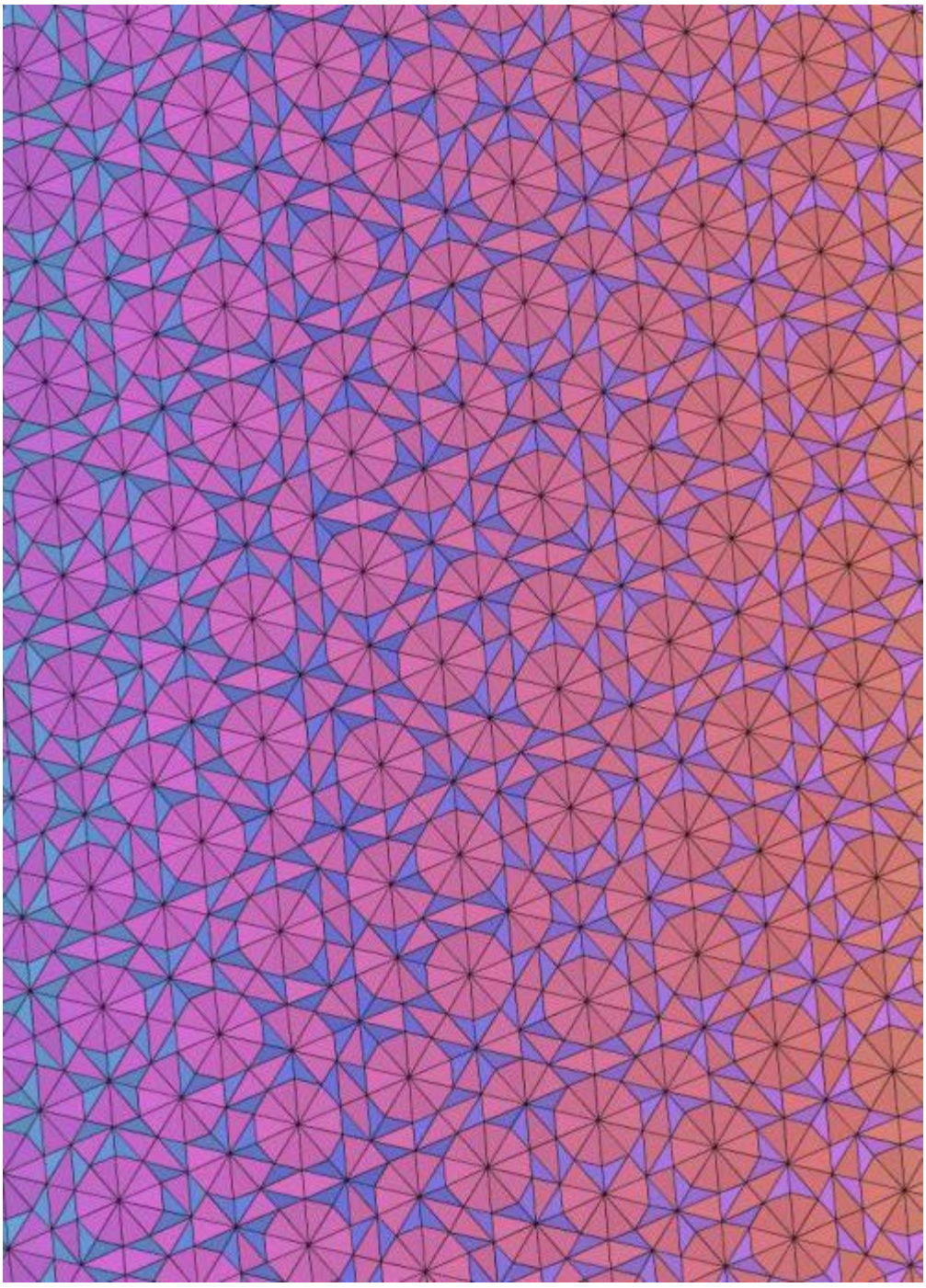
For my December 2008 diary, go here.

Diary - January 2009

John Baez

January 1, 2009

Happy New Year!



In the last week I reached some sort of tentative completion on two papers. They're not done, but they're done enough to put on the arXiv:

- John Baez, Alexander Hoffnung and Christopher Walker, Groupoidification.
- John Baez, Aristide Baratin, Laurent Freidel and Derek Wise, Infinite-dimensional representations of 2-groups.

It's a huge relief! I feel like I've been wading through molasses the last year, finishing old projects instead of thinking about new ones. But now I can see the light at the end of tunnel. (Okay, so I'm wading through a tunnel of molasses — sue me.)

My next job is to finish the final section of the Rosetta Stone paper with Mike Stay. Then I need to finish my history of n-categorical physics with Aaron Lauda. And then my slate will be close to clean! I've been thinking a lot about what I want to do next. Not more of the same. Waking up and not knowing what I have to do — that would be nice.

On Saturday I'll fly to DC to visit my mother and sister. Later I'll visit my friend Bill Schmitt and give two talks at the 2009 Joint Mathematics Meetings in downtown DC. This mega-conference runs from Monday to Thursday. I'm really looking forward to meeting lots of friends there — odd, but the prospect of talking to friends seems vastly more interesting than the mathematics. (Maybe that's normal, but I'm not normal, normally.)

I'll then spend more time with my family, and come home on Saturday the 10th.

Then I'll dive into teaching. This quarter I'm continuing my seminar on Lie theory and also teaching an undergraduate course on the geometry of curves and surfaces, based on Thorpe's book *Elementary Topics in Differential Geometry*. I've never taught a course like this, and I've always been skeptical of doing differential geometry without the modern notion of manifold. But now it seems charming, in a "retro" kind of way.

(Once upon a time manifolds were just higher-dimensional surfaces embedded in R^n. Now they're defined by gluing together coordinate patches that look like copies of R^n. As Jim Dolan pointed out, both approaches are clunky, but in dual ways: we start with Euclidean space, and then build more general spaces using either equalizers or coequalizers! Why does the modern approach using coequalizers seem more "intrinsic" to most people? I know Alain Connes never liked the modern definition of manifold, building the darn things by stitching together little pieces of R^n. He says this is why he invented noncommutative geometry.)

It's New Year's Day. As always on this day, Lisa is writing a poem. So far I seem to be regurgitating my recent activities and short-term plans. Maybe that's what a diary is good for — not so much to record all this crud, but simply to get it out of my system.

(There's a theory that this is what *dreams* are for.)

Anyway, moving on... here's a fun essay by the inimitable Nicholson Baker:

- Nicholson Baker, The charms of Wikipedia, *The New York Review of Books*, Volume 55, Number 4, March 20, 2008.

If you've written a bunch of Wikipedia articles you may know much of this stuff — but it's still amusing.

And here's an interesting article on antibiotics:

- Robert L. Dorit, Routes of resistance, *American Scientist*, January-February 2009, 20-22.

Antibiotics are often naturally produced by various organisms, so the question arises: *why do they do it?* Some antibiotics are really weapons used by one bacterium to kill another: for example, bacteriocins. A single molecule of this sort of protein can kill its target! But many antibiotics are naturally produced in concentrations too low to be lethal. And it turns out that many of these are used as *signals*:

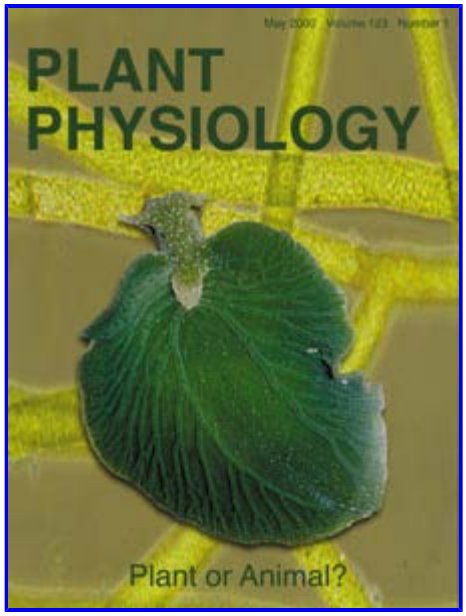
> At sublethal concentrations, antibiotics can have profound and unexpected effects on surrounding cells. Several different antibiotics, when present at a small fraction (less than 1 percent) of their lethal

concentration, coordinate the expression of whole sets of genes in bacteria that sense the antibiotic. These coordinated responses are not simply the molecular expression of panic (the aptly named "SOS response") expected when an antibiotic is present. The signal may, for instance, induce *Pseudomonas aeruginosa* bacteria to develop into a bacterial biofilm — an architecturally complex, surface-bound conglomeration of cells — which, regrettably, makes bacteria much less sensitive to antibiotics in clinical settings. In another irony, low concentrations of of antibiotic appear to upregulate the expression of a suite of genes responsible for increased virulence, in effect transforming a benign bacterium into a pathogen.

Some other curious bio-news: there's a kind of sea slug that can take the chloroplasts from the algae it eats and use them to do its own photosynthesis. Even weirder, the sea slug also takes *genes* from the algae — genes that produce proteins required for photosynthesis — and incorporates these genes in its own DNA! Even cooler, these genes are found in the sea slugs' sex cells, so it can pass on these genes to its descendants:

- Mary E. Rumpho *et al*, Horizontal gene transfer of the algal nuclear gene psbO to the photosynthetic sea slug *Elysia chlorotica*, *Proc. Nat. Acad. Sci.* **105** (2008), 17867-17871.
- Mary E. Rumpho, Elizabeth J. Summer and James R. Manhart, Solar-powered sea slugs: mollusc/algal chloroplast symbiosis, *Plant Physiol.*, 2000 **123** (2000), 29-38.

These sea slugs even *look* like plants:



January 3, 2009

Today I flew to Dulles Airport and took a cab to my mom's house. The cab driver had been a computer security engineer until he was laid off; he's looking for a job that pays about what he used to earn — he said if you take a step down it's hard to ever get a job paying what you used to earn.

The plan is for me to spend a day at my mom's house and then go into DC on Monday for the Joint Mathematics Meetings — a big annual math conference combining the MAA, the AMS and other organizations. While there, I'll stay with my friend Bill Schmitt. Then on Friday I'll come back home and spend some time with my mom and sister.

January 9, 2009

Today I took the Metro from DC to my sister's apartment, and she drove us to my mother's house. It was great seeing her; we talked a lot and looked at old family photos. But the task of the day — which didn't take very long at all — was to sprinkle my father's ashes on our yard, as he had requested.

My mom originally thought they should be sprinkled in the back yard, but I suggested that the area near the old woodpile would be better, since that's where he spent the most time, chopping wood for the cast iron stove.

The ashes were in a cardboard box: no urn, he hadn't wanted that. My mom and sister seemed reluctant to open it, so I decided to take charge. I opened it up. Inside there was a plastic bag held closed a plastic tie that was hard to cut. Eventually I succeeded, and then we took the bag outside.

Nothing marked the site of the old woodpile. No logs anymore: my parents had stopped using that stove to heat the house when my dad got too weak to chop logs. We had to guess where the old place was.

Suddenly my mom asked me or my sister to say some words. We hadn't planned for this, and neither of us were quite ready to improvise a speech or sermon. My sister didn't want to say anything. I said something about how my father had never wanted any ceremony to mark his death, and that these ashes were not really my father in any true sense, just the remains of his body. Not very inspirational or eloquent.

I sprinkled the ashes around, finding to my slight horror that instead of a fine powder, as I'd imagined, they contained lumps of stuff and things that looked like small rubber bands. I didn't dare examine them closely.

My mom cried and I hugged her. We walked back into the house. I looked down and noticed that my shoes were covered with ashes.

January 14, 2009

A correspondent told me some fascinating things about the youth orchestra program in Venezuela called El Sistema:

> It's a massive social project in Venezuela that rescues children from extreme abject poverty by giving them instruments and music lessons and getting them to play in orchestras. It's extraordinarily successful. I believe there are currently 100,000 children in the system ("Sistemas"). It started about thirty years ago when Venezuela only had two professional orchestras, and now there are 30 professional orchestras and 200 youth orchestras, and the national one is the Simón Bolivar orchestra. It's now one of the greatest orchestras in the *world*, and the children who've been trained through it have gone to professional jobs in the greatest orchestras in the world, including Gustavo Dudamel, who's been appointed conductor in LA.
>
> The children come from the slums and aren't allowed to take their instruments home because of mugging. Some of them come from drug centres, have criminal records etc. Every successive government has poured money into this project because it's so successful. I am rather sceptical about such a thing working in the UK though. Living in the north has opened my eyes to some hidden class issues in the UK. I think people assume that the "upper classes" (whatever they are) are maintaining the supposed "class system" here, and oppressing the "lower classes". But there's another issue which is the proud working classes e.g. of the North. I had never heard anyone describe themselves as any class at all until I came here, and all over the place there are people who declare themselves to be proud working class people. They don't *want* to be any other class. They don't *want* to do anything that they perceive as being for "posh people". They don't want to go to university if they perceive it as being for posh people. And if you gave their children instruments and put them in an orchestra, I fear they would say "Oh no, music like that isn't for us working class people, it's for the posh people!"
>
> Maybe it's because we don't have the sort of extreme abject poverty that is found in the slums of Venezuela. Apparently the children are prone to headaches because their families don't have any food. I compare this with the English beggar to whom I gave a loaf of bread. He said "Oh no, I don't eat bread!" to which I rather astonishedly replied "You don't eat bread???" to which he replied "Well, not without anything on it!"

However, they're now trying to emulate the Venezuelan program in Scotland.

January 16, 2009

This morning Lisa flew to Paris for a conference. I'll be on my own for a week — nice in some ways, but a bit lonely.

January 17, 2009

For a harrowing true story that illustrates the chaos the American invasion unleashed in Iraq, read this:

- God is my shelter, *Harper's Magazine*, February 2009.

A less harrowing tidbit concerns the War On Telephone Poles:

> For a short time, the telephone was little more than a novelty. For ten cents you could see it demonstrated by Bell himself, in a church, along with singing and recitations by local talent. From some distance away, Bell would receive a call from "the invisible Tom Watson". Then the telephone became a plaything of the rich. A Boston banker paid for a private line between his office and his house so that he could let his family know exactly when he would be home for dinner. Mark Twain was among the first Americans to own a telephone, but he wasn't completely taken with the device. "The human voice carries entirely too far as it is," he remarked.
>
> By 1889, the New York Times was reporting a "War on Telephone Poles". Wherever telephone companies erected poles, homeowners and business owners were sawing them down, or defending their sidewalks with rifles. Property owners in Red Bank, New Jersey, threatened to tar and feather the workers putting up telephone poles. A judge found that a man who had cut down a pole because it was "obnoxious" was not guilty of malicious mischief. Telephone poles, newspaper editorials complained, were an urban blight. The poles carried a wire for each telephone — sometimes hundreds of wires. There were also telegraph wires, power lines, and trolley cables. The sky was netted with wires.
>
> The War on Telephone Poles was fueled, in part, by the American concern for private property and the reluctance to surrender it to a shared utility. And then there was a fierce regard for aesthetics, an obsession with purity, a dislike for the way the poles and wires marred a landscape that other new inventions — skyscrapers and barbed wire — were just beginning to complicate. There was also a fear that distance, as it had always been known and measured, was collapsing.
>
> The city council in Sioux Falls, South Dakota, ordered policemen to cut down all the telephone poles in town. And the mayor of Oshkosh, Wisconsin, ordered the police chief and the fire department to chop down the telephone poles there. Only one pole was chopped down before the telephone men climbed all the poles along the line, preventing any more chopping. Bell Telephone Company stationed a man at the top of each pole as soon as it had been set, until enough poles had been set to string a wire between them, at which point it became a misdemeanor to interfere with the poles. Even so, a constable cut down two poles holding forty or fifty wires. And the owner of a cannery ordered his workers to throw dirt back into the hole the telephone company was digging in front of his building. His men threw the dirt back in as fast as the telephone workers could dig it out. Then he sent out a team to dump a load of stones into the hole. Eventually the pole was erected on the other side of the street.
>
> Despite the War on Telephone Poles, it would take only four years after Bell's first public demonstration of the telephone for every town of more than 10,000 people to be wired, although many towns were wired only to themselves. By 1900, telephones outnumbered bathtubs in America.

January 20, 2009

I woke up at 8:30, turned on the TV, and watched the inauguration. Then I put on my President Obama T-shirt and went to work.

The mood at the inauguration was electric, thanks to the enormous crowd and the months, even years of anticipation —

topped off by the huge concert in front of the Lincoln Memorial the day before yesterday, and the Martin Luther King celebrations yesterday.

Obama's speech was, as usual, carefully crafted to the mood of the moment: not triumphant or soaring, but bracing. It began by painting a bleak picture of the mess we've gotten ourselves into:

> That we are in the midst of crisis is now well understood. Our nation is at war, against a far-reaching network of violence and hatred. Our economy is badly weakened, a consequence of greed and irresponsibility on the part of some, but also our collective failure to make hard choices and prepare the nation for a new age. Homes have been lost; jobs shed; businesses shuttered. Our health care is too costly; our schools fail too many; and each day brings further evidence that the ways we use energy strengthen our adversaries and threaten our planet.
>
> These are the indicators of crisis, subject to data and statistics. Less measurable but no less profound is a sapping of confidence across our land — a nagging fear that America's decline is inevitable, and that the next generation must lower its sights.

Then came a powerful attempt to make us come to our senses before it's too late:

> On this day, we come to proclaim an end to the petty grievances and false promises, the recriminations and worn out dogmas, that for far too long have strangled our politics.
>
> We remain a young nation, but in the words of Scripture, the time has come to set aside childish things. The time has come to reaffirm our enduring spirit; to choose our better history; to carry forward that precious gift, that noble idea, passed on from generation to generation: the God-given promise that all are equal, all are free and all deserve a chance to pursue their full measure of happiness.

"Set aside childish things" — that hit with the force of bucket of cold water. Since when has a president told us in his first moment of office that we are behaving *childishly?*

And consider this:

> What the cynics fail to understand is that the ground has shifted beneath them — that the stale political arguments that have consumed us for so long no longer apply.

This is the sort of thing one tries to make true by saying it *is* true. Obama is trying mightily to make it true, and while he

didn't seek office knowing he would preside over an economic crisis, he is smart enough to take advantage of this as a window of opportunity for drastic change. We'll see how it goes.

People outside the United States — citizens of older, wiser, more cynical countries — may underestimate how Americans, even pessimists like me, can be fired up by patriotic words, biblical allusions and a rousing call to action. I can't imagine this speech working in England, for example. But Americans still clutch to a dream of greatness, a dream they feel slipping away.

Here are the words that predominated Obama's speech, courtesy of Kate Day at the *Telegraph*, made using worlde.net:

The Chinese media omitted or altered two sentences in Obama's speech:

> Recall that earlier generations faced down fascism and communism not just with missiles and tanks, but with sturdy alliances and enduring convictions.

and, even more telling:

> Those who cling to power through corruption and deceit and the silencing of dissent, know that you are on the wrong side of history.

January 22, 2009

As if rousing us from a long nightmare, Obama signed executive orders that forbid torture and start the shutdown of the prisons in Guantanamo.

Executive Order regarding Interrogation

Executive Order revokes Executive Order 13440 that interpreted Common Article 3 of the Geneva Conventions. It requires that all interrogations of detainees in armed conflict, by any government agency, follow the Army Field Manual interrogation guidelines. The Order also prohibits reliance on any Department of Justice or other legal advice concerning interrogation that was issued between September 11, 2001 and January 20, 2009.

The Order requires all departments and agencies to provide the ICRC access to detainees in a manner consistent with Department of Defense regulations and practice. It also orders the CIA to close all existing detention facilities and prohibits it from operating detention facilities in the future.

Finally, the Order creates a Special Task Force with two missions. The Task Force will conduct a review of the Army Field Manual interrogation guidelines to determine whether different or additional guidance is necessary for the CIA. It will also look at rendition and other policies for transferring individuals to third countries to be sure that our policies and practices comply with all obligations and are sufficient to ensure that individuals do not face torture and cruel treatment if transferred. This Task Force will be led by the Attorney General with the Secretary of Defense and the Director of National Intelligence as co-Vice Chairs.

Executive Order regarding Guantanamo Bay detainees

Executive Order requires closure of the Guantanamo detention center no later than one year from the date of the Order. Closure of the facility is the ultimate goal but not the first step. The Order establishes a review process with the goal of disposing of the detainees before closing the facility.

The Order sets up an immediate review to determine whether it is possible to transfer detainees to third countries, consistent with national security. If transfer is not approved, a second review will determine whether prosecution is possible and in what forum. The preference is for prosecution in Article III courts or under the Uniform Code of Military Justice (UCMJ), but military commissions, perhaps with revised

> authorities, would remain an option. If there are detainees who cannot be transferred or prosecuted, the review will examine the lawful options for dealing with them. The Attorney General will coordinate the review and the Secretaries of Defense, State, and Homeland Security as well as the DNI and the Chairman of the Joint Chiefs of Staff will participate.
>
> The Executive Order directs the Secretary of State to seek international cooperation aimed at achieving the transfers of detainees.
>
> The Order directs the Secretary of Defense to halt military commission proceedings pending the results of the review.
>
> Finally, the Executive Order requires that conditions of confinement at Guantanamo, until its closure, comply with Common Article 3 of the Geneva Conventions and all other applicable laws.

So, the vile art of tying people down and pouring water into their lungs until they confess whatever you want, developed by the Spanish Inquisition and practiced here in America by Bush's henchmen, is no longer allowed.

Obama also barred his aides from lobbying any executive agency for the duration of his administration, putting an end to the revolving door practices of the Bush administration, which blurred the line between regulators and the industries they regulate.

And Obama issued three orders to make government more transparent. For example, he revoked executive order 13233, a rule instituted by Bush that allowed former presidents, vice presidents (guess who?) *and their heirs* to block the release of documents after they have left office.

January 23, 2009

I got invited by Physics World to write a feature article on the history of the Earth — they liked my discussion of that in week273. I think I'll try it.

January 24, 2009

Saul Griffith is a Californian inventor who received a MacArthur "genius" award in 2007. Here is Stewart Brand's summary of a talk by Griffith at the Long Now Seminar. The talk was called 'Climate Change Recalculated'.

> Engineer Griffith said he was going to make the connection between personal actions and global climate change. To do that he's been analyzing his own life in extreme detail to figure out exactly how much energy he uses and what changes might reduce the load. In 2007, when he started, he was consuming about 18,000 watts, like most Americans.
>
> The energy budget of the average person in the world is about 2,200 watts. Some 90 percent of the carbon dioxide overload in the atmosphere was put there by the US, USSR (of old), China, Germany, Japan, and

Britain. The rich countries have the most work to do.

What would it take to level off the carbon dioxide in the atmosphere at 450 parts per million (ppm)? That level supposedly would keep global warming just barely manageable at an increase of 2 degrees Celsius. There still would be massive loss of species, 100 million climate refugees, and other major stresses. The carbon dioxide level right now is 385 ppm, rising fast. Before industrialization it was 296 ppm. America's leading climatologist, James Hanson, says we must lower the carbon dioxide level to 350 ppm if we want to keep the world we evolved in.

The world currently runs on about 16 terawatts (trillion watts) of energy, most of it burning fossil fuels. To level off at 450 ppm of carbon dioxide, we will have to reduce the fossil fuel burning to 3 terawatts and produce all the rest with renewable energy, and we have to do it in 25 years or it's too late. Currently about half a terawatt comes from clean hydropower and one terawatt from clean nuclear. That leaves 11.5 terawatts to generate from new clean sources.

That would mean the following. (Here I'm drawing on notes and extrapolations I've written up previously from discussion with Griffith):

"Two terawatts of photovoltaic would require installing 100 square meters of 15-percent-efficient solar cells every second, second after second, for the next 25 years. (That's about 1,200 square miles of solar cells a year, times 25 equals 30,000 square miles of photovoltaic cells.) Two terawatts of solar thermal? If it's 30 percent efficient all told, we'll need 50 square meters of highly reflective mirrors every second. (Some 600 square miles a year, times 25.) Half a terawatt of biofuels? Something like one Olympic swimming pools of genetically engineered algae, installed every second. (About 15,250 square miles a year, times 25.) Two terawatts of wind? That's a 300-foot-diameter wind turbine every 5 minutes. (Install 105,000 turbines a year in good wind locations, times 25.) Two terawatts of geothermal? Build 3 100-megawatt steam turbines every day — 1,095 a year, times 25. Three terawatts of new nuclear? That's a 3-reactor, 3-gigawatt plant every week — 52 a year, times 25."

In other words, the land area dedicated to renewable energy ("Renewistan") would occupy a space about the size of Australia to keep the carbon dioxide level at 450 ppm. To get to Hanson's goal of 350 ppm of carbon dioxide, fossil fuel burning would have to be cut to ZERO, which means another 3 terawatts would have to come from renewables, expanding the size of Renewistan further by 26 percent.

Meanwhile for individuals, to stay at the world's energy budget at 16 terawatts, while many of the poorest in the world might raise their standard of living to 2,200 watts, everyone now above that level would have to drop down to it. Griffith determined that most of his energy use was coming from air travel, car travel, and the embodied energy of his stuff, along with his diet. Now he drives the speed limit (no one has passed him in six months), seldom flies, eats meat only once a week, bikes a lot, and buys almost nothing. He's healthier, eats better, has more time with his family, and the stuff he has he cherishes.

Can the world actually build Renewistan? Griffith said it's not like the Manhattan Project, it's like the whole of World War II, only with all the antagonists on the same side this time. It's damn near impossible, but it is necessary. And the world has to decide to do it.

Griffith's audience was strangely exhilarated by the prospect.

—Stewart Brand

Over at the *n*-Category Café there was some discussion of how Griffith arrived at such a large area as "the size of Australia". I asked Brand and he said:

The Australia line came from Saul, in relation to an earlier version, where 2 terawatts of power was to come from algae instead of half a terawatt. Also I gave the wind only in terms of turbines; they take up formidable acreage.

An interview with James Lovelock gives another slant on these issues:

- Gaia Vince interviewing James Lovelock, One last chance to save mankind, *New Scientist* **2692** (January 23, 2009).

Here are a few selected quotes. He seems to agree with the idea, noted above, that wind power requires vast amounts of area. He's less optimistic about our ability to build 'Renewistan':

> **Question:** Your work on atmospheric chlorofluorocarbons led eventually to a global CFC ban that saved us from ozone-layer depletion. Do we have time to do a similar thing with carbon emissions to save ourselves from climate change?
>
> **Answer:** Not a hope in hell. Most of the "green" stuff is verging on a gigantic scam. Carbon trading, with its huge government subsidies, is just what finance and industry wanted. It's not going to do a damn thing about climate change, but it'll make a lot of money for a lot of people and postpone the moment of reckoning. I am not against renewable energy, but to spoil all the decent countryside in the UK with wind farms is driving me mad. It's absolutely unnecessary, and it takes 2500 square kilometres to produce a gigawatt - that's an awful lot of countryside.
>
> **Question:** So are we doomed?
>
> **Answer:** There is one way we could save ourselves and that is through the massive burial of charcoal. It would mean farmers turning all their agricultural waste — which contains carbon that the plants have spent the summer sequestering — into non-biodegradable charcoal, and burying it in the soil. Then you can start shifting really hefty quantities of carbon out of the system and pull the CO_2 down quite fast.
>
> **Question:** Would it make enough of a difference?
>
> **Answer:** Yes. The biosphere pumps out 550 gigatonnes of carbon yearly; we put in only 30 gigatonnes. Ninety-nine per cent of the carbon that is fixed by plants is released back into the atmosphere within a year or so by consumers like bacteria, nematodes and worms. What we can do is cheat those consumers by getting farmers to burn their crop waste at very low oxygen levels to turn it into charcoal, which the farmer then ploughs into the field. A little CO_2 is released but the bulk of it gets converted to carbon. You get a few per cent of biofuel as a by-product of the combustion process, which the farmer can sell. This scheme would need no subsidy: the farmer would make a profit. This is the one thing we can do that will make a difference, but I bet they won't do it.
>
> **Question:** Do you think we will survive?
>
> **Answer:** I'm an optimistic pessimist. I think it's wrong to assume we'll survive 2 °°C of warming: there are already too many people on Earth. At 4 °C we could not survive with even one-tenth of our current population. The reason is we would not find enough food, unless we synthesised it. Because of this, the cull during this century is going to be huge, up to 90 per cent. The number of people remaining at the end of the century will probably be a billion or less. It has happened before: between the ice ages there were bottlenecks when there were only 2000 people left. It's happening again.
>
> I don't think humans react fast enough or are clever enough to handle what's coming up. Kyoto was 11 years ago. Virtually nothing's been done except endless talk and meetings.

Read the rest to find out why he's an 'optimistic' pessimist. I think it's related to how Saul Griffith's audience was "strangely exhilarated" — as Lovelock says, "We're much better equipped to deal with [this] kind of thing than long periods of peace."

January 25, 2009

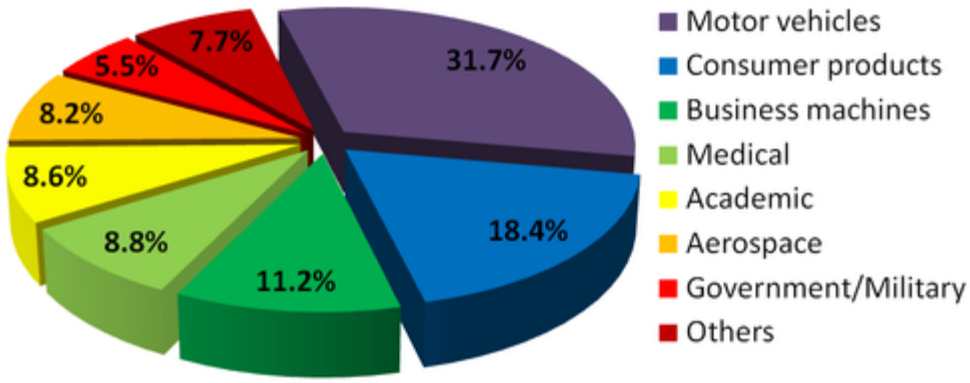
Just as a universal computer can be programmed to simulate any other computer, John von Neumann imagined a universal constructor — a machine that could be programmed to construct any machine. He even designed a toy model, which lived not in our universe but in a cellular automaton.

Since such a machine could build any other machine, it could also build *itself*. So, it would be a self-replicating machine. Von Neumann imagined building such machines in the real world and letting them spread throughout the universe. NASA actually tried to design such a machine in 1980. But it seems they never worked out all the details.

My friend Bruce Smith just pointed me to this interesting website:

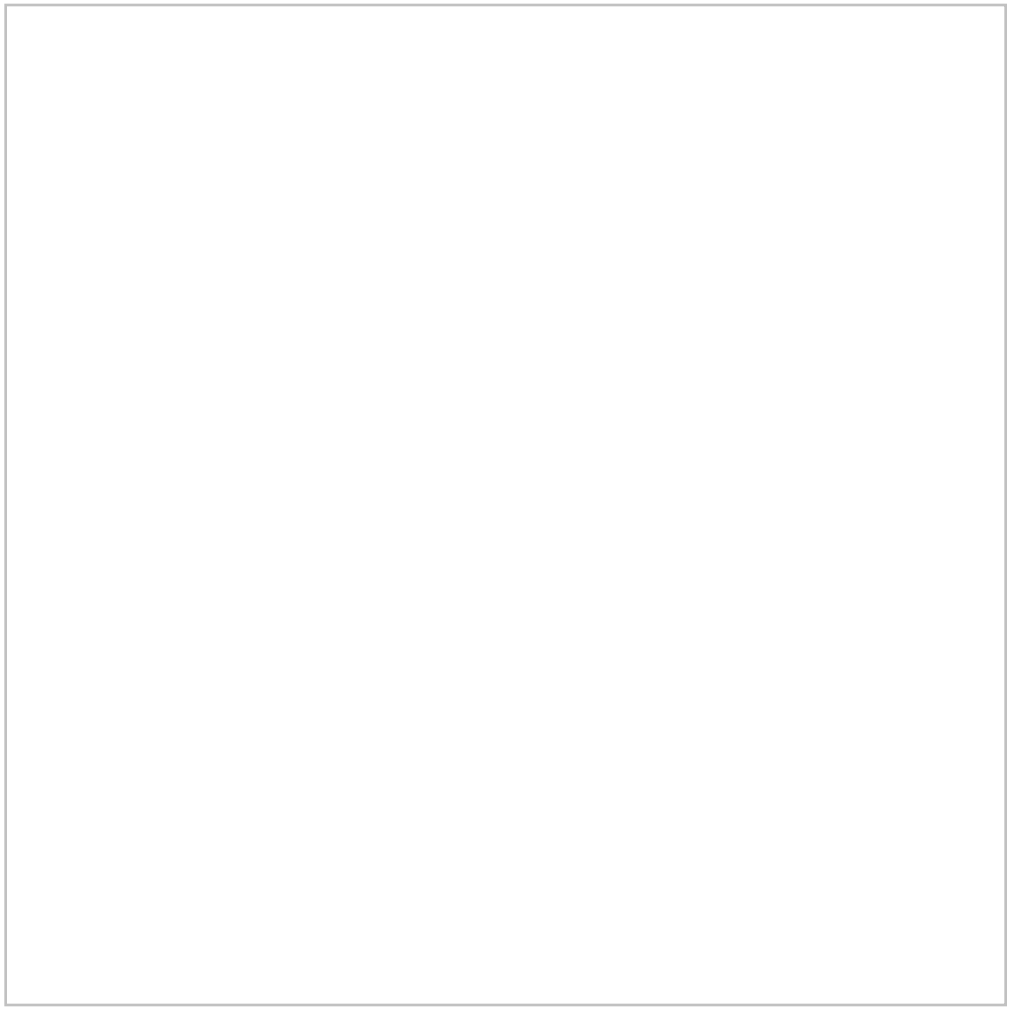
- RepRap

You may have heard of 3d printers. A 3d printer can build three-dimensional objects of any desired shape by laying down successive cross sections of plastic. People use them for rapid prototyping: that is, quickly building rough models of various products.



