New Zealand Skeptic

Number 114 Summer 2014

Mathematics and Pseudoscience
A mathematician's experiences with mathematical cranks

The TPP and its Impact on the NZ Health Sector

ACC and Acupuncture
Mark Hanna investigates

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New Zealand Skeptics

ABOUT US

The New Zealand Skeptics form a network of New Zealanders including scientists, health professionals, teachers, magicians and many others from all walks of life. Members have a variety of religious faiths, economic beliefs and political leanings, but are all interested in examining what objective scientific support there is for claims of such things as psychic abilities, alternative health practices, creationism and other areas where science, pseudo-science and shonky science interact.

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Letters for the Forum may be edited as space requires – up to 250 words is preferred.

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Where have all the skeptics gone?

I found out what a skeptic is when I was living in London. My husband Mark listened to a weekly podcast called *The Skeptics' Guide To The Universe* hosted by a bunch of brothers and their friends. After Mark finally persuaded me to arrive at the 21st century and purchase myself an iPod, the first thing he did was subscribe me to the podcast.

When I listened to my first SGU show, I discovered that there was actually a word for someone who, when they sit there listening to a colleague or acquaintance talking about their horoscope, can only reply with "Really?! That's very interesting. Not."

Now here was a podcast, hosted by people who were saving the world from evil one crank at a time, and people actually *listened* to them. It was one of those lightbulb moments for me. That podcast opened the door to an entire world of people who thought like me and were passionate about the same stuff as me.

London was a great place to become a skeptic. There was always something going on. I went to *The Amaz!ng Meeting* in 2010, and a comedy gala hosted by the irrepressibly-atheist Robin Ince. Everyone knew who I was talking about when I mentioned Darwin, Dawkins, Cox, Hitchens and Gervais. A lot of the people I met were skeptics themselves or atheists, or just loved science and geeky things.

When I came back to New Zealand in 2011, things changed somewhat. I found that it suddenly wasn't very easy to be a skeptic. Although I love New Zealand with its easy-living pace, its beautiful environment and friendly people, it isn't exactly the centre of the skeptical movement. I was slightly bemused to find myself plonked in the middle of a town where practically everyone I knew belonged to a Christian church, and the highlight of their evening TV viewing was not *Cosmos*, but *Shortland Street*.

Although this lack of commonality never stopped me from voicing my opinions when it came to climate change, vaccination or religion, it didn't take long for me to start feeling like I was… well, weird.

And then something happened. I was listening to the SGU podcast and they mentioned that they were coming to New Zealand for the NZ Skeptics Conference. Say *what*?! Click, click, click, tickets purchased, flight to Auckland booked.

Knowing about Steven Novella's love for birds, Mark sent the SGU an email asking them if they wanted us to take them around Zealandia in Wellington. To our great surprise, they said yes. So the week before the Auckland conference, Mark and I were taking Steven, Bob, Jay, Evan and their families around Zealandia. There I also met Mark Honeychurch and Matt Beavan, and we got talking about the NZ Skeptics and where it was and where it was headed. My passion for the skeptical movement was reignited.

The NZ Skeptics Conference in Auckland a week later was fantastic. Not only was it because the SGU were there and I got to totally geek out with them, but also because it drove home to me that, yes, New Zealand may be small, but there is very much a skeptical presence that I didn't know about. The likes of Mark Hanna with his constant campaigning, Toby Ricketts and his film on tax and religion, and Michelle Dickinson as the inspiring Nanogirl, makes me hopeful that there are New Zealanders out there who are fighting the good fight. Not to mention the NZ Skeptics Committee and all the grassroots skeptical clubs out there that tirelessly work together to bring important issues to the forefront.

So if you've picked up this magazine off someone's coffee table, and you're looking for someone to talk to who thinks that, you know what? – actually, vaccinations *are* important, and acupuncture *is* ridiculous, and science *is* real, come join the NZ Skeptics. Go along to your local Skeptics in the Pub. Help us grow. Change the world for the better (or even just New Zealand). ❑

Read something of interest? Share it with us.
Email editor@skeptics.nz
(Please indicate the publication and date of all clippings)

US AIRFORCE CONFIRM AUCKLAND UFO WAS JUST A CLOUD

NZ Herald, 22 Jan 2015 | Recently released United States Air Force files have confirmed that a suspected UFO photographed in the skies above Auckland more than 60 years ago was actually just a cloud.

The *Project Blue Book* files, which have recently been made available online, related to USAF investigations from 1947-1969. One of the images shows a circular disc shape in the sky, which *thecid.com* UFO website reported as being above Auckland in mid-1951. This image was titled "Winter 1951".

The photographer believed it to be a flying saucer, but the USAF concluded that it was in fact a lenticular cloud, the Daily Mail reported.

The lens-shaped formations were the result of moist air that had condensed at a high altitude. The clouds were formed when the air temperature dropped and moisture droplets were pushed up a steep slope by high winds, the paper said.

Another famous image was of the Lubbock Lights, which was reported in Texas in 1951, that were likely to be plover birds, which had white breasts that reflected light from cities below.

The *Project Blue Book* investigated more than 12,000 suspected UFO encounters. More than 700 cases remain unsolved, accounting for 5.5 per cent of the files.

TEACHER CENSURED AND DEREGISTERED AFTER FAILED PONZI SCHEME

NZ Herald, 20 Jan 2015 | A teacher who was jailed after losing about $1.5 million of investors' money in a failed Ponzi scheme has been censured and deregistered by the Teachers Disciplinary Tribunal.

Rene Alan Chalmers was sentenced in Auckland District Court in January last year to serve four years and three months in prison after pleading guilty to 14 charges of theft by a person in a special relationship, dishonestly using a document, and making false statements to investors. Many of his clients were family, friends and colleagues.

In a recently released decision, the tribunal said Chalmers' offending was "dishonesty at the highest level".

"In our view, we would not be discharging our responsibilities to the public and the profession were we to allow this teacher to retain his registration."

The offending was so serious, the tribunal said if Chalmers was to attempt to reregister in the future, they would be surprised if the application was treated "sympathetically".

The Pukekohe teacher's convictions stemmed from trading foreign currency and misleading banks when buying three Bay of Plenty properties.

When obtaining loans for these he showed bank accounts from his company, Chalmers Cameron Investments, passing off the balance as his own money, not that of investors. He also made 519 false statements to 64 investors about his company in which its parlous financial position was not disclosed.

During sentencing, prosecutor Dale La Hood said the operation was never viable and was a Ponzi scheme. Defence lawyer Paul Mabey, QC, told the court that by his own admission, Chalmers was incompetent at forex trading but when the operation was set up there was no intention to deceive investors.

RAW MILK DEATH PROMPTS WARNING

NZ Herald, 12 Dec 2014 | Authorities in New Zealand have issued a warning about unpasteurised milk after the death of an Australian child.

The child's death and four other children falling

seriously ill have been linked to the consumption of raw milk in Victoria. The state's health department issued a warning about drinking the raw milk, which was being sold in health food shops for cosmetic purposes.
The death of a 3-year-old had been referred to the coroner.
A spokeswoman for the Ministry for Primary Industries in New Zealand said there were risks associated with drinking raw milk. Producers of raw milk needed to tell their customers their product might contain bacteria that could cause illness, she said. Those particularly at risk were the young, old, pregnant and those whose immune system was weakened.
"We also advise producers to inform their customers that it is recommended to heat the milk to 70°C for a minute to reduce the risk of bacteria."
The food safety risks associated with drinking raw milk needed to be carefully managed, which was why extensive consultation on the policy and rules applying to the sale of raw milk to consumers was recently undertaken, she said.
Federated Farmers dairy and food safety chairman Andrew Hoggard said sellers were required to make buyers "well aware" of the risks.
"Being unpasteurised [drinkers] are really at risk of any bugs that the cows may have been in contact with and passed through their milk."
Raw milk could not be kept for any length of time, Mr Hoggard said.
"It's important if you are going to buy the stuff, that you are going to get what you need for a day or two at the most and you don't overstock."
Some New Zealand retailers have had to close down because they had not gotten the hygiene right, Mr Hoggard said. Australian chief health officer Rosemary Lester said raw milk, which was marketed as bath milk, could affect the kidneys, the bloodstream and cause watery diarrhoea if consumed.

PAKISTAN CRICKET PLAYER "TRAUMATISED" BY SUPERNATURAL PRESENCE IN CHRISTCHURCH HOTEL ROOM

NZ Herald, 27 Jan 2015 | A touring Pakistan cricket player is reportedly "traumatised" and unable to train after complaining of a supernatural presence at his Christchurch hotel room.
The Pakistan team have been staying at Rydges Latimer Christchurch in the earthquake-devastated central city while they play some warm-up matches ahead of the Cricket World Cup which starts in New Zealand next month. But rising star Haris Sohail has been "freaked out" staying at the hotel.
Pakistan media reports that the 26-year-old woke up in the night at the weekend terrified that there was a supernatural presence in his room.
Sohail believed that a ghost had pushed him while he was asleep, once source told NZME. News Service. He phoned team management and by the time they came to see him he had developed a high fever.
Team bosses convinced hotel management to change his room immediately, reports say.
Comment was being sought from the Pakistan team management.
A spokesman for Rydges Latimer Christchurch last night said there was "no active ghost".
"It's hard to believe," he said. "They [Pakistan management] told me it was only a nightmare.
I spoke with a team physiotherapist and other people on the team. He [Sohail] didn't come to me but they wanted him to move rooms. He's been sleeping in another room for about two night now."
A source said the hotel – built after the February 22, 2011 earthquake which claimed 115 lives when the multi-storey Canterbury Television building collapsed just 100m away – has not received any similar complaints in the past.
Sohail didn't play during Pakistan's first warm-up match on Sunday at Lincoln outside Christchurch playing against New Zealand President XI, which they lost. Since his scare, Sohail has been unable to practice with the team, a source said.
"He's not trained for two days because he's so traumatised. He's pretty freaked out."
Sohail tweeted yesterday that Allah "always answers your duas".
A follower replied: "@HarrisSohail89 it's nice to hear that you recovered from that incident in New Zealand. May Allah protect you."
Sohail is playing Pakistan's second warm-up match against the New Zealand President XI at Lincoln again today. However, he failed to make much of a contribution with the bat, coming in at number 4 and scoring just 6 off 25 balls before falling to Logan van Beek.

FLU OUTBREAK HITS BABIES, TOTS HARDEST

NZ Herald, 10 Nov 2014 | Hospital admissions for the flu and respiratory illness more than doubled

this year compared with last year – with babies and toddlers among the worst affected, a new study says.

Results from the third year of a five-year multimillion-dollar study also showed this year's flu season claimed four lives. There were no deaths last year.

The Southern Hemisphere Influenza and Vaccine Effectiveness Research and Surveillance (Shivers) study has been tracking patients admitted to Auckland District Health Board and Counties Manukau District Health Board hospitals with severe acute respiratory illness and those who went to their GP with flu symptoms.

Principal investigator Sue Huang said there were 109 patients admitted to the hospitals' intensive care units with influenza and respiratory illness this year, compared with 52 last year.

The study's co-lead investigator, Associate Professor Nikki Turner from Auckland University, said there wasn't any particular reason for the dramatic jump in numbers this year.

"Last year was a relatively quiet flu year. It's not that we're doing anything differently, but some years you have more community immunity."

Babies (under 1 year old) were hardest hit with the highest influenza hospitalisation rate – almost five times higher than children aged 1-4 years, the second-hardest hit age group, the study found.

