

# OPUNTIA

## 360

Early December 2016

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

### **TIS THE SEASON DOWNTOWN**

photos by Dale Speirs

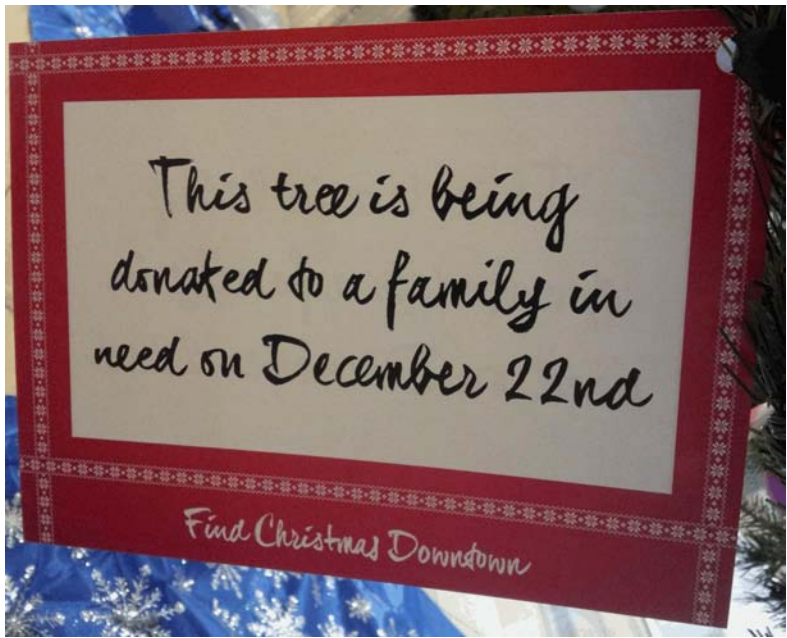
Calgary is in the rain shadow of the Rocky Mountains, so we don't get much snow, and what little that does fall is usually removed a few days by chinooks. But the nights are drawing in, and in late November the sun sets by 17h00. The merchants set out their Christmas displays, this year with a tinge of desperation to them as the economy goes into recession.

I ride the buses quite a lot, and only use my car for grocery shopping, country driving in the summer, and going out in evenings to club meetings. Last winter, I used just one tank of gas between November and March. The view shown at right is from the bus stop I take homeward bound. The Calgary Tower is gaily decorated in lights.





Christmas trees in the TD Square atrium of the downtown core. Each business sponsors a tree, to be donated to a needy family just before Christmas.

