Skeptic
a person in a state of terminal caution
Margaret Mahy

Science as a human endeavour

Skepticism Greek style

Healing Touch at university

Lake monsters

Conference report

Bent Spoon for NZ Police

new zealand

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editorial

Ominous trends in the schoolroom

ANOTHER annual conference has come and gone, with the usual collection of thought-provoking presentations. This issue we present two highlights, from Waikato University biology lecturer and science communicator Alison Campbell, and Greek Honorary Consul Nikos Petousis.

Alison Campbell's topic – how to inspire students to pursue careers in science – could not be more timely, with several related news reports in recent weeks about the declining interest in science among young New Zealanders.

Radio New Zealand National's Morning Report for 30 September carried an item about the National Education Monitoring Project (NEMP), which has revealed a steep decline in interest in science expressed by Year 8 (the old Form 2) students. Eight years ago, 15 percent said they actively disliked science; this has now increased to 37 percent. Only five percent say they like the subject and would consider a career in it. Project co-director Terry Crooks credits the decline to the failure of schools to provide activities that students really enjoy, such as practical experiments. Education reporter Gail Woods mentioned the pressures on the curriculum from other subjects such as dance and healthy eating, and a big focus on reading and maths. There is less concern over levels of achievement, in which New Zealand has traditionally scored highly by international standards, although in two measures – understanding the physical world and the material world – there has been a decline. And surely, if attitudes towards science are deteriorating, academic perfomance standards are soon to follow.

In the NZ Herald on 3 October Dr Crooks said the survey showed a lot of students wanted more science, but they weren't happy with what they were getting.

Morning Report also described on 1 October how this decline is affecting secondary students as well, and how Auckland's Tamaki College was trying to change the perception among its mostly Pacific Island and Maori students, that science was too hard. Principal Soana Pamaka is developing an education programme with Auckland University which she says makes science enjoyable and relates it to real life. Jacquie Bay, director of the university's Liggins Institute, said a recent presentation by the students showed they were comfortable with the language of science.

Science has been popular with students in the past, and with the right approach can still be so. The NEMP is a timely wake-up call for everyone who cares about science literacy in this countrv – and that should be all of us.

David.

Science as a human endeavour

Alison Campbell

If students are to pursue careers in science, they need to be able to see themselves in that role. One way to encourage this may be through the telling of stories. This article is based on a presentation to the 2008 NZ Skeptics Conference in Hamilton.

NEW Zealand's new science curriculum asks us to develop students' ability to think critically. As a science educator I think that's about the most important skill we can give them: the ability to assess the huge amount of information that's put in front of them from all sorts of sources. We also need to recognise that the ideas and processes students are hearing about have come to us through the activities of people – it's *people* who develop science understanding. Science changes over time, as people's ideas change. It's fluid, it's done by people, and it's a human endeavour.

This puts science in an interesting position. It has its own norms, and its own culture, but it's embedded in the wider culture as well. Those norms of science include its history. I find it sad that many of my students have no idea of where the big ideas in science came from. They don't know what the people who were developing those ideas were like.

The new curriculum document recognises that the nature of science is an important strand in the curriculum, because it is what gives science its context, and lets students see science as a human endeavour. They're going to learn what science is, and how scientists do science. They will become acquainted with the idea that scientists' ideas change as they're given new information; that science is valuable for society. And students are going to learn how it's communicated.

Common stereotypes of scientists are not complimentary. Small wonder many students do not see themselves pursuing a career in science.

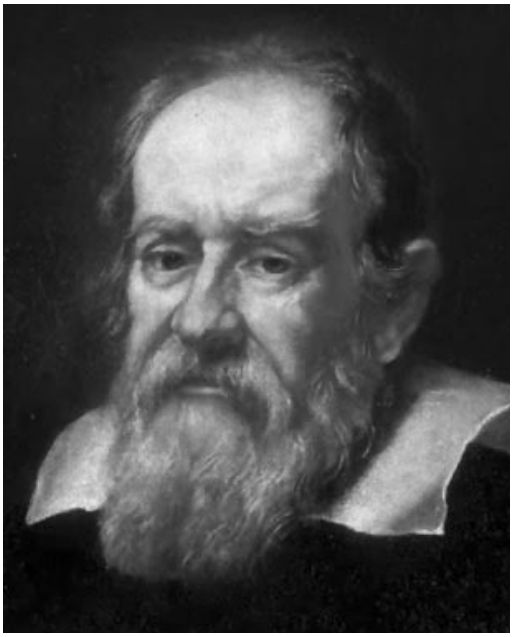
Our future prosperity depends on students continuing to enter careers in the sciences. Richard Meylan, a senior adviser at the Ministry of Research, Science and Technology, said to me recently that somewhere between the end of year 13 and that two-month break before they go to university, we seem to be losing them. The universities are tending to see a drop in the number of students who have picked science as something that they want to continue in. Students don't seem to see it as a viable career option, and there are many reasons for that.

We need more scientists, we need scientifically-literate politicians, and we need a community that understands science: how science is done, how science is relevant; one that sees science and scientists as being an integral part of the community. But how are we going to get there? What sorts of things can we do that are going to make young people want to carry on in science? Students often don't choose science – how are we going to change that?

One of the reasons, perhaps, is that they often don't see themselves as scientists. We did a bit of research on this at Waikato University last year, asking what would encourage our first-year students to continue as scientists. And what they were saying was,

"Well, a lot of the time I don't *see* myself as a scientist." We asked, what would make a difference? The response: "Seeing that my lecturers are people." People first, scientists second.

When I googled 'scientist' I had to go through eight or nine pages of results before finding



Galileo: wrong about the tides.

something that looks like my own idea of a scientist. ('Woman scientist' is a bit better!) Almost all the guys have moustaches, they've all got glasses, all the women are square-shaped. Students don't see themselves in this. We need them (and the rest of the community!) to see science as something that ordinary people do.

Now, what sorts of things are those ordinary people doing? They're thinking; they're speculating, they're saying 'what if?' They're thinking creatively: science is a creative process and at its best involves imagination and creativity. Scientists make mistakes! Most of the time we're *wrong* but that doesn't make good journal articles; usually no-one publishes negative results. So you just hear about the 'correct' stuff. Scientists persist when challenged, when things aren't always working well.

Science stories

One way of fostering students' engagement with science, and seeing themselves in it, is to tell them stories, to give them a feeling of how science operates. Brian Greene, a science communicator and physicist in the US, says:

"I view science as one of the most dramatic narratives our species can tell. The story of our search to understand the Universe and ourselves. When that search is conveyed using the power of story – the story of discovery – we can all feel part of the journey."

So I'm going to tell you stories. And I'm going to tell stories about old, largely dead, people because one of my passions at the moment is the history of science. A lot of science's big ideas have a history that stretches back 3-400 years. But they're just as important today, and I think that an understanding of the scientists who came up with those ideas is also important today.

I think it's important that kids recognise that a lot of scientists *are* a bit quirky. But then, everyone's a bit quirky – we're all different. One example of someone 'a bit different' is Richard Feynman. Famous for his discoveries in the nanotech field, he was a polymath: a brilliant scientist with interests in a whole range of areas – biology, art, anthropology, lock-picking, bongo-drumming. He was into *everything*. He also had a very quirky sense of humour. He was a brilliant scientist and a gifted teacher, and he showed that from an early age. His sister Joan has a story about when she was three, and Feynman was nine or so. He'd been reading a bit of psychology and knew about conditioning, so he'd say to Joan: "Here's a sum: 2 plus 1 more makes what?" And she's bouncing up and down with excitement. If she got the answer right, he'd give her a treat. The Feynman children weren't allowed lollies for treats, so he let her pull his hair till it hurt (or, at least, he behaved as if it did!), and that was her reward for getting her sums right.

Making mistakes

We get it wrong a lot of the time. Even the people we hold up as these amazing icons – *they get it wrong*. Galileo thought the tides were caused by the Earth's movement. At the time, no-one had developed the concept of gravity. How could something as far away as the Moon possibly affect the Earth? We look back at people in the past and we think, how could they be so thick? But, *in the context of their time*, what they were doing was perfectly reasonable.

Louis Pasteur, the 'father of microbiology', held things up for years by insisting that fermentation was due to some 'vital process'; it wasn't chemical. He got it wrong.

And one of my personal heroes, Charles Darwin, got it completely wrong about how inheritance worked. He was convinced that inheritance worked by blending. When Darwin published The Origin of Species,

in 1859, Mendel's work on inheritance hadn't been published. It was published in Darwin's lifetime – Mendel's ideas would have made a huge difference to Darwin's understanding of how inheritance worked – part of the mechanism for evolution that he didn't have. But he never read Mendel's paper.