Last year, patients aged 5-19 years had the highest rate. The other group with high illness rates were those living in crowded and draughty housing conditions.

Dr Huang said the influenza vaccine was the main weapon to fight the virus. The predominant strain of flu to hit the population this year was the H1N1 strain, which the vaccine protected against.

Vaccination doses had reached one million since 2009, but even more needed to take up the jab in order for hospital admission figures to decrease, she said. The vaccine was free for anyone aged over 65, anyone who suffered from specific medical conditions, and pregnant women.

Having the vaccine free for all would be "lovely", but there were factors to consider such as the cost, she said. People in high-risk groups needed to think about vaccination for next year. ❑

Letters

Got something to say?

Email us!

editor@skeptics.nz


Skeptical Desiderata

Go skeptically amidst the lies and the guile, and take comfort in whatever rationality there may be.

As far as possible, without being an asshole, question established orthodoxies and fatuous argument. Speak your truth quietly and clearly even to the dull and ignorant, for though it conflicts with the evidence, they too have their story.

Avoid creationists and climate change deniers, for they are vexatious to rational argument and their minds are lost. You will argue with them in vain and become bitter.

Enjoy your small victories. Keep interested in your local blogs and groups, however humble; they are the force that propels the changing attitudes of our time.

Exercise caution in your medical choices, for the world is full of quackery. But let this not blind you to what progress there is, and remember that many persons strive for scientific rigour. Everywhere life is full of enquiry.

Be yourself, unless evidence suggests that you should be otherwise. Especially, do not feign knowledge you do not have. Do not be skeptical about love, even though it can be couched in terms of evolutionary psychology, for you shall have less fun.

Take kindly the counsel of the years, gracefully surrendering the falsehoods of youth, and remember that confirmation bias still plies its trade within you. Nurture an appreciation of being wrong, for you undoubtedly still hold to some cherished untruth.

Do not distress yourself with religious fundamentalists. Their convictions are born of their time in history, and it is for the world at large to leave them behind.

Beyond a wholesome questioning, be gentle with yourself. Write that blog entry, but try to get outside too.

You are a child of the universe, made of the same stuff as trees and stars, and whether or not it is clear to you, the universe is expanding with or without your help.

Therefore be at peace with rationality, even if your idea of it scarcely overlaps that of your neighbour's. And whatever campaign you wage to lift the veil of ignorance, remember to take time out for science fiction. Use sunscreen.

With all of its sham, chicanery and prescientific beliefs, it is still a beautiful world.

You are a skeptic, so be happy.

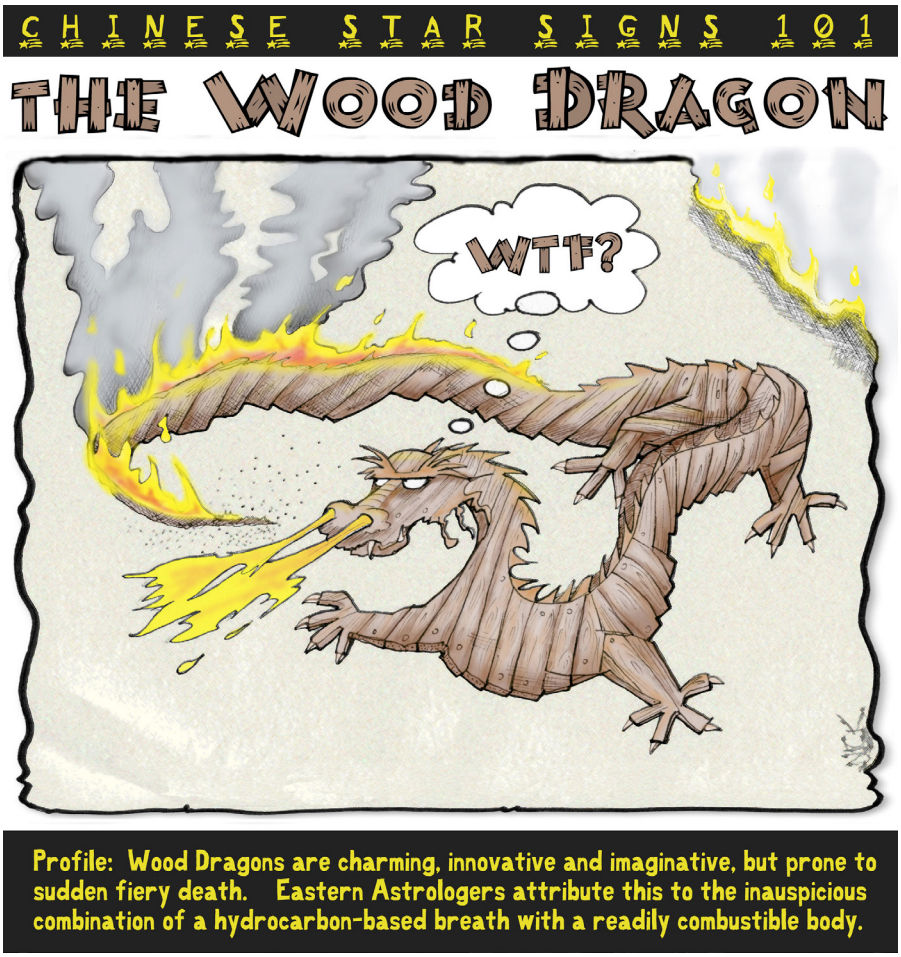
By Matthew Willey, with apologies to Max Ehrman

SKEPTICAL DESIDERATA

Congratulations go to Matthew Willey for his delightful "Skeptical Desiderata" (*Spring Issue, 2014*). Its whimsical humour and its philosophy are great. Thank you for presenting it.

Margaret Whitwell
Tauranga

Cartoon by Nick Kim



Steven Galbraith is an associate professor in mathematics at the University of Auckland. His research interests include cryptography and information security, and he enjoys breaking mathematical cryptosystems (cryptanalysis is basically skepticism about cryptosystems). Read about his work at ellipticnews.wordpress.com

Mathematics and Pseudoscience

Steven Galbraith writes about his experiences with mathematical cranks.

First, please don't panic! This article is about pseudoscience and those who practice it, and does not require knowledge of mathematics.

There are two types of pseudoscience. The first type is a deliberate marketing ploy: using the language of science to add credibility to products. As skeptics we are very aware of how common this is. This cynical 'blinding with science' not only means that consumers are exploited, but it potentially weakens the public's attitude to science.

However, this article is not about that form of pseudoscience. It is about unintentional pseudoscience. Here the practitioner believes that (s)he is doing science and, furthermore, that (s)he has made a significant contribution to the field. If the methodology is sound and the finding is true, then of course the practitioner has been doing valid science. There are examples of original scientific work being done by 'amateurs', and again I will say little about this topic.

My main interest is when the methodology and/or findings are wrong, but the practitioner is unable to recognise this. This is the territory of 'cranks.' Of course, this situation can happen with professionals (one is reminded of Linus Pauling and his promotion of vitamin C), but is more commonly associated with amateurs, by which I mean people who are not employed in a university or research laboratory.

I remember recieving my first letter from a mathematical crank. I had only finished my PhD

about one year previously and I was employed as a post-doctoral researcher in a mathematics department in the UK. I received a hand-addressed envelope containing some pages purporting to prove Fermat's Last Theorem. My first thought was that I must have really 'made it' as a mathematician if my name was becoming known to such people. Now I realise that, since their letters are ignored by the overwhelming majority of mathematicians, such cranks are so desperate to have an audience that they send their papers to everyone they can think could read it. So the threshold to receive such letters is not high.

Since that time I have received around a dozen letters or emails from amateur mathematicians. Unlike the majority of mathematicians, I usually do not delete these immediately. Instead, I am inclined to engage with the senders. This is, in part, due to my interest in skepticism. But before we get into that, first I want to make some comments about mathematics so that we can distinguish mathematics from 'pseudomathematics'.

What is mathematics?

Mathematics is quite hard to define. As a subject it bears little resemblance to the school subject with the same name. According to Wikipedia "Mathematics is the abstract study of quantity, structure, space, change, and many other topics". I prefer the following definition, due to the famous geometer Bill Thurston: mathematics is the smallest subject satisfying the following:

- Mathematics includes the natural numbers and plane and solid geometry.
- Mathematics is that which mathematicians study.
- Mathematicians are those humans who advance human understanding of mathematics.

It is more useful to consider the characteristic features of mathematics (as compared with the physical sciences). Mathematics is based on rigid logical rules and a notion of 'proof'. Mathematical theorems are 'true', and remain true forever (unlike theories in the physical sciences, which are always models or approximations to reality that can be improved in future). Interestingly, mathematics contains the tools to analyse itself. For example, it is possible to prove that certain problems are impossible to solve within a given mathematical system.

People often wonder (mistaking 'mathematics' with the subject studied at school) why it is necessary or possible to do research in mathematics. Surely, they think, we know how to add and multiply and so there is nothing to be done?

But I hope most readers will know that mathematics, like science, is perpetually generating new questions for itself, as well as finding new applications.

My PhD was in a branch of mathematics called Number Theory, which is one of the most ancient parts of mathematics. This is a subject that is mainly about problems regarding the integers (rather than the real numbers). For example, prime numbers are part of Number Theory.

Number Theory was considered to be an entirely 'pure' (meaning, studied for its own beauty, rather than because it has applications) branch of mathematics for over 2000 years, but nowadays is recognised as fundamental to cryptography and communications (which are my own main research areas).

There are many famous problems in number theory. For example, Fermat's last theorem; Riemann hypothesis (million dollar prize for solving it!); Goldbach conjecture (every even integer is sum of two primes); and Twin primes (there are infinitely many integers p, p+2 that are both prime).
The first of these is now proved, but the other three are still unsolved.

Number Theory is very attractive to amateurs because the problems can be very easily stated (for example, the Golsbach and Twin primes problems

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can be understood by 10 year olds). Hence it is known that number theorists (like me) are more likely to receive letters from cranks than researchers in other branches of mathematics.

Paradoxers and cranks

Having said some words about the nature of mathematics, I can say what I mean by 'pseudomathematics'. It is any purported solution to a mathematical problem that does not meet the accepted standards of logic and rigour. Sometimes it is the mathematics that contains a mistake, but more often it is the writing that has a superficial resemblance to genuine mathematical writing, but that does not follow the usual laws of mathematical logic.

You might be surprised to learn that this is not a recent phenomenon. The distinguished mathematician Augustus De Morgan (1806-1871), first president of the London Mathematical Soceity, collected a large body of works by cranks and wrote a number of short articles about the phenomena. These were collected posthumously under the title *A Budget of Paradoxes* (1872).

De Morgan used the word *paradoxer* to mean a freethinker who challenges orthodoxy (what we would nowadays call a maverick): "a paradox is something which is apart from general opinion, either in subject-matter, method, or conclusion". He notes that the progress of science requires paradoxers, but also that many who believe they are paradoxers are actually wrong. The word *crank* means a paradoxer who is wrong and is unable to see that they are wrong. So there is a subtle dividing-line between being a maverick and a crank, and the difference may only become clear with hindsight.

De Morgan writes "The manner in which a paradoxer will show himself, as to sense or nonsense, will not depend upon what he maintains, but upon whether he has or has not made a sufficient knowledge of what has been done by others, especially as to the mode of doing it." In other words, the mark of a crank is to not understand the subject fully, to not use the language correctly, and to not follow the accepted methodology of the subject. A consequence is that most writings by cranks are incomprehensible and would take much more time to evaluate than work by professionals. US Judge Richard Posner writes "To call a person a crank is to say that, because of some quirk of temperament, he is wasting his time pursuing a line of thought that is plainly without merit."