Percentage use of rapid prototyping worldwide, as of 2000.

It would be nice to have a 3d printer that could print out a copy of *itself*. And that's the idea of the RepRap — short for "replicating rapid prototyper". It doesn't completely build itself yet, but it can make 60% of its own parts out of 500 euros worth of raw materials. The rest of the parts are supposed to be fairly cheap. Some hand assembly is required.



The RepRap doesn't just make copies of itself. It can also make flyswatters, coat hooks, children's shoes and many other things.

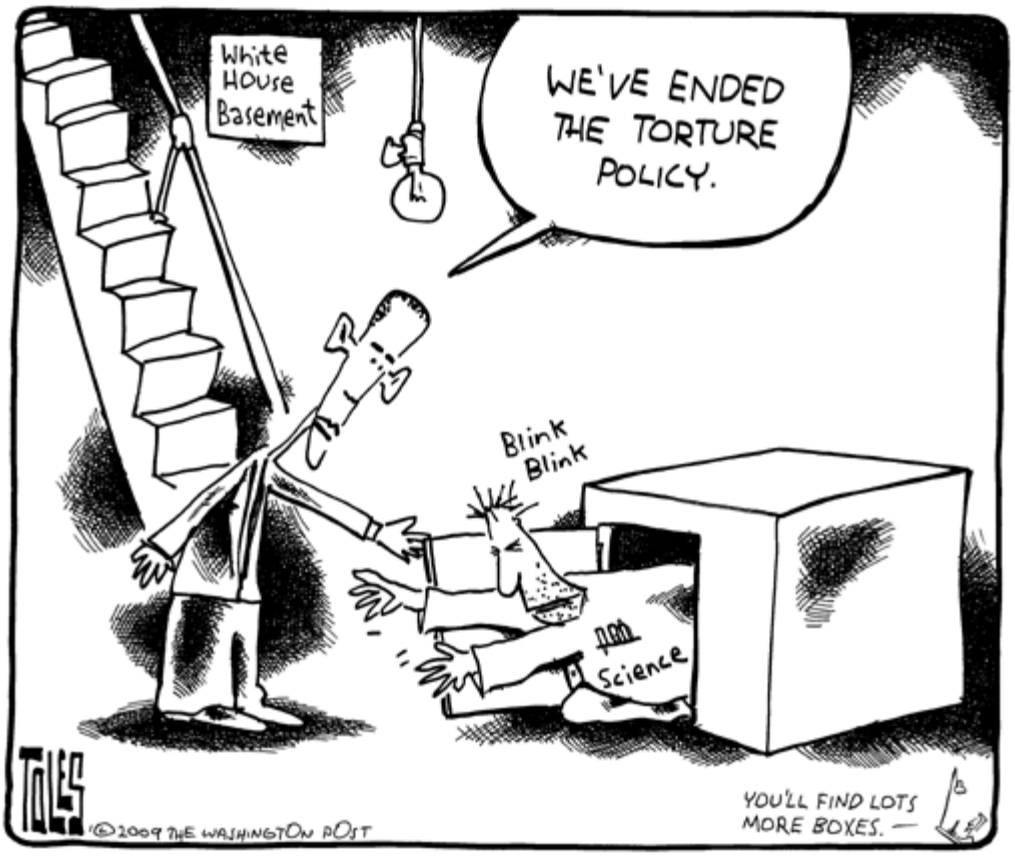
January 26, 2009

Above I compared Obama's words to "a bucket of cold water", and his actions to "rousing us from a long nightmare". It turns out I'm not the only one reaching for such metaphors.

On December 21, 2007 I described how Stephen Johnson — Bush's head of the Environmental Protection Agency — had been trying to stop California and other states from boosting fuel efficiency. They wanted to do it to fight global warming. They needed a waiver from the EPA to do it. Johnson, acting against the recommendations of his staff, refused to even hear their case. Four labor unions representing most of the EPA's professional staff published an open letter to Johnson, complaining that he had ignored the EPA's official Principles of Scientific Integrity.

Here's some news on that from the Riverside Press Enterprise:

> Last year, Obama co-sponsored a bill with Democratic Sen. Barbara Boxer of California to approve the waiver.
>
> "If confirmed, I will immediately revisit the waiver," Lisa Jackson, Obama's choice to head the Environmental Protection Agency, told Boxer at her confirmation hearing last week.
>
> Boxer, head of the Senate Environment and Public Works Committee, is expecting quick approval. She compared the EPA under Bush's leadership to Sleeping Beauty, saying that the agency now "needs to be awakened from a deep and nightmarish sleep."



January 30, 2009

Lisa was in Paris at the beginning of the Year of the Ox, but now she's back — and today we had our big annual lunar new year's day party. We had about 40 guests, and made about 360 *jiaozi*, the traditional food for this celebration. Folks coming between 5 and 7 pm helped prepare these dumplings in the dining room, with Lisa's Chinese grad students doing most of the work.

The big crowds showed up around 7. Lisa boiled batch after batch of *jiaozi* for hours afterward, talking to people in the kitchen. I roamed about doing random chores, and kept coming back to the kitchen to make bowls of dipping sauce: 4 tablespoons light soy sauce, 4 tablespoons rice wine vinegar, 2 tablespoons sesame seed oil. The party ended around 11:30.

For my February 2009 diary, go here.

If it does not do justice, what is the government but a great criminal enterprise? - Augustine, *City of God*

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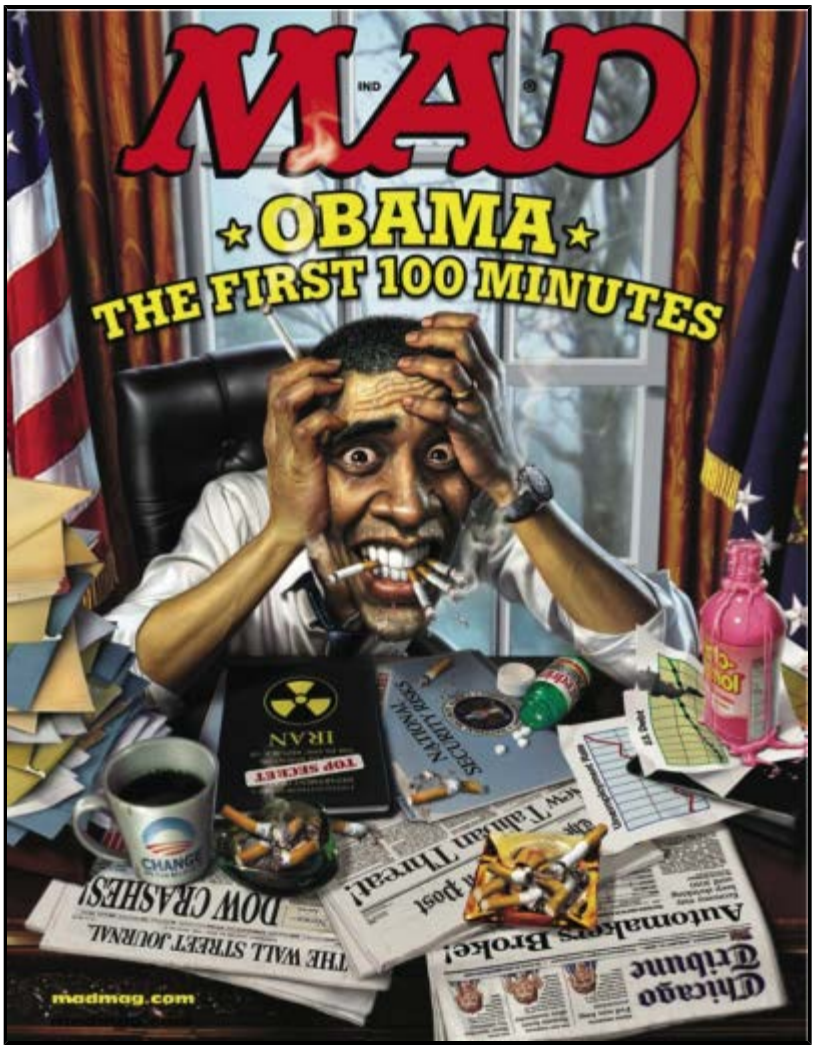
[For my January 2009 diary, go here.]

Diary - February 2009

John Baez

February 1, 2009



The mood of the country is grim and fearful, as big companies lay off tens of thousands.

I bought three rose bushes today, and as is my habit these days, I asked the sales clerk at the plant nursery how business was doing. She said it's been bad: "people are scared." When people are scared, I guess they don't buy flowers. But she said people are buying lots of vegetables for their gardens!

The state of California is broke, unable to pass a budget, and the University of California is starting to get hit with cutbacks. Nonetheless, I have enough confidence to buy 30 bucks worth of roses:

- First of all, a Don Juan. This is a dark red climbing rose, popular because it's one of the few *fragrant* climbing roses. We had a Don Juan before, but it was mysteriously chopped down — or bitten off by some crazy critter — before it had a chance to bloom. This made me angry and determined to get another. With luck, it will grow to 8 feet tall. We planted it against the wooden wall on the west side of our property.
- Second, a Black Magic. This is a hybrid tea rose. As one website says, it's the "deepest, darkest red rose ever, but not black red, just a deep bold red.... velvety black buds swirl open to magnificent, dark garnet blooms on

extremely long stems against lush, deep green leaves." We planted it directly to the left of our fountain, which already has two red roses to the right.

- Third, a Lavender Simplicity. Up to now we've stuck to classic red and white roses, avoiding more dainty shades, but this time we decided to throw caution to the winds and get a lavender-colored rose, which we'll plant to the left of the Black Magic. It's supposed to have a citrus scent! "Simplicity" is a strain of floribunda rose that got its name both for its clean simple appearance and because it needs little care.

"Needs little care" sounds nice — but apart from the mysterious demise of our Don Juan, we've had great luck with roses here, even knowing nothing about them. They flower endlessly in this warm dry climate, and grow like mad.

February 6, 2009

My student Chris Rogers and I were supposed to fly to Göttingen on Tuesday the 3rd for a workshop on higher structures in topology and geometry. Another of my students, Alex Hoffnung, successfully flew from New York directly to Frankfurt, and then took the train to Göttingen. But thanks to the worst snowfall in 18 years on Monday, life in England ground to a halt and hundreds of flights passing through Heathrow were cancelled. This included our flight from Los Angeles to Heathrow.

I found out at the last minute, just as I was waiting for my ride to come. I was given a choice of taking an *earlier* flight or one leaving the next day.

After a brief spell of agonizing indecision, I realized it would be unlikely I could get to the airport in time for the earlier flight. So, I decided to wait for the next one. So, Chris and I were doomed to miss the first day of the 2-day workshop. I emailed our host, Chenchang Zhu, and she kindly rescheduled our talks for the second day.

On Wednesday our flight left uneventfully from Los Angeles. I fell asleep as soon as possible, and got 6 hours of sleep. Unfortunately our flight was a bit late to Heathrow, so we missed our connection to Frankfurt. The next flight to Frankfurt left about 3 hours later, and arrived after the last train to Göttingen. I'd known all along that catching this train would be a close call, so we'd planned for this eventuality: we spent the night in a hotel next to the airport.

At 6:42 the next morning — i.e. today, Friday — we took a train to Göttingen. From then on, things got better. On the train ride we talked about some cool new math ideas. We easily found our way to the legendary mathematics institute in Göttingen, which was the world headquarters of math back in the days of Hilbert until the Nazis took over. I gave my talks and Chris gave his. We'd missed the talk of my student Alex Hoffnung on the previous day, and some talks by Ieke Moerdijk... but apart from that everything was great. The audience asked lots of interesting questions.

Here are some photos of my talk and the dinner later that night, taken by Nadja Kutz:

Dazed me at left, Chenchang Zhu talking to Urs Schreiber on right.

Alex Hoffnung at left.

Chris Rogers and Alex Hoffnung acting like they don't know each other.

February 7, 2009

Today a bunch of us walked around town and saw the sights, most notably Gauss' tomb:

February 12, 2009

It's Darwin's 200th birthday! There was an interesting radio show about why he took so long to publish. He may have done it for love... and he may have finally gotten up the nerve to publish after his daughter died. I guess nobody really knows, but it's fun to speculate:

- Robert Krulwich, Death of child may have influenced Darwin's work, *Morning Edition*, National Public Radio, February 12, 2009.

February 13, 2009

It would be really interesting if this theory turned out to be true... but I'm not betting on it, yet:

- D. J Kennet *et al*, Nanodiamonds in the Younger Dryas boundary sediment layer, *Science* 323 (2006), 94.

Here's a nice expository account:

- Joel Achenbach, Gems point to comet as answer to ancient riddle, *Washington Post*, January 2, 2009.

Quoting a bit:

> Something dramatic happened about 12,900 years ago, and the continent of North America was never the same. A thriving culture of Paleo-Americans, known as the Clovis people, vanished seemingly overnight. Gone, too, were most of the largest animals: horses, camels, lions, mammoths, mastodons, saber-toothed cats, ground sloths and giant armadillos.
>
> Scientists have long blamed climate change for the extinctions, for it was 12,900 years ago that the planet's emergence from the Ice Age came to a halt, reverting to glacial conditions for 1,500 years, an epoch known as the Younger Dryas.
>
> In just the last few years, there has arisen a controversial scientific hypothesis to explain this chain of

events, and it involves an extraterrestrial calamity: a comet, broken into fragments, turning the sky ablaze, sending a shock wave across the landscape and scorching forests, creatures, people and anything exposed to the heavenly fire.

Now the proponents of this apocalyptic scenario say they have found a new line of evidence: nanodiamonds. They say they have found these tiny structures across North America in sediments from 12,900 years ago, and they argue that the diamonds had to have been formed by a high-temperature, high-pressure event, such as a cometary impact.

A more traditional theory is that the *Clovis people* killed off the North American megafauna. This is called the "Pleistocene overkill hypothesis", and I talked about it here on December 10, 2006. There are lots of reasons to be skeptical of the new theory — read more of the above article to see some.

February 15, 2009

The recent collision between near-Earth satellites has some people worried about a chain reaction in which collisions make debris that causes more collisions. In fact this worry has been around for a while:

- Chris Gorski, Scientists fear space debris problem worsening, *Inside Science News Service*, American Institute of Physics, April 28, 2008.

Quoting:

St. Louis, MO — In the wake of the Chinese government's destruction of one of its retired satellites in orbit last year, scientists are increasingly concerned that space debris poses a significantly greater risk to satellites than previously believed. Indeed, scientists at a recent American Physical Society meeting in St. Louis said they fear the chances of a destructive "supercritical chain reaction" collision in space are increasing.

Scientists have long been concerned about debris in space, particularly in the band between 500 to 600 miles above Earth, where many other satellites orbit. Space debris is also a problem in the lower orbits around 200 miles up, typically used by the Space Shuttle.

One phenomenon that scientists fear is the supercritical chain reaction, in which a collision between two pieces of debris creates more pieces that then collide with other debris. The result is a slow cascade of collisions that breaks existing debris into thousands of smaller pieces. Each one of those pieces poses a threat to orbiting satellites. This chain reaction problem, said David Wright, codirector of the global security program for the Union of Concerned Scientists, "is worse than assumed."

In January, 2007, the Chinese blew up the defunct satellite, Feng Yun-1C, with an anti-satellite missile, creating a cloud of debris in space. Scientists studied the explosion and determined that the NASA Standard Breakup Model used to predict the amount of debris produced by a collision underestimated the actual number by a factor of three.

In addition to the explosion occurring in the most crowded orbital zone, Wright said that because of extremely low atmospheric density at that altitude the pieces of the Chinese satellite may linger for decades before falling into the lower atmosphere and burning up.

The Chinese explosion made what was already a bad problem worse. A 2006 study by NASA scientists published in the journal *Science* suggested that the number of pieces of debris would continue to grow for the foreseeable future. The study based its predictions only on items in orbit at the time.

While gravity and atmospheric drag remove pieces of debris from orbit, the process is slow. In a supercritical chain reaction, collisions create more debris than those forces remove, causing the amount of debris to build up and increasing the likelihood of collisions.

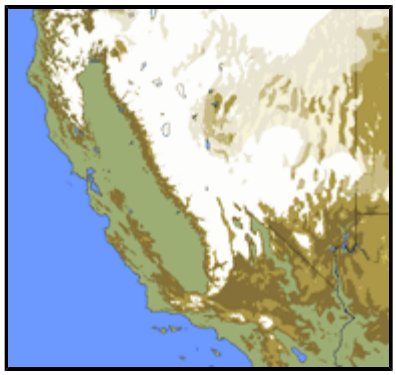
> Previous research has shown that a particle of the right size scoring a direct hit on a 10-ton satellite in low-earth orbit would double the amount of debris presently in the band. Now, said Wright, "the Chinese test suggests that [the impact] would be even bigger."

Presumably this sort of chain reaction becomes inevitable after the density of satellites exceeds a certain threshold, unless people can get satellites to dodge junk, or set up some system for debris removal. Is anyone suggesting treaties to keep the density of satellites below this threshold?

For more, try *Orbital Debris Quarterly News*.

February 16, 2009

Yesterday the second of three storm systems rolled into California. By today, snow blanketed the more mountainous parts of the state:



See those tiny white spots near the southernmost part of this picture? Those are some mountains we can see from here. They're expecting 18 inches of snow up there today. Here it's raining. When the clouds clear up, the mountains will be beautiful.

Last night we stayed home and I made a pot roast for dinner. I support vegetarianism for many reasons, but on a cold wet windy night something in me still enjoys slowly cooking meat over a flame. It's the vegetables, though, that make the pot roast smell good: garlic, onions, leeks, carrots and turnips!

February 19, 2009

After staying awake for 45 hours, the California Senate finally passed a budget for the state. It was months overdue, and our state had started laying off employees and handing out IOUs instead of checks where money was due. It was an enormous game of chicken between the Democrats and Republicans, with the Republican governer Arnold Schwarzenegger eventually siding with the Democrats in their demand to raise takes... a story too complicated and sordid for me to retell here, with a dramatic ending.

Lots of things will happen now, few of them pleasant. To confront the $42 billion dollar shortfall, the new budget raises taxes by $12.5 billion, cuts $14.8 billion in spending, borrows $5.4 billion and relies on $7.8 billion in federal stimulus funds. Those numbers don't add up to $42 billion, but hey! — that's okay as long as nobody knows how to add. And fewer people will! Funding for kindergarten through 12th-grade public education will be cut by $4.8 billion, on top of this year's $400 million cut. That means $750 less per student per year. The University of California, where I work, and California State University will also each suffer a 10 percent budget cut.

February 20, 2009

My neighbor Sarah Simpson picked me up and drove me to work. She was going to pick up her husband and take her

kids up to the mountains to see the snow.

She's a contributing editor at *Scientific American* who specializes in earth sciences. Her husband, Tim Lyons, is a professor of biogeochemistry at UC Riverside. He works on the early history of the Earth's climate. Sarah said lately he's been spending a lot of time in Oman. I didn't get a chance to ask why, since I had to jump out and go teach my class.

I'd picked up a free local newspaper sitting in my driveway right before Sarah picked me up. Waiting for class, I gave it a look. The headline was "Professor Finds Evidence of Oldest Animals". It was about Gordon Love, who also works in biogeochemistry at UCR. He too has been spending a lot of time in Oman. He found rocks containing traces of chemicals that suggest the presence of sponges dating between 750 and 635 million years ago — the chilly period known as "Snowball Earthquot;. These would be the oldest known multicellular organisms!

For details, read this:

- Sponges on steroids, *Astrobiology Magazine*, February 6, 2009.

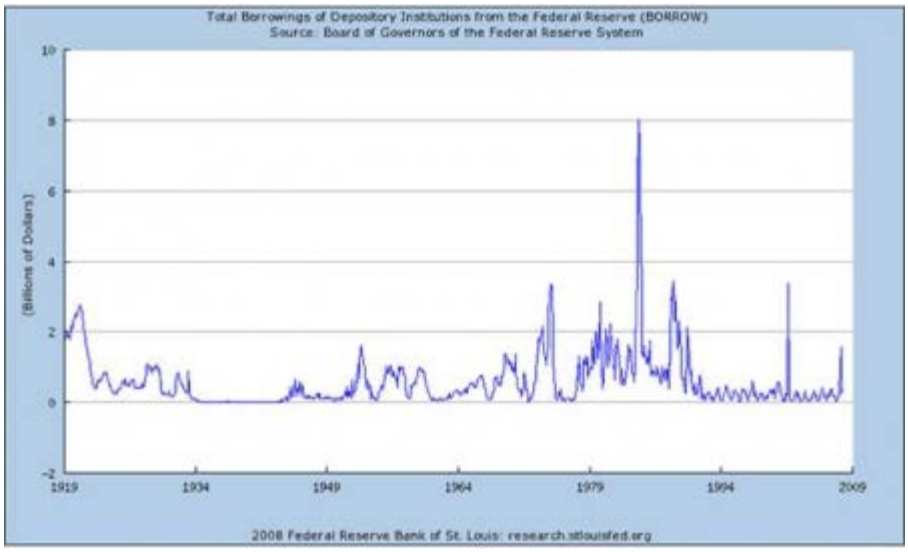
February 21, 2009

Two graphs have been making the rounds, thanks to the blog East Coast Economics.

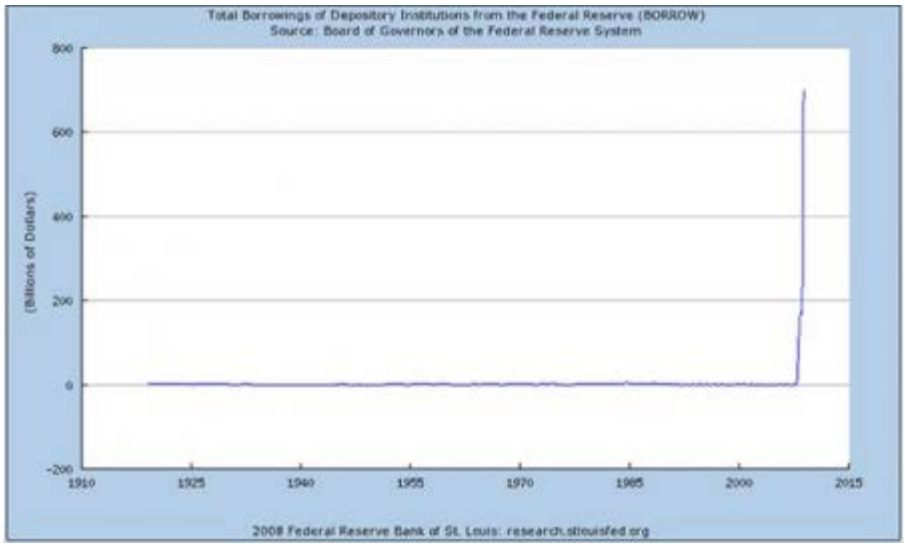
The Federal Reserve is the US government-run banking system established in 1913 in response to the panic of 1907, when the stock exchange dropped 50% and there was a run on banks. If you haven't read about the panic of 1907, now is a good time.

A swarm gathers on Wall Street during the bank panic in October 1907.

The following graph shows how much money US banks borrowed from the Federal Reserve between 1919 and December 2007. Note that the top of the scale is $10 billion. The sharp spike is the savings and loan crisis at the end of the 1980s:

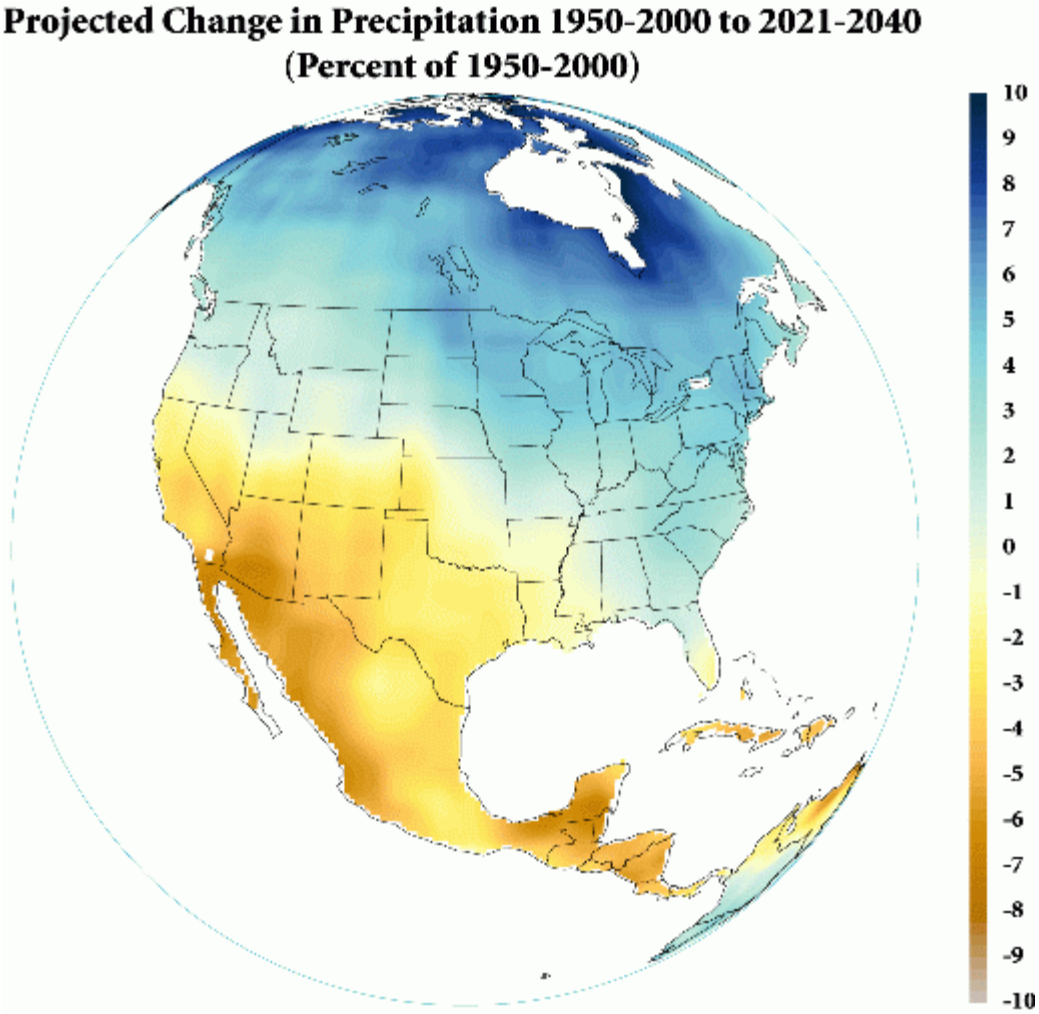


The second graph shows the same thing during the period between 1919 and November 2008. Now the top of the scale is $800 billion, and all the ups and downs of earlier eras are dwarfed by the crisis we're in now:



February 22, 2009

On this diary I talk a lot about the drought in California. If you live somewhere where it rains a lot you may think that's just a reflection of my overall nervousness about climate change, but it's not just that. The drought has been going on for years. It's real. And despite the delightful rains we've had last week, it's so bad that farmers in the Central Valley — the big valley that produces a quarter of all the food grown in the US — may *not get any water this summer*. On top of the general economic crisis and the special problems faced by California, this will really hurt. But it's something we need to get used to: the southwest United States is probably headed for a permanent drought, as discussed in my April 6th, 2007 diary entry.



Central Valley Farmers Told No Water Will be Delivered This Year

Janet Zimmerman
Riverside Press-Enterprise
Feburary 21, 2009

Many farmers in the state's agricultural heartland will get zero water allocations this year because of drought, a problem that will likely spur more fallowed and abandoned fields, tens of thousands of job losses and higher food prices, officials said Friday.

It is the first time the U.S. Bureau of Reclamation expects to provide no water to its agricultural customers in the San Joaquin Valley, said Donald Glaser, regional director of the bureau's mid-Pacific region. The allocation can be re-evaluated and increased if the state has a very wet spring, but that is not expected to happen.

Last year's allocation was 40 percent. The previous low, during the last drought in the early 1990s, was 25 percent. The growing region, which includes Stockton, Fresno and Bakersfield, produces a quarter of the nation's food supply.

"There will be as much as a million acres of land in the Central Valley that will not receive water," Glaser said at a news conference in Sacramento. "This is going to be a tough year."

Farmers will cut back on production, which "is going to have a ripple affect through the economy. Food's going to go up, they don't need as much labor, they don't need as many supplies, fuel, tractors, trucking, boxes, pallets," said Steve Pastor, executive director of the Riverside County Farm Bureau.

California's agriculture is a $36.6 billion a year industry.

Richard Howitt, chairman of the UC Davis Department of Agricultural and Resource Economics, has said water deliveries of 15 percent of full allocation could cause the loss of 40,000 jobs in California and $1.15 billion in farm and related income.

The Bureau of Reclamation administers the Central Valley Project, fed by Northern California reservoirs that are at historic lows. The project also supplies residents and industry in the San Francisco Bay area and wildlife refuges, which all will get 50 percent to 75 percent of their allotments.

The allocations are based on predictions of snowpack runoff into Shasta Reservoir, which is at about one-third of capacity. If the runoff is greater than expected, agricultural users would get a 10 percent allocation and other users would get 60 percent to 100 percent, Glaser said.

February 23, 2009

Some good news for a change. The air in Southern California is getting better! Trucks bringing in goods from the ports clog our highways, and they're a big part of why the air is so bad. Finally someone is doing something about it.

Cleanup at the ports of Los Angeles and Long Beach begins to pay off

Ronald D. White
Los Angeles Times
February 23, 2009

An ambitious plan to clean up once-filthy air around the ports of Los Angeles and Long Beach has shifted into high gear.

Hundreds of 1988-and-older trucks have been banned since October. Others that don't meet 2007 air pollution standards began paying a $70 fee last week each time they haul cargo to and from the ports. This week, the first of a fleet of electric trucks will debut. And within three years, most ships will be able to plug into the ports' electrical grid and turn off their exhaust-belching diesel engines.

For more than a decade, South Bay and Long Beach residents have complained about pollution from the ports, and 1,200 annual premature deaths have been linked to the ports' air pollution problems. But in October, the ports launched the cleanup, and it's beginning to pay off.

"This is the No. 1 health issue in our city," said Long Beach Mayor Bob Foster, who was pleased with the new truck fees introduced last week. "By paying these fees, the people who benefit from the goods-movement industry have become part of the solution to cleaning the air."

Los Angeles Mayor Antonio Villaraigosa agreed. The new fee collection "marks a milestone in our efforts to clean up the ports as we roll ahead with taking 16,800 dirty-diesel trucks off the road for good."

The National Resources Defense Council, long one of the ports' toughest critics, was impressed. It praised the step in October to remove about 2,000 trucks that were at least 20 years old. As a result, the group estimated that diesel particulates emissions may have been reduced 50%.

February 26, 2009

Today my student John Huerta will take his oral exam! He'll talk about The Algebra of Grand Unified Theories. If he passes, he'll do his thesis work on the octonions and their role in super-Yang-Mills theory, superstring theory and other physical theories.

I've been frantically trying to finish up a paper with Mike Stay in time for an end-of-the-month deadline. We've been working on this paper for years! The tough part was finding and then nicely explaining a programming language suitable for quantum computation. Once this is done — and it *will* be done this weekend — he can move ahead on *his* thesis, which will be about 2-categories and computation. After going broke as a math grad student at UCR (he has a family to support), he took a job at Google, but he's going to get a PhD in computer science at the University of Auckland, where he got his master's, with me as one of his thesis advisors.

