THE SCIENCE CREATIVE QUARTERLY ISSUE TWO PART THREE OF SIX AUGUST 8TH 2005 PING!

Our masthead, we think, will be forever evolving, although at present we have two Daves, a Bethany, a Caitlin, a Stephen, a Claire, a Russell, an Alex, a Justin, and Andrew and a Caley

Tom, Moebius and Richard continue to be happy to help.

Maybe Willow?

We did follow up on Chris and his friends, and for now, we know that Chris is on board.

Isn't Jen really good at drawing pictures?

Our exotic sounding Azar is sort of still with us, but involved with a different project that will likely have an affiliation with the SCQ later this summer.

Email us at **tscq@interchange.ubc.ca**

BECAUSE IT IS SUMMER AND BECAUSE WE ARE LAZY: A FEW SIMPLE LINES TO BRING YOU UP TO SPEED.

What is the status?
The site is now doing reasonably well.

Can you state the central thesis?
In which this will be a place for those that crave and wish to submit literary science pieces of any shape, size or form.

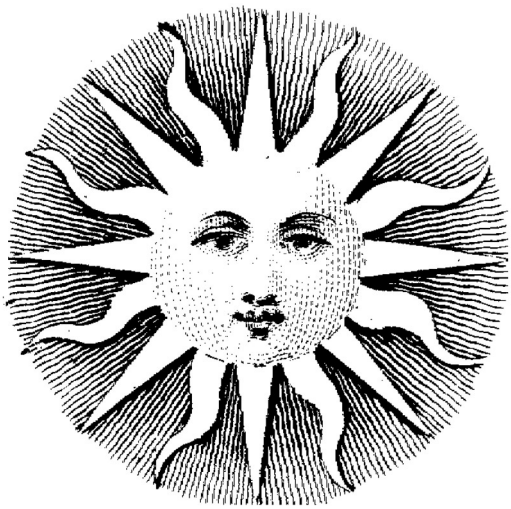
What is your hypothesis?
There are two basic hypotheses which can be summarized as follows:

i. That the vast hordes of closet science geeks will unite and make this venture a roaring success. Pity those that stand in our way.

or

ii. That, at the end of it all, nobody really gives a shit. The venture will burn that slow yet lucid death to obscurity.

Can I submit something?
Yes, of course! -- Please refer to the submission guidelines.



SHORTSTOP PROVIDES HUNTINGTON'S CLUES

By David Secko

A debate is going on in Huntington's research about whether the hallmark protein aggregates found in the brain of patients actually cause the disease. Now, a new "shortstop" may have found part of the answer.

But this shortstop isn't an infielder. It's a new strain of mouse, one with a mutation expected to cause neurodegeneration -- since it's tailored to make large amounts of the above protein aggregates -- only it doesn't.

Shortstop mice were recently created by Elizabeth Slow and colleagues at the University of British Columbia. And their unexpected ability to resist neurological damage is causing their creators to suggest the debate is over: protein aggregates do not seem to be toxic in mice.

"This [shortstop] finally ends the debate, showing that aggregates in vivo are not causative of illness," says Michael Hayden, director of the Centre for Molecular Medicine and Therapeutics at UBC and senior author of a paper describing the mice.

An end to the debate could be important for the future development of drugs to treat Huntington disease, since such drugs are often chosen for their ability to inhibit aggregate formation. Shortstop mice suggest this method may not give the most useful compounds, says Hayden.

Aggregates became a big part of Huntington's research around half a decade ago when they were found in the brains of patients. They are made of a mutant version of the protein huntingtin and can be easily seen under a light microscope.

"Huntingtin aggregates were only seen in the patients with the illness," says Hayden, "so people thought it was the cause." However, it was not altogether clear whether huntingtin aggregates are in fact toxic to the brain, or are simply an indicator of some other pathological process.

Slow and colleagues actually set out to investigate this question by creating a strain of mice that made more of the mutant huntingtin protein. Indeed, they did create such mice, called YAC128, which produces huntingtin aggregates.

But, in a fluke, they also created shortstop.

"We've been creating an animal model for this illness and to do that you have to take a very large piece of DNA and inject it into a mouse," says Hayden, "occasionally the DNA shears and breaks into pieces."

This is what happened in the creation of shortstop, which although it makes the same amount of huntingtin as YAC128, the version it makes is a smaller protein. Nevertheless, this smaller version still contains the mutation associated with the disease, suggesting these mice should look the same as YAC128 mice.

The serendipitous creation therefore allowed Slow and colleagues to compare YAC128 mice to shortstop mice. They found that both strains formed huntingtin aggregates (these show up as inclusion bodies in neurons). YAC128 mice also had neuronal dysfunctions, in the form of

decreases in brain weight and the loss of neurons. However, shortstop mice had no ill effects, despite the presence of huntingtin aggregates in their brains. The results of the study appear in the August 1, 2005 online edition of PNAS.

The results with shortstop mice show that the presence of aggregates and the huntingtin mutation are not sufficient to cause the disease, says Hayden.

However, Hayden does caution that the truncated huntingtin protein in shortstop mice may act slightly differently than the full length version. "The results don't exclude all the forms of protein folding that can cause the disease," he says.

Nevertheless, the work makes you question using inclusion bodies of huntingtin as a biomarker for testing drugs to treat Huntington's, says Hayden,

"Instead we need to look for news ways to screen for these drugs," he says.

MONKEY VS. SEA MONKEY: WHICH IS RIGHT FOR YOU?

By Steven Seighman

When I was in grade school, my best friend had a monkey. I don't know what kind it was, but I can tell you this: My friend's parents had a Kung-Fu outfit for this monkey. His name was Bentley and he was kept is a large cage in the basement. When you got too close to his cage, he would grab at your shirt and tear it. But, if you were my friend's dad, he would let you get into the cage and wrestle him. Bentley had some scrap in him, that's for sure. I used to love watching the two of them go at it. It was like seeing a man and a small, furry Bruce Lee in a cage match. The dad, who was a Golden Gloves champion in the Navy, took it easy, though, because he saw the monkey, as did everyone, more like a very excitable, very challenged little boy…who was only let out of his cage for parties.

Recently, I was looking for a pet of my own because I was sad and lonely in New York City. I'm allergic to dogs and cats, so I knew I needed something else, something less traditional. Iguanas crossed my mind. So did the Mexican Hairless, but neither seemed to have any personality or warmth. Then, I remembered Bentley. Was I allergic to him? I don't recall sneezing or itching when I was watching my friend's dad put him in a headlock. And even if I was, would it bother me that much if I kept him in a cage in my second bedroom? I don't go in there too often, so I wouldn't die or anything. I just wouldn't hang out in there and spar with him. But it would smell. Oooh man do I remember the way that basement smelled. Of course, they had a raccoon down there, too.

Would I have to walk my monkey? That could be a problem in this city, what with all of the permits I wouldn't have and all. And I'm sure, if he was as radical as Bentley, he wouldn't take kindly to those annoying little dogs that look like rats wearing coats and sneakers.

The idea of owning a monkey, which I thought could double as a kind-of-human friend, was still very appealing to me, regardless of all of these things. So I began to price them. As it turns out, monkeys are expensive! The cheapest one I could find online was $5,000!

Suddenly, having a monkey quickly became unfeasible. So, I did the next best thing: I bought Sea Monkeys.

After a few weeks, I am still happy with my choice. Sure, Sea Monkeys lack the animation of a primate, but they float around sometimes and are waaaay easier (and cheaper!) to maintain.

If you are considering getting a monkey, but can't decide if it's for you or not, consider going the Sea Monkey route. Here's a Tale of the Tape that might help you to make up your mind:

Average Weight:
Monkey: 8.8-20 lbs.
Sea Monkey: Virtually nothing!
Winner: Tie – depends on your space

Cost:
Monkey: At least $5, 000
Sea Monkey: $5, tops
Winner: Sea Monkey, of course

Maintenance:

Monkey: Must clean filthy cage regularly
Sea Monkey: None
Winner: Sea Monkey!