Another who has written extensively about cranks is Underwood Dudley, and I have been influenced by his book *Mathematical Cranks*. He describes mathematical cranks as follows: "A lot of them are amateurs...who like to work on mathematical problems. [They] aren't nuts, they're just people who have a blind spot in one direction." One particular subclass of mathematical crank are those who try to solve problems that have already been proven to be impossible to solve (such as trisecting the angle using the rules of Euclidean geometry). These are the mathematical equivalents of people who try to build perpetual motion machines.

> "A LOT OF THEM ARE AMATEURS...WHO LIKE TO WORK ON MATHEMATICAL PROBLEMS. [THEY] AREN'T NUTS, THEY'RE JUST PEOPLE WHO HAVE A BLIND SPOT IN ONE DIRECTION."
>
> - UNDERWOOD DUDLEY

What is a crank thinking when they contact a mathematician? They have a conviction that they are correct, and a desire to be recognised for their contribution (sometimes this recognition requires prizes and accolades).

A warning!!!!

The hallmarks of cranks in mathematics and science are: enthusiastic amateurs who are well-read about science; often people with some formal academic training (e.g. a bachelors degree in mathematics, engineering, physics); imaginative and intelligent free-thinkers; people with spare time in their later lives.

So *you*, dear readers of this journal, are an 'at risk' category. The rest of the article is to give you some friendly advice about how to protect yourself from crankdom.

Steps to avoid crankdom

So, imagine you are a free-thinker with an interest in a problem in mathematics or science. And suppose you have some ideas that you believe to be original and correct. What should you do?

You should first accept the possibility that you might be mistaken. Your thoughts may not be original, or they may not be correct. This is what I am always thinking whenever I think I may have made a breakthrough in research, and it is how all scientifically-minded people should be.

How can one be certain that one is not a crank? Well, you could talk to people in the pub and try to convince them that you have amazing new ideas. Or you could write letters to newspapers or journals. And this may make you feel good. But these avenues are not robust tests of your ideas.

Instead, you should seek professional help! Which means, you should try to talk to professionals in the subject area of your work and ask them to critique your ideas.

Most young mathematicians are advised to ignore emails from cranks. For example, this is the advice given in Underwood Dudley's book:

- "It is almost always a mistake to correspond with trisectors, because it is virtually impossible to convince them that they have made an error."
- "Some of us are so filled with the urge to educate that we try to reason with the trisector. This is almost always futile."
- "To the first letter reply politely ... If this technique does not suffice then be brutal. Write a letter that is harsh, scathing ..."

However, I have chosen to ignore this advice. Partly, I think due to my interest in skepticism.

So here are some reasons why I interact with mathematical paradoxers:

- I like to be nice to people who like mathematics. In my opinion it is important that society has a high regard for science and mathematics and so people who are interested in these subjects should be encouraged.
- Who else should do it?
- It is part of my social duty as a professional mathematician and public servant.
- I might learn something. Usually not about mathematics (though occasionally I do), but mainly about human psychology.

Step 1: How should a paradoxer approach a professional?

Keep in mind that almost all mathematicians will delete your email or throw away your letter immediately, and young mathematicians are discouraged from "wasting their time" talking to amateurs. This is not because they are evil, but because they are busy. A very distinguished mathematician, who is an editor of a good journal, told me he immediately rejects any crank paper submitted because "either it is wrong or it is right, in which case it deserves to be published in a much better journal."

Case study 1: *"I have an inquiry about whether you would be willing to review a paper on a number theoretic topic. I am an amateur mathematician with no contacts in academia and no history of published papers. To make matters worse, the problem to which I am proposing a solution is notorious for attracting failed attempts. Consequently my chances of getting my paper reviewed by any journal without supporting expert opinion could not be less favorable."*

This is a good approach. It shows an awareness of reality and suggests that the author is not actually a crank.

Dos and Don'ts:

- Be polite.
- Do not be arrogant.
- Especially, do not compare yourself to Einstein or Galileo or Ramanujan.

Step 2: Try to learn the language

Science and mathematics have their own language. It is not easy to get into. But if your proof will result in a one million dollar prize, is it such a bad hourly rate to learn something about the language and standards of the subject? Here's one email I got from the same person as I quoted above: "Apologies my paper is painful to read. I do not find it easy myself and I wrote it."

Step 3: Taking criticism

You asked for an expert opinion, now listen to what they say. In particular, try to understand their argument before responding.

Case study 2: *"I'm just a dumb Kiwi physicist, but I have been thinking about factorisation using*

classical algorithms. The short attached paper discusses an algorithm that is probably well known, but I cannot easily find it in the literature. Could you please take a quick look and give me some literature hints? The physics is very interesting. Thanks."

Once I replied, pointing out some connections between their work and previous (rather naive) algorithms, I received this:"Thank you for your helpful email. Clearly I do not have any appreciation for the complexity of linear algorithms ... Actually, I was not expecting it to be fast, just different in some way ... because I am more interested in the physics."
So this is a good outcome for all, and the sender shows themselves to be not a crank.

Step 4: Try to control the anger
You will become impatient and frustrated by the reviewer's insistence on details. You will be disappointed in how many mistakes there are in your work. Please try not to send angry emails telling the reviewer to "destroy all copies of my papers that you have in your possesion" or "I have decided I do not want to continue with the review. Thank you for your feedback. It has been much appreciated." Because sooner or later you will likely want to re-contact that one person who listened to you.

Step 5: Be gracious in defeat
Inevitably (though it doesn't feel like it at the beginning) your idea will turn out to be either not original or not correct. You will be disappointed. But please be gracious about it.

"Thanks for explaining...I understand your argument now. I am afraid my wish for... undermined my ability to think clearly about it. It makes a proof of...uncertain, to say the least."

Can cranks be cured?

To earn the name "crank" one needs to be more-or-less impervious to criticism, so in that sense it is a terminal condition. However, the people I have been quoting in this article have had their minds changed by our communications, and so are not fully-fledged cranks. Some of them I have never heard from again, so I presume they are cured. For at least one them, treatment is ongoing. My feeling is that a full 'cure' is rare, but that early intervention may have some preventative effect on the worst symptoms (e.g. persecution complex, recourse to conspiracy theories).

How likely is it that an amateur is correct? The case of Kurt Heegner

Heegner was a German high school teacher. He announced a proof of the "class number 1" problem in 1952, but it was not recognised as a correct solution.

Stark and Baker independently solved the problem (and were awarded major prizes) in the 1960s. Birch writes: "Heegner's paper was written in an amateurish and rather mystical style, so perhaps it was not surprising that at the time no-one tried very hard to understand it. It was thought that his solution of the class number problem contained a gap." In 1967 Birch deduced that Heegner's proof was correct. Stark later recognised that Heegner's approach was essentially equivalent to his own. Heegner died in 1965, before his work was vindicated.

Alf Van der Poorten writes "Fortunately this story is not well known, otherwise it would feed the persecution complexes of amateurs. Is this a disgraceful scandal? I think not. An amateur better have clear arguments to get a proper hearing. That's not unfair; it's our playing the odds. If in consequence great contributions are neglected, that is a misfortune, not a scandal."

I agree with Alf here. The fact that now and then an amateur turns out to be right, does not imply that the thousands of others deserve careful scrutiny by experts.

There are a lot of paradoxers around (I have been contacted by four or five such people here in little old NZ). Paradoxers should contact professionals for a critique of their ideas, rather than complaining to their mates in the pub.

Most professionals will not respond to requests. But I encourage experts to communicate with paradoxers ... up to a point. The mark of a crank is how they deal with critical comments. Besides, if we can't cure cranks in mathematics, what hope can there be for the rest of (pseudo-)science? ❑

Dean Conger is a physician who emigrated to NZ from the USA in 2010 with his partner and children. He completed his medical degree in 1991 and finished specialty training in Ophthalmology (eyes) in 1997. A mid-career sabbatical begun in 2008 led to the family getting on a sailboat and cruising around the Pacific ocean for 2 years before finally sailing into Waitemata Harbor. He works primarily at Counties Manukau DHB.

The Trans-Pacific Partnership and its Impact on the NZ Health Sector

A very important process is currently flying below the public radar and I think it requires urgent scrutiny. The Trans-Pacific Partnership (TPP) is a regional trade treaty under negotiation between twelve diverse low, middle and high income countries of the Pacific Rim: Australia, Brunei, Canada, Chile, Japan, Malaysia, Mexico, New Zealand, Peru, Singapore, the United States of America, and Vietnam. Formal negotiations have been underway since 2008, since which time new negotiating countries have come onboard. Once signed, the TPP will be a legally binding agreement that regulates trade – and by extension practices – between these nations indefinitely. Although amendment and new members will be possible, the TPP is intended to be a "landmark, 21st-century trade agreement", establishing new norms for global trade.

New Zealand's Pharmaceutical Management Agency (PHARMAC) has been highly successful in facilitating affordable access to medicines through a combination of aggressive price negotiations, innovative procurement mechanisms, and careful evaluation of value for money. Recently the US government, through the establishment of a series of bilateral and multilateral 'free' trade agreements, has attempted to constrain the pharmaceutical access programs of other countries in order to promote the interests of the pharmaceutical industry.

The Trans-Pacific Partnership Agreement (TPPA) represents the latest example; through the TPPA the US is seeking to eliminate therapeutic reference pricing, introduce appeals processes for pharmaceutical companies to challenge formulary listing and pricing decisions, and introduce onerous disclosure and "transparency" provisions that facilitate industry involvement (?!) in decision-making around coverage and pricing of medicines (and medical devices). The US agenda, if successfully prosecuted, would be likely to increase costs and reduce access to affordable medicines for New Zealanders. This would in turn be likely to exacerbate known inequities in access to medicines and thus disproportionately affect disadvantaged population groups, including Maori and Pacific peoples.

> "THE US AGENDA...WOULD BE LIKELY TO INCREASE COSTS AND REDUCE ACCESS TO AFFORDABLE MEDICINES FOR NEW ZEALANDERS."

Trade agreements can constrain preventative health policy by empowering foreign investors to sue governments if changes to health regulations interfere with the value of an investment or its anticipated profits (known as 'Investor State Dispute Settlement' or ISDS). While earlier World Trade Organisation arrangements allowed lawsuits between member governments, agreements such as the TPP extend this right to foreign individual and corporate investors. This means that foreign investors based in any one of the 12 TPP countries could challenge domestic regulations, policies or even court decisions that are perceived by them to result in a significant loss of their investment's

value or expected profits.

Negotiations thus far have been carried out in secret, without public comment or input. Available information has come from copies of draft provisions leaked to the press and posted on WikiLeaks.

Doctors Without Borders has raised alarm bells regarding the following provisions as they feel the impact on public health in developing countries will be severe. They state that provisions in the TPPA will likely result in:

- Lowering the bar of patentability – require patenting of modifications of old medicines, even in the absence of therapeutic benefits.
- Patenting of medical methods – require the patenting of surgical, therapeutic and diagnostic methods.
- Prohibit pre-grant oppositions – forbid challenges to weak or invalid patents until after they have been granted.
- Patent term extensions – require extending 20-year patent monopolies by at least five years to compensate for delays in the regulatory process.
- Patent linkage – prohibit national drug regulatory authorities from approving generic medicines until patents have expired.
- Require new forms of IP enforcement – grant customs officials new powers to detain shipments, including in-transit shipments, suspected of non-criminal trademark infringements; require mandatory injunctions for alleged IP infringements; raise damages amounts.

