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## WHAT'S NEW IS OLD

by Dale Speirs

Samuel Clemens remarked that history doesn't repeat itself exactly but it does rhyme. We who live in the aftermath of the Panic of 2008 can see the institutions and governments rhyming with the authorities of the Weimar Republic when they printed trillions of marks to maintain liquidity, the Revolutionary government of post-Bastille France assuring citizens that the latest 800 million livres issue of banknotes would be the last, and Great Depression politicians telling citizens that business was fundamentally sound.

Financial panics date back to at least 33 A.D. (Rome), and follow the same patterns. There is a credit expansion, business booms, everyone buys a house including those who have no money, and the pundits pronounce that this time is different. Eventually people become nervous and decide to cash out, and the latecomers take the hit. Deflation or hyperinflation sets in, depending on the circumstances. Gold and silver coins are hoarded for serious emergencies, and farmers keep back crops from the market. Debtors demand relief, creditors oppose it, and since governments are the biggest debtors, the former category usually win.

The first serious panic of the newly settled North America was the Panic of 1819, and developed into a war between debtors and

creditors. In those days the USA was still in its infancy, and Canada was only a loose collection of squabbling colonies. When Americans spoke of "the West", they did not mean Montana or Wyoming, they meant Ohio or Kentucky. They were still 75% rural, and manufacturing was little more than craftsmen hand-building widgets on a back-room workbench. The War of 1812 had stumbled to an exhausted finish, with both Canada and the USA claiming victory but in reality an inconclusive draw.

Murray Rothbard published in 1962 a detailed analysis of that first financial crisis, titled THE PANIC OF 1819: REACTIONS AND POLICIES, revised in 1973, and reprinted in 2007, which is the edition I am reviewing here. The Panic of 1819 was the first financial upset in North America that could not be attributed to a specific cause such as a war, blockade, or natural disaster. It could not be blamed on a single government action or a speculator collapsing a bank. Since no one could find an obvious cause for it, there was much argument in the newspapers by pundits and letter writers. Everyone had a pet cause for its origin.

**A General Malaise.**

Prior to the War of 1812, the currency of the USA was a mixture of domestic and foreign gold and silver coins, collectively known as specie. The dominant specie coin throughout the Americas was the silver Spanish dollar, or piece of eight, which was minted in Mexico and had a value of 8 reales. Hundreds of local banks issued their own paper currency, redeemable in specie. There was no Federal Reserve (it wasn't founded until 1913) and consequently there was no such thing as a single nation-wide currency other than the Spanish dollar. People carried little books of exchange rates, and banks posted their rates for redeeming specie or banknotes of other banks.



The further away a banknote came from, the greater it was discounted when redeemed at a local bank. Local banknotes were redeemed in specie at full face value, while a banknote from the far end of the country might only be accepted at 45% of face value. There were people who made their living traveling about the country, buying outlander banknotes in specie at a discount and then taking them back to their origin to redeem them at full face value. They were, in effect, the first currency speculators.

All wars are expensive, and the War of 1812 forced the American government to borrow from local banks everywhere. There wasn't enough specie to go around, so in August 1814 the government suspended conversion into specie and allowed the banks to print as many banknotes as they saw fit without any backing or redemption of specie. In the second decade of the 1800s, American manufacturing had started to grow because of the War of 1812. After the war, factories continued to be built.

By 1815, the amount of currency in circulation had doubled, and prices of goods were also increasing. The post-war boom continued for several years under its own momentum, production grew fast, and inflation was pushed on by a flood of paper currency. It wasn't that the economic danger went unrecognized, but rather everyone wanted a soft landing. It was agreed that banks should start contracting their credit and banknotes, and go back to specie redemption, but not just yet. In 1817, Congress created the Second Bank of the United States (BoUSA) to issue banknotes to mop up the local issues and return everyone to specie or specie-backed banknotes. It was also that year that the New York Stock Exchange was founded, as speculation boomed in just about everything.

After the War of 1812, the American federal government began selling off large tracts of public lands in the new territories. A real estate bubble developed in expectation of a massive flood of immigrants who would be happy to buy undeveloped land at a premium. Buyers made their down payment in local banknotes, which the BoUSA accepted at par. This had the effect of standardizing all paper currency at par with each other. It also drove specie out of circulation because the banks issued far more banknotes than they had specie in their vaults.