Scientists do come into conflict with various aspects of society. Galileo had huge issues with the Church. He laid out his understanding of what Copernicus had already said: the Universe was not geocentric, it didn't go round the Earth. The Church model was that the Universe was very strongly geocentric: everything went round us. Galileo was accused of heresy, and shown the various instruments of torture; for pulling out his thumbnails and squashing his feet. He did recant, and he was kept under house arrest until his death. And the Church officially apologised to him in 1992. A long-running conflict indeed.

And there's conflict with prevailing cultural expectations. Beatrice Tinsley was an absolutely amazing woman; a New Zealander who has been called a world leader in modern cosmology, and one of the most creative and significant theoreticians in modern astronomy. She went to the US to do her PhD in 1964, and finished it in 1966. Beatrice published extensively, and received international awards, but she found the deck stacked against her at the University of Texas, where she worked. She was asked if she'd design and set up a new astronomy department, which she did. The university duly opened applications for the new Head of Department. Beatrice applied. They didn't even respond to her letter. So she left Texas. (Yale did appreciate her, and appointed her Professor of Astronomy.) A couple of years later she found she had a malignant melanoma, and was dead by the age of 42. The issue for Beatrice was a conflict between societal expectations and the area where she was working: women didn't do physics.

Science versus societal 'knowledge'

Raymond Dart was an English zoologist who worked at the University of Witwatersrand in South Africa. He was widely known among the locals for his fondness for fossils; you could trundle down to Prof Dart's house, bring him a lovely bit of bone, and he'd pay you quite well. One day in 1924 the workers at Taung quarry found a beautiful little skull – a face, a lower jaw, and a cast of the brain – in real life it would sit in the palm of your hand. Dart was getting ready for a wedding when the quarry workers arrived, and he was so excited by this find that when his wife came in to drag him off to be best man, he still didn't have his cuffs and his collar on and there was dust all over his good black clothes. He was absolutely rapt.

The Taung child: "something in it of ourselves."

Dart looked at this fossil and saw in it something of ourselves. He saw it as an early human ancestor. The jaw is like ours, it has a parabolic shape, and the face is more vertical – relatively speaking – than in an ape. He described it, under the name *Australopithecus africanus*, as being in our own lineage and went off to a major scientific meeting, expecting a certain amount of interest in what he'd discovered. What he got was a fair bit of doubt, and some ridicule. How could he be so foolish? It was surely an ape.

By 1924 evolution was pretty much an accepted fact in the scientific community. But there was a particular model of what that meant. In some ways this built on the earlier, non-evolutionary concept of the Great Chain of Being. They also had a model that tended to view the epitome of evolutionary progress as white European males. It followed from this that humans had evolved in Europe, because that's where all the 'best' people came from. Black Africans were sometimes placed as a separate species, and were regarded as being lower down the chain.

Yet here was Dart saying he'd found a human ancestor in Africa. This would mean the ancestor must have been black

– which didn't fit that world-view. It's a racist view, but that reflected the general attitudes of society at the time, and the scientists proposing that view were embedded in that society just as much as we are embedded in ours today.

Another difficulty for Dart had to do with prevailing ideas about how humans had evolved. By the 1920s Neanderthal man was quite well known. Neanderthals have the biggest brains of all the human lineage – a much bigger brain than we have. And the perception was that one of the features that defined humans, apart from tool use, was a big brain. It followed from this that the big brain had evolved quite early. Dart was saying that *Australopithecus* was a hominin, but *Australopithecus* as an adult would have had a brain size of around 400cc. We have a brain size of around 1400cc. *Australopithecus* didn't fit the prevailing paradigm. The big brain had to come first; everybody knew that.

And belief in that particular paradigm – accepted by scientists and non-scientists alike – helps to explain why something like Piltdown man lasted so long. Over the period 1911-1915 an English solicitor, Charles Dawson, 'discovered' the remains of what appeared to be a very early human indeed in a quarry at Piltdown. There were tools (including a bone 'cricket bat'), a skull cap, and a lower jaw, which looked very old. The bones were quite thick, and heavily stained. This was seized upon with joy by at least some anatomists because the remains fitted in with that prevailing model: old bones of a big-brained human ancestor.

People began to express doubts about this fossil quite early on, and these doubts grew as more hominin remains were confirmed in Africa and Asia. But it wasn't completely unmasked as a fake until the early 1950s. The skull looked modern because it *was* a modern (well, mediaeval) skull that had been stained to make it look really old. The jaw was that of an orang-utan, with the teeth filed so that they looked more human and the jaw articulation and symphysis (the join between right and left halves) missing. When people saw these remains in the light of new knowledge, they probably thought, how could I have been so thick? But in 1914 Piltdown fitted with the prevailing model; no-one expected it to look otherwise. And I would point out that it was *scientists* who ultimately exposed the fraud. And scientists who re-wrote the books accordingly.

You *can* overturn prevailing paradigms, you *can* change things. But in order to do that you have to have evidence, and a mechanism.

Thinking creatively

The next story is about Barry Marshall, Robin Warren, and the Nobel Prize they received in 2005. (These guys aren't dead yet!) Here's the citation:

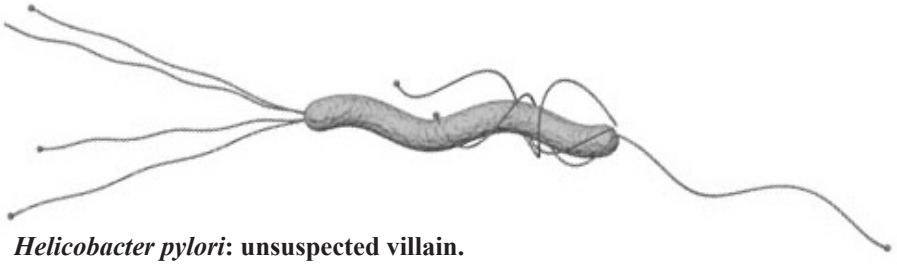
> [The 2005] Nobel Prize in Physiology or Medicine goes to Barry Marshall and Robin Warren, who with tenacity and a prepared mind challenged prevailing dogmas. By using technologies generally available ... they made an irrefutable case that the bacterium *Helicobacter pylori* is causing disease.

The prevailing dogma had been that if you had a gastric or duodenal ulcer, you were a type A stress-ridden personality. The high degree of stress in your life was linked to the generation of excess gastric juices and these ate a hole in your gut. Marshall and Warren noticed that this bacterium was present in every preparation from patients' guts that they looked at. They collected more data, and found that in every patient they looked at, *H. pylori* was present in the diseased tissue. One of them got a test-tube full of *H. pylori* broth and drank it. He got gastritis: inflammation of the stomach lining and a precursor to a gastric ulcer. He took antibiotics, and was cured. The pair treated their patients with antibiotics and their ulcers cleared up.

Because they were creative, and courageous, they changed the existing paradigm. And this is important – you *can* overturn prevailing paradigms, you *can* change things. But in order to do that you have to have evidence, and a mechanism. Enough evidence, a solid explanatory mechanism, and people will accept what you say.

Which was a problem for Ignaz Semmelweiss. He had evidence, alright, but he lacked a mechanism. Semmelweiss worked in the Vienna General Hospital, where he was in charge of two maternity wards. Women would reputedly beg on their knees not

to be admitted to Ward 1, where the mortality rate from puerperal fever was about 20 percent. In Ward 2, mortality was three or four percent. What caused the difference? In Ward 2 the women were looked after exclusively by midwives. In Ward 1, it was the doctors. What else were they doctors doing? They were doing autopsies in the morgue. And they would come from the morgue to the maternity ward, with their blood-spattered ties, and I hate to think what they had on their hands. Then they would do internal examinations on the women. Small wonder so many women died. Semmelweiss felt that the doctors' actions were causing this spread of disease and said he wanted them to wash their hands before touching any of the women on his ward. Despite their affronted reactions he persisted, and he kept data.



***Helicobacter pylori*: unsuspected villain.**

When those doctors washed their hands before doing their examinations, mortality rates dropped to around three percent.

The trouble was that no-one knew how puerperal fever was being transmitted. They had this idea that disease was spread by miasmas – 'bad airs' – and although the germ theory of disease was gaining a bit of traction the idea that disease could be spread by the doctors' clothes or on their hands still didn't fit the prevailing dogma. Semmelweiss wasn't particularly popular – he'd gone against the hospital hierarchy, and he'd done it in quite an abrasive way, so when he applied for a more senior position, he didn't get it, and left the hospital soon after. He was in the unfortunate position of having data, but no mechanism, and the change in the prevailing mindset had to wait for the conclusive demonstration by Koch and Pasteur that it was single-celled organisms that actually caused disease.

