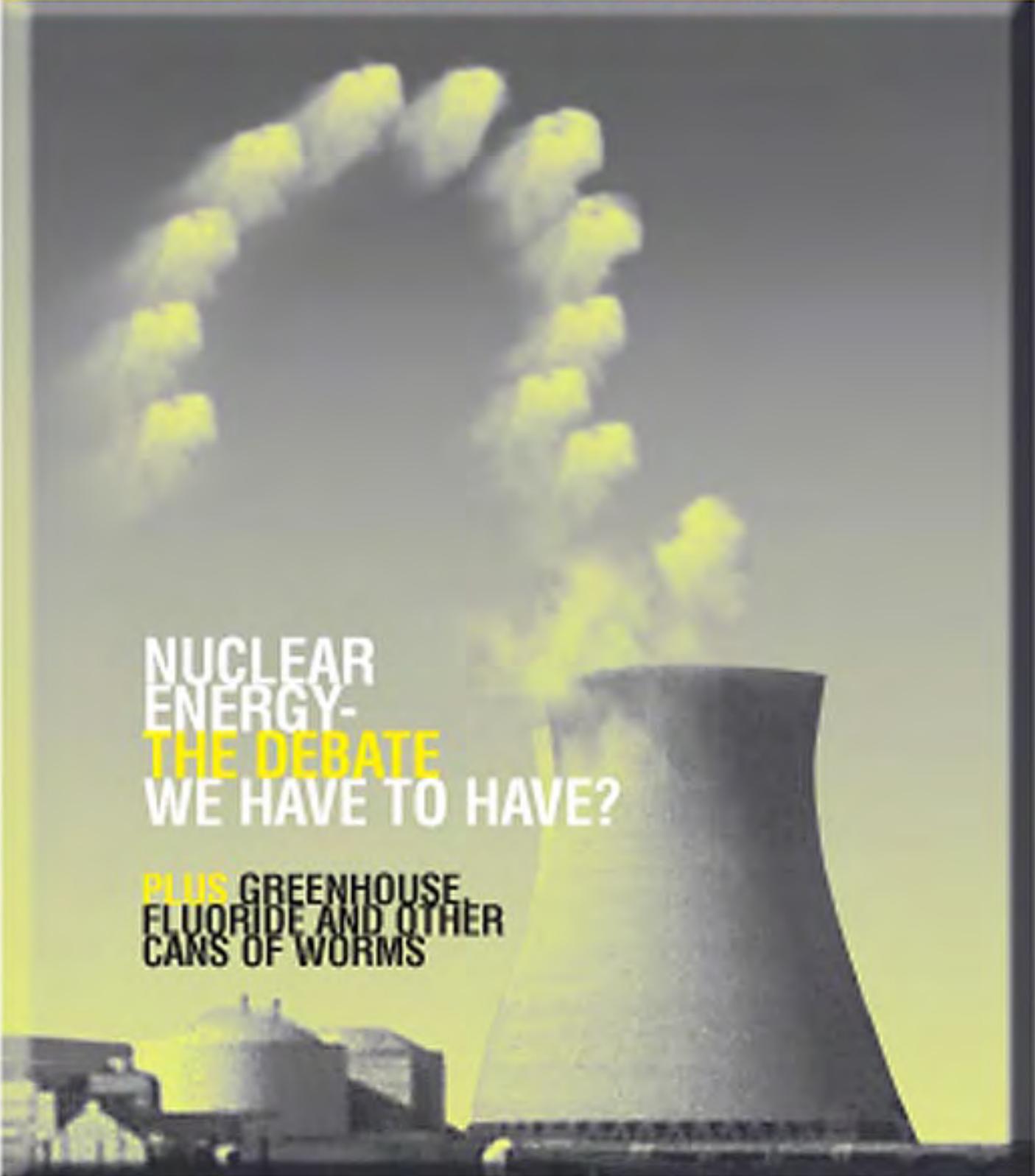


# the skeptic

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NUCLEAR  
ENERGY-  
**THE DEBATE**  
WE HAVE TO HAVE?

**PLUS GREENHOUSE  
FLUORIDE AND OTHER  
CANS OF WORMS**

# the Skeptic

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# Debating the Issues

This issue marks something of a departure from our normal practice in that it contains considerable material on topics that are more properly matters of mainstream scientific controversy, rather than our usual concerns with pseudoscience and the paranormal. The reasons why we do not normally stray into such areas are obvious. Most readers of *the Skeptic* are well-read and scientifically literate, and many Skeptics are highly skilled professionals in various fields, but the number of specialists in any given field is necessarily limited, so such debates are better left to refereed specialist journals.

However, some scientific issues do become embroiled in important matters of public policy, where they are intermingled with, *inter alia*, economics, politics, and emotion. Science is rational and so too should be economics, while politics struggles to achieve it and emotion rarely does. Yet the answer to any of these problems must be a rational one; their consequences are far too important to allow emotion to rule. This is not to discount the emotional side of our nature, which plays an important part in making us (including Skeptics) human, but we are also a reasoning species and we need to maintain a balance between the two. To encourage that is why we have given over so much of this edition to these important topics.

In this edition, we carry stories on water fluoridation, the greenhouse effect and nuclear energy, all of which

fit into the above category. They are all complex issues and they all attract controversy, yet they are issues about which everyone should try to make themselves informed. That is not so simple when, as in the case of energy policy, there are multitudes of players involved, each with their own particular barrow to push. At least some of what each of them has to say is rational and genuine, yet they are all largely convinced that theirs is the only solution.

Taking one subject as an example, Australia is very handily placed to contribute a great deal to finding answers to energy problems for the rest of the world. We have abundant quantities of most of the elements that go into a wide variety of solutions; vast resources of fossil fuels, uranium, sunlight and wind; geology to enable us to explore geothermal power generation, carbon sequestration and waste storage; and a long coastline, should tidal energy become a major factor. Our modern society, stable polity, and moderate climate allow us to seriously investigate sensible energy conservation measures. Our educated population have the scientific expertise and technological skills that should make us a leader in the field.

It is likely that, rather than having one 'fits all' answer, all of the proposed options have a place in providing energy and curtailing pollution of the environment, not only in the immediate term but into the distant future. All options have strengths but

they also have weaknesses and the final decisions will be coloured by economic, political and emotional factors. They should all be considered on their merits. Skeptics should be wary of any claims that one or other option should not even be discussed, for such claims lie in the realm of religious faith, not of rational discussion. We live on a dynamic planet and we are a dynamic species, and while our inventive nature has often led to both pain and gain, it seems to be the only way we can solve our problems. Retreat to a past Arcadian golden age is not an option, not least because it never existed in the first place.

Skepticism is the correct approach to allow us to discriminate between the facts and the spin, but it requires that as we are able to get access to accurate information. Information is vital for our brains to work properly — without it we have to rely on 'gut feelings' and, as that arch-skeptic Carl Sagan famously said, "I try not to think with my gut".

Finally, I must apologise to a number of contributors whose papers I intended to publish in this issue. The serendipitous arrival of the transcripts of the Canberra nuclear energy debate at the same time as this became a 'hot topic' in the media, made it important that we change our line-up. Your contributions will be carried in the next issue.

**Barry Williams**

# Around the Traps

## Straws in the wind

Be that as it may, there are some straws in the wind to suggest that someone or thing supportive of the Skeptical enterprise has a hand in guiding human affairs, as the following stories will show.

### Straw 1

A comprehensive study conducted at the University of Berne in Switzerland and published in *The Lancet* in August 2005, told of research which compared 110 randomised placebo-controlled trials of homeopathy with 110 conventional-medicine trials, covering a wide range of ailments and treatments.

The results of the study showed that homeopathic remedies were no more effective than placebo. No surprises there for Skeptics, but nor did it prevent proponents of homeopathy from ducking, diving and equivocating in support of their own brand of witchcraft.

### Straw 2

A study of 15,000 people conducted by universities in Denmark and Germany and reported in the May issue of the journal *Personality and Individual Differences*, found:

*... in no cases did date of birth relate to individual differences in personality or intelligence.*

and concluded:

*the present large-scale study certainly found no independent effects of sun signs, elements, or gender, and thus yields no support for the common claims of astrology.*

Readers will not be surprised to hear that divers astrologers disputed this study, claiming that “real” as opposed to “pop” astrology was the fair dinkum article. But they would say that, wouldn't they?

### Straw 3

In 2000, the UK Ministry of Defence (MoD) received the results of a study they had commissioned four years earlier into “Unidentified Aerial Phenomena in the UK”. For reasons that are not entirely clear, this report was classified *Secret: UK Eyes Only*, until earlier this year, when Dr David Clarke from Sheffield Hallam University succeeded in having it released under the Freedom of Information Act.

The 400-page report includes the following statements:

*No evidence exists to suggest that the phenomena seen are hostile or under any type of control, other than that of natural physical forces.*

and:

*There is no evidence that 'solid' objects exist which could cause a collision hazard.*

The study, which aimed to assess whether UAPs (aka UFOs) posed any

military threat to Britain, concluded there was:

*nothing of defence intelligence value.*

Later, a number of minute verdant humanoids were seen protesting outside the MoD offices, alleging blatant planetist discrimination.

### Straw 4

Readers will probably recall the hype that accompanied the release of the appalling *Alien Autopsy* TV production a decade or so back and the ease with which its amateurish claims were exposed. Various suspects were nominated as being behind the hoax, though there was never any good evidence to convict anyone.

Now the *Sunday Times* in the UK reveals that the perpetrator has finally outed himself. John Humphreys, creator of the *Max Headroom* cartoon character, and a consultant on *Dr Who*, claims it was he who shot the footage, not in a tent in Roswell, New Mexico, but in a studio in Camden, London. The gory bits removed from the ‘alien’ were in fact sheep and chicken entrails and the body was made of latex.

Now wasn't that a surprise?

### The final straw

Meanwhile, another more important study, and one that we are sure will appeal to most Skeptics, was conducted by assorted European universities. Its findings, which were re-

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leased at a conference in Brussels recently, were that beer is good for you. We'll drink to that.

### More than straw

This one is more than a straw, more a bale of hay — if it is true. Russell Kelly, of the Borderline Skeptics, has had a tip that Victoria University will be discontinuing Natural Medicine as an area of study at the end of this year. These degree courses, including, *inter alia*, naturopathy and homeopathy are conducted at the University's Health Sciences facility.

Russell has been engaged in a paper war with the university and governments state and federal about this for some time, and has been supported by staff of the Health Sciences faculty. He is naturally pleased at the result, which shows that we Skeptics can make a difference.

### The Ides (almost) of June

Because we use the calendar we do, it was as inevitable (Armageddon aside) that we would eventually reach 6 June 2006 as it was that we would reach 21 October 2005. There's nothing particularly significant about these two dates, apart from their both being anniversaries of famous battles (D Day Normandy landings and Trafalgar) — they are simply artefacts of the system we have devised to keep track of the quotidian round.

But one of these dates has much more significance in the fantasy world inhabited by far too many people in our society. An obscure verse in *Revelation*, the most obscure of the books that make up the Christian Bible, leads some people to be apprehensive about the number 666 — the so-called Number of the Beast. Irrational, yes, but no more so that any number of other irrational beliefs. That 6 June 2006 contains three 6s is enough to set bells jangling in those circles, and the fact that it also contains 200 doesn't seem to matter. Nor does the fact that our calendar, with its days months and

years, is an arbitrary human invention, post-dated by some centuries when it was introduced, and later modified to make a match between its purported starting date and the realities of planetary motion.

Media hype ensured that this otherwise undistinguished date received more attention than it deserved and that our Editor had his voice heard all over the wide-brown. He pontificated on the dangers inherent in expectant mothers superstitiously seeking medical intervention to avoid giving birth on the day. He did seek to point out the absurdity of this particular irrationality by claiming that, as we live in the Southern Hemisphere and are thus 'upside down' from the perspective of the author of *Revelations*, we should be more worried about 9 September 2009, but he is not hopeful of success. Time will tell.

### Soft soap

With any luck the recent court case in the USA (covered in our last issue) should have put the Intelligent Design rabbit back in its hutch, at least until the anti-science creationist push comes up with yet another cunning ruse to confuse the naive and pecunious.

However, while there is zero evidence to suggest that an intelligent designer is running the world, at times there are worldly goings-on that are so wierd as to make one suspect that *some sort* of intelligence is manipulating matters, giving us the feeling that we are all living in some sort of second-rate soap opera.

For example:

- ◆ the tragedy and triumph of the Beaconsfield mine accident;
- ◆ the tragedy, descending into farce, of the Private Kovko affair;
- ◆ the media frenzy about the otherwise unremarkable date of 6 June, 2006;
- ◆ the sheer fantasy of a No 10 batsman going in as night watchman and scoring 150 in a test match; and many more in like vein.

Let us therefore propose for your delectation Bunyip's very own explanation of origins which, for the sake of brevity, we will call the *Mediocre Scriptwriter Theory*.

### Epiphany of a baronet

On the morning of the rescue of the Beaconsfield miners several people rang ABC radio stations claiming that their talking 'Boonie dolls' (a brewing company promotional gimmick, released during the cricket season) had returned to life, giving forth such inspirational epigrams as: "I need a beer" and "He's seeing them like watermelons". The fact that David Boon (on whose ample figure the doll was based) is a Tasmanian is significant.

Clearly a miracle had occurred, which led our resident bard and flannel fool evangelist, Sir Jim R Wallaby, to experience an epiphany and to launch his very own religion with this prayer:

#### Lords (and SCG) Prayer

*Our Punter, who art in the Middle,*

*Hallowed be thy Game.*

*Let Bowlers come,*

*Thou wilt make a Ton*

*At Lords, as well as the Gabba.*

*Give us this day a slow half-volley*

*And forgive us our snicks*

*As we forgive umpires who rule against us.*

*Let us not send the opposition in,*

*But deliver us from wrong-uns,*

*For thine is the SCG,*

*The MCG, Bellerive, Waca and Ad Oval*

*Until stumps are drawn.*

*Howzat!*

**Bunyip**

# The Greenhouse Debate and Skepticism - II

## Second part of a paper on a serious issue

In the first part of this article, I gave some background on the greenhouse effect and global warming.