Payment for the Louisiana Purchase was due in 1818 and had to be made in specie. The BoUSA therefore sucked up most of the specie in circulation and flushed more out by paying a premium. The Spanish dollar was at a premium of 6% to the banknote equivalent. In order to pay the French, the BoUSA stopped redeeming banknotes for specie, and returned local banknotes to the state banks that had issued them and demanded redemption. By January 1819, the amount of BoUSA currency in circulation was one-third of what it was a year earlier. This set off a chain reaction, as local banks had to contract their loans and credits.

The malaise spread. Debtors are not big spenders when the bailiff is constantly hounding them, so the prices of goods and services began falling, and the country went into a deflationary period. Crop prices fell, so farmers cut back purchases in town. Manufacturers had to lay off workers. Land speculators suddenly found themselves holding mortgages they had no chance of selling or paying off. Interest rates rose, compounding the misery of debtors. All classes of society had spent money big time during the boom. Farmers went into debt for new machinery and buildings, manufacturers enlarged factories for demand that never came, and speculators bought land on margin.

**That Time Was Different.**

A full-fledged depression began in1819, bankruptcies soared, and yet the whole crisis had largely resolved itself by late 1820 and 1821.

Unlike subsequent panics that hit harder and harder, the early USA had several advantages going for it. Firstly, 75% of the population lived on farms which were far more self-sufficient than they are today. If no specie or banknotes could be had to buy what couldn't be produced on the farm, then at least barter was widespread.

Secondly, the governments, both state and federal, did nothing. It wasn't that they were uncaring. For two years, extended debates occurred in legislative chambers everywhere on debt relief. Debtors wanted out, and creditors fought vigorously to prevent that. In general, few effective programmes of relief were established. There were many attempts to have stays instituted, a stay being a general moratorium on debt collection for one or two years. Some people even proposed a jubilee, which in its original Biblical meaning was a forgiveness of all debt everywhere every 50 years. As it turned out, most non-performing debts were cleared by the time-honoured process of bankruptcy.

Since debtors are short of money, another proposal was to print more currency. Because paper currency was largely printed locally, not by a central bank, many banks did take that opportunity. Those who did only had a very brief respite, because the surplus in supply was quickly discounted, and no one would take the paper at anything approaching face value. The ongoing shortage of currency baffled many people, and there were numerous proposals to set up banks owned directly by the state. A huge flood of paper currency from hundreds of banks spread out over the land. Yet no matter how much was printed, there never seemed to be enough in circulation. Some debtors were able to pay off their debts in depreciated currency, although hyperinflation never kicked in. Interest rates rose to compensate creditors for their losses by depreciation. Specie was available only at a premium. A customer with a Spanish dollar could buy anything at a favourable price, while the customer with a wad of paper banknotes was told the shopkeeper was out of stock.

By 1821, the depression caused by the Panic of 1819 was largely over. Debts were purged, unemployed workers settled for new jobs at lower wages, prices came down because merchants didn't get subsidies, and land could be had cheap at the expense of speculators. Subsequent generations would learn nothing from the panic, and still haven't today.

**THE AWL BIZ**
by Dale Speirs

Alberta's economy lives or dies on the price of oil and natural gas. Calgary is the capital of Canada's petroleum industry, often jokingly referred to as the awl biz, after the pronunciation used by

expatriate Texans and Oklahomans working here. In the past I've reviewed a number of factual books about the petroleum business, but have also been keeping an eye out for fiction related to same. They are a favourite of action-adventure authors, because it is easy to throw in large explosions, with an eye to future movie rights sales.

**There's Trouble Down At The Rig.**

THE RIG is a 2009 monster movie about a drilling platform in the Gulf of Mexico off the coast of Louisiana. Charlie 15 is just starting the borehole when a storm forces the evacuation of the workers, save for a skeleton crew who will ride out the storm. When the drill bit first punched into the ocean bottom, the crew noticed plumes of pink fluid gushing out of the sand. After the opening credits this somehow translated into a humanoid fish with fangs for a face. We see later in the movie that it has blue-black blood, and what the point of the pink fluid was is never explained. The critter comes aboard and picks off the crew one by one.