Collaboration and connectedness

Scientists *are* part of society. They collaborate with each other, are connected to each other, and are connected to the wider world. Although there have been some really weird people that weren't. Take Henry Cavendish – the Cavendish laboratory in Cambridge is named after him. He was a true eccentric. He did an enormous amount of science but published very little, and was quite reclusive – Cavendish just didn't like talking with people. If you wanted to find out what he thought, you'd sidle up next to him at a meeting and ask the air, I wonder what Cavendish would think about so-and-so. If you were lucky, a disembodied voice over your shoulder would tell you what Cavendish thought. If you were unlucky, he'd flee the room.

But most scientists collaborate with each other. Even Newton, who was notoriously bad-tempered and unpleasant to people whom he regarded as less than his equal, recognised the importance of that collaboration. He wrote: "If I have seen further than others, it is because I have stood on the shoulders of giants." Mind you, he may well have been making a veiled insult to Robert Hooke, to whom he was writing: Hooke was rather short.

What about Darwin? Was he an isolated person, or a connected genius? We know that Darwin spent much of the later years of his life in his study at Downe. He had that amazing trip round the world on the Beagle, then after a couple of years in London he retreated to Downe with his wife and growing family, and spent hours in his study every day. He'd go out and pace the 'sandwalk' – a path out in the back garden – come back, and write a bit more.

Darwin spent eight years of that time producing a definitive work on barnacles, and he didn't do it alone. He wrote an enormous number of letters to barnacle specialists, and to other scientists asking to use work that they'd done, or to use their specimens to further the work he was doing.

He was also connected to a less high-flying world: he was into pigeons. This grew from his interest in artificial selection and its power to change, over a short period of time, various features in a species. So he wrote to pigeon fanciers. And the pigeon fanciers would write back. These

were often in a lower social class and various family and friends may well have been a bit concerned that he spent so much time speaking to 'those people' about pigeons. And Darwin had a deep concern for society as well. He was strongly anti-slavery, and he put a lot of time (and money) into supporting the local working-class people in Downe. He was still going in to London to meet with his colleagues, men like Lyell and Hooker, who advised him when Alfred Wallace wrote to him concerning a new theory of natural selection. Now there's an example of connectedness for you, and the impact of other people's thought on your own! It was Wallace who kicked Darwin into action, and led to him publishing the Origin of Species.

That's enough stories. I'm going to finish with another quote from Brian Greene:

> Science is the greatest of all adventure stories, one that's been unfolding for thousands of years as we have sought to understand ourselves and our surroundings. Science needs to be taught to the young and communicated to the mature in a manner that captures this drama. We must embark on a cultural shift that places science in its rightful place alongside music, art and literature as an indispensable part of what makes life worth living.
>
> Science lets us see the wonder and the beauty of the stars, and inspires us to reach them.

Alison Campbell is a Biological Sciences lecturer at Waikato University.

Skepticism Greek-style

Nikos Petousis

Modern skepticism owes a huge debt to ancient Greece. This article is based on a presentation to the 2008 NZ Skeptics Conference

I WAS born in Athens, Greece, and grew up during the war, one of 12 children of a poor family with a very hard working mother. She was, like most women of her time in Greece, illiterate. This made her susceptible to all the religious teachings and prejudices of the Greek Orthodox Church which all Greeks belonged to. She was able to answer my questions with biblical quotations and prophetic clichés. When explaining to me where I came from she credited a stork – but a few weeks later the bird had changed to a pelican. When I asked her a third time, she got quite angry with me and pointed at her belly and said: "It was cut open by the doctor." But I had not seen any evidence of cut marks so I became sceptical.

When it rains in Athens during the summer, it lasts only for 10 minutes but it is a cloudburst with thunder and lightning. My mother used to burn incense, light candles and utter incantations. When I asked her why, she answered me that God sends the thunder to punish sinful people. When I asked her why God decided to do this when it rained, she mumbled something I never understood.

The Greeks put icons high up on the walls of their houses and they believe that some of them have miraculous properties. My mother's favourite was St Nicholas, who resided high up in the corner of the room. He had a habit of dropping to the floor before any tragedy occurred in our family. My mother always connected the sign with a following event, and took this as proof of his infallibility. "You see, St Nicholas fell to the floor three days ago, and now this has happened."

One day I found the icon on the floor and discovered that it only had a frayed cotton thread holding it up, so I replaced it with a piece of wire. After that St Nicholas stayed on the wall. My mother found this quite worrisome, and felt she had been deserted by him, so she took the icon down and discovered my alterations. She reprimanded me severely, and repaired him by replacing the wire with an old bit of cotton again, thus restoring his powers. This made me even more sceptical.

My mother was obsessed with the second coming of the Messiah – she assured me it was going to be in 1948. A year later I reminded her that it hadn't happened. In response to this she muttered something I didn't understand. This confirmed my doubts about events occurring through divine intervention and started me on a path of scepticism.

In Sunday school, which I had to attend, children were told that humans were made as an exact replica of God – omniscient, omnipotent and all-loving. Why then did he give us such useless things as nails on toes and nipples on men? By then I had given up asking for answers and I started finding out for myself.

Origins of scepticism

In the Greek language the noun skepsis means deep and critical thought, reflection, contemplation, debating with oneself, activities which occupy those with some intelligence. It is natural for human being to be curious and to learn. It is ignorance and superstition which stifles this innate tendency.

Empirical scepticism originated in ancient Greek philosophy in the 7th century BCE in Ionia. Ionia was a group of city states, and was the first place where events and circumstances made it possible for people to be able to inquire about physical phenomena without being circumscribed by religious dogmas and despotic oppression. For the first time knowledge no longer belonged to a religious or royal elite. Knowledge and thinking became the property of anybody who was prepared to make the effort to learn. The Greek alphabet had recently been further developed and refined, which facilitated the dissemination of the written word and Greek thought.

Egypt and Mesopotamia had achieved a high degree of civilisation but they lacked the components which the Greeks from Ionia were able to provide. These were philosophic scepticism and free inquiry. Bertrand Russell in his book The History of Western Philosophy had this to say: "They invented mathematics and science and philosophy; they first wrote history as opposed to mere annals; they speculated freely about the nature of the world and to the ends of life, without being bound in the fetters of any inherited orthodoxy."

As a result of this climate of freedom of thought, a flowering of scientific rigour, deductive reasoning and innovation occurred. I will now give some examples of scientific discoveries and speculations that arose as a result of being able to stretch the boundaries of thought to a limitless horizon with no institutional constraints. The Greek gods had to come to Olympus, down to Earth.

The first Skeptic

Thales lived around the mid 620s-547 BCE and was born in the city of Miletus. He was the first person to develop truly critical thought – in my opinion, the first true skeptic. Unlike the Egyptians and Mesopotamians, he tried to explain the world by observing natural phenomena, critically analysing this data and then making deductions from it. Many of his findings are still regarded as correct and he influenced most subsequent philosophical thought.

He set the seasons of the year and divided the year into 365 days. He speculated that life originated from water and was able to predict an eclipse in 585 BCE. It is said that he travelled to many countries, learning as he went and made the first map of the known world stretching from Africa to north of the Caspian Sea and from Spain to India. When in Egypt, the Egyptian priests complained, "You Greeks ask too many questions, just like children." The most outstanding aspects of Thales' heritage are the search for knowledge

To Page 12

New Zealand a sceptical nation?

Compiled by David Riddell

READERS of the NZ Skeptic may find this a bit hard to believe, but New Zealanders seem to be a fairly sceptical bunch overall (Sunday Star-Times, 11 September).

Victoria University psychologist Marc Wilson's on-line survey on the paper's website, based on 5690 usable entries, reports only 40 percent of respondents believed in God, with another 10 percent not sure, and 38 percent believing in or neutral about reincarnation. Levels of paranormal belief were very low by international standards.

Some of us are, however, prepared to entertain the weirdest of notions: 3.3 percent said they thought it was "likely" Elvis Presley had faked his own death.

Looking at the full survey results (accessible via the Sunday Star-Times website), more fascinating details can be gleaned. Almost 80 percent accept evolution, and more than 70 percent accept the Big Bang, but about 32 percent believe there are actual cases of witchcraft, and that some people can predict the future.

And you'd have to be concerned at the standard of science eduction when 64 percent say it's likely the seasons are caused by the Earth's elliptical orbit.