How then should a Skeptic approach the greenhouse debate? How should a Skeptic approach other scientific debates, for that matter?

It is understandable that a Skeptic may feel that much of what they get from the media debate is unreliable, as it is. A week or so before I wrote this, a letter appeared in the *Sydney Morning Herald* pointing out that just because this summer in Sydney was hot that does not prove that global warming is here (apparently in answer to three previous letters claiming the opposite the day before). This is correct, and just the point I made earlier, but the letter went on to conclude that we should not jump on the greenhouse bandwagon, missing the point that the scientific case for global warming does not rely on one place and one year. More worrying, an accompanying letter made the bold statement that there was nothing to worry about as the Sun would cool (around 2015, for a decade or more, if I recall correctly) cancelling any global warming. I have never heard of this theory, I can't find mention of it anywhere and it contradicts what we know about solar variation (we can

extrapolate the 11 year cycle a bit, but not predict long-term changes decades in advance). The letter writer could have obtained this idea psychically for all I know, but it further confuses the public perception.

Given that there is a pretty good scientific consensus among climate scientists, I think a Skeptic should at least look at what the consensus is. That is what I have tried to do in the first half of this article. A good place to look on the web is *RealClimate* ([www.realclimate.org/](http://www.realclimate.org/)) mentioned in Mark Lawson's article (25:2). This discusses most of the issues raised by the greenhouse critics and environmental alarmists. It got a *Scientific American Science & Technology Web Award* for 2005, as one of the best 25 science web sites.

Obviously consensus is not unanimous — you can always find someone who disagrees with any given position (you can't please everyone), and even qualified scientists can have some odd views. When I was a graduate student in the 1980s there was a Professor of Physics I knew at Sydney University who was an enthusiastic proponent of Tarot cards and levitation using Transcendental Meditation (readers of *the Skeptic* with long memories may know who I refer to, and if you have access to the



Paul Jones is an astrophysicist and long term Skeptic, who complains that the lack of frequent flyer seats on intergalactic UFOs makes his job much harder.

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searchable *Great Skeptic CD*, you can find out).

## Science and Skepticism

In evaluating science, it is useful to consider what has been quality checked by peer review. It is easy to put a bit of work on your website, or self-publish, but it is a good idea for someone else to look over it to check for problems. Like many scientists, I have a collection of unsolicited manuscripts by people who have made great discoveries, like antigravity and the Unified Field Theory that Einstein couldn't understand (often from retired engineers who know a bit of physics and have time on their hands). The main problem with such manuscripts is they are usually (a) incoherent or (b) conflict badly with current physics, and are inconsistent with the results of many experiments. Scientists (and other academics) typically use peer review of their papers to pick up problems (*Is it new? If not, it may be plagiarism and fraud. Is there a major problem that it would be embarrassing for you to have missed?*). Checking that people can understand what you are saying is also important, particularly as English has become the world standard and is quite often not the native language of the writer.

This is explained nicely in the brochure "I don't know what to believe" published by the British group Sense About Science ([www.senseaboutscience.org.uk/](http://www.senseaboutscience.org.uk/)). Peer review in science does not stop some bad papers getting through (eg, occasional fraud) as no system is perfect, and does not stop scientists getting their work published, as there are lots of non-reviewed publications (eg, conference proceedings), but it does help the quality control.

Not all scientific writing is peer reviewed — some is commentary, like this *Skeptic* article. However, when Creation "scientists" publish only in their own internal magazines and don't even try to publish in the peer-reviewed literature (because their papers will be rejected due to gross errors), they have forfeited the

right to call themselves scientists, and Skeptics should be ... well, skeptical. Pseudo-scientists (for example, Creationists) will then usually resort to accusations of Conspiracy Theory to explain why their work is unfairly ignored by the scientific mainstream, and this is where the debate usually degenerates into name-calling instead of science.

I don't think that skepticism is simply being negative. Because Creationism does not hold up to scrutiny as science, and is really a religious dogma, it was ruled unconstitutional to teach it in public schools in the USA under the separation of Church and State. Creationists then switched to simply putting forward (spurious) arguments against evolution, geology etc, without bothering to mention their own theories. This has been a quite successful political strategy. However, I would not describe Creationists as "evolution skeptics", because they are approaching the issue as dogmatists not skeptics. The phrase "evolution critic" is probably better to describe someone who is anti-evolution.

Science is often treated for simplicity of argument as a set of links, as I have done in the first part of this article, with the requirements of narrative making the links sequential. A much better analogy would be a network of links (tapestry? jigsaw puzzle?). If you want to replace a piece of the picture, then you have to be careful that in explaining part A, you don't unexplain parts B, C, D etc. Putting this another way, as a Skeptic, who tries to "... seek the evidence" you should worry about more than just one small part of the evidence.

## Greenhouse Critics

If we are skeptical or critical of the greenhouse effect or global warming, we should really narrow down what aspects that we are critical of. That greenhouse gases do not affect surface temperature? That greenhouse gases have not changed? That the greenhouse gases have changed but this is not due to humans? That the

global temperature has not increased? That global temperature has increased, but it is not due to greenhouse gases or humans? That the climate will not change? That the climate will change, but that it will not be due to humans or greenhouse gases?

All of these are good questions, and I hope that I have shown in the first part, in giving some of the history, that the answers are not obvious. However, they have been discussed for decades in the scientific literature. The answers, and the confidence in them, have changed as time goes on and more evidence accumulates (for example, a longer time of data makes change easier to distinguish).

This is best given in a quote from John Maynard Keynes, which would make a good motto for Skeptics:

*When the facts change, I change my mind. What do you do, sir?*

I was actually quite surprised by the level of agreement among climate scientists with the IPCC consensus summary found by Oreskes (2004). That was because (a) a lot of work has been done over the last 15 years or so since I was personally involved and (b) the popular media concentrates on controversy and gives a biased impression (as I have discussed). I am sure the scientific disagreement was much greater 15 years ago, but the scientific skeptics have apparently been convinced.

I can reassure Tom Biegler (25:3) that the scientific debate is much less heated and polemical than the public debate. My experience as an outsider to the climate community (an astrophysicist) was that I was not prevented from bringing in new ideas and speaking my mind (although, Skeptics should be wary of anecdotal evidence).

So, how should skeptics respond to specific criticisms of the greenhouse effect and global warming? Let me take some examples from Mark Lawson's article (25:2) — there are many others from the Internet and media reports. Oddly, one of the most prominent sources of criticism

in the media debate is a novel, a work of conspiracy-theory fiction *State of Fear* by Michael Crichton.

### Historical Climate

The major main scientific point of Lawson's article is a criticism by (economist) Ross McKittrick of the Michael Mann *et al* reconstruction of the temperature over the last 1000 years (hockey stick diagram). This is largely a technical discussion about statistics which can be followed up by experts on links from RealClimate or Mann *et al* (1998, 1999). Other independent studies broadly confirm the Mann *et al* result not McKittrick. However, I should point out that changes to this graph before 1500 are really pretty irrelevant to the evidence for global warming in the last 140 years (from the instrumental record), or predictions for the future (from physical models). Also, what the IPCC really said in 1995 was "Data prior to 1400 are too sparse to allow the reliable estimation of global mean temperature." (IPCC 1995). In the last decade, more work has been done.

The graph printed in Lawson's article is actually a schematic based on local European climate records, not "World Climate History", and it looks as if someone has tampered with it as there are no numbers on the temperature axis.

Given that, as Lawson concedes, the Mann *et al* graph is "not the only piece of evidence for global warming", why has it been singled out for so much attention? I think that it is because some critics see it as "the centrepiece display", and have an incorrect view of science as a chain of links, so that if one link is broken, the whole field collapses. Attempts to break this link are not confined to scientific debate. Mann and his co-authors were sent letters by Representative Joe Barton (Texas), Chairman of the US House Energy and Commerce Committee requesting personal details, financial details, raw data, computer programs and contracts, which it was onerous (like a tax audit) or in some cases impossible to comply with. This led to an

editorial in *Nature*, and concerns from other scientific organisations, like the US National Academy of Sciences and American Association for the Advancement of Science. The Chair of the US House Committee on Science stated "The only conceivable explanation for the investigation is to attempt to intimidate a prominent scientist ...". I fear that this is now a political battle.

### Ice Ages

The other main scientific point of Lawson's article is about Ice Ages — again not really central to the arguments for recent climate change (so not mentioned so far). The timing of Ice Ages is now well recognised to be due to cyclic changes in the Earth's tilt and orbit around the Sun (Milankovitch cycles), which does not change the total amount of incoming sunlight much, but does change the distribution. The problem is that these changes are small, so some other effect must enhance the solar input changes to lead to the large temperature fluctuations in a positive feedback loop. The answer is (surprisingly or unsurprisingly depending on your point of view) greenhouse gases.

Lawson shows a graph of the Vostok Ice Core temperature record, but what he does not show is the corresponding carbon dioxide concentration record. If he did, and overplotted the two curves you would see that they match very well by eye. The correlation between temperature and carbon dioxide is very striking, and most people's reaction would be "Wow ! Greenhouse gases really do have something to do with temperature". It is true that there is a small lag (800 years in the 100 000 year cycle) between temperature and carbon dioxide, as the feedback loop needs to be started (triggered by the solar input changes and possibly ocean circulation). I should explain in the feedback idea, that it not a choice between temperature affecting carbon dioxide versus carbon dioxide affecting temperature, but both occurring. In the decline phase this would be lower temperatures

causing lower carbon dioxide levels which in turn cause lower temperatures etc.

### Scientific Uncertainty

Lawson quite correctly points out that it is poor journalism for the Good Weekend to quote a 6 degree rise in a century as a firm prediction, where this is not what the IPCC actually said, as the IPCC gave a range for different emission scenarios. However, he makes exactly the same error in using the 2 to 6 degree range to dismiss the climate scientists for not having a single precise estimate. As pointed out earlier, the wide range is largely due to different input scenarios of future emission not the scientific uncertainty. Nevertheless, let me explain why scientists do quantify their uncertainty (sorry for getting a bit lecturing here, but I spent ten years explaining this concept to first year university students).

Some things we know very accurately, say the orbits of the planets (in my field of astronomy), and other things less accurately. For example, a few years ago, the Hubble Constant in cosmology was only measured to within a factor of two as between 50 and 100 km/s/Mpc. We might quote this as 75 km/s/Mpc with an uncertainty of 25 km/s/Mpc (or 33 % uncertainty). We might prefer to have an exact value (73.67992184321669 ... km/s/Mpc) but we are not omniscient, so we try to be honest at how accurately we really can measure it — 0.1 % accuracy would be pretty good but 33 % accuracy is still useful for some purposes. We similarly typically consider the uncertainty of predictions from scientific models, recognising that there are some physical quantities or processes that we know roughly, but not exactly.

As this way of approaching quantities is different to accounting (you expect an exact calculation from your accountant), let me give a financial analogy. Consider the "get rich scheme" of going to the casino. You ask a mathematician to calculate the return on investment given

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your strategy, say on the roulette wheel. They cannot give you an exact number, because there are things they don't know (where the ball will land each time) but they can give you a good estimate of the mean value and range (using probability). Since the casino operates on these principles, I am sorry to say that you will, on average, lose money. Taking the range of predictions of even a factor of three, the mathematician might tell you that you are likely (95 % of the time) to lose somewhere between \$ 2000 and \$ 6000. I think it would be a foolish strategy to reject the mathematician's advice on the grounds that "you can't tell me the exact number, so you know nothing".

One of the appeals of pseudo-science, unlike real science, is that your psychic can give you a definite answer (even if it is wrong), whereas science cannot always give you the exact answer, and people feel reassured with certainty. I think that it is a pretty poor reaction of Lawson to dismiss the scientific approach of being honest and admitting uncertainty ("simply laugh at anyone wasting time on them").

### Climate Science and Politics

As I have already said, I think the public debate on the greenhouse effect and global warming is largely about the political and economic implications, not the science. It is worth noting that the conference Lawson reports on is entitled "Managing Climate Change — Practicalities and Realities in a Post-Kyoto Future" (implications) hosted by an "Economic Co-operation" Study Centre, not for example, the Bureau of Meteorology or the CSIRO. The Greenhouse 2005 conference in Melbourne was also largely about impacts and mitigation, but was mostly organised by CSIRO and presented the science too. I do, however, note the recent *Four Corners* report on "gagging" of CSIRO staff in their public comments on Climate Change, so they may have to tread a fine line in public. (Disclaimer: I have worked for CSIRO in the past

and have read their "Policy on Public Comment" but the views here are my own and do not represent CSIRO etc etc).

I think it is a fair inference, that if you are really concerned about the economic implications of global warming, you probably do not like global warming, as it is expected to cause problems, either in mitigating the effects or preventing them. (As an aside, this does not automatically follow, as Lovins (2005) argues that wasted energy is wasted money and businesses can both save energy and increase profits by cutting greenhouse gas emissions with improved efficiency.) The tendency, I think, is to "blame the messenger" (the climate scientists) and therefore look for some reason to convince yourself that the science of global warming is a "hoax" or a "myth" so the problem just goes away.

This is a trap in thinking that Skeptics are probably aware of, even if it is an easy trap to fall into. We should not confuse what we want to be true, with what is true. I may **want to be** a millionaire, but that doesn't mean that I **am** a millionaire.

The "anti-greenhouse" argument is usually really an "anti-Greenie" political and economic argument. Skeptics may be quite sympathetic to this position, as elements of the Green Movement overlap with the New Age (of Aquarius) having the smug self-righteousness of a true-believer in millennial and mystical renewal. Environmental activists often emphasise the unlikely "worst-case" scenarios and speculations, rather than the most-likely, and so, as I have said, do not accurately represent the scientific mainstream. However, sometimes they do also use arguments from the scientific mainstream, but that is not a good reason to reject the science with "guilt by association" just because you don't like the greenies. The environmentalists also use the fact that the Earth is round (resources are finite etc) but we should not therefore jump to the conclusion that the Earth is flat.