I am skeptical of the assurances provided by the NZ negotiators that the public health will be protected. At the very least, trade negotiations that affect public health must be conducted with adequate levels of transparency and public scrutiny, including providing access to the negotiating texts. I suggest you contact your MPs…SHOW ME THE DATA! ❑

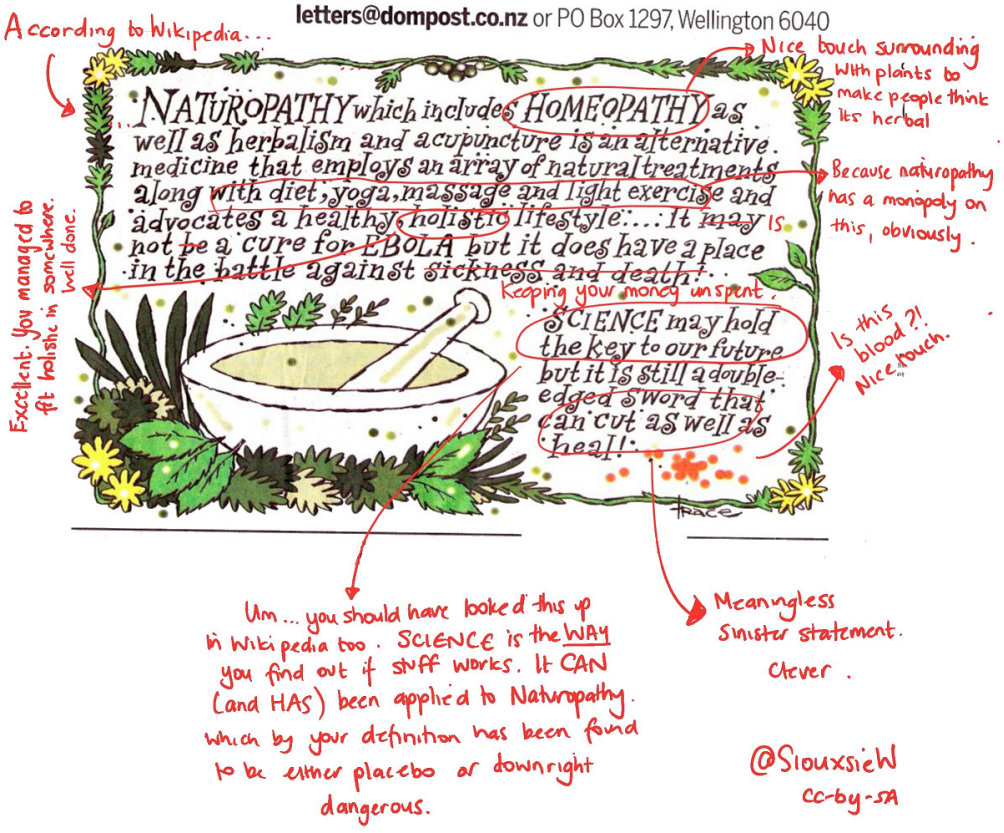
Cartoon by Siouxsie Wiles

Naturopathy vs Science

In November Wellington's Dominion Post newspaper ran a piece (in my opinion...) of misleading propaganda they passed off as a cartoon which can be summed up as naturopathy vs science.

I assume it is in response to the bad press that homeopathy received after Green Party MP Steffan Browning signed a petition calling for the World Health Organisation to start using homeopathy to treat people in West Africa with Ebola. I had the pleasure of explaining what homeopathy is on breakfast TV.

Inspired by the fantastic *@WieldARedPen* on twitter, I fixed the cartoon. Enjoy!



sciblogs.co.nz/infectious-thoughts/

A tribute to Warwick Don

Warwick Don will be sorely missed by New Zealand's skeptical community. He was the last of the active founding members of the New Zealand Skeptics, and took pride in recent years to be the only one to have attended all our conferences. He served as Chair from the founding to 1992, and continued to show an interest in things scientific and skeptical well after having handed the torch on.

But Warwick will be remembered for much more than that – his example of how to be courteous while also critical has been an inspiration to many of us. He took a strong interest in science education, from school pupils looking for information on the evolution and creationism debate to supervising and supporting research and publications on a broad range of topics.

Talking with Warwick was always a stimulating experience. A devoted classical music fan and this country's foremost authority on ants, Warwick was a great conversationalist who was interested in just about everything. Though he always had a very gentle demeanor he could, when called upon, defend a position with great intellectual vigour. Many will remember his extended debates in the letters column of *Investigate Magazine* with the publication's creationist editor Ian Wishart. In 2003 the debate spilled over into the pages of the *NZ Skeptic* with Warwick and Ian exchanging articles. Warwick contributed several other pieces to the magazine on creationism and they were always a delight to read.

His gentle sense of humour was much appreciated. One year when the Skeptics had an auction as after-dinner entertainment, Warwick turned up with proof that man and dinosaurs walked the earth at the same time. He'd had Otago's Geology Department rig up a fake fossil complete with a therapod print overlying a human footprint. The redoubtable Frank Haden bought the rather large item and then cheerfully donated it back to Warwick, who had taken quite a shine to his artwork. Perhaps it'll be found in the geology department's basement one day and startle some unsuspecting paleontologist....

An even more hidden talent occasionally revealed was Warwick's fine voice. One year the Skeptics encouraged conference attendees to pen skeptically relevant new words to well-known tunes. The singers were struggling a bit with a hymn about homeopathy – "Dilute With Me" – until Warwick's lovely voice cut in, carrying the "Abide with Me" music to new heights.

He will be missed. ❑

Alison Campbell has expertise in the disparate fields of animal behaviour and science education, with a particular interest in students' understanding of the language of science; gaps in student knowledge (and how to bridge them); and attitudes to the theory of evolution.
Read her *BioBlog* at sci.waikato.ac.nz/bioblog/

SHOULD FOOD CONTAINING DNA BE LABELLED?

Apparently 80% of people in the USA think so, according to a Washington Post article that's been all over Facebook in the last few days. That is, 80% of those polled in the regular Food Demand Survey (by Oklahoma State University's Department of Agricultural Economics) agreed with the proposition that all food containing DNA should be labelled. (To put this in context, there is currently a heated debate in the US – driven by those opposing the incorporation of material from genetically-modified organisms into the food chain – over whether such foods should be labelled as such.)

Now, you could argue that the question was poorly worded. There's been a certain amount of skepticism that those in agreement with the DNA proposition could be so high – after all, anything with whole cells in it will definitely contain DNA, and there'll probably be traces in most other foods, apart from very highly processed foodstuffs like refined oils and sugars. And salt. Perhaps they thought they were talking about foods from genetically-modified sources, as opposed to 'natural' foods? (More on that later.)

Perhaps. But there was also a question on that. Here's the list of questions that were asked:

Do you support or oppose the following government policies?

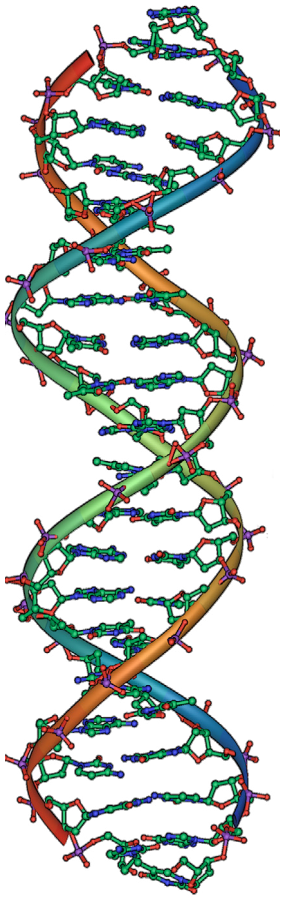
- Mandatory calorie labels on restaurant menus
- Mandatory country of origin labels for meat
- A ban on the sale of food products made with transfat
- A tax on sugared sodas
- Calorie limits for school lunches
- A requirement that school lunches must contain two servings of fruits and vegetables
- A ban on the sale of raw, unpasteurized milk
- Mandatory labels on foods produced with genetic engineering
- Mandatory labels on foods containing DNA
- A ban on the sale of marijuana

The author of the Post article suggested that the poll results were the outcome of "the intersection between scientific ignorance and political ignorance", and went on to say that perhaps many of those polled "don't really understand what DNA is, and don't realise that it is contained in almost all food."

This is close to the information deficit model: the one that argues that if 'laymen' are given all the information on the scientific issue du jour, that

they will change their minds and accept the scientific perspective. However, this ain't necessarily so. As that debate around labelling of GM foods shows, there are far more factors in play than simple (lack of) scientific understanding: do people feel that their voices have been heard by those making the decisions? Do they have particular religious beliefs that affect their attitudes? How much of their feelings on the subject are shaped by personal ethical perspectives, or individuals' experiences?

This means that those communicating about science need to be aware of these perspectives and frame their communication accordingly, with an eye to real engagement rather than simply throwing information at people.



In New Zealand these issues and others were canvassed by the Royal Commission into Genetic Modification, back in 2000. This was a good example of the sort of meaningful engagement with the public that needs to become more widespread, although looking at how these questions are addressed in schools could also be interesting. I know that back in the early 2000s, we found that a small proportion of new first-year students were aware that all living things – and not just GMOs – contained DNA. A much, much, much smaller proportion than in the US survey! So at that level, maybe we're doing something right.

Oh, and the Washington Post wrote a rather tongue-in-cheek mock-up of what a food label might look like, if public opinion results in such labelling becoming mandatory:

WARNING: This product contains deoxyribonucleic acid (DNA). The Surgeon General has determined that DNA is linked to a variety of diseases in both animals and humans. In some configurations, it is a risk factor for cancer and heart disease. Pregnant women are at very high risk of passing on DNA to their children.

❑

'Natural' vs. GMO foods: geneticist Kevin Folta has noted that modern GM techniques give far more control, in terms of known genetic and phenotypic outcomes, than hybridisation or mutational breeding (and that genes can and do move between species without human intervention). Here's a useful graphic comparing the outcomes of the different techniques:

2012 Kevin M. Folta @kevinfolta	Hybrids (cross between two non-clonal plants)	Polyploids (whole genomes duplicated or added)	Mutation breeding (Chemical or radiation induced damage to DNA)	Crossing Species Barriers (interspecific crosses)	Transgenics (rDNA method to add a gene- "GMO")	Cisgenics (rDNA method to add a gene)
Examples in common foods	Almost everything	Strawberries, wheat, bananas, brassicas, others	Some bananas, pears, apples, rice, yams, mint, others	Pluots, tangelos, some apples, rice, wheat	Much corn, canola, soybeans, cotton, papaya	Coming soon.
Transfers genes from one species to another	Yes, sometimes	Yes, often	No	By definition	Yes	No
Occurs in nature	Yes	Yes	Yes, transposon movement, mutation from environment	Yes, rare, seldom fertile	Yes. Agrobacterium, other horiz. trans.	N/A
Human intervention	Yes, for crop improvement	Can be induced chemically to improve crops	Yes, to introduce variation for crop improvement	Yes, for crop improvement	Yes, for precision crop improvement	Yes, for precision crop improvement
Number of genes affected	10K to >300K, depending on species	10K to >800K	No way to assess	10-300K	1-3	1-3, usually 1
Know what genes moved or affected do	No.	No	No	No	Yes	Yes
Know where affected genes are in genome	No	No	No	No	Yes	Yes
Plant patentable	Yes	Yes	Yes	Yes	Yes	Yes
Documented adversity	Yes	??	???	Yes	No	No
Environmental assessment	No	No	No	No	Yes	Will see.
Organic acceptable	Yes	Yes	Yes	Yes	No	No
Time for new variety	5-30 years	>5 years	>5 years	5-30 years	<5 years	<5 years
Demanding label	No	No	No	No	Yes	Will see.