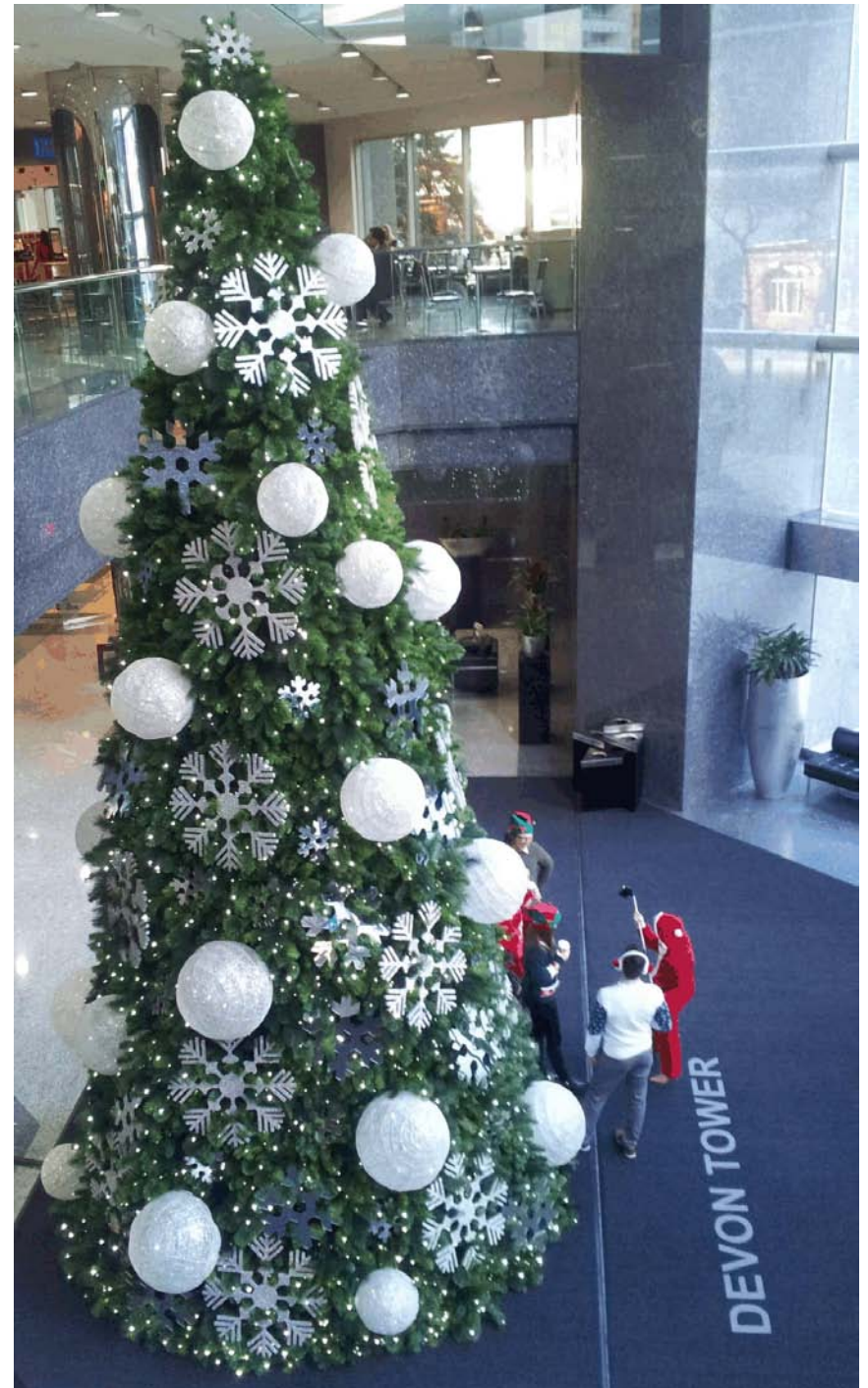






Left: Purdy's Chocolates, TD Square. I don't think there were actual chocolates in the boxes.

Below: I spotted Santa's elves taking a selfie in the Devon Tower.







At left: National Bank of Canada

Bottom left: Nexen Petroleum

Calgary Stock Exchange lobby. They forgot to measure the height of the tree, which is why the top is truncated.





Bow Valley Square



BP Centre





Eighth Avenue Place



Scotia Centre

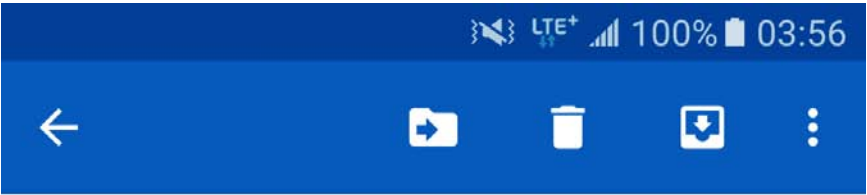




**AROUND COWTOWN: MANHOLE COVERS. PART 2**  
by Dale Speirs

The exciting first installment of this series was in OPUNTIA #308. I've only seen one more manhole cover of interest since, down on the Stampede grounds this summer, shown below. Telus is a major telecom in Canada.

After OPUNTIA #308 was posted on the Internet, I began receiving a new style of spam. Somebody in China actually wrote a spambot to sniff out references to manhole covers. It may even be legit, but since I'm not in the market for any or all ductile iron products, I've been trashing the spams. If anyone out there is seriously interested, please reply direct to them and don't mention my name.



Hello Dear Manager,

Here is **Manhole Covers supplier** from China.

- As your drawing
- Over ten year experience
- Supply **ODM/OEM** service

--**EN124 A15 B125 C250 D400** (GG25 GG30 GGG50) **grey iron and ductile iron** Manhole Covers

We are **manufacture**,  
My contact details as follows,and would be glad to hear from you. Then I **will send the catalogue**. Thank you.

Yours Faithfully,

---

Wendy Ji  
skype:wfjufeng2@outlook.com





**TIS THE SEASON TO PROTEST**

photos by Dale Speirs

2016-12-02

There were speakers to rally the crowd. I have no idea what they were saying, but they did get rounds of applause from the protestors. The only thing more unintelligible to me than Mandarin is Mandarin shouted through a bullhorn.

Chinatown is wedged between downtown and the Bow River, about the only place left in the core that is predominantly low-rise buildings. A developer has proposed a skyscraper for a central site there, which has the residents stirred up. They marched over to City Hall Plaza to make their cause more visible.





## THE OTHER INVISIBLE MEN: PART 2

by Dale Speirs

[Part 1 appeared in OPUNTIA #262.]