So if the public debate has become politicised (as I pointed out with the US House of Representative Committees intervening, with party politics involved) where can we get some balance? If we are interested in the science (rather than policy implications) then a summary of the peer-reviewed scientific literature, by a broad international group of scientists, such as the IPCC, would be a good place to start. Lawson (quoting Robert Carter) asserts that the IPCC "is an unabashedly political, not scientific organisation". Is this true? Well, yes and no. The IPCC is the Intergovernmental (not International as Lawson misquotes) Panel on Climate Change, so it does report back to the national politicians and the United Nations (OK, politics). Major reports of the Science Working Group have (as well as copious scientific discussions in Scientific Assessment Reports) the Summary for Policymakers which is agreed as the majority view. However, the whole point of the IPCC was to get independent scientific advice for the policymakers (national politicians) to consider, and develop national policies and international agreements. In practice, most national governments have accepted the science summary, even if they then develop quite different policy responses.

I fear that the accusation that the IPCC science summary is "political" (in a pejorative sense) is really just the understandable emotional "gut-reaction" that global warming can't possibly be true (because we would really like it not to be true, and we don't like the greenies) so there must be some giant conspiracy amongst the scientists. I bring in another pithy quote, this time from Carl Sagan (in Dawkins 2003) who when pressed "What is your gut feeling?" replied "But I try not to think with my gut". I think that Skeptics should be quite wary of gut reactions and conspiracy theories.

### Conspiracy Theories

I cannot address all criticisms of the greenhouse effect and global warming science, but you can find many

on the Internet, often then repeated in the popular media. As I mentioned, bizarrely, one of the most influential sources of such criticism is the conspiracy-theory/thriller fiction *State of Fear* by Michael Crichton.

I have read a couple of Crichton's early books (*The Terminal Man* and *The Andromeda Strain*) but have to confess that I then lost interest as he seemed to be reiterating the same anti-science theme of "scientists go too far, and cause a disaster as things get out of hand...". I enjoyed both *Jurassic Park* movies for the special effects, but was disappointed with the plots which were of this theme again. I am therefore not surprised that in *State of Fear* those who accept the science of global warming are either evil or stupid. What I was very surprised to see, was that the book was filled with footnotes quoting the (mostly peer-reviewed) scientific literature — the only book of fiction that I know of to do this! Unfortunately, the papers are taken out of context — the arguments the quotes are used to support are not what the scientific papers were saying.

Readers of *the Skeptic* may recall the notorious Creationist *Quote Book*, where prominent scientists were quoted, out of context, to support the Creationist position, much to fury of the scientists.

OK, you may say, but this is a work of fiction, and a conspiracy thriller at that so no-one would take it seriously. Unfortunately, the reviews (for example on Amazon, [www.amazon.com](http://www.amazon.com)) treat the scientific preaching very seriously and positively (except when it slows down the action) and accept the basic conspiracy theory (that global warming is a hoax perpetrated by environmentalist terrorists). What is more, Crichton was invited to advise a US Senate Committee on climate change. So how does a writer of thrillers have so much influence on the public understanding of such a technical area of science?

### Influencing Public (Mis)Understanding of Science

In any scientific field, there will be a range of dissenting minority views that reject the mainstream, but, as I made the point with Creationism, being critical is not at all the same thing as being skeptical. Skeptical dissenting scientists try to convince the majority with evidence. Critics who are dogmatists without the evidence to support them (like Creationists) will give up on the scientific debate, and often resort to the conspiracy theory argument to explain why the scientific mainstream does not accept their view.

To influence the public, which typically cannot be expected to judge the scientific merits, it is not necessary for critics to even worry about the scientific debate. Creationist organisations have recently sent DVDs on Intelligent Design to schools in Australia to bypass the Department of Education — most science teachers will ignore them, but some may not. The source of the DVD is one of the most influential groups pushing Intelligent Design, the Discovery Institute, which sounds very impressive, is well-funded, has a great web-site, and is very persuasive. They may not have a good scientific case, but why should they care? They have a religious/political agenda and have succeeded very well in convincing the public (in the US, so far, but obviously Australia is a target) that there is something wrong with evolution. The old aphorism says "Where there is smoke, there is fire", but sometimes where there is smoke there is just smokescreen.

Since, as I say, the public debate about the greenhouse effect and climate change, is largely about economics and politics, there are lobby groups, such as the Lavoisier Group (quoted recently by Miranda Devine in a *Sydney Morning Herald* opinion piece) which explicitly argues that this is a political battle that they are winning against the climate mainstream.

Who cares about the scientific evidence? I think that Skeptics should care.

### Conclusion

I think the greenhouse effect and global warming debate does have some interesting lessons for Skeptics. I have tried to include some useful skeptical principles here that can be applied to other scientific debates.

As you can tell, my position is close to that of the scientific consensus, not the extremes of activist alarm (Warning! Warning! Disaster!) or dismissal (It's obviously a load of rubbish, and a conspiracy!). However, I hope that this is for the right reasons of skeptical approach to the evidence. The media and Internet are full of pronouncements from both extremes, and it is genuinely hard to work out what is going on.

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# Alien Invasion!

Or if you prefer a more down-to-earth explanation ...

## Finding out how the other half lives



John Sweatman, when not administrating real estate data, is an enforcer for the NSW Committee.



Martin Hadley, barrister and president, is not afraid of being abducted by aliens, trusting that they will go for someone easier to carry.

*You shall not oppress a resident alien; you know the heart of an alien, for you were aliens in the land of Egypt*

(Exodus 23:9)

On Saturday May 6, The UFO Society of Western Sydney hosted the 2006 National UFO Conference. Following a tipoff from Skeptic and astrophysicist, Andre Phillips, NSW Committee members Martin Hadley, Phillip Peters and John Sweatman joined about 200 true believers at Campbelltown. Martin thought that the title "UFO Society" implied objectivity, as did the references on the website to "investigations". His optimism turned out to be misplaced, whereas John's lower expectations did not prevent disappointment at the quality of most of the content.

### Military cover-ups?

The event was opened by the conference coordinator, Attila Kaldy, who proceeded to describe his adventures in the Blue Mountains hunting UFO's and aliens. He recounted many heroic tales like fighting off bird-eating spiders, although how they got to the Blue Mountains from their native South America was not explained. SAS troops were apparently monitoring their every move, which indicated to Attila that the government was trying to suppress their activities and cover up UFO reports. A military training exercise was obviously too simple an explanation for the UFO believers. The best story had him chasing an alien along a bush track in the middle of the

night (definitely not a wallaby, we were assured). Eventually E.T. stopped and crouched behind a bush (it must have gotten puffed) at which point Attila turned and ran off in terror without managing to get a photo. What a shame!

Right from the outset, Attila used the terms "UFO" and "Alien Craft" interchangeably, indicating that his mind was already made up about what these Unidentified Flying Objects actually were. A later speaker, Frankh Wilks, was not so subtle and objected strongly to the use of the term "UFO" on the grounds that everyone knew that these were identified extra-terrestrial craft.

Next to speak was well known UFO investigator Bill Chalker. We found his to be one of the more interesting talks, as Bill used proper scientific methodology to test the authenticity of alleged alien artifacts. He described a number of 'alien' objects which, after testing, were found to be very much terrestrial and mundane. One exception was a hair sample which was alleged to have come from an alien-human hybrid and which was the subject of Bill's recent book *Hair of the Alien*. His DNA testing on this revealed interesting results that he claimed would not have been obtained from a normal human hair sample. There might be something in this, but until the results are repeated by other independent scientists and subjected to proper peer review, we won't consider it anything more than an interesting oddity.

## Alien Invasion

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Next, Dominic McNamara spoke on the Disclosure Project with which he is involved. He described the painstaking process of trawling through government archives to uncover military and police records of UFO reports. He came across a few interesting items, the best of which was an incident involving a female camera operator at the Woomera missile testing range in the 1950's.

He managed to track down this lady and recorded an interview with her on camera, which he screened during his talk. She told of how a strange light appeared in the viewfinder when she was filming a missile test. She reported it to her superiors who promptly took the film away and ordered her not to tell anyone about what she saw. Dominic seemed to infer that this was evidence of a government conspiracy to cover up UFO reports. What he failed to consider, however, was that Woomera was a place for testing new top secret military technology and that the unexplained lights could have been a result of this, rather than an alien craft. If this were the case, it would make sense that the military would not want information about these weapons leaking out.

This raises an interesting question though: if aliens are indeed paying us visits, why on earth would the government try to cover it up for decade after decade? Some claim that the government has used recent terrorist incidents to frighten the citizenry and erode their civil liberties. Wouldn't the threat of an alien invasion provide much better excuse to do these things? Surely they would play up the threat rather than cover it up!

### Keynote?

After an enjoyable lunch in the club cafeteria, we returned to hear the much lauded keynote speaker: Jaime Maussan. Jaime was flown out from Mexico by the conference organisers at what must have been a considerable expense. Despite this, the 'evidence' that he presented for UFOs visiting Mexico was embarrassingly

poor with many pieces of video or stills being obvious hoaxes.

Jaime's qualifications are in entertainment not science. He broadcasts material sent in by his audience. He needs content and for him it is a sufficient guarantee of authenticity that a person does not ask for a fee when they provide him with stuff. Most of what he showed was jiggly handheld footage shot through cheap cameras at the extreme of their digital zoom with the distortions so caused, including false shadows as the software struggles to create a distinct image.

Many of Jaime's videos of alien activity have been explained through mainstream media including the Discovery Science channel. A fair dinkum investigator would have mentioned this and given the audience an opportunity to decide for themselves. Jaime's tactic was to accumulate an implication that science had no answer to what he was showing. This persisted through some really lame stuff including high flying aircraft creating contrails and even the setting sun catching the edge of a layer of cloud.

He began by extracting a few frames from a video to show a white object flying into a volcano and thereby triggering an eruption. Apart from the fact that smoke was already thousands of metres into the air, indicating that the eruption was well underway, the full video shown on Foxtel was obviously a bird flying relatively close to the camera. It descended from left to right and kept flying after the last frame that Jaime had selected. It was nowhere near the crater and clearly did not fly into it.

It was a little irritating to hear most of the uninformed audience lapping this up. One sincere lad stood at the end to say that the presentation had been the most significant moment of his life. Jaime got the most ooohs! and aaaaahs! from his 'flotillas' which he said were controlled formations of alien 'spheres' or 'lights' trying to communicate something to us, possibly as foretold by Mayan astronomers. We have to

stop being horrible to each other and follow the messages.

He got the sphere idea from footage of what were obviously two helium filled party balloons tied together and being blown along. The effects of wind turbulence were to Jaime, intelligently controlled 'magnetic' movement. But from this point in the talk, any video of an indistinct spot was of 'a sphere'. The flotillas were tiny white specks. Jaime insisted they were at least 5,000m up and 5m across, figures he plucked from the air. The first flotilla was six points making a rectangle and then there were three kind of making an equilateral triangle. Geometric arrangements!

The audience was hooked and became increasingly amazed at flotillas with more and more spheres, forgetting that they were certainly not geometric any more. There was a gasp as he showed a flotilla moving in formation. We had to take his word for the movement because there was no reference point at the edge of the frame, only sky.

It did not trouble the audience that the 'lights' did not keep formation in most of the shots that followed. But this was because the movement was intended to communicate something. Of course we must strive to decode the messages and keep watching Jaime's show. In his world of selected conclusions there will always be more work for him to do.

Then there was the footage of the Mayor being filmed at an official engagement, surrounded by smartly turned out police. Look up in the sky — lights! He looks up, counts them, shrugs, and then continues with the visit. He is obviously trying to pretend they are not there, suggests Jaime and the audience hurrumphs at another shabby cover-up. To us, the Mayor's nonchalance was exactly what you would expect from a man looking at a flock of high flying birds, gliding like storks or pelicans. We like birds and the flotillas were pretty to see, but it was not the most significant event of our lives.

Jaime had some rare close up

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footage shot through a phone camera. We see two lads who are keen to improve their soccer technique and are therefore practicing at night in an alley (as you do). The ball is headed back and forth and then as one retreats to take the ball he passes beside a telegraph pole. Sproing! Out leaps an alien and tugs at his t-shirt. The player recoils in surprise and within two seconds the attempted abduction is over. That seemed a rather feeble effort for a being who had taken the trouble to travel so far to get here; and with all the special powers that suggests. But Jaime revealed that it was not so much trouble after all. His investigation of the scene confirmed his suspicion that behind the pole there must be a space portal; so the alien could pop out, as and when required. [The audience being what it was, I was trying really hard not to laugh, but at this point my stoicism deserted me — Martin]

The worst bit, though, was footage of a captured alien sitting at a table in a darkened room fighting for life after being infected with some disease. It was embarrassingly obvious that this was a small guy in a costume or a dummy being manipulated by a couple of pranksters who also had very poor actors playing the paramedics.

A member of the audience stated that he works in special effects and much of what Jaime had shown were obviously hoaxes. Jaime's response was very telling; his reply to this guy was very defensive, even angry. This got us wondering whether Jaime knows a lot of his stuff is bunk but presents it as proof anyway, unlike some of the others who are genuine, albeit deluded, believers. A supporter stood up and said in a very heavy Spanish accent, that Jaime was a **WONDERFUL MAN**. She got a round of applause (while John smiled politely and Martin's eyes rolled back into his head).

### Media bias?

Next speaker was George Simpson, who focussed on UFO sightings in

Victoria. Of particular interest to him was an alleged landing of an alien craft near a school in the 1960's, which he told us was witnessed by a number of the students. The evidence he presented was very flimsy and unconvincing and included lots of anecdotes and hearsay.