A tireless skeptical activist, **Mark Hanna** is co-founder of the Society for Science Based Healthcare, blogger at *SciBlogs* and winner of the NZ Skeptics Society's inaugural Skeptic of the Year award.
Read his blog *Honest Universe* at honestuniverse.com

ACC and *acupuncture*

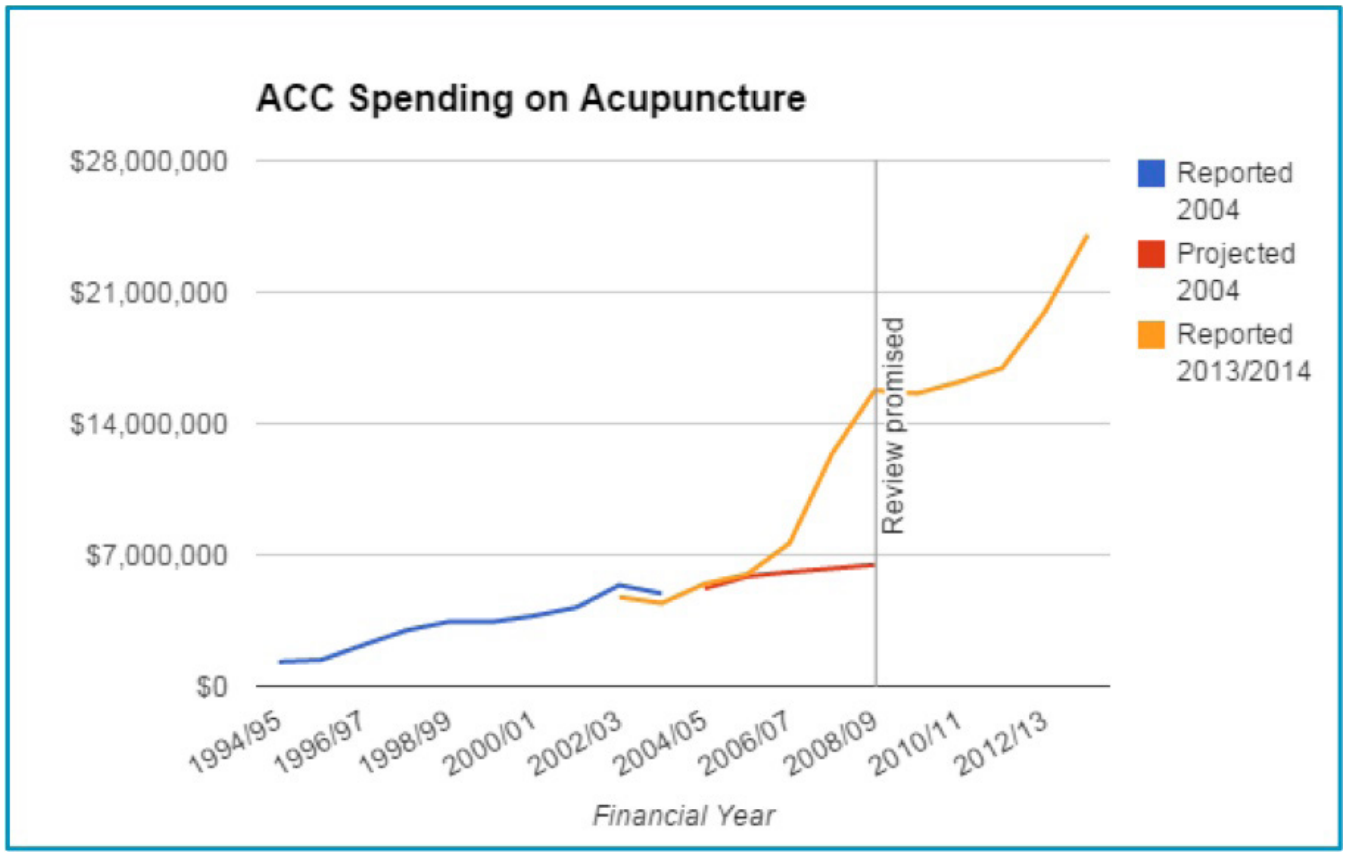
How much does the ACC spend on acupuncture? Mark Hanna investigates.

In 2014 a couple of Official Information Act (OIA) requests made by the Society for Science Based Healthcare to the Accident Compensation Corporation (ACC) uncovered information about how much they had spent on acupuncture treatments over the past decade ($120 million), as well as a more detailed breakdown of how much was spent on acupuncture for different categories of injury. Here are the top 5 categories by expenditure:

- Soft Tissue Injury $145 million
- Fracture / Dislocation $4.9 million
- Other $4.5 million
- Laceration, Puncture Wound $2 million
- Gradual Onset $1.18 million

Information released in parliament in 2004 also revealed how much money ACC spent on acupuncture in the decade from 1994-2004 ($31 million), as well as projections on how much they expected to spend on acupuncture from 2004-2009 (< $7 million p.a.).

As you can see from the following chart, their projections turned out to be rather inaccurate, and ACC spending on acupuncture has been absolutely booming ($24 million in 2013/14):



In August, I submitted my own OIA request asking for copies of or links to all literature reviews regarding the effectiveness of acupuncture for any condition undertaken by ACC.

I was told that there are only two ACC literature reviews on the efficacy of acupuncture.

- Pragmatic Evidence Based Review: The efficacy of acupuncture in the management of musculoskeletal pain (2011)
- Brief Report: Effectiveness of acupuncture in selected mental health conditions (2014)

Here are the important parts of those reviews' conclusions:

- The evidence for the effectiveness of acupuncture is most convincing for the treatment of chronic neck and shoulder pain. In terms of other injuries, the evidence is either inconclusive or insufficient.
- There is limited good quality evidence to conclusively determine acupuncture's efficacy in treatment of mental health conditions such as Major Depressive Disorder, Dysthymia, Anxiety Disorder, Borderline Personality Disorder and Post Traumatic Stress Disorder.

When I went to write on this topic last year during *Acupuncture Awareness Week*, I found two more ACC literature reviews on the efficacy of acupuncture (as well as other treatments) on the ACC website:

- Managing Soft Tissue Ankle Injuries (2002)
- Traumatic Brain Injury: Diagnosis, Acute Management and Rehabilitation (2006)

On the topic of acupuncture, these reviews concluded: The evidence is either weak or absent for…acupuncture…current evidence does not support the use of acupuncture to treat people with [Traumatic Brain Injury].

Feeling rather frustrated that ACC's response to my earlier request (which arrived less than two weeks before last year's September election) was apparently false, I sent a more specific follow-up:

> *I would like to reiterate my request to be provided with copies of or links to all literature reviews regarding the effectiveness of acupuncture for any condition undertaken by ACC. For the sake of clarity, I would like to be explicit that this includes both reviews that looked at several treatment options including acupuncture, and reviews that were commissioned by ACC as well as those directly undertaken by ACC.*

I hope anyone reading this would agree that this followup should absolutely not have been

necessary, and all the information I was requesting here should have been provided in ACC's response to my original request before they'd be breaking the law.

However, when ACC finally acknowledged my request over a week after having received it, they maintained that "the information provided to [me] on 3 September 2014 was complete" and that this was therefore a new, separate OIA request. Because of the break over summer, this gave them until the 20th of January to respond to my request.

At 4 o'clock on the afternoon on the 20th of January, I heard back from ACC with an answer that essentially felt like 'find the information yourself, it's online'. Instead of providing me with copies of, or links to, any reviews, they told me the name of one review commissioned by ACC and that it could be found online, and provided me with two links to pages on their website that listed all of their reviews.

Interestingly, although I don't believe the 2011 review has been released except in response to an OIA request, it was not mentioned in ACC's response and they told me that "ACC does not hold any other information that has not been published".

Having taken some time to go through all the reviews found on the pages I was linked to, in order to find all those which mention acupuncture, I came up with the following list. As well as the review's title and date where I could find one, I am quoting the relevant conclusions below.

- There is limited good quality evidence to conclusively determine acupuncture's efficacy in treatment of mental health conditions such as Major Depressive Disorder, Dysthymia, Anxiety Disorder, Borderline Personality Disorder and Post Traumatic Stress Disorder.
  Brief Report: Effectiveness of acupuncture in selected mental health conditions (2014)

- There is limited and heterogeneous evidence of effectiveness of acupuncture in depression... The evidence base [for anxiety] is small and varies greatly in terms of methodological rigour and comparability and the published literature is limited to very few good quality RCTs.... There is limited evidence about the effectiveness of acupuncture in PTSD.
  Considered Judgement Form: Effectiveness of acupuncture in selected mental health conditions (2014)

- Unknown effectiveness (conflicting evidence of efficacy or absence of evidence; methodological concerns with research/insufficient data to date)

- While acupuncture and ginkgo biloba have respectively been demonstrated in two small, separate randomised clinical trials to provide statistically significant effects on the frequency of [Primary Raynaud's] attacks, use of these therapies is not recommended in these guidelines, on account of the absence of any further followup studies investigating these interventions.
  Distal Upper Limb: Guidelines for Management of Some Common Musculoskeletal Disorders

- Evidence of no improvement in clinical outcomes
  New Zealand Acute Low Back Pain Guide (2004)

- Evidence on the use of acupuncture for post-TBI symptoms is scarce and inconsistent. Therefore, current evidence does not support the use of acupuncture to treat people with TBI.
  Traumatic Brain Injury: Diagnosis, Acute Management and Rehabilitation (2006)

- No recommendations can be made about the use of acupuncture, chiropractic, osteopathy or other complementary therapies for the treatment of soft tissue knee injuries due to a lack of good quality evidence.
  The Diagnosis and Management of Soft Tissue Knee Injuries: Internal Derangements (2003)

- There is some evidence that exercise and acupuncture, compared with exercise alone, may lead to better outcomes [for Frozen Shoulder].
  The Diagnosis and Management of Soft Tissue Shoulder Injuries and Related Disorders (2004)

- Given the very small number of eligible RCTs identified, and their heterogeneity, it is not possible for this review to reach any

strong conclusions about the effectiveness of acupuncture for the treatment and rehabilitation of musculoskeletal injuries.
Effectiveness of acupuncture for the treatment and rehabilitation of accident-related muskuloskeletal disorders: A systematic review of the literature (2002)

- The evidence for the effectiveness of acupuncture is most convincing for the treatment of chronic neck and shoulder pain. In terms of other injuries, the evidence is either inconclusive or insufficient.
Pragmatic Evidence Based Review: The efficacy of acupuncture in the management of musculoskeletal pain (2011)

Although they have told me so incorrectly in the past, I have ACC's word that these are all the ACC literature reviews that evaluate acupuncture. As you can see, they are inconclusive or negative for all but a few specific conditions: frozen shoulder, chronic neck pain, chronic shoulder pain.

In 2014 ACC spent $30,000 on acupuncture to treat burns, $59,000 on acupuncture for concussion and brain injury, and $591,000 on acupuncture for fracture and dislocation. They apparently spent $22,592,000 on acupuncture for soft tissue injuries, but I find it highly unlikely that all of th money was used to treat frozen shoulder, chronic neck pain, and chronic shoulder pain.