The plot follows the time-honoured tradition of monster movies. First, the unawareness: "Has anyone seen Bob? He didn't show up for lunch". Then dawning realization: "Omigod! A fast-moving creature just ate Henry!". Plans are made: "Okay, you guys huddle in the control room while I try to single-handedly kill the monster." Instead of staying in the barricaded control room until help arrives from the outside world, the rest of the crew roam about the rig, and are eaten one by one. Natural selection in action. Finally someone discovers that the monster's blue-black blood is flammable (is it actually crude oil?). Plan A is to lure it into a room, flood the room with natural gas, and ignite it. Well yes, blowing up the rig is one way to do it, although the company that owns the rig might have a different point of view, considering they cost a billion dollars each. Fortunately only part of the platform is blown up, and all ends well, except for the dead of course.

The movie is padded out with endless search sequences, as the roughnecks hunt the critter up and down the corridors of the rig, but that is why we have fast-forward on DVD players. I don't know offshore rigs, but I did notice authentic details that also apply to conventional wells here in Alberta, so the producers got good technical advice. For example, the boss's cabin is clearly labeled "Company Man Office". In drilling, the Company Man is an actual job title and is the representative of the oil company that owns the field. The oversized pipe wrenches were certainly authentic. The movie's main failing was that it was too slow-paced and the plot entirely predictable. This would make a good movie for a drinking party.

Another offshore rig story is "Next Tuesday", a 2010 episode from Season 2 of the

supernatural television series SANCTUARY. The heroine, Helen Magnus, and her sidekick Will go to the Gulf of Mexico to retrieve a giant vampire squid. Nothing to do with Goldman Sachs or Margaret Atwood, but a sea monster lurking in the vicinity of an abandoned oil rig 300 km south of New Orleans. The story is told in an annoying flashback style, mainly, it seems, to make it more interesting. A straightforward linear version would reveal the plot to be the ordinary monster show that it is.

Magnus and Will catch the mutant squid. As they load it into the helicopter, she remarks that cephalopods are shy, passive creatures. Not so passive as thought, they learn a few moments later when it goes berserk, and punches holes in the chopper. The helicopter spirals out of control and crashes into the rig's moon pool, the deep central well where the drill goes down. The squid escapes, leaving Magnus and Will trapped at the bottom of the moon pool with no way to climb out, no working radio, and hidden from view of any rescuers. That's assuming the searchers come anywhere near the rig, because Magnus informs Will that she filed a false flight plan putting them 320 km away from the rig. She says she likes to keep her Sanctuary operation private, or perhaps she just didn't want the hassle of getting a permit from the Environmental Protection Agency to trap endangered species.

The giant squid comes back but they manage to drive it off. As they clamber around the wreckage, they discover another mutant, a giant sea scorpion. There is a three-way battle between the squid, the scorpion, and the humans, much splashing around, and finally the chopper is blown up, disposing of the critters. Magnus and Will tread water, celebrate, and then Will asks "How do we get out of here?". At this point, the episode fades to black and the end credits roll. The following episode opens with Magnus and Will back on dry land chasing another mutant. Somehow they got out, but the writer was cheating.



**Thar's Oil In Them Thar Inhospitable Terrains.**

DEEP BLACK: ARCTIC GOLD by Stephen Coonts and William Keith (2009, mass-market paperback) begins with a covert NSA mission in St. Petersburg going terribly wrong due to betrayal by an informer, and the NSA agents are hard-pressed to get clear. The whole fiasco has the controllers back home wondering what could go wrong next. What could go wrong next is the escort of an American scientist by FBI and NSA agents. He is attending a conference in London, England, where he will prove that climate change is purely natural and human activity is not the cause. This will not go over well with Greenworld, the militant faction of Greenpeace, and the agents are worried. Their worries are justified as an assassination attempt against the scientist almost succeeds.

Meanwhile, back at the ice floe, known as Ice Station Bear, Greenworld and Russian agents have created havoc, based on Russia's claim to the North Pole in order to get at the oil supposedly under the sea bed. In all these snafus, the hand of the Organizatsiya is seen, the Russian mafia. Russian agents kidnap some Americans and as per accordance with standard spy story procedures, take them into the centre of the action instead of shipping them away from headquarters to a prison.

Other NSA agents make a side trip to a Crimean dacha where they infiltrate the mafiya's electronics with some implausible electronics. The data intercepts from there indicate the polar action is an underwater drilling rig (because you can't drill through shifting ice floes) that has hit methane clathrates instead of oil. The boomer submarine USS Ohio is pressed into service to make a raid on the Russians, which bogs down into a torpedo exchange with one of their subs. One torpedo ploughs into the clathrates, releasing a gigantic cloud of methane that takes out several hundred hectares of ice. The Americans make it home battered and bruised, the Organizatsiya is foiled, and the handsome agent gets the girl.