Diet:
Monkey: Fruit
Sea Monkey: Specially developed "Sea Monkey Food" (included in box!)
Winner: Monkey. You can share!

Personality:
Monkey: Can be pretty grumpy, but can also funny!
Sea Monkey: Hard to tell
Winner: Tie. Depends on how much interaction you need

Poo-flinging:
Monkey: Yep
Sea Monkey: Do they even make this to fling?
Winner: Sea Monkey, hands down

Service to Science:
Monkey: For sure. Primates are in.
Sea Monkeys: Would you believe, a role in toxicology? [1,2,3]
Winner: Too close to call – even.

Dressability:
Monkey: Oh yes
Sea Monkey: Not Really
Winner: That snazzy monkey!!

Environment:
Monkey: a cage in your second bedroom/basement/yard
Sea Monkey: a bowl of water, anywhere
Winner: Tie – Again, depends on your space

As you can see, it's a pretty close call between these two. I suppose your decision will come down to how invested you would be in owning a pet…and whether or not you feel like dodging flung poo.

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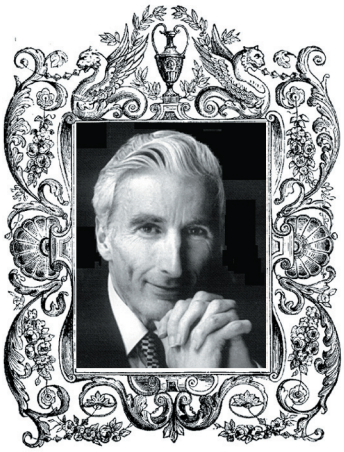
5 HOT SCIENCE-Y GUYS.

by Melissa Bell

1. Sir Martin Rees



I don't know if this guy's straight or gay, and I don't care. He's got a certain polished appeal going on, and he's the freaking Astronomer Royal for crying out loud. What does that mean, you ask? How does that make him any more special than any other astronomer besides the Royal part? Well, look, if I have to explain that, it would mean one of us would have to do some research. And I'm tired. I just got in from a party. But I do know that this guy's been busy studying multiuniverses and I like to just sit and think about those kinds of things every once in a while, usually every Friday or Saturday night, even if QEII probably doesn't even know who he is when he shows up at her Christmas brunch or whatever she puts "her people" through every year. I mean, who doesn't like to entertain the possibility that while we're stuck in this one stupid world eating another boring salad without cheese and struggling to keep our skirt size in the single digits, somewhere in some other universe Bono is President, and I'm making a fantastic risotto for me and Brad Pitt and Richard Feynman.

2. Brad Pitt

Nice try, Bell, you're thinking. Way to inappropriately segue the Bradmeister into the list. Well

you just pipe down and leave me alone. The Bradmeister (as if I would ever, ever call him that, thank you very much, unless he wanted me to) is apprenticing as an actual architect (with some cat named Frank Gehry or whatever). How many other actors can you name over the age of 40 who go and try to learn something constructive during their downtime instead of buggering off and "nurturing" their other "dimensions" in C-grade rock bands and Krazy Kults (I'm looking at both of you misters, Crowe and Cruise). So does architecture qualify as a science or an artform? Look, why are you so bitter about Brad Pitt anyway? Jealous? Haha, thought so! Well just thank your lucky stars that crap movies leave the premises after a week or two. Crap buildings can stick around for a lifetime.

Good for all of us that Mr. Pitt is pursuing his dream of trying to beautify the planet through proper design engineering so he just doesn't take all that money of his and mess up the landscape building kooky weird stuff like the above.

3. Dr. Gregory House

Okay, so technically this guy isn't even real; he's a TV character on a medical series that debuted this year. But damn, this guy is very hot in that quietly gorgeous British way. Oh yeah, the actor is a Brit. Remember Blackadder? Yes, that's him - no not the Mr. Bean guy, the other one. No, I didn't know it either until I was Googling the show, and then I gave myself a good smack on the forehead. (Hey, that's two British guys on the Hot list and neither one of them is Prince William or Beckham.) Anyway, other than the quietly gorgeous and great-at-not-sounding-British thing that is Hugh Laurie, the character of Dr. Gregory House is hardly Patch Adams (thank heavens). He's a drug addict, limps horribly (i.e. not going to be much help at the cottage), always has a smart-ass remark about everything, and by the looks of that beard, his hygiene is probably better studied at a distance. Still. We love the bad boys, don't we, ladies? So he's hot. Watch the show. It's good, too.

4. Alton Brown

It's nice how he explains things. Yes, his show, Good Eats, is unbearably goofy at times, and for such a smart guy, I find myself wincing with discomfort at the bad puns and contrived infotainment shenanigans. Alton, give it to us straight up and on the rocks, babe! It's you who's the twist, mister! Can it with the cornball and union-scale supporting cast of cheesy actors and just do your thing. This is one guy who knows what he's doing. Yes, it happens to be cooking, and if you don't think cooking involves a degree of scientific knowledge, then chances are you wind up having to eat out a lot or depend on others to feed you. How sad. But Alton will explain the magic of food preparation to you, my hungry friend. Using simple diagrams, and nicely suitable props, Alton will tell you exactly why you can't get any yolk in your soon-to-be-whipped egg whites so that the next time you brag on and on about how you could probably make just as good an angel food cake as your brother if you had a recipe, you won't be so darn careless and ruin somebody's birthday party, you hapless fool. Anyway. Follow his simple rib eye steak methodology to the letter, and it will improve every quality of your life forever. Jeez, what more does anybody really want out of anybody?

5. Richard Feynman

Was this guy adorably sexy or what? How many Nobel laureates can you say that about? Well

here's a guess: zero. But you can say it about Professor Feynman. Too bad he's dead, is another thing I say. He could juggle, play the bongos, and safecrack with the best of them. Students must have thrown panties at Dr. Feynman's lectures. Or at least thought about it. But even if they did, you know he'd be so charming and cool about it and work those thrown panties into his discussions on nanotechnology, and the next thing you know, you would spend all the rest of the next week learning everything you possibly could about everything nanotechnological in the world, just so that maybe, just maybe, if you were drunk enough, but obviously not too much – you're a hardworking student, remember? - you'd have the courage to raise your hand at the next class and hopefully, hopefully ask him an intelligent question. And he would respond by saying, "Well, really, that's one of those things that's best discussed over dinner." And the class would laugh. But he would hold your gaze while you bit your lip, while you wondered whether or not he was really serious…sigh…

(Just don't think about the fact that Alan Alda once portrayed this man in a play. Trust me. It strips all the hotness right out of the fantasy.)

Bonus Item!
Marc "Sparky" Bartolomeo

Should be Bartor*omeo* doncha think? Oh wait. You're still wondering "Who the hell is this guy?" Relax, I'll tell you. He's the electrician on TLC's "In a Fix". Well, you should watch it. Yes, he's an electrician. (Electricity. That's science, so leave me alone, will you please?) His bio says he also enjoys cooking/baking and going to garage sales. If he had said his favourite movie is "Gone With the Wind" I would have to assume he's probably married to someone named Jeremy or Stefan, but the bio does mention a former girlfriend (who once entered him in an underwear contest) so I'm going to assume he's straight, okay? Which means he's pretty much the World's Most Perfect Man. Unless you're gay. Which means you probably think he's gay because all the gay men I know think everybody's gay. Well whatever. Say what you will about whomever. I love Sparky. Let's both love Sparky.

Did Not Make the Cut:
Bill Nye

Bill Nye – Well he is The Science Guy and all that. But the bowtie look isn't sexy, unless you're Brad Pitt and you're wearing a tux. Just because you're all science-y and stuff, you don't have to look like you spend more money on Battlestar Gallactica trading cards than you do on hair product. Sorry, but Albert Einstein gets on this list before The Science Guy does. (And Mr. Nye's website bugged me a LOT. Jeez. No, I don't want to download anything, thank you. Stop making it do all that crazy stuff. Damn, that's so annoying!)

BT CORN: IS IT WORTH THE RISK?