ACC's expenditure on acupuncture shows no sign of slowing. It grew 17% from 2011/12 to 2012/13, then a further 17% from 2012/13 to 2013/14, leaving the expenditure for 2013/14 at over $24 million. It's certainly not a large part of ACC's total expenditure ($1.3 billion in 2013/14), but it's no small sum of money.

ACC is publicly funded. Publicly funded healthcare should be based on rigorous evidence. ACC does not appear to have evidence that would allow them to conclude that acupuncture is an effective treatment for any more than these conditions. It is well past time for ACC to re-evaluate their expenditure on acupuncture. It should only be funded when used to treat conditions in a way that is supported by rigorous evidence, and that is certainly not the case currently.

I will end this article the same way as I have ended my previous writings on this topic, with my recommendations for how ACC should deal with this issue:

I think ACC needs to review its funding scheme for acupuncture. I think their approach to this should start with reviewing their Acupuncture Treatment Profiles document, ensuring that the only treatments contained within it are those supported by rigorous evidence, and purging pseudoscientific claims from it. If they find they need to undertake further reviews of the evidence for the use of acupuncture for particular indications, then they should do that before approving funding for it.

I think ACC should then only agree to pay for acupuncture treatments that are aligned with their Treatment Profiles document, which they should commit to reviewing at regular intervals to keep it in line with the latest evidence (I'm not sure what time interval would be most appropriate, and I understand that there is a cost involved in that work).

I'm not sure, but it's possible some changes to legislation may be required before this becomes a reality, but if that's the case those changes should happen. A government body should not be bound by law to fund healthcare that is not supported by evidence.

> ACC IS PUBLICLY FUNDED. PUBLICLY FUNDED HEALTHCARE SHOULD BE BASED ON RIGOROUS EVIDENCE.
> IT IS WELL PAST TIME FOR ACC TO RE-EVALUATE THEIR EXPENDITURE ON ACUPUNCTURE.

There's one last thing I'd also like to see, although I really feel like this is a long shot. I think ACC should take an active role in discouraging healthcare practice based on the "pre-scientific notions" described in their 2011 review. I think they should do this by distancing themselves from those acupuncturists who promote it and who base their practice on it, by refusing to grant them status as registered ACC practitioners if they are found to rely on it. ❑

Complaining Cheat Sheet

Do you think an ad is misleading?

The Society for Science Based Healthcare
contact@sbh.org.nz | sbh.org.nz

If you think an ad is misleading, you can complain about it to the Advertising Standards Authority.

Complain online:
www.asa.co.nz/complaint_form.php

Practically all claims in advertising must be backed up by evidence. You don't need to prove them false - it's up to advertisers to provide evidence.

Weak and vague health claims, like "supports weight management", can often be made without any evidence behind them.

For examples of claims that do and don't require evidence, see www.anza.co.nz/Section?Action=View&Section_id=45.

Ask for help!

The Society for Science Based Healthcare can help you with a complaint.

contact@sbh.org.nz | sbh.org.nz

Complaint Layout

1. **Identify the ad**

- What type? Website/in-store display/radio ad etc.
- When and where?
- Include photos/screenshots/recordings if you can
- Is there any precedent? Search here e.g. "NZASA magnet" www.nzlii.org

2. **What did it say?**

- Which parts are problematic?
- What was the context?

3. **What is the problem?**

- Which codes does it violate? How?

Advertising Code of Ethics

www.asa.co.nz/code_ethics.php

Is it misleading or deceptive?
Basic Principle 3

Is it not socially responsible?
Basic Principle 4

Does it use research, tests, or surveys in a misleading way?
Rule 3

Does it play on fear or exploit superstition?
Rule 6

Advocacy Principles

www.asa.co.nz/advocacy_principles.php

Advocacy advertising is given more leniency, because of the right to free speech, but still must meet certain criteria:

Does it portray opinion as fact?
Advocacy Principle 1

Is the identity of the advertiser unclear?
Advocacy Principle 5

Therapeutic Products Advertising Code

www.asa.co.nz/code_therapeutic_products.php

This code is relevant to medicines and medical devices. If the ad makes therapeutic claims, this code will be relevant.

Is the content misleading or deceptive?
Principle 2

Are any claims unsubstantiated?
Principle 2

Is it not highly socially responsible?
Principle 3

Is it likely to mislead or deceive?
Requirement 4(a)

Does it abuse trust or exploit lack of knowledge?
Requirement 4(b)

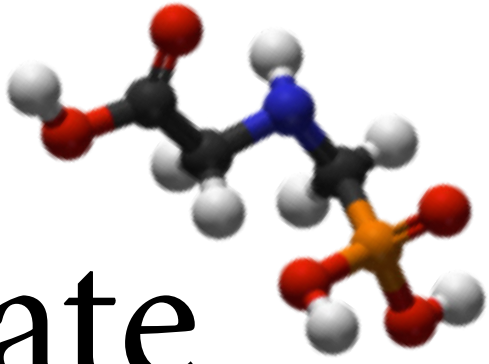
Does it play on fear or exploit superstition?
Requirement 4(c)

Does it use scientific terminology inappropriately?
Requirement 4.3

Steven Novella, MD, is an academic clinical neurologist at the Yale University School of Medicine. He is also the president and co-founder of the New England Skeptical Society, the host and producer of the popular weekly science podcast *The Skeptics' Guide to the Universe*, the author of the *NeuroLogica Blog* and founder of *Science-Based Medicine*.

sciencebasedmedicine.org is dedicated to evaluating medical treatments and products of interest to the public in a scientific light, and promoting the highest standards and traditions of science in health care.

Science-Based Medicine
Exploring issues & controversies in science & medicine



Glyphosate
The New Bogeyman

Dr. Steven Novella breaks down the latest environmental factor that apparently causes autism.

There is an ideological subculture that is motivated to blame all the perceived ills of the world on environmental factors and corporate/government malfeasance. Often this serves a deeper ideological drive, which can be anti-vaccine, extreme environmentalism, or anti-GMO. The latest environmental bogeyman making the rounds is glyphosate, which is being blamed for (you guessed it) autism.

Glyphosate is the active ingredient in the herbicide Roundup. It has been widely used for about 40 years, and with the introduction of GM crops that are Roundup resistant, its use has increased significantly in the last 20 years. It has therefore become a popular target for anti-GMO fearmongering.

Glyphosate is one of the least toxic herbicides used. It inhibits the enzyme 5-enolpyruvylshikimic acid-3-phosphate synthase which interferes with the shikimic pathway in plants, resulting in the accumulation of shikimic acid in plant tissues and ultimately plant death. The enzyme and pathway do not exist in animals, which is why toxicity is so low. Still, chemicals can have multiple effects and so toxicity needs to be directly measured and its epidemiology studied.

A systematic review published in 2000 found:

> Experimental evidence has shown that neither glyphosate nor AMPA bioaccumulates in any animal tissue. No significant toxicity occurred in acute, subchronic, and chronic studies.

and

> Therefore, it is concluded that the use of Roundup herbicide does not result in adverse effects on development, reproduction, or endocrine systems in humans and other

> mammals. For purposes of risk assessment, no-observed-adverse-effect levels (NOAELs) were identified for all subchronic, chronic, developmental, and reproduction studies with glyphosate, AMPA, and POEA.

As pesticides go, glyphosate has very low toxicity, and any dose a person is likely to get exposed to is well below the safety limits. A 2012 review looking specifically at reproductive and developmental effects found:

> In conclusion, the available literature shows no solid evidence linking glyphosate exposure to adverse developmental or reproductive effects at environmentally realistic exposure concentrations.

This includes exposure of farm workers spraying glyphosate, as the chemical is very poorly absorbed through the skin.

A 2011 review of epidemiological studies looking at the association of glyphosate and all non-cancer health outcomes concluded:

> Our review found no evidence of a consistent pattern of positive associations indicating a causal relationship between any disease and exposure to glyphosate. Most reported associations were weak and not significantly different from 1.0.

And a 2012 study looking at cancer outcomes:

> Our review found no consistent pattern of positive associations indicating a causal relationship between total cancer (in adults or children) or any site-specific cancer and exposure to glyphosate.

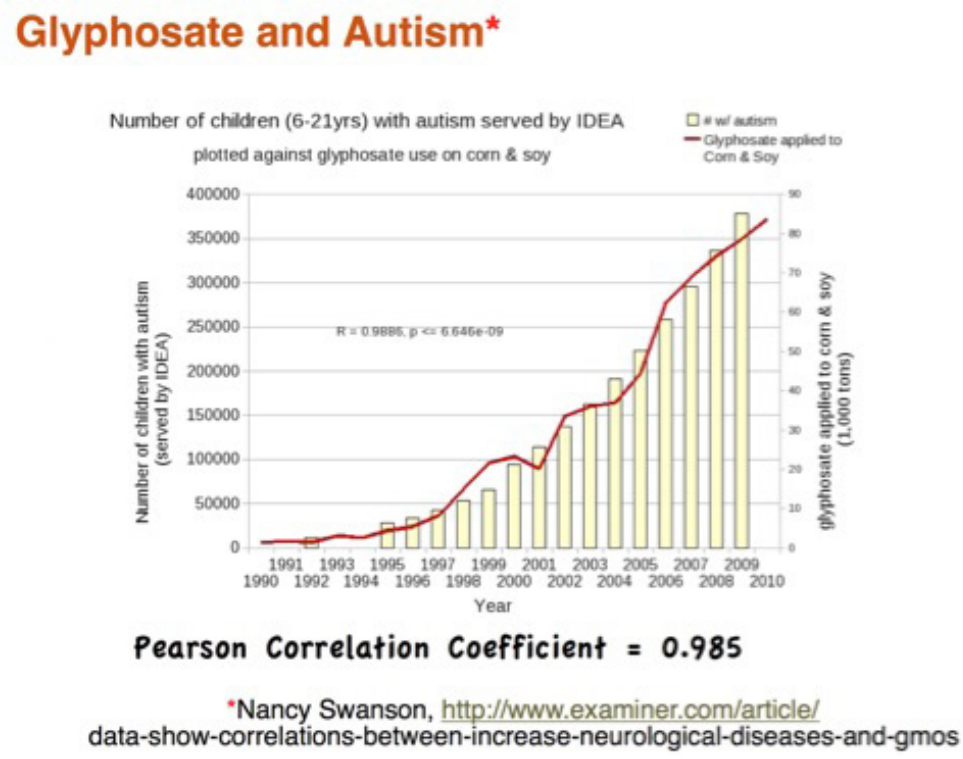
In short, there is no evidence for any significant glyphosate toxicity. It breaks down quickly in soil, and can get into ground water, but environmental levels are orders of magnitude lower than accepted safety limits.

The current article spreading fears about glyphosate cites the work of Stephanie Seneff, making a clear argument from authority:

> For over three decades, Stephanie Seneff, PhD, has researched biology and technology, over the years publishing over 170 scholarly peer-reviewed articles. In recent years she has concentrated on the relationship between nutrition and health, tackling such topics as Alzheimer's, autism, and cardiovascular diseases, as well as the impact of nutritional deficiencies and environmental toxins on human health.

Seneff, however, has not actually performed any research into glyphosate. She is "a Senior Research Scientist at the MIT Computer Science and Artificial Intelligence Laboratory." She is also an anti-GMO activist. That does not mean she is wrong – it just means it is misleading to cite her as a researcher and authority. She has published only speculations and gives many presentations, but has not created any new data.