The whole novel follows the standard James Bond plot. Lots of incredible technology such as dust-sized bugging devices and secret underwater laboratories. The story changes location from one exotic locale to another, and I wouldn't have been surprised if the hero had made a side trip to a Monaco casino. With a few name changes, this novel could easily become a Bond movie.

**Real Peak Oil.**

BLACK MONDAY by Bob Reiss (2007, mass-market paperback) starts right off with the premise of the novel, a plague of nanobacteria that eat oil with a vengeance. Aircraft are falling out of the sky, police can't drive their cruisers, and machines are stopping everywhere. The nanobacteria are in oil fields, storage tanks, and pipelines around the world, and cannot be filtered out by normal means. The people responsible for the problem have hit men going about eradicating those who might be able to solve the crisis and then leaving false clues to decoy the police. The people responsible for the solution are hampered by inter-agency feuding and inability to mobilize out in the field.

All the food that city dwellers eat is delivered in the last kilometre by trucks, and cities only have about three days supply in the warehouses. It doesn't take long for citizens to figure this out, and the rioting and looting begins within a day. Paper money and credit cards are useless, and only barter or gold and silver is accepted. Few can get to their places of employment, so essential services begin to fail. Help isn't coming, and civilization is crashing.

Those with backyard gardens who strut about congratulating themselves on being green quickly find out how little that helps, especially when their neighbours know they have the food and forcible sharing quickly consumes what's left. Most of the novel is given over to a description of the long emergency, as neighbourhood wanna-be warlords emerge and the hero fights his way through the anarchy to find the cause. The villain is finally located and the novel ends with the western world staggering through the ruins as a generation-long recovery begins. The novel sags in the middle section from too much repetition of rioting scenes, but the overall effect is realistic.

ILL WIND by Kevin J. Anderson and Doug Beason (1996, mass market paperback re-issued 2011) considers the same theme, that of oil-eating bacteria becoming too prolific. The stage is set with an oil tanker running aground against the Golden Gate Bridge in San Francisco Bay. While the first responders are still hurrying to the scene, a sub-plot is introduced in New Mexico, where Spencer Lockwood has just successfully demonstrated a microwave satellite project that beamed energy down from a string of low-orbit powersats. Back at the spill, Alex Kramer, a biologist with serious psychological problems, is asked by the Oilstar company, owner of the supertanker, to use his oil-eating microbes, code-named Prometheus, to clean up the mess. The bacteria work, spectacularly so.



Within a day or two, people start noticing that when they fill their car with gasoline at service stations, the gas has a rotten-eggs odour. Cars start dying on the side of the road across California. Within another day, traffic everywhere is at a standstill and people are realizing that something is terribly wrong. The bacteria are spreading by air and by contact, eating up all fuel and leaving hydrogen sulphide and gunk. Instead of just eating octane molecules, the bacteria are rapidly decomposing anything derived from petroleum, in particular all things plastic. It turns out that Kramer supplied a different bacterium than the octane-specific Prometheus. Whatever his reasons, he destroyed his notes and then committed suicide, leaving behind a world that is falling apart.

The petroplague spreads around the world in a few weeks in exponential fashion. Aircraft fall out of the sky. Electrical power fails as the insulation on the wires is dissolved. Cellphones and laptops turn into goo. Essential utilities fail because many have plastic components and the rest cannot be serviced by staff who can't get to work and are too busy trying to survive. The Arabs are not happy when the bacteria contaminate their oil fields and destroy their source of political power. The American President is trapped in Qatar while on a diplomatic mission and has no way of getting home or even communicating. The Vice President dies when the elevator he is riding in takes a fatal plunge as its plastics fail.

As transportation reverts to horses, and communications to messenger boy, the world dissolves into small enclaves no larger than a man can travel in a day. Military bases try to protect themselves first and their sources of supply, urban mayors become local warlords, and the world returns to a medieval village economy. The riots quickly peter out, if only because all the available food is quickly looted and people are too busy struggling to survive to march in the central square. The tinfoil survivalists lose all their bottled water and anything else stored in plastic containers. In a fortnight, the world as we know it is gone.