Some books I'd like to read if I had time. These are the latest offerings from the University of California Press:

- Joan Roughgarden, *The Genial Gene: Deconstructing Darwinian Selfishness*. I'm curious to see how thorough a framework this author constructs to understand evolution in a way where cooperation plays just as crucial a role as competition.

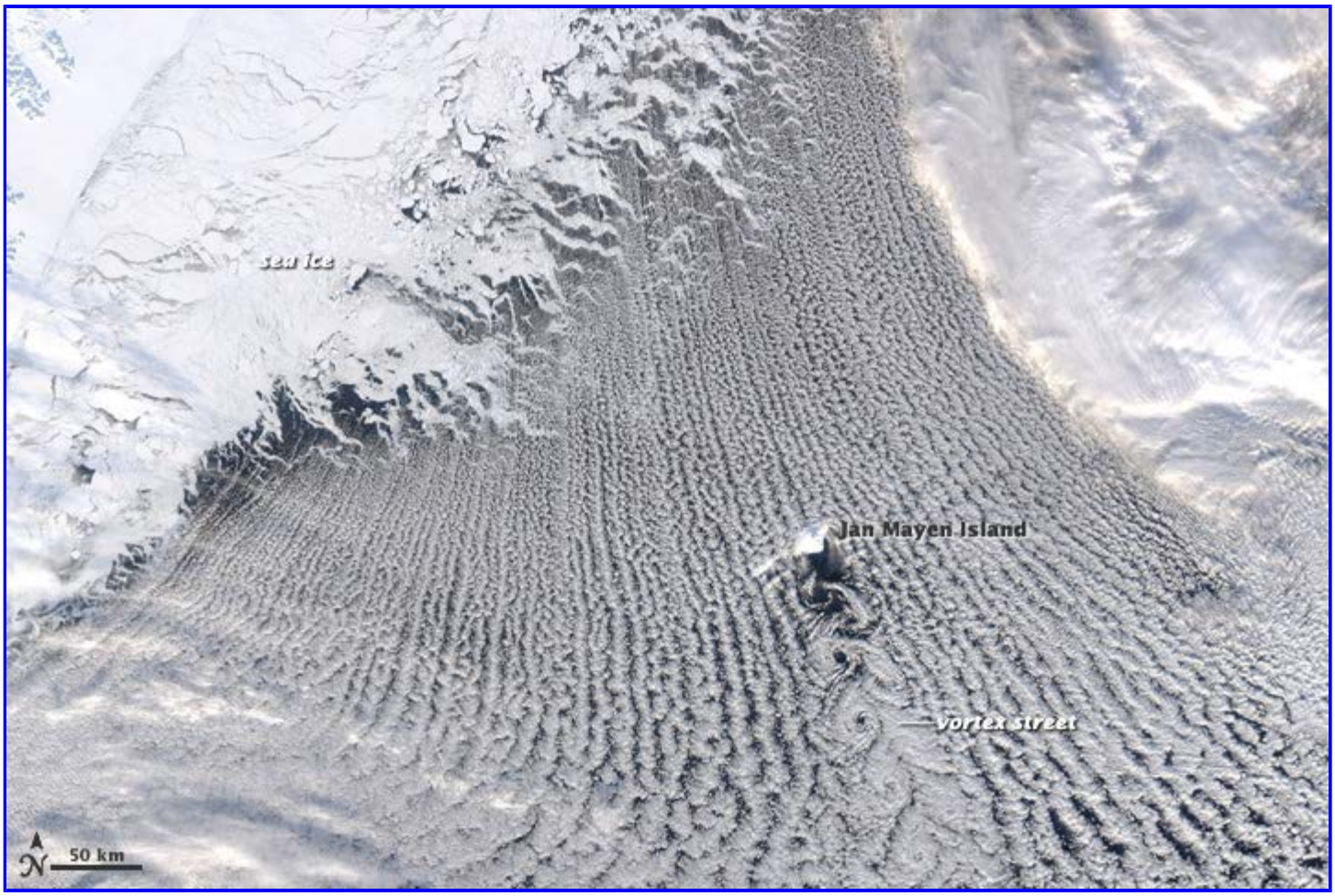
- David J. Metzler, *First Peoples in a New World: Colonizing Ice Age America*. This book puts together the evidence to tell the story of how humans colonized North America around 12,000 years ago. I'm fascinated by Beringia and the Clovis culture, so I've *got* to read this one.

- Susan Freinkel, *American Chestnut: The Life, Death and Rebirth of a Perfect Tree*. Chestnuts grew all over Laurasia before this supercontinent split into North America and Eurasia; then different species evolved in different regions. In one of the worst blows to the ecology of North America since the last ice age, four billion American chestnut trees died from a blight that was accidentally introduced to this continent in 1900. Many of their root systems still survive, but the blight attacks any shoots that grow up. I've seen them! No cure has been found, but the American Chestnut Foundation is struggling to develop a disease-resistant strain. For more, read the first chapter of this book.

February 27, 2009

John Huerta passed his oral with flying colors.

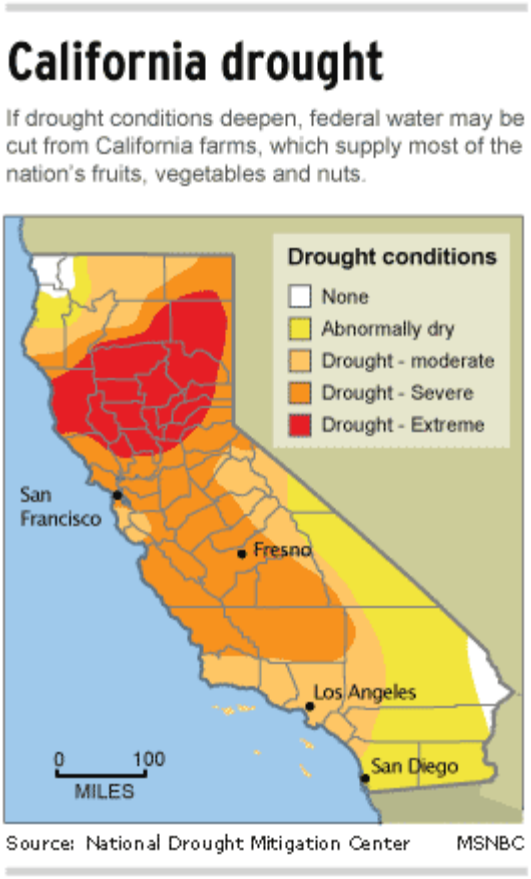
My friend Oz pointed me to this nice picture from NASA:



On Tuesday February 24th, cold winds coming down from Greenland collided with moist air over the Greenland Sea, forming wonderfully regular rows of clouds called "cloud streets". When these hit the island of Jan Mayen, they formed a string of eddies called a von Kármán vortex street. If you look carefully you can see the same phenomenon when water in a stream flows past a protruding rock!

The NASA picture is incredibly detailed. Here's a blowup:

We could use some of those clouds down here in California, where Governor Schwarzenegger declared a state emergency today.



February 28, 2009

A fun story in yesterday's *Los Angeles Times*: an octopus in the Santa Monica Pier Aquarium figured out how to flood the place.

For my March 2009 diary, go here.

From the war of nature, from famine and death, the most exalted object which we are capable of conceiving, namely, the production of the higher animals, directly follows. There is grandeur in this view of life. - Charles Darwin

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For my February 2009 diary, go here.

Diary - March 2009

John Baez

March 1, 2009

The Dar al-Hajar, northwest of the capital of Yemen.
This five-story palace was built by Yemeni ruler
Imam Mansour Ali Bin Mehdi Abbas in 1786.

March 7, 2009

There's new evidence that horses were domesticated around 3500 BC, a thousand years earlier than previously thought:

- Sandra J. Olsen, Botai: early horse herders on the steppes of Northern Kazakhstan.

The predecessors of the Botai were nomadic hunters of red deer, moose, aurochs, saiga antelope and horses. They travelled in small bands. But sometime around 3500 BC, the Copper Age culture of the Botai emerged, with large permanent settlements. Their economy became centered on the horse, both eating horsemeat, drinking mare's milk, making tools from horse bones and also using their skin. (Fermented mare's milk is still used by many peoples of the Eurasian steppe.) The Botai were unusual in being non-nomadic pastoralists: usually it takes agriculture to keep people in one place.

Horses seem to be latecomers to domestication compared to dogs and cats. As I explained on September 27th, 2007, wolf remains have been found in association with hominids as far back as 400,000 years ago, and the time they became domesticated is much argued: sometime between 130,000 years ago and the end of the last ice age around 10,000 years ago, depending on who you listen to. Cats showed up later, when agriculture attracted rats: the earliest evidence of domestic cats is 9,500 years old.

March 15, 2009

Anyone interested in climate change and how we can find our way towards a sustainable civilization should read this free book:

- David J.C. MacKay, *Sustainable Energy — Without the Hot Air*, Independent Publishers Group, 2009.

He cruches the numbers and explains the results in clear English. See why wind power can only be of limited help, and why hydrogen-powered cars are a pointless indulgence, while electric cars are not.

Thanks to Robert Smart and Jeff Tansley for bringing this to my attention.

March 18, 2009

Using its magic powers, the Federal Reserve snapped its fingers, created 1 trillion dollars, and used it to buy Treasury bonds and mortgage secruities. Whee!

March 20, 2009

I've been hard at work trying to finish a paper on The Algebra of Grand Unified Theories with John Huerta. Today John flies to England for a conference on algebraic structures from physics at the Newton Institute.

The government of Abu Dhabi is trying to build a "green city" — a car-free, zero-carbon-dioxide-emissions, zero-waste city that will be mostly solar-powered and use 20 percent as much power as a conventional city of similar size. It's called Masdar, and it's due to be built in 2016. It's being designed by Gerard Evenden.

- Kevin Bullis, A Zero-Emissions City in the Desert, *Technology Review*, March-April 2009.

A quote:

> One of the first things Evenden did was subtract cars: with the highways gone, the city's buildings could be separated by passages just 7 to 12 meters wide, close enough to shade each other yet far enough apart to let in indirect light. That's a cheap way to reduce the need for not only air conditioning but electric lighting, the largest drain on electricity in commercial buildings. Insulation is cheap, too: in the Masdar Institute, Evenden plans to use 30-centimeter-thick insulation to keep out the heat. He's also incorporating "skins" of copper foil that reflect light and conduct heat away from the buildings. The foil will be protected from the desert dust by a self-cleaning Teflon-like plastic. To reduce the need for energy-intensive desalination, Evenden's design will cut water consumption by 75 percent through recycling, low-flow fixtures, and waterless urinals.
>
> A small fraction of the energy that's still needed to run the city will come from waste-based fuel and perhaps geothermal power. The rest will come from the sun--but not all of it through expensive photovoltaics, which convert sunlight into electricity. Much cheaper devices that concentrate heat from the sun will heat water and run a type of air conditioner called an absorption chiller. (This is the same kind of technology that is used now in propane-powered refrigerators.)

Previous projects along these lines have not done well: reality throws unexpected curve-balls, making everything less effficient than planned. Windblown dust lands on solar cells, easily reducing their efficiency by 20%. Fancy automated control systems fall into crazy feedback loops. And so on. But it's worth trying, and learning from mistakes.

Two things I really like about Masdar: narrow streets to keep things cool, and wind cones inspired by the *bad gir*, or windcatchers, used in traditional Middle Eastern architecture. (In my October 30th entry I showed you a nice picture of a *bad gir* in the city of Yazd, taken by Greg Egan.) These are very simple things that take advantage of the laws of physics to keep things cool in the desert without using any power.

March 29, 2009

Wonder what's going on with the economy? The main reason I'm not writing more about it is that I *know* I don't know. Here's one financier's view:

- Economic Darwinism, Letter to Obama: Our Voices Will Be Heard.

A short quote, just to get you to read the whole thing:

> Dear Mr President,
>
> It is *almost* unfair to criticize you given the extraordinary circumstances surrounding this country when you took the oath of office. Time was a precious commodity and you were forced to make urgent decisions. To be clear, I cannot think of anyone else I would rather have at the helm now than you. Choosing generals was job number one and, for the most part, you did a fantastic job.
>
> However, we clearly find ourselves in a severe financial crisis that, due to improper handling and an initial failure to recognize the scope of the problem, has mutated into a full blown economic crisis. Continued failure to right the ship is increasing the chances of a total global economic and social breakdown. In 2007, Bernanke and Paulson's assurances that the subprime mortgage crisis would be contained only served to illustrate their complete lack of understanding of the circumstances. The crisis was no more about subprime mortgages than an influenza outbreak is about runny noses.
>
> People smarter than me will tell you that a large contributor to economic growth over the last 10 years (some would say 20) was fueled by increasing levels of debt. Debt came to pervade every aspect of developed economies from consumers, to corporations and financial institutions, all the way up to local and federal governments. This debt came in the form of credit cards, auto loans, school loans, residential mortgages, commercial real estate loans, corporate bonds, municipal bonds as well as Treasury bills, notes, and bonds.
>
> Scholars will debate the true causes for decades, but let me offer this as a plausible explanation...

Read his explanation and his shocking recommendations.

For my April 2009 diary, go here.

From the war of nature, from famine and death, the most exalted object which we are capable of conceiving, namely, the production of the higher animals, directly follows. There is grandeur in this view of life. - Charles Darwin

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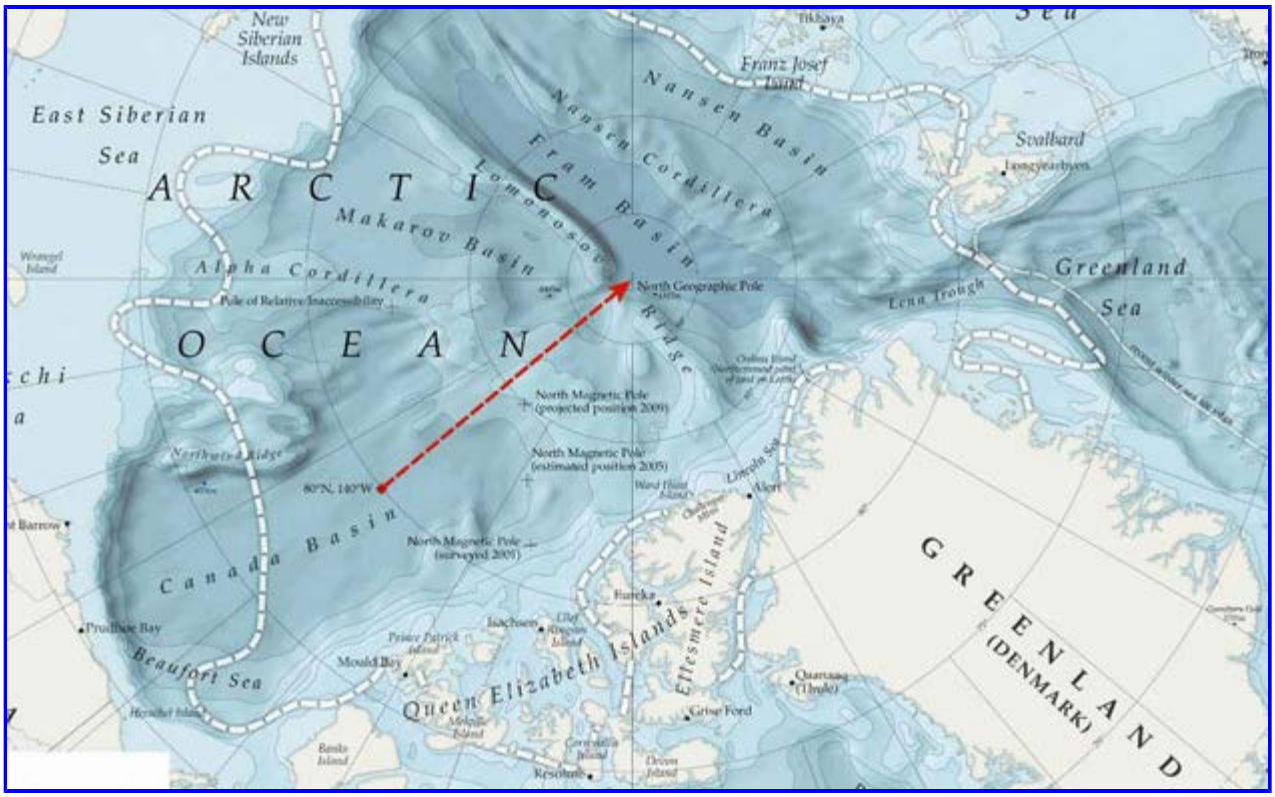
Diary - April 2009

John Baez

April 3, 2009

I like wild, dangerous adventures. At least I like reading about them. And I especially like them when they serve some halfway useful purpose: actual exploration, or collecting scientific data, not just pure showing off.

So, I got very excited when I heard about the Catlin Arctic Survey group. Three people — Pen Hadow, Ann Daniels and Martin Hadley — have begun a trek 1200 kilometers across the Arctic. They were dropped onto floating ice 1000 kilometers north of Canada on March 1st. They planned to reach the North Pole by late May — and make lot of measurements of ice thickness along the way.



After 18 days, they were fighting for survival on half rations because their supply plane had to turn back due to stormy weather:

- Martin Hartley, Disappointment, March 15, 2009.
- Ian Wesley, No go, March 16, 2009.
- British ice expedition fighting for survival, *Guardian*, March 18, 2009.
- Ann Daniels, Two steps forward, one step back, March 18, 2009.

They got their food on March 19th:

- Pen Hadow, First resupply, March 19, 2009.
- Arctic ice expedition relief as supply plane lands, *Guardian*, March 19, 2009.

Then their sledges were much heavier: 110 kilos!

- Ann Daniels, Chivalry on the ice, *Guardian*, March 20, 2009.

So, the Arctic is still a tough place, despite all the high tech.

The mission leader, Pen Hadow, is clearly well-prepared: he was the first to trek solo from Canada to the North Pole, *without resupply*. He skied pulling a sledge that started out weighing 125 kilos, and he *swam*, wearing an immersion suit, whenever he hit water or thin ice. On the 45th day he lost a ski when he fell through the ice, so he had to walk the rest of the way. He reached the North Pole in 64 days. He clearly has the right attitude to succeed in such situtations — caution mixed with a nearly insane way of always looking at the bright side:

- Pen Hadow, We are not alone!
- Pen Hadow, Progress on the ice, March 27, 2009.

In the first entry, he writes how his spirits were lifted by seeing polar bear tracks. In the second:

> A slight rise in temperature (-38 degrees C at the moment) has been a positive development on the whole. It means I can spend longer outside, carrying out the experiments that are the purpose of us being here. I made

48 snow measurements after we'd stopped walking today — the best yet.

The photographer, Martin Hartley, seems a bit more human — so I'm worried whether he'll make it! You can tell when I mean from the titles of his blog posts:

- Martin Hartley, Stabbing pain.
- Martin Hartley, Croissants in Paris.

By the way, the reason I'm including so many links to the mission blog is that it's miserably organized: a lot of dead links, and no way to read through all the blog posts in chronological order.

April 4, 2009

Now for the *good news* about climate change:

- Joseph Romm, Introduction to climate economics: Why even strong climate action has such a low total cost — one tenth of a penny on the dollar, *Climate Progress*.

But you should also read this:

- Joseph Romm, Is 450 ppm politically possible?, *Climate Progress*.
    - Part 0: The alternative is humanity's self-destruction.
    - Part 1: The problem.
    - Part 2: The solution.
    - Part 3: The breakthrough technology illusion.
    - Part 4: The most urgent climate policy — and it isn't a CO_2 price.
    - Part 5: Old coal's out, can't wait for new nukes, so what do we do NOW?
    - Part 6: What the Boxer-Lieberman-Warner bill debate tells us.
    - Part 7: The harsh lessons of the financial bailout.

And also this:

- Joseph Romm, How the world can (and will) stabilize at 350 to 450 ppm: The full global warming solution, *Climate Progress*.

Let me quote a bit of the last. It assumes you're familiar with the rough idea of the "stabilization wedges", which I explained back on October 2nd, 2007. These are measures, each of which could reduce carbon emissions by 1 billion tons per year. Pacala and Socolow, two scientists from Princeton, listed 15 such measures and argued that by adopting 12 we could stabilize the atmosphere at 450 parts per million of carbon dioxide. (Right now it's 385.) This might mean about 2 degrees Celsius of warming.

Anyway, here's what Romm says:

> **In this post I will lay out "the solution" to global warming, focusing primarily on the 12 to 14 "stabilization wedges."** This post is an update to "Is 450 ppm (or less) politically possible? Part 2: The Solution."
>
> I have argued that stabilizing atmospheric concentrations of carbon dioxide at 450 ppm or lower is not politically possible today, but that it is certainly achievable from an economic and technological perspective (see Part 1). I do, however, believe humanity will do it since the alternative is Hell and High Water.
>
> It would require some 12-14 of Princeton's "stabilization wedges" — strategies and/or technologies that over a period of a few decades each reduce global carbon emissions by one billion metric tons per year from projected levels (see technical paper here, less technical one here). The reason that we need twice as

many wedges as Princeton's Pacala and Socolow have said we need was explained in Part 1. That my analysis is largely correct can be seen here: "IEA report, Part 2: Climate Progress has the 450-ppm solution about right."

I agree with the IPCC's detailed review of the technical literature, which concluded in 2007 that "The range of stabilization levels assessed can be achieved by deployment of a portfolio of technologies that are currently available and those that are expected to be commercialised in coming decades." The technologies they say can beat 450 ppm are here. *Technology Review*, one of the nation's leading technology magazines, also argued in a cover story two years ago, "It's Not Too Late," that "Catastrophic climate change is not inevitable. We possess the technologies that could forestall global warming."

I also agree with McKinsey Global Institute's 2008 Research in Review: Stabilizing at 450 ppm has a net cost near zero.

I do believe only "one" solution exists in this sense — We must deploy every conceivable energy-efficient and low carbon technology that we have today as fast as we can. Princeton's Pacala and Socolow proposed that this could be done over 50 years, but that is almost certainly too slow.

We're at about 30 billion tons of carbon dioxide emissions a year — and notwithstanding the global economic slowdown, probably poised to rise 2% per year (the exact future growth rate is quite hard to project because it depends so much on what China does and how quickly peak oil kicks in). We have to average below 18 billion tons (below 5 GtC) a year for the entire century if we're going to stabilize at 450 ppm (see "Nature publishes my climate analysis and solution"). We need to peak around 2015 to 2020 at the latest, then drop at least 60% by 2050 to at most 15 billion tons (4 billion tons of carbon), and then go to near zero net carbon emissions by 2100.

That's why a sober guy like IPCC head Rajendra Pachauri, said in November 2007: "If there's no action before 2012, that's too late. What we do in the next two to three years will determine our future. This is the defining moment." Or as I told *Technology Review*, "The point is, whatever technology we've got now — that's what we are stuck with to avoid catastrophic warming."

If we could do the 12-14 wedges in four decades, we should be able to keep CO2 concentrations to under 450 ppm. If we could do them faster, concentrations could stay even lower. We'd probably need to do this by 2040 if not sooner to have a shot at getting back to 350 this century. [And yes, like Princeton, I agree we need to do some R&D now to ensure a steady flow of technologies to make the even deeper emissions reductions needed in the second half of the century.]

I do agree with *Hansen et al* that the basic strategy is to replace virtually all of coal as quickly as possible, which is why so many of the wedges focused on electricity — that, along with the need to electrify transportation as much as possible. I also agree that this will be harder and more expensive if conventional oil were not going to peak soon. But for better or worse, it is (see "Merrill: Non-OPEC production has likely peaked, oil output could fall by 30 million bpd by 2015" and "Normally staid International Energy Agency says oil will peak in 2020").

Also, I tend to view the crucial next four decades in two phases. In phase 1, 2010 to 2030, the world finally gets serious about avoiding catastrophic global warming impacts (i.e. Hell and High Water). We increasingly embrace a serious price for carbon dioxide and a very aggressive technology deployment effort.

In phase 2, 2030 to 2050, after multiple climate Pearl Harbors and the inevitable collapse of the Ponzi scheme we call the global economy, the world gets truly desperate, and actions that are not plausible today — including widespread conservation — become commonplace (see here for a description of what that collapse might look like).

In the basic solution, I have thrown in a some extra wedges since I have no doubt that everybody will find

something objectionable in at least 2 of them. But unlike the first time I ran this exercise, I have blogged on most of the solutions at length.

This is what the **entire planet** must achieve:

- 1 wedge of albedo change through white roofs and pavement (aka "soft geoengineering) — see "Geoengineering, adaptation and mitigation, Part 2: White roofs are the trillion-dollar solution"
- 1 wedge of vehicle efficiency — all cars 60 mpg, with no increase in miles traveled per vehicle.
- 1 of wind for power — one million large (2 MW peak) wind turbines
- 1 of wind for vehicles –another 2000 GW wind. Most cars must be plug-in hybrids or pure electric vehicles.
- 3 of concentrated solar thermal (aka solar baseload)– ~5000 GW peak.
- 3 of efficiency — one each for buildings, industry, and cogeneration/heat-recovery for a total of 15 to 20 million GW-hrs. A key strategy for reducing direct fossil fuel use for heating buildings (while also reducing air conditioning energy) is geothermal heat pumps.
- 1 of solar photovoltaics — 2000 GW peak
- 1/2 wedge of nuclear power– 350 GW
- 2 of forestry — End all tropical deforestation. Plant new trees over an area the size of the continental U.S.
- 1 wedge of WWII-style conservation, post-2030 [just a placeholder, will blog more on this later]

Here are additional wedges that require some major advances in applied research to be practical and scalable, but are considered plausible by serious analysts, especially post-2030:

- 1 of geothermal plus other ocean-based renewables (i.e. tidal, wave, and/or ocean thermal)
- 1 of coal with biomass cofiring plus carbon capture and storage — 400 GW of coal plus 200 GW biomass with CCS
- 1/2 wedge of next generation nuclear power — 350 GW
- 1/2 wedge of cellulosic biofuels for long-distance transport and what little aviation remains in 2050 — using 8% of the world's cropland [or less land if yields significantly increase or algae-to-biofuels proves commercial at large scale].
- 1 of soils and/or biochar– Apply improved agricultural practices to all existing croplands and/or "charcoal created by pyrolysis of biomass." Both are controversial today, but may prove scalable strategies.

That should do the trick. And yes, the scale is staggering.

April 9, 2009

This reminds me of my sabbatical visit with Ross Street and other category theorists in Australia. The long drought had already started back then...

What Will Global Warming Look Like?
Scientists Point to Australia

Julie Cart, *Los Angeles Times*
April 9, 2009

Reporting from the Murray-Darling Basin, Australia — Frank Eddy pulled off his dusty boots and slid into a chair, taking his place at the dining room table where most of the critical family issues are hashed out. Spreading hands as dry and cracked as the orchards he tends, the stout man his mates call Tank explained what damage a decade of drought has done.

"Suicide is high. Depression is huge. Families are breaking up. It's devastation," he said, shaking his head.

"I've got a neighbor in terrible trouble. Found him in the paddock, sitting in his [truck], crying his eyes out. Grown men — big, strong grown men. We're holding on by the skin of our teeth. It's desperate times."

A result of climate change?

"You'd have to have your head in the bloody sand to think otherwise," Eddy said.

They call Australia the Lucky Country, with good reason. Generations of hardy castoffs tamed the world's driest inhabited continent, created a robust economy and cultivated an image of irresistibly resilient people who can't be held down. Australia exports itself as a place of captivating landscapes, brilliant sunshine, glittering beaches and an enviable lifestyle.

Look again. Climate scientists say Australia — beset by prolonged drought and deadly bush fires in the south, monsoon flooding and mosquito-borne fevers in the north, widespread wildlife decline, economic collapse in agriculture and killer heat waves — epitomizes the "accelerated climate crisis" that global warming models have forecast.

With few skeptics among them, Australians appear to be coming to an awakening: Adapt to a rapidly shifting climate, and soon. Scientists here warn that the experience of this island continent is an early cautionary tale for the rest of the world.

"Australia is the harbinger of change," said paleontologist Tim Flannery, Australia's most vocal climate change prophet. "The problems for us are going to be greater. The cost to Australia from climate change is going to be greater than for any developed country. We are already starting to see it. It's tearing apart the life-support system that gives us this world."

Deadly fires

Many here believe Australia already has a death toll directly connected to climate change: the 173 people who died in February during the nation's worst-ever wildfires, and 200 more who died from heat the week before. A three-person royal commission has convened to decide, among other things, whether global warming contributed to massive bush fires that destroyed entire towns and killed a quarter of Victoria state's koalas, kangaroos, birds and other wildlife.

The commission's proceedings mark the first time anywhere that climate change could be put on trial. And it will take place in a nation that still gets 80% of its energy from burning coal, the globe's largest single source of greenhouse gases.

The commission's findings aren't due until August, but veteran firefighters, scientists and residents believe the case has already been made. Even before the flames, 200 Melbourne residents died in a heat wave that buckled the steel skeleton on a newly constructed 400-foot Ferris wheel and warped train tracks like spaghetti. Cities experienced four days of temperatures at 110 degrees or higher with little humidity, and 100-mph winds. In areas where fires hit, temperatures reached 120.

On the hottest day, more than 4,000 gray-headed flying foxes dropped dead out of trees in one Melbourne park.

"Something is happening in Australia," firefighter Dan Condon of the Melbourne Metropolitan Fire Brigade wrote in an open letter. "Global warming is no longer some future event that we don't have to worry about for decades. What we have seen in the past two weeks moves Australia's exposure to global warming to emergency status."

For my May 2009 diary, go here.

Mother Nature doesn't do bailouts. - Glenn Prickett

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home

[For my April 2009 diary, go here.]

Diary - May 2009

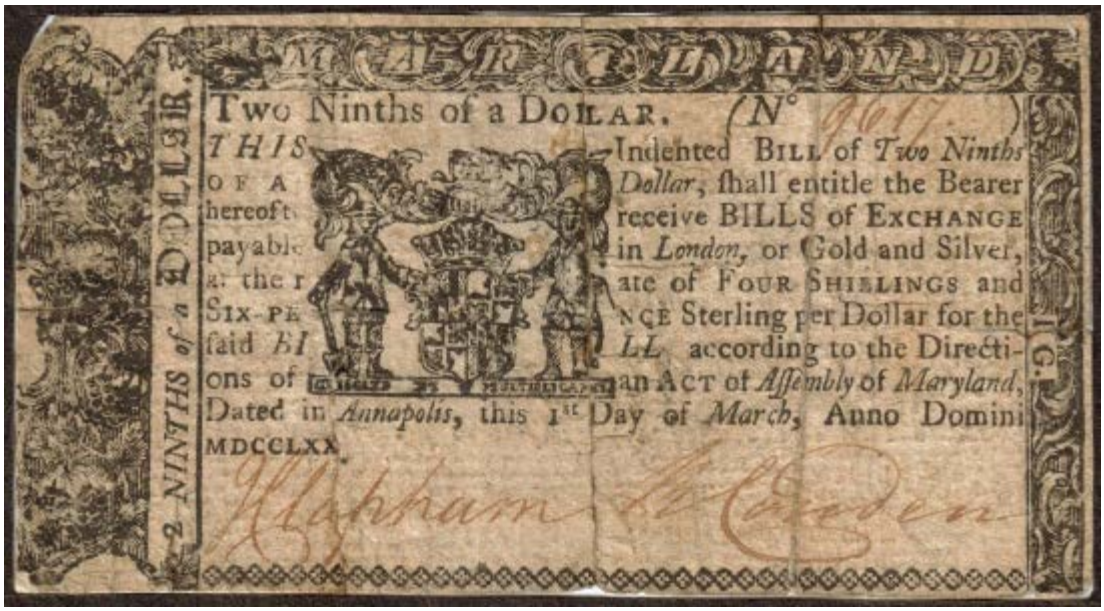
John Baez

May 5, 2009

Since it's an odd day, let us celebrate the 1/9 dollar bill used in colonial Maryland:

A total of 57,000 bills of this sort were issued in 1767, 1770 and 1774. The dent in the upper left corner was deliberate: 'indented' bills were used to fight against counterfeiting, which was rampant at the time. Another trick was inserting deliberate typos, like the colon after "Annapolis". Note also that this note is hand-signed, with a hand-written serial number. Back then, being treasurer must have involved a lot of manual labor!

You might argue that the 2/9 dollar bill was even odder...



... but I'd have to disagree: I think it's oddly evener!