However, he did make an interesting point about how Ufologists are treated by the media. He gave an example of how Channel Nine showed Victorian skeptic Steve Roberts some very flimsy UFO footage and asked him to comment on camera. Steve correctly dismissed the footage as mundane phenomena that had been misinterpreted as UFO's by some. Channel Nine then interviewed George and had him make general comments about UFO sightings but without showing him the footage Steve had seen. The result was edited to have George appear to endorse the flimsy footage as genuine UFO evidence when in fact he had never seen it. He explained that had he been allowed to view the footage, his conclusion would have been the same as Steve's. This is typical behaviour of commercial current affairs programs and there have been many other occasions where the tables were turned and the Skeptics were made to look like dills instead.

Diane Harrison from the ironically named *Hard Evidence* magazine, was the next to come forward and deliver a talk on "UFO Abduction and the Dream Time Connection". She explained that many ancient rock paintings by indigenous people depict creatures that look very similar to what modern alien abductees have described. We weren't convinced. This suggests that people 10,000 years ago had just as good imaginations as people living today.

### Conspiracies

The final speaker for the formal part of the conference was Frankh Wilks. Frankh was introduced as a "Humanistic Psycho Therapist, Hypnotherapist, Herbalist, Homeo-

path and Naturopath". Tally ho, we thought but after giving a brief introduction, he put on an hour long documentary which tried to prove that the 9/11 attacks were all the result of a big CIA conspiracy. (This was the same program that was shown on Channel Ten a few months prior, and has been shown by others to be complete conspiratorial nonsense).

This was rather self-indulgent of Frankh. He was invited to the conference to speak on hypnotherapy and how it can be used to recover memories of people abducted by aliens. But he instead decided to use his timeslot to push a pet conspiracy theory unrelated to the subject matter of the conference.

The dinner was pleasant and included a talk by Lorraine Cilia on the "Rendlesham Forest Mysteries". She didn't deal much with the famous event itself, but instead focused on weird and spooky happenings that are observed by tour groups visiting the site now. Lots of photos with weird light effects were shown and explained as alien phenomena, but they were obvious tricks requiring no more than a cable release, a torch and a flashgun. Lorraine was adamant that torches were not allowed into the forest during these research trips, but she was not there when most of the shots were taken. Swirls of mist were shown to be examples of the presence of aliens. What's really funny though, is that there are other people who are convinced that such swirls indicate the presence of ghosts, not aliens.

Being in the prime of our lives, we did not set aside a beautiful autumn Saturday to acquire snipers' ammunition. We wrote to the conference organisers the day after the event with constructive criticism and the dialogue will continue. Any discerning Skeptic should believe in UFOs; it's whether they are alien controlled that is a slightly bigger ask.



# Good Fun with Bad Faith: Humbug Celebrated

**An understanding of informal fallacies can be used for good or evil**

**We accepted this article in good faith – more fool us**

A few weeks before I conceived and got down to writing this article I was engaged in a discussion with one of my students. The discussion began with a gratifying exchange about the importance of developing an enhanced understanding of informal fallacies. The discussion was gratifying because it affirmed my approach to teaching, and my choice of textbook for the course (my own). My student and I agreed that discussion is far more likely to be fruitful and truthful if the discussants are:

- (a) well-acquainted with common fallacies;
- (b) able to detect those fallacies in the arguments of others; and
- (c) able to challenge half-baked opinions masquerading as sound arguments.

My student made the observation that her husband and some of her friends were so discomfited by her enhanced argumentation skills that in self-defence, they had bought copies of the book (*Humbug!*) for themselves. As a consequence, her previous advantages in argument were being nullified as her opponents in argument developed enhanced argumentation skills of their own — and had in turn started to see through her bluffing.

It was at this point in our chat that we began to trespass on unhalloed ground. We began to admit to

ourselves that one-sided knowledge of informal fallacies could be fun, and that there is always a temptation to use an enhanced sensitivity to fallacies to improve the potency of one's own fallacies (rather than to avoid making fallacious arguments). We then spent some time recounting shameful anecdotes — triumphalist stories about how we sometimes won arguments by engaging in false attribution. We agreed that once one chooses to travel down that path, it can be more fun if the fake source is comprehensively and artfully contrived. The cartoon on the following page is an attempt to capture the flavour of some of our gleefully guilty reminiscences.

## The question of bad faith

After my discussion with the student in question, I began to reflect on the issue raised by our frankly acknowledged delight in corruptly winning arguments (by misusing a knowledge of fallacies to wrong-foot an opponent). I don't wish to overstate the case here, as I mostly use my knowledge of fallacies in the service of truth. However, there is no doubt that knowledge about the means of truth-seeking does not automatically guarantee the ends of truth-seeking. Broadly speaking, a knowledge of informal logical fallacies can be used to detect false claims in argument in order to approach closer to truth; or



*Jef Clark is a mild-mannered educator's educator, who fights for Truth, Justice and the Appian Way. He recently became a grand-father, which serves him right.*

to make bigger, better and more sophisticated false claims in argument — in order to win an argument. The concept of bad faith provides a useful perspective for further examination of this issue.

When a person shamelessly admits to engaging in argument in order to win an argument, then bad faith is not an issue, even when he or she uses a sophisticated knowledge of fallacies to wrong-foot an opponent. However, when the same person maintains that his or her motives are pure — in the service of truth alone, then bad faith is involved.

Bad faith involves making a claim to a principled posture when the claimant is in fact unprincipled. Other, more simple descriptors may be used to label such a posture — “lying hypocrite” comes to mind.

But bad faith is a term which is worthwhile advancing for its precision of meaning, and emotional coolness. (Calling someone a lying hypocrite can be provocative, whereas claiming that he or she is acting in bad faith may be, or ought to be less inflammatory.)

I have a well-founded dislike of the use of definitions to clarify a concept, so here are some examples of bad faith to both clarify the concept, and to illustrate its utility. (Note that the use of “well-founded” in the previous sentence is an act of bad faith.)

The first example is almost literal, and is prompted by my dim recollection of a scene from an episode of *Yes Prime Minister*. Jim Hacker is conferring with Sir Humphrey Appleby about possible appointees to the newly vacated post of Archbishop of

Canterbury. Sir Humphrey makes a compelling case for appointing someone who doesn't believe in God. The appointment process as depicted in the episode is of course in bad faith, but an agnostic or atheist Archbishop preaching (with apparent sincerity) from a pulpit about the resurrection and the life everlasting would necessarily (and literally) be acting in bad faith.

wasn't in the preceding parentheses — or was it?)

- A hypocritical peace activist acts in bad faith when he or she expresses public anguish at the death of non-combatants while privately delighting in such casualties — as civilian deaths add weight to his or her rhetorical position on armed conflict.



### Bad faith alert: don't believe anything you read from this point on

At the risk of confusing the reader, I am about descend into a downward spiral of layered irony in an attempt to further illustrate my point about bad faith uses of knowledge of fallacies. I will use rather heavy-handed irony, so it shouldn't be too difficult to separate my actual views from my feigned views. Although at the time of writing this very sentence,

even I am unsure about my real views. But on reflection, perhaps I would only say that if I were lying.

The reason for writing this article is to articulate a useful concept — bad faith. The context for this elaboration is an indeterminate domain of knowledge which might be labelled fallacies in thinking and/or informal logic. This domain has a pedigree ranging back to the writings of the most notable of ancient Greek philosophers — Aristotle and Socrates in particular. However I don't wish to have to read masses of arcane and esoteric material in order to demonstrate my *bona fides* in presuming to pontificate on such matters. To avoid having to gain a deep understanding of the writings of Socrates (in Plato), and Aristotle, I propose to disparage their writings in the most general

Some less ecclesiastical examples may serve to illustrate the broad utility of the concept.

- A hypocritical journalist acts in bad faith when he or she claims to be reporting news — while in reality he or she creates news by provoking newsworthy incidents.
- A hypocritical social researcher acts in bad faith when he or she claims to be researching a topic in order to discover underlying reality — while in reality he or she discards and doesn't report results which don't support his or her cherished hypothesis (the so-called “desk-drawer” effect is one commonly acknowledged example of this phenomenon). (Note that the use of “so-called” and “scare quotes” is often an act of bad faith — but it

## Good Fun with Bad faith

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terms, and thus I will be able to dismiss them altogether, and avoid having to deal with them. Naturally, I searched for sources which might support my dismissive and shallow account of their work. The best source I found was the Department of Philosophy at Woolloomooloo University's Drinking song (*Python*, c.1967 - my emphasis).

*Immanuel Kant was a real pissant who was very rarely stable.  
Heidegger, Heidegger was a boozy beggar who could think you under the table.*

*David Hume could not consume  
Wilhelm Friedrich Hegel, and  
Wittgenstein was a beery swine who was just as sloshed as Schlegel.*

*There's nothing Nietzsche couldn't teach ya 'bout the raisin' of the wrist.  
**Socrates** himself was permanently pissed.*

*John Stuart Mill, of his own free will, after half a pint of shandy was particularly ill. Plato, they say, could stick it away, 'alf a crate of whiskey every day! **Aristotle, Aristotle** was a bugger for the bottle, and Hobbes was fond of his Dram. And Rene Descartes was a drunken fart." I drink, therefore I am."*

*Yes, **Socrates** himself is particularly missed; a lovely little thinker, but a bugger when he's pissed.*

My source clearly establishes that both Socrates and Aristotle were crapulous dipsomaniacs. It therefore seems unlikely that their writings are worthy of consideration, so I will not dignify their works by referring to them in this article. Unless I change my mind later.

To deflect possible criticism from letter-writers in the next edition of *the Skeptic*, I wish to make it clear that I have made liberal use of self-deprecating humour throughout much of this article. Some readers will find the self-deprecating humour difficult to discern, because I have hidden it beneath ironic faux-arrogance. My purpose in doing this was to deliberately give examples in

my own writing of a range of fallacies. So it's really no use any letter writers claiming to have caught me out. If you do discover a fallacy herein, I will simply claim that the use of the fallacy was intentional, and then:

(a) congratulate you for finding the fallacy; and

(b) express surprise that you failed to realise the passage was a now-common literary form which Clark (2006 b) first described as "sucker-baiting irony". (Note that if you have failed to detect both false attribution and stacking the deck in the paragraphs above, you are not really paying sufficient attention.)

It should also be noted here that I am not attracted to, nor competent in the painstaking parsing of arguments required of formal logicians and argument mappers. For this reason, I am drawn to informal logic — because it is not as hard, and because it is a more literary form than formal logic. Formal logic is about certainty. Informal logic is about persuasion, nuance, clear communication and the generation of engaging forms of written and oral expression. There is also a place in informal logic for satire and debunking — my favourite forms of writing and argument. Unhappily, such forms tend to be relatively unsuccessful at persuading the uncommitted to a proponent's point of view. I fear that satirists and debunkers are often seen as shallow, insincere and disingenuous. Speaking as one myself, I feel that this characterisation is unfair and prejudicial. But that's exactly the sort of thing you would expect an insincere and disingenuous proponent to say. But that still doesn't mean the charge is correct. In fact if you can't prove the charge is correct, then by default, I have proved that it is incorrect.

### Bad faith sub-heading to disguise abrupt change of tack

Recently, I have been re-reading older publications in my areas of interest (informal fallacies in thinking and flawed reasoning). These

older books and articles (from the 1950s and 1960s) are usually worth reading, as the authors of that era were less likely to be running a theoretical agenda, and were more likely to be able to write clearly. The book *Guides to Straight Thinking* by Stuart Chase was published in 1956. In that book, Chase reminds us that there were "two contrasting uses of logic as developed by Greek thinkers — uses still in sharp contrast today". The contrasting uses were:

(a) those employed by the Sophists, in order to "advance somebody's power or position"; and

(b) those employed by Socrates (and later Aristotle), in order to "advance human knowledge".

In today's academy, the intellectual progeny of Socrates and Aristotle (the truth-seekers) tend to be located in the natural and life sciences. The intellectual progeny of the Sophists (power-seekers) tend to be located in the social sciences and humanities.

Chase provides a useful shorthand description of the *modus operandi* of real scientists.

*The three steps in the scientific method follow naturally: First, get together the facts bearing on your question. Second, develop a theory, or hypothesis, to explain the facts. Third, arrange experiments to verify (sic) the hypothesis. Arrange them in such a manner that other competent observers can repeat them. Maintain a healthy skepticism throughout, and be ready to say "I was wrong".*

I will use Chase's description as a framework for my own description of the *modus operandi* of many social scientists and other flaky denizens of the contemporary academy.

*The three steps in the social-scientific method follow naturally: First, seek out a theory which accords with your world-view and social-emotional predilections and prejudices. Second, seek facts that seem to be in accord with your theory and ignore facts which challenge your assumptions. Third, arrange opportunities for selective observation in the field;*

and confound observation and interpretation in your data-gathering. Then write up your study so that other like-minded social researchers can endorse your study for publication. Maintain an unwavering commitment to your a priori prejudices throughout, and never admit to the possibility that you may have been wrong in your assumptions.