### Now You See Me, Now You Don't, And Never Will.

One problem with invisibility is when it is an irreversible process. It's not much of a life by oneself.

"The Invisible Ape" was a 1958 episode of the old-time radio (OTR) show SUSPENSE, written by Michael Frost. (This and other OTR shows are available as free mp3s from [www.archive.org](http://www.archive.org).) The narrator is Joe, who works in a laboratory developing invisibility by irradiation. The experiment succeeds on mice and a chimpanzee.

The invisible chimp escaped and is terrorizing the village, but the lab director Dr Bernstein is keeping quiet about the cause of what appears to the public to be poltergeist activity. Not unreasonable perhaps, for while this is the modern era and mobs don't use torches and pitchforks anymore, quite a few of the populace have hunting rifles and jerry cans of gasoline.

Joe has a co-worker named Janet whom he wants to marry, but his lousy pay makes it impossible. He decides to turn himself invisible and do a bit of selective looting, such as a humongous diamond engagement ring from a jeweler, some ready cash from the bank, and, inadvertently, the invisible chimp, which he brings back to the laboratory.

The mice have been re-irradiated to bring them back to visibility and died. Bernstein and Joe put the chimp under irradiation again and it is DOA on returning to visibility. The two men realize that the initial dose to turn an organism invisible puts the subject close to the allowable limit for radiation exposure, and reversing the process delivers a lethal cumulative dose. Joe is trapped as an invisible man. For good measure, Janet rejects him. The perils of modern science.

"Revenge Of The Invisible Man" by Robert R. Chase (2016 October, ANALOG) is about Henry Driscoll, who was made invisible during experiments by Advanced Biometrics. Unfortunately they can't reverse the effect, and Driscoll demands satisfaction.

He begins attacking company executives in their homes. AB scientists are working hard but can't find the cure. A black-ops agent called into the case fixes the problem by not trying. Instead, he recruits Driscoll into the spy agency, a workaround that seems to fit.

### Hubris.

There is always a catch, as demonstrated in "The Man Who Vanished", a 1948 episode of THE MYSTERIOUS TRAVELER, written by Robert A. Arthur and David Kogan. The story is about an albino man who wants to reverse his condition. After years of research in his own private laboratory, he ends up going in the opposite direction, having accidentally discovered a way to make living tissue transparent.

He tries it out on test animals. He discovers that the serum only works for 24 hours, after which an antidote must be injected or else death occurs. Notwithstanding that risk, he takes an injection and goes off to terrorize the village. He begins to use invisibility to gain revenge on his enemies, real or imagined, and becomes drunk with power at his ability to move about unseen.

The police are baffled at first, but what the invisible man forgot was that he left fingerprints at the scene of the crime. As he tries to get rid of that evidence, he lurches from one crime to another, entangling himself deeper and deeper into trouble. When the police search his house, he hides in a basement room. A detective doesn't see anything in the room and on leaving, automatically bolts the door from the outside without thinking. A good twist ending.

THE WILD WILD WEST was an action-adventure television series of the 1960s, about the travails of two U.S. Secret Service agents of the 1870s, James West and his sidekick Artemus Gordon. They have their own private train in which they live, moving from place to place and parking on a siding for each adventure. The villains they were up against commonly used superscience methods to carry out their nefarious deeds. The series is often said to be retroactive steampunk, but I don't agree.

"The Night Of The Burning Diamond" is a 1966 episode from Season 1, written by Ken Kolb. An invisible man is stealing diamonds, the big ones that are golf ball size, zooming in and out so fast that no one can see him. He is the archvillain Morgan Midas, who needs them for his diabolical schemes. He has an elixir which speeds up human metabolism and enables one to travel so fast



that ordinary people just feel a puff of air and can't see him. The elixir can only be produced by burning diamonds in the process.

Pause for lecture about bad Hollywood science. Diamonds are pure carbon. They can in fact be burned, but combust into carbon dioxide. Even in the 1870s, there must have been cheaper sources of CO<sub>2</sub> for laboratory scientists. An elixir that speeds up metabolism as fast as the episode depicts it would kill the user in minutes from overheating of organs, particularly the brain.

One point addressed in the episode is air friction. Someone moving so fast as to be invisible would quickly ignite into a fireball and burn to death. This is unconvincingly explained away by Midas telling West and Gordon that he moves slow enough not to burn but still be invisible.

West and Gordon take some of the fluid and fight Midas to the death in his laboratory. They all become heated just to the edge of combustion. Midas is pushed against a laboratory bench and has a carboy of pure alcohol fall on him. He not only burns to death, but without a trace of ash.

