infect nonmarine protists, leaving their strategies and prevalence in marine environments largely unknown.

Using eukaryotic single-cell metagenomics in the Pacific, we discovered a Mimiviridae lineage of giant viruses, which infects choanoflagellates, widespread protistan predators related to metazoans.

The ChoanoVirus genomes are the largest yet from pelagic ecosystems, with 442 of 862 predicted proteins lacking known homologs. They are enriched in enzymes for modifying organic compounds, including degradation of chitin, an abundant polysaccharide in oceans, and they encode three divergent type-1 rhodopsins (VirR) with distinct evolutionary histories from those that capture sunlight in cellular organisms.

One (VirRDTS) is similar to the only other putative rhodopsin from a virus (PgV) with a known host (a marine alga). Unlike the algal virus, ChoanoViruses encode the entire pigment biosynthesis pathway and cleavage enzyme for producing the required chromophore, retinal.

We demonstrate that the rhodopsin shared by ChoanoViruses and PgV binds retinal and pumps protons. Moreover, our 1.65-Å resolved VirRDTS crystal structure and mutational analyses exposed differences from previously characterized type-1 rhodopsins, all of which come from cellular organisms.

Multiple VirR types are present in metagenomes from across surface oceans, where they are correlated with and nearly as abundant as a canonical marker gene from Mimiviridae.

Our findings indicate that light-dependent energy transfer systems are likely common components of giant viruses of photosynthetic and phagotrophic unicellular marine eukaryotes.

Suggitt, A.J., et al (2019) **Widespread effects of climate change on local plant diversity.** CURRENT BIOLOGY 29:2905-2911

Authors' abstract: *Human activity has sent many measures of biodiversity into long-term decline, and there are suggestions that the sheer scale of this impact*

is sufficient to consider the modern era as a geological epoch of its own, known as the Anthropocene. However, recent meta-analyses show that local alpha diversity is often stable or slightly increasing.

Here, we show that the local alpha diversity (species richness) of plants found in quadrats and transects has increased the most in cooler regions of the world that have experienced the highest absolute changes (i.e., changes in either direction) in climate. The greatest statistical support is for the effects of precipitation change.

On average, alpha diversity declined slightly (-4.2% per decade) in the third of sites that experienced the lowest precipitation change but increased (+10.8% per decade) in the third of sites with the highest precipitation change.

These results suggest that the perturbation of local communities during climatic transitions increases the average number of species, at least temporarily, an effect likely to remain important as climate change continues.

Toyama, K.S., et al (2019) **Sand-swimming behaviour reduces ectoparasitism in an iguanian lizard.** THE SCIENCE OF NATURE 106:doi.org/10.1007/s00114-019-1651-8

[Ectoparasites are skin parasites such as leeches and mites.]

Authors' abstract: *Sand swimming behaviour occurs in several lizard clades. Known ecological advantages of sand swimming include reduced predation risk and enhanced thermoregulation.*

We addressed whether, by way of sand abrasion, sand-swimming reduces ectoparasitism in the lizard Microlophus occipitalis, whose natural habitat includes sandy substrates (beach) and firm soil (dry forest). We hypothesised that, aside from habitat differences in infestation probability, ectoparasite prevalence and load would be lower in the beach than in the forest because of ectoparasite removal caused by sand-swimming.

In an experiment with lizards confined in boxes with substrate from both habitats, lizards in beach boxes showed a greater decrease in ectoparasite load compared with lizards in forest boxes. Ectoparasite prevalence and load were much higher in the forest than in the beach across seasons. Larger lizards showed higher ectoparasite loads, and there were no sex differences in ectoparasite infestation. We provide evidence that sand swimming may confer another ecological advantage to lizards: reduced ectoparasitism.

Schmidt, J.O. (2019) **Predator-prey battle of ecological icons: Horned lizards (Phrynosoma spp.) and harvester ants (Pogonomyrmex spp.)** COPEIA 107:404-410

Author's abstract: *Horned lizards, Phrynosoma spp., and harvester ants, Pogonomyrmex spp., could be in a predator-prey arms race in which the lizards are specialists that feed on harvester ants, and ants have highly toxic venom and other defenses to help deter predacious horned lizards.*

All 23 examined species of harvester ants possess venoms that are highly lethal to mice, but the venoms of the tested ant species were nearly inactive toward horned lizards.

Blood plasma of Phrynosoma cornutum contains a factor (or factors) that neutralizes the ability of harvester ant venom to kill mice, but does not neutralize the venoms of honeybees, a rattlesnake, Russell's viper, or a cobra.

A species of harvester ant present only in southern South America was used to test the predictions that the lethality of harvester ant venom evolved in response to predation pressure from horned lizards, and that horned lizard plasma does not neutralize the lethality of this species of harvester ant.

This ant species did not overlap in range with horned lizards, which have a range from Guatemala to Canada. Not only was the venom of the South American ant species the most lethal of all tested harvester ant venoms, the venom's lethal activity was neutralized by horned lizard plasma.

These results indicate that horned lizards responded to the lethality of their invertebrate prey's venom, but that the harvester ant venom lethality did not evolve in response to predation pressures by present day horned lizards.

Jungen, M.T., et al (2019) **Monitoring Eastern Diamondback Rattlesnakes using a novel external radio-transmitter attachment method.** COPEIA 107:411-416

Authors' abstract: *Internal implantation of radio-transmitters is the preferred attachment technique for snakes, but the high costs and invasive nature of the surgery make a functional alternative desirable. Attaching radio-transmitters externally can be a cost-effective alternative to surgical implantation. External transmitter attachment site and methodology depend on the unique morphology of a given study species, making external adherence impractical for most snake species.*

Rattlesnake rattles are unique morphological features that can serve as an attachment site for external radiotransmitters. From 2011 to present, we have been attaching transmitters to the rattles of Eastern Diamondback Rattlesnakes (Crotalus adamanteus; EDB) using thread and epoxy.