The novel alternates between different areas of the USA and how the survivors try to begin anew. The subplots illustrate different aspects of survival in the End Times, and the novel is well paced. There is no miracle cure, the petro-plague continues forever, and the enclaves of civilization have to revive the methods of olden times. Society reverts to village culture, and learns what it is like to live in a world where there are no weather forecasts, milk comes from your own cow and not a supermarket, and you can't telephone anyone.

**Pipelines.**

ATHABASCA by the late Alistair Maclean has a rotund Nero Wolfe-wannabe private detective investigating sabotage on both the Alaska pipeline and in the Athabasca Tar Sands. The novel was published in 1980 and suffers from the fact that the method of mining tar sands has since changed from bucket-wheel excavators feeding conveyor belts in those days to giant loaders feeding giant dump trucks today. This is an important plot point because in the novel the characters recognize the vulnerability of the conveyor belt system to sabotage. In real life, frequent mechanical breakdowns were enough to convince the petroleum companies to switch to dump truck hauling, which has the advantage of multiple redundancy since one broken down truck will not bring production to a stop.

Maclean throws in some info dumps but they are not obtrusive. Being an Englishman, he did trip up over one thing that any North American reader will notice immediately. The saboteurs made a threatening call from a phone booth, so the detective asks the Post Office to investigate. In Europe at the time the novel was written, the telephone system was run by the post offices, but in Canada and the USA, the telephone companies have always been separate. That was the only big clanger I noticed.

There is a co-ordinated effort by unknown saboteurs to cripple both the pipeline and the mine. They know exactly what the weakest points are that would take the most time to fix. For example, if you want to shut down a pipeline, blow up the pump station, not the actual pipeline itself. Pipe is easily and quickly replaced, but the huge pumps that move

oil are not bought off the shelf. A conveyor belt can be re-stitched, but the processing plant is a complex maze of valves, tubes, and distillation units. It quickly becomes obvious that the saboteurs are working from the inside, so the reader has to tick off the list of bodies to narrow down the suspects.

Maclean knew how to keep a story moving briskly, albeit with some of the usual cliches, such as the bad guys kidnaping the detective's wife and holding her hostage. Alas, the march of time has made this a period piece.

PIPELINE by Peter Schechter (2009, mass-market paperback) is an action-adventure novel of the near future, but not too near. The opening is a permanent state-wide power blackout in California, as a drought means no hydroelectricity and a shortage of natural gas means the gas-fired power plants are down. Not just a blackout of a day or two as experienced elsewhere, but a continuing failure that leads to anarchy and the law of the jungle. The police and National Guard aren't coming to the rescue because they haven't got enough fuel, since the fuel stations use electric pumps. The hospitals and first responders can do nothing once their backup generators run out of diesel.

Pause for an info dump from me. I wrote that this wasn't a near-future novel. Currently North America has a surfeit of natural gas due to shale gas drilling, but the novel is a reasonable extrapolation of what might happen after the insanity of shale gas fades out five to ten years from now.



Unlike conventional gas wells which flow for years or decades, shale gas wells deplete 90% in their first month of operation. The drillers are in a Red Queen's Race, and have to keep drilling more wells to maintain their cash flow. A few years ago when there was a brief spike in natural gas prices, drillers rushed to sign up leases with landowners, all of which are "drill it or lose it" leases. If the driller doesn't get a well in within three years, they lose their rights and their deposit money. Thus the mad race to drill, flooding the market temporarily with cheap gas, and throttling back conventional gas wells that can't compete. Eventually the party will end as it did with oil, and the scenarios of this novel will become more plausible.

Getting back to the novel, the President and his officials debate, but, like New Orleans after Hurricane Katrina, help from outside will be slow and unreliable. The CIA director, a female military officer from Alaska who can see Russia from her house (her name is Martha, not Sarah) suggests, as a longer term solution, a natural gas pipeline from Siberia underneath the Bering Strait to North America.

The novel shifts to Russia, where Volga Gaz, a subsidiary of the Russian government, temporarily shuts down the supply to Ukraine and thence to western Europe as a warning.

It is politics, not actual shortages. Volga Gaz is also trying to lock up Peruvian gas supplies to tighten the screws further on the USA. There is lots of intrigue and counter-intrigue between the Russians internally and with Martha trying to secretly negotiate a Bering Strait pipeline on her own. A few cross-cultural love affairs are thrown in to spice up the mix, and some of the villains get their just rewards from hit men.

The novel reads well. The premises are reasonably believable. In accordance with the tenets of its genre, it keeps the pace moving with secret intrigues and double-crosses.