To sum up, there must be easier ways to become invisible, even in Hollywood.

**Come Spy With Me.**

THE INVISIBILITY AFFAIR (1967) by Thomas Stratton is #11 in a series of paperback novels based on the 1960s television spy series THE MAN FROM UNCLE. Stratton was the collaborative pseudonym of Gene DeWeese and Robert (Buck) Coulson, both SF fans who also wrote separately and were well known in zinedom. Coulson was a correspondent in the pages of OPUNTIA for many years.

The novel has UNCLE agents Napoleon Solo and Ilya Kuryakin heading to the exotic wilds of Wisconsin to check reports of a house suddenly becoming invisible and then returning to normalcy. Besides dealing with THRUSH agents, they inadvertently become mixed up with a margarine smuggling ring. In those days, many states and provinces prohibited the sale of margarine in order to protect their dairy industries. Nothing to do with the nefarious plans of THRUSH, but it does make a humorous counterpoint to the more serious alarms and excursions. The margarine actually does play an important part in the plot.

Solo and Kuryakin are on the trail of Dr Willard Morthley, the resident mad scientist in rural Wisconsin. He appears to have discovered the secret of invisibility but hasn't yet worked out all the glitches from his device. One of them is that everyone inside the field is blinded because their eyes are transparent and thus can't collect light to see with. Morthley was working on a wearable device that would reverse the effect around the operator to let him see. Another problem was that the effect was spherical and made the ground vanish, looking as if a giant sinkhole had suddenly opened up.

THRUSH steals the device, and kidnaps Motherley and his pretty niece (there had to be someone for Solo to romance). They install the device on a dirigible and take it to a South American country where it will be used to foment a coup. Solo and Kuryakin manage to get on board the ship, followed by the usual derring-do and business of saving the world.

The book is well written. Its funniest parts involve a subject seldom mentioned in action-adventure stories, that of the cost of doing business. Both the UNCLE and THRUSH agents spend as much time fighting their internal bureaucracy and accountants as they do each other. There is a running joke about Solo's drycleaning bills because when he fights THRUSH agents he gets his suit dirty and keeps putting in expense claims. The local UNCLE branch office in Wisconsin has to rent in a warehouse district because they can't afford anything better. The THRUSH agent-in-charge is pestered by his boss over the cost of running a dirigible.

**SHAKING ALL OVER: PART 4**

by Dale Speirs

[Parts 1 to 3 appeared in OPUNTIA's #259, 326, and 341.]

**Mad Scientists.**

ZERO HOUR (2013) by Clive Cussler and Graham Brown is an action-adventure novel about a mad scientist who wants to destroy the world by earthquakes. The novel starts off with several different premonitions to set the stage before the hero Kurt Austin makes his entrance. Enter the villain, rather late, in Chapter 6, Maxmillian Thero, as mad of a scientist who ever went "Bwah ha! ha!" and had a secret underground lair.



It doesn't take long for Austin's attention to be attracted to Thero, not more than three more chapters, and then the game is afoot. Thero has discovered a method to use zero-point energy. I was going to try and explain it, but that would take an entire issue, so go to Wikipedia for the details. It's subatomic quantum stuff.

The other scientists all laughed at him, so he went to Australia, against whom he seems to have a particular animus. Instead of using zero-point energy for the common good, such as electricity too cheap to meter, Thero intends to activate tectonic plates and rip apart continents, starting with Australia.

The action moves about Australia and the Pacific area, with a look-in to the NSA in Washington, DC, who have Nikola Tesla's papers. At the start of the 1900s, Tesla invented what many believe was a zero-point energy device, a preliminary test of which may have caused the 1906 San Francisco earthquake. Much to-ing and fro-ing later in the novel, Austin and his operatives find another hidden lair.

There is a last-minute race to stop the first release of zero-point energy, which fails. The traditional method of a nuclear bomb is used, the shock wave of which apparently cancelled out the zero-point energy wave by moving in opposite phase.

Next is the attack on the lair and its destruction. If you've ever seen any 1960s James Bond movie, then you've read this part. All ends well except for a few kangaroos in the Outback who were shaken a bit by some of the vibrations. A fast-paced adventure novel that rips along.

**The Big One.**

THE GREAT LOS ANGELES EARTHQUAKE (1990), written by William Bast and Paul Huson, originally aired as a three-hour miniseries. Much of the opening story is taken up by characters arguing whether or not foreknowledge of The Big One should be announced if the predictions aren't any better than the weather forecast. It is a fair point. Some of the characters are opposed to making an announcement because of the economic damage to business if nothing happens, and the harm caused by public panic as 12 million people take to the freeways.