Goldberg (2003:32) puts the distinction between truth-seekers (scientists) and worldview-validators (social scientists and other infantile narcissists) very succinctly:

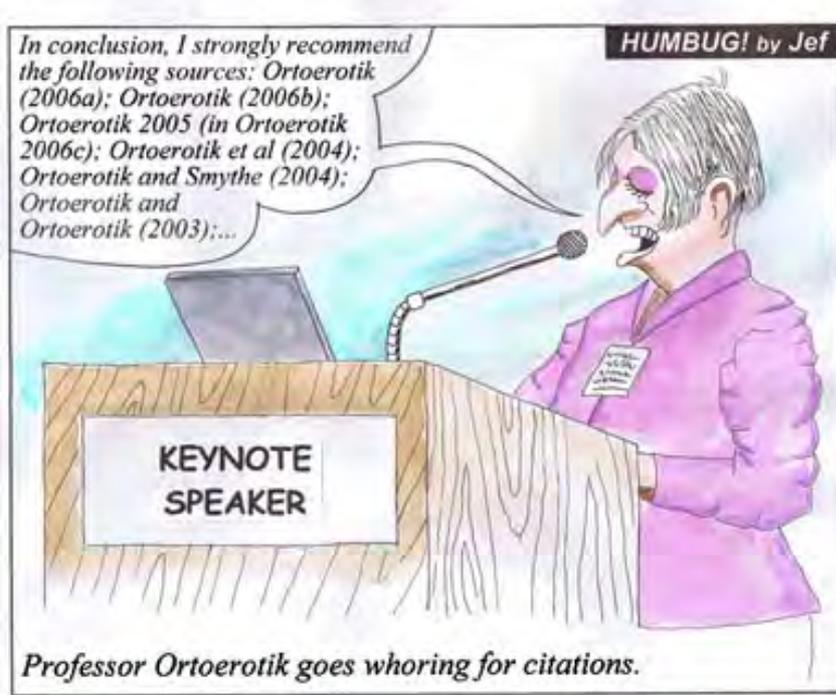
*The only goal of science is the diminution of the distance between present knowledge and truth. To the scientist, the willingness to validate an empirical claim on the basis of bias, prejudice, or emotional and political need — or to reject a claim on the basis of the motivations of the claimant or the putative consequences of accepting the claim — represents an infantile narcissism.*

**Another sub-heading deployed here to disguise another digression**

The Stanford (2006) source given in the list of references at the end of this article is a highly readable, condensed and yet comprehensive treatment of informal fallacies. In fact (and in all honesty), it is a much better treatment of the topic than that which is incorporated into the present article. I would therefore recommend that those of you with a serious and genuine interest in this topic (and limited time) should cease reading this self-indulgent tripe, log onto the website and have a look at the genuine article.

(I would have to assume that you

are now reading this sentence. If so, you have failed to take my advice, and so I am obliged to quote a particularly good bit from the Stanford article, so that you don't miss out entirely:)



*Informal logic is an attempt to develop a logic which can be used to assess, analyse and improve the informal reasoning that occurs in the course of personal exchange, advertising, political debate, legal argument, and in the types of social commentary found in newspapers, television, the World Wide Web and other forms of mass media.*

*In many instances, the evolution of informal logic has been motivated by a desire to develop ways of analysing and evaluating ordinary reasoning which can be made a part of general education, and which can inform and improve public reasoning, discussion and debate. (Stanford, 2006)*

The case could be made that a consideration of informal logic should begin with the “form of the good”. That is, the form of the good argument (cf, Plato’s Theory of Forms). (Note that the phrase in parentheses immediately preceding this sentence in parentheses is what

I like to think of as a “wanker’s aside” — an abstruse reference of no utility which is calculated to bolster an author’s lame claim to erudition. The wanker’s aside is always an act of bad faith.)

*The problems with fallacy theory have convinced many that theories of informal logic should focus, not on fallacies, but on general criteria for good reasoning (premise acceptability and relevance, etc.) and on forms of good argument (ie, reliable argument schema) which set standards for good reasoning... many have developed approaches to informal logic that place more emphasis on the identification of good*

*appeals to authority, good arguments by analogy, and other argument schema, and on the construction of good arguments. (Stanford, 2006)*

So why did I put the above quote in here? I don’t really know, as I propose to do the opposite of the “convinced many” alluded to in the quote. If I were given to stacking the deck (arguably the most pernicious informal fallacy practised by academics), I might read the quoted material in my preparation for this article, but I would avoid mentioning it, as it undermines my case for a concentration on fallacies as a primary means to good reasoning. The common practice of academics in the social sciences and humanities is to pretend that material which contradicts their position doesn’t exist. Here I have chosen to do the opposite in order to give a non-example of stacking the deck (cf, Jerome Bruner’s work on concept formation). (Also note that my puzzling refer-

## Good Fun with Bad faith

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ence to Bruner here is another example of the wanker's aside.)

### A posteriori justification masquerading as an a priori justification

The co-author of my book *Humbug!* (Theo Clark) and I decided not to organise our treatment of fallacies in thinking around a taxonomy of fallacies. Accordingly, the table of contents in *Humbug!* simply lists fallacies in alphabetical order by name. (Also note that there is as yet little consensus in the literature on the names of fallacies, let alone taxonomic groupings). Our justification at the time the decision was made was purely pragmatic, and was in part a function of the blurry edges between fallacies (eg, stacking the deck and observational selection may be difficult to distinguish at times — especially when the motives of the proponent are undiscoverable). In the next edition of *Humbug!* however, we will pretend that we gave the matter of whether or not to classify fallacies more serious and scholarly consideration. We will, for example cite the following extracts as if we had read them prior to making our decision:

*A fallacious argument, as almost every account from Aristotle onwards tells you, is one that seems to be valid but is not so... Of those who invent their own classifications... their most noteworthy characteristic is that they disagree not only with the Aristotelians but also extensively with one another, and have quite failed to establish any account for longer than the time it takes a book to go out of print... Despite divergences of arrangement, there is considerable overlap in raw material as between one writer and another: the individual kinds of fallacy are much the same, even down to their names. (Hamblin, 1970: 12,13)*

If we feel that the incorporation of the above quote from Hamblin in our introduction doesn't do the trick, we'll include this much more pithy and disparaging one.

*Most modern writers have their minor preferences of arrangement (of fallacies), but it is almost always the same material that is being chopped about and served up reheated. (Hamblin, 1970: 49)*

Of course, in our next edition we will separate a series of quotes from the same author by a goodly amount of text, so that we don't appear to be lazy. We don't want our readers to think that we are given to padding out our writing by using over-long quotes; or through over-frequent use of gratuitous and redundant quotes from the same source. Just in case you haven't got the point yet, here is another really good quote from Hamblin.

*Thus, although current in the ancient world in Athens, Alexandria and Rome it was 'lost' to western Europe, for some centuries during the monastic period; but was rediscovered with enthusiasm about the twelfth century, when it began to form a section of the logic curriculum in the emerging universities. ... and since, for most of the period, all students took Logic, Europe's men-of-affairs have generally regarded a nodding acquaintance with a standard version of Aristotle's doctrine as a routine necessity. (Hamblin, 1970: 9)*

### This sub-heading is a really long one because the break in continuity here is even more bewildering than hitherto

Let's revisit the last sentence in the Hamblin quote above: "Europe's men-of-affairs have generally regarded a nodding acquaintance with a standard version of Aristotle's doctrine as a routine necessity." Leaving aside the fact that a person of my finely honed and contemporary sensibilities will naturally condemn Hamblin for the misogynous pig he is ("men-of-affairs" indeed!), he makes a point to which I would subscribe. In my view a knowledge of fallacies is a necessary foundation for good argument and for good decision-making. "Aristotle's doctrine" to which Hamblin refers boils down to

his discourses on thirteen fallacies, viz: (1) ambiguity; (2) amphiboly; (3) combination of words; (4) division of words; (5) wrong accent; (6) the form of expression used; (7) accident; (8) the use of words absolutely or in a certain respect; (9) misconception of refutation; (10) assumption of the original point; (11) consequent; (12) non-cause as cause; (13) making of two questions into one. (Source — Hamblin, 1970: 62,63).

And while we're on the topic of Hamblin: Hamblin (1970) notes the existence of a large number of books which list and describe informal fallacies, and acknowledges that they have their place, but asserts: "What is needed, above all, is discussion of some unresolved theoretical questions, which these books do not include in their terms of reference" (p. 11). He thus positions his own work as attempting to develop what he calls a "theory of fallacy". In my view I think he is seriously deluded about the possibility of generating a coherent or useful "theory of fallacy". My view is informed by my view, which in my view does not require justification with reference to validating sources.

However, just in case the skeptical reader feels the need for external validation before giving serious consideration to my point of view, I present the following quote from an anonymous author published on an ephemeral website (just for the record, it wasn't me).

*Though it is a quarter of a century old, informal logic might still be described as a discipline in its formative stages of development. There are some general trends that characterize the field (most notably, a move toward a broad conception of argumentation which extends the analysis of argumentation beyond the analysis of premises and conclusions) but there is no predominant approach to informal logic in the textbooks or the research literature. Instead, work in the field often makes different assumptions about the goals and methods of informal logic; about the usefulness of falla-*

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*cies, formal logic, etc. in attempts to understand ordinary argument.* (Stanford, 2006)

Of course, a key assertion in the above quote is demonstrably false. The author claims that informal logic is “a quarter of a century old”. But over two millennia would be nearer the mark. Although I do concede that the ancient Greek “founding fathers” of this pseudo-discipline were at times unconvincing because their thinking was often affected by intoxication (as noted above, and in Clark, 2006a, Aristotle was a “bugger for the bottle”, and Socrates was a “bugger when he’s pissed”).

While there is no agreed-upon standard set of fallacies, the naming and describing of fallacies is a necessary step in the development of humbug-hunting skills

From this point on until the next sub-heading I will paraphrase a couple of passages from the Stanford (2006) article without acknowledgement of the source. The paraphrase will fall well short of actual plagiarism. This is a time-honoured bad faith academic practice. Those readers with ample time on their hands might like to see if they can identify the original passages in the source.

As has been argued above, there is no consensus on a “standard set of fallacies”. There is no definitive system of classification, and sets of informal and formal fallacies are often placed across categories rather than within discrete classes. Most attempts over the last few decades to analyse informal reasoning have focused on fallacies. In most of these accounts, fallacies are seen as patterns of flawed reasoning which give the appearance of good reasoning. These types of treatments are themselves deficient, as it may be impossible to develop systems of analysis which identify with certainty when poor reasoning appears to be sound reasoning. In many cases, such decisions are a matter of taste or nuance rather than certainty. However imperfect, the tradition continues today, and most treatments of informal reasoning focus on the description and detection of flawed arguments.

### **Bad Faith involves the failure of an advocate to accept the burden of responsibility**

Well, I actually more or less finished this article before the sub-heading immediately above, but I need to make my reference list look a little more respectable. So (like many of my students and some of my colleagues) I will engage in bad faith and bung in an isolated and entirely irrelevant quote so I have a quasi-legitimate reason for putting this bloke Horowitz in my reference list.

*To raise the socialist ideal as a critical standard imposes a burden of responsibility on its advocates that critical theorists refuse to shoulder. If one sets out to destroy a lifeboat because it fails to meet the standards of a luxury yacht, the act of criticism may be perfectly “just”, but the passengers will drown all the same... Without a practical alternative to offer, radical idealism is radical nihilism — a war of destruction with no objective other than war itself. (Horowitz, 1998: 30).*

“It’s as well to be hung for a sheep as a lamb” (convict saying). Now that I’ve crossed the “gratuitous and irrelevant quote threshold”, I might as well bung in a quote from this other bloke Goldberg.

*One of the joys of teaching is the experience of eliciting the “oh, now I see it” response from a student who sensed that something was wrong with a widely accepted claim or explanation, but couldn’t quite put a finger on what the problem was. (Goldberg, 2003: 143).*

Finally, and in conclusion, it is more or less axiomatic that anyone who takes exception to this article has failed to understand my purpose in writing it. I am afraid that I can’t dissemble here: the fault is entirely yours.

However I am open to constructive criticisms. So I invite any malcontents who wish to communicate their general displeasure or specific complaints to contact me by email. I will be more than happy to respond.

My email address is:  
Jef.Clark@bogusemail.com.au

If your email bounces, then the server may be down, or you may be experiencing other technical difficulties beyond my control and responsibility. In which case you might try my alternate email address:  
Jef.Clark@badfaith.com.au  
(P.S. For an even shallower treatment of fallacies visit  
humbugonline.blogspot.com.)

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# The Healing Power of Distant Prayer

**As a medical process, prayer doesn't have a prayer**



Surendra Verma is a Melbourne-based science writer. His latest popular-science books, *The Mystery of the Tunguska Fireball* and *The Little Book of Scientific Principles Theories and Things*, are reviewed in this issue.

About five years ago 26-year-old Ryan Corbin accidentally crashed through his California apartment building's skylight. The 12-metre plunge to the concrete floor fractured his skull, broke his jaw and ruptured his spleen. When doctors told the parents that he was likely to remain in a coma the rest of his life, they were devastated. Corbin is grandson of Pat Boone, a popular singer of the 1960s. Within days of hearing this heart-breaking news Boone and other members of the family asked the public through churches and the internet to pray for Corbin's recovery. Boone went on the *Larry King Live* show on CNN and asked viewers around the world to pray for his grandson.

After five months in a coma Corbin is now slowly but steadily recovering. Corbin's story has been called 'miraculous' in American tabloids, cable TV shows and church pulpits. 'He's Exhibit A for the power of prayer,' said Boone.

Will the jury in a trial of the healing power of intercessory prayer (prayer on behalf of others) admit Exhibit A or dismiss it as a fluke? Talking about extrapolating the possibility of life on other planets from one example of life on Earth, American astronomer John A. Ball once remarked that one example could be a fluke, 'with two examples we can do statistics'.

## The Right Statistics

To make the jury's task easier — and to do the right statistics — a team of 16 American researchers studied not two, but 1802, patients to assess the healing effects of intercessory prayer. The study has been described as the largest 'randomized, placebo-controlled study of distant prayer' in an editorial comment in the *American Heart Journal* (April 2006), which accompanies the study report.

In this scientifically rigorous study, which began almost a decade ago, researchers monitored patients at six hospitals nationwide for 30 days after the patients had undergone heart surgery. They evaluated whether:

1. receiving intercessory prayer;
- or
2. being certain of receiving intercessory prayer,

was associated with recovery without any complications after the surgery. The patients were randomly assigned to one of the three groups:

- ◆ Group 1 (prayer but uncertain): 604 patients received intercessory prayer after being told that they may or may not receive prayer.
- ◆ Group 2 (no prayer but uncertain): 597 patients did not receive intercessory prayer also after being told that they may or may not receive prayer.