The survey itself deserves to be taken with a grain of salt, though. Respondents were far from a representative sample of the population, with more than a quarter of them living in Wellington, and more than half describing their work as professional/managerial. In fact there was a Skeptic Alert about the survey, so skeptics may well have been disproportionately represented.

But Wilson did include some detailed breakdowns of the figures. Women were more likely to express belief in all paranormal phenomena, and were much more positive about alternative medicine.

"They are, dare I say it, more feeling souls," said New Idea clairvoyant Marlene Marshall in the Star-Times article. "Females are more in tune with their bodies and their feelings."

Bigfoot fails DNA test

In an announcement that should surprise no-one, a University of Minnesota scientist has declared a DNA test of alleged Bigfoot tissue showed it was a mix of human and opossum material (Sydney Morning Herald, 16 August).

Curt Nelson emailed the results of his tests to Tom Biscardi, who hosts a weekly radio show on Bigfoot in Palo Alto, California. The results were revealed at a press conference which also featured Matthew Whitton and Rick Dyer, who claim they found a carcass of the legendary creature while hiking in northern Georgia. They shot to notoriety after releasing a photo which appears to show a gorilla suit with a pile of offal on it, crammed into a chest refrigerator. They are also co-owners of a company that offers Bigfoot merchandise.

Biscardi said the DNA samples may not have been taken correctly and may have been contaminated, and that he would proceed with an autopsy of the alleged Bigfoot remains, currently in a freezer at an undisclosed location.

Fuel savers a waste of money

Fuel-saving devices and additives are probably a waste of money, says the Automobile Association (Timaru Herald, 6 August).

AA technical advice manager Jack Biddle said an invitation by the AA in Australia for independent testing of devices and fuel-saving additives saw only one put forward and it did not save fuel.

When it came to spending money there wasn't hard evidence showing fuel savings. He said the Environmental Protection Agency in the United States had tested more than 100 fuel-saving devices and none was shown to work.

Timaru mechanic Ash Palmer-said he was sceptical of what fuel additives could achieve. When his tyre was worn out he didn't expect a spray to repair the worn section. When engine parts were worn it was likely they had to be repaired or replaced. He said no customers had ever raved about fuel savings from a product.

Creationist issues $11.7 trillion challenge

A Turkish creationist has offered a multitrillion-dollar challenge to scientists (NZ Herald, 30 September).

Adnan Oktar, who writes under the name Harun Yahya, is the most prominent Islamic creationist. 'Yahya' is in fact so prolific that some suspect other writers assist Oktar with his output.

Now Oktar has offered a "call to all evolutionists" promising 10 trillion Turkish lira – about NZ$11.7 trillion – to anyone who produces a single intermediate-form fossil demonstrating evolution.

The 52-year-old former architecture student claims there are no fossils to support Darwinist theories. "Not one [fossil] belongs to strange-looking creatures in the course of development of the kind supposed by evolutionists."

Dr Kevin Padian at the University of California told the New York Times Oktar "does not have any sense of what we know about how things change through time. If he sees a fossil crab, he says, 'It looks just like a regular crab, there's no evolution.' Extinction does not seem to bother him."

Oktar found fame in 2006 when 10,000 copies of his Atlas Of Creation were distributed worldwide. The 800-page volume illustrated his claims that for millions of years life forms have not developed, supporting his Islamic creationist beliefs.

This month Oktar won a case in a Turkish court claiming that Richard Dawkins' website contained blasphemous and defamatory content. Internet users in Turkey can no longer access the site.

LHC panic claims victim

Sensationalist reports that the Large Hadron Collider (LHC) could bring about the end of the world have led to a 16-year-old Indian girl committing suicide (BBC, 11 September).

Bihari Lal said his daughter Chaya drank insecticide after watching TV reports that the massive European particle accelerator would cause the Earth to crack up.

"We tried to divert her attention and told her she should not worry about such things, but to no avail," he said.

Chaya was taken to hospital, where she told police before she died that she had been worried by the doomsday predictions.

"She said she could not bear to see the destruction of all that was dear to her and therefore thought it was better to end her life," said Virendra Singh Yadav, the policeman who took her statement. Many people throughout India were reported to have rushed to temples the day before the LHC was switched on, fearing the world's end after watching media coverage.

Royal Society in creationism row

An Anglican clergyman who was the education spokesperson for the Royal Society has been stood down after saying teachers should be respectful to creationist students and be prepared to discuss creationism in science classes (Times On Line, 18 September). Columnist Tom Whipple says Professor Michael Reiss was taken out of context, and was the victim of a culture where all arguments must be expressible in a sentence, and all sentences able to stand on their own. Reiss's speech is at **www1.the-ba.net/bafos/press/showtalk2.asp?TalkID=301**

In his Dominion Post World of Science column, Bob Brockie (29 September) says those who think the cleric was unjustly sacked have a point. The biblical creation story provides a wonderful springboard for teachers to discuss the profound differences between fables, mythology and science, he writes.

"The scientists I know think creationism is no more credible than tarot reading. The Earth created in seven days? Talking snakes? Magic apples? Virgin births? The ark marooning 120,000 species of mollusc 4000 metres up Mt Ararat?"

The endless barrage of creationist propaganda streaming out of two TV channels and several radio stations and mailed to schools needs to be challenged, he says, adding that our own Royal Society should remind teachers that science progresses by confronting superstitious nonsense and demanding experimental evidence for any claim.

"Some kids and their parents will be offended, but we must balance that with other kids and parents equally offended by the claims of creationists."

From Page 9

for its own sake; the development of the scientific method; the adoption of practical methods and their development into general principles; his curiosity and conjectural approach to the questions of natural phenomena. In the sixth century BCE Thales asked the question, "What is the basic material of the cosmos?" The answer is yet to be discovered.

Atomic theory

The putative father of Greek skepticism is Pyrrhon of Elis (c. 360-c. 272 BCE). Even though he didn't write anything, he was influential in some subsequent philosophical schools. His contemporary, skeptic philosopher Epicurus thought that the human mind was beset by fears and ignorance that disturbed it and made people suffer needlessly throughout their lives. He believed that the fundamental constituents of the world were indivisible little bits of matter (atoms, flying though empty space).

A heliocentric universe

Aristarchus was the first to state that the sun was at the centre of the universe. He was a mathematician and an astronomer, not merely an astrologer as in the past, and was capable of thinking at a cosmic level without fear of persecution by the gods, unlike Galileo who nearly paid with his life for saying the same thing nearly 2000 years later. Aristarchus attempted to estimate the relative sizes of the Earth, Moon and Sun, and the distances between them. He used the right methodology but did not have a telescope.

He improved the sundial, which had already been invented by Anaximander, eventually leading to the sextant. Some people have suggested that Copernicus stood on the shoulders of Aristarchus when making his astronomical calculations.

The Riddle of Epicurus

If God is willing to prevent evil, but is not able to
Then He is not omnipotent.
If He is able, but not willing
Then he is malevolent.
If he is both able and willing
Then whence cometh evil?
If He is neither able nor willing
Then why call Him God?

The size of the Earth

Eratosthenes was one of the greatest thinkers. He was the chief librarian in the famed library of Alexandria. He was also a mathematician, poet, athlete, geographer and astronomer.

He was the first person to calculate the circumference of the Earth and the tilt of the Earth's axis, both with remarkable accuracy. He may also have accurately calculated the distance from the Earth to the Sun. He devised a system of latitude and longitude and is regarded as the most innovative geographer of his time. It had already been deduced that the Earth was spherical, but he was able to estimate its circumference with an error of less than two percent.

Yet, a thousand years later a Byzantine adventurer, Kosmas Indicopleustes, travelled as far as India, and when he came back to Constantinople he drew a map of the world – a square – and at the centre of it he placed Jerusalem. Worse even than this, books written by Eratosthenes and other geographers were regarded as heretical and blasphemous and were ordered to be destroyed by the Christian authorities.

Eureka!

Archimedes is regarded as one of the foremost scientific minds of Greek antiquity. He owes this reputation to his critical observation of natural phenomena. His theorems on moving bodies are well known to those who have studied mathematics or physics, and of course he had the world's first Eureka moment. Archimedes was the inventor of the helix, commonly known as the Archimedes screw, which has been used for drawing water from rivers and lakes since ancient times and is still in use today.

Steam engines

Heron, also a chief librarian in Alexandria about the first century BCE, devised a steam turbine and a double action water pump, which was in use even at the end of the nineteenth century by the Chicago fire service.