We calculated average monitoring duration using radio-telemetry data collected from 49 adult EDBs telemetered from 2014 to 2017 in coastal South Carolina. On average, we monitored EDBs for 189±78 days with 14 EDBs monitored >240 days and 3 EDBs monitored >300 days. External transmitter attachment is a viable alternative to surgical implantation, providing a noninvasive approach to monitoring rattlesnakes.

Rubin, M.D., et al (2019) **A large-scale study reveals 24-hour operational rhythms in hospital treatment.** PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES USA 116:doi.org/10.1073/pnas.1909557116

Authors' abstract: *We found that orders and initial doses of treatment in the hospital were strongly influenced by time of day, regardless of drug type, diagnosis, or care unit. As the first large-scale account of 24-h rhythms in hospital medicine, this study identifies a potential operational barrier to best clinical care.*

Clinical decisions should be made around the clock; pain, infection, hypertensive crisis, and other conditions do not occur selectively in the morning.

Systemic bias in the timing of medicine may also conflict with circadian biology, which can influence when certain treatments are most effective or safe. Our findings suggest that time of day in hospital operations deserves further consideration.

Hospitals operate 24 hours a day, and it is assumed that important clinical decisions occur continuously around the clock. However, many aspects of hospital operation occur at specific times of day, including medical team rounding and shift changes. It is unclear whether this impacts patient care, as no studies have addressed this.

We analyzed the daily distribution of ~500,000 doses of 12 separate drugs in 1,546 inpatients at a major children's hospital in the United States from 2010 to 2017. We tracked both order time (when a care provider places an electronic request for a drug) and dosing time (when the patient receives the drug).

Order times were time-of-day-dependent, marked by distinct morning-time surges and overnight lulls. Nearly one-third of all 103,847 orders for treatment were placed between 8:00 AM and 12:00 PM. First doses from each order were also rhythmic but shifted by 2 hours. These 24-hour rhythms in orders and first doses were remarkably consistent across drugs, diagnosis, and hospital units.

This rhythm in hospital medicine coincided with medical team rounding time, not necessarily immediate medical need. Lastly, we show that the clinical response to hydralazine, an acute antihypertensive, is dosing time-dependent and greatest at night, when the fewest doses were administered.

The prevailing dogma is that hospital treatment is administered as needed regardless of time of day. Our findings challenge this notion and reveal a potential operational barrier to best clinical care.

Hernandez, L.M., et al (2019) **Plastic teabags release billions of microparticles and nanoparticles into tea.** ENVIRONMENTAL SCIENCE AND TECHNOLOGY 53:doi.org/10.1021/acs.est.9b02540

Authors' abstract: *The increasing presence of micro- and nano-sized plastics in the environment and food chain is of growing concern. Although mindful consumers are promoting the reduction of single-use plastics, some manufacturers are creating new plastic packaging to replace traditional paper uses, such as plastic teabags.*

The objective of this study was to determine whether plastic teabags could release microplastics and/or nanoplastics during a typical steeping process. We show that steeping a single plastic teabag at brewing temperature (95 ˚C) releases approximately 11.6 billion microplastics and 3.1 billion nanoplastics into a single cup of the beverage.

The composition of the released particles is matched to the original teabags (nylon and polyethylene terephthalate) using Fourier-transform infrared spectroscopy (FTIR) and X-ray photoelectron spectroscopy (XPS). The levels of nylon and polyethylene terephthalate particles released from the teabag packaging are several orders of magnitude higher than plastic loads previously reported in other foods.

An initial acute invertebrate toxicity assessment shows that exposure to only the particles released from the teabags caused dose-dependent behavioral and developmental effects.

Ryan, P.G., et al (2019) **Rapid increase in Asian bottles in the South Atlantic Ocean indicates major debris inputs from ships.** PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES USA 116:20892-20897

Authors' abstract: *Most plastic debris floating at sea is thought to come from land-based sources, but there is little direct evidence to support this assumption. Since 1984, stranded debris has been recorded along the west coast of Inaccessible Island, a remote, uninhabited island in the central South Atlantic Ocean that has a very high macrodebris load (~5 kg·m).*

Plastic drink bottles show the fastest growth rate, increasing at 15% per year compared with 7% per year for other debris types. In 2018, we examined 2,580 plastic bottles and other containers (one-third of all debris items) that had accumulated on the coast, and a further 174 bottles that washed ashore during regular monitoring over the course of 72 days (equivalent to 800 bottles·km^{-y}).

The oldest container was a high-density polyethylene canister made in 1971, but most were polyethylene terephthalate drink bottles of recent manufacture. Of the bottles that washed up during our survey, 90% were date-stamped within two years of stranding.

In the 1980s, two-thirds of bottles derived from South America, carried 3,000 km by the west wind drift. By 2009, Asia had surpassed South America as the major source of bottles, and by 2018, Asian bottles comprised 73% of accumulated and 83% of newly arrived bottles, with most made in China.

The rapid growth in Asian debris, mainly from China, coupled with the recent manufacture of these items, indicates that ships are responsible for most of the bottles floating in the central South Atlantic Ocean, in contravention of International Convention for the Prevention of Pollution from Ships regulations.

Just a spacefiller, seen at the New Central Library in downtown Calgary. There was no sign to explain it, and since Halloween was nigh, it seemed to be a decoration.