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◆ Group 3 (prayer and certain): 601 patients received intercessory prayer after being told they would receive prayer.

The prayers were delivered by members of three congregations using the patients' first names and the first initial of their last names. The prayers were provided for 14 days, starting the night before the operation.

### Prayers Made No Difference

After analysing complications in the 30 days after the heart operation, the research team, which was headed by Dr Herbert Benson of Harvard Medical School, found no differences between those patients who were prayed for and those who were not.

In fact, patients who knew they were being prayed for had more complications than those who did not know. Fifty-nine percent of Group 3 patients who knew they were being prayed for suffered complications compared with 52 per cent of Group 1 patients who were not. Dr Charles Betha of Oklahoma Heart Institute, one of the team members, believes that strangers' prayers may have made patients worried that their conditions were worse than they have been told: 'It may have made them uncertain, wondering am I so sick they had to call in their prayer team.'

Major complications and deaths were similar across the three groups.

For the statistically minded, in the two groups uncertain about receiving prayer, complications occurred in 52 per cent (315/604) of Group 1 patients who received prayer compared with 51 per cent (304/597) of Groups 2 who did not receive prayer (relative risk 1.02, 95 per cent CI 0.92–1.15). Complications occurred in 59 per cent (352/601) of Group 3 patients certain of receiving prayer compared with the

52 per cent (315/604) of Group 1 patients uncertain of receiving prayer (relative risk 1.14, 95 per cent CI 1.02–1.28).

### 'Power to Empty Pews'

In 2000 a systematic review of five intercessory prayer trials pointed out that two of these trials showed 'a significant treatment effect on at least one measured outcome in patients being prayed for' (*Annals of Internal Medicine*, 2000;132:903–910). The other three trials did not show any measurable effect. The latest trial was the sixth such major study. It was also the most comprehensive.

In an article in *eSkeptic* (5 April 2006), the online newsletter of the US Skeptics Society, Dr Michael Shermer says that the study is particularly significant because Dr Benson 'has long been sympathetic to the possibility of that intercessory prayer can positively influence the health of patients'.

However, critics of the study think otherwise. The John Templeton Foundation, which pursues new insights at the boundary between theology and science, was the major sponsor of this US\$2.4-million study. An 'official statement', which appeared on the Foundation's website following the release of study results in April 2006, says in part:

*Analysts, however, had pointed to methodological weaknesses calling these results into question. In view of both the empirical uncertainties and the potential significance of a non-null result, the Foundation's advisory board advocated that substantial resources be put forth in order to advance methodological rigor in the design and execution of a new "blue ribbon standard" study.*

So, we can look forward to another Foundation-funded study of the healing power of prayer.

The writers of the editorial comment in the *American Heart Journal* also note that the most striking aspect of the study report is in 'the interpretation of the study results showing significantly worsened outcomes in one of the experimental arms'. They say that the researchers take 'an almost casual approach toward any explanation'. However, they admit that the study methodology was 'at the highest level'.

The *Harvard Crimson* (5 April 2006), online student newspaper of Harvard University, quotes Dr Harold Koenig, founder of Duke's Center for the Study of Religion/Spirituality as saying that the study overlooked the importance of sincerity of prayers: 'God is not like a Coke machine, where you put in 50 cents and get one size and put in one dollar and get another size.'

Remarks Bonnie Erbe, an American syndicated columnist for Scripps Howard News Service, in *Tri-City Herald* (3 April 2006): 'Given the power of these results to empty pews, neither does the angry reaction from clergy come as any surprise.'

No study can answer the question whether we should we pray for the recovery of our sick loved ones. Unfortunately, medical science does not follow the precise laws of the universe as expounded by renowned physicist Roger Penrose in his phenomenal bestseller, *The Road to Reality: A Complete Guide to the Laws of the Universe*. We must pray (without telling the patient), but should not expect that by some unknown law of quantum mechanics our prayers will generate waves that will improve the physical wellbeing of the patient. At least, prayer will make you feel happy.



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## Convention – Melbourne – Nov 18-19

# (No) Escape from Alcatraz

## Mythology, mystery and mundanity of an historic prison



*Karen Stollznow, our expat North American correspondent, is a linguist whose aim is to teach the natives how to say "G'Day" <kstollznow@berkeley.edu>.*

The San Franciscan tourist's itinerary is typically comprised of a drive across the Golden Gate bridge, a walk past Postcard Row, a trolley trip to Pier 39 and the ferry ride to Alcatraz Island. Eating a sourdough 'bowl' of clam chowder, the shameless tourist buys and even wears the 'Psycho Ward' or 'Alcatraz Triathlon' t-shirts. These are the tourists who boast that they "escaped Alcatraz". Through suicide, murder, emancipation or freedom, is there anyone who hasn't somehow 'escaped' from Alcatraz? Forty-three years after the last prisoners were relocated to other institutions, has anyone, or anything, 'remained'?

Yet another claimant to the title of America's most haunted place, Alcatraz certainly reigns as one of the world's most notorious jails. During its three decades of operation, Alcatraz was the 'Hollywood' of prisons, with an infamous cast of high-profile villains, starring 'tax cheat' gang lord Al 'Scarface' Capone, murderer Robert Stroud, the 'Birdman of Alcatraz', gang member Alvin 'Creepy' Karpis, bank robber and kidnapper turned altar boy George "Machine Gun" Kelly and Floyd Hamilton, Bonnie and Clyde's mole and one of the prison's escape artists.

Now, as an abandoned prison with a colourful history, Alcatraz has become not only the subject of numer-

ous movies, but also of numerous myths. Gross inaccuracies and melodramatic accounts are reproduced in books, movies, documentaries and online. Enshrouded in fog, and in mystery, what is fact and what is fiction about Alcatraz?

### Pre-history

An island in the San Francisco Bay, 'The Rock' lies two kilometres from the mainland. Isolated, rocky and whipped by salt-laden, cold winds, lore claims that the indigenous people avoided the area, considering it 'evil' and 'cursed'. In fact, the island probably began its career as a fishing and hunting ground for the Ohlone and Miwok Indian people. While the island is sparse in vegetation, it is hardly barren, but rather a haven for birds. For this reason, when Spanish explorer Juan Manuel de Ayala sailed into the area in 1775, he bestowed the island with its full name, translating to the 'Island of the Penguins'. (Today, there are no penguins, but the island is home to hawks, ravens, geese, finches, hummingbirds and more seagulls than Manly Beach). For the next 75 years, the Island was noted on maps but otherwise unused.

This solitude ended when California was annexed by the US during the Mexican-American war of 1846-1848. However, following the war, the area was bought by the US as

part of the peace Treaty of Guadalupe Hidalgo. Northern California was now in the midst of the Gold Rush, and the Bay Area's population exploded, from a sleepy settlement of 300 people to a burgeoning population of 20 000. This spurred the development of Alcatraz as a fortress, and all in good time for the Civil War that broke out in 1861, when the city and port became targets for the Confederates. Over time, and with advances in military technology, the island's defences became obsolete and in 1907, the army formally decommissioned Alcatraz as a fortification. So, what do you do with a retired fort; a remote island, with a guardhouse, barracks and other disused infrastructure?

### Penal history

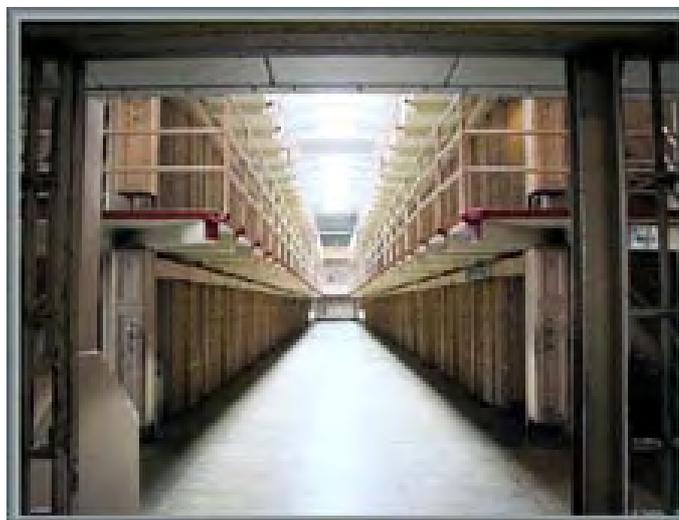
Before Alcatraz became a civilian prison, it was a military prison. During the Civil War era, soldiers were imprisoned for crimes of desertion, theft, assault, rape and murder. Once, the jail housed the crew of a Confederate ship. The island was further enlisted as a prison for indigenous people captured during the various Indian wars of the mid to late C19<sup>th</sup>, and for military convicts during the 1898 Spanish-American War. Conscientious objectors were jailed during World War I. Undergoing hard labour, breaking rocks and performing construction work, these early prisoners built the prison to house themselves. This haphazard history came to an end after the Great Depression. The Island was transferred from the War Department to the Department of Justice. This began a new chapter in the chronicle of the island.

From 1934 until 1963, Alcatraz served as a civilian prison. This was the



*Alcatraz Island*

end of the road in the federal penitentiary system for America's most hardened criminals. The Institution Rules and Regulations state: "You are entitled to food, clothing, shelter and medical attention. Anything else that you get is a privilege". While it is true that this was a maximum security prison for 'incurable' prisoners, it's a myth that it was a cruel and brutal Papillon-like jail. Various sources, and especially the internet, are replete with dramatic depictions of torture, deprivation and disease. Inaccurate stories flourish, claiming that the inmates suffered appalling conditions and inhumane treatment. Their cells were overcrowded. They slept on the floor. They lived without heating, light, windows or water. They ate bread and water. Others were starved altogether. They were denied healthcare in the face of constant sickness. They were routinely



*'Broadway' corridor, Alcatraz*

harassed, beaten and forced into hard labour. Speaking was forbidden and showers were weekly events only. This was 'Hellcatraz'.

While Alcatraz was no holiday resort, after all, this was a prison, the rumours are greatly exaggerated. This was a place of discipline and rehabilitation; but it wasn't a

barbaric dungeon. In contrast, the inmates had 5' x 9' private cells, unlike the shared cells of other institutions. These cells were sparsely furnished, but each contained a bed, running water, a toilet, shelves and lighting. Although the cell house is naturally cold, it had central heating, and there are windows to allow in light and sun. Alcatraz was not overcrowded, the prison was comparatively small, and the 336 cells were never filled to capacity. The prison fare was surprisingly good, with high-quality food and even a menu, allowing for choice. This practice was reputedly to avert the riots that were commonly started in other prisons because of poor prison food. Rather than denying medical care to the inmates, the prison had its own hospital. In the event that a condition was serious, inmates were sent to the mainland for specific care; as

was the case for Al Capone, who was relocated from the island following diagnosis of syphilis.

In the early years, Alcatraz did have a 'silence policy', although this was not a relentless rule and was later relaxed. Typically, the inmates had good relations with the wardens, who knew each man by name. Prisoners were more at risk from other prisoners, and brawls were common. Work was neither demanding nor enforced; rather, it was considered a privilege; relief from the

## Alcatraz

monotony of the sentence. Inmates could work in the kitchen, the laundry, the garden and the library. Except for the kitchen, where contraband moonshine was furtively made, the work was paid, albeit meagrely. All in all, rather than being poor, the conditions were comparatively good. In fact, [alcatrazhistory.com](http://alcatrazhistory.com) includes sections of an interview with former inmate Willie Radkay, who considered his time at Alcatraz to be “better than at any other penitentiary”.

### Infamous inmates

1545 prisoners ‘did time’ within these walls. The prisoners were only males, as females weren’t deemed to be ‘incurable’ until 1969. The average stay was 8-10 years, although ‘Creepy’ Karpis served the longest stretch on the Island, 25 years in total. These prisoners were long-term trouble makers. No man was directly sent to Alcatraz, and only two were ever paroled from there. Many had continued their life of crime behind bars, and were deemed violent and uncontrollable. Others had taken advantage of their previous minimum security jails, and had indulged in corruption. At Leavenworth in Kansas, the Birdman had murdered a warden yet, over time, enjoyed astonishing privileges; he was allowed to breed and study birds, and to maintain a lab inside two additional cells! He enjoyed frequent contact with other fanciers and even used his laboratory equipment to distil alcohol. Al Capone virtually had the wardens working for him, enjoying a flood of visitors and a comparatively opulent cell during his time at East-



*The type of cell Capone would have had at Alcatraz*

ern State Penitentiary in Pennsylvania (his friends and family kept residence in a nearby hotel). Initially, Capone had repeatedly attempted to gain special privileges in Alcatraz, such as more flashy facilities and more regular visits (which were only allowed monthly). His bribery attempts were all unsuccessful, prompting the true Godfather’s resigned remark, “It looks like Alcatraz has me licked”.<sup>1</sup>

The cell house is the apex of the island, and the focal point of the tour. There are four cellblocks in total, each separated by hallways, known in prison jargon as Broadway, Times Square, Park Avenue and Michigan Avenue. The ‘Sunset Strip’ contours D Block, the ‘Segregation’ or ‘Treatment Unit’. Marinacci



*Capone's cell at Eastern State Penitentiary*

claims “Rule infractions meant confinement in the ‘Hole’, one of four tiny, lightless cells furnished only with straw mattresses; there naked, starving inmates were regularly beaten. Some men went insane or died after months-long stays in the Hole”.<sup>2</sup> The only factual statement here is that D Block was indeed known to the inmates as ‘The Hole’. Rather than being “tiny”, these cells are larger than the regular cells. There are 36 segregation cells, and six, not four, solitary confine-

ment cells. The latter cells were lightless although all cells contained beds. Prisoners in the Hole were not deprived of food or clothing, and were not beaten. So, you may ask, what was the punishment? Being sent to the D Block meant a loss of privileges, the opportunity to work, exercise and socialise. The ‘Birdman’ occupied a segregation cell for six years of his stay on the island (and then eleven years in a hospital cell). Some inmates were insane to begin with, but none went insane or died in D Block.