I thank Robert Schlesinger for tipping me off about the existence of these odd fractional bills. The above pictures come from the following delightful history, where you can also see a 4 dollar bill, a 6 dollar bill, a 1/3 dollar bill, and so on:

- John A. Sandrock, Maryland colonial and Continental bank note issues of the American Revolution.

But: why did they make a 1/9 dollar bill? To answer this, look carefully at the bills above and see how much British money a dollar was worth. Then calculate how many *pence* a dollar was worth. Here this table of old British currency may come in handy:

> **Gold coins:**
> Five-sovereign piece, equal to five pounds.
> Two-sovereign piece, equal to two pounds.
> One-sovereign piece, equal to one pound.
> Half-sovereign piece, equal to half-a-pound.
>
> **Silver coins:**
> A crown, or five-shilling piece, equal to one fourth of a sovereign.
> Double-florin, or four-shilling piece, equal to one-fifth of a sovereign.
> Half-a-crown, or two shillings and sixpence, equal to one-eighth of a sovereign.
> Florin, or two-shilling piece, equal to onetenth of a sovereign.
> Shilling piece, equal to one-twentieth of a sovereign.
> Sixpenny piece, one-half of a shilling.
> Threepenny piece, one-half of a sixpence.
>
> **Bronze coins:**
> Penny, equal to one-twelfth of a shilling.
> Halfpenny, equal to one-half of a penny.
> Farthing, one-fourth of a penny.

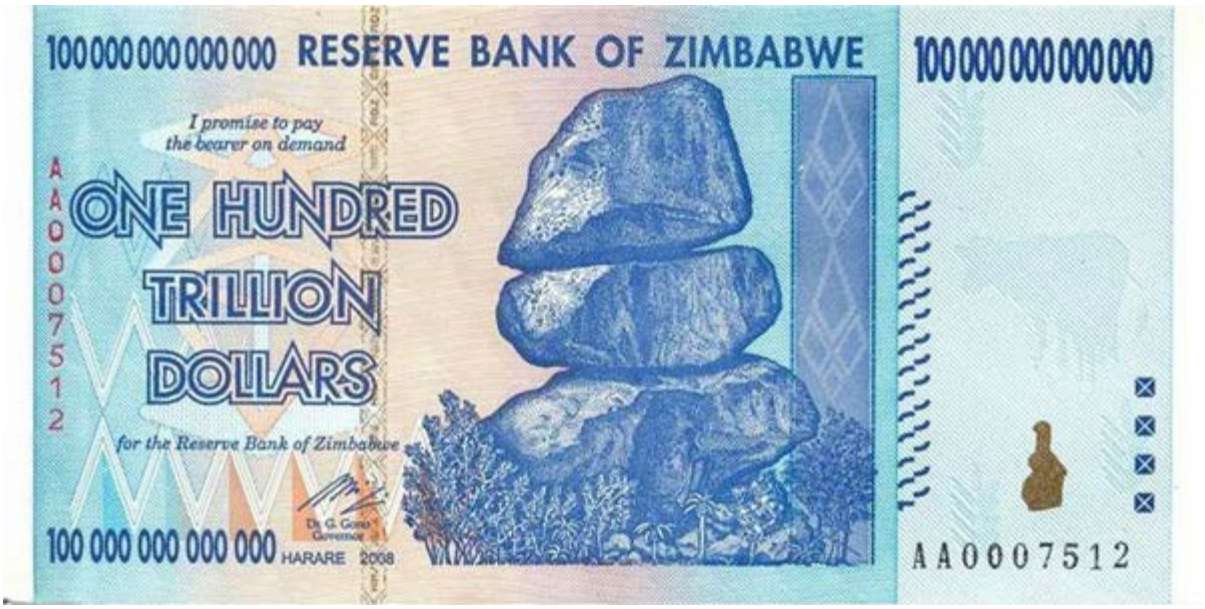
You'll then see why one ninth of a dollar was a reasonable amount of money!

May 8, 2009

If you like odd bills, check out my September 30, 2006 entry featuring the biggest bill ever printed in the United States:

not counting this joke bill they've started cranking out to put an end to the current economic crisis:

or this sadly real one issued by Zimbabwe:



before the currency was redefined this February: 1 trillion old Zimbabwe dollars equals one new dollar. This is just the latest of a series of moves that have devalued Zimbabwe's money by a factor of 10^{25} since Mugabe wrecked the country.

Over at the *n*-Category Café, James Cranch informed us some other oddly large bills: the 1 million and 100 million pound notes issued by the Royal Bank of Scotland, called "Giants" and "Titans".

May 11, 2009

Lisa just finished reading *A Thousand Splendid Suns* by Khaled Hosseini, author of *The Kite Runner*. Judging from her reaction, it's a heart-wrenching tale of two women struggling to survive in Afghanistan during the reign of the Taliban. The title recalls these lines from the poem 'Kabul' by the 17th-century Persian poet Saib-e-Tabrizi:

Every street of Kabul is enthralling to the eye
Through the bazaars, caravans of Egypt pass
One could not count the moons that shimmer on her roofs
And the thousand splendid suns that hide behind her walls.

Kabul is now recovering from the Taliban era. Meanwhile today, hundreds of thousands of people are fleeing Swat Valley as Pakistani troops move in to fight the Taliban.

May 14, 2009

Once this diary was an economics diary. Then I broadened its scope. But the need for understanding and reforming the world's economic system is more apparent than ever, so I'm very happy that the Perimeter Institute, a physics institute in Canada, decided to have a conference on this subject:

- John Brockman, The economic crisis and its implications for the science of economics, *Edge*.

I got this letter from Eric Weinstein, a friend of mine who participated in this conference:

> Hi John,
>
> I wanted to give you a heads up before posting.
>
> We're back from an amazing Perimeter Institute conference and my opening talk here;
>
> - Eric Weinstein, A science less dismal: welcome to the economics Manhattan Project.
>
> where I'd be interested in your take. This is currently discussed at *Edge* at the top.
>
> The goal is to hug economics closer to science rather than pushing it away with the idea of having 'debunking' take place as a normal part of reintegration with the more traditional science. Take a look at the talk and see if you think it is effective. I'd value your feedback on many levels.
>
> Pia spoke on gauge theory as the natural language of economic theory here:
>
> - Pia Malaney, A new marginalism: gauge theory in economics.
>
> with the biggest difference being the presence of economists and math/physics types in the same room.
>
> All of the main conference talks can now be found here:
>
> - Perimeter Institute Recorded Seminar Archive, The Economic Crisis and Its Implications for The

Science of Economics.

including:

- Nassim Taleb,
- Nouriel Roubini,
- and the Panel Discussion with Richard Freeman.

It was an amazing event and hopefully the beginning of something really new, sound, and paradigmatic.

Best,
Eric

Getting scientists interested in economics as a *predictive* science based on fewer unrealistic idealizations would be a wonderful thing.

May 15, 2009

While you've probably heard about it, and I mentioned it already on May 8th, I still think it's one most underreported stories of the year. As the Pakistani army closes in on the Taliban, *800,000 people have fled their homes* in the Swat Valley! More will do so now that the army has lifted the curfew today for 8 hours. About *150,000 are trapped* in Mingora, the main city of the area — and they're running out of gas, electricity and water! The Taliban are digging in there, laying mines.

Four days ago the number of displaced people was closer to 300,000. Here's the story of Majid, a 24-year-old student who fled Swat and is now in Peshawar. It's one of three stories you can read at the BBC website.

> We fled Mingora last Friday, together with much of the population of the city. Our life had become very difficult: we were trapped in curfews, electricity was cut, there was no water or food.
>
> In the early hours on Friday morning we were under attack from gunship helicopters. Later the army told us we had to leave Mingora.
>
> We got up, put clothes on and rushed out of the door. We didn't have time to pack anything. We didn't even

prepare food for the journey. We just shut the door and left.

People were running, everyone was so scared. We didn't know what was going to happen next.

We decided to go to Peshawar. The first part of our journey was on foot, until we reached Malakand. The road was packed with people, thousands of them. My grandfather is old, he couldn't walk for long and needed regular breaks. And it was a hot day.

Then we hired a truck and drove to Peshawar. Many people stayed behind, as not everyone could afford to hire a vehicle.

Pakistani civilians pack a bus leaving Mingora.

I am staying at a university hostel with friends. My family is at some relatives' house. Many joined refugee camps, but those must be full, because I see lots of people lying on the roads, people for whom there's no accommodation or help.

The nearby park is full of people from Swat. There are Swat people all over the city, everyone with their own story.

Everyone is deeply disturbed by this experience. We left everything and our life here is uncertain.

I am thinking of leaving the country to study abroad. My dad says that he'll try to set up his own business and open a shop in Peshawar.

I feel depressed. Swat has been brought back to the Stone Age. Each and every individual has left. There's no life there any more. I am not hopeful that things will get better any time soon - they can't clear this mess up in a hundred years.

May 18, 2009

I'm working on one of the last of what I call my "hair-shirt" papers — papers I'd promised to write years ago, that have become a major obstruction to having fun and doing new things. These are the hair-shirts I've finished in the last year:

- On December 29, 2008, my former student Derek Wise, my colleague Laurent Freidel, his student Aristide Baratin and I finished a 101-page paper on Infinite-Dimensional Representations of 2-Groups. Actually this may need a bit more polishing before we submit it for publication.

- On March 2nd, 2009 Mike Stay and I finished a 73-page review of category theory and its applications: Physics, Topology, Logic and Computation: A Rosetta Stone, to appear in Bob Coecke's volume *New Structures of Physics*.

This is the hair-shirt I'm working on now:

- A Prehistory of *n*-Categorical Physics, with Aaron Lauda, to appear in *Deep Beauty: Mathematical Innovation and the Search for an Underlying Intelligibility of the Quantum World*, ed. Hans Halvorson, 60 pages so far.

I hope to finish it by June 1st. We'll see.

Some good news! I've repeatedly complained here about how Bush's head of the EPA blocked the desire of California and 13 other states to boost CO_2 emissions standards for cars. Now Obama has turned everything around!

> **U.S. to Issue Tougher Fuel Standards for Automobiles**
>
> John M. Broder, *New York Times*
> May 18, 2009
>
> WASHINGTON — The Obama administration will issue a new national standard for cars and light trucks that incorporates California's tough auto-emission rules, industry officials said Monday.
>
> Preident Obama will announce as early as Tuesday that he will combine that state's emissions rules with the existing corporate average fuel economy standard overseen by the Transportation Department, the officials said. As a result, cars and light trucks sold in the United States will be roughly 30 percent cleaner and more fuel-efficient by 2016.
>
> The White House would not divulge details, but environmental advocates and industry officials briefed on the program said that the president would grant California.s longstanding request to implement its tailpipe standards. Thirteen other states and the District of Columbia have said they intend to apply the same rules. That request had been denied by the Bush administration but has been under review by top Obama administration officials since January.
>
> Yet Mr. Obama is planning to go further, effectively issuing a single rule for both fuel economy and emissions that matches California's strictest-in-the-nation standard.
>
> Under the new standard, the new combined fuel efficiency standard for cars and light trucks will be about 35 miles per gallon by 2016, roughly in line with the California rule.

Another piece of good news: *Scientific American* has started a magazine called Earth 3.0, which focuses on environmental issues... and the copy I picked up was actually quite good! Check out these articles online:

- Chris Mooney, Obama's climate challenge: winning the carbon game.
- Michael D. Lemonick, Global warming: beyond the tipping point.
- Jane Braxton Little, The Ogalalla Aquifer: saving a vital U.S. water source.

May 23, 2009

Yay! A House committee passed the Waxman-Markey bill to control greenhouse gases. It would implement a 'cap-and-trade' mechanism. This bill still needs to pass through the House and Senate... and that will be very, very tough. For details, try these:

- Joseph Romm, House committee approves landmark (bipartisan!) clean energy and climate bill — political realists rejoice, climate science realists demand more.
- Joseph Romm, Energy and global warming news for May 22nd: still a long way to go to pass an energy and climate bill in the House.

Some good news about the drought in California: the Department of Water Resources is going to give state water

project contractors 40% of the water they asked for. That's *good* news? Yes, because at first it was going to be 15%. Snow and rain in early May helped ease the situation. But it's still bad.

May 23, 2009

Yay! Lisa and I found a flat to stay in for the first month of our visit to Paris this summer: it's on the 7th floor of 42 Rue Liancourt in the 14th arrondisement, near the Denfert-Rochereau metro station.

We'll stay there from June 11th to July 11th. Then we'll move to the apartment we'd stayed at last summer, and stay there until August 11th. I'll be working with Paul-André Melliès for most of this time; our project on logic and category theory has taken firmer shape, at least in my mind, thanks to my discussions with Mike Stay.

In August, we'll come back to Riverside.

May 30, 2009

Paramecia may use at least two frequencies of electromagnetic radiation to communicate, one in the ultraviolet range! Daniel Fels of the Swiss Tropical Institute grew these microorganisms in test tubes in complete darkness. He claims that paramecia in one test tube can influence the behavior of those in another. In particular: small populations of paramecia grew significantly better when separated from larger ones by glass that blocks ultraviolet light rather than quartz glass, which is transparent to ultraviolet. Read the paper:

- Daniel Fels, Cellular communication through light, *Public Library of Science,* April 1, 2009.

He writes:

> Information transfer is a life principle. On a cellular level we generally assume that molecules are carriers of information, yet there is evidence for non-molecular information transfer due to endogenous coherent light [1]. This light is ultra-weak, is emitted by many organisms [2].[5], including humans [6], [7] and is conventionally described as biophoton emission [8]-[10]. Research on biophotons focuses mainly on the physical aspects and origin [11]-[13], non-invasive diagnostics [14], [15], and emission during meiosis [16] or embryogenesis [17], [18]. Some organisms, e.g. the crustacean *Daphnia magna* [19] absorb biophotons from their neighbours - so called *photon sucking* [20] — and the uptake can differ among classes of individuals, e.g. healthy as compared to malign cells [21]. Although biophotons may carry biologically

> relevant information [12], [13], [22], only very little is known about whether individuals indeed use them for sending and receiving information. A few studies (with populations separated from each other molecularly but not electromagnetically) strongly suggest biophotons as transmitters of information: e.g., onion roots influence mitosis positively in neighbouring onion roots (supposedly due to so-called *mitogenetic radiation* [23], being probably effective in the UV-range [24]); yeast cells, which emit biophotons in the UV- and the visible range [25], affect growth in other yeast cells positively [26]; tissue cells arrange themselves in a non-random manner according to the pattern of tissue cells on the opposite side of a glass slide [27]; and germinating *Fucus*-zygotes probably sense biophotons emitted by their living substrate to which they direct their growth [28].
>
> It was the paucity of more detailed knowledge on biophotons as a means for electromagnetic information transmission that motivated this study...

Lots of references to look at!

For my June 2009 diary, go here.

Kabul

Ah! How beautiful is Kabul encircled by her arid mountains
And Rose, of the trails of thorns she envies
Her gusts of powdered soil, slightly sting my eyes
But I love her, for knowing and loving are born of this same dust

My song exhalts her dazzling tulips
And at the beauty of her trees, I blush
How sparkling the water flows from Pul-I Bastaan!
May Allah protect such beauty from the evil eye of man!

Khizr chose the path to Kabul in order to reach Paradise
For her mountains brought him close to the delights of heaven
From the fort with sprawling walls, A Dragon of protection
Each stone is there more precious than the treasure of Shayagan

Every street of Kabul is enthralling to the eye
Through the bazaars, caravans of Egypt pass
One could not count the moons that shimmer on her roofs
And the thousand splendid suns that hide behind her walls

Her laughter of mornings has the gaiety of flowers
Her nights of darkness, the reflections of lustrous hair
Her melodious nightingales, with passion sing their songs
Ardent tunes, as leaves enflamed, cascading from their throats

And I, I sing in the gardens of Jahanara, of Sharbara
And even the trumpets of heaven envy their green pastures

- Saib-e-Tabrizi, translated by Josephine Davis

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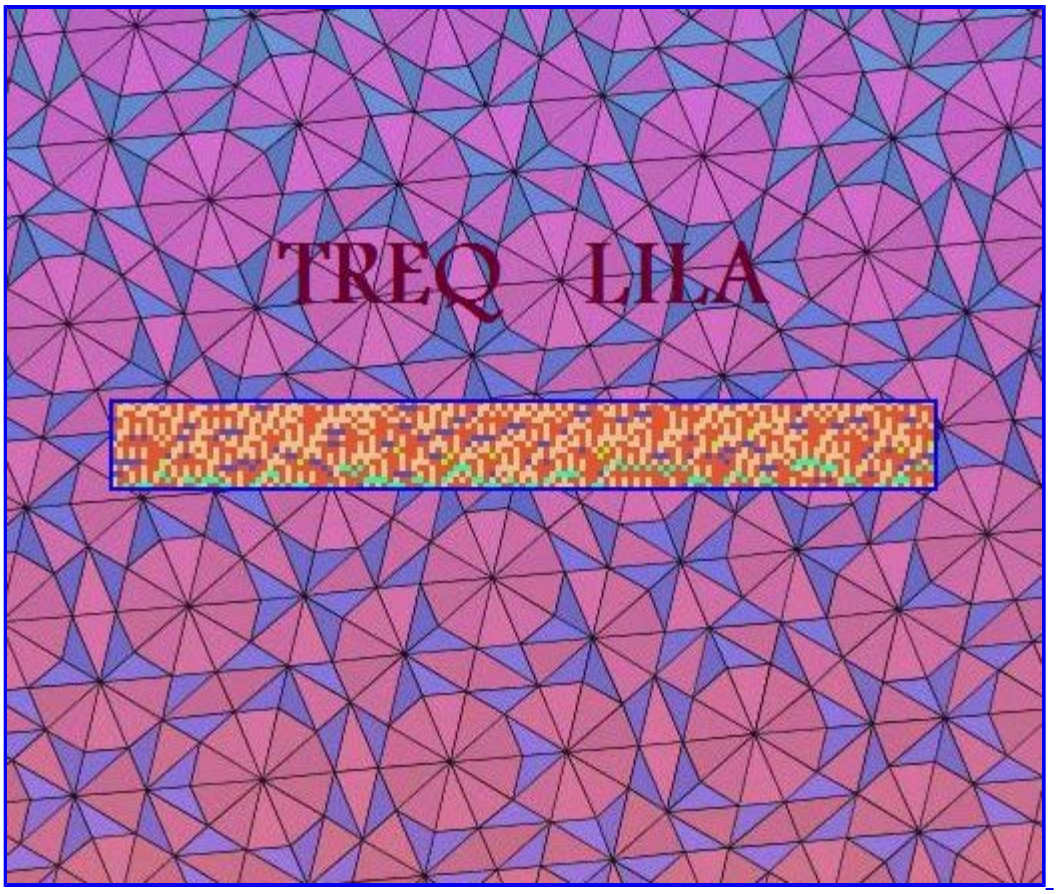
[For my May 2009 diary, go here.]

Diary - June 2009

John Baez

June 2, 2009



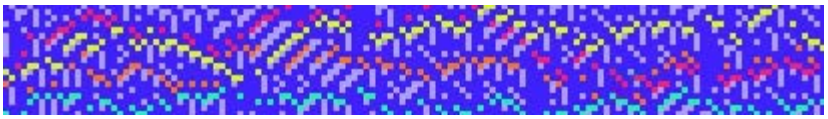
Lalla Aisha

Al-Layla

Ice Blue

The Return of Lalla Aisha

Swirl



Treq Lila

Click on songs to play them. Or if you prefer,
download the whole album or **read how it was made.**

Music by **John Baez** and **Wolframtones.**

Background tiling by **Greg Egan.**

I've been working on this album for a long time. I started in August 2007 when I was holed up in Greenwich trying to prepare a talk for the 2007 Abel Symposium. Now I'm editing the page proofs for my paper in the proceedings of that conference, and putting off work on an overdue paper for the proceedings of another — a paper I've been writing for almost two years.

So, you could say this album was conceived in procrastination and finally born out of procrastination. That doesn't sound promising, but I bet a lot of great art has been created merely to avoid real work. Perhaps even the first cave paintings.

Some things move slowly while others race along. My short bouts of work on *Treq Lila* have had long gaps between them. I've kept mum about it because I could only get permission to modify or share music made using Wolframtones after signing a contract with Wolfram Research. Every few months I've created a new track, or modified one, or discarded one I don't like.

At the very end I slimmed the album down a lot to make it stylistically coherent. I also added a new tune, 'Swirl', that's more energetic than all the rest. I put my favorite, the title song, at the very end.

So, it's short now, almost like a fragment of some longer album. And it's rather oddly divided in two parts, 3 tunes each, each part starting with a version of 'Lalla Aisha'. But I think that's okay. Someday I'll pull out all the stops and make an album of music that's all mine, but this is a curious man-machine hybrid, like a cyborg, and it's probably best to keep it terse and somewhat odd.

June 5, 2009

I got something great in the mail today: an invitation to visit the Centre for Quantum Technologies in Singapore starting in the summer of 2010. My wife Lisa already got a similar offer from the philosophy department of the National University of Singapore — one of the few places in the world that does serious research on both classical Chinese and classical Greek philosophy. We hope to visit Singapore for two years. It promises to be a marvelous adventure!

Meanwhile, the University of California system keeps taking budget cuts as the financial crisis shit hits the fan. The Chancellor of UC Riverside wants us to take 16 days of unpaid 'furlough', with 13 of them being on holidays —

contradicting the usual definition of 'furlough'. The head of the University Committee on Faculty Welfare thinks this amounts to pretending that life can go on more or less as it has been, when it actually can't:

- Chancellor Timothy White, Impacts of further operating budget deterioration - update.
- Helen Henry, The current budget crisis and UC's long-term future.

I think the problem with taking 'furlough' during holidays is that it sends a message to the legislature and the people of California that cutting money to the University of California will have no real effect — that we'll just soldier on bravely.

Anyway, it will be a good time to be on leave.

June 12, 2009

Today is my birthday.

The day before yesterday I gave the final exam in my undergraduate number theory class. The exam went from 7 pm to 10 pm — some of UCR's exams are late at night, because we have a shortage of classrooms. The next morning I graded the exam and entered the course grades. Then, at 4:30 pm Lisa and I went to the airport to catch a flight to Paris! It was a stressful, tightly timed business.

Due to some flight delays we arrived in Paris at 9:30 pm yesterday. Exhausted, we dragged ourselves to the metro, got out at Denfert-Rochereau, and walked to our apartment at 42 Rue Liancourt. We got there at 11 pm.

All of a sudden, life started getting better. We were met by the friend of the fellow who is renting us his apartment. He kindly served us a snack of wine, bread, cheese, strawberries and melons.

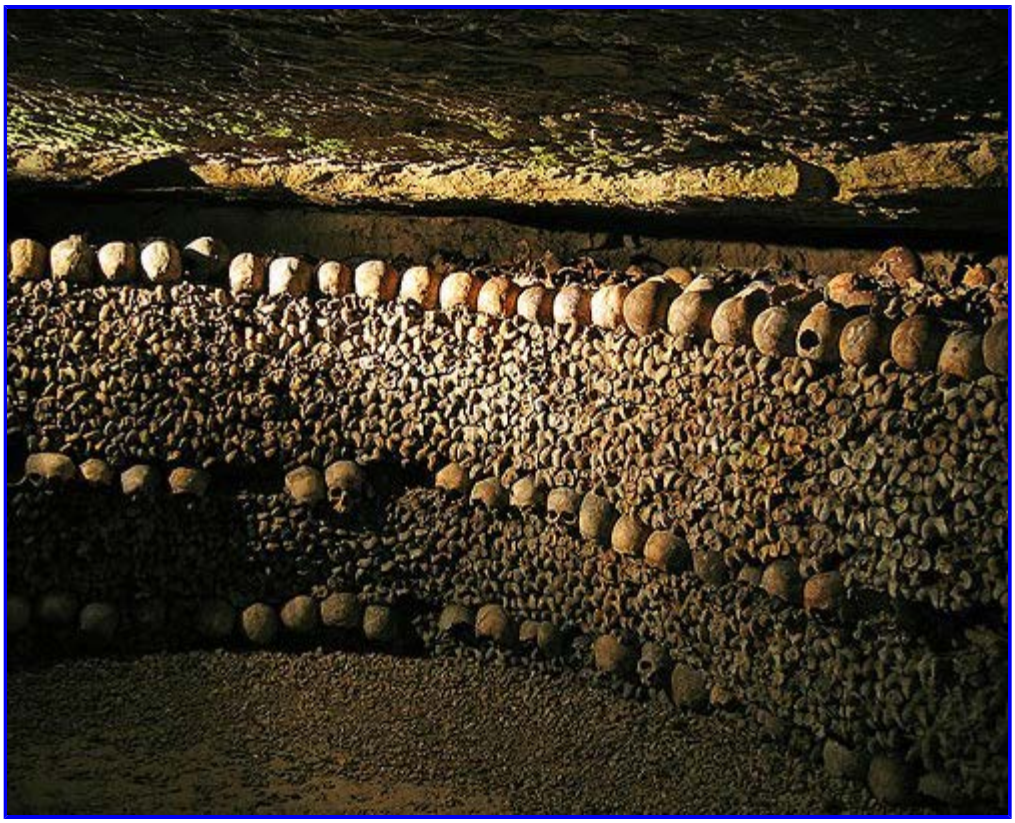
The apartment turned out to be much larger than advertised. It's a penthouse at the top of a 7-story building, with a 360-degree view of the city. It's ringed by a gardened patio, with a bamboo screen that provides privacy. We can eat outdoors and even almost bathe outdoors, because the bathroom has large glass doors to the patio, and a skylight.

In short, it's so ridiculously luxurious that I keep thinking I'm in the first scene of a movie where black-masked ninja terrorists rappel up the walls of the building, break in, kidnap me, and torture me for the rest of my summer vacation. But, it hasn't happened yet. So, my birthday was very nice.

June 15, 2009

Still no ninjas. Lisa is trying to finish her book on divination. I've been polishing up my paper on the history of the earth for *PhysicsWorld*, and blogging about some work I did with James Dolan on algebraic geometry for category theorists. I'm also working with Paul-André Melliès on stuff like "the theory of cartesian closed categories". Along with my student Mike Stay, we're starting to figure out some good stuff.

And of course, Lisa and I are having fun walking around and admiring the city. We're quite close to the Montparnasse Cemetery, and fairly near an entrance to the catacombs — which I have not yet explored.



All this stuff is near Place Denfert-Rochereau, which explains why this square used to be called "Place d'Enfer", meaning Place of Hell — I guess "Enfer" is like "infernal". After the Franco-Prussian war it was renamed in honor of someone who fought well for the French, Pierre Denfert-Rochereau. But they did it because "Denfert" is pronounced just like "Denfer"!

June 18, 2009

A noteworthy story, passed on by my friend Steve Forcey.

Earlier this year the President of Peru, Alan García, sold the rights to explore, log and drill 70% of his country's portion of the Amazon rainforest to international oil and gas companies, saying "There are millions of hectares of timber there lying idle." But indigenous people live there. They blockaded the rivers and roads to keep the companies out.

García responded by declaring a state of emergency and sending in the military. On June 5th they opened fire on the protesters with live ammunition and stun grenades:

So far, nothing surprising. But then something surprising happened. The Peruvian Congress, presumably shamed by this incident, repealed the laws that allowed oil company drilling, by a margin of 82 votes to 12. Garcia was forced to apologise. The protesters have celebrated and returned to their homes in the Amazon.

But of course the battle is not over.

June 20, 2009

One of my great discoveries in Paris has been a little shop called Paris Jazz Corner at 5 Rue Navarre. The first floor is mostly devoted to vinyl albums, which is not my thing anymore, much as I support in principle such technostalgia... but the basement is packed with CDs, including some delightful ones I'd never stumbled over before.

I'm particularly enjoying *Porgy and Bess* by Miles Davis and Gil Evans. Well, this is very famous, so it was only my own sluggishness in acquiring everything by Miles Davis (whom I love tremendously) that kept me from getting to know it earlier... but the real suprises on this version of the album are a couple of "bonus tracks": two takes of a song called The Man I Love, played by a band that seems to have come out of a crazed jazz aficionado's fantasies: Miles Davis on trumpet, Milt Jackson, Percy Heath and Kenny Clarke (three quarters of the Modern Jazz Quartet) on vibraphone, bass, and drums... and *Thelonius Monk on piano!*

Bizarre! Such an unexpected combination of strong musical personalities. If you don't know jazz, just rock, imagine that you stumbled over a little-known song by Jimi Hendrix, David Byrne and Bob Dylan. The liquid, flowing line of Milt Jackson's vibraphone melody contrasts with the halting, angular style of Monk in a truly surrealistic way, and when Monk takes his solo as if he's from a dimension where time flows at a reduced rate... but somehow it works.

Hmm, now I see there's other stuff by Monk and the MJQ.

Adding to the fun, when Lisa and I visited this shop we bumped into Bill Messing, a mathematician who collaborates with Larry Breen. A couple of days later we met him again when we had dinner at Breen's place, but meeting people by chance like this is what makes Paris feel like a small town.

June 23, 2009

Paul-André and I went with Lisa to the Collège de France to hear a talk by her colleague Michael Nylan on the birth of classicism in China. Lisa's friend Anne Cheng was recently elected to the Collège de France, which is why I know that

every professor there has to give lectures that are open to the public — once a week, I guess. This fascinated me — it's pretty unusual — so I was interested to see one. Unfortunately they're mostly in French, which I don't understand. So, it was nice to discover that the professors can also invite visitors to speak — and they're allowed to speak in English!

It was fascinating to hear about the first Chinese scholar to mention the *pleasure of reading* — Yang Xiong, who lived from 53 BC to 18 AD, near the end of the Han Dynasty. Before Yang Xiong, they only wrote about how reading made them tired. According to Michael Nylan, Yang Xiong said "books are sexier than women". I wonder how you say that in classical Chinese!

After the talk, Lisa and I went out for drinks with Michael and Anne, together with Marc Kalinowski, Karin Chemla and Christoph Harbsmeier. Among these leading lights of European sinology, I was the only one who didn't speak French. So, I was completely lost in the conversation until one of them kindly began simulteneously translation for me, which was even more humiliating. Oh well, it's probably good for me.

June 27, 2009

Wow! The House passed the Waxman-Markey bill, which would implement a cap-and-trade scheme for carbon emissions!

June 28, 2009

Iran's national poet, Simin Behbahani, has written a poem about the situation in Iran - the re-election of Ahmadenijad, followed by protests which the government has violently tried to crush. You can hear it here:

- A symbol of women's struggles in Iran, *Weekend Edition Saturday*, NPR, June 27, 2009.

It is perhaps more of a malediction than a "poem" in the sense we may be used to. A portion, in translation:

If the flames of anger rise any higher in this land, your name on your tombstone will be covered with dirt.
You have become a babbling loudmouth; your insolent ranting, something to joke about.
The lies you have found, you have woven together. The rope you have crafted, you will find around your neck.
Pride has swollen your head, your faith has grown blind. The elephant that falls will not rise.

June 30, 2009

My grandparents lived first near Grand Rapids, Michigan and then a bit further out in the town of Ada. When I visited I would hear them mention the city of Flint... nothing special, just another wholesome midwest city. So, I was shocked on my ride to the LA airport a couple of weeks ago when the taxi driver said he'd moved from Flint to Riverside, and that Flint had the *highest crime rate in the US*.

It turns out the declining US auto industry was the cause. A lot of ethnic groups who didn't get along, pulled in by auto jobs, now unemployed.

Now a correspondent has forwarded me this article about Flint, saying "This was shared with me as "bad" news, but I saw it as good."

- Tom Leonard, US cities may have to be bulldozed in order to survive, *The Telegraph*, June 12, 2009.