By Hardy Hall

Bt corn, a genetically modified organism (GMO), has been both the poster-child and thorn-in-the-side of the plant biotechnology industry from the late 1990's to present. There are several versions of this transgenic crop that each have a gene from an insect pathogen, *Bacillus thuringiensis* (Bt), which encodes a protein toxic to the European corn borer (ECB), an insect pest that eats and destroys corn stems (see Figure 1). Bt corn has proven effective in reducing crop damage due to ECB, yet public opposition to Bt corn has escalated amid fears of human health and environmental risks associated with the production and consumption of Bt corn.

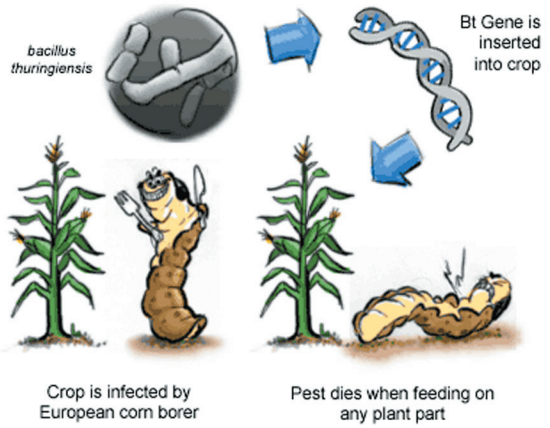


Figure 1. Engineering resistant corn. Following the insertion of a gene from the bacteria Bacillus thuringiensis, corn becomes resistant to corn borer infection. This allows farmers to use fewer insecticides

History of Bt

Bt corn draws its humble origins from France, where in 1938 *B. thuringiensis* bacteria was grown in large quantities and sprayed on corn crops to prevent ECB damage[1]. Artificial selection of Bt strains has led to the successful targeting of many insect pests. Because no toxic effects of Bt on humans have been detected in its seventy years of use, it is now considered an acceptable pest control measure for the organic food industry[2]. To this day, Bt is an important part of many integrated pest management strategies. The success of the Bt spray has been limited because the bacteria cannot survive for very long on the plant's surface. Bt is particularly ineffective at controlling ECB because these insect live most of their larval life inside the corn stem, not on the surface: sprays are only effective when the insects are starting its journey into the stem. Thus, a means of penetrating corn tissue with Bt is required to offer long-term anti-feeding measures against tunneling insects such as ECB.

Mechanism of Bt toxicity

Researchers investigated how this bacteria kills particular insects and discovered that Bt has two classes of toxins; cytolysins (Cyt) and crystal delta-endotoxins (Cry)[3]. While Cyt proteins are toxic towards the insect orders Coleoptera (beetles) and Diptera (flies), Cry proteins selectively target Lepidopterans (moths and butterflies). As a toxic mechanism, Cry proteins bind to specific receptors on the membranes of mid-gut (epithelial) cells resulting in rupture of those cells[4]. If a Cry protein cannot find a specific receptor on the epithelial cell to which it can bind, then the Cry protein is not toxic. Bt strains will have different complements of Cyt and Cry proteins, thus defining their host ranges[5]. The genes encoding many Cry proteins have been identified providing biotechnologists with the genetic building blocks to create GM crops that express a particular Cry protein in corn that is toxic to a particular pest such as ECB yet potential safe for human consumption.

Making Bt corn

As it turns out, nature has its own biotechnologist called *Agrobacterium tumefaciens* which induces the growth of tumours on woody plants. These tumours are engineered by *A.tumefaciens* to produce a special food for the bacteria (opines) that plants normally cannot make. These tumours arise from a unique bacterial transformation mechanism involving the Ti-plasmid which coordinates the random insertion of a subset of its DNA (t-DNA) containing opine synthase genes into a plant chromosome[6] (see Figure 2). By replacing portions of the t-DNA sequence with genes of interest (such as Cry), researchers have been able to harness this transformational mechanism and confer new traits to many flowering plants including grasses such as corn7 and rice[8]. Cry-transformed corn varieties, called 'Bt corn', produce sufficient levels of Cry proteins to provide an effective measure of resistance against ECB and are now widely grown in North America.

The promise of this technology has been largely overshadowed by concerns about the unintended effects of Bt corn on human health and the environment. Cry protein toxicity, allergenicity, and lateral transfer of antibiotic-resistance marker genes to the microflora of our digestive system threaten to compromise human health. Despite these alarming possibilities, the risks to human health appear small based upon what is known about the bacterial endotoxin, its specificity, and confidence in the processes of plant transformation and screening[9]. The task of determining the levels of such risks, however, are immense. Human diets are complex and variable. How can we trace the acute or chronic effects of eating GM ingredients when they are mixed in with many other foods that may also present their own health hazards? It is even more complicated to determine the indirect risk of eating meat from animals raised on transgenic crops. These tests take time, and the results of clinical trials are not always clear-cut. It will likely take decades before we can know with any certainty if Bt corn is as safe for human consumption as its non-GM alternatives[10].

We currently know very little about the actual ecological risks posed by Bt corn. Bt corn may be

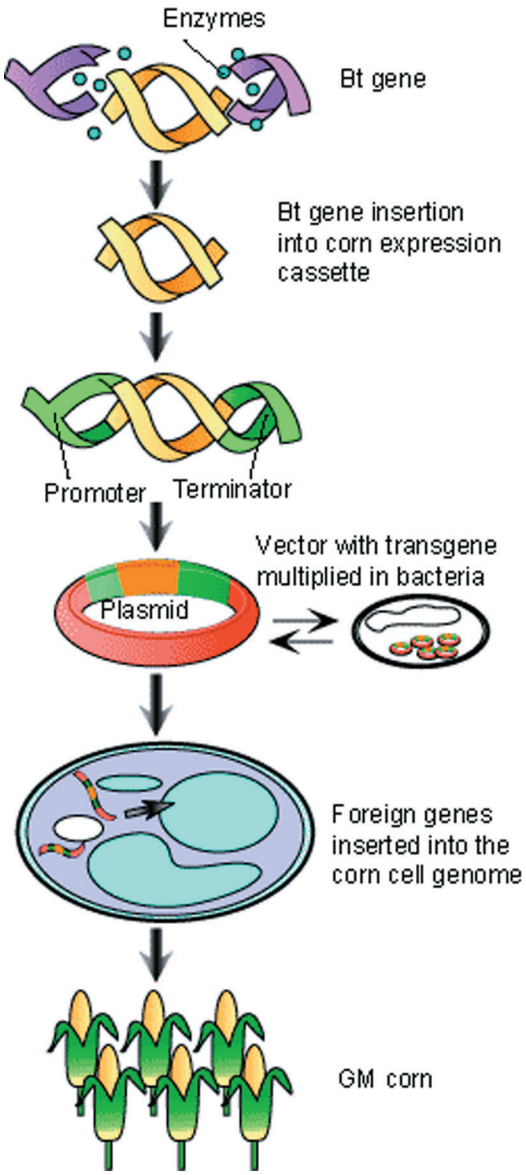


Figure 2. General schematic of GM crop production

Human health and environmental risks

toxic to non-target organisms, transgenic genes may escape to related corn species, and ECB and other pests may become resistant to Cry proteins[11]. The alleged effect of Bt corn pollen on Monarch butterfly larvae has rocketed to the front pages of major newspapers around the world (ex. CNN). Some research has shown that Monarch butterfly larvae fed their normal diet of milkweed leaves suffer a significant decline in fitness when those leaves are dusted with Bt corn pollen (Losey et al. 1999). The methodology of this experiment, however, has been harshly criticized by members of the scientific community.

Most recently, the threat of Cry gene escape into wild populations has been substantiated by the discovery that artificial DNA from transgenic corn has been detected in traditional corn varieties in remote areas of Mexico (Quist and Chapela, 2001). However, this study was pulled from

NATURE magazine in an unprecedented fashion following a heated scientific and political debate[12]. While few contest that such transgenes are present in the local corn races of Mexico, there is still no evidence to suggest that these genetic constructs are "escaping" to become established in local corn races. We are limited to an educated guess as to the likelihood and speed of such genetic pollution[13].