The dramatic claim she is currently making, the one prompting many scary headlines, is that "Half of All Children Will Be Autistic by 2025." This is not based on any new research. It is simply a naïve extrapolation of current trends indefinitely into the future – which is always dubious. Seneff is also naively equating correlation with causation. This graph is her big evidence:



She then assumes correlation is causation – this is the same error the anti-vaccine ideologues make when looking at thimerosal and autism (although they conveniently ignore the lack of correlation after the removal of thimerosal from the routine childhood vaccine schedule). The graph below, however, nicely demonstrates that correlation is not necessarily due to causation.

Seneff makes many other dubious claims as well:

> Dr. Seneff points out, however, that our gut bacteria do have this pathway, and that's crucial because these bacteria supply our body with crucial amino acids.

This is pure speculation. There is no evidence that glyphosate has any adverse effect on gut bacteria, or that such effects are linked to any disease.

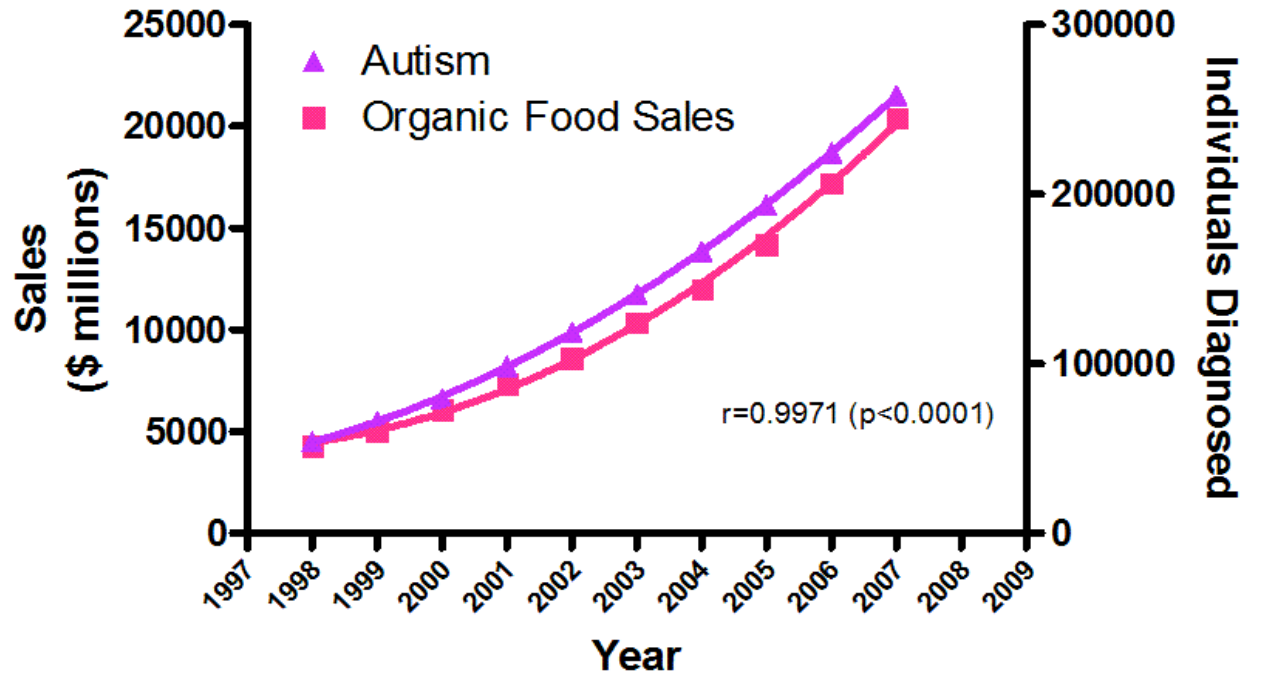
She makes further claims based purely on correlation as well, including blaming glyphosate for celiac and gluten sensitivity.

The article also repeats a common anti-GMO claim, that wheat in the US is routinely sprayed with glyphosate just prior to harvest. There is never any source given for this claim, and a careful investigation reveals that it is untrue.

Dr. Seneff gives every indication of being an anti-GMO ideologue. She is not a biologist, but rather is a computer scientist, and yet she is being presented as an expert. She has also not conducted any original research, but is spreading fears about glyphosate based on pure speculation, bad science and bad logic.

Meanwhile, numerous published systematic reviews show clear evidence that glyphosate has very low toxicity. More careful study when it comes to any agent being used as heavily as glyphosate is always welcome. Science is complicated, and it is always a good idea to consider factors that may have been previously missed. However, failure to show any adverse effect from glyphosate in epidemiological studies is very reassuring. Given its widespread use, any adverse effect must be tiny or non-existent to be missed by the evidence we have so far.

The evidence, however, will not stop ideologues from cherry picking, misusing evidence, presenting pure speculation as if it were evidence, assuming causation from correlation, and generally fearmongering about a safe chemical in order to grind their ideological axe. ❑



Sources: Organic Trade Association, 2011 Organic Industry Survey; U.S. Department of Education, Office of Special Education Programs, Data Analysis System (DANS), OMB# 1820-0043: "Children with Disabilities Receiving Special Education Under Part B of the Individuals with Disabilities Education Act

Dr. Siouxsie Wiles describes herself as a microbiologist and bioluminescence enthusiast but to others she is "the owner of the pinkest head of hair you'll ever see". Siouxsie heads the Bioluminescent Superbugs Group at the University of Auckland where she combines her twin passions to understand and combat infectious diseases.
Read her blog *Infectious Thoughts* at sciblogs.co.nz/infectious-thoughts/

Will new antibiotic Teixobactin save us all?

Umm, not quite...

Researchers in Germany and the USA have just published a paper in the journal *Nature* describing a new antibiotic they have called Teixobactin. This study is good news: the World Health Organization warned last year that cancer chemotherapy and routine surgery will soon become life-threateningly risky because of the worldwide rise in antibiotic-resistant superbugs.

So will Teixobactin save us all from a post-antibiotic era? Maybe, but not in the way you think it might. Here's a little FAQ.

What is Teixobactin?

Teixobactin is a newly discovered antibiotic produced by a previously uncultured soil bacterium called Eleftheria terrae. Teixobactin acts by stopping some bacteria from making their cell wall (their outer coating, if you like). It was found to be active against a range of nasty bacteria, including Staphylococcus aureus (also known as MRSA), Clostridium difficile (which causes nasty diarrhoea which can be deadly in elderly people), Bacillus anthracis (which causes anthrax) and Mycobacterium tuberculosis (the cause of TB). This is good news as we have a desperate need for new antibiotics against these superbugs.

The researchers also showed that Teixobactin did not have any effect on mammalian cells and could protect mice infected with S. aureus and Streptococcus pneumoniae. This is also good news but it will still take 2-5 years more testing before Teixobactin makes it to a doctor's surgery or hospital near you.

So why isn't Teixobactin going to save us all?

Because bacteria roughly divide into two groups based on their cell walls; they are either classified as Gram-positive or Gram-negative*. Teixobactin only works against Gram-positive bacteria.

Unfortunately, it can't get around the extra outer membrane of Gram-negative bacteria. This means the antibiotic doesn't work against some pretty nasty bacteria that we are running out of antibiotics to kill, like E. coli, Pseudomonas aeruginosa and Klebsiella.

Finding new antibiotics – the iChip.

How the researchers discovered Teixobactin is in some ways more important than the antibiotic itself. Many microbes remain undiscovered, partly because it has been impossible to culture them in the laboratory. Given that antibiotics are made by microbes, this means that many antibiotics lie undiscovered all around us.

The researchers made a sort of 'hotel' for soil bacteria that allowed them to cultivate previously uncultivated bacteria. This 'hotel' is called the iChip and is basically a board with holes on it. Each whole was seeded with a single bacteria from a sample of soil, and then the whole board, covered in a permeable membrane, was dunked into a beaker of soil so the bacteria could access all the nutrients they needed to grow. Very clever. The discovery of Teixobactin should be just the tip of the antibiotic iceberg.

Is Teixobactin really resistant to resistance?

One of the interesting findings of the study was that the researchers couldn't produce strains of M. tuberculosis or S. aureus that became resistant to Teixobactin. I think it's a little premature to suggest that bacteria are unlikely to become resistant to Teixobactin based on the published data; the researchers didn't try particularly hard to make it happen.

As Dr Prof. Ian Malcolm says: "Life finds a way"…. ❑

*depending on whether or not they can be stained using crystal violet, a method known as Gram-staining.

The Humanist Society of New Zealand (Inc) is an organisation that promotes Humanist philosophy and ideals. It meets in Wellington with members throughout New Zealand, and is affiliated internationally to the IHEU and the United Nations Association of NZ.
Visit their website humanist.org.nz

The Humanist Society of New Zealand will be publishing a regular column called *The Humanist*, named after the magazine they used to produce. Below is a statement released by the Society in response to the recent Charlie Hebdo attack in Paris.

The Humanist Society of New Zealand is appalled and deeply concerned by the recent attack on the offices of the magazine *Charlie Hebdo* in Paris, France, on Wednesday 7 January that resulted in the deaths of twelve people and the wounding of eleven others, four of them seriously.

This attack must be of concern to us all, for it was an attack on freedom of expression, a fundamental and much cherished component of modern society. There is no doubt that the perpetrators, who were reported to have shouted Allahu Akbar, "God is great", during the attack, were Islamic Fundamentalists intent on silencing all criticism of Islam both directly through murder and indirectly by instilling fear of similar attacks in the future.

Freedom of belief and freedom of expression are values of the enlightenment developed over many centuries and enshrined in the United Nations Universal Declaration of Human Rights. Article 18 of the Declaration states that "Everyone has the right to freedom of thought, conscience and religion; this right includes freedom to change his religion or belief, and freedom, either alone or in community with others and in public or private, to manifest his religion or belief in teaching, practice, worship and observance"; and Article 19 states that "Everyone has the right to freedom of opinion and expression; this right includes freedom to hold opinions without interference and to seek, receive and impart information and ideas through any media and regardless of frontiers".

The right to freedom of expression is enshrined in the laws of modern democracies. The New Zealand Bill of Rights states that "Everyone has the right to freedom of expression, including the freedom to seek, receive, and impart information and opinions of any kind in any form".

Satire has long been recognised as a valuable and legitimate form of expression and we must abhor any attempt to suppress humour. In addition, we should all be prepared to have all our beliefs, whatever they are, questioned. We should seek sound justifications based on sound evidence to justify our beliefs and must always be prepared to undertake free and open debate to justify those beliefs.

Humanists have long seen the lampooning of beliefs, including our own, as a legitimate and valuable form of debate. Using violence and murder to silence the questioning of a belief is generally evidence that that belief cannot be reasonably justified. Any form of censorship should always be limited, and where it exists should be sanctioned by law, should be aimed at protecting individuals from real harm rather than imagined harm or offence, should be open to questioning through the legal system and parliament, and should never be aimed at the questioning of religious beliefs.

In addition, we decry attempts by some to argue this attack was somehow justified. There is no basic Human Right to not be offended, and satire is never a justification for murder. It is pertinent to remember that while Islam presents itself as a religion of peace, the vast majority of violence against Muslims comes from other Muslims.

We call upon all people and countries to take action in support of freedom of expression and to remove any remaining vestiges of limitations on freedom of expression, such as the punitive blasphemy laws that still exist in some countries including New Zealand. We join with others in saying "Je Suis Charlie". ❑

JE SUIS CHARLIE

Luke Duane Oldfield is a 31 year old postgraduate student at the University of Waikato. His Masters dissertation is an examination of interest group involvement in comparative politics systems and the consequences for public health policies. When he's not reading, writing or eating burgers there's a high chance he's watching cricket. Email him at luke.oldfield@msof.nz

Making Sense of Fluoride is a society that includes scientists, skeptics, teachers, health professionals, students and other individuals, all who have looked at the science and advocate that fluoridation is a significant public health initiative.