Here's a quote:

> The government looking at expanding a pioneering scheme in Flint, one of the poorest US cities, which involves razing entire districts and returning the land to nature. Local politicians believe the city must contract by as much as 40 per cent, concentrating the dwindling population and local services into a more viable area.
>
> The radical experiment is the brainchild of Dan Kildee, treasurer of Genesee County, which includes Flint. Having outlined his strategy to Barack Obama during the election campaign, Mr. Kildee has now been approached by the US government and a group of charities who want him to apply what he has learnt to the rest of the country.
>
> Mr. Kildee said he will concentrate on 50 cities, identified in a recent study by the Brookings Institution, an influential Washington think-tank, as potentially needing to shrink substantially to cope with their declining fortunes. Most are former industrial cities in the "rust belt" of America's Mid-West and North East. They include Detroit, Philadelphia, Pittsburgh, Baltimore and Memphis. In Detroit, shattered by the woes of the US car industry, there are already plans to split it into a collection of small urban centres separated from each other by countryside.
>
> "The real question is not whether these cities shrink — we're all shrinking — but whether we let it happen in a destructive or sustainable way," said Mr. Kildee. "Decline is a fact of life in Flint. Resisting it is like resisting gravity."
>
> Karina Pallagst, director of the Shrinking Cities in a Global Perspective programme at the University of California, Berkeley, said there was "both a cultural and political taboo" about admitting decline in America. "Places like Flint have hit rock bottom. They're at the point where it's better to start knocking a lot of buildings down," she said.
>
> Flint, sixty miles north of Detroit, was the original home of General Motors. The car giant once employed 79,000 local people but that figure has shrunk to around 8,000. Unemployment is now approaching 20 per cent and the total population has almost halved to 110,000. The exodus — particularly of young people — coupled with the consequent collapse in property prices, has left street after street in sections of the city almost entirely abandoned.
>
> In the city centre, the once grand Durant Hotel — named after William Durant, GM's founder — is a symbol of the city's decline, said Mr. Kildee. The large building has been empty since 1973, roughly when Flint's decline began.
>
> Regarded as a model city in the motor industry's boom years, Flint may once again be emulated, though for

very different reasons.

But Mr. Kildee, who has lived there nearly all his life, said he had first to overcome a deeply ingrained American cultural mindset that "big is good" and that cities should sprawl. Flint covers 34 square miles. He said: "The obsession with growth is sadly a very American thing. Across the US, there's an assumption that all development is good, that if communities are growing they are successful. If they're shrinking, they're failing."

But some Flint dustcarts are collecting just one rubbish bag a week, roads are decaying, police are very understaffed and there were simply too few people to pay for services, he said.

If the city didn't downsize it will eventually go bankrupt, he added.

Flint's recovery efforts have been helped by a new state law passed a few years ago which allowed local governments to buy up empty properties very cheaply. They could then knock them down or sell them on to owners who will occupy them. The city wants to specialise in health and education services, both areas which cannot easily be relocated abroad.

The local authority has restored the city's attractive but formerly deserted centre but has pulled down 1,100 abandoned homes in outlying areas. Mr. Kildee estimated another 3,000 needed to be demolished, although the city boundaries will remain the same.

Already, some streets peter out into woods or meadows, no trace remaining of the homes that once stood there.

I'm reminded of Eric Smith's amazing photographs of Detroit's Michigan Central Station:

You should really see them on your full screen:

- Claire O'Neal, Michigan Central Station: eyesore or landmark?, NPR.

For my July 2009 diary, go here.

Music inhabits us in a literal sense. It invades the parameters of the body and takes root, almost systemically, even when we would rather have silence. It is why we refer to "haunting melodies." Music, like spirits, is attributed with an agency of its own. It can possess us. - Deborah Kapchan

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For my June 2009 diary, go here.

Diary - July 2009

John Baez

July 4, 2009

It's Independence Day in the United States... but in Iran, some big news: the Association of Researchers and Teachers of Qom has called the election and the Ahmadinejad government *illegitimate*. This is a powerful group of leading clerics, so they'll be hard to shut up.

July 7, 2009

My friends Chris Lee and Meenakshi Roi are visiting Paris this week on their way back home from a bioinformatics conference in Stockholm. Today, along with Lisa, we went down into the Paris Catacombs.

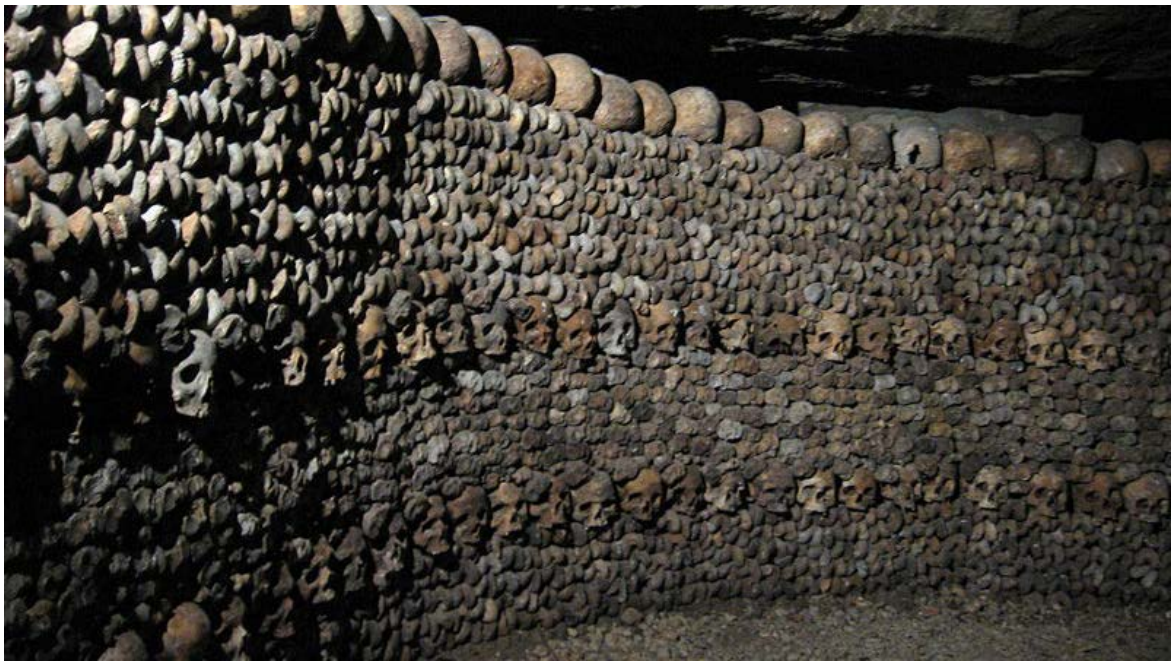
We met at Café Daguerre, where the pedestrian part of Rue Daguerre meets Avenue Géneral Leclerc, at 9:45 am. There's an entrance to the metro right here, so this is a great place to meet friends if you want to visit the catacombs. Walking due north one block along Géneral Leclerc and looking to our right, we spotted a long line of people waiting nearby at the entrance to the catacombs in Place Denfert-Rochereau.

The line slowly started moving around 10:00. Eventually we reached the front of the line, paid our 6 euros (or 4 euros with an academic discount) at the ticket counter, and descended a *very* long spiral staircase to the quarries below Paris. We then walked along twisting dim-lit corridors cut from the rock or lined with mortar, marching steadily for about 15 minutes, occasionally stopping to look at plaques, until we reached some rooms with sculptures of buildings, apparently made by a former prisoner who had committed these buildings to memory by staring out a jail window. This fellow later died in a

cave-in.

Then the corridors widened out as we came to a doorway with a sign above it saying *Arrete! C'est ici L'Empire de la Mort* — "Stop! Here is the Empire of the Dead."

Heedless of this advice, we entered. Suddenly we saw endless stacks of neatly packed bones, decorated by skulls. Leg bones formed the main front face of these structures.



Quoting the Wikipedia article:

> Most of Paris's larger churches once had their own cemeteries, but city growth and generations of dead began to overwhelm them. From the late seventeenth century, Paris' largest Les Innocents cemetery (near the Les Halles district in the middle of the city) was saturated to a point where its neighbours were suffering from

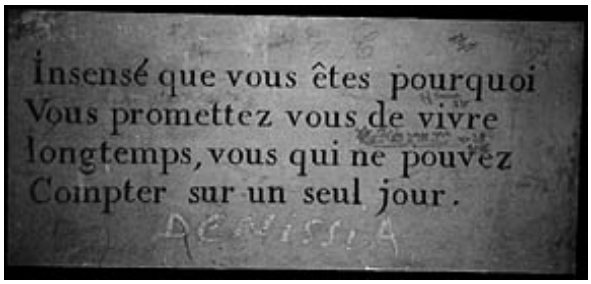
disease, due to contamination caused by improper burials, open mass graves, and earth charged with decomposing organic matter.

After almost a century of ineffective decrees condemning the cemetery, it was finally decided to create three new large-scale suburban cemeteries and to condemn all existing within the city limits; the remains of all condemned cemeteries would be moved discreetly to a renovated section of Paris's abandoned quarries. The use of the depleted quarries for the storage of bones, based on the idea of Police Lieutenant General Alexandre Lenoir, was established in 1786 by his successor, M. Thiroux de Crosne, under the direction of Charles Axel Guillaumot, Inspector General of Quarries, and following him, by Louis-Étienne Héricart de Thury.

Remains from the cemetery of Saint-Nicolas-des-Champs were among the first to be moved. Bodies of the dead from the riots in the Place de l'Hôtel-de-Ville, the Hotel de Brienne, and Rue Meslee were put in the catacombs on 28 and 29 August 1788.

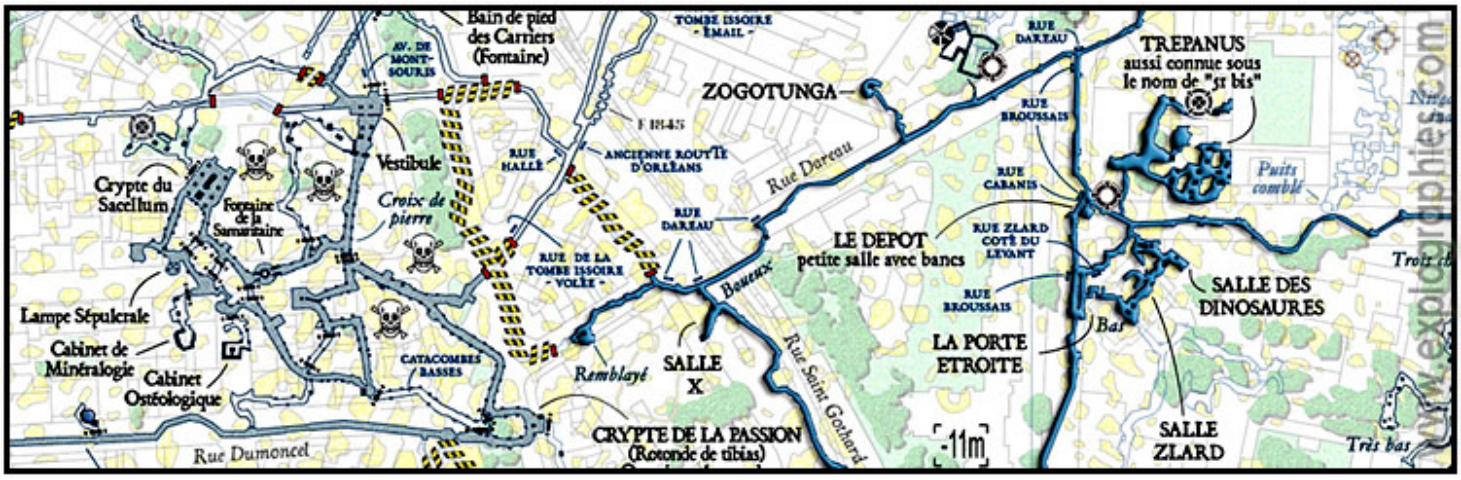
Old stone plaques said which cemeteries each batch of skeletons was from, and when they'd been moved to the catacombs.

Some signs had poems on them, first in French, then in Latin as we reached more ancient regions.



I hadn't really understood how many people were down there until today. Someone said 6 million, but the impressive part is not the number, but actually hiking for almost an hour down dim-lit corridors lined with bones, skulls, plaques, poems and altars. I have little sense of how much of the whole labyrinth we saw — many passageways were blocked off, probably to

keep people from getting lost.



Some regions were wet underfoot, with water dripping from the ceiling. For example, the region near the Crypt of the Sepulchural Lamp:

Towards the very end, we came to some large chambers had been formed by cave-ins. Here there was an exhibit about people killed during the Revolution the Terror, and the following violence who are now among the dead in the catacombs: Robespierre, for example, and the chemist Lavoisier.

Finally, we climbed a narrow spiral staircase with about 80 steps, and popped out into a little white room with a doorway to a street several blocks southeast of Place Denfert-Rochereau. This door is unlabelled and quite unobtrusive — if I'd simply walked by it, I'd never have guessed where it leads!

July 9, 2009

There was a big cyber attack on US and South Korean websites:

- Cyber attack even stronger than first feared, Associated Press, July 8, 2009.
- Ari Shapiro, Attacks Highlight Flaws In U.S. Cyberdefenses, *All Things Considered*, NPR, July 8, 2009.

July 11, 2009

My pal Bill Schmitt spent tonight in Paris en route to Hopf-in-Lux, a conference I might have liked to attend, were my life not already oversaturated. We went out to dinner at Le Decí, a restaurant on Rue des Cinq Diamants very near the apartment he stays in. Nice! I had steak tartare.

Earlier, when Lisa and I were staying at Rue Liancore, I'd walk down Boulevard August Blanqui to the Paris 7 math department at Chevralet, always in a hurry because I was always late, and I'd see the pretty ivy-covered wall where Rue des Cinq Diamants meets the avenue at a very acute angle, and I'd wonder "What's that street?" And then I'd see the street sign, almost overgrown with ivy: "Rue des Cinq Diamants". And I'd want to go down it, in part because it looked interesting and in part because the name "Street of Five Diamonds" seemed mysterious and romantic. But I was always in too much of a rush.

But now I had time to look around, and yes: it's romantic! But I can't find out why it's called "5 diamonds". If you know, please drop me a line.

I'm actually curious about a lot of the street names in Paris. For example, Rue du Vieux-Colombier. I guess this means "Street of the Old Dovekeeper, which seems to hint at yet another romantic tale.

July 14, 2009

Yesterday my fellow *n*-Café blogger David Corfield and his wife Ros showed up for a few day's visit. They're staying at the Hotel St. Jacques on Rue des Ecoles, which is just a couple blocks north of here. They spent a year once on Rue Vallette, just north of the Pantheon, so this area is like an old home to them. But, they didn't know our favorite restaurant right near the Pantheon - L'Écurie, on Rue Laplace. So, we ate there last night.

I'd hoped to have a nice conversation with both David and Paul-André Melliès, but Paul-André couldn't make it, so I wound up talking to David for hours and hours.

Bastille Day!

July 15, 2009

I spent a long time telling David about my project with James Dolan on algebraic geometry. It was fun getting a chance to explain the whole thing, or at least a large portion. I haven't talked about it much with anyone except Jim. I've discussed it with David and others on the *n*-Café, and that served as a nice springboard for the conversation, but I think we got a lot further today. Talking is a good way to prepare for writing an expository paper.

July 16, 2009

Hey! You can hear all of Bill Frisell's new album on National Public Radio!

- Bill Frisell, Disfarmer, National Public Radio.

While you're at it, check out Bill Frisell with one of his great bands:

- Bill Frisell and the Intercontinentals.

July 18, 2009

Bill Schmitt came back to Paris yesterday; he took the same train as Paul-André, who had gone to just the last day of "Hopf-in-Lux", and they discovered — as I'd hoped — that they had a lot of interests in common. This time Bill and I got a bit of time to talk about math; he spent the night at our apartment, and today I went down to his and we chatted, mainly about monads and combinatorics. I realized all of a sudden that all sorts of topics in monad theory that had previously terrified or repulsed me now seemed quite approachable and interesting.

July 19, 2009

Biology is endlessly fascinating for the subtle strategies that arise from the ruthless winnowing of natural selection.

For example: the tiger moth, *Bertholdia trigona*, defends itself by jamming the sonar of bats! You can hear it doing so on this radio show:

- Christopher Joyce, Moths outwit bats by jamming sonar, Morning Edition, July 17, 2009.
- Aaron J. Corcoran, Jesse R. Barber, William E. Conner, Tiger moths jam sonar, *Science* **325** (2009), 325-327.

And from Mike Stay, here's another interesting case of symbiosis:

- Iddo Friedberg, From predator to plant in one gulp, *Byte Size Biology*, July 4, 2009.
- Noriko Okamoto and Isao Inouye, A secondary symbiosis in progress?, *Science* **310** (2005), 287.

Quoting a bit from Friedberg's blog:

> Two researchers have shown a striking example of endosymbiosis forming now: in 2005 Noriko Okamoto and Isao Inouye reported on a unicellular organism called *Hatena*. *Hatena* ("enigma" in Japanese) leads a curious life cycle. *Hatena* is a single-celled organism, swimming around in the water, using a little feeding apparatus to eat cells and organic material smaller than itself. At some point, it would feed on a unicellular alga, the *Nephroselmis*. Once *Hatena* swallows *Nephroselmis*, it does not digest it. Rather, *Nephrosolmis* makes itself a comfortable home inside *Hatena*. The alga starts growing inside *Hatena*: it grows to about 10 times its original size, filling up most of *Hatena*. The alga also seems to lose most of its own organelles, except for the chloroplast. The chloroplast actually grows bigger.

Hatena before and after ingesting *Nephroselmis*.
Picture by Noriko Okamoto.

> *Hatena* changes too as a result. Before ingesting the alga, it has a rather complex "mouth", or feeding apparatus. After ingesting the alga, this mouth disappears only to be replaced by an eyespot from the alga. The eyespot is a light sensing organelle, a very primitive eye, that guides algae to light sources. In this case, it also guides the host, *Hatena*, to light. *Hatena* has obviously stopped feeding, at least through its mouth. It is now swimming to the light, letting the alga photosynthesize its food for both of them.

What happens in the next generation? Read the blog article!

Why does the article by Okamoto and Inouye speak of "secondary symbiosis"? Because algae *themselves* acquired the ability to phosynthesize by symbiosis! Billions of years ago they took in cyanobacteria, which gradually lost the ability to live on their own and became chloroplasts.

July 21, 2009

Physicists like to complain that economists don't make enough testable predictions. There's a geophysicist at UCLA named Didier Sornette who has tried to remedy this situation. Here is his latest paper on the arXiv:

- K. Bastiaensen, P. Cauwels, D. Sornette, R. Woodard, and W.-X. Zhou, The Chinese equity bubble: ready to burst, July 10, 2009.

I was pointed to this by Robert Schlesinger. The paper claims that an equity index called the Shanghai Stock Exchange Composite Index, or SSE, is exhibiting faster-than-exponential growth, that it's in a "bubble" — and that this bubble will burst between July 17th and 27th with 60% probability. It hasn't burst yet:

You can watch how it does on Yahoo. It's interesting how the graph looks so different depending on which time scale you view it at.

For more, try:

- Econophysicist predicts date of Chinese stock market collapse, *The physics arXiv blog*, July 14, 2009.

Sornette has a model of bubbles, and he's been using it to make predictions. For example:

- Wei-Xing Zhou and Didier Sornette, Is there a real-estate bubble in the US?, June 3, 2005.

predicted the turning point of the real estate bubble in mid-2006. (Does that count as a success?)

For a sketchy but readable explanation of Sornette's model, leading up to his "log-periodic power law", try this:

- Didier Sornette and Ryan Woodward, Financial bubbles, real estate bubbles, derivative Bubbles, and the financial and economic crisis, section 2.3: Finite-time singular behavior of bubbles.

This has references to more technical stuff.

July 22, 2009

Lisa went to Nuremberg today for the first meeting of a research group on divination and its role in ancient and modern culture. I'm staying holed up on Rue Soufflot to finish off a paper with Aaron Lauda: A prehistory of *n*-categorical physics.

For dinner I had just salad, bread and cheese. But oh, what cheese! It's a kind called Eschourgnac. We were introduced to it by one of the daughters of our friend Anne Cheng, a young gourmet who described meeting this cheese as a case of "love at first bite". That was exactly my reaction, too.

It has an intense smell and taste of *walnuts*, obtained by washing the rind in walnut liquer. Somehow that taste permeates the whole cheese, and it's delicious. It's been made since 1868, first by monks in la Trappe d'Echourgnac, and then, after an interruption in World War I, by Cistercian nuns.

July 23, 2009

A friend pointed me to this article:

- Christopher Ketcham, Could you survive without money? Meet the man who does, men.style.com.

Being a *sadhu* in India is easy... well, comparatively speaking. But in America?

July 24, 2009

If you're a fan of the Talking Heads album *Remain in Light*, you should hear them live in Rome in 1980, on YouTube. Here are my three favorites:

- 9 - Houses in Motion
- 10 - Born Under Punches
- 11 - The Great Curve

For some newer funky live Byrne stuff, try:

- Fuzzy Freaky
- Dance on Vaseline

These are worth comparing:

- Dance on Vaseline — Thievery Corporation Remix.
- Dance on Vaseline — Sessions at West 54th.

For my August 2009 diary, go here.

The ideals of the reform movement have now been destroyed. Its impractical ideas of freedom, tolerance and civil society failed to attract support among the ordinary people who wanted social justice and an end to poverty. - Iranian government newspaper

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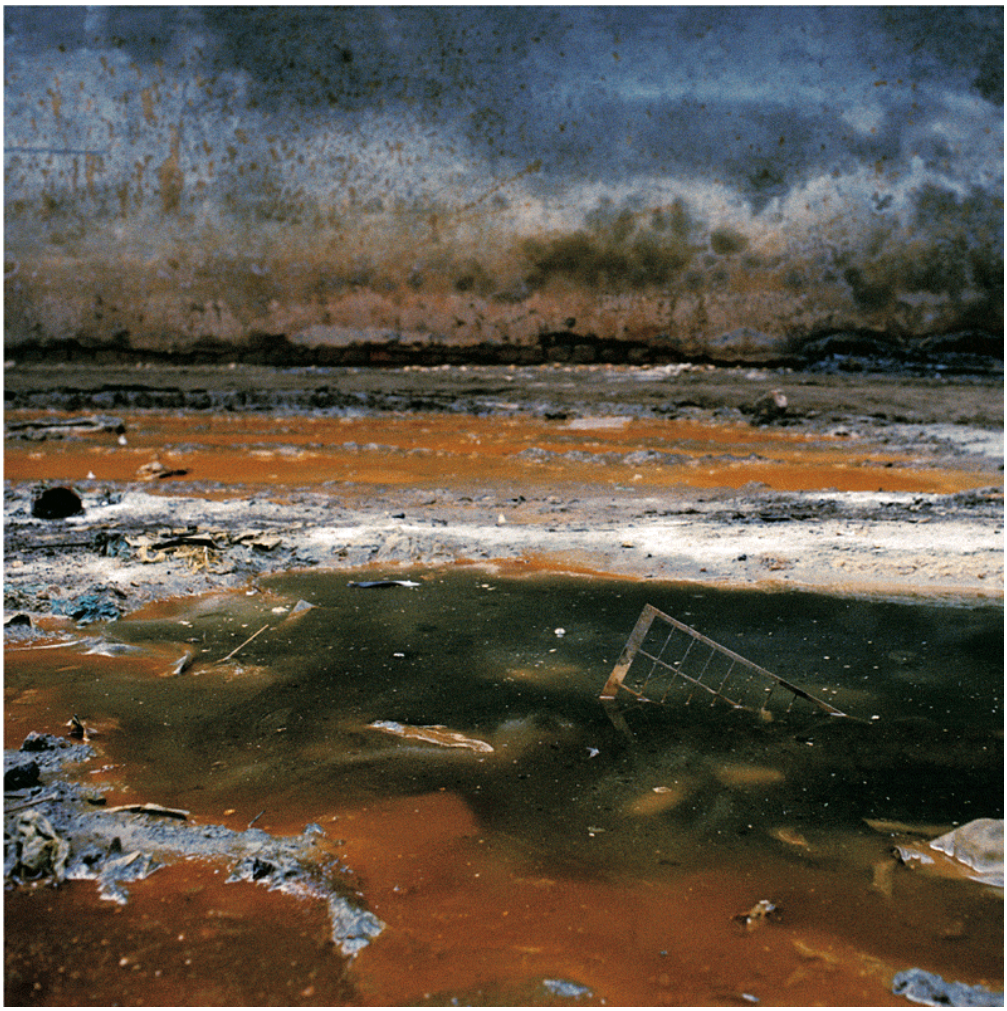
For my July 2009 diary, go here.

Diary - August 2009

John Baez

August 1, 2009



This impressive photograph taken by Sophie Gerrard shows acid pollution in the streets of Mandoli, India, the result of processing scrap electronic equipment.

August 8, 2009

Here are the most romantic Paris street names I know:

- **Rue du Vieux-Colombier**. Literally "Street of the Old Dovekeeper",
  but perhaps "Old Dovekeeper Street" is more accurate.
- **Rue des Blancs Manteaux**. Literally "Street of the White Cloaks",
  but apparently this is the name of a religious order.
- **Rue de Cinq Diamants**. "Street of Five Diamonds".
  Apparently this street was named after a theater of the same name located there.
- **Rue des Quatre Ventes**. "Street of the Four Winds".
  I've no idea why.

- **Rue de l'Ancienne-Comédie**. Literally "Street of Ancient Comedy".
  This street got its name from the Hôtel des Comédiens français, located there.

August 27, 2009

Yay! The dean said my leave application will be approved! I'm going to Singapore!

My wife Lisa is taking a 1-year leave of absence from U.C. Riverside to visit the Department of Philosophy at the National University of Singapore, usually known as NUS. I'll be visiting the Centre for Quantum Technologies, or CQT. This is a research institute on the campus of NUS, but not strictly part of the university. We'll be going from July 2010 to the end of June 2011.

I visited the CQT back in March of 2008, as described here in my diary and also week262 of This Week's Finds. That's when I got the first informal offer of a visiting position there. It's been a bit complicated working out the details. But now it's coming true!

August 28, 2009

Today I put another paper on the arXiv: Higher-dimensional algebra VII: groupoidification, written with my students Alex Hoffnung and Christopher Walker. I've been finishing lots of papers in the last year — projects that have been hanging over my head like swords of Damocles. It feels like a lot of writing. Let me see how many pages:

- December 29, 2009: Aristide Baratin, Laurent Freidel, Derek Wise and I finished Infinite-dimensional representations of 2-groups, 101 pages.
- January 29, 2009: Chris Rogers and I finished Categorified symplectic geometry and the string Lie 2-algebra, 16 pages.
- March 2, 2009: Mike Stay and I finished Physics, topology, logic and computation: a Rosetta Stone, 73 pages.
- April 9, 2009: John Huerta and I finished The algebra of grand unified theories, 72 pages.
- August 1, 2009: I finished The Earth - for physicists, 5 pages.
- August 18, 2009: Aaron Lauda and I finished A prehistory of *n*-categorical physics, 129 pages.
- August 28, 2009: Alex Hoffnung, Christopher Walker and I finished Higher-dimensional algebra VII: groupoidification, 64 pages.

Hmm, that's 460 pages! And I plan to finish one more by next week. This will be the last of them, for a while:

- September 3, 2009: John Huerta and I finished Division algebras and supersymmetry, currently 15 pages.

That'll bring the total up to 475. No wonder I'm tired! 

Of course many of these took years to write, but they're all coming out now, and it takes an extra burst of energy to finish each one. It's exciting to work on lots of different subjects, but changing gears takes work. So, I'm pretty exhausted, but happy.

August 30, 2009

There's a nice article on the domestication of wolves in the magazine *American Scientist*:

- Pat Shipman, The woof at the door, *American Scientist* **97** (July-August, 2009), 286-289.

Back on September 28, 2007, I wrote a diary entry on the domestication of wolves — or in other words, *dogs*, because they're really the same species as far as their ability to interbreed is concerned. So, think of this as a continuation of that.

Nobody is sure when people first started making friends with wolves, or how long the domestication process took. But Russian biologists did an interesting experiment that sheds some light on this. They kept a colony of silver foxes and bred them to be less scared of people, and less aggressive.

After just 10 generations, 18% of the foxes sought human contact and showed little fear! And after about 30 generations, a true "domesticated fox" had developed. At the end, the Russians had 700 domesticated foxes — but they ran out of money when the USSR collapsed, and had to sell 600 of them as pets. At last report, "Most of the project expenses are covered by selling the foxes as pets, but the project remains in a difficult situation, looking for new sources of revenue from outside funding".

Anyway: domestication can happen quickly under laboratory conditions, but that only sets a lower bound on how long it took for wolves to become dogs.

Shipman's article summarizes our rather sketchy state of knowledge:

> Another way of estimating the time at which domestic dogs originated is to consider their genetic differences from wolves. One prominent group of researchers, including Robert Wayne, along with Carles Vilà of the Uppsala University in Sweden and their collaborators, initially estimated in 1997 that dogs diverged from gray wolves 100,000 to 135,000 years ago. After more study, they revised their divergence date to between 40,000 and 100,000 years ago. Another group, led by Peter Savolainen of the Royal Institute of Technology in Sweden, favored the Chinese wolf, a subspecies of the gray wolf, as the probable ancestor and estimated in 2002 that it was domesticated between 15,000 and 40,000 years ago.
>
> How do these genetic estimates stack up against the fossil record? Until 2009, the oldest known remains of domestic dogs were two adult skulls dated to between 13,000 and 17,000 years ago, from Eliseevichi, a region in Russia. Both had the relatively broad, short snout typical of dogs, and both were large, heavy animals, nearly the size of great Danes.
>
> Then a team led by Mietje Germonpré of the Royal Belgian Institute of Natural Sciences reported a stunning new finding in the February 2009 issue of *Journal of Archaeological Science*: a nearly complete fossil dog skull dated to 31,680 ± 250 years ago.

The article then describes Germonpré's research in more detail: studies of canine skulls from various Paleolithic sites in Europe, studies of mitochondrial DNA in ancient canine bones, and best of all, how this work led to the realization that a fossilized dog from Goyet Cave in Belgium was about 31,680 years old! This is about the time of the earliest cave paintings in Europe. For example, the Chauvet Cave in France has paintings about 32,900 ± 490 years old, and also *the footprints of a human child, along with dog footprints that seem to be following her!*

Carbon dating of charcoal from "a torch the child carried" — but how do they know that? — says it's about 26,000 years old.

What this article *really* makes me want to learn about are the various European cultures of the Upper Paleolithic. I'd never paid them much attention, but when you think that these are epochs of human culture that lasted longer than "civilization as we know it", you realize they must be worth understanding! This is when many of the truly great inventions and discoveries were made: art, language, basic tools...

So, just to get myself started, let me list a few cultures centered around France, going backwards in time:

- Magdalenian: a culture that thrived from 18,000 to 10,000 BC — that is, from the Last Glacial Maximum to the end of the last ice age.

- Solutrean: a culture located in eastern France, Spain and England, skilled in flint-knapping. It appeared around 19,000 BC and "mysteriously disappeared" around 15,000 BC. The Solutrean hypothesis suggest that this culture was related to the New World Clovis culture.

- Gravettian: a culture located in France from 26,000 to 20,000 BC.

- Aurignacian: a culture throughout Europe and southwest Asia, which flourished from 32,000 to 21,000 BC. The first known stone mines date to this period.

- Châtelperronian: a culture located around central and southwest France and northern Spain, lasting roughly from 33,000 to 27,000 BC. This was a period of overlap between Neanderthals and *Homo sapiens*.

All these cultures count as Upper Paleolithic. The Upper Paleolithic started in Africa around 50,000 BC as *Homo sapiens* began to use more sophisticated stone tools; this may have coincided with the rise of *language*. The Upper Paleolithic reached Europe about 46,000 BC, and shortly thereafter the Neanderthals there went extinct.

For my September 2009 diary, go here.

Language is largely made to show off, gossip, confuse people, delude them, charm them, seduce them, scare them, exploit them, etc. And, as a side effect, convey information. Just a side effect, you fools. - Nassim Taleb

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For my August 2009 diary, go here.

Diary - September 2009

John Baez

September 1, 2009

A firefighter retreats on Aliso Canyon Road in Acton as the Station fire rages
Genaro Molino, *Los Angeles Times*, August 30

Last month there were fires charring over 525 square miles (135,000 hectares) of land in California — most notably the Station Fire in the forests north of Los Angeles, which so far has burned 246 square miles (63,000 hectares). And it's not even the fire season yet!

Pyrocumulus cloud from the Station Fire as seen from North Hollywood
C. Ellsworth, August 28

Everyone seems to agree that a major cause of these huge fires is a long-term Forest Service policy of putting out every fire as quickly as possible. Most of the brush in the Station Fire region had not burned in 60 years.

Then, of course, there's the drought.

But the big questions in my mind are: at this rate, how many years it take for all the most of the old brush to burn? Will the forests recover? Or will the combination of intensely hot fires killing trees that can withstand normal fires and drought induced by global warming, mean that many fire-affected areas will permanently change character. Will they become grassland or chaparral instead of forest? In other words: is this a temporary nuisance or part of long-term shift in climate?

Does anyone have a good guess?

On September 9th, Martin Gisser responded:

> My "guess", it's plain physics: Global temperature rises, so tropical belt expands, pushing polewards the subtropics and their arid zones.
>
> Result:
> Forests in new arid subtropic regime burn until they are gone. It may take a decade or two. There's some self enforcing feedbacks built in: Less forest, less water held. Occasional rain gushes will wash away what's left of soil, which makes it harder for forest to regrow.
>
> See also southeast Australia, they are a few years ahead. Southern Europe will follow California.