Balancing risk and benefit

Despite the lack of conclusive evidence that GM foods present considerable risk to human health and environment, widespread use of this new technology is being compared to past mistakes such as broadcast spraying of populated towns with DDT to control mosquitoes during the 1950s. Notions of "frankenfoods"[14] and "agroterrorism"[15] corrupting our planet present theoretical possibilities that cannot be discounted given the remarkable ability of the unlikely to become an actuality. In truth, we must plead ignorance of the long-term impacts of GM crops[16].

Arguably, every food in our current diet carries with it associated risks, determined through "trial-and-error" extending back before to our hunter-gatherer origins. Often, we will accept a certain degree of exposure to known hazards to receive known benefits. Bt corn has obvious benefits for agricultural production, increasing profit margins through more efficient and consistent corn production and improving the working environment for farmers through reduced exposure to pesticides. In a surplus market, these benefits may be passed on to the consumer as a grocery bill reduction. On a global scale, decreased crop losses due to herbivory may translate into improved world food supply since corn remains a major staple in the global diet. Ecosystems are not likely to benefit from ECB-resistant Bt corn propagation since this technology replaces a largely mechanical (non-chemical) control for ECB.

These benefits, real or imagined, have been used as leverage by Bt corn proponents in the argument to accept what they argue are minimal levels of health and environmental risk. Yet many consumer, civil rights, and environmental advocacy groups characterize such arguments as industry propaganda, asserting that corporate benefits should not out-weigh the undetermined human health, socioeconomic and environmental risks.

The relative ease in engineering Bt biopesticides into crops such as corn, cotton and rice, combined with the cost effectiveness of Bt crops for growers under threat of ECB, makes banning this technology in North America seem unlikely. This reality highlights the necessity for the research community to improve methods for assessing risks posed by GM crops. While some industry proponents may resist, it is ultimately the public's responsibility to ensure that this new technology is properly managed in the context of other pest management methods that have their own set of risks and benefits.

Notes

Glossary

Artificial Selection - the encouragement of certain traits in an animal through selective breeding by humans, both intentional or unintentional

Ti plasmid - "tumour-inducing" plasmid: originally found in the bacterium Agrobacterium tumefaciens, this plasmid integrates into a host cell genome and causes galls on plants. Biotechnologists can take advantage of this integration to insert genes of their choice into plant cells.

Lateral transfer - also called horizontal gene transfer, the movement of genetic material from one organism to another other than from parent to offspring, and often across species, genus, or even domain.

Antibiotic resistance marker genes - genes that allow biotechnologists to distinguish between plants that have been modified properly and those that have not depending on their suceptibility to antibiotics.

Screening - the process of selection of desirable plants from a large population of transformants (different insertional events) with variation in trait depending on location and number of t-DNA insertions.

Herbivory - the consumption of plants by animals, in this case to the detriment of the plant (predation).

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THE KYOTO PROTOCOL: THE BEST TOOL IN THE BOX?

By Avery Poole

There is a general consensus that global warming is underway, but what should we do about it? The Kyoto Protocol has proven to be a hotbed of contention amongst scientists, policymakers, environmentalists and industry. Is it an exciting and groundbreaking development in the fight against global warming and the broader problem of climate change, or an ineffective and economically harmful attempt to win political kudos?

What is the Kyoto Protocol and how is it supposed to address global warming?

The Kyoto Protocol, an international and legally binding agreement to reduce global greenhouse gas (GHG) emissions, entered into force on 16 February 2005. It has been ratified by 141 states, including all major industrialised countries except the United States, Australia and Monaco.

The Kyoto Protocol is an amendment to the United Nations Framework Convention on Climate Change (UNFCCC). The UNFCC is an agreement to reduce GHG emissions, especially carbon dioxide, and was signed in Rio at the UN Conference on Environment and Development (UNCED) in 1992. However, by 1996 it was clear that little progress had been made, and scientists and environmental non-governmental organisations (NGOs) called for a renewed effort to combat global warming. Part of the problem was that the UNFCCC did not articulate specific targets for reductions.

The result was a conference of the Rio signatories in Kyoto, Japan in December 1997, where they committed to reduce emissions of carbon dioxide (CO_2) and five other GHGs: methane (CH_4), nitrous oxide (N_2O), sulphur hexafluoride (SF6), hydrofluorocarbons (HFCs) and perfluorocarbons (PFCs). Signatories committed to reduce these emissions by 5.2% of 1990 levels as an average over the period 2008 - 2012. Most provisions of the Protocol apply only to developed countries, listed in Annex 1 to the UNFCCC. Developing countries were not included given that the current climate change problems are regarded as having been largely caused by the industrialisation processes of developed countries.

Two somewhat controversial 'loopholes' may enable some countries to avoid an outright reduction of GHG emissions. Firstly, they can engage in 'emissions trading', whereby countries

which had successfully reduced their emissions below their Kyoto targets could 'sell' their surplus emissions to other countries for use as 'credits'. Secondly, countries with significant forests and that engage in reforestation can earn credits due to their so-called 'carbon sinks', given that trees absorb carbon dioxide.

How effective is the Kyoto Protocol?

Given that it entered into force on 16 February 2005, it is perhaps too early to gauge the Protocol's effectiveness. It could not enter into force until 55% of Parties to the UNFCCC accounting for at least 55% of the global CO2 emissions in 1990 had ratified the agreement, and this was finally achieved when Russia ratified in November 2004. This brought the number of ratifications to 141, representing 61% of global GHG emissions (as of February 2005). However, initial reports suggest that several countries are not on track to reach their targets. This, of course, highlights the omnipresent problem of international treaties and agreements: signatories do not always implement measures to fulfil their commitments on a timely basis, or at all. This is not simply a matter of rhetoric not being matched with reality; governments must contend with domestic pressure from commercial interests, lobby groups, and of course, the electorate.

The International Energy Agency found that, between 1990 and 2002, several countries actually increased their GHG emissions. This includes most EU countries, despite the EU's vehement support for the Protocol and frequent criticism of the US refusal to ratify it. According to the IEA, global emissions of carbon dioxide (the main GHG) increased by 16.4% during the period.[1] Such statistics obviously do not bode well for the Protocol's desired impact.

However, the success of signatories in reaching their Kyoto targets is not necessarily a measure of the Protocol's effectiveness in combating climate change. This, of course, depends on whether those targets are appropriate, and will make a significant impact on global warming even if they are all reached. Hence, the scientific debate that continues with furore.

What is the scientific debate?

Firstly, there is much scepticism regarding the degree of global warming that is actually taking place. Some scientists argue that the Kyoto Protocol has shaky scientific foundations, and that the rate of global warming has not been agreed upon. Another aspect of the debate concerns whether the Protocol will make any real difference even if targets are successfully met. Some argue that it will not, and that its impact will be virtually negligible. Others claim that while the Protocol is a positive first step, it must be followed by further

agreements with more stringent commitments.

The Kyoto Protocol did rely on scientific evidence in its design. The UN Intergovernmental Panel on Climate Change (IPCC) was established in 1989, and comprises leading scientists appointed by governments to review scientific findings on climate change and provide advice to policymakers. It has summarised the work of around 2,000 climate change expects, and concluded that the world is indeed getting warmer, largely due to man-made causes. The IPCC has also found evidence of rising sea levels, retreating mountain glaciers and reduced snow cover.

Despite these findings, a fiery debate about the scientific basis of the Kyoto Protocol, and climate change generally, continues. Philip Stott, emeritus professor of biogeography at the University of London, is a prominent climate change sceptic who points to what he regards as a fundamental contradiction of the Protocol: "that climate is one of the most complex systems known, yet that we can manage it by trying to control a small set of factors, namely greenhouse gas emissions. Scientifically, this is not mere uncertainty: it is a lie."[2] Scientists such as Stott do not necessarily deny that climate change is occurring, but that we do not yet fully understand how it works and the most appropriate means of addressing it. Some regard Kyoto as merely a political response to environmental pressure groups, rather than an agreement formulated on the basis of 'hard science'. Policy and science thus intersect in interesting and contentious ways.