CHARON'S LANDING by Jack Du Brul is a 1999 novel re-issued as a 2006 paperback. I almost quit reading after the first chapter because the plot is so improbable. A newly-elected President announces his plan to make the USA self-sufficient in energy. This apparently motivates the big multi-national oil companies and Arab oil exporters to commit all kinds of skullduggery to stop him. Since every American president since Nixon has announced such plans with no one in the awl biz worrying, this is a major implausibility. It can't be done in the first instance, and even if it could, the multi-nationals and Arabs would shrug their shoulders and sell their oil elsewhere, probably China.

Nor does Du Brul mention the Athabasca Tar Sands, which by 1999, when the novel was first published, were already exporting 200 million barrels of oil per year to the USA, double that by 2010. Alberta is the USA's largest source of oil imports, not Saudi Arabia.

Du Brul throws in the usual gang of militant environmentalists, plus a nasty ex-KGB rouge agent who has a secret plan, code-named Charon's Landing, to destroy the Alaska pipeline. The hero, a geologist named Philip Mercer, gets more action in a day than James Bond did in his busiest month, and bodies litter the pages. A tanker ship out of Alaska is highjacked, and the Russian agent is killing people left and right to further his plans. In case those aren't enough sub-plots, Iran and Iraq have joined forces in a plot to roll up the Emirates and Saudi Arabia and take control of all the Gulf oilfields.

As an action-adventure novel, the story is fast paced and bloody. However, the basic implausibility of the book is so overwhelming as to leave no chance to suspend one's disbelief. It is also badly dated by the second Iraq war. One failing of novels such as this one is they become obsolete very easily, however topical and fresh they may have been when first issued.

**SEEN IN THE LITERATURE**
noticed by Dale Speirs

Desaulty, A.M., et al (2011) **Isotopic Ag–Cu–Pb record of silver circulation through 16th–18th century Spain.** PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES USA 108:9002-9007

"*Estimating global fluxes of precious metals is key to understanding early monetary systems. This work adds silver to the metals used so far to trace the provenance of coinage through variations in isotopic abundances. Silver, copper, and lead isotopes were measured in 91 coins from the East Mediterranean antiquity and Roman world, medieval western Europe, 16th–18th century Spain, Mexico, and the Andes and show a great potential for provenance studies. Pre-1492 European silver can be distinguished from Mexican and Andean metal. European silver dominated Spanish coinage until Philip III, but had, 80 years later after the reign of Philip V, been flushed from the monetary mass and replaced by Mexican silver.*"

Speirs: In other words, the pre-existing silver coinage in Spain went elsewhere in Europe to pay their debts, but not to worry because they had boatloads of incoming silver from Mexico.



Wells, K., et al (2011) **Pitchers of *Nepenthes rajah* collect faecal droppings from both diurnal and nocturnal small mammals and emit fruity odour.** JOURNAL OF TROPICAL ECOLOGY 27:347–353

"*The pitchers of Nepenthes rajah, a montane carnivorous plant species from Borneo, are large enough to capture small vertebrates such as rats or lizards, which occasionally drown therein. The interactions of N. rajah with vertebrates, however, are poorly understood, and the potential mechanisms that lure vertebrates to the pitchers are largely unknown. We observed frequent visits (average: one visit per 4.2 h) of both the diurnal tree shrew Tupaia montana and the nocturnal rat Rattus baluensis to pitchers by infrared sensor camera and video recording. Both mammalian species often licked the inner surface of the pitcher lid, which harbours numerous exudate-producing glands. Analysis of volatiles extracted from the secretions of the pitcher lids by gas chromatography coupled to mass spectrometry (GC/MS) revealed 44 volatile compounds, including hydrocarbons, alcohols, esters, ketones and sulphur containing compounds, which are commonly present in sweet fruit and flower odours. The faeces of small mammals were repeatedly observed inside the pitcher, whereas we found the body of only one Tupaia montana drowned in the 42, vital and reasonably large, surveyed pitchers. Our findings suggest that the N. rajah pitcher makes use of the perceptual biases of rats and tree shrews by emitting volatiles known from*

*fruits. The profits that the plant obtains from the repeated visits of two small mammals, together with the provision of exudates for the mammals, comprise an exceptional case of plant–vertebrate interaction."*

Speirs: Nepenthes are tropical carnivorous pitcher plants. Their leaves look like a tankard, with a lid partly open over the pitcher. As this study reveals, small mammals straddle the pitcher while licking the sweet substances secreted on the underside of the lid. The pitchers contain fluid, and occasionally a shrew or mouse slips and falls into the pitcher while licking the lid. It can't get back out again and drowns in the fluid. The decomposing corpse provides nutrients to the plant. Even if the animal doesn't fall in, many of them will use the pitcher as a toilet, which also provides nutrients. These pitchers can grow to milk-jug size, and were the origin of legends of man-eating plants.