Foregoing his usual scientific principles, Heron devised a contraption to open the massive temple doors on the command of the priest without any apparent human effort, thus overawing the faithful and giving proof of his supernatural power. One wonders what the reward was for Heron's secrecy in this little matter.

We now need to look at the setting for the daily lives of ordinary Greeks of that time.

Religious dogma, meaning laws enacted by the clergy for their own benefit and which had to be strictly observed, played no part in religious observances. On the contrary, religion was kept in its place, as an adjunct to social occasions such as festivals. The clergy in a city state, as in Athens, had no power and the salary of the priest was set to be no more than the value of the lowest paid labourer – this acted as proof against corruption as they received a portion of the sacrificial meat – a scarce commodity for ordinary people – as a perk.

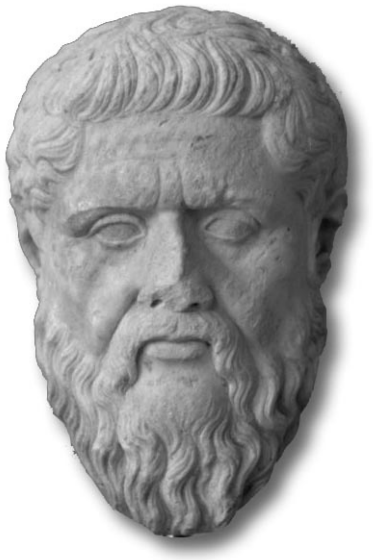
So how then, did the Ancient Greeks honour their gods?

The temple of Apollo was 125m long, not much smaller than St Pauls of London. And yet, the Greek people seldom entered the temple to worship. It was merely to house the statue and provided the venue for priests and priestesses to carry out rituals associated with it.

The Greek people could not accept the notion that they should be enclosed, even for a short period, inside a religious building. That was the business of the Hebrew synagogue.

Instead, the religious festivals changed the emphasis from submission to a deity in a building to honouring the deity through revering nature. Sculpture and painting portrayed deities with human form – omitting the combination of animal and human used by others. People competed in athletic games, such as the Olympics, in honour of the body and the psyche. Competitions of lyrical poetry, singing, music and dancing expressed human heights of excellence in honour of the gods.

Theatres were invented to honour Dionysus and provided the forum for questioning human nature and values and morals, both human and divine – even the Greek gods could not escape criticism. Crowds of up to 30,000 filled the theatre, which provided the stimulation for a public, shared, critical inquiry into morals and concepts.



Defaced: Even Plato suffered the indignity of a broken nose.

Theodosius' decree

In approximately 380 AD Christianity became the official religion of the Roman Empire. For the first time the Greek people had to bow before the priests. The idea of sin and everlasting punishment in hell was introduced. Any philosophical inquiry was regarded as heresy and was punishable. Subsequent emperors enacted laws which resulted in the destruction of anything that stood for freedom of thought and expression. Theodosius, for instance, decreed that books should be burnt, the Olympic Games should cease to exist, the Academy of Athens and the theatre should close, and he ordered the destruction and obliteration of anything which stood before in the Hellenic world.

The zealots broke statues wherever they could and at the very minimum the nose was broken off. The rationale for this was the statues would not be able to breathe again.

Theodosius also sanctioned the burning of the library of Alexandria by bishop Theophilus. During the reign of Theodosius II in 415 AD a heinous crime was perpetrated in that city. Hypatia was a scholar and teacher of philosophy, astronomy and mechanics, who was also considered the first notable woman mathematician. A mob, directed by Bishop Cyril, later to become Saint Cyril, took Hypatia inside a Christian church and flayed her alive using seashells. This was to inflict maximum pain – an example of the new religion of love. Her crime was to criticise the Christian faith.

Thus ended a period of burgeoning of human inquiry and achievement initiated by the Ionian inquiring mind. All that had been built up and developed during those productive years was destroyed, defaced or taken over by the Christian church. This initial flowering of the Ionian mind was crushed, trampled and engulfed by the Church, causing the gradual decline into barbarism and the Dark Ages.

Nikos Petousis is the Greek Honorary Consul in New Zealand.

University funds therapeutic touch

David Mackenzie

Why is Canterbury University fostering an alternative therapy at its Health Centre?

SHOULD Canterbury University be funding pseudo-science? It was implied that this was occurring in a recent university press release:

> "Staff development awards of up to $5000 are available every six months for general staff. They are designed to recognise and assist professional development activities… One of the recipients this year is Wendy Risdon, who works at the UC Health Centre as a practice nurse. She will use her award to fund a trip to the US, where she will attend the 12th Annual Healing Touch International Conference in Milwaukee."

According to the Healing Touch International, Inc. website:

> "Healing Touch works with your energy field to support your natural ability to heal. It is safe for all ages and works in harmony with standard medical care."

When people start talking about someone's energy field, especially with respect to medical treatments, alarm bells should start going off in your head. A simple Wikipedia search reveals several critical evaluations of the therapeutic touch practice.

In the press release, Wendy goes on to say: "I will be going to facilities that use complementary therapies such as Healing Touch as part of their mainstream care… Healing Touch is not particularly well-known or used here in New Zealand but I think there is a big role for it. My goal is to incorporate complementary therapies into mainstream medicine."

It wasn't clear what was happening down at the Health Centre, so I went to find out for myself. Wendy Risdon is a Registered Nurse at the UC Health Centre and a Level 5 Healing Touch practitioner. She was more than happy to talk about her work.

DM: How does Touch Healing work?

WR: It's a biofield therapy, that means it's utilising the magnetic fields of the body of both the person and the practitioner. And it's helping to move energy around the body. And I guess people are more familiar with things like acupuncture when you talk about moving energy. It involves the energy centres of the body called chakras.

DM: Have you ever considered that the simple act of massaging could act as a placebo effect and that there are no auras involved?

WR: To a certain extent I do think that the simple interaction between two people in a caring environment has positive benefits. There are measurements which have been done on practitioners and the actual frequency or the Hertz of the vibrations that they're sending out and so we know that different organs of the body vibrate at different frequencies. What I think happens is that the practitioner can influence those frequencies by the energy that they're sending out.

Looking through the literature suggested by Wendy revealed many complicated scientific terms used in an attempt to explain the mechanisms behind Healing Touch. Terms borrowed from quantum physics, or just the word quantum were used with audacious frequency. To a person who has studied advanced quantum mechanics, it is clear that the words were being misused. This is known as argument by poetic language; the 'if it sounds good, it must be right' argument. Unless you're a scientist, these things are sometimes hard to detect, but the measurements claimed to have been carried out on the auras are obviously junk science.

So who chooses the recipients of these awards? A panel of sen-

ior staff from the Human Relations department determines the best applicants and then makes a recommendation to the Vice-chancellor, Roy Sharp, who has the final say. He was ill in this case, so the final decision became that of Paul O'Flaherty, the Director of Human Resources.

DM: Do you know what Healing Touch is and did you do any research into Healing Touch?

PO: In the application, the application was supported by all the general practitioners at the Health Centre and the director of the Health Centre. One of the panelists rang the director and said, "We understand this is an alternative therapy. Just wanted to check that you did in fact support the application." When they confirmed they did, we worked it on that basis.

DM: Do you believe the university should fund pseudoscience?

PO: I wouldn't describe it as that. I took the view with this that this was endorsed by mainstream professional health practitioners.

It doesn't seem like Human Resources are at fault here. They consulted with the on-campus experts in medicine. It also turns out that there were only three applications for the General Staff development awards this year and all three applications were successful.

Dr Joan Allardyce is the Medical Director of the UC Health Centre.

DM: When you first heard about Healing Touch were you at all sceptical and what research did you do regarding Healing Touch?

JA: I was interested to know how it would be applied and what benefits would be derived. Wendy gave a presentation to all the doctors and nurses and all the doctors and nurses were all happy about it. So basically what it is, is massage. She's applied it when people have severe neck pains or migraines or really stressed. People go away feeling really improved.

DM: If Healing Touch is acceptable in your health centre, can other members of staff also use other alternative medicines such as homeopathy and magnetic therapy?

JA: No, they are not acceptable. I cannot believe in iridology. We're not going in that direction. We are absolutely not going down the track of opening our doors to any crackpot out there. Definitely not.

DM: The Healing Touch practitioners, including Wendy believe the healing mechanism is manipulation of an aura. As far as you're aware, does Health Touch vary from normal massage?

JA: Who knows, it probably doesn't actually matter. It's the outcome that matters.