The second broad group of critics doubt that the Protocol will have any notable impact, even if its targets are met. For example, Dr James Hansen, a NASA scientist, and colleagues note that climate simulations have demonstrated that 'the Kyoto reductions will have little effect in the 21st century, and "30 Kyotos" may be needed to reduce global warming to an acceptable level.'[3] Further, many have argued that without the world's biggest economy, the Protocol is virtually meaningless. Individual reductions made by other nations pale in comparison to continued US emissions, and collectively they still amount to only 61%. Of course, while this argument may be valid, the Protocol may be valuable as a first step in addressing climate change, and yield benefits simply by drawing attention to the issue and increasing public awareness.

Canadian scientists have been actively involved in the debate. In June 2003, 46 climate experts (mostly Canadian, but a few international) signed an open letter to then-future Prime Minister Paul Martin. The letter laments the lack of 'credible science consultations' undertaken by the government, and calls for 'wide ranging

consultations with non-governmental climate scientists.'[4] The scientists do not refute the scientific basis of the Protocol, but argue that Canada's commitment to it should have been made only after a comprehensive debate, to ensure that it is based on a 'strong foundation of environmental science'. They believe that basing Kyoto on the work of government-appointed scientists (on the IPCC) does not amount to impartial evidence.

Dr Timothy Ball, an environmental consultant and former professor of climatology at the University of Winnipeg, was one of the signatories to the letter. However, he goes beyond the position of the letter to attack a number of 'myths' about the Protocol and climate change generally. He argues that 'a social agenda is what really drives Kyoto, not environmental concerns'.[5] Dr Kenneth Green, a scientist at The Fraser Institute in Vancouver, agrees, and points out that several US and Canadian scientists argue that the threat of global warming is overstated by the IPCC.[6] Such arguments characterise the other prominent aspect of the Kyoto discourse: the political / commercial debate.

What is the political / commercial debate?

The Kyoto Protocol was formulated on the premise that we have a responsibility to redress some of the damage caused by industrialisation. Further, it is assumed that the economic costs of environmental damage will be reduced in the long term, if it is addressed now. However, several Protocol signatories have encountered vehement opposition domestically, largely due to the perceived economic costs of implementing measures to reduce GHG emissions. Not surprisingly, representatives of industries that rely on fossil fuels are particularly vocal.

Powerful industry lobby groups undoubtedly influenced the US decision not to ratify the Protocol. While the US signed it under the Clinton administration, it has refused to ratify it and hence make it binding. The initial basis of the US objection, as expressed by a Senate resolution in June 1997, is that developing countries are not required to reduce GHG emissions. The argument is that China and India, while classed as 'developing' by the Protocol, are rapidly industrialising and emitting GHGs. However, George W Bush has been more explicit about the perceived damage to the US economy of committing to the Protocol. At the same time, he asserts that he supports the notion that climate change must be addressed.[7] The US position is that it will address climate change by implementing 'cleaner', more efficient technology, but on its own terms.

The question of whether Protocol is the most appropriate means to address climate change will thus no doubt continue to be

contentious. The debate remains prominent in Canada, particularly since the Protocol has come into force and the Canadian government is expected to implement measures to fulfil Canada's commitment. On 13 April 2005, the government released a plan named Moving Forward on Climate Change: A Plan for Honouring Our Kyoto Commitment. This is the first stage of 'Project Green,' intended to oversee the pursuit of Canada's Kyoto targets. The government has been criticised by various groups and individuals both for failing to implement such measures on a timely basis, and for signing the Protocol in the first place.

These concerns are partly related to the absence of the US. Kenneth Green worries that the Protocol will be detrimental to Canadian trade competitiveness, given that the resulting price increases of electricity, natural gas and gasoline will be undoubtedly passed on to the consumer. The US, which absorbs 87% of Canadian exports, may find other trading partners to be more commercially viable.[8] In addition, Mark Jaccard from the School of Resource and Environmental Management Simon Fraser University predicts substantial increases in the Canadian cost of living due to higher energy prices.[9] Green hopes that Paul Martin is merely paying lip service to the Protocol but will not actually seek to implement measures to fulfil Canada's commitment. This seems somewhat optimistic, and a touch perverse.

What does the future hold for Kyoto?

So what is the future for the Kyoto Protocol, and for the fight against climate change? The success of the Protocol will evidently depend to a large extent on the political will of the countries that have ratified it, which in turn is a function of domestic pressures and competing interests in each country.

The limitations of the Protocol do not necessarily portend the failure of global efforts to combat climate change. Murray Ward, a New Zealand climate change consultant, argues that the Protocol was never intended to represent the final solution, but rather a 'necessary first step.' He regards the major contribution of Kyoto as the establishment of the global carbon market, which will be 'a primary means to mobilise investment in energy efficiency and renewable and cleaner technology'.[10] Thus, the primary benefit of the Protocol may be the establishment of mechanisms with which further global solutions to climate change can be sought.

Continued debate is valuable in that it motivates research agendas and alternative explorations of addressing a global issue. However, the vehement and protracted nature of the Kyoto discourse is indicative of the challenges of international cooperation, given individual state interests. Further, it demonstrates the difficulties

associated with coordinating scientific evidence and political motivations, on issues that purport to affect all of humanity.

As Joseph Joubert wrote, "it is better to debate a question without settling it than to settle a question without debating it." However, one hopes that we can settle this question enough to actually do something about it!

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9. Mark Jaccard, John Nyboar, & Bryn Sadwonic, The Cost of Climate Policy, Vancouver: UBC Press, 2002

10. Murray Ward, 'Getting the story straight,' The New Zealand Herald, June 28, 2005

Sources and Further Reading

Canadian Government's Climate Change page (focuses on Canada's commitment to the Kyoto Protocol) (http://www.climatechange.gc.ca/english/)

Dr Timothy Ball's site 'Envirotruth' (http://www.envirotruth.org)

Environment Canada's Climate Change page (http://www.ec.gc.ca/climate/home-e.html)

Friends of Science Society (non-profit organization based in Calgary, made up of active and retired geologists, engineers, earth scientists and other professionals, as well as concerned Canadians 'who believe the science behind the Kyoto Protocol is questionable')
(http://www.friendsofscience.org)

Intergovernmental Panel on Climate Change ('IPCC')
(http://www.ipcc.ch)

Open letter to Canada's then-future Prime Minister, Paul Martin, dated 4 June 2003 and signed by 46 climate experts from 6 countries
(http://www.john-daly.com/guests/openletter.htm)

Ross Gelbspan's site 'The Heat is Online'
(http://www.heatisonline.org)

The Copenhagen Consensus Initiative of Denmark's Environmental Assessment Institute - project on climate change
(http://www.copenhagenconsensus.com/Default.asp?ID=165)

The Science & Environmental Policy Project
(http://www.sepp.org)

United Nations Framework Convention on Climate Change ('UNFCCC')
(http://unfccc.int/)

United Nations Environmental Program ('UNEP') Climate Change page
(http://www.unep.org/themes/climatechange/)

THE DEBRIEFING

By Robert Isenberg

QAJAOG: Greetings, Captain Zabujek.

ZABUJEK: Your eminence, Emperor Qajaog, I am honored by this private audience.

QAJAOG: Captain, word of your exploits has reached the farthest reaches of the Federated Republic of the Empire. Is it true that you have ventured to the planet called Earth?

ZABUJEK: It is true, Your Sliminess. We have journeyed millions of light years and returned safely to report our findings.

QAJAOG: Go on.

ZABUJEK: As you know, our study required two simple, working-class humans from a small, remote mountain town. Men, of course, preferably gullible and childless and mildly alcoholic.

QAJAOG: Yes, of course.

ZABUJEK: As we orbited, our Stealth Field activated, we zeroed in on the human settlement of Stone River, Idaho, which sustains a population of 215 humans and harvests nearly 500 tons of potatoes a month.