The Loose Change Range: A bunch of fallacies, an anecdote and a fluoridated drink.

Luke Oldfield discusses the art of engaging with a 'Non-Opinion'

When the doors to Hamilton's first Carl's Jr. franchise finally swung open on a dreary autumn day in 2013, I made my way to the first available counter and ordered up my own grease-filled fantasy. I grinned as a bubbly *Waikato Times* journalist (a high school friend) approached and remarked, "I didn't think you'd do it, the first customer in Hamilton! I guess we'll have to make a celebrity out of you," all the while barely controlling her laughter. Indeed, for the next few days, I was somewhat of a minor Facebook celebrity as the story began to circulate among friends, students and otherwise bored and easily entertained Hamiltonians.

With the exception of those that abstain from meat for ethical or cultural reasons, the act of revelling in fast food folklore would probably be considered a rather innocuous pastime of a graduate student with too many spare hours in a day. After all, as skeptics, what else we choose to pursue in our spare time is hardly as important as the research we cite or write, right?

Well, maybe or maybe not. I, for one, have a growing feeling we need to seriously reconsider how we approach public engagement, who we approach, and what we present them with. Google-proficient anti-fluoridationists have also enjoyed my Carl's Jr. adventure, although for different reasons. But their cynical take on my stunt – copying and pasting the article each and every time we cross paths on the internet – should give some necessary pause to our current approach.

The pretext to this view is derived from what we've recently digested in the field of political psychology. Nythan's paper *Effective Messages In Vaccine Promotion: A Randomized Trial* (2014) lends to the hypothesis that individuals are even less likely to adjust their pre-existing world views in the light of new evidence. As I flicked through the paper I found myself nodding as I recalled numerous instances where, as a society, we had attempted to correct the misinformation online regarding water fluoridation, only to find that the person presenting such information becomes even more enamoured with pseudo-scientific beliefs.

Freelance political philosopher Eric Hoffer referred to those persons with rigid and polarised views as 'True Believers'. Indeed, I would contend that opponents of water fluoridation are the gold standard of true believer, and like the aforementioned anti-vaccinator, they're increasingly likely to dig their heels in when faced with conflicting evidence. Which perhaps suggests

that engaging with them is practically useless, unless our engagement is accessible by those who are yet to develop an opinion on the matter and have a sufficient level of scientific literacy.

For the anti-fluoridationist, 'minor' details matter little. It does not matter that I acknowledged my choice of burger was an artery thickener any more than when Harvard researcher Anna Choi publicly stated that her meta-analysis into the neurotoxicity of fluoride was not related to community water fluoridation.

Referenda in Hamilton, Whakatane and Hastings, despite all returning a positive outcome for water fluoridation policy, have all had one other common theme: low participation. It's perhaps this frontier, those non-voters, rather than the True Believer, that deserve a greater level of attention by skeptics, particularly as low participation rates can often produce undesirable electoral results.

Political scientist Philip Converse first introduced the concept of a 'non-opinion' after an analysis of electoral surveys in his seminal work *The American Voter*. The varying degrees of a 'non-opinion', according to Converse, often make up the majority of the electorate. The non-opinion is someone who will either not vote or not strongly consider the candidate or subject matter before voting. In the instance of water fluoridation, it could be someone who has not been sufficiently compelled to seriously consider the argument being made before them. Later research, in particular that by Conover and Feldman theorised that the non-opinion is susceptible to four categories:

- Existing position
- Ideology predisposition
- Party cues
- 'Candidate' Characteristics

Call me a pessimist, but I would be inclined to argue that carefully explaining to a 'non-opinion' that hydrofluorosilicic acid dissociates in water and becomes the fluoride ion, the same fluoride ion found 'naturally' in New Zealand waterways, is about as useful as explaining to a bunch of young parents the complexities of ethnic rivalries among Kyrgyz and Uzbeks in the Central Asian Plateau. A complete lack of literacy in the most basic principles of toxicology (existing position), borne in part out the of the dismantling of compulsory science education in senior high school has made even the most nuanced discussion about 'how things work' the modern day pipe dream of science communicators.

In his blog Dr Ken Perrott, science advisor for *Making Sense of Fluoride*, has sought to neutralize the ideological predispositions of anti-fluoridationists, pointing out that 'choice' can indeed be exercised and the provision of a 'social good' (such as a reduction of tooth decay via water fluoridation) is part of the very fabric of a modern progressive society. Furthermore, it's perhaps quite remarkable that no political party currently represented in the New Zealand parliament has opportunistically latched onto an opposition of community water fluoridation.

This then leaves the skeptic with only one remaining consideration when engaging a non-opinion: candidate characteristics. Skeptics have a long and proud tradition of pointing out fallacious arguments as an important fundamental of critical thinking. An ad hominem based on someone's circumstances, even their penchant for a delicious burger, is clearly a fallacious argument. But to dismiss the relevance of someone's extra curricular activities in the court of non-opinion would be to deny the ability of an emotional argument to trump a rational one.

So let them talk about my/our affection for burgers, let's not rise above it, let's not sit on our pedestal and point out an error in reasoning. We can leave that to our academic institutions and our government agencies. As skeptics, let's remind the public of where the greater level of credibility can be sought. Aisling Fitzgibbon (The Girl Against Fluoride) is a 'qualified' angel healer with a marketing strategy that involves stripping down to her underwear during protests; and Paul Connett is a retired professor who accepts funding from an internet entrepreneur who also just happens to sell water filters and fluoride-free toothpaste and claims that cancer is a fungus that can be cured with baking soda. Enough said.

Politics is no respecter of rationality. It's an often arbitrary process of deciding "who gets what, when and how". Helping those with no opinion identify the characteristics of those at the forefront of anti-fluoride movements is often the single most useful tactic we will ever have at our disposal. ❑

Where popular culture is given a skeptical mark

Game Review:
Pokēmon Omega Ruby / Emerald
Nintendo 3DS

So, how to look skeptically at a Pokēmon game? What I want to examine is how well the game treats scientific topics, and specifically what credulous ideas from our world have managed to sneak in.

This is a world in which creatures 'evolve' not over millennia via natural selection, but by growing up, or levelling-up to use gamer lingo. In fact, the game uses the word evolution when metamorphosis would be a better word: the Pokēmon 'evolve' like insects, from larva to pupa to imago (adult). But, I've decided to forgive that word-borrowing. As I say, this is an alternate world, and who wouldn't want to visit a world where evolution is super-rapid and lions 'evolve' into lioniods and then into lionasaurs? You wouldn't? Ok, this game probably isn't for you.

Science/Skeptical Positives

- Scientists and scientific endeavour are depicted favourably. For example, there are dedicated palaeontologists.
- Good conservation, treatment of environment, messages throughout. Everyone walks and cycles everywhere and there's a lot of commentary on caring for Pokēmon and their world.
- Correct use of words 'meteorite' and 'meteor'. "There's a meteor shower tonight." "You must find the meteorite shard".
- Features some nice science terminology - craters, meteorites, fossils, evolution etc. (I know we could quibble and say they shouldn't have used the term evolution, but I would argue at least they used the word at all.)
- It's an atheistic world - there are no churches. There is some talk of ancient lore and temples etc, but it's more mythological than religious.
- Extreme ideological thinking is normally given to the negative characters, whose typical gambit is wanting to cast aside the current world for a specific utopian ideal. Come on, villains, you should've learnt by now…

Science/Skeptical Negatives

- Most of the scientists and engineers encountered are men. Women are more likely to have traditional roles. There are female scientists but not as many at the upper echelons.
- Reflexology clinic - you can go along to this to boost your Pokēmon's friendliness towards you. How charming. It's just a shame it isn't called something else. Is Poke Cuddling just too twee? What about Placebo Clinic?
- Alternative medicine, especially naturopathic, is ubiquitous. Herbs and potions and berries are the carry-around healing methods for weakened, compromised Pokēmon. The worst offender for this woo is in the Herb Shop in Lavaridge Town, where you are specifically informed about the wonders of natural medicines. But, I do like that the herbs from this shop are bitter and lower the friendliness of your Pokēmon, whereas in every Pokēmon Center there's a machine that'll heal six Pokēmon at a time with no detrimental effects. Ah, the wonders of science, even fictional science.
- Dowsing machine. A machine used for finding hidden/ invisible objects. Again, it's a shame they didn't use a different name. They use Pokēmon for just about everything else in the game, so why not have a sniffer Pokēmon?
- Psychic trainers. I don't mind that the game features psychic Pokēmon. I think it's a given that fantastical creatures should have fantastical powers. But, you meet and battle some Pokēmon trainers who are casually labelled psychic and I think that's a shame. The humans in the game aren't supposed to be magical or superheroes, so why have psychics?

The Mark: 9/10. My favourite version of one of my favourite game series. A masterful Pokēmon game for newbies and seasoned trainers. As ever with Nintendo, the attention to detail is exquisite.

The Skeptical Mark: 6.5/10. Lots of very good points, but could do a bit better. As a game played by lots of younger gamers, there was a little too much real world woo, especially given that the game's designers can create whatever they like.

Film Review:
Lucy
Directed by Luc Besson

Lucy was probably the movie that got most skeptical tongues wagging in 2014, after *Interstellar*. Particularly from skeptics who only saw the trailer. Unfortunately, I watched it. Well, part of it.

If you don't know already, the movie's tagline is: *The average person uses 10% of their brain capacity. Imagine what she could do with 100%.*

So, why even watch it? Optimistically, I hoped the unscientific premise would be a very minor primer for 90 minutes of Luc Besson's signature whacky awesomeness, along the lines of *The Fifth Element* or *Leon*. But Morgan Freeman's character, a professor of some kind, speculates repeatedly to a crowded lecture hall about what might happen when more and more of the brain is utilised. This means you are exposed to lots of nonsense.

We then get to see what happens to Lucy as these hypothesised stages are met. From what I could tell, all the science is completely wrong. No wait, all the science IS completely wrong. I had to hide behind my hands a few times. In my opinion, if you're going to be blatantly wrong, then don't even dress it up as science; just go all out *The Fifth Element* or *Avengers*. In the end, the level of drivel overwhelmed my puny brain, probably because I was using 15% or something.

Not only riddled with nonsense, the movie did very little to warm me to Lucy herself or her plight. There was no moral centre to her story, she killed needlessly and without remorse. And her quickly gained superpowers seemed to immediately remove any genuine peril. I went from hopeful to annoyed to bored fast.

Forty minutes or so into the movie, we made the call and switched it off. Life is too short. If you saw the rest and it redeemed itself, please let me know.

The Mark: 3/10. 10% interesting visual flourishes and novel techniques, 90% drivel piled upon drivel.

The Skeptical Mark: 1/10. That's 10%.

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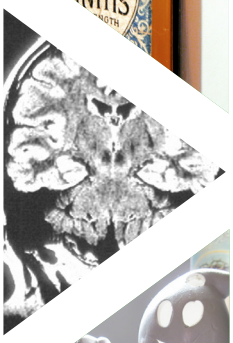
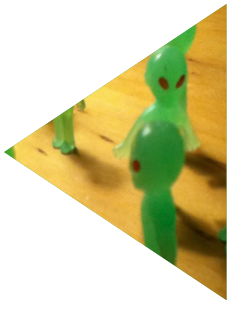
"The essence of the independent mind lies not in what it thinks, but in how it thinks."

-Christopher Hitchens,
Letters to a Young Contrarian





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