Seismologist Dr Clare Winslow is the heroine of the story. She has a theory, as they all do, that says The Big One will hit the Los Angeles basin in three days.

The movie trots out the standard subplots that disaster movies are known for. There is the bratty teenager who gets into trouble and needs to be saved. (Although she is smart; when the earthquake hits, she shuts off the natural gas to the house.) The usual Bickerson couple is supplemented by an extended family feud involving Winslow, her sister, and their mother, the three of whom don't hesitate to drag in their unfortunate husbands and boyfriends into their squabbles. I pity the men who were hapless enough to become involved with any of those women. There is a corrupt developer who wants a lid on the whole thing, and an ambitious television reporter who wants to blow that lid off. Completely unnecessary is a subplot about a visiting South African black politician who is targeted by assassins.

But the news gets out, there is panic in the streets as citizens flee, and then The Big One steps up the panic several more notches. The SFX are very good for their time and hold up well today. Since the actual earthquakes can only occupy about fifteen minutes at most of the three hours, the rest of the time must be filled in arguments about will it/won't it before the shake, and rescue scenes after everything has rattled and rolled.

Even before the rubble stops bouncing, the Army and National Guard move in to rescue and support the survivors. It is difficult to believe they could move so fast, since we know from real-world disasters that it takes a day or two to mobilize. The lengthy rescue scenes are mixed in with all the subplots as they work themselves out.

Winslow abandons her post at the emergency centre and rushes off to find her daughter and husband, as if none of the other seismologists or first-responders had families. This was, I suppose, intended to show her as the heroine but instead she came across as a selfish woman.

The second half of the movie covers the chaos of the aftermath. The search-and-rescue scenes tend to drag on, but nonetheless fairly represent what the real event would be like. Assorted supporting characters are killed off one by one as expected.

The producers resisted the temptation to have the movie end with a group hug of the leading characters, but instead showed that the rescues were just the beginning of the aftermath. I was pleasantly surprised by how good the movie was, notwithstanding some of the cliched subplots.



# ON THE CUTTING EDGE OF TECHNOLOGY: PART 3

by Dale Speirs

[Parts 1 and 2 appeared in OPUNTIA's #258 and 346.]

## Tape And Wire Recorder Fiction.

DANGEROUS ASSIGNMENT was an old-time radio (OTR) series that ran from 1950 to 1954, all episodes written by Bob Ryf. (This and other OTR shows mentioned further on are available as free mp3s from [www.archive.org](http://www.archive.org).) It was about a secret agent named Steve Mitchell who each week received a briefing from his boss at an unnamed spy agency. Generally he had to go someplace to retrieve something, a MacGuffin, as Alfred Hitchcock liked to describe it. There was a sameness to the episodes, and the theme music was the blandest elevator music I ever heard. At least once each episode, sometimes twice, he was slugged unconscious. At that rate, he should have been a brain-damaged patient in an institution by the end of the first season.

“Recover Wire Spool” was a 1950 episode that begins with a man coming to the agency to report a strange event. He had told a woman he was dating that he was going on a vacation to Italy. She offered him \$5,000 to take a dictaphone spool over there, meet a man, give him a password, and hand over the recording. The student is suspicious and goes to the agency. The recording is played back and is of a man dictating statistics about the common cold in Europe. If it is in code, the agency can’t break it. Mitchell takes the place of the student and goes to Italy. Several dead bodies later, he and a Rome police inspector make their way up the chain of spies and locate Mr Big. A standard spy story without much suspense.

Also from 1950 was the episode “Champlin And His Reel Of Tape”. The spy agency gets a telephone call from Champlin, a radio correspondent in Istanbul, who says there is a plot to embarrass the American government by killing thousands of Istanbul residents and making it look like the Americans’ fault. He is sending a reel of tape on which he recorded a conversation of the conspirators when he bugged their room. The phone call is suddenly cut off, and Mitchell is sent to Istanbul to find the tape.

On arrival he meets a local police inspector assigned to the case. Champlin’s car is found at the bottom of a cliff, with him dead in it. Most of the tape reel was destroyed in the wreck but the first part of it survived. It begins with a

terrorist talking on the telephone. The window of the room was open and the horn of a ferry boat was blaring, so the terrorist tells the person on the other end to wait a minute while he shuts it. That is all, and there are no other clues.