QAJAOG: Potatoes, harvested? Barbarians!

ZABUJEK: I'm aware of their folly, my squishy, amorphic highness, but they know not what they do. Wounded by their inhumanity, I've since adopted three potatoes from the Spud Kennel. They seem happy in my home.

QAJAOG: But back to your study.

ZABUJEK: Yes. Our sensors located two ideal specimens: Larry and Doug, two out-of-work loggers who were going on a platonic friendship-affirming camping trip that weekend, during which they had planned fruitless fishing and many back-slapping hugs.

QAJAOG: How did you apprehend them?

ZABUJEK: We sent down one of our colossal flying saucers, thinking they would confuse it for an airplane or a bird. They were busy tossing back a couple Bud Lights and trying to pitch their tent, and at first didn't notice us looming over the trees.

QAJAOG: Didn't notice you?

ZABUJEK: As we soon discovered, humans need – heh, heh, you're gonna love this one – light radiation in order to see.

QAJAOG: Light radiation! What the hell?

ZABUJEK: Ha! Ha! Can you believe it?

QAJAOG: Ha! Ha! Ha! Oh, my God, I'm oozing.

ZABUJEK: Priceless.

QAJAOG: Ha! Ha! Ho. Wow. Wow.

ZABUJEK: Hooooo. So, yeah.

QAJAOG: Yeah. So. You were saying?

ZABUJEK: So we waited until they could see us. Because what's the sport in catching them while their backs are turned?

QAJAOG: True that.

ZABUJEK: So suddenly they turn around, and bam! We hit them with a big, bright light.

QAJAOG: Oh, perfect!

ZABUJEK: Scared the living crap out of 'em. And they're all like: Oh, my God, it's the aliens! And we're all like: How'd they know? And they're screaming and losing their shit as we pull them into the starship using the gravitational fetching beam.

QAJAOG: Couldn't you just have grabbed them?

ZABUJEK: Yeah, see, Togath in engineering really, really wanted to use the beam, and who wants to argue with Togath? Once that guy gets pissy, he locks himself in the slimatorium and pouts. We figured, okay, fine, make Togath happy. Then maybe he won't be such a baby.

QAJAOG: So what did you do with the humans?

ZABUJEK: Well, we shackled them to an uncomfortable slab of metal surrounded by lots of needles and sharp implements. I don't want to be mean, but Larry was a little on the hefty side, so we had to rummage through the closet to find a bigger slab of metal.

QAJAOG: And then?

ZABUJEK: Everybody's favorite part, of course.

QAJAOG: Ooh! Anal probe?

ZABUJEK: Hell, yeah.

QAJAOG: I love it. So what did you find out?

ZABUJEK: Not much. Mostly just the contents of their recta, the length of their respective intestinal tracts, and a bunch of microorganisms helpful in the digestive process. But check this out: It turns out that most of their neurological activity occurs in their heads.

QAJAOG: No way!

ZABUJEK: Way.

QAJAOG: So that's what the human brain is for.

ZABUJEK: Go figure.

QAJAOG: You released them, then?

ZABUJEK: Oh, yeah. They're negotiating their contract with Sci Fi Network movie as we speak.

QAJAOG: Cool. Who's playing you?

ZABUJEK: Duh. David Duchovny.

QAJAOG: Thank God. That guy needed a break.

ZABUJEK: Anyway, that should do it for now. I'll let you know when we get the rest of our test results.

QAJAOG: You know what, don't bother. I'm probably going to get the Intergalactic Navy to destroy the Earth, city by city, using apocalyptic laser beams and savage hand-to-claw combat, anyway.

ZABUJEK: Woah, you feeling okay, Your Highness?

QAJAOG: Just one of those weeks, I guess. Anyway, I'll check you later, Zabujek. Or should I say, Captain?

ZABUJEK: Oh, Emperor. You're make me secrete protoplasm.

QAJAOG: Just don't let it go to your mandibles. Okay, seriously, I have to go. Have to go walk my potato.

A CREATIONIST FAQ

by Richard Harter

Q: What is the principle evidence for Creationism?
A: The Holy Bible, of course. After all, is it likely that the author of the Universe would be mistaken about its age?

Q: But isn't the Bible religion and not science?
A: Truth is truth. It's a poor sort of science that ignores truth.

Q: But isn't there a lot of evidence for evolution?
A: Not really, most of it is from university professors writing papers for each other. If they didn't write papers they wouldn't have jobs.

Q: How big was Noah's ark?
A: Big enough.

Q: But what about radioactive dating?
A: Hey, everybody knows that stuff is bad for you. Stick with good Christian girls.

Q: What about the fossil evidence?
A: The real fossils are university professors writing papers for each other.

Q: Is there any other evidence for creationism besides the Bible?
A: Yes.

Q: Can you give us some?
A: Yes.

Q: Could you give us a specific example?
A: Yes.

Q: What would be a specific example of evidence for Creationism?
A: I've already answered that question.

Q: What about the Antarctic ice core data?
A: Now I put it to you. Coop up a bunch of men in a Quonset hut in the worst weather in the world, with nothing to do but gather data and drink, and what do you expect?

Q: Did the dinosaurs coexist with man?
A: Look, the liberals were preaching coexistence with the Communists, and you saw what happened to them.

Q: Should Creationism be taught along with Evolution in the schools?

A: Creationism should be taught instead of Evolution in the schools.

Q: Doesn't the Geologic Column prove that the Earth is very old?
A: The geologic column proves that some things are on top of other things and some things are underneath other things. But we already knew that, didn't we.

Q: Hasn't evolution been demonstrated in the Laboratory?
A: Students are demonstrating everywhere these days. To their shame, many professors are demonstrating also.

Q: Aren't Hawiian wallabies an example of Evolution in action?
A: No.

Q: Why not?
A: Because they aren't.

Q: What is a kind?
A: A kind is cards of the same rank. Thus 4 aces and a king are four of a kind, but four spades and a heart are not.

Q: Doesn't genetic variation indicate that life has been going on a long time?
A: Let's be up front about this. That's deviation, not variation, and yes, there is a lot of deviancy out there. That just shows that there has been a lot of Sin since the garden of Eden.

Q: What about Neanderthal Man?
A: Hey, you take one of those geezers and put him in tweeds and give him a pipe and he could be a professor anywhere.

Q: Some scientists state that the earth's continents are drifting around on top of a molten interior which has shaped life as we see it now. Are they right?
A: As you well know the Bible says that beneath the surface of the earth is Hell where there is eternal fires and brimstone. If the continents appear to be moving around that is Satan's doing.

Q: Why do almost all of the scientists believe in Evolution?
A: The real scientists don't. As for the rest of them, that's a very good question, isn't it?

Q: Are you talking about a Satanic conspiracy?
A: Did I say anything about a conspiracy? You might want to think about the shape the world is in since the Evolutionists and the Liberal Humanists captured academia and how Evolution is hand in hand with Godless Communism and crime in the streets but I certainly wouldn't want to say anything about a Satanic conspiracy. I just want you to think about it with an open mind.