So, just how many deaths were there on Alcatraz? There were no executions on the Island, although there were five suicides and eight murders. Most of these murders took place during what is known as the 1946 Battle of Alcatraz, conspired by six inmates. This was the most violent and deadly escape attempt, a three day uprising that ended in the deaths of three inmates and two guards, while fourteen guards and one inmate were left injured. The Marine Corps were eventually called in to end the clash, with a bombardment of gunfire, mortar and teargas. Curiously, the Birdman even played a part in attempt-

ing to end the hostilities, and to protect his fellow inmates from the conflict that ensued. Of the three conspirers who survived, two didn't survive for long, but were executed at the nearby San Quentin Jail. The final inmate, a 19 year old, received an additional life sentence.

### Inescapable?

Alcatraz was the Titanic of prisons; the inescapable prison from which prisoners escaped. In the days of the military prison, escapes were common and usually successful. With the advent of the civilian jail, with a high warden to prisoner ratio, improved security features and the deliberate rumours of 'man-eating sharks', escape attempts were far less common. The main deterrents and obstacles were the cold water, the strong currents and the distance to the shore. The civilian penitentiary never recorded any attempts as "successful". For some quick statistics, 36 men were involved in 14 separate attempts, 23 were recaptured, 7 were shot and killed, two drowned, and five were declared missing, and are presumed to have drowned in the icy Bay waters.

The real mystery of Alcatraz is the escape attempt popularised by the movie *Escape from Alcatraz*. Frank Morris and brothers Clarence and John Anglin devised an elaborate escape attempt in 1962, with decoy bodies, fake walls and homemade drills. The men were never found and no one has ever claimed these identities. But did they really drown? Subsequent tests by the US Army Corp of Engineers and the television show *MythBusters*, have demonstrated that escape from Alcatraz, and even survival, could indeed be possible.



*Dummy heads made by escapees*

Following this incident, the prison came under scrutiny for the deteriorating condition of the facilities, increasing maintenance and operating costs (although prisoner numbers were small, 300 civilians lived on the island at any given time). Budget cuts had resulted in diminishing security measures. Restoration was estimated to cost five million dollars. In 1963, after 29 years of operation, Alcatraz was closed by US Attorney General Robert Kennedy. The remaining prisoners were transferred to other jails, and Alcatraz was left to the care of a lone custodian.

After a period of theme park proposals and native American occupation, Alcatraz Island is now administered by the National Park Service, and is visited by over one million people each year. Ferry services are operated daily from Fisherman's Wharf, and are combined with both guided and audio tours of the Island. The Island is listed as a National Historic Landmark; not because it was a prison, but because the 1857 guardhouse is a heritage building.



*Ghost of a prisoner with two left feet?*

### Mythical mysteries

With this mythical pedigree, stories of the unnatural have naturally followed. Staff and visitors report a wide array of paranormal phenomena on the island. Skepticism doesn't require a degree in a 'hard' science, all it takes is a little commonsense and

logic. And using these, many Alcatraz stories debunk themselves. For example, the metallic sound of "jingling cell keys" that echoes through the chambers. This tale neglects to reveal that the cell doors were lockless, and operated by levers. The Hole is another target for ghost stories; [haunteddoghouse.com](http://haunteddoghouse.com) states: "In the Hole, especially cells 12 and 14 house the most intense feelings of panic. The moment you walk in, you can feel it almost choking you with fear, hate and palpable tension". This wasn't the reaction that I had, or the friend who accompanied me, or the tens of visitors streaming through these cells. There are also many accounts of "cold spots" in the cell house...but the entire island is one big cold spot!

Cell 14D was apparently the scene of a puzzling murder. During the days of the military prison, it is rumoured that an inmate was locked into this cell, whereupon he began screaming that 'something' with 'glowing red eyes' was locked in with him. According to legend, the terrified prisoner screamed uncontrollably "for hours", until an eerie silence befell the cell. Strangely, the wardens never checked in on him until morning, when he was discovered, dead. An autopsy revealed strangulation marks around the victim's neck; but this wasn't suicide. In a paranormal postscript, the murdered prisoner still appeared in the line-up for the next

morning's call, before disappearing into 'thin air'. There are no prison records of this incident, but the following fact is recorded. No autopsies were ever performed in the prison morgue. The morgue is a fertile ground for stories of the resurrection of murdered prisoners and vengeful ghosts.

Then there are the haunted sounds of Alcatraz; visitors and staff claim to hear inexplicable crying, disembodied voices, laughing and bloodcurdling screams. For starters, the 'laughing' is incongruous, but it provides us with a clue. The audio guide refers to sounds travelling in from the mainland, especially the revellers at New Year's Eve. Moreover, there are thousands of daily visitors to Alcatraz, the sounds of audio tours and tour guides and a continuously screening documentary; any or all could be the source of these 'baffling' sounds. There is also the story of the strains of Al Capone's banjo playing, haunting the cell believed to be once his. Not only is this cell 'off limits' to visitors, this story conflicts with the 'silence' theory, and the prison rules. While it is true that Capone played banjo in the prison band, he was not allowed to do so in the cell house.

### Mundane explanations

LegendsOfAmerica.com claims that Alcatraz is often described as "a portal to another dimension" that is "filled with the energy of those who came to the 'Rock' and seemingly never left". A web search on "Alcatraz ghosts" further reveals stories of footsteps (other visitors?), gun and cannon shots (the documentary?), the clanging and echoes of cell doors being slammed shut (the live demonstrations?), malodorous smells (the Bay?), a sense of being watched (paranoia?) and the sight of Civil War soldiers (delusion?). Alcatraz has attracted the usual suspects, Sylvia Brown, and a host of other 'psychic' mediums who have held séances and reported lost souls and lingering spirits.

Why is the history of Alcatraz distorted and sensationalised? The visitor guide proposes that "For security purposes, visits to the island were restricted; this apparent secrecy and the remoteness of the prison may have fuelled these rumours". The true history of Alcatraz is further obscured by the fictional portrayals in movies, the stylistic stories in books, and the fabrications of urban lore.

Alcatraz doesn't need myths of torture and hauntings to present a tragic tale. This is a true story of crimes and punishment, of dehumanisation, segregation, demoralisation and routine. Listening to the tour interviews of former prisoners, they repeatedly speak of the real, psychological punishment of Alcatraz. Some of these men were never socialised; they had lived in the prison system for so long that driving, relationships, careers and society were alien and fearful. Staring out through the barred windows, the inmates had majestic views of the Golden Gate Bridge, the Bay Bridge, the city, the headlands and the beaches; constant reminders of the life they couldn't have.

1 Johnston, James. 1949. *Alcatraz Island Prison: And the Men who Live There*. C. Scribner's Sons.

2 Marinacci, M. 1988. *Mysterious California: Strange places and eerie phenomena in the Golden State*. Panpipes Press., p.38.

With thanks to Alcatrazhistory.com for the cell house images and Ghoststudy.com for the 'ghost' image.



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# Not *Just* a Theory

**An investigation into the nature of science**

***Just a Theory*, Moti Ben-Ari; Prometheus Books 2006**

In *History of Western Philosophy*, Bertrand Russell highlights the difference between scientific beliefs and ‘other ways of knowing’: “It is not what the man of science believes that distinguishes him, but how and why he believes it. His beliefs are tentative, not dogmatic; they are based on evidence, not on authority or intuition.”

Computer Scientist Moti Ben-Ari staunchly argues Russell’s point in his book, *Just a Theory - Exploring the Nature of Science*. Science (the overall endeavour) is right in what it tells us, not because of what it tells us, but because of why it tells us. With respect to scientific epistemology, what science says is irrelevant; what matters is the justification, why it says it. *Just a Theory* is an excellent exposition of a common sense, realist view of science. Ben-Ari develops his position logically, starting from what people think scientists do, moving through various aspects of what scientists actually do, to an examination of the philosophy and sociology of science, a dismantling of postmodern critiques, as well as the use of logic and statistics in scientific reasoning. Ben-Ari’s subtitle is *Exploring the Nature of Science* and he achieves this aim (though perhaps it should have included the word ‘Defending’ in there

as well). He does this in an entertaining fashion, through the use of historical examples, and expositions of scientific discoveries and theories.

What people believe scientists do is naive induction-deduction. Induction involves the scientist observing some phenomena, recording observations as facts from which he or she forms a generalisation. This generalisation then becomes the theory. Deduction follows this, with the scientist making predictions based on the theory, which he or she (presumably wearing a dishevelled lab coat, complete with pocket protector) then tests with experiments (presumably involving lots of test tubes and clear glass pipes, filled with colourful liquids giving off vapour). Ben-Ari (rightly) shows this belief to be simplistic and naive. Observations are not carried out unstructured and in isolation to the observer (and I’m not even talking about a Schrodinger’s Cat). A scientist chooses what to observe and this choice is made because of various historical antecedents. That is, observations in science are already theory-laden. All scientists (indeed, all people) view the world through theoretical frameworks, and these frameworks guide observations.

Ben-Ari uses Galileo as an example. Galileo’s two choices of theoretical frameworks (for his astronomical observations) were the systems of Ptolemy and Copernicus. Galileo



*Theo Clark, science teacher and co-author of Humbug!, is currently testing the hypothesis that new parenthood and sleep are compatible.*

## Not Just a Theory

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viewed the sky through a Copernican framework. Consequently, in spotting extra points of light near Jupiter he did not dismiss them as imperfections in the manufacturing of his telescope's lens, or as reflections from a neighbour's balcony; he recorded their positions over time until he was able to conclude that there were moons orbiting Jupiter. However, most viewed the sky through the Ptolemaic framework, and as such were skeptical of Galileo's claims. Ben-Ari continues in this vein, pointing out that the naive view doesn't take into account how one gets from observations to theory, the unreliability of observation, prediction and retrodiction ('predicting' the past) as well as confirmation and falsification.

Though what scientists do is clearly more complicated than the naive induction-deduction view, there is something to be said for that. If, as a 'scientifically minded' person, I am in discussion with a more 'challenged' thinker on the topic of (say) astrology, we are certainly not going to move into the realms of epistemology. However, as a basic approach to sound reasoning about the physical world — the idea of making accurate and reliable observations, both to form and test theories, has great value. The naive inductivist-deductivist approach might have some merit in convincing my 'challenged' acquaintance: "What are the observations?" "What generalisations have astrologers made which becomes their theory?" "What are the predictions based on their theory and what experiments can we perform to test this (and of course they have been done)?" And so on. Continuing this theme, comparison between the 'lay' world and the world of science, Ben-Ari looks at the difference between the common language and the language of science.

### Facts about facts

"It is a fact that you are reading this sentence now." As much as common sense might dictate your belief in this statement, you can't possibly

know for sure. As such, the word 'fact' is one that a scientist wouldn't use. Of course, Ben-Ari points out, that's not quite true. A scientist does use the word 'fact', but not with the 'standard definition', viz: something that is indisputably true. Technically, we shouldn't say anything is a scientific 'fact', or that it is possible to 'prove' something (in the non-mathematical sense). When we do use these terms, we mean the explanation for it is so well established that we do not bother doubting it; it serves no useful purpose. Using our 'scientific definition', with regard to the 'fact' that you are reading this sentence, a scientist ought to claim: "The preponderance of evidence points to the reality of you reading this sentence now." I'd wager though, most would just be colloquial and simply say it's a fact; saves a lot of time.

A *scientific theory* is the next level below a fact, but shares many of the same characteristics. The reason we give (provisional) consent to any theory is because, compared to any alternatives, it is backed by the most convincing evidence, has the greatest explanatory power and is the least convoluted (Occam's Razor). Unless some science is done to cast doubt upon it, or a new theory which offers greater explanatory power and is more parsimonious is proposed, we have no good reason and it serves no useful purpose, to doubt it.

This is a fairly uncontroversial view, held by realists. We can never be sure that what we have discovered is actually the way nature is, or is actually a universal law of nature. We can never have definite positive knowledge of the world when it comes to discovering the laws and processes by which it works. But if the preponderance of evidence is in favour of the theory, no useful purpose is served in doubting it. Some go further than this and make the unwarranted conclusion that because we can never be 100% sure that what we believe to be the truth of reality, is actually the truth of reality, there is, therefore, no reality,

or reality is what you make it to be. This 'reasoning' (an obvious *non-sequitur*) underpinning such postmodernist (PoMo) claims is so risible as to be hardly worth dealing with. It is, in 'fact', so obviously lacking in any reasonable basis that I've always be quite astounded that anyone could actually hold this position. However, some do. Ben-Ari takes a look at some PoMo critiques of science and effectively argues the realist case for science's universality.

One such PoMo absurdity is the claim that as science is performed by human beings, all of whom have their own ideological, social and political agendas, the science they do is nothing but a product of this. Scientific claims of reality, therefore, are no better than the claims of any other group or culture. Again this does not follow. The practice of science is a human activity and consequently, is flawed. But to argue that this means the actual discoveries of science are flawed is without foundation. One way Ben-Ari demonstrates this is by the use of Japan as a case study.

During the Scientific Revolution in Europe, Japan stagnated. Later on, in the Meiji Restoration beginning in 1867, Japan began to accept Western 'ways of knowing' about nature, without changing other aspects of their culture. (Clearly the Japanese aren't postmodernists.) Within 40 years, using the Western technology they had learned by sending students to Europe and America to study, they defeated the Russians at sea and on land. This combination of science, technology and militarism eventually enabled Japan to take on China and finally the rest of the World — an impressive turnaround. One could argue they have since been even more impressive. Japan is a recognised world leader in science and technology, yet they still retain, as much as any country can, their own particular culture and social institutions. As Ben-Ari points out, it's fairly difficult to explain this from any other position other than that of a realist.

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## What is a theory?