- Reuters, The dramatic rise in Western forest fires: is climate change to blame?, September 2, 2009.
- Climate Progress, Global warming, California, and what a 1-degree temperature increase means for

wildfires, September 1, 2009.

- Climate Progress, An introduction to global warming impacts: *Hell and High Water*, March 22, 2009.

It looks like a lot of people were asking the same question at almost the same time! Since Reuters news articles have a disturbing habit of disappearing, let me quote that one:

> PRINCETON, N.J., Sept. 2 /PRNewswire-USNewswire/ — Blaming a specific forest fire on the impact of climate change could be asking for trouble; but so too is ignoring obvious trends. That was clear last night from *The NewsHour* with Jim Lehrer on PBS when Climate Central, an emerging authority on global warming, explored the dramatic increase in forest fires in Washington State over the past few decades.
>
> Correspondent Dr. Heidi Cullen, Climate Central's Senior Research Scientist, interviewed forest ecologists who see evidence that ecosystems of the Pacific Northwest's once vibrant forests are under duress because of global warming. Some observers believe that fire management practices by the U.S. Forest Service may help account for the increase in fires. Climate Central, in keeping with its mission to provide objective information on climate change, went deeper.
>
> Dr. Cullen reported that in Washington State, "Average spring temperatures have risen nearly three degrees since 1950. Natural variability makes some years cooler or hotter. But records show an overall warming trend."
>
> Climate Central reported that since the late 1980s, dramatically more land burned in Washington and the American West than in the two decades prior — and that these trends are closely associated with warming temperatures, earlier snowmelt, and drier forests. In addition, a University of Washington forest ecologist pointed to epic outbreaks of the mountain pine beetle — now pervasive in northwestern forests deep into Canada - as another consequence of warming temperatures. The voracious beetles have turned great swaths of Northwest trees into deadwood, with subsequent fires scarring the landscape for generations.
>
> Climate Central's Executive Director, Dr. Berrien Moore, who ranks among the world's most highly regarded experts on climate change, commented, "It is troubling but not surprising that climate change could be altering patterns of very small pests and disease. And, that this could lead to an increase in very large and destructive wildfires. Such is the reality of our connected planet."
>
> Dr. Cullen, whose work on climate change has taken her from the tropics to the North Pole, provided the kind of additional context and information that has become the hallmark of Climate Central's reporting. She explored the dynamic and profound consequences that the timing of spring snowmelt can have on a forest ecosystem. The data, folded into a mini science lesson — suggest that the Northwest could develop a very different appearance in the decades ahead.
>
> Last night's special report, informally titled "Washington: Warming and Wildfires," featured interviews with:
>
> - Dr. Susan Prichard / University of Washington
> - Rita Kenny / Winthrop, WA
> - Peter Goldmark / Public Lands Commissioner of Washington
> - Doug Mohre / Winthrop, WA
> - Roger Townsend / Twisp, WA
> - Dr. James Agee / University of Washington
> - Becki Heath / US Forest Service
>
> The story was produced in a partnership between *The NewsHour* and Climate Central, a non-profit, non-advocacy group of scientists and journalists. "Washington: Warming and Wildfires" is the fourth in a series of reports about the local and regional impacts of and solutions to climate change being produced by Climate Central.

Climate Central's website will supplement the video with line-by-line background on the science and sources behind the story — providing additional explanation and depth for the television segment, and highlighting the scientific care that went into creating the video.

"Washington: Warming and Wildfires" is now available to view at www.climatecentral.org.

See also the transcript of the *NewsHour* show.

September 8, 2009

What country is as large as Western Europe, with a population of under 3 million people, and where wages have dropped 60% due to global financial crisis?

Munkhbat Altangerel at his ger in Uyanga
Ariana Lindquist for NPR

It's Mongolia:

- Louisa Lim, Global financial crisis hits Mongolia's grasslands, *Morning Edition*, National Public Radio, September 8, 2009.

September 9, 2009

I'm at Texas Christian University, in Forth Worth, giving a bunch of talks at the math department:

- At 1 pm on Tuesday the 8th I spoke about the number 5.
- At 7 pm on Tuesday the 8th I spoke about Zooming Out in Time.
- At 1 pm on Wednesday the 9th I spoke about the number 8.
- At 4 pm on Wednesday the 9th I will speak about Fundamental Physics: Where We Stand Today.
- At 1 pm on Thursday the 10th will speak about the number 24.

Then I fly back to Riverside on Thursday night... and then Friday, Lisa and I will fly to Corfu! There I'll give talks on Categorification in Mathematical Physics at 2nd School and Workshop on Quantum Gravity and Quantum Geometry, as part of the Corfu Summer Institute.

In short: busy running around burning carbon. I agreed to give these talks before I cracked down on my travel and started refusing lots of invitations...

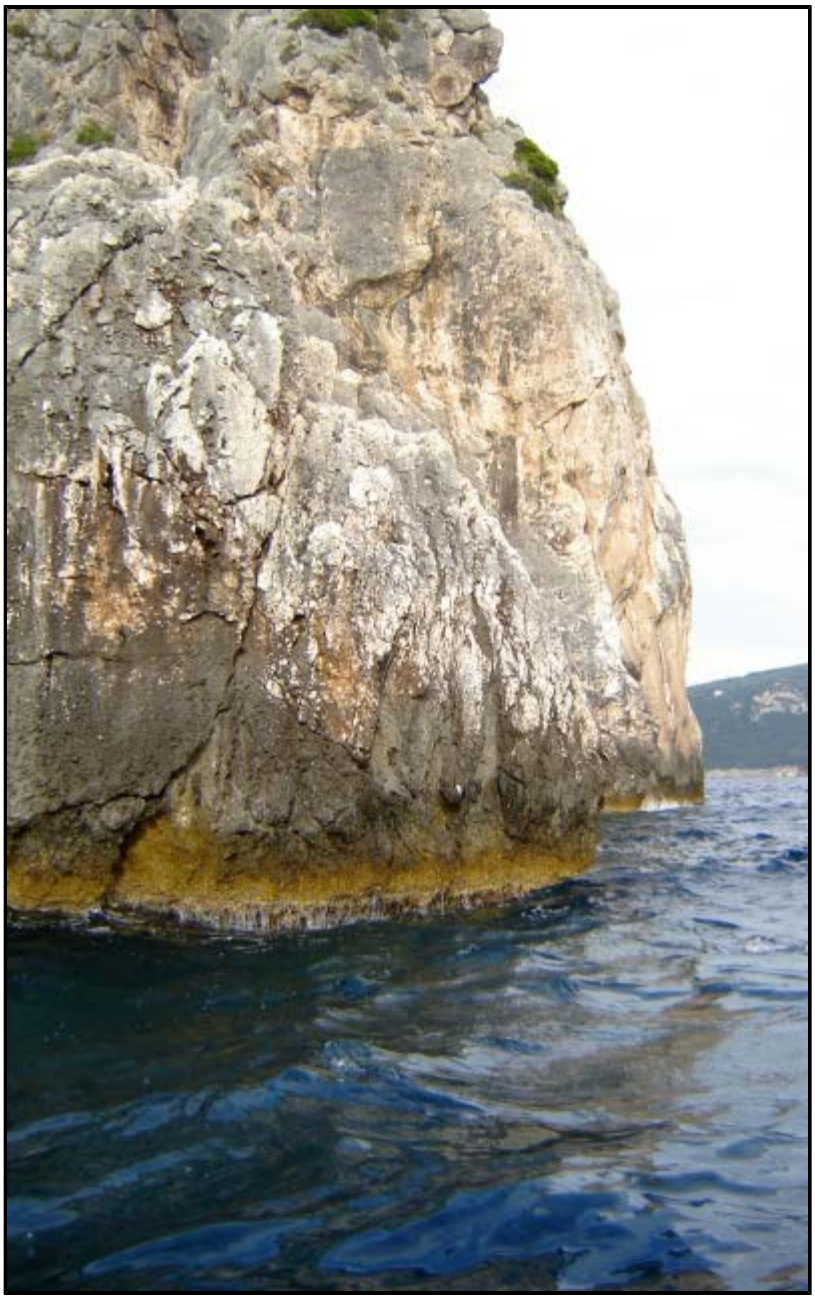
September 22, 2009

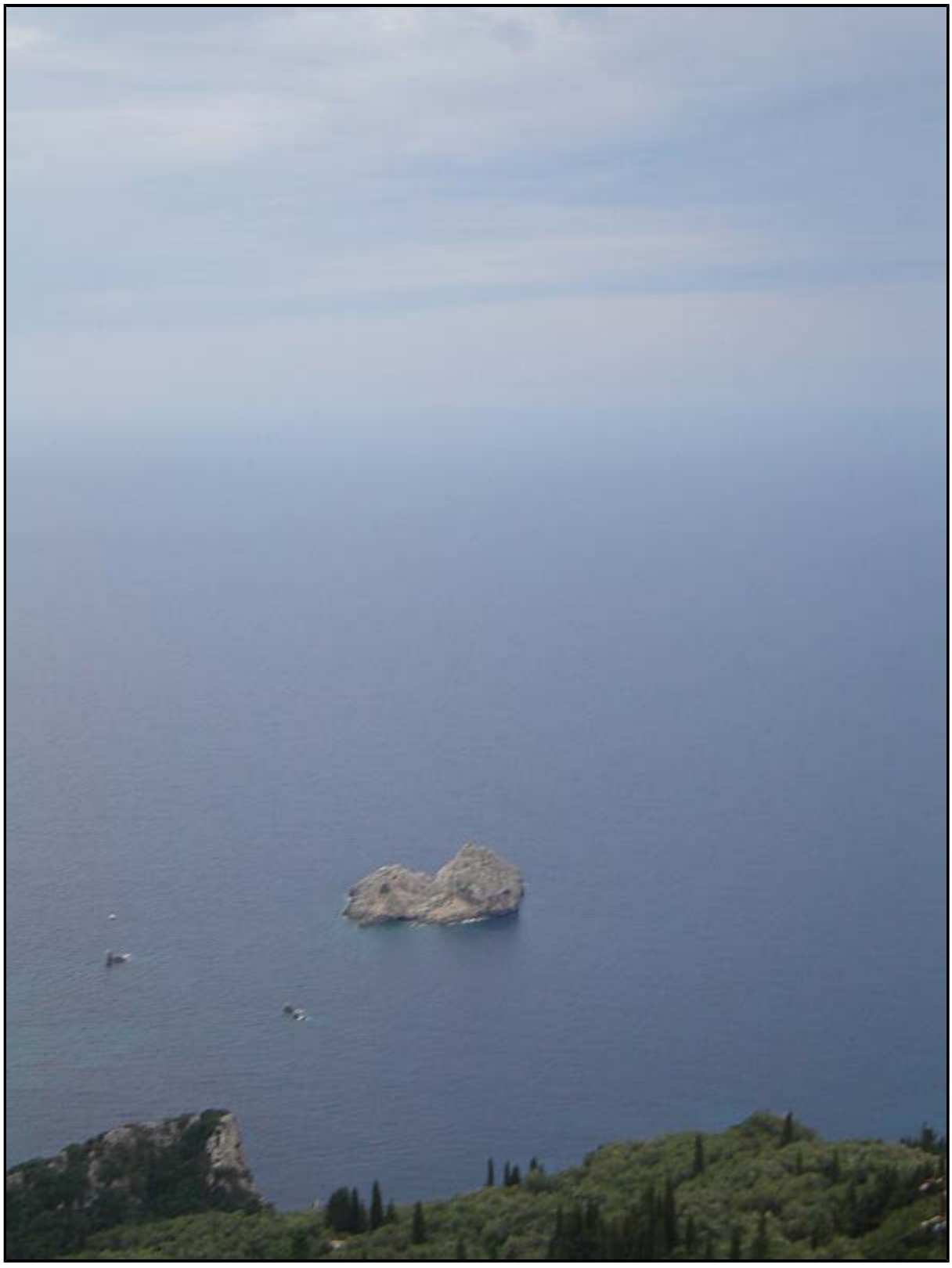
In Corfu I learned a lot about what has been going on in loop quantum gravity over the last few years — see "week280" of This Week's Finds for some of that. Here are some pictures from my trip.

Out the hotel window:

At the Achileon:

From a boat tour in Paleokastritsa:





From the town of Corfu:

September 24, 2009

The budget crisis in California has forced faculty to take so-called "furloughs" where get pay cuts but don't actually do any less work: we can take days off, but not on days we're teaching. Meanwhile students will be paying higher fees. There was a big protest of this throughout the UC system today, with walkouts and strikes.

Recently Deborah Simons of the *New York Times* interview Mark Yudof, the president of the University of California. It got a lot of UC faculty enraged. For example:

Deborah Simons: Already professors on all 10 U.C. campuses are taking required "furloughs", to use a buzzword.

Mark Yudof: Let me tell you why we used it. The faculty said "furlough" sounds more temporary than "salary cut," and being president of the University of California is like being manager of a cemetery: there are many people under you, but no one is listening. I listen to them.

DS: The word "furlough," I recently read, comes from the Dutch word "verlof," which means permission, as in soldiers' getting permission to take a few days off. How has it come to be a euphemism for salary cuts?

MY: Look, I'm from West Philadelphia. My dad was an electrician. We didn't look up stuff like this. It wasn't part of what we did. When I was growing up we didn't debate the finer points of what the word "furlough" meant.

DS: How did you get into education?

MY: I don't know. It's all an accident. I thought I'd go work for a law firm.

DS: Some people feel you could close the U.C. budget gap by cutting administrative salaries, including your own.

MY: The stories of my compensation are greatly exaggerated.

DS: When you began your job last year, your annual compensation was reportedly $828,000.

MY: It actually was $600,000 until I cut my pay by $60,000. So my salary is $540,000, but it gets amplified because people say, "You have a pension plan".

Later it turned out that Deborah Simons specializes in taking long interviews and chopping out pieces that sound outrageous.

September 26, 2009

My aunt pointed me to this charming article about Imen Shan, a specialist in *dan cong* oolong teas who runs a shop called Tea Habitat:

- C. Thi Nguyen, At Tea Habitat, tea connoisseurship is taken to the extreme, *Los Angeles Times*, August 19, 2009.

September 27, 2009

Having finished all the big nasty papers I had to write, I'm making more time in my life for other things. My wife does *tai chi* most mornings. I'm not doing that, but I've joined her for the preliminary stretching exercises. Over the last few years I've been getting stiffer, doubtless from lack of stretching — too much time sitting in front of a computer. I used to find stretching unpleasant: it hurts a bit, and it forcefully reminds me of my physical limitations. But it turns out to be really nice to get up in the morning, go outside into the paradise that is our back yard, and do a little stretching while listening to the birds, smelling the fresh cool air, and gently getting rid of that creaky feeling that plagues me in the morning. It's a bit like meditating, without all the mind games that can go along with that.

I recently discovered that I have high blood sugar, a sign of incipient type 2 diabetes. So, I'm also changing my diet. I will have another blood sugar test soon and talk to my doctor about exactly what I need to do. But I'm getting started now.

For my October 2009 diary, go here.

... we abandoned ourselves to television, the box that separates the dreamer from the dreaming. - Joy Harjo

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For my September 2009 diary, go here.

Diary - October 2009

John Baez

October 3, 2009

Driving home from our grocery shopping this Saturday, Lisa and I saw a pyrocumulus cloud rising up from the mountains behind San Bernardino. It turned out to be the start of the so-called Sheep fire, which later burnt close to the mountain community of Wrightwood. The above photo, not by me, is a closeup of the source of the pyrocumulus I saw.

Yes, there are enough fires around here that we learn words like pyrocumulus. Indeed, you can see a picture of a pyrocumulus cloud on my September 1st diary entry.

October 11, 2009

I got a nice email in response to my comment about incipient type 2 diabetes. Lorenz Borsche is an old acquaintance from the days when I spent a lot of time on sci.physics and sci.physics.research. His mail brings back good memories:

Mancher lehnt eine gute Idee bloss deshalb ab, weil sie nicht von ihm ist. - (Luis Bunuel)

Lorenz Borsche
Gabelsbergerstr. 1
69120 Heidelberg

> Hello John,
>
> you may remember my name from former times in s.p. and s.p.r. (when one still could read and write there...). Actually I was searching for your crackpot index and came to read lots of your homepage (since it's Sunday morning, raining outside, my wife at the gym etc...).
>
> Finally I read the notice on your high blood sugar. I privately 'researched' the whole subject some three years ago — and didn't come to any other conclusions than are pinned down by Gary Taubes in his absolutely stunning book:
>
> - Good Calories, Bad Calories: Fats, Carbs, and the Controversial Science of Diet and Health
>
> (~12$ at amazon). You may like the book also for shedding light on some historical facts and turns of the medical 'science'.
>
> I often think of how you once described how Millikan's oil drop measurement was so off track but the real value was only reached by small steps over generations of laboratry re-runs, where no one dared to exceed the error limits... I can't find that post, which is a pity, as it stands as a vivid example of how things can develop over time even in the precise 'natural sciences' (the posting must have been in the mid/end-90ies in s.p.). Reading Taubes you may often see analogies to the oil drop experiment.
>
> BTW: No need to worry, if you change your food, the high blood sugar will completely go away and no D II will arise.
>
> Mit herzlichen Grüssen / Cordially yours
> Lorenz Borsche | http://www.borsche.de

There's an interesting critical review of Taubes' book here:

- Gina Kolata, Carbophobia, Sunday Book Review, *New York Times*, October 7, 2007.

October 14, 2009

I wrote about how Russian scientists managed to breed a line of tame silver foxes in my August 30th diary entry. They did it in just 30 generations. But that's not all they did! Here's more about this story, thanks to Mike Stay:

- Henry Nicholls, My little zebra: The secrets of domestication, *New Scientist*, October 5, 2005.

A quote:

> In 2003, while geneticist Svante Pääbo was visiting Novosibirsk, Russia's third-largest city, he decided to look in on a famous experiment run by the Institute of Cytology and Genetics, which is based in the city. Fifty years ago, the then head of the IC&G, geneticist Dmitry Belyaev, had begun breeding silver foxes to see how easily they could be tamed. What Pääbo didn't know, though, is that Belyaev had also set up another experiment in the 1970s involving rats. This time, one line of rats was selected for tameness and another selected for aggression.
>
> When Pääbo saw them, he was stunned. After just 30 years of selection, the IC&G researchers had fashioned two populations that could hardly be more different. "I could take the tame ones out of the cage with my bare hands. They would creep under my shirt and seemed to actually seek and enjoy contact," recalls Pääbo. "The aggressive animals were so aggressive I got the feeling that 10 or 20 of them would probably kill me if they got out of the cages."

October 18, 2009

The truth leaks out, one drop at a time...

The Environmental Protection Agency, or EPA, has released a secret Bush-era document! In December 2007, the EPA concluded that greenhouse gas emissions from motor vehicles were endangering public welfare and needed to be regulated. But the Bush administration covered this up. Until now, only a few members of Congress have been allowed to see this document. See it yourself.

The fun starts on page 7:

> Carbon dioxide is the most important GHG [greenhouse gas] directly emitted by human activities, and is the most significant driver of climate change.

October 22, 2009

I'd been meaning to do it for months. Last week I finally did. I drove down to the Riverside County Waste Management office in Moreno Valley and bought a Biostack Bin:

Now I can turn all my coffee grounds, banana peels, leaves and weeds into something useful: *compost.* Instead of feeling vaguely guilty for throwing them out, I now feel virtuous. And I'm actually looking forward to watching them rot!

Composting is a lot of fun, because it lets you watch something very fundamental to life on this planet: the transformation of dead plant matter back into soil. Of course animals and even us people turn back into soil... but don't put animal products into your compost, unless you want to attract critters!

Here's the best quick guide to composting:

- Dr. C. Forrest McDowell and Tricia Clark-McDowell, Home Composting Made Easy.

To make a good compost, you need to learn about "green" versus "brown". "Green" material is stuff with lots of nitrogen, like:

- Grass clippings
- Weeds
- Vegetable peelings, leaves & stems
- Kitchen scraps (not meat)
- Soft green prunings
- Coffee grounds
- Animal manure (sheep, poultry, horse & cow — no carnivores, please)

"Brown" material has less nitrogen, mainly just cellulose and other complex carbohydrates:

- Sawdust

- Shredded/chopped newspaper or cardboard
- Straw and hay (wet well)
- Twigs & small branches (shredded)
- Wood chips

The green stuff breaks down quickly because the nitrogen promotes microbial activity. But too much green, and your compost heap will go anaerobic and get smelly! The optimal mix is about 2 parts green to 1 part brown. This corresponds to about 30 parts carbon per 1 part nitrogen, though 50-1 is okay for a slower, cooler compost pile.

Cooler? Yes, decomposition creates heat, and this is important! Below 13°C (55° F) most microbes are almost dormant — not much decomposition will occur. In the range of 13-21°C (55-70°C), the cool-loving psychrophiles will wake up and begin to oxidize the pile, warming it up. This in turn activates the next shift: the mesophiles. These are microbes that do well in the range of 21-32°C (70-90°F). This crew does most of the work... but in an ideal compost pile, they set the stage for their own exit by heating the pile still further. As temperatures rise to 32-60°C (90-140°F), the thermophiles take over. These kill disease germs and weed seeds, and generate humic acids — the brown acids that are major constituents of humus.

As the thermophile's food runs out, the pile will cool, and the mesophiles and psychrophiles move back in from the cooler edges.

I don't know any of this from experience — I just read it. But hopefully in a few months or years it'll be familiar and intuitive. This reminds me of my father, who could never resist a bad pun: he said that as a soil scientist, he had a good sense of humus.

October 23, 2009

Speaking of compost, San Francisco recently passed a law that gives householders, apartments and businesses just 6 weeks to start throwing their food waste and plant trimmings into a green cart, where it's taken away to be composted. The compost is then sold to Bay area farms and vineyards:

- David Gorn, Food recycling law a hit in San Francisco, *Morning Edition*, National Public Radio, October 21, 2009.
- Nancy Mullane, San Francisco compost a hit with local vineyards, *Day to Day*, National Public Radio, December 13, 2006.

San Francisco already manages to recycle 72% of its waste. Now that may go up to 90%!

And now some bad news — or at least a warning, which I hope comes in time:

- Richard Harris, New biofuel laws may harm environment, *Morning Edition*, National Public Radio, October 23, 2009.

In their current formulation, the Kyoto Protocol and European law don't count carbon released from burning biofuels. Scientists have found that this creates an incentive to cut down forests to plant crops for biofuels, even if this *boosts* the total CO_2 emissions!

October 26, 2009

An interesting article on attempts to deal with Type 2 diabetes using dietary regimes:

- Marni Jameson, A battle for control, *Los Angeles Times*, October 26, 2009.

Some lab tests came back and seem to indicate that I *don't* have diabetes... but my blood sugar on an earlier test was quite high, so I'll have to talk to my doctor now and see what he thinks.

October 27, 2009

The armchair adventurer in me loves this story of two American women who rode from Sudan to Egypt along the Darb al-Arba'in — the "Forty Days' Road" — along with eight camel herders and 200 camels.

- Angela Stephens, Riding the Forty Days' Road, with photographs by Lorraine Chittock, *Saudi Aramco World* 48 No. 5 (September/October 1997), 16-27. Abbreviated version, with pictures at Lorraine Chittock's website.

A quote:

> As we approach the Egyptian border, we are 20 days' ride from our starting point west of Omdurman, across the Nile from Sudan's capital, Khartoum. We're bound for the place all camel herds go from Western Sudan, the camel market in Daraw, north of Aswan, Egypt, a journey of 1250 kilometers (775 miles). From there, the camels will be loaded onto trucks and shipped to Cairo, home of the largest camel market in the Middle East.
>
> The trail arcs gently northwest through Sudan and then curves northeast into Egypt, along the palm-lined Nile. Starting in savanna covered with dry grass and acacia trees on which the camels feed, the trail reaches pure sand desert in the northernmost third of the country. The traveler does not see vegetation again until the trail joins the Nile.
>
> Sudan has nearly three million camels, the second-largest national herd in the world, after Somalia's. Nearly one and a half million square kilometers (580,000 sq mi) of territory is suitable for their grazing — an area more than twice the size of Texas and three times as large as Spain. Approximately a third the size of the United States, Sudan is the largest country in Africa, sparsely populated with 27 million people.

Kharga Oasis - photo by Hanne Siegmeier

> The journey from Omdurman to Daraw takes approximately 30 days, yet herders still refer to this route as Darb al-Arba'in, the Forty Days' Road. The historic Forty Days' Road connected the el-Fasher area of Sudan with Assiut in Egypt, via the Selima and Kharga Oases. This was the path followed by the great ancient camel caravans of old, a trade route dating back at least 700 years.

I urge you to read the full story — and try the version with pictures! My mother subscribes to *Saudi Aramco World* in part for the remarkable photos. It's a propaganda magazine put out by an Saudi oil company — that's why you can get a free subscription. But it has lots of informative articles on Islamic culture and history, which tend to lean strongly in the positive direction. For example, the above story doesn't mention that the Forty Days' Road was famous for the transportation of slaves.

There's a book by Angela Stephens and Lorraine Chittock that goes into a lot more detail, with lots of great photos:

- Angela Stephens and Lorraine Chittock, *Shadows in the Sand: Following the Forty Days Road*, 2nd edition available in November 2009.

Also try this:

- Kristian Schiller, The camel market of Daraw, Salon, 1999.

October 29, 2009

American Scientist has some good reviews of books on the oversimplifications of classical economics — the theme that led me to start this diary in the first place. The first attacks the theory of "efficient markets":

- Justin Fox, *The Myth of the Rational Market: A History of Risk, Reward, and Delusion on Wall Street*, Harper Business, 2009.

and here's their review:

- Cosma Shalizi, Twilight of the efficient markets, *American Scientist* **97**, (November-December 2009), 504-506.

A quote:

> The founding principles of efficient-market theory are easily described. The assumption on which all else rests is that, unless one has private knowledge, there is no way to profit from financial markets without risk. Admittedly, some securities are as safe as humans can make them, and they do pay returns, notably bonds issued by the U.S. Treasury. (Whatever else he does, Uncle Sam pays his debts.) The rates of return on these next-to-riskless instruments are, however, extremely low. Other kinds of securities pay returns that are, on average, higher, but these returns are more variable.there is some nontrivial risk of getting back less than the amount one has invested, or getting back nothing at all. The basic idea of efficient-market theory is that anything that pays higher returns than the risk-free rate must also be more risky. There should be no opportunities for arbitrage (making money from riskless trades that exploit price discrepancies between markets). Moreover, the trade-off between risk and return must be the same across different assets: If stock A was as risky as stock B, but A paid lower returns than B, people would sell A, lowering its price and raising its rate of return, and buy B, with the opposite effect — arbitrage in which the arbitrageurs put themselves out of business.
>
> Classically, there is a very specific idea — the "capital asset pricing model" — about how the risk-reward trade-off is supposed to go, at least for stocks. The return on a portfolio of several stocks is an average of those stocks' returns. More diversified portfolios are less exposed to the risks peculiar to individual companies, leaving only the risks common to the whole corporate sector. The returns for each stock, then, are supposed to combine a firm-specific term, alpha, and the firm's correlation with the economy as a whole, beta. Higher returns, in this scheme, compensate for higher betas — that is, for risk that cannot be mitigated by diversification.
>
> One corollary is important enough to count as a principle itself. Legend relates that J. P. Morgan, when asked what the stock market would do the next day, replied, "It will fluctuate". Someone who could predict these fluctuations (or their absence) could increase their returns with no extra risk. Therefore, says efficient-market theory, securities prices are unpredictable. Current prices are supposed to be optimal forecasts, on

> the basis of currently available data, of the present value of future returns, because changes in optimal forecasts are, themselves, unpredictable. (If you know that tomorrow your forecast of next year's gasoline price will be higher than today's forecast by $1, you should raise your current forecast.) As Paul Samuelson put it, "properly anticipated prices fluctuate randomly". The efficient-market hypothesis, as a technical term, is the claim that market prices cannot be predicted, either from past prices alone or from past prices combined with other publicly available information. One of the early triumphs of the school was the demonstration that stock prices look very much indeed like random walks.
>
> By now it is clear that the efficient-market school has been interestingly ambivalent about arbitrage and arbitrageurs. On the one hand, the assumption that there are no opportunities for arbitrage is the basis for all calculations. On the other hand, for all prices to be exactly right at all times is too much to ask, and arbitrageurs have been invoked as the restoring force pulling prices back to equilibrium. There is something almost Taoist about the assertion that arbitrage is so powerful and ubiquitous that it cannot be seen. Alas for paradoxes, this view is actually incoherent, as the effort that goes into figuring out what prices should be can only be compensated if prices are not fully efficient. But this leaves open the possibility that prices are close to efficient, without systematic deviations.
>
> A vast superstructure was erected on these foundations, beginning in the 1950s and really taking off in the 1960s and 1970s. Particularly impressive wings of that edifice were devoted to the design of portfolios to balance risk against return and to the valuation of derivative securities ("contingent claims" or bets on the value of other securities), especially options to buy or sell stocks at given prices by given dates. As Fox notes, scholars of finance achieved acclaim, and were awarded substantial consulting fees, for solving pricing problems that by hypothesis were already being solved by the markets themselves! (Donald Mackenzie's *An Engine, Not a Camera* explores this paradox in depth.)
>
> By the 1980s and 1990s, these ideas had led to changes in the way the investment industry worked, new concepts of corporate governance and new kinds of financial firms, which aimed to systematically identify arbitrage opportunities — deviations from what the theory said prices should be — and to earn a profit even as they eliminated those opportunities. More diffusely, the academic prestige of efficient-market theory provided, at the least, rhetorical support for deregulating markets, especially financial markets, and delegating more and more authority to them. This was aided by a conflation — subscribed to by many scholars — between those markets having *informationally efficient* prices (that is, unpredictable ones) and those markets *allocating capital efficiently* (directing savings to where the money can be used most profitably). The latter is the more usual economic notion of efficiency, but informationally efficient prices are neither necessary nor sufficient for efficient allocation.
>
> The whole edifice, however, has turned out to be built, if not on sand, then at best on loose fill. More rigorous testing on larger data sets has shown that the capital asset pricing model does not fit the data...

The second tackles the game-theoretic notion that people act rationally to maximize their happiness:

- Herbert Gintis, *The Bounds of Reason: Game Theory and the Unification of the Behavioral Sciences*, Princeton University Press, 2009.

and here's their review of that:

- Karl Sigmund, The loitering presence of the rational actor, *American Scientist* **97**, (November-December 2009), 510-513.

October 30, 2009

Remember my October 27th entry? Well, Angela Stephens and Lorraine Chittock aren't the only women to feel the attraction of the Darb al-Arba'in — that is, the "Forty Days' Road", the traditional camel route from Sudan to Egypt. Check this out:

- Carolyn McIntyre, The Beja and the Jinn of Port Sudan, Girl Solo in Arabia, September 24, 2009.

This is a great blog for armchair adventurers like me. Starting in January 2006, Carolyn McIntyre undertook to retrace the journeys of the Moroccan scholar Ibn Battuta, which lasted from 1326 to 1354 and covered North Africa, West Africa, Southern and Eastern Europe, the Middle East, India, Central Asia, Southeast Asia and China! For a nice tale of his journey, try this:

- Douglas Bullis, The longest Hajj: the journeys of Ibn Batutta, *Saudi Aramco World*, July-August 2000.

And then there's this:

- Michael Asher, *In Search of the Forty Days' Road*, Longman Group, United Kingdom, 1984. Review by Tony Kelly, *The Independent*, Saturday November 27, 1999.

But I'm not always just an armchair adventurer. Since I'll be spending a year in Singapore, I want to take advantage of that location to visit Bali, Borneo, Thailand and other nearby places! So I should start reading up on those. I've already been invited to Hong Kong by my friend and colleauge Jiang-Hua Lu, but having spent a summer there — and Lisa a year — this has the charms of a favorite familiar place, rather than "adventure".

For my November 2009 diary, go here.

From Timbuktu I sailed down the Nile on a small boat, hollowed out of a single piece of wood. - Ibn Battuta

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home

For my October 2009 diary, go here.

Diary - November 2009

John Baez

November 1, 2009

Lisa dressed up for Halloween, since we were visiting some friends for dinner: Teresa Toscano and John Laursen. Lisa looked quite spooky in her Pierrot mask and a veil, so I took some pictures. We walked over to our friends' house — and when we arrived, Teresa let out a gasp of shock as she opened the door and saw Lisa's masked face.