Perrier, X., et al (2011) **Multidisciplinary perspectives on banana (Musa spp.) domestication.** PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES USA 108:11311-11318

"*Original multidisciplinary research hereby clarifies the complex geodomestication pathways that generated the vast range of banana cultivars (cvs). Genetic analyses identify the wild ancestors of modern-day cvs and elucidate several key stages of domestication for different cv groups. Archaeology and linguistics shed light on the historical roles of people in the movement and cultivation of bananas from New Guinea to West Africa during the Holocene. The historical reconstruction of domestication processes is essential for breeding programs seeking to diversify and improve banana cvs for the future. ... The geographic distributions of genotypes involved in banana domestication require human translocations of plants, most likely under vegetative forms of cultivation, across vast regions. Linguistic analyses of (traditional) local terms for bananas reveal several striking regional-scale correspondences between genetic and linguistic patterns. ... Additionally, the dispersals of bananas through wet tropical and subtropical regions, including around or across the Indian Ocean, are indicators of interlinked, yet predominantly local, social networks extending from NG to West Africa; these networks are at least 2,500 years old. ... Current global production of more than 100 million tons is based on large-scale vegetative propagation of a small number of genotypes, which derive from only a few ancient sexual recombination events: These genetically restricted and inflexible clones are particularly susceptible to diseases, pests, and current ecological changes. The challenge for banana improvement is to produce resistant and sterile polyploid hybrids through genetic recombinations of fertile diploids that meet consumer expectations for each cv type. The required breeding strategy will need to reproduce the sequence of crossings and*

*selections that occurred minimally during the past 6,500 years, while substituting punctually some genitors from closely related genomes selected for their level of resistance to biotic and abiotic stresses. Hence, a prerequisite for banana improvement is to reconstruct as precisely as possible the domestication pathways of the major cv groups.*"

Forgan, D.H. (2011) **Spatio-temporal constraints on the zoo hypothesis, and the breakdown of total hegemony.** INTERNATIONAL JOURNAL OF ASTROBIOLOGY 10:341-347

"*The Zoo Hypothesis posits that we have not detected extraterrestrial intelligences (ETIs) because they deliberately prevent us from detecting them. While a valid solution to Fermi's Paradox, it is not particularly amenable to rigorous scientific analysis, as it implicitly assumes a great deal about the sociological structure of a plurality of civilizations. Any attempt to assess its worth must begin with its most basic assumption, that ETIs share a uniformity of motive in shielding Earth from extraterrestrial contact. This motive is often presumed to be generated by the influence of the first civilization to arrive in the Galaxy. I show that recent work on inter-arrival time analysis, while necessary, is insufficient to assess the validity of the Zoo Hypothesis (and its related variants). The finite speed of light prevents an early civilization from exerting immediate cultural influence over a later civilization if they are sufficiently distant. I show that if civilization arrival times and spatial locations are completely uncorrelated, this strictly prevents the establishment of total hegemony throughout the Galaxy. The Zoo Hypothesis is therefore only justifiable on weak anthropic grounds, as it demands total hegemony established by a long-lived early civilization, which is a low probability event. In the terminology of previous studies of solutions to Fermi's Paradox, this confirms the Zoo Hypothesis as a 'soft' solution. However, an important question to be resolved by future work is the extent to which many separate hegemonies are established, and to what extent this affects the Zoo Hypothesis.*"



Yang, Y., et al (2011) **Transparent lithium-ion batteries.** PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES USA 108:13013–13018

"*As battery electrode materials are not transparent and have to be thick enough to store energy, the traditional approach of using thin films for transparent devices is not suitable. Here we demonstrate a grid-structured electrode to solve this dilemma, which is fabricated by a microfluidics-assisted method. The feature dimension in the electrode is below the resolution limit of human eyes, and, thus, the electrode appears transparent.*

*Moreover, by aligning multiple electrodes together, the amount of energy stored increases readily without sacrificing the transparency. This results in a battery with energy density of 10 Wh L at a transparency of 60%. The device is also flexible, further broadening their potential applications.*"

Speirs: If transparent lithium batteries are here, can transparent aluminum be far behind? Over to you, Mr. Scott.