Mitchell works up a fantastic scheme. A dozen police vehicles are scattered along the waterfront, each with a tape recorder. They move away from the waterfront four blocks at a time, stopping at each point to record the ferry horn on the tape. Back at the police station, the tapes are compared with Champlin’s tape, and the ones with the same loudness of the ferry horn are used to mark out a line of possible locations for the terrorist’s room.

After a door-to-door search, they find the right rooming house and then the correct room. They surprise the terrorist who is on his way to carry out his nefarious plot. That turns out to be dumping bacteria into a water treatment plant outflow to poison a quarter of the city. The plant had just been finished by American engineers as part of foreign aid. A chase ensues, and Mitchell stops the terrorist just as a bag of bacterial spores is about to be emptied into the water. The terrorist is never explicitly identified, but the Cold War was underway, so it seems the Soviets were up to their dastardly tricks.

“You And The Music” by John Lutz (1975 June, ALFRED HITCHCOCK’S MYSTERY MAGAZINE) is narrated by a man whose wife Natalie is really into top-dollar stereo tape decks and home recording studios. So much so, that she is impoverishing him with all the money spent on electronics. She is promoting a local rock musician, nomen Mad Dog Howl, who never seems to get that big break he is looking for.

One day the narrator finds out that Natalie and Howl are having an affair. He waits until Howl has left the house, then disposes of her the hard way. The tape deck was on “record” when he settled the matter, and her screams of agony as he beat her to death were accidentally dubbed over one of Howl’s songs. After disposing of the body, he gives the tape to Howl, who is impressed at how her background screams are so realistic. Howl doesn’t ask questions about why Natalie went to visit her mother and isn’t coming back, because the song becomes a Top Ten hit.

## Phonograph Fiction.

Phonograph recorders were available at some shops, where for a fee you could record a message on a phonograph record and mail it to someone. THE LIFE



OF RILEY was an OTR sitcom about Chester Riley, a boneheaded boor whose life was chaos because he would never listen to people and was just plain stupid. I don't like this show and only listened to certain episodes that had interesting titles. I've met too many people like Riley in my life and have always tried to avoid them thereafter. You don't want this type of person dragging you into their troubles.

A 1945 episode titled "Phonograph Record Saves Riley" was written by Ashmead Scott, Alan Lipscomb, and Reuben Ship. It begins when Riley's son Junior brings home a used phonograph recorder he bought cheap. Riley is running for President of his lodge at the time. His opponent visits him and tricks him into quitting the race by fraudulent remarks.

What both don't know is that the phonograph recorder was on and got the conversation on disk. Riley finds out at the lodge that he is going to lose the election because of the trickery and returns home depressed and angry. (To be fair, his usual condition.) His wife and Junior had meanwhile discovered the recording of the conversation and try to tell Riley about it. As usual, he cuts people off without listening to them and angrily throws the record against the wall. Fortunately it doesn't break.

Junior and his mother finally get it through Riley's thick skull what the record represents. Riley takes it to the lodge to expose the trickster but can't find a record player. Instead he uses a jukebox to play it to convince his fellow lodge members that his opponent is a sharp practice man. Riley wins the election.

It wasn't as straightforward as I described it, but it would take a page to explain all the twists and turns in the plot. Riley will never listen to people. He won't let people give him vital information, is too proud to admit he made a mistake or needs help, and as a consequence multiplies his troubles many times over. He almost throws out the phonograph record with his opponent's voice on it because he wouldn't hear his son's explanation that the conversation had been recorded, thereby prolonging Riley's agony. How this man kept his wife and job is a mystery.

Switching to genuine humour, "The Record Collectors" is a 1956 episode of CBS RADIO WORKSHOP. A smarmy announcer is interviewing two guests who collect phonograph records. When he asks them how many records they have in their collections, one of them is indignant and points out the worth of a collection is not based on the number of items. (Which is true of any type of

collecting.) The other collector says he doesn't know how many records he has but they cover two-thirds of a basketball court. The announcer challenges him on that, but the collector explains that he was trying to sort out his collection one day and the local YMCA manager let him use the court to spread out his records.

In between questions, the announcer plays truly horrible record selections. One of the collectors sneers at the pure sound quality of one recording, and says it isn't a real collectible record unless it pops, hisses, and clicks from scratches. They both agree that 78 rpm is the epitome of records, and nothing will ever come of those newfangled 33<sup>1/3</sup> records now on the market. When the old records are played, the collectors recite tedious anecdotes about their making, much like jazz or classical music hosts still do today on public radio stations. It's funny because it's true.