ELSEWHERE AND OVERHEARD

By Angela Genusa

Overheard

"It just made me want to get them done right there. And then when I graduated, my parents were like, all right, congratulations, you got a boob job."
Lulu Diaz on her high school graduation gift she got from her parents, as did many other girls at her high school and beauty school she now attends - new breasts. (ABC News)

"The presence of female functional endometrial in a male prostrate gland can cause this type of anomaly."
Pradip Mitra of the West Bengal Gynaecological Society, about an extremely unusual case in which a Kolkata doctor is treating a teenage boy who has been showing symptoms of menstruation, including bleeding in the second week of every month lasting three days, cramps, nausea and mood swings. (Rediff, India)

"It's the young, healthy males who are the ones who often faint in the dental office."
Brian Chanpong, a U of T master's degree candidate on a study that suggests the level of fear among men is probably underreported. (Science Daily)

Elsewhere

Robots Attend Nursery School
(http://www.physorg.com/news4725.html)

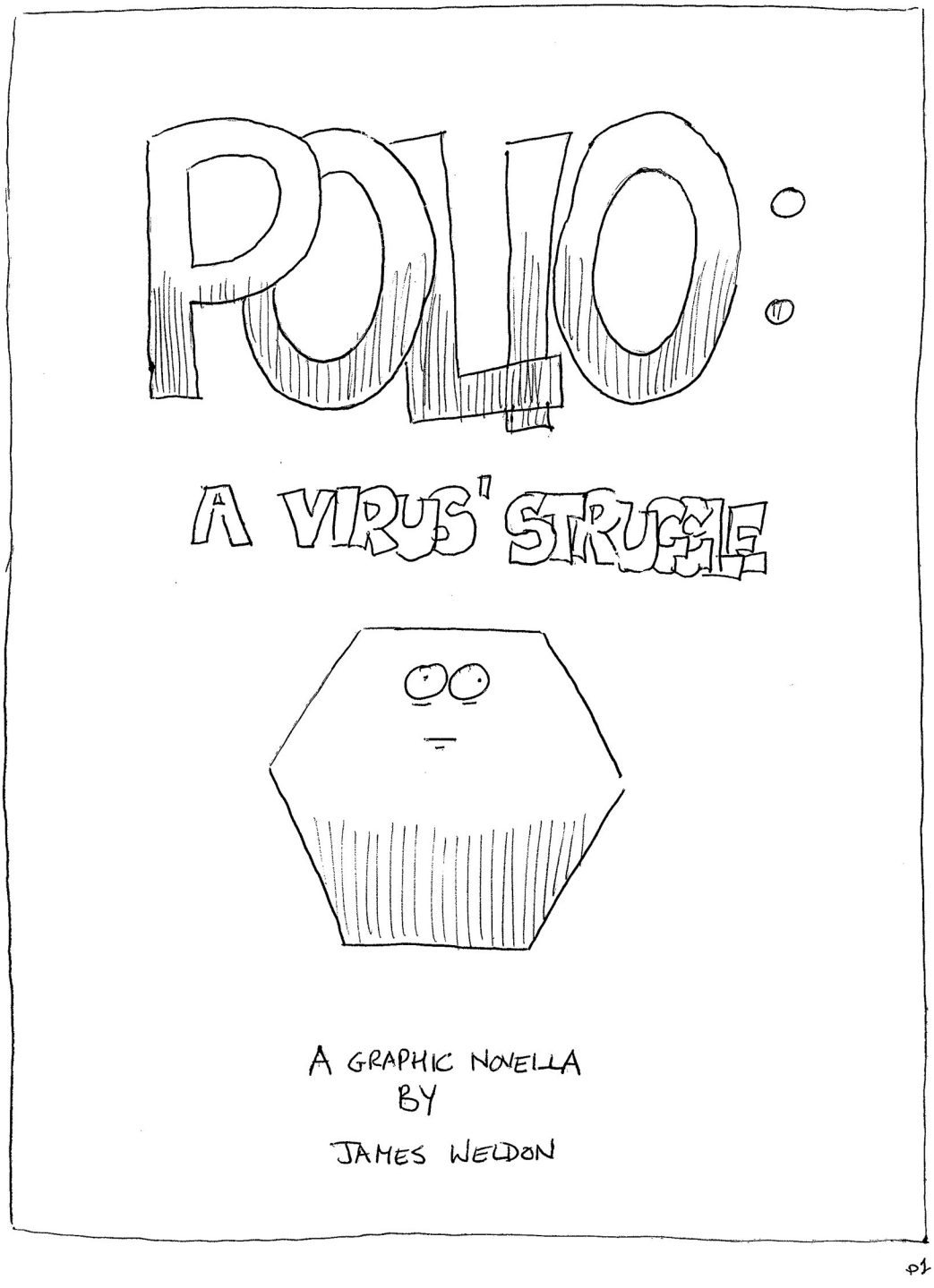
Fathers Also Have Postpartum Depression
(http://www.sciencedaily.com/upi/index.php?feed=Science&article=UPI-1-20050624-19593000-bc-britain-daddyblues.xml)

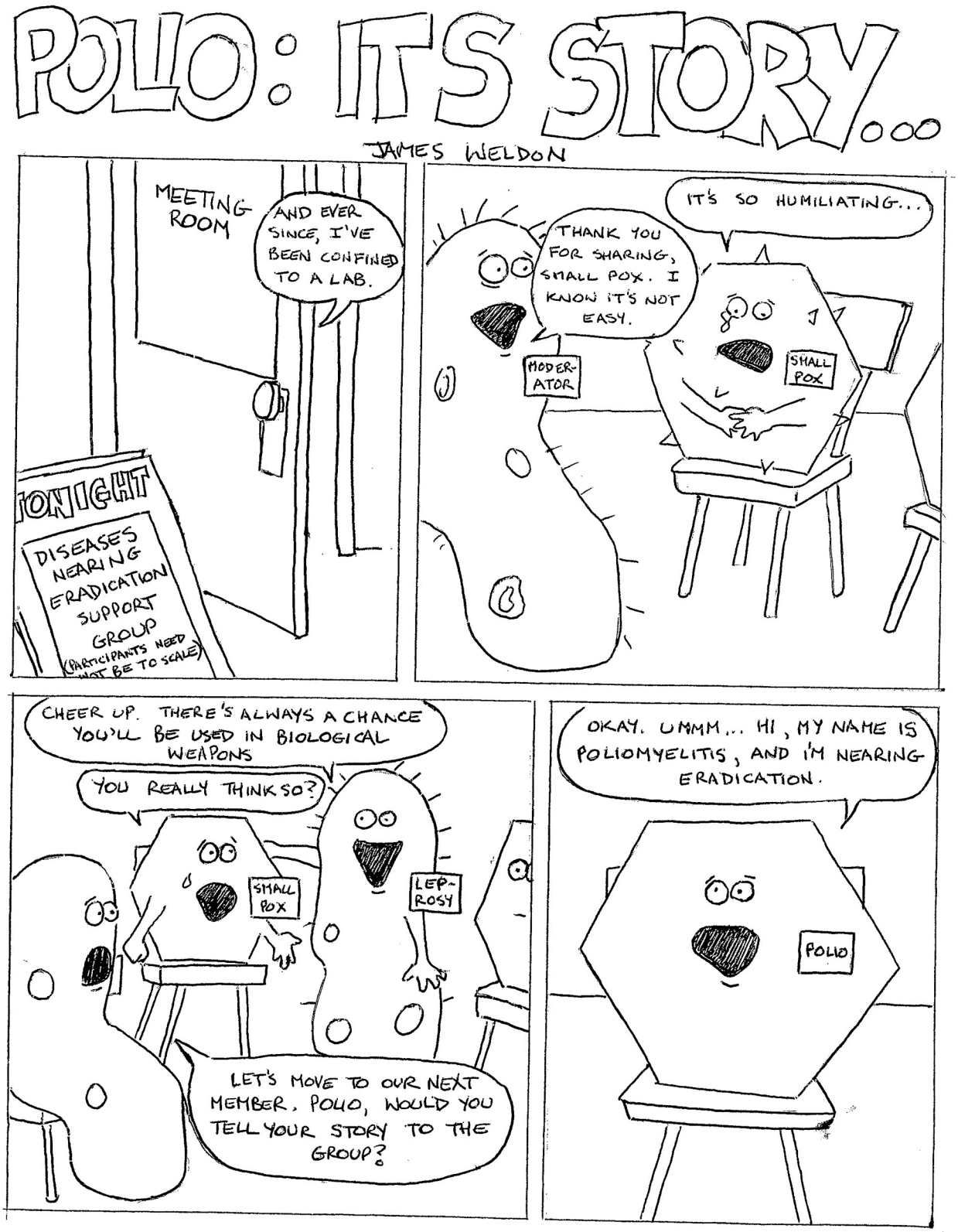
Junk DNA Makes Voles Better Dads
(http://www.sciencedaily.com/upi/index.php?feed=Science&article=UPI-1-20050621-18404900-bc-us-voles.xml)