Much to our delight, our old friends Gene and Barbara Anderson were also there. In 2005 Lisa and I travelled to Turkey with them, visiting Istanbul and Konya. Gene is an anthropologist with prodigious erudition when it comes to recognizing plant and animal species, cooking medieval dishes, and much more. Barbara is a public health specialist whose idea of good time is taking students on public health tours in the poorest parts of Ethiopia or Cambodia. They'd moved up Seattle after Gene retired from the anthropology department here at UCR and Barbara left Loma Linda to become a associate dean at the the College of Nursing at Washington State University. Now she's retired too, and they're back.

We had dinner as kids came by trick-or-treating... but Lisa did not answer the door and scare the wits out of them.

November 7, 2009

We had an AMS conference at UC Riverside this weekend. On Friday: dinner with Scott Carter and also Scott Morrison and his girlfriend and baby. On Saturday: tons of talks, including my talk on the icosahedron. Then dinner at Tio's, with a huge crowd: I ate with Lou Kauffman, David Radford, Scott Carter, Masahico Saito and Seeichi Kamada. Then some of us went on to the Cigar Bar (smoking not allowed!) and Worthington's. At this point the crowd had shrunk to grad students and postdocs (apart from me) such as Aaron Lauda, David Spivak, Alex Hoffnung and John Huerta. I wisely quit at midnight, while some carried on eating pizza and playing pool at Worthington's. Sunday: lots more talks. At lunch I finally met Kevin Walker, and we talked with Justin Roberts, Yael Fregier, Chris Rogers, and also a bit with Vasily Dolgushev.

Categorification is getting really popular.

November 11, 2009

Long hidden in a Swiss bank vault, Carl Jung's *Red Book* is now available:

- Karen Michel, 'The Red Book': a window into Jung's dreams, *All Things Considered*, National Public Radio, November 11, 2009.
- Sara Corbett, The holy grail of the unconscious, *New York Times Magazine*, September 16, 2009.

Quoting the latter:

> He later would compare this period of his life — this "confrontation with the unconscious," as he called it — to a mescaline experiment. He described his visions as coming in an "incessant stream". He likened them to rocks falling on his head, to thunderstorms, to molten lava. "I often had to cling to the table," he recalled, "so as not to fall apart".
>
> Had he been a psychiatric patient, Jung might well have been told he had a nervous disorder and encouraged to ignore the circus going on in his head. But as a psychiatrist, and one with a decidedly maverick streak, he tried instead to tear down the wall between his rational self and his psyche. For about six years, Jung worked to prevent his conscious mind from blocking out what his unconscious mind wanted to show him. Between appointments with patients, after dinner with his wife and children, whenever there was a spare hour or two, Jung sat in a book-lined office on the second floor of his home and actually induced hallucinations — what he called "active imaginations." "In order to grasp the fantasies which were stirring in me 'underground,'" Jung wrote later in his book *Memories, Dreams, Reflections*, "I knew that I had to let myself plummet down into them". He found himself in a liminal place, as full of creative abundance as it was of potential ruin, believing it to be the same borderlands traveled by both lunatics and great artists.
>
> Jung recorded it all. First taking notes in a series of small, black journals, he then expounded upon and analyzed his fantasies, writing in a regal, prophetic tone in the big red-leather book. The book detailed an unabashedly psychedelic voyage through his own mind, a vaguely Homeric progression of encounters with strange people taking place in a curious, shifting dreamscape. Writing in German, he filled 205 oversize pages with elaborate calligraphy and with richly hued, staggeringly detailed paintings.

November 15, 2009

Jim Stasheff pointed out some really cool images of Mars taken by the High Resolution Imaging Science Experiment, like these sawtooth patterns in the carbon dioxide ice near its south pole.

November 19, 2009

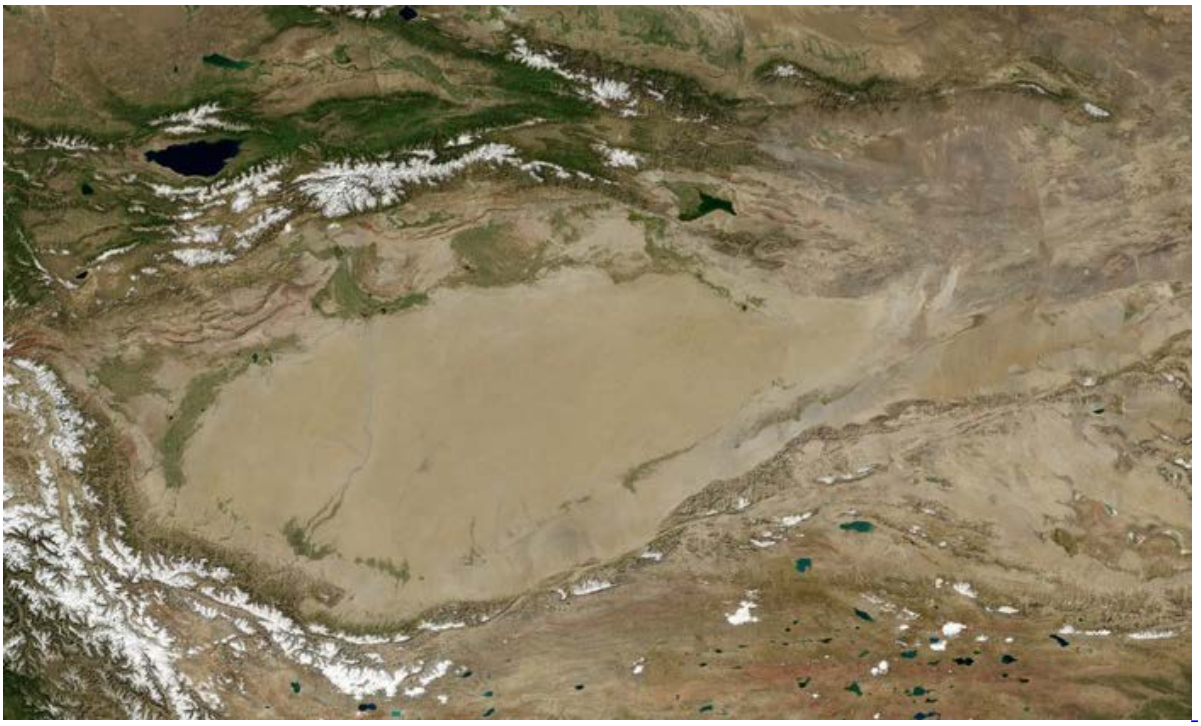
Remember the Uighur uprising in northwest China? One reason: the old town in Kashgar is being levelled.

- Stephen McDonell, The Uighur dilemma, ABC News, August 28, 2009. Transcript and video.

Kashgar has been an important Silk Road city for at least 2000 years, thanks to its location at an oasis at the western end of the Taklamakan

Desert, where the northern and southern routes around this incredibly harsh desert meet.

Map of the Tarim River and Taklamakan Desert.
"Kashi" is another name for Kashgar.



Satellite photo of Taklamakan Desert,
bordered by the Tien Shan range in the north, Kunlun Shan in the south, and Pamir Mountains at west.

Taklamakan Desert

Yak in Kashgar market, photo taken in 1987 by Bernard Gagnon

For more photos of Kashgar, go here, here, and here. I would like to visit the place before it's completely modernized.

I fell in love with the Silk Route and cities in the Taklamakan Desert, like Kashgar, Khotan and Turfan, when I read this book:

- Peter Hopkirk, *Foreign Devils on the Silk Road: The Search for the Lost Cities and Treasures of Chinese Central Asia*, University of Massachusetts Press, Amherst, 1980.

You simply *must* read this you enjoy history, archaeology or adventure stories!

Here are some books by the original European explorers of the Taklaman Desert — the "foreign devils" who dug up and stole the buried archaeological treasures from this land. I'm going to get these, either from the UCR library or interlibrary loan...

- Albert von Le Coq, *Buried Treasures of Chinese Turkestan: An Account of the Activities and Adventures of the Second and Third German Turfan Expeditions*, G. Allen & Unwin Ltd., London, 1928.

  Abstract: During the early decades of this century a handful of foreign explorers raced to remove wall-paintings, sculptures, manuscripts and other treasures from the lost cities of the Silk Road, the great trans-Asian highway that had once linked imperial China and distant Rome. The German archaeologist, Albert von Le Coq — one of the most successful of these explorers — discovered the huge, ninth-century Buddhist murals from the cliff-face monastery at Bezeklik. *Buried Treasures of Chinese Turkestan*, first published in 1928, is von Le Coq's account of the adventures and misadventures that beset him during his excavations along the Silk Road.

- Aurel Stein, *Sand-Buried Ruins of Khotan: Personal Narrative of a Journey of Archaeological & Geographical Exploration in Chinese Turkestan*, with a map from original surveys and numerous illustrations. T. F. Unwin, London, 1903.

  Abstract: A popular account of his first archaeological expedition into Central Asia from 1900 to 1901. It is his most charming and exciting book which is partly a witty and entertaining travelogue, partly a journal of exceptional archaeological exploration and partly Stein's proof to himself that his theory of the long lost Buddhist kingdoms of the Silk Road and the Serindian culture they supported was indeed correct. It is something of a detective story for it contains his own description of how he unmasked Dun Huang.

- Ella Constance Sykes, *Through Deserts and Oases of Central Asia*, Macmillan, London, 1920.

- Langdon Warner, *The Long Old Road in China*, Arrowsmith, London, 1927.

- Homer H. Dubs, *A Roman City in Ancient China*, China Society, London, 1957.

I enjoyed Stein's *Ruins of Desert Cathay*, so I'll probably like these too. You can read a bunch of them online if you click on the links!

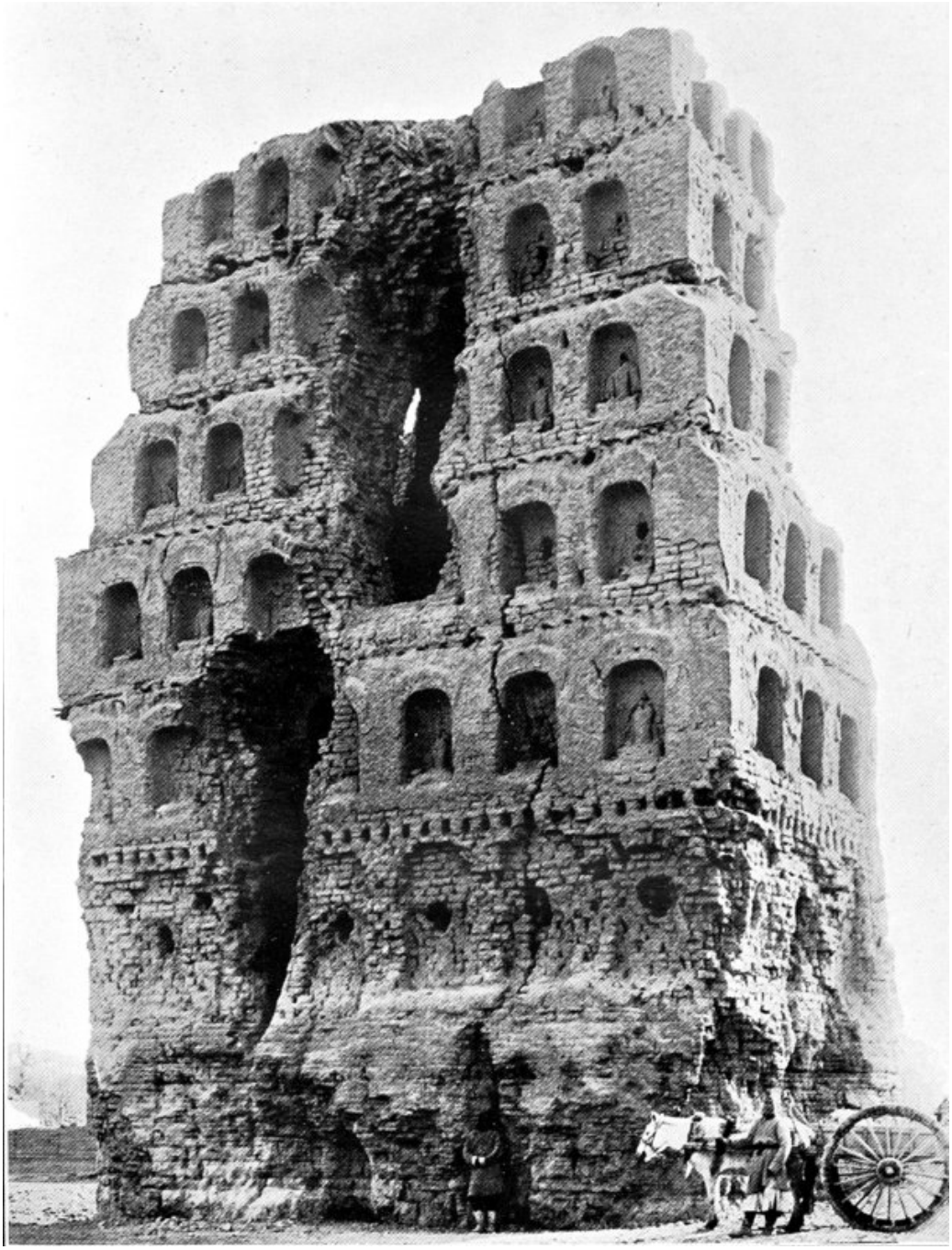
Wow — this site is packed with great stuff:

- Digital Silk Road.

For example, it has a digital archive of rare books including all these books by Aurel Stein:

- *Ruins of Desert Cathay*
- *Ancient Khotan*
- *Serindia* (5 volumes)
- *Innermost Asia*
- *On Ancient Central-Asian Tracks*
- *Memoir on Maps of Chinese Turkistan and Kansu*

From volume 2 of Stein's *Innermost Asia*, here's a photo he took of a shrine in Sirkip, which seems to be somewhere in or near the Gobi desert:



November 21, 2009

Together with a number of coauthors, Jacquelyn Gill of the University of Wisconsin in Madison recently uncovered new evidence for the "Pleistocene overkill hypothesis":

- Jacquelyn L. Gill, John W. Williams, Stephen T. Jackson, Katherine B. Lininger, and Guy S. Robinson, Pleistocene megafaunal collapse, novel plant communities, and enhanced fire regimes in North America, *Science* **326** (November 20, 2009), 1100-1103.
- Richard Harris, Fungus provides clues to North American extinctions, *Morning Edition*, National Public Radio, November 20, 2009.
- Sid Perkins, Climate not really what doomed large North American mammals, *ScienceNews*, November 19, 2009.

To help you understand what's at stake here, let me expand a bit on the story I told back in December 1, 2006.

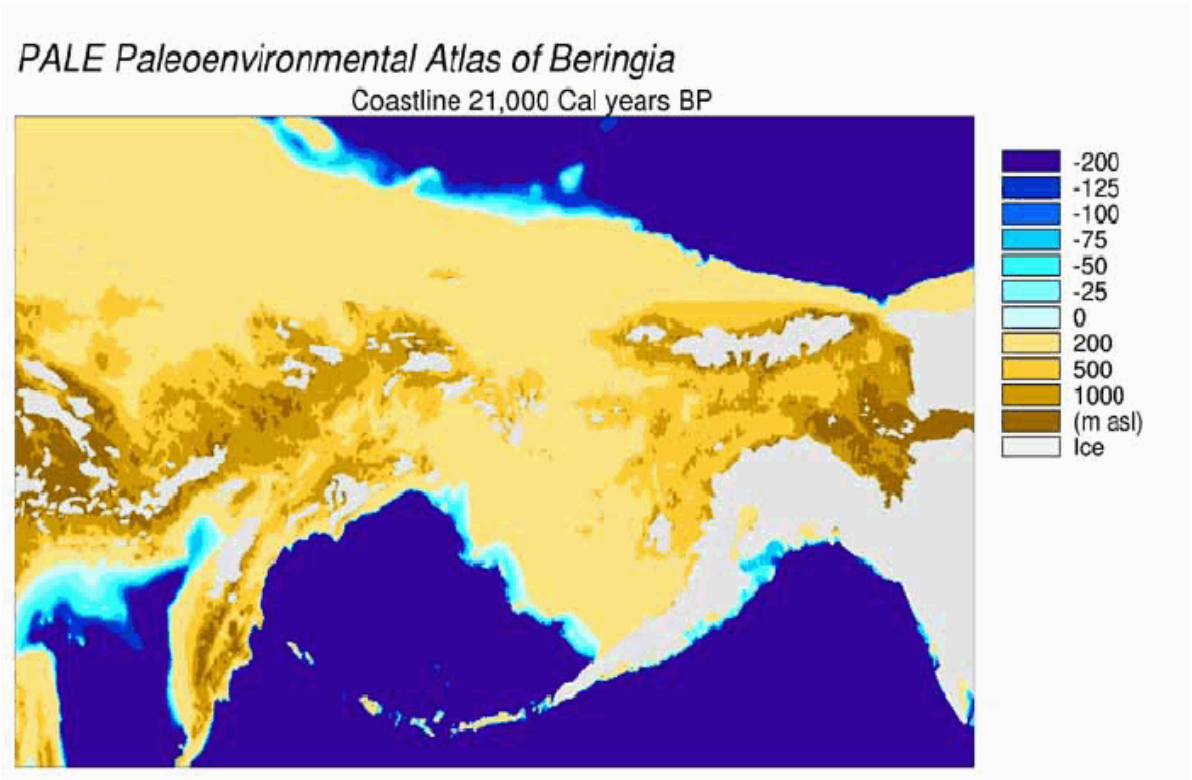
The last Ice Age - the Wisconsin glaciation, began in about 70,000 BC. The glaciers reached their maximum extent about 18,000 BC, with ice sheets down to what are now the Great Lakes. In places the ice was over 1.6 kilometers thick!

Then it started warming up. By 16,000 BC people started cultivating plants and herding animals. Around 12,000 BC, people of the Clovis

culture came to the Americas — known by their distinctive and elegant spear tips, called Clovis points:

The culture then broke into several local cultures — the Folsom tradition, Gainey, Suwannee-Simpson, Plainview-Goshen, Cumberland point, and Redstone — roughly around the time of the Younger Dryas cold spell beginning around 10,800 BC. By about 10,000 BC the Ice Age was over, and a warm wet period called the Atlantic began. The first cities in the Old World date to around 7,500 BC; cities in the Americas seem to come much later.

At the time of maximum glaciation, there were three main refuges for life in North America. Biologists call such things "glacial refugia". The first was all the land south of the glaciers, including an "ice-free corridor" just east of the Rocky Mountains. The second was Beringia, a huge region made of what's now Yukon and Alaska, together with eastern Siberia. As you can see, the ocean was lower when more water was frozen up in glacier and the ice caps:



The third was the coastal plain region of eastern America, which is now submerged to form the continental shelf off the coast of New England and Canada. Besides these big refugia, there were also smaller coastal refugia and nunataks - mountains too high for the glaciers to cover them!

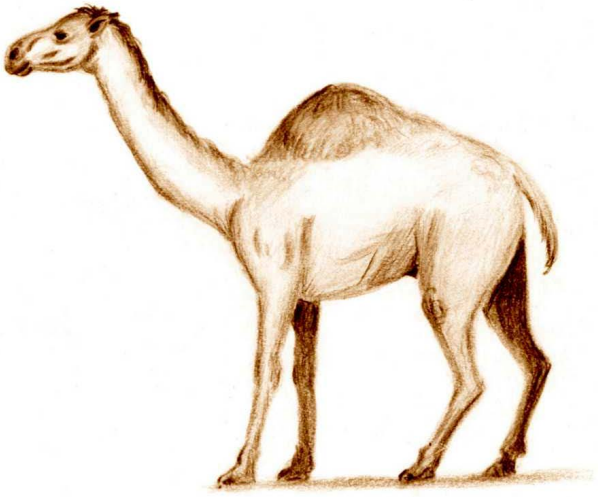
What was life like south of the ice sheets near the height of the last ice age? In the eastern half of North America there was tundra and spruce forest. Further west it was drier, except for a belt that got runoff from melting glaciers. West of what is now Minnesota it was too dry for forests - just grasslands. And where the Great Plains now reign supreme, there was a huge area of sand dunes!

There were many large mammals, almost all extinct now — and the mystery of their extinction is what the new paper tackles! Largest of these were the American mastodon and four species of mammoths, only two of which survived to the end of the ice age: the woolly mammoth in

the tundra of Beringia, and the much larger Jefferson's mammoth in the central plains and the west. Both these went extinct around 9,000 BC, perhaps killed off by humans. But the *ScienceNews* article by Sid Perkins says that butchered mammoth bones have been found in Wisconsin archaeological sites dating back to 12,700 BC and 12,100 BC. And bones from butchered mammoths have been found with Clovis spear points in Wyoming and South Dakota.

There were giant beavers, 2.5 meters long and 220 kilograms (485 pounds) in weight. There were also giant ground sloths.

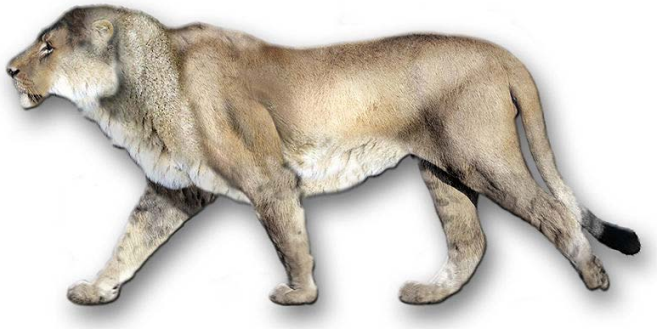
There was also the Mexican horse and western camel, *Camelops hesternus*:



Recently people have found spearheads dating back to 8,300 BC bearing protein residue from the Mexican horse! Indeed, this horse may have been hunted into extinction. Early Americans also hunted the western camel in Wyoming, as recently as 8,000 BC, which is around when *they* died out.

Caribou and tundra muskox ranged far further south than they do today. The tundra muskox probably crossed into Beringia around 90,000 BC. There was also a species of woodland muskox, now extinct. The elk, white-tailed deer, mule deer, bison and bighorn sheep that we know today were already widespread. But there were apparently no moose, except in Beringia.

The familiar cougars, bobcats and black bear were already here. Timber wolves were present but uncommon. Grizzly bears reached midlatitude America only after the ice sheets began to melt. But there was also the dire wolf, similar to the modern wolf but bigger and stronger. There was the sabertooth, about the size of a lion, with incredible teeth. There was its smaller relative, the scimatar cat... together with the American cheetah and the American lion, shown here:



All these are gone.

And then, there was the giant short face bear. This was the most powerful predator of the lot: a flesh-eater with powerful jaws, and probably quick on its feet, able to run down prey. It stood 1.6 meters (5.5 feet) at the shoulder. It weighed about 900 kilograms (almost a ton). You would not want to meet one of these:

How did all these animals die out? There are many possible explanations. The most obvious is climate change — until you realize that this latest Ice Age was not the last, and many of these animals seem to have survived through many previous glacial periods and interglacials! On February 13th I mentioned a recently popular theory: a comet collision!

- D. J Kennet *et al*, Nanodiamonds in the Younger Dryas boundary sediment layer, *Science* 323 (2006), 94.
- Joel Achenbach, Gems point to comet as answer to ancient riddle, *Washington Post*, January 2, 2009.

Quoting a bit from the latter:

> Something dramatic happened about 12,900 years ago, and the continent of North America was never the same. A thriving culture of Paleo-Americans, known as the Clovis people, vanished seemingly overnight. Gone, too, were most of the largest animals: horses, camels, lions, mammoths, mastodons, saber-toothed cats, ground sloths and giant armadillos.
>
> Scientists have long blamed climate change for the extinctions, for it was 12,900 years ago that the planet's emergence from the Ice Age came to a halt, reverting to glacial conditions for 1,500 years, an epoch known as the Younger Dryas.
>
> In just the last few years, there has arisen a controversial scientific hypothesis to explain this chain of events, and it involves an extraterrestrial calamity: a comet, broken into fragments, turning the sky ablaze, sending a shock wave across the landscape and scorching forests, creatures, people and anything exposed to the heavenly fire.
>
> Now the proponents of this apocalyptic scenario say they have found a new line of evidence: nanodiamonds. They say they have found these tiny structures across North America in sediments from 12,900 years ago, and they argue that the diamonds had to have been formed by a high-temperature, high-pressure event, such as a cometary impact.

However, as you can probably tell from what I wrote above, I consider the most plausible theory to be the Pleistocene overkill hypothesis: namely, that as humans moved into the Americas, they killed off all these large animals. And the new paper by Gill *et al* seems to support this theory.

Their idea was to look for spores of a fungus called *Sporormiella* in sediments that accumulated on lake beds in Indiana and New York. This fungus spends part of its life cycle in the dung of large herbivores — for example, these spores have been found in mammoth poop. So, Gill and company argue, the abundance of its spores can be used as a proxy for the abundance of large herbivores!

From this evidence, it looks like their numbers in Indiana began to drop around 12,800 BC. But it wasn't until 11,700 BC that the abundance of *Sporormiella* had crashed to 2% of its original level. Interestingly, this is when pollen grains from broad-leaved trees such as ash and ironwood began to show up in lake-bottom sediments in substantial numbers. Gill and company argue that this change was a *result* of the population crash of megafauna that ate the leaves of such trees.

One curious fact is that most sources seem to date the Clovis culture only back to 11,500 BC. According to Gill and company, that seems to be near the *end* of the collapse of megafauna in America!

Here's one possibility that leaps to my mind: the archaeological record is too sketchy for us to see the Clovis people first showing up around 12,800 BC. And here's another: perhaps the first invading humans belonged to some pre-Clovis culture! There seems to be some evidence for this.

November 25, 2009

Can ants count? Maybe so!

- Robert Krulwich, Ants that count!, *Morning Edition*, National Public Radio, November 25, 2009.

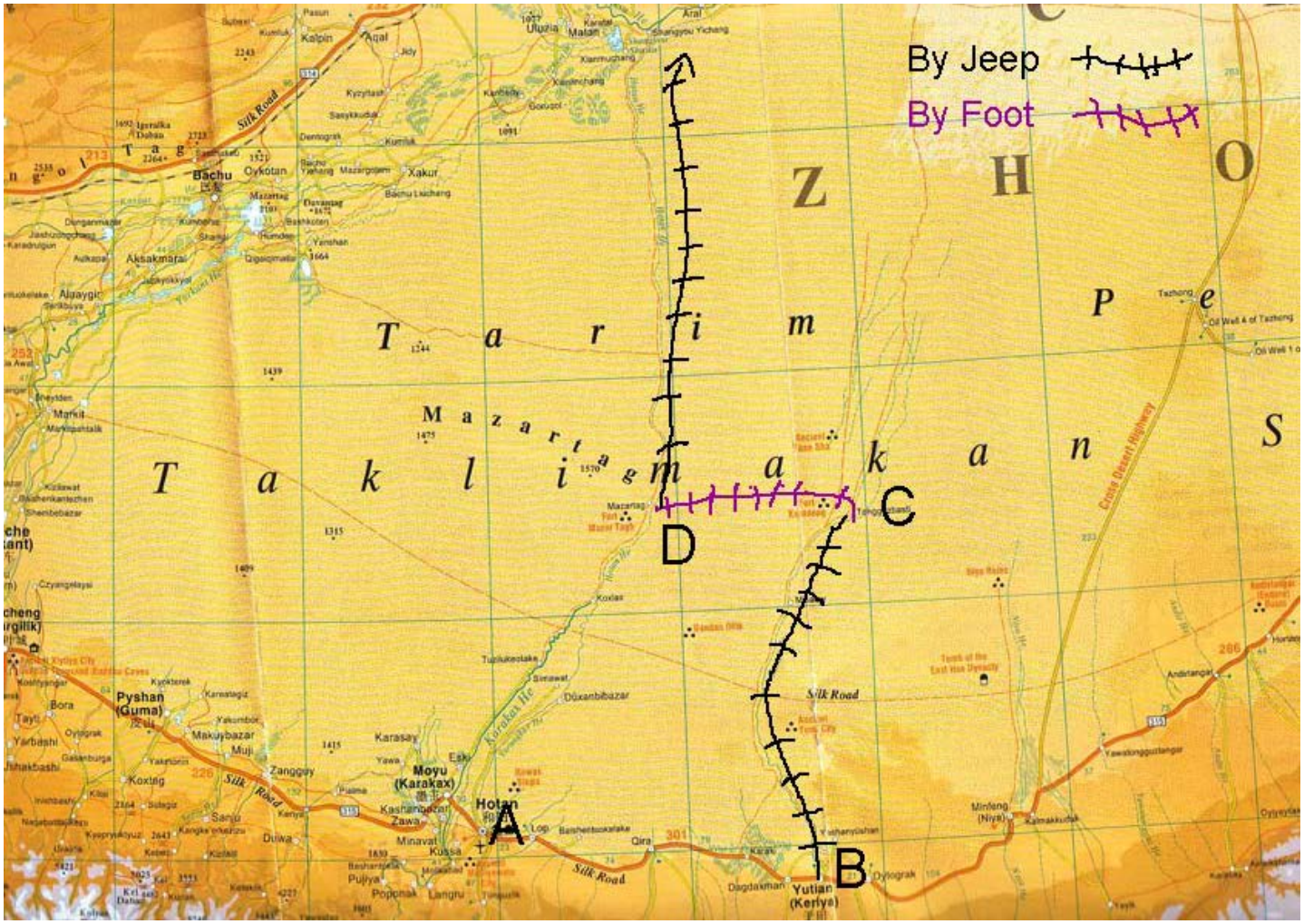
November 29, 2009

Yesterday we had Lisa's friend Lothar over for dinner. He went to Kashgar in October! He said I should go. This got me looking at Taklaman desert tours:

- Guide to Adventure and Expeditions, a private division under the China Xinjiang Kashgar Xinlu International Travel Services Co., Ltd, based in Urumqi. Here's the first of 3 Taklamakan Desert itineraries. A much longer and more romantic description can be found on their webpage:
    - Day 1 - Cross the Tuogart Pass and transfer to Kashgar.
    - Day 2 - Free day in Kashgar.
    - Day 3 - Leave Kashgar, head towards Khotan. Stop at Yarkand for 2 hours.
    - Day 4 - Switch your bus into jeeps and leave for Kerriya (Yutian County).
    - Day 5 - A hot and dusty drive to the last settlement in the valley, Tongguzbasti, where they set up camp.
    - Day 6 - Day for sightseeing in and around this village.
    - Day 7 - Set off trekking into the desert, accompanied by Uighur camel drivers and their animals.
    - Day 8 - Head west, lunch in the ruins of Karadong. Camp there.
    - Days 9-12 - For five days, trekking over sand dunes and "sand mountains" which are 60 to 70 metres high.
    - Day 13 - A final morning in the dunes, reaching the dried out Khotan River.
    - Day 14 - Meet up with transport, driving out of the desert, heading north along the river bed. One last night camping in the desert.
    - Day 15 - After a further 5 hours' driving, reaching the first greenery for a week. More and more farmland and villages appear en route to the junction of the Khotan and Tarim rivers. Finally arrive at Aksu. Hot bath and dinner.
    - Day 16 - Switch transport from jeeps to a bus and leave for Kuche. Stop for 2 hours on the way to visit one of the biggest and most famous Buddha Caves in China, Kizil Buddha Cave.
    - Day 17 - Start early and visit the ruin of Subashi.
    - Day 18 - Leave for Turfan and check in a hotel in Turfan in the evening.
    - Day 19 - A lazy morning in Turfan.
    - Day 20 - Free day in Urumqi; then fly to Bishkek the next morning.
- The Oriental Caravan. Again, you can see a longer trip description on their website, but here's the basic idea:
    - Day 1 - Bishkek. Arrive Bishkek, capital of Kyrgyzstan. (Hotel)
    - Day 2 - Bishkek. Morning city sightseeing. Afternoon free. (Hotel)
    - Day 3 - Naryn. Scenic drive to Naryn, the last town before the Kyrgyz / Chinese border. (Hotel/guesthouse)
    - Day 4 - Kashgar. Cross into China over the Tourgut Pass and drive to Kashgar. (Hotel)
    - Day 5 - Kashgar. Full day to explore Kashgar including the Abakh Hoja mausoleum and the Id Kah mosque. (Hotel)
    - Day 6 - Yarkand. Visit Kashgar's Sunday bazaar. Drive to Yarkand (190km). (Hotel)
    - Day 7 - Khotan. Morning drive to Khotan (278km). Afternoon explore Khotan. (Hotel)
    - Day 8 - Yutian. Continue to the small oasis of Yutian (180km). Visit Uighur village. (Simple Hotel)

Day 9 - Keriya. By jeep head north into the desert, following the Keriya River (approx 100km). (Camp)

- Day 10 - Tongguzbasti. Continue north to the remote village of Tongguzbasti, home to the 'lost tribe of the Taklamakan' (approx. 120km). (Camp)
- Day 11 - 16 Desert. Using pack camels and led by Uighur guides, trek through the Taklamakan Desert. En route, visit the archaeological site at Karadong Fort. (Camp)

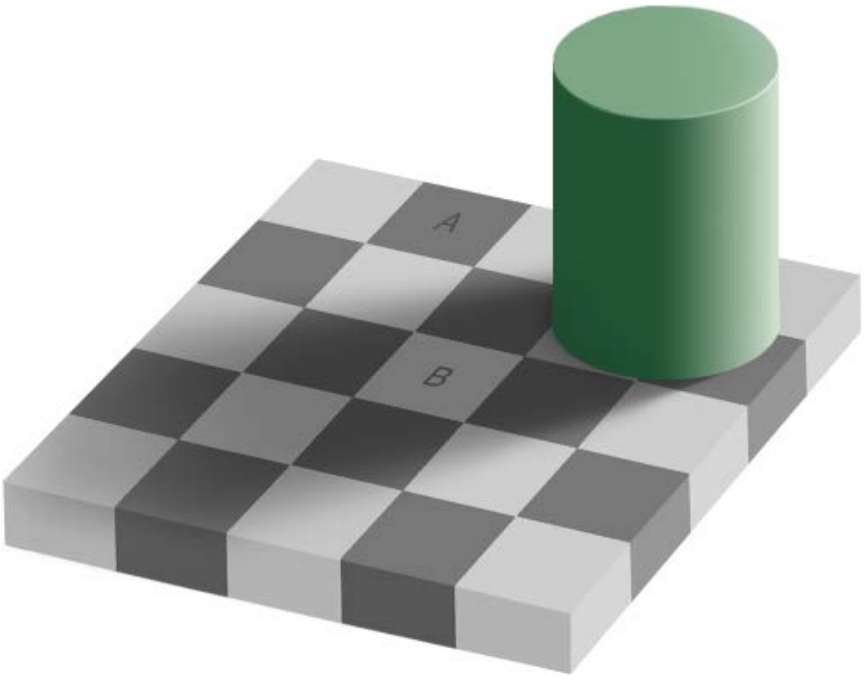


A = Khotan, B = Yutian, C = Tongguzbasti, D = Mazartagh

- Day 17 Mazartagh. Reach Mt. Mazartagh on the banks of the Khotan River. Visit Mazartagh Fort. (Camp)
- Day 18 - Kuqa. Drive along the Khotan River to Kuqa. (Hotel)
- Day 19 - Korla. Morning visit to Kizil Buddhist grottoes. Continue to Korla. (Hotel)
- Day 20 - Turfan Drive to Turfan. Afternoon sightseeing including Jiaohe ancient city. (Hotel)
- Day 21 - Urumqi. Morning sightseeing including Bezeklik and the Flaming mountains. Drive to Urumqi. (Hotel)
- Day 22 - Urumqi. Free day in Urumqi. Recommended visit to the Xinjiang Museum to see the Celtic mummies of the Taklamakan. (Hotel)
- Day 23 - Bishkek. Fly to Bishkek. (Hotel)
- Day 24 - Trip ends.