And, of course, Joan is right. Massage Therapy is a well established treatment with peer-reviewed research to back up the results. However, when you rename Massage Therapy as 'Healing Touch' and try to explain it with auras and the transfer of energy it becomes pseudoscientific. Massage itself should be sold as such; there's no need to use mystery and make-believe to help relieve someone's physical manifestations of stress by giving them a massage, especially intelligent young university students who surely are trying to seek truth in their academic pursuits.

If alternative medicines worked beyond a placebo effect then they wouldn't be alternative anymore, they'd just be medicine. Alternative medicines become dangerous when they are used in place of conventional medicine to treat more serious conditions. Treating a headache/stress or other psychological ailment is different from treating physiological conditions such as infections or cancer. People believe they're getting a treatment that works, but they're paying for something that is ineffective. And in many cases they're not only paying for the treatment with money, but with their lives. There are many examples listed on the website **whatstheharm.net**

In this case, it seems very unlikely that anyone will be harmed by the practice of Healing Touch at the UC Health Centre. All the medical staff are extremely competent. Healing Touch might work for you. But it has nothing to do with manipulating an aura around your body.

David Mackenzie is a physics PhD student studying nanotechnology at Canterbury University. This article initially appeared in the university student newspaper Canta, on 23 July 2008.

Poison for profit

John Welch

THERE is something rotten in the state of China, a country where greedy people are quite happy to poison their own citizens in the name of profit. Milk powder is assayed for protein content by detecting nitrogen levels. Melamine, being a nitrogen-rich compound, gives a return in this test which indicates for protein, so if you have a poor milk product or it has been watered down, melamine can be added to make the product look as if it is up to normal protein levels.

The Chinese have been down this path before when they used melamine in pet food and it caused similar problems with kidney stones.

They also have a history of adding effective western drugs such as Viagra and steroids to enhance useless herbal remedies.

Melamine is relatively non-toxic but is relatively insoluble so tends to precipitate out and form stones in any animal that has the ability to concentrate urine.

Some animals such as cats and dogs are at a higher risk than humans because their urine is acidic and melamine has a lower solubility in acid urine.

I recall a previous scandal in the Chinese health system where the chief culprit was convicted and immediately shot. Despite my reservations about capital punishment one is tempted to wish the same fate on the criminals who have visited so much illness and suffering on small children.

Herbal Remedies for long life?

Folk wisdom is often seen as being somehow superior to modern medicine. Inductive logic is frequently used as a justification for quaint belief, reasoning from the specific case to the general case. For example, Great Uncle Fred took arsenic every day and lived to be 100 so therefore…

A nutritionist found a book in her late mother's attic and has used it on a website promoting folk remedies such as pepper for earache, plantain leaves for toothache and horseradish mixed with gin for premenstrual tension. (Just as an aside, do women have postmenstrual docility?)

www.howtolive100years.com/index.html

You can even download the book, How to Live 100 Years. The nutritionist recalled her father treating her for mumps – "he put boiled onions on my neck." This sounds remarkably like the medieval philosophy known as the doctrine of signatures where it was believed that God provided a 'signature' to plants as a sign for what ailments they might be useful for. An onion resembles the swelling of the neck with mumps so according to this doctrine an onion is the appropriate cure.

Marlborough Express 16 July 2008

Quackupuncture

An article in the Australian Medical Journal (2007; 187: 337-341) claimed to show that acupuncture was an effective treatment for allergic rhinitis. This struck me as absurd and also drew a sharp criticism from Edzard Ernst, Professor of Complementary Medicine, University of Exeter. Ernst has experience of a wide variety of modalities such as acupuncture, spinal manipulation and homeopathy. Despite what you might expect of his appointment he has proved to be something of a gadfly for those who make claims about alternative medicine.

The study had a fatal flaw as outlined by Ernst. It was supposed to be a 'randomised sham controlled trial' as follows. Needles were inserted into acupuncture points and stimulated when 'chi' was elicited. Chi is the subjective sensation associated with the needling of an acupuncture point. In the sham group needles were inserted at non-acupuncture points, where according to acupuncture theory no chi would be experienced! Ernst commented: "Thus the intervention patients were experiencing chi, and the control patients were not. This means that neither the patients nor the therapist were blinded." (just as an aside, 'blinding' could have been achieved with acupuncture needles – the 'King Lear' trial).

Another study I came across had the grand title "Laser acupuncture in children with headache: A double blind, randomized, bicentre, placebo controlled trial." Some years ago, when I reviewed the literature on acupuncture, I found the most poorly designed trials were the ones claiming the greatest results. A similar trial claimed to show laser stimulation of acupuncture points produced a 'dramatic' relief of pain in patients with rheumatoid arthritis. Some more sceptical people repeated the study and obtained the same improvement even when the laser was switched off!

Ancient Wisdom

While in Australia recently I saved an article from the Sunday Telegraph (21 September).

It claimed that the overburdened Australian Health System is causing large numbers of people to seek out traditional Chinese remedies.

According to Dr Alan Bensoussan, "The Chinese have linked particular signs together, connecting not only physical symptoms, such as the colour of the tongue and the quality of the pulse on the wrist, but also their predominant emotions, to make a diagnosis." What happens if you have a consultation straight after eating a raspberry ice block?

The article contains the usual anecdotal reports. A woman with asthma claimed that repeated courses of antibiotics had failed to cure chest infections which aggravated her asthma. She was cured by a one-week course of some unspecified herb.

The majority of chest infections in asthmatics are in fact caused by viruses so I have no argument there. As to the herb: probably as effective as powdered fox lung, a traditional English remedy for asthma.

Another person complained that he got the flu despite being immunised and taking a course of antibiotics. He now takes regular doses of herbal medicine and no longer gets the flu.

Immunisation is not 100 percent effective and as we all know antibiotics are ineffective against viruses. I wish journalists would challenge people on these issues instead of promulgating myths about antibiotics.

An example is given of the difference (East vs West) between traditional Chinese and western medicine.

Six patients are found to have peptic ulcers and are all treated the same way by western doctors, **regardless of sex, age and emotional state.**

The Chinese traditional medicine practitioner however, takes into account differences in build, pulse quality, complexion, tongue colour, moods, sleeping patterns and length of nostril hairs. (No, I made that last one up). Each patient is diagnosed with a different root (unintentional pun here) cause for their ulcer, **based on their unique clinical picture.**

I deliberately highlighted the last bit because this sort of treatment requirement is often quoted as a reason why such traditional treatments cannot be subjected to traditional drug trials. In order to give a patient an individual treatment they cannot by definition be randomised into a clinical trial. This often quoted as the "plea for special dispensation." The other argument used is: "we know our treatments work so there must be something wrong with your trial."

However, I am mindful of the fact, pointed out by Professor Sir John Scott at last year's conference, that a great deal of traditional western treatments and practices have never been put to the test. This is true but at least modern medicine is based on plausible ideas derived from scientific study of anatomy, physiology and pathology.

Chinese traditional medicine is based on highly implausible beliefs that defy logic and common sense.

Sensing Murder or Sensing Money?

I AM a skeptic when it comes to psychics, mediums and anything to do with the 'paranormal'. Over the last couple of years, I have watched perhaps four or five episodes of the popular show Sensing Murder, each time growing more annoyed.

These programmes are NOT harmless pieces of fun. In each programme you can see the anguish on the faces of the families that have lost loved-ones. I believe their emotions are being stirred up with deceit and lies.

The programmers probably make money, the psychics on the program certainly will get well paid, but, not only that, the participating psychics are now hot property hosting costly readings and work-shops creaming in thousands of dollars.

Last year, I offered Ninox Television, the producers of Sensing Murder the chance to participate in a psychic challenge, but had no reply. A few weeks ago, I again challenged the company to participate in mutually agreed tests and offered prize money of $400,000. They sent pleasant replies but refused to submit their psychics to such tests.

Do you know that this hugely popular program is financed (or partially financed) by New Zealand on Air, a publicly funded entity whose mission statement promises, "To consult and obtain qualitative and quantitative research so that funding decisions are well informed and audience preferences taken into consideration."?

These programmes are not just entertainment as they lionise the deceitful psychic industry.

In many ways it is similar to gambling: both are harmless to the majority of the population but devastating to a minority. So why is it that the gambling industry is highly regulated and the psychic industry left alone?

Does anyone else feel aggrieved by such hypocrisy?

Visit **www.psychicchallenge.co.nz** to leave me a comment.

Stuart Landsborough
Wanaka

(In a recent press release, Stuart adds:

In a challenge of their own to Stuart and his skeptic contemporaries, he was instructed to watch the latest episode on The Kay Stewart case (Sept 9) as definitive proof of their abilities.