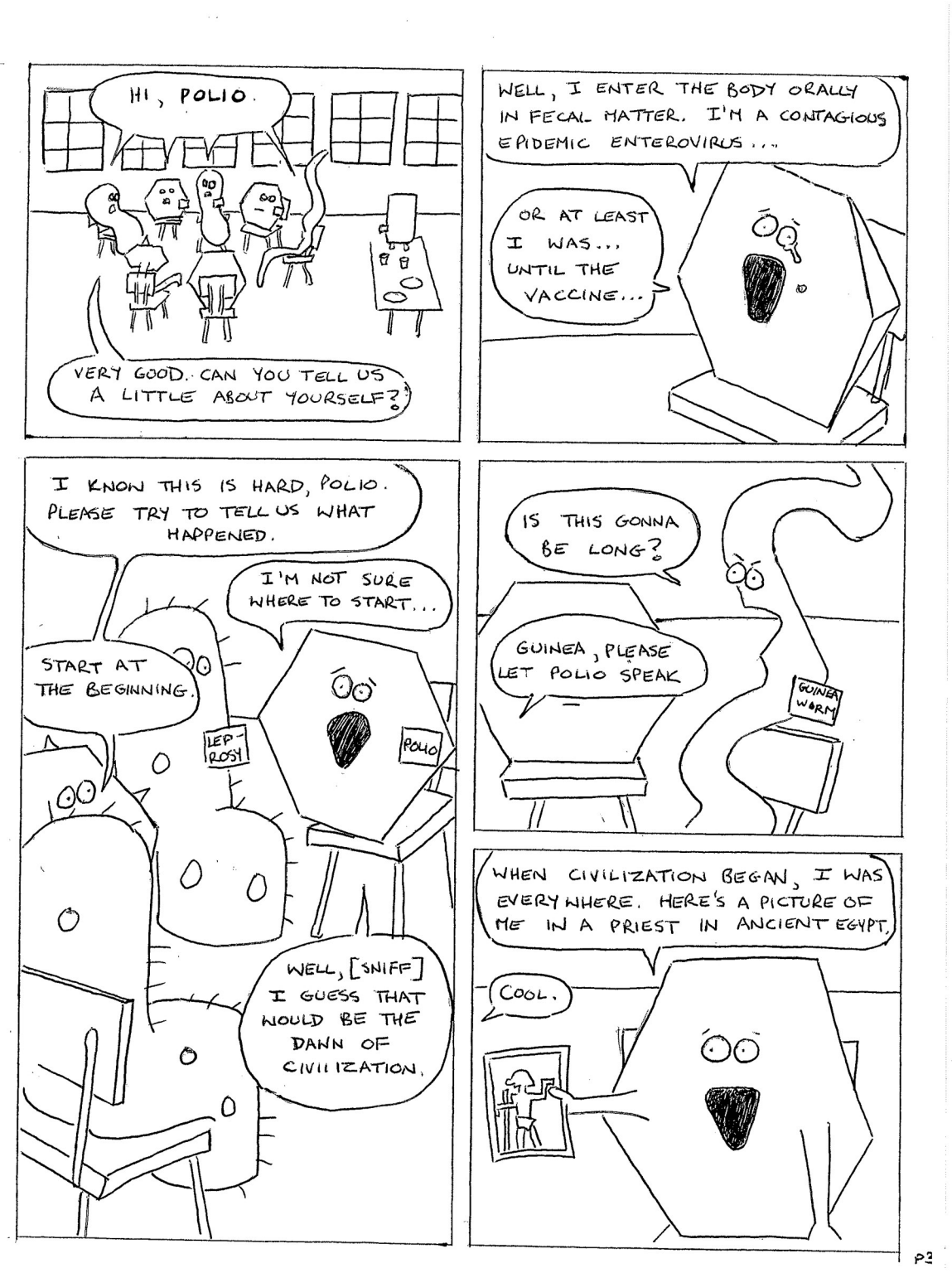
Male Sweat Sells Men's Lifestyle Magazines
(http://www.newscientist.com/article.ns?id=dn7571)

POLIO: IT'S STORY...(PART ONE)

By James Weldon




POLIO: IT'S STORY...
JAMES WELDON
MEETING ROOM
AND EVER SINCE, I'VE BEEN CONFINED TO A LAB.
TONIGHT
DISEASES NEARING ERADICATION SUPPORT GROUP
(PARTICIPANTS NEED NOT BE TO SCALE)
THANK YOU FOR SHARING, SMALL POX. I KNOW IT'S NOT EASY.
IT'S SO HUMILIATING...
MODERATOR
SMALL POX
CHEER UP. THERE'S ALWAYS A CHANCE YOU'LL BE USED IN BIOLOGICAL WEAPONS
YOU REALLY THINK SO?
SMALL POX
LEPROSY
LET'S MOVE TO OUR NEXT MEMBER. POLIO, WOULD YOU TELL YOUR STORY TO THE GROUP?
OKAY. UMMM... HI, MY NAME IS POLIOMYELITIS, AND I'M NEARING ERADICATION.
POLIO
p2



TO BE CONTINUED...

JOURNAL CLUB SELECTION.

Chewing gum can produce context-dependent effects upon memory.
(2004) Appetite 43: 207–210
If only these results were published when I was in Grade Two.

(Found by Alex Lane, pdf of title page, available on line)

Appetite 43 (2004) 207–210

Chewing gum can produce context-dependent effects upon memory

Jess R. Baker, Jessica B. Bezance, Ella Zellaby, John P. Aggleton

Two experiments examined whether chewing spearmint gum can affect the initial learning or subsequent recall of a word list. Comparing those participants in Experiment 1 who chewed gum at the learning or the recall phases showed that chewing gum at initial learning was associated with superior recall. In addition, chewing gum led to context-dependent effects as a switch between gum and no gum (or no gum and gum) between learning and recall led to poorer performance. Experiment 2 provided evidence that sucking gum was sufficient to induce some of the same effects as chewing.

NEW (THIS TIME AROUND) CONTRIBUTORS

Melissa Bell lives in Toronto. She is still bitter that she never received a chemistry set for Christmas, but is at least beginning to accept that her parents probably knew what they were doing. Some places her writing has appeared include online with McSweeney's and in print with Flesh & Blood.

Hardy Hall is an aspiring plant molecular biologist studying the fascinating world of plant immunity and its underlying signalling mechanisms. Hardy enjoys long walks on the beach, orienteering with his miniature dachshund, and gnawing on perplexing biological questions.

Robert Isenberg is a freelance writer and actor. A columnist for Pittsburgh Magazine, his fiction and humor have appeared in The New Yinzer, Deek, and McSweeney's. His sixth play, 20 Questions, will receive production in August.

Avery Poole is about to start her PhD in Political Science at the University of British Columbia. She hopes to publish some academic work soon, as her publications so far have been mostly cranky letters to the editor.

Steven Seighman had a chemistry set well into his teenage years and, to this day, reads Richard Dawkins books. He is also an editor at Monkeybicycle (http://monkeybicycle.net) which plumbs the depths of science like no other.

ABOUT SUBMISSIONS:

Anything will do, but if you like more direction, we are happy to look at:

Things with some link (however weak) to science.

Things in English.
Things in other languages that are more or less readable when translated with Google tools.

Things with many words.
Things with few words.
Things with pictures.

Things that are news worthy.
Things that are not terribly so.

Things that educate.
Things that entertain.
Things that both educate and entertain.

Things that are important to ones well being, or perhaps to the global community at large.
Things that (at the end of the day) are really only there for the sake of being there.

Things from famous people who think that this is a pretty neat thing going on here.
Things from infamous people - they're interesting too.
Things from everyone else.

Things that could win you an iPod of some shape and form.

And things whose copyright ultimately remain with the author, although it would be nice to be acknowledged as being involved in presenting it to others.

Submissions are preferred as attached word documents, or text pasted directly into the body of the email. Please send us your good work to **tscq@interchange.ubc.ca**