November 30, 2009

Are squares A and B the same color?



Yes! If you don't believe me, look at this, and then read the Wikipedia article about this illusion invented by Edward Adelson of MIT.

For a related illusion, try this.

For my December 2009 diary, go here.

What I see are the current devastation, the frightening disappearances of living species, be they plants or animals. Because of its current density, the human species is living in a type of internally poisonous regime and I think of the present, of the world in which I am ending my days, as this world that I do not love - Claude Levi-Strauss

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For my November 2009 diary, go here.

Diary - December 2009

John Baez

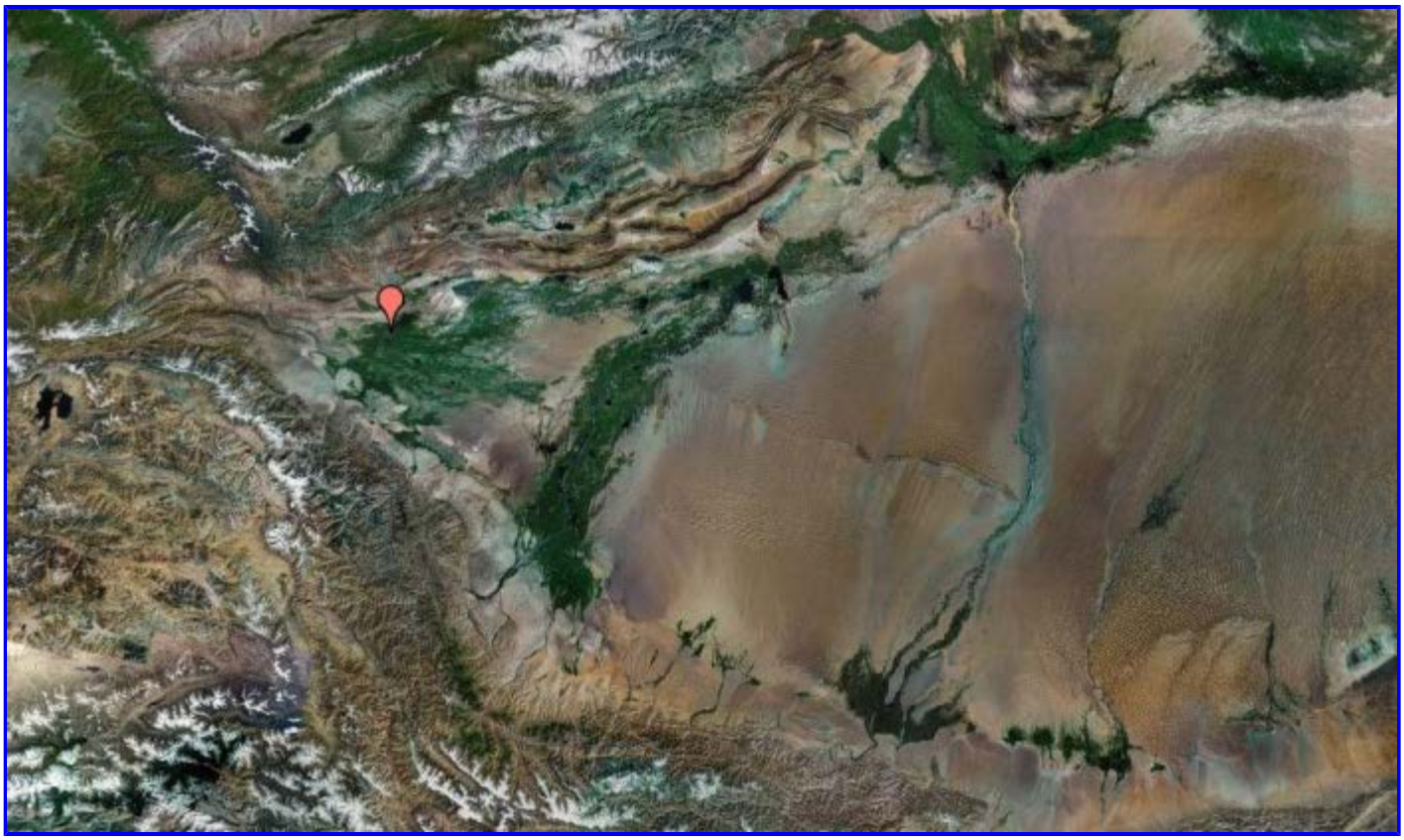
December 1, 2009

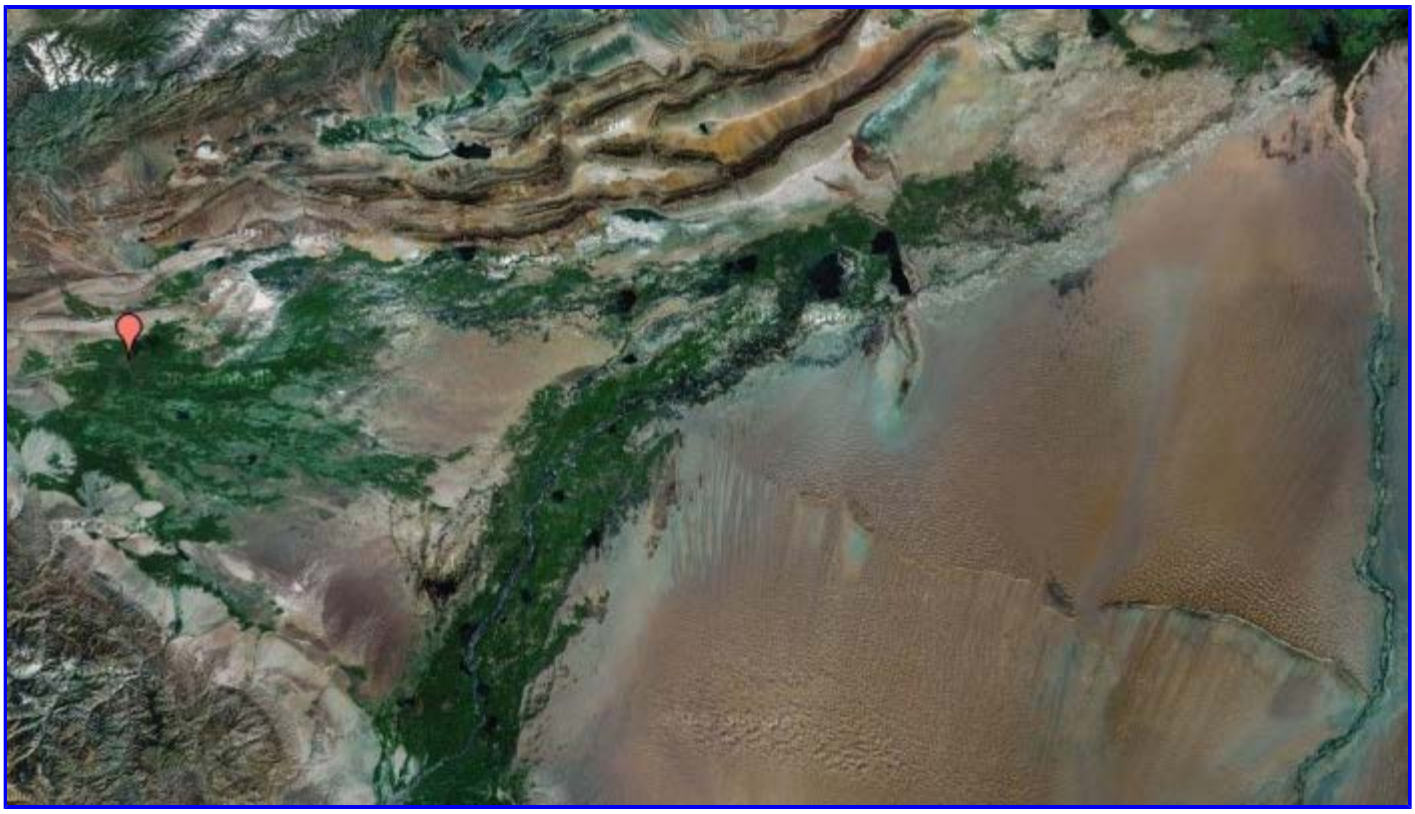
China plans to demolish 85% of the old city of Kashgar:

- A city, and people, at a crossroads, produced by Jeffery DelViscio, Michael Wines and Rogene Fisher with photos by Shio Fukada, May 25, 2009.

- Michael Wines, To protect an ancient city, China moves to raze it, *New York Times*, May 27, 2009.

Zooming into Kashgar on Google Maps, we see different things at different scales. First the immensity of the Taklamakan desert, then the lush green of the oasis fed by mountain streams, then the gritty urban landscape of a city of 350 thousand, and then the winding streets of the old town... and then children running through these streets, in a photo taken by Shiho Fukada:





December 2, 2009

I'm getting to really love the routine of stretching outdoors in the fresh morning air... and I can feel the difference. I used to be much more stiff and creaky, not just in the morning, but throughout the day. And now I've gotten over the feeling that the slightly painful feeling of stretching to ones limits is a bad thing... perhaps because I can see how each week I can stretch a bit more!

December 3, 2009

Tarim Desert Highway
photo by Sean Gallagher

I began pondering the Taklamakan Desert here in my November 19th and November 29th entries. Over a millennium ago, Kashgar was just one of many thriving towns along the Silk Road. But it seems the melting snow from the Kunlun and and Tien Shan mountains, which feeds the rivers that flow into this area, has been gradually diminishing over time. Many of these towns were abandoned as the desert encroached, and are now sand-buried ruins.

The Tarim Desert Highway, shown above, crosses the Taklamakan Desert from north to south. It is about 550 kilometers long. About 450 of these lie on shifting sand dunes. At the halfway point along the desert highway, there are a few restaurants and a gas station. Except for the workers there, the region is entirely uninhabited.

The above photo was taken by Sean Gallagher, who has written about desertification in China:

- Sean Gallagher, Desertification in China, Pulitzer Center on Crisis Reporting.
- Sean Gallagher, China's growing sands, audio slideshow, June 9, 2009. See also other slideshows.

December 4, 2009

Timbuktu

For centuries, Tuareg camel caravans have carried heavy blocks of salt from the mines in Taodenni to the city of Timbuktu. Now this tradition may be drawing to a close:

- Andrew Harding, Timbuktu's ancient salt caravans under threat, BBC, December 3rd, 2009.

Also read about the literary heritage of Timbuktu:

- Andrew Harding, Saving Africa's precious written heritage, BBC, November 30th, 2009.

It's being saved by libraries including the Ahmed Baba Institute.

December 5, 2009

Looking around for more information on the Silk Road, I blundered into this excellent blog:

- Jochi, Mongols, Ancient China and the Silk Road.

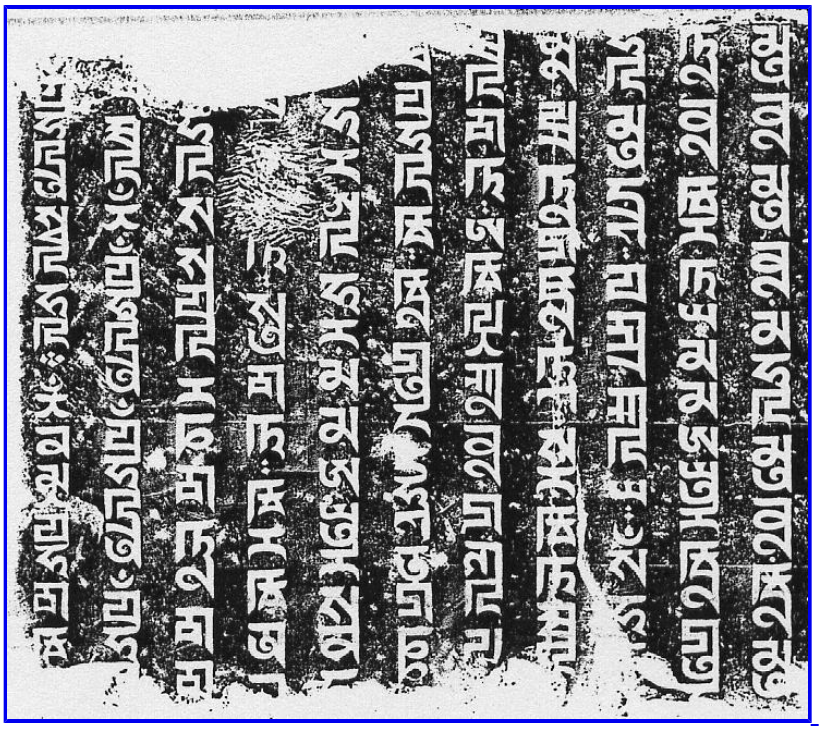
Like me, Jochi fell in love with the Silk Road after reading Peter Hopkirk's *Foreign Devils on the Silk Road*. Now he's digging deeper. A typical entry points out the series edited by Lisa's colleague Victor Mair: Sino-Platonic Papers. It's now free online!

Turfan was a cool place:

- Doug Hitch, *The Special Status of Turfan*, Sino-Platonic Papers, vol. 186.

The article begins:

> More than twenty languages are represented in the medieval documents found in Turfan, mostly in the early years of the twentieth century. Perhaps no other archeological area has offered up such linguistic bounty. Identified languages include Old Turkic, Chinese, Sanskrit, Sogdian, Middle Persian, New Persian, Parthian, Tibetan, Mongolian, Prakrit, Tumshuqese, Tocharian A and B, Bactrian, Khotanese, Hebrew, Syriac, Arabic, Tangut, Greek and Khitan. In addition there are at least twenty scripts attested with most languages attested in more than one. For instance, Old Turkic is found in the Brahmi, Manichean, Sogdian, Uyghur, Nestorian (Syriac), Tibetan, Runiform, Arabic and `Phag-spa scripts. For many of these languages, the documents are the oldest known samples on perishable materials. For some of these languages, the Turfan documents supply much of the information we have on them. The materials are highly valuable to several philological fields.



`Phags-pa Sanskrit inscription at Juyongguan

[...]

But Turfan is special in other ways as well. It was here that significant remains of a once vibrant Manichean community were discovered. Besides the artistic legacy of Manicheism found in frescos, painted cloth wall hangings, and manuscripts illuminations, there was the religious literature. Before this time, the doctrines of this once world religion — it was practiced from China and India to Spain and North Africa — were known only from polemicists like Augustine. Suddenly, scholars could hear members of this faith speaking from the past. Not only did they speak in seven languages, but apparently one voice is even that of Mani himself. Some of the written remains are copies of works penned, and illustrated, by the third century Babylonian-Persian saint. Here also were found Nestorian Christian churches and manuscripts in at least four languages. And the recent discovery of the Sogdian tombs in Xi'an has provided new information on Zoroastrian (Mazdean) burial customs in the east, and has led scholars to now see evidence for Zoroastrian burial practices in Turfan. But the main religion of Turfan in the first millenium was probably Buddhism which is represented by literary documents in more than ten languages. In the artistic sphere, medieval Turfan was equally cosmopolitan. The early scientific travellers were struck by the clear presence of Indian, Iranian, Chinese and Greek elements in sculpture, frescos, and other painting.

December 7, 2009

Rain! The first real rain since spring — a solid day's worth of rain, not just a sprinkle. We need it badly! I opened up the top of the compost bin to let it get moistened up.

Later, many other parts of the country got a harsh snowstorm:

Lisa flew to Hong Kong this evening. She's speaking at a conference on... happiness!

December 9, 2009

The Obama administration announced it will pay native Americans $3.4 billion dollars to settle a class-action suit. The US government has cheated tribes for more than a century of royalties for oil, mineral and other leases. Now, finally, over half a million people are getting some compensation. Congratulations to Elouise Cobell, the lead plaintiff, who has been working for this 13 years!

Elouise Cobell outside the offices of Kilpatrick and Stockton in Washington on Dec. 8, 2009.
AP Photo by Gerald Herbert

She was the Treasurer of Blackfeet Tribe based near Browning Montana - my father used to work on the reservation there. She discovered financial irregularities and started digging. She found out that native Americans were owed about $176 billion dollars of payments for mining rights (for example oil wells) and agricultural rights for their land — debts that were the result of *signed agreements* between tribes and the U.S. government.

She wound up settling for a small fraction of this amount: $3 billion. She wrote:

> In 1996, we embarked on a journey to end decades of mistrust, suspicion and apprehension about the federal government's management of Individual Indian Money accounts. I was among the more than 500,000 Indians across the nation with funds in such an account, and I did not know and could not find out how much money I had, where it came from, how it was being invested, nor how or whether it would ever reach my pocket.
>
> As a banker myself, I knew that was not right. Who would turn her paycheck over to a banker hundreds or thousands of miles away, giving a faceless, unknown person sole authority over how that money is invested, as well as the ability to decide how often she can withdraw and use it to meet her family's needs? Only someone given no other choice.
>
> When we filed this case, I thought it would be 2-to-3 years of litigation. I believed all we had to do was expose the lack of accounting by the government, everyone would come to agreement over the issues, and we would settle the case. I expected to have a settlement 10 years ago; instead it turned into a battle of 14 years.
>
> We have faced Secretaries of the Interior and Treasury in three presidential administrations to arrive at what we hope is this long journey's final destination. Today we have an Administration that is listening to us, and an Administration willing to admit the wrongdoings of the past and settle this matter to benefit those who had to do without access to their own money for way too long.
>
> Although we have reached a settlement totaling more than $3.4 billion dollars, there is little doubt this is significantly less than the full amount to which individual Indians are entitled. Yes, we could prolong our struggle and fight longer, and perhaps one day we would know — down to the penny — how much individual Indians are owed. Perhaps we could even litigate long enough to increase the settlement amount.
>
> Nevertheless we are compelled to settle now by the sobering realization that our class grows smaller each year, each month, and every day, as our elders die, and are forever prevented from receiving their just compensation. We also face the uncomfortable, but unavoidable fact that a large number of individual money account holders currently subsist in the direst poverty, and this settlement can begin to address that extreme situation and provide some hope and a better quality of life for their remaining years.
>
> I am particularly happy to see recognition of the need for funds to be set aside to promote higher education opportunities for Indian youth. When Indian parents and grandparents talk to me about this suit, they always speak of how they will use the money they receive to improve their children's and grandchildren's lives. I am hopeful that these funds can lift a generation and help break a cycle of poverty that has held too many Indian families and individuals in its grip for too many generations.

In a related story, watch this video essay on an 1.8-million-acre area that had been claimed by both the Hopi and Navajo in northeast Arizona, where all development has been frozen for 40 years. In May, President Obama repealed this freeze! But it's taken a toll. Also read the accompanying story:

- Barbara Davidson and Albert Lee, Frozen land, forgotten people, *LA Times*, November 5, 2009.
- Kate Linthicum, Trying to rebuild after 40 frozen years, *LA Times*, November 5, 2009.

December 11, 2009

More rain last night!

As the big United Nations Climate Change Conference in Copenhagen lumbers on, don't forget the melting Arctic:

- Alun Anderson, A final warning from the Arctic, *New Scientist*, November 2009.

Stream of meltwater washing down a moulin in Greenland
Photo by Alun Anderson

December 12, 2009

It rained today again... pouring!

(It doesn't rain much here. On days when I don't say it's raining, it doesn't mean I'm bored of the idea of rain. It means it's dry.)

Tevian Dray and Corinne Manogue are visiting southern California. They came by today, along with my grad student John Huerta, and we talked about the octonions, the exceptional Jordan algebra, spinors in 10d spacetime, and E6.

Then we went to Tio's Tacos for dinner.

December 13, 2009

Cloudy and cool but not rainy. Today we talked about the magic square, and then Corinne and I made dinner.

December 14, 2009

Sunny again. I began the day working on my paper with Paul-André Melliès. Then John, Corinne and Tevian came over. We talked about the magic square and generalizations of the 3-ψ's rule. Then we went to dinner at a Middle-Eastern restaurant.

Some news today: computer technicians found 22 million emails that the Bush Whitehouse 'lost':

- Don Gonyea and Robert Siegel, 22 million 'lost' Bush-era e-mails recovered, National Public Radio, December

14, 2009.

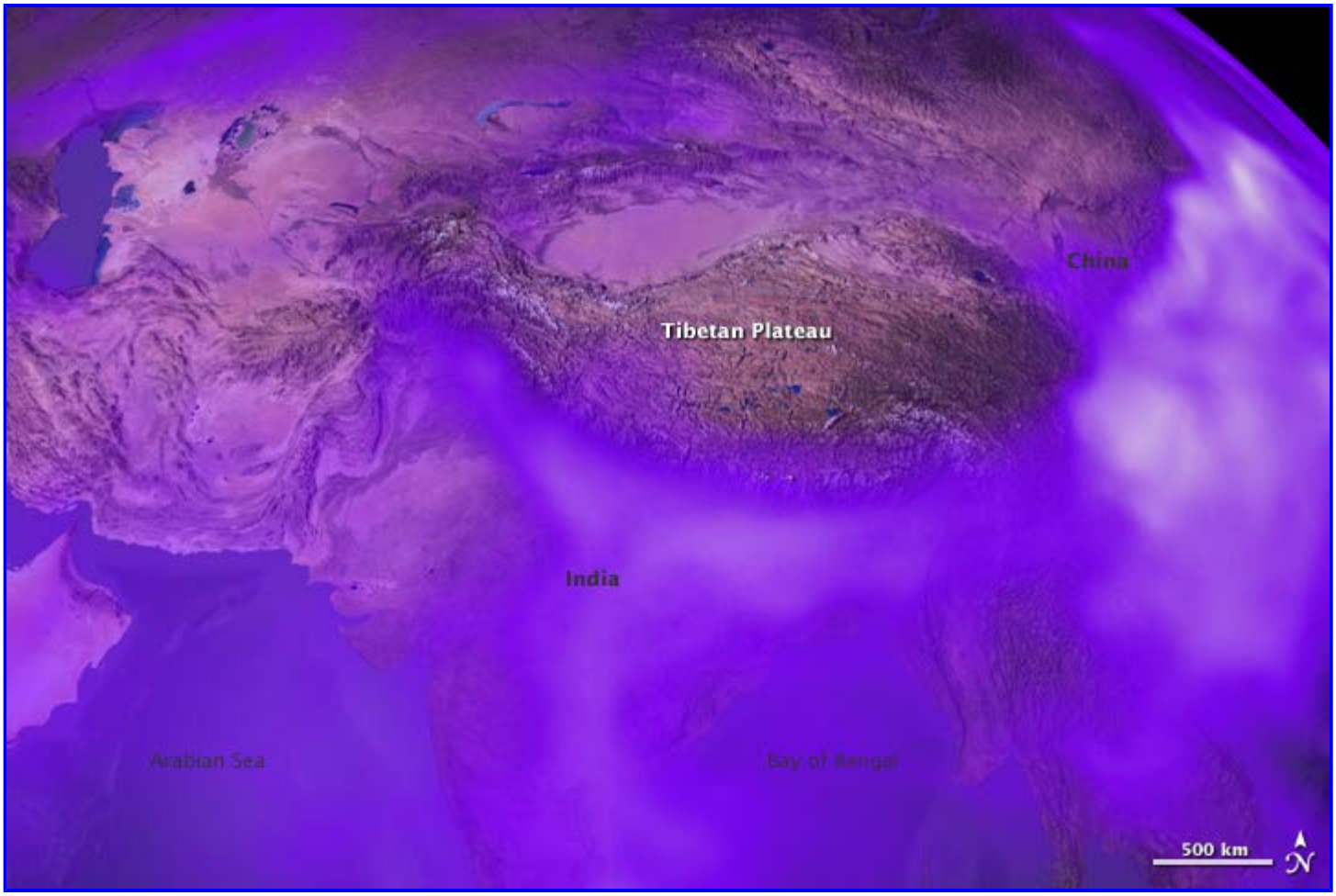
Meanwhile, the really ***big*** news — the news that could decide our future — is the wrangling going on in Copenhagen:

- Michael Von Büow, Poor countries agree to resume climate talks, Climate Change Conference, December 14, 2009.

December 15, 2009

Here's an interesting report on the Tibetan plateau, which I received as a kind of Christmas present from my great friend Oz:

- NASA, Black soot and the survival of Tibetan glaciers.



Glaciers on the Tibetan plateau are melting faster than global warming alone can account for. Why? It seems that soot from air pollution in Asia, especially India, is to blame. The white clouds above indicate — somewhat paradoxically — black soot. The highest concentrations of soot occur over the densely populated coastal plains of China. But there's also a lot over India, and it washes over the southern arc of the Tibetan Plateau. You can watch a video of this.

You don't care about Tibetan glaciers? Well, the Yangtze, Mekong and Indus rivers start there, so millions of people depend on them!

For more, try:

- J. Hansen, Science briefs: survival of Tibetan glaciers, NASA GISS Website, December 2009.
- Glaciers in and around Tibet shrink at alarming rate, *Thaindian News*, February 23, 2009.

December 20, 2009

In his essay 'The Wisdom of Rats', Charles Bowden writes about the lands near the border of the US and Mexico:

> If human marks matter, there are thousands of years of history on this creek, and if life matters, there are millions of years, and if reality matters, the creek is a recent wrinkle on the face of eternity. History here has been mainly a series of one-act plays — human communities enter with cultures formed in other environments, flourish for a spell, and then recede. Modern American and Mexican history insists it is the final act, and that its script will now play out here until the end of time. But as the nations shout these beliefs, the ground underneath them and the sky above them turn a deaf ear. We are dancing to the edge of life and we now move through the forests of dread and what we fear, really fear, is not some other nation conquering our plains and mountains and deserts, no, no, what we fear is that someone or something will do to us exactly what we have done to the buffalo, and to the mounted warrior on horseback with that lance and bow, what we have done to the rivers and the trees and the fine native grasses that first fell under our footsteps as we ventured into the bewitching and yearning ground.

December 21, 2009

Today the Russian Communist Party called for a moratorium on criticizing the murderous psychopath Jozef Stalin, since it's the 130th birthday of this vile monster. "We would very much like for any discussion of the mistakes of the Stalin epoch to be silenced today, so that people could reflect on Stalin's personality as a creator, a thinker and a patriot," wrote Ivan Melnikov, the Communist deputy speaker of the lower house of parliament. This might seem merely a sick joke, given that Stalin's foul deeds were far from "mistakes" — but unfortunately, it's part of a trend encouraged by Vladimir Putin and others.

So, let it be remembered:

> His forced collectivisation of agriculture cost millions of lives, while his programme of rapid industrialisation achieved huge increases in Soviet productivity and economic growth but at great cost. Moreover, the population suffered immensely during the Great Terror of the 1930s, during which Stalin purged the party of 'enemies of the people', resulting in the execution of thousands and the exile of millions to the gulag system of slave labour camps.
>
> These purges severely depleted the Red Army, and despite repeated warnings, Stalin was ill prepared for Hitler's attack on the Soviet Union in June 1941. His political future, and that of the Soviet Union, hung in the balance, but Stalin recovered to lead his country to victory. The human cost was enormous, but was not a consideration for him.
>
> After World War Two, the Soviet Union entered the nuclear age and ruled over an empire which included most of eastern Europe. Increasingly paranoid, Stalin died of a stroke on 5 March 1953.

December 24, 2009

Asked why he left fame and fortune to return to his poor hometown in Mali, the great guitarist Ali Farka Toure said: "That life out there, it was like dried crap. It didn't stick to my shoes."

December 25, 2009

Lisa and I went to see the movie *Avatar*. While the premise is fundamentally silly — people are sending spaceships to another solar system to mine "unobtainium", on a world that has floating mountains, and the natives manage to beat off the invading heavily armed humans using little more than spears, bows and arrows, and some flying reptile-like creatures — other things about the movie made it well worth seeing. It was in 3d, with lots of motion-capture acting to produce realistic 10-foot-tall blue aliens! That sounds awfully kitschy. But it was well-done: it really did create the

experience of an alien world. And the experience of putting on 3d glasses, leaning back and sinking into this strange world cleverly mimics the immersive experience undergone by the main character, who gets neurally linked to one of these 10-foot-tall blue aliens.

December 29, 2009

A lot of American documents from World War II are still classified. Historians can't get to them. But today President Obama asserted that "no information may remain classified indefinitely."

More importantly, he signed an executive order establishing a new National Declassification Center at the National Archive to speed up the declassification of documents. The accompanying presidential memorandum says:

> Under the direction of the National Declassification Center (NDC), and utilizing recommendations of an ongoing Business Process Review in support of the NDC, referrals and quality assurance problems within a backlog of more than 400 million pages of accessioned Federal records previously subject to automatic declassification shall be addressed in a manner that will permit public access to all declassified records from this backlog no later than December 31, 2013.

He also got rid of George W. Bush's rule that allowed spy agencies to veto decisions by an interagency panel to declassify information. Instead, they'll have to appeal to the president.

All this is great until we get another president like Bush. Luckily Obama said that he's looking forward to recommendations from a study that's supposed to "design a more fundamental transformation of the security classification system".

- Ari Shapiro, Executive order reduces total of classified papers, *Morning Edition*, National Public Radio, December 30, 2009.

For my January 2010 diary, go here.

The qoz *is dotted with villages; compounds of grass with straw-roofed huts, which blend in with the color and texture of their surroundings. These works of man are pinpricks against the background of the enormous dimensions of the range-lands, for this is a place where humankind has wrought little of permanence on the landscape, where nature, by sheer size and power, has resisted any encroachment on its autonomy. As I travelled, I felt myself becoming totally immersed in my environment....*

It was a world existing within its own time span, and all but oblivious to the outside. I never regretted my decision to cross it by camel. - Michael Asher, *In Search of the Forty Days Road*

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