Needless to say Stuart pored over what was dubbed, "The episode that will silence the skeptics" and found numerous examples of faulty logic, conflicting answers and the unbelievable fact that both psychics, Deb Webber and Kelvin Cruickshank have already worked on the case!

If a fourth season of Sensing Murder is produced you can bet that Stuart will be continuing discussions with Ninox to follow through with a test and prove, once and for all what exactly is being sensed.)

Fluoridation

Dr John Welch suggests that those who oppose fluoridation of drinking water are pure water crackpots and that giving fluoride systemically to children can improve their teeth (NZ Skeptic 88). The 2006 National Research Council report on Fluoride in drinking water raises concerns about the safety of fluoridation including the effects on the developing nervous system and the thyroid. These are also referred to by Dan Fagin in Scientific American, January 2008, in an article on Second Thoughts about Fluoride.

Professor Vyvyan Howard, University of Belfast, noted at Toronto on 11 August 2008 that there was reasonable scientific evidence that fluoride could exert an epigenetic effect on brain development through impairing thyroid function and that fluoridation should be stopped on a precautionary basis (see **www.fluoridealert.org**). Dr Jennifer Luke, University of Surrey, also spoke at Toronto at the 28th conference of the International Society for Fluoride Research and noted that fluoride accumulates in the pineal gland and affects melatonin levels, resulting, in female gerbils, in earlier sexual maturity.

The principal invited speaker at Toronto, Professor AK Susheela, Fluorosis Research and Rural Development Foundation, Delhi, found that fluoride could affect both soft and hard tissues and that the problem of anaemia in pregnancy with low birth weight babies did not respond to prophylactic iron but improved markedly when the fluoride intake was reduced and

dietary advice given emphasising the used of fresh vegetables and fruit.

I would welcome a review by Dr Welch of a short book I have written, Fluoride Fatigue, available free in pdf form at **www.pauapress.com**

Bruce Spittle

Creationism not a conspiracy

I am religious, and the push for 'Intelligent Design' to be taught in the science curriculum annoys me as much anyone. The reason is simple: it is not science. Neither are science teachers metaphysicians; it is thus doubly inappropriate. What bothers me almost as much, however, is the ad hoc assumption that there is some conspiracy or sinister agenda behind the push.

Contrary to popular opinion, Science and Truth are not happily interchangeable terms. A degree of antirealism seems necessary for science to flourish, in fact, with some notable thinkers (such as Kuhn and Mach) openly advocating the discovery of mere instrumentally useful theories to be science's key aim. The basic approach, as David Riddell pointed out in the last issue, is to try to disprove a theory, the failure of which allows it to be accepted tentatively. Thus there is a constant state of flux and development; nowhere is there any suggestion of final, deductive proof in a scientific theory.

Conversely creationism is untestable, unfalsifiable, and indemonstrable. It may be instrumentally useful as a 'theory', but being unfalsifiable it is a very poor one. (Indeed it reeks of sophistry.) It may have some truth-value, and its adherents genuinely and firmly believe so. However, in my experience this is generally by way of some other acceptable, but thoroughly metaphysical, reason. Metaphysics are not science – despite their propositions being subject to logical scrutiny.

And this is where I believe the confusion lies. There is a lay-assumption that science=truth and truth=science. Being convinced of the truth of their own metaphysical beliefs, creationists take the apparently reasonable step of demanding the 'theory' of creationism to be taught alongside the theory of evolution. After all, they point out, evolution is a theory in crisis, riddled with anomalies. This betrays their ignorance. On this basis any scientific theory is a theory in crisis; this is how science works. The reason creationism is not a 'theory in crisis' is that it is not a scientific theory.

The next step is even more fallacious. It is common among the religious to cry 'foul' at his point, and shake sorrowful fists at the corrupt state, education system, and scientific community for suppressing valid, truth-tracking ideas in school science. There is no corruption, of course. The science community is sticking to science. And this is good: as a philosopher, I don't want scientists teaching philosophy, particularly not religion, and especially not the brand of religion espoused by the philosophically and scientifically ignorant, ie scientific-creationists.

Equally, I submit, there is nothing inherently conspiratorial about the creationist movement. Ignorance and misunderstanding fuel it: which is annoying, disappointing, but not corrupt. To suggest anything stronger than a mistake among creationists is a technically invalid conclusion, and despite isolated counterexamples is an unfair reflection of creationist proponents in general. In my view, for either camp to suspect the other of having some sinister ideal is to miss the more basic point that they are simply talking past each other. Certainly, I know how irksome the barrage of ill thought out anti-evolution 'evidence' can be, but what needs to be thrown back is not so much suspicion as education. Personally, I would like to see philosophy taught in schools, with standard Philosophy of Science taught alongside science proper. This would help clear myriad confusion among everyone.

That is why conspiratorial accusations and rhetoric among Skeptic literature bother me. It instantiates an equal fallacy. Neither camp is primarily driven by corruption; hence, I suggest future publications of NZ Skeptic avoid rhetoric such as 'IDers [having] designs on NZ schools', 'a favourite ploy of creationists', 'blatant anti-evolution[ism]', and so on. I believe the suspicion these imply is as unfounded as is the push for creationism in science classes, and rather unfortunate in a publication promoting unbiased, critical thinking.

Joel Gilmore
Hamilton

The monster in the Nelson Lakes

Jim Ring

A visit to Lake Rotoroa in Nelson Lakes National Park is rewarded with a remarkable sighting.

SEA MONSTERS are real enough; I have even caught one. Years ago a friend and I found a live oarfish (*Regalecus glesne*) stranded on a reef in Tasman Bay. This is one of the candidates for sightings of the Great Sea Serpent and at over 5m long it was certainly impressive. It was still alive though injured by its struggles on the rocks.

However the oceans are large enough to support populations of giant creatures, and new ones are still being found. The colossal squid is a fairly recent example.

Lake monsters however are supernatural beasts. Enthusiasts seem to imagine they are seeking a single individual that could hide in a large body of water. But animals exist as populations and no lake is large enough to support a population of giant creatures. Lakes are also ephemeral; very few are more than tens of thousands of years old; Lake Baikal is a rare exception to these rules.

However this has not stopped people from claiming sightings of monsters in lakes. They have suggested plesiosaurs (which died out around 65 million years ago) exist in lakes that are less than 20,000 years old. The Loch Ness Monster is perhaps the best known of all these myths. It was a deliberate fabrication or rather a series of fabrications for the simple purpose of making money. There is an extensive literature on the subject.

It is perhaps odd that New Zealand with a large number of lakes has had so few claimed sightings of lake monsters. The Taniwha is part of Maori superstition, but few claim to have seen one, much less describe it.

The overseas literature includes a large number of sightings in lakes which were thought mysterious by the observer. Otters, clumps of vegetation, ducks seen in mist, offer simple explanations for many sightings, but these are rejected by those of mystical leanings. One favourite is an odd number (usually three or five) of dark humps showing above the surface and apparently moving through the water. Anybody used to small boats will recognise this common phenomenon as the intersection of two wakes from craft that may not be visible.

However nearly 40 years ago I did see monsters in Rotoroa in Nelson Lakes National Park. It was a very close encounter yet for some time I could not identify what I was seeing.

We used to have an annual fishing trip to the head of Rotoroa, which is accessible only by boat or a walk of nearly 18km. One year we had a weekend of heavy rain; both the D'Urville and Sabine Rivers were unfishable and pouring muddy water into the lake. I fished the lake edge with some success on the Saturday but the next day, which was calm and cloudy, I decided to experiment. We drifted at the edge of the deep water and jigged. That is, we bounced small heavy lures vertically under the boat and close to the bottom. I had not brought my small portable echo sounder and we were not very successful because the technique works best where there is a sharp change of depth. The sounder is needed to find the right spots.

The water was gin-clear once away from the river mouth and we could see many vertical metres down, though not to the bottom which we discovered was about 60 metres below by measuring the length of line needed to reach it.

I was peering over the stern when a huge pale green-brown object rose out of the depths. It got to within a few metres of the surface then turned down and dived out of sight. I was literally speechless. Then another one rose. This time I looked for a head, fins, anything, but it seemed featureless. Down it went like the first but soon another came up – there was an endless procession of monsters.

I looked up and saw that we had drifted to about 250 metres

directly off the mouth of the D'Urville River and the truth dawned. The monsters were waves of muddy water appearing much greener than the brown river when seen through the clear upper water of the lake. It was April (our trips were always at this time of year); the lake surface water was warm, but the river water very cold.

In summer, surface water warms up but unless the lake is shallow, the main body of water stays cold. The warm water floats on the denser cold water and there is often a sharp temperature gradient called the thermocline.