## ZINE LISTINGS

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

[The Usual means \$5 cash (\$6 overseas) or trade for your zine. Americans: please don't send cheques for small amounts to Canada or overseas (the bank fee to cash them is usually more than the amount) or mint USA stamps (which are not valid for postage outside USA). US\$ banknotes are still acceptable around the world.]

**Banana Wings #64** (The Usual from Claire Brialey and Mark Plummer, 59 Shirley Road, Croydon, Surrey CR0 7ES, England) Some commentary on feminism and robot elf porn (a new one on me), and lots of letters of comment on matters fannish and conventionish.

**Christian New Age Quarterly V22 #3 and #4** (US\$7 for special double issue from Catherine Groves, Box 276, Clifton, New Jersey 07015-0276) This is a double issue printed in two parts. The first part is the usual mix of essays and letters. The second part is entirely taken up by Robert M. Price's remarkable collation of the earliest manuscripts of the Gospel of Mark, which are not the same as the versions we use today. Proto-Mark, as Price titles it, takes out the later interpolations and redactions that early gospel scribes made while editing their manuscripts. Written in modern English, Proto-Mark is an unusual read. Well worth obtaining; I went through it in one sitting.



## SEEN IN THE LITERATURE

Nutman, A.P., et al (2016) **Rapid emergence of life shown by discovery of 3,700-million-year-old microbial structures.** NATURE 537:535-538

Authors' abstract: *"Here we report evidence for ancient life from a newly exposed outcrop of 3,700-Myr-old metacarbonate rocks in the Isua supracrustal belt (ISB), southwest Greenland that contain 1 to 4-cm-high stromatolites, macroscopically layered structures produced by microbial communities. The ISB stromatolites grew in a shallow marine environment, as indicated by seawater-like rare-earth element plus yttrium trace element signatures of the metacarbonates, and by interlayered detrital sedimentary rocks with cross-lamination and storm-wave generated breccias. The ISB stromatolites predate by 220 Myr the previous most convincing and generally accepted multidisciplinary evidence for oldest life remains in the 3,480-Myr-old Dresser Formation of the Pilbara Craton, Australia. The presence of the ISB stromatolites demonstrates the establishment of shallow marine carbonate production with biotic CO<sub>2</sub> sequestration by 3,700 million years ago, near the start of Earth's sedimentary record. A sophistication of life by 3,700 Ma is in accord with genetic molecular clock studies placing life's origin in the Hadean eon (>4,000 Ma)."*

Speirs: Stromatolites are layers of certain types of primitive algae that build up year after year and are recognizable fossils from rocks dated gigayears old. The algae still exist in a few modern specialized environments, such as Shark Bay, Western Australia. This paper shows that life developed very fast after Earth's geological and meteorological conditions stabilized.

Lenton, T.M., et al (2016) **Earliest land plants created modern levels of atmospheric oxygen.** PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES USA 113:9704-9709

Authors' abstract: *"The rise of atmospheric oxygen over Earth's history has received much recent interdisciplinary attention. However, the puzzle of when and how atmospheric oxygen reached modern levels remains unresolved. Many recent studies have argued for a major oxygenation event, of uncertain cause, in the Neoproterozoic Era >541 megayears (Ma), enabling the rise of animals. Previous modelling work has predicted a late Paleozoic oxygen rise (<380 Ma) due to the rise of forests. Here we show that neither scenario is correct.*

*Instead, the earliest plants, which colonized the land from 470 Ma onward, first increased atmospheric oxygen to present levels by 400 Ma, and this instigated fire-mediated feedbacks that have stabilized high oxygen levels ever since, shaping subsequent evolution."*

*"The progressive oxygenation of the Earth's atmosphere was pivotal to the evolution of life, but the puzzle of when and how atmospheric oxygen (O<sub>2</sub>) first approached modern levels (about 21%) remains unresolved. Redox proxy data indicate the deep oceans were oxygenated during 435 to 392 Ma, and the appearance of fossil charcoal indicates O<sub>2</sub> >15 to 17% by 420 to 400 Ma. However, existing models have failed to predict oxygenation at this time. Here we show that the earliest plants, which colonized the land surface from about 470 Ma onward, were responsible for this mid-Paleozoic oxygenation event, through greatly increasing global organic carbon burial, the net long-term source of O<sub>2</sub>. We use a trait-based ecophysiological model to predict that cryptogamic [spore-bearing plants] vegetation cover could have achieved about 30% of today's global terrestrial net primary productivity by about 445 Ma. Data from modern bryophytes [mosses] suggests this plentiful early plant material had a much higher molar C:P ratio (about 2,000) than marine biomass (about 100), such that a given weathering flux of phosphorus could support more organic carbon burial. Furthermore, recent experiments suggest that early plants selectively increased the flux of phosphorus (relative to alkalinity) weathered from rocks. ... This oxygen rise represents a permanent shift in regulatory regime to one where fire-mediated negative feedbacks stabilize high O<sub>2</sub> levels."*