McDonald, R.I., et al (2011) **Global urban growth and the geography of water availability, quality, and delivery.** AMBIO 40:437–446

"*Globally, urban growth will add 1.5 billion people to cities by 2030. We show that 523 million people are in cities where water availability may be an issue, 890 million people are in cities where water quality may be an issue, and 1.3 billion people are in cities where water delivery may be an issue. Tapping into groundwater is a widespread response, regardless of the management challenge, with many cities unsustainably using this resource. The strategies used by cities deficient on the water delivery axis are different than for cities deficient on the water quantity or water quality axis, as lack of financial resources pushes cities toward a different and potentially less effective set of strategies.*"

Asano, K., et al (2011) **Artificial selection for a green revolution gene during japonica rice domestication.** PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES USA 108:11034-11039

"*The semidwarf phenotype has been extensively selected during modern crop breeding as an agronomically important trait. Introduction of the semidwarf gene, semi-dwarf1 (sd1),which encodes a gibberellin biosynthesis enzyme, made significant contributions to the "green revolution" in rice (Oryza sativa L.). Here we report that SD1 was involved not only in modern breeding including the green revolution, but also in early steps of rice domestication. We identified two SNPs in O. sativa subspecies (ssp.) japonicaSD1as functional nucleotide polymorphisms (FNPs) responsible for shorter culm length and low gibberellin biosynthetic activity. Genetic diversity analysis among O. sativa ssp. japonica and indica, along with their wild ancestor O. rufipogon Griff, revealed that these FNPs clearly differentiate the japonica landrace and O. rufipogon. We also found a dramatic reduction in nucleotide diversity around SD1 only in the japonica landrace, not in the indica landrace or O. rufipogon. These findings indicate that SD1 has been subjected to artificial selection in rice evolution and that the FNPs participated in japonica domestication, suggesting that ancient humans already used the green revolution gene.*"

Forgan, D.H., and M. Elvis (2011) **Extrasolar asteroid mining as forensic evidence for extraterrestrial intelligence.** INTERNATIONAL JOURNAL OF ASTROBIOLOGY 10:307-313

"*The development of civilizations such as ours into spacefaring, multi-planet entities requires significant raw materials to construct vehicles and habitats. Interplanetary debris, including asteroids and comets, may provide such a source of raw materials. In this article, we present the hypothesis that extraterrestrial intelligences engaged in asteroid mining may be detectable from Earth. Considering the detected disc of debris around Vega as a template, we explore the observational signatures of targeted asteroid mining, such as unexplained deficits in chemical species, changes in the size distribution of debris and other thermal signatures that may be detectable in the spectral energy distribution of a debris disc. We find that individual observational signatures of asteroid mining can be explained by natural phenomena, and as such they cannot provide conclusive detections of extraterrestrial intelligences. But, it may be the case that several signatures appearing in the same system will prove harder to model without extraterrestrial involvement. Therefore, signatures of targeted asteroid mining are not detections of extraterrestrial intelligences in their own right, but as part of 'piggy-back' studies carried out in tandem with conventional debris disc research, they could provide a means of identifying unusual candidate systems for further study using other search for extra terrestrial intelligence (SETI) techniques.*"

del Carmen Jorgea, M., et al (2011) **Mathematical accuracy of Aztec land surveys assessed from records in the Codex Vergara.** PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES USA 108:15053–15057

"*Land surveying in ancient states is documented not only for Eurasia but also for the Americas, amply attested by two Acolhua–Aztec pictorial manuscripts from the Valley of Mexico. The Codex Vergara and the Códice de Santa María Asunción consist of hundreds of drawings of agricultural fields that uniquely record surface areas as well as perimeter measurements. A previous study of the Codex Vergara examines how Acolhua–Aztecs determined field area by reconstructing their calculation procedures. Here we evaluate the accuracy of their area values using modern mathematics. The findings verify the overall mathematical validity of the codex records. Three-quarters of the areas are within 5% of the maximum possible value, and 85% are within 10%, which compares well with reported errors by Western surveyors that postdate Aztec–Acolhua work by several centuries.*"