Under the calm conditions, dense, cold, river water was not mixing with the lake surface but flowing in below the warm water. What I was seeing were 'thermocline waves', a well-known phenomenon but one which is rarely so dramatically visible. Furthermore, relatively small, fast-moving thermocline waves like these are probably not terribly common. The lake surface was glassy, so I had not been thinking about waves.

This was a remarkably convincing monster display and I expected that eventually somebody else would spot this phenomenon and claim they had seen genuine lake monsters. I would then be able to counter with a rational explanation. However I have never seen such a claim either in NZ or overseas. Mind you I have not looked too hard; 'Lake Monsters' in a web search produces over 7.5 million results and it is clearly not worth wading through such a huge amount of nonsense.

Jim Ring is a Nelson skeptic.

BSA slams 60 Minutes

The Broadcasting Standards Authority (BSA) has upheld a complaint from the Commerce Commission against TV3 current affairs show 60 Minutes. An item, broadcast at 7.30pm on 15 October 2007, presented the story of Ewan Campbell, who had "invented a way to make farms grow faster" but had been prosecuted by the Commerce Commission and faced a fine of "over a quarter of a million dollars for false representation" (see Newsfront, NZ Skeptic 84).

In their decision, released on 2 October, the BSA found the programme failed to provide viewers with a significant perspective which was critical to their understanding of the issues, and was unfair to the Commission because it did not fairly present the Commission's side of the story. Two other complaints – that the programme contained inaccurate statements and that a promo was unfair to a Commission representative – were not upheld. The broadcaster was ordered to pay costs and to broadcast a statement on the decision.

At the start of her coverage Melanie Reid (winner of the 2004 Bent Spoon Award for her "testing" of medium Jeanette Wilson – see NZ Skeptic 73), stated that a Commerce Commission representative had posed as an avocado grower seeking information from Mr Campbell. A year later four investigators had arrived with a search warrant. The presenter said:

> You'll be asking by now what heinous crime has taken place up here in the back blocks of Waihi. Well, was it a crime? All that's happened is that a man has invented an alternative to conventional chemical-based fertilisers, a natural system that many farmers up and down this country swear by.

The programme continued in a similar vein, portraying Campbell as a battler whose company, Probitas, was being driven out of business by vested interests in the fertiliser industry, and fertiliser consultant Dr Doug Edmeades as a "hired gun" for that industry. Campbell was shown demonstrating with a voltmeter that there were voltage differences in the soil, saying "you change the terminals around, it goes immediately into negative, which shows it is a directional flow."

He continued, "What we found out was that there [are] low level electrical currents anywhere in the world, but we can actually put the right type of silica on, which actually enhances it and lifts it... it lifts the nutrient availability, stimulates the microbiology, and enhances the plant production".

As Doug Edmeades said on the programme: "Based on the scientific evidence accumulated to date, and based on what that product contains, and based on its claimed mode of action, it cannot work as advertised."

Agricultural journalist Philippa Stevenson provides more detail on the case at **www.rural-network.co.nz/pseudo-probe-of-fake-fertiliser/**

Mystery lights and magical doves

***David Riddell** revisits the 2008 NZ Skeptics conference.*

THE NZ Skeptics learned first-hand that strange lights in the sky can have rational explanations as the annual conference kicked off at Waikato Diocesan School for Girls in Hamilton on 26 September.

By taping LEDs to lithium batteries and placing them in helium balloons participants achieved dramatic results – all filmed for Jono's New Show, on C4, though the segment as broadcast (**www.c4tv.co.nz/C4Videos/JonosNewShowVideos/tabid/612/Default.aspx**) focused more on the possibilities of having sex with aliens. Billed as a Paranormal Special, the show was a humorous but merciless evisceration of ghosts, alien abductions and alternative health products. It made being sceptical look cool, even if it did suggest that a Skeptics conference was not a good place to pick up women.

The conference proper got under way the following morning, with Matthew Dentith arguing it was logically possible for there to be psychic phenomena which weren't amenable to scientific investigation, though this didn't necessarily mean they existed. As with all presentations, this generated plenty of discussion at mealtimes!

In a weekend of highlights, Felicity Goodyear-Smith's presentation of her research into now-forgotten epidemics of non-sexually transmitted gonorrhoea in young girls stood out as a work of major social significance. Expect to see this and other presentations in future issues of NZ Skeptic, following on from Nick Petousis and Alison Campbell's in this issue.

As always, the conference dinner was a great opportunity to relax and catch up with old friends or make new ones. Young Auckland magician Mark Robinson astounded everyone as he materialised one dove after another, and taught us all a simple mind-reading trick. Next year's conference in Wellington can't come soon enough.

Clockwise from left: Magician Mark Robinson materialises yet another dove at the conference dinner; preparing UFO's for launch on Friday evening; mysterious lights in the sky over Diocesan School; Chair-entity Vicki Hyde and niece Sandra Hyde at the dinner, with friends.

Skeptics give Police thumbs down

***Vicki Hyde** dishes out this year's Bent Spoon Award.*

THE NZ Skeptics Bent Spoon for the most irresponsibly gullible statement in the media in the past year goes to Detective Senior Sergeant Ross Levy of the New Zealand Police Force for promoting psychics as "just another tool" in the investigative policing toolbox.

What´s next? Witness testimony from dreams and pre-emptive arrests on the basis of clairvoyant claims? The NZ Police Force has had enough credibility problems in recent years without this sort of thing making them look really shonky.

Levy has helped the most recent public relations campaign for exploitainment show Sensing Murder, making appearances on television and radio to talk about his interest in seeing what the psychics´ "take" was on an unsolved missing person´s case. It´s the second time he has been involved in the programme and he told Radio New Zealand´s Kathryn Ryan that he didn´t see any issue of police credibility in supporting such an approach.

Levy stated that the aim was to "give the investigation as much exposure as possible in the hope of getting information in return". But this cheap exploitative alternative to Crimewatch is unlikely to help. The Sensing Murder franchise has not been credited with providing any useful information anywhere in the world. The **whatstheharm.net** website, which counts the costs of such claims, lists numerous cases where psychics erroneously told families their loved ones were dead when they weren´t and vice versa, causing anguish to the families, wasting police time and sometimes pointing the blame at innocent parties.

Sensing Murder is simply a marketing vehicle for the psychics and a money-spinner for a television company keen to exploit vulnerable families in the name of shoddy entertainment. Levy did admit that no new information had been provided by the psychics, all material having been previously uncovered by ordinary policing methods. Both Sensing Murder psychics had had previous contact with the family in the case, but Levy had a confident "gut feeling" that they had not elicited any information that way, having their "credibility and integrity to protect".

I guess he didn´t see the Australian current affairs sting, played here last year on Eating Media Lunch and available on YouTube, showing Deb Webber talking with three dead people who didn´t actually exist. It looks like even basic background checks weren´t done before the Detective Senior Sergeant allowed the Lower Hutt police station to be used as a TV set.

Kathryn Ryan´s interviews with Webber and Levy, as well as other items where she demonstrated critical thinking in covering science and pseudoscience topics, has seen her given a Bravo Award by the NZ Skeptics.

Raybon Kan, known for his lighter approach, also gained plaudits with his Sunday Star-Times column "I see dud people", wherein he stated: "I don't want to get in the way of entertainers earning a crust, but it's scummy to pretend to communicate with the dead to take advantage of grieving relatives".

A third Bravo Award went to the Royal Society of New Zealand for their 2008 Big Science Adventure video competition focusing on the life and work of Charles Darwin. However, the Skeptics took the unusual step of issuing a brickbat for the same initiative.

It was great to see such talented work celebrating Darwin and evolution in the run-up to next year´s worldwide celebration of the 200th anniversary of Darwin´s birth, but many of our members were dismayed to see our pre-eminent science advisory institution commending one video which contained numerous errors of fact in promoting the unscientific ideas of Intelligent Design and creationism.

The awards were given telepathically at the NZ Skeptics Conference dinner on 27 September.

If undelivered, return to:

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We want your email addresses!

On October 6 we emailed all members that we held email addresses for to highlight the Skeptic Alert mailing list and the NZ Skeptics Yahoo group. Around 70 of these emails bounced!

We find it useful to have email addresses recorded for members as it is helps greatly in resolving "gone, no forwarding address" cases, and for very occasional email messages, such as the recent one on mailing lists. If you did not get the October 6 email then we do not have a record of your current email address.

If you would like to tell us of your email address, send details to Paul Ashton, secretary (**secretary@skeptics.org.nz**)