Huang, R., et al (2016) **Convergent evolution of caffeine in plants by co-option of exapted ancestral enzymes.** PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES USA 113:10613-10618

Authors' abstract: *"The well-known stimulant caffeine, and its xanthine alkaloid precursors, has evolved multiple times in flowering plant history for various roles in plant defense and pollination. We have shown that convergent caffeine production, surprisingly, has evolved by two previously unknown biochemical pathways in chocolate, citrus, and guaraná plants using either caffeine synthase or xanthine methyltransferase-like enzymes. However, the pathway and enzyme lineage used by any given plant species is not predictable from phylogenetic relatedness alone. Ancestral sequence resurrection reveals that this convergence was facilitated by co-option of genes maintained over 100*



million y for alternative biochemical roles. The ancient enzymes of the Citrus lineage were exapted for reactions currently used for various steps of caffeine biosynthesis and required very few mutations to acquire modern-day enzymatic characteristics, allowing for the evolution of a complete pathway.”

Speirs: Caffeine randomly evolved in several species of plants as a defence against insect herbivores. It develops from enzyme genes that are easily mutated from their regular duties into the new route of biosynthesis.

Wald, D.S., et al (2016) **Child-parent familial hypercholesterolemia screening in primary care.** NEW ENGLAND JOURNAL OF MEDICINE 375:1628-1637

Authors’ abstract: “Child-parent screening for familial hypercholesterolemia has been proposed to identify persons at high risk for inherited premature cardiovascular disease. We assessed the efficacy and feasibility of such screening in primary care practice.”

“We obtained capillary blood samples to measure cholesterol levels and to test for familial hypercholesterolemia mutations in 10,095 children 1 to 2 years of age during routine immunization visits. Children were considered to have positive screening results for familial hypercholesterolemia if their cholesterol level was elevated and they had either a familial hypercholesterolemia mutation or a repeat elevated cholesterol level 3 months later.”

“Child-parent screening was feasible in primary care practices at routine child immunization visits. For every 1000 children screened, 8 persons (4 children and 4 parents) were identified as having positive screening results for familial hypercholesterolemia and were consequently at high risk for cardiovascular disease.”

Speirs: Cholesterol problems show up at an early age, so it is worthwhile to have children tested when they are very young.

Cuk, M., et al (2016) **Tidal evolution of the Moon from a high-obliquity, high-angular-momentum Earth.** NATURE 539:402-406

Authors’ abstract: “In the giant impact hypothesis for lunar origin, the Moon accreted from an equatorial circum-terrestrial disk; however, the current lunar orbital inclination of five degrees requires a subsequent dynamical process that is still unclear. In addition, the giant impact theory has been challenged by the Moon’s unexpectedly Earth-like isotopic composition. Here we show that tidal dissipation due to lunar obliquity was an important effect during the Moon’s tidal evolution, and the lunar inclination in the past must have been very large, defying theoretical explanations. We present a tidal evolution model starting with the Moon in an equatorial orbit around an initially fast-spinning, high-obliquity Earth, which is a probable outcome of giant impacts.”

“Using numerical modelling, we show that the solar perturbations on the Moon’s orbit naturally induce a large lunar inclination and remove angular momentum from the Earth-Moon system. Our tidal evolution model supports recent high-angular-momentum, giant-impact scenarios to explain the Moon’s isotopic composition and provides a new pathway to reach Earth’s climatically favourable low obliquity.”

Speirs: Most planets, Earth included, have an angle of rotation different than the ecliptic, which is the plane that the Earth revolves in around the Sun. This is, incidently, why we have seasons. If Earth’s equator was lined up with the ecliptic, there would be no seasons because the poles would not be tipped to the ecliptic.

This paper shows that satellites such as the Moon orbiting close in to Earth, as it did after the impact, should revolve around their planet in the plane of the planet’s equator. As they recede over time due to angular momentum transfer, they move into an outer zone where they become perturbed by the Sun’s influence. They are thus pulled into an inclined orbit as a result of a tug-of-war between the gravitational forces of Earth and the Sun. This explains why the Moon orbits at an incline to Earth despite impact theory saying it should be in Earth’s equatorial plane.