I'll now take a look at the fulcrum of the book, what exactly is a theory? Ben-Ari proposes a very workable definition:

*A scientific theory is a concise and coherent set of concepts, claims and laws (frequently expressed mathematically) that can be used to precisely and accurately explain and predict natural phenomena.*

*A theory should include a mechanism that explains how its concepts, claims, and laws arise from lower-level theories. (Original emphasis.)*

He elaborates on this definition by using examples of various scientific theories, such as Newton's theory of gravitation. Newton's theory is both concise and coherent, and it can be used to accurately explain and predict natural phenomena (though, of course, general relativity has since expanded it). Now given Newton's theory fulfils these criteria very well, it is given the status of a scientific theory. However, it is lacking one important feature — as Newton acknowledged — a mechanism.

This demonstrates, Ben-Ari argues, that we don't reject a theory (especially one which works so well) just because we don't yet have a mechanism. General relativity is better in providing a mechanism, gravitational waves and gravitons, both of which lack experimental evidence so are still controversial. The explanatory power of general relativity (ie, it works) means we deem it a scientific theory and are content to continue working on the mechanism. Given this little caveat, I think another line worth adding to Ben-Ari's definition would be: "To accept a theory as the 'orthodox' explanation it is required that the theory be backed up by repeatable experimental evidence." At this point general relativity can claim orthodoxy, as its predictions have always been upheld, yet the 'lower-level' theory behind its mechanism (gravitational waves and gravitons) cannot. Ben-Ari continues in this vein, evaluating

evolution, creationism and intelligent design as theories — I'll allow the reader to guess his conclusions... (not much of a challenge admittedly).

## Science and pseudoscience

Ben-Ari also argues Popper's criterion for the demarcation of science and pseudoscience, falsification (as proposed in Popper's *The Logic of Scientific Discovery*). One of the criticisms levelled at falsificationism was that as long as one proposed a falsifiable prediction, one could claim their theory as science. There is actually no merit in this particular criticism, in that once something is falsified, we know it's not true. Of course a theory should be falsifiable to be scientific, but if it's falsifiable, it isn't automatically granted status as a scientific theory. To be granted the status of a scientific theory, to demarcate science from pseudoscience, it seems to me that Ben-Ari's definition is itself sufficient. Even though falsifiability does not necessarily demarcate science from pseudoscience on its own, I would argue it is an essential part of doing science, in that any hypothesis should be falsifiable. The definition I give my students is: "A statement that through experimental investigation could be shown to be false." In this sense one can study anything scientifically, but as we'll see, it doesn't mean what is being studied qualifies as a science.

Homoeopathy falls into the above category. If we use Ben-Ari's definition of a theory as the demarcation criterion, we can see that homoeopathy has been studied scientifically yet it is clearly a pseudoscience. Homoeopathy lacks experimental evidence (it doesn't precisely and accurately explain and predict natural phenomena) and it has no plausible mechanism (unless you take the word of 'homoeo-physicists': "It's quantum memory mechanics", or whatever they actually call it...). Consequently there is no good reason to give it any credence whatsoever. Herbal medicine, on the other hand, though it still isn't science (it

is far from coherent and lacks credibility), it has the potential to be scientific (there is undoubtedly a mechanism by which herbs can affect the body).

This kind of argument and distinction lies at the heart of *Just a Theory*. Ben-Ari's aim is to provide a modern overview of the nature of science, not only to help non-scientists understand the scientific ideas they are exposed to, but to distinguish science from pseudoscience. He succeeds only to a point. This is not through any fault of his own, but rather, simply due to the esoteric nature of the subject matter — philosophy of science. I quickly came to the view that this is a book I would recommend to my colleagues — others involved in science education, or those with a reasonable knowledge of science, rather than 'lay people'. Essentially, in terms of its genre, it lies between Alan Chalmers's excellent introduction to Philosophy of Science — *What Is This Thing Called Science?* (at the accessible academic end) and Carl Sagan's highly recommended and entertaining *A Demon-Haunted World* (at the 'lay person' end).

A common argument against a particular scientific domain, for example, evolution, is in the form of: "...It's just a theory, it's not 'proven'", as if this is a failing. There is a failing here, but not in the theory. Saying something is a theory is about as strong a statement one should make. The failing is a fundamental flaw in much science education, the misunderstanding of the nature of science. This misunderstanding is where Ben-Ari gets his title from — *Just a Theory* — and the book is his noble and worthwhile contribution to the amelioration of this failing.



# What's in a Name?

## Chronicling trouble in Paradise

The first Young Earth Creationist (YEC) organisation in Australia began in 1977 using the name Creation Science Association, which in 1979/80 combined with a Queensland group and became Creation Science Foundation Ltd (CSF). In 1987 Ken Ham was seconded by CSF to work with an American organization, Institute for Creation Research (ICR). In 1996 CSF assisted Ham to form an independent ministry in the US, Creation Science Ministries, but, on 10 November 1997, along with CSF, it changed its name to Answers in Genesis (AiG) which incorporated the Australian, UK and New Zealand ministries. Now, a little over eight years later, AiG has divested itself of its hitherto faithful Australian ministry and has changed its name to AiG-USA and is now affiliated only with AiG-UK. AiG Australia is now called Creation Ministries International (CMI) and encompasses the Australian, Canadian, New Zealand and South African ministries, the latter three being only one-horse operations.

While on the surface the split of AiG into CMI and AiG-USA might appear to be a simple strategic move, when one looks closely at the way CMI has reacted it becomes apparent there is more to it than meets the eye. AiG once enjoyed an harmonious relationship with its Australian counterpart, indeed, according to CMI, the US arm of AiG relied heavily on the Australian creationists for much of its content. On their new web site CMI states:

*The AiG website was developed in the US and hosted there. It was largely dependent for its intellectual content on the scientists and thinkers in the*

*parent corporation, in particular such as Dr Don Batten, Dr Jonathan Sarfati, and Dr Carl Wieland. These and other writers were heavily contributing to the site until late 2005/early 2006, when the US ministry withdrew themselves from the international ministry group (with the exception of the UK) with an expressed desire to operate autonomously, without eg, website content being subject to an international representative system of checks/balances/peer review involving all the other offices bearing the same 'brand name'.*

*At that time, in the midst of discussions about this and other differences in operating philosophy (not involving the statement of faith or similar), the Australian office was formally invited to form its own website. This required a new name to avoid confusion.*

*The four national ministries (Australia, Canada, New Zealand and South Africa) which were committed to continuing their focus and operational 'team' philosophy, and to continuing to forge and strengthen a representative international ministry alliance structure (based on Proverbs 11:14), then rebranded as Creation Ministries International (CMI).*

So AiG-USA didn't like "being subject to an international representative system of checks/balances/peer review ...". I can see the need for checks and balances, but peer review? In Ken Ham's AiG, peer review probably consists of criticism by his peers, the more rabid fundamentalists in the USA, who view any attempt by a creationist organisation



John Stear is a retired public servant who continues to serve by calling make-believe 'scientists' to account on his website [home.austarnet.com.au/stear/](http://home.austarnet.com.au/stear/)

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to “rationalise” its irrational arguments against science as something approaching heresy. For example, AiG’s attempt in 2002 to chastise the seriously irrational Kent Hovind was removed without explanation from its web site. I’ve spoken at length of this apparent back down by AiG on my web site at [home.austarnet.com.au/stear/aig\\_integrity\\_slipping.htm](http://home.austarnet.com.au/stear/aig_integrity_slipping.htm). The fact that AiG’s criticism of Hovind has reappeared on CMI’s web site only reinforces my speculation.

It’s interesting to note that there is not one link to AiG-USA on CMI’s web site, or at least I couldn’t find one. Nor does AiG-USA link to its once bosom pal in Australia. One could reasonably expect like minded groups with close philosophical ties to, in normal circumstances, link to each other. But these appear not to be normal circumstances.

The only acknowledgement by AiG-USA that a split has occurred and that CMI exists is via a link “More past articles” on AiG-USA’s home page (see [www.answersingenesis.org/Home/Area/postings.asp](http://www.answersingenesis.org/Home/Area/postings.asp)). This link leads one to what should be the big news story of the decade, the separation and renaming of the Australian ministry. The announcement under the heading “A new name in the creation family” (see [www.answersingenesis.org/docs2006/0305newname.asp](http://www.answersingenesis.org/docs2006/0305newname.asp)) merely states:

*You may have already noticed that some of the former Answers in Genesis ministries have changed their names to Creation Ministries International (CMI). Under new board leadership, the CMI ministries have philosophical and operational policies that have them moving forward with unique goals and objectives.*

*The boards and staffs of Answers in Genesis–USA and the United Kingdom will continue to pray for God’s rich blessings on our brothers and sisters in CMI as they seek His perfect will for their ministries.*

Surely a link to CMI’s new web site rather than a reliance on the vagaries of God’s blessings would be

a more practical, or at least speedier, way of assisting in the advancement of CMI’s fight against science.

Reading between the lines (and ignoring the word “intellectual”, and appellations such as “scientists” and “thinkers”) I reckon that CMI is a mite dirty on AiG because, as they say above:

*It [AiG] was largely dependent for its intellectual content on the scientists and thinkers in the parent corporation ... with an expressed desire to operate autonomously ...*

Another puzzling aspect of this separation can be found in an announcement by Ken Ham, AiG-USA’s CEO, concerning the launching of a new magazine, *Creation ANSWERS*. CMI wouldn’t have been amused by Ham’s curt announcement that:

*The Australian publication Creation magazine is no longer distributed by Answers in Genesis in the USA ...*

Again, there is no helpful link for those who might want to continue to subscribe to the Australian publication.

Following Mr Ham’s announcement of the launch, CMI had this to say:

*Creation magazine has for over a quarter of a century always been produced by the Australian ministry (now renamed Creation Ministries International), and was purchased in bulk by Answers in Genesis USA (from a special printing by us within the US) for distribution to **a mailing list to which we have no access.** [my emphasis]*

*Our notification of the cessation of this arrangement **was the web announcement by AiG-USA** in late February, when we were almost ready to print the batch in the US (subscribers in other countries have not been affected). [my emphasis]*

*On this announcement, it was stated that US subscribers would be automatically ‘upgraded’ to another magazine, unless they chose to have their unused subscription money*

*refunded. In reality, of course, you have the choice of continuing with Creation, **whether you want the substitute magazine in addition or not.** [my emphasis]*

The fact that AiG-USA preferred to notify CMI that they (AiG) were ending their magazine purchasing arrangement via an announcement on their web site is strange indeed — no friendly discussions? No attempt at negotiation? CMI, in an email to subscribers, has been forced to make an embarrassing request to former subscribers to their magazine and journal to notify their US friends/contacts that the two publications are still available in the USA:

*Mag Still Available in US*

*Many former subscribers to Creation mag and the Journal of Creation (formerly TJ) are unaware (and we don’t know who they are) that these two quality periodicals are still available in the USA — please tell as many US friends/contacts as you can to use this link [www.creationontheweb.com/magUSA](http://www.creationontheweb.com/magUSA) to subscribe/resubscribe.*

Because of this abrupt termination of a long standing and hitherto successful arrangement, perhaps CMI can be forgiven for its somewhat bitchy references to “a mailing list to which we have no access”, “another magazine” and “substitute magazine”. Such bloody-mindedness on the part of AiG-USA (read Ken Ham) surely doesn’t augur well for a cooperative relationship between what should be kindred spirits in the anti-evolution crusade. Then again, it’s becoming increasingly obvious that AiG-USA, under the influence of Ken Ham, is more and more chasing the credulous dollar.

It has often been said that creationism is bad science and even worse religion, so there might be some among us who would not be too surprised (or unhappy) with these mysterious movements of the Lord ...



# A Witchcraft Trial

## - and the triumph of a key skeptical concept

### Learning a skeptical lesson from history

When I have time, I like to read old texts. I admire David Hume, Herbert Spencer, and Francis Bacon, among others. There's a kind of excitement in receiving the ideas and arguments of someone from the past. I doubt, though, whether anyone would read all of Pliny the Elder's *Natural History* for fun. This 37-volume monstrosity was the first encyclopaedia<sup>1</sup>. In it, Pliny set out to chronicle all of the knowledge of humanity, as it was in 77CE.

Who was Pliny the Elder? He was a Roman who lived from 23-79 CE. He seems to have been a workaholic who wrote 75 books on history, military matters, grammar and philosophy. He died as commander of a Roman fleet in the Bay of Naples. When he learned that Vesuvius was erupting, Pliny went ashore to find the cause and reassure the survivors. He was overcome by the fumes and died (Dennis 2004).

Pliny's *Natural History* is his only surviving work. It was quite unique in its day. Pliny set out to "set forth in detail all the contents of the entire world." As Pliny himself said in the introduction:

*There is no one among us who has ever attempted it, nor is there any one individual among the Greeks who has treated of all the topics.*  
Pliny (77a)

To write the *Natural History* Pliny, by his own account, did a great deal of work:

*I have included in thirty-six books<sup>2</sup>, 20,000 topics, all worthy of attention*

*... gained by the perusal of about 2000 volumes ... and to these I have made considerable additions of things which were either not known to my predecessors, or which have been lately discovered.* Pliny (77a)

Even with all his labours, Pliny was aware that he could not cover all knowledge. As he wrote in the introduction:

*Nor can I doubt that there still remain many things which I have omitted; for I am a mere mortal, and one that has many occupations.*  
Pliny (77a)

As we shall see, the problem with Pliny is not that he did not include everything: the problem is that he included things that are not so — and in some cases he should have known that they are not so. Still, the work had some real virtues. Pliny clearly thought the world was a fascinating place, and he set out to chronicle all its wonders. He was also intellectually honest, in that he credited his sources. As he wrote in his introduction, while studying older works, he found that many authors copied from others with no acknowledgement. Pliny, instead, lists all the sources he has used, arguing that:

*For I consider it to be courteous and to indicate an ingenuous modesty, to acknowledge the sources whence we have derived assistance, and not to act as most of those have done whom I have examined ... For indeed it is the mark of a perverted mind and a*



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*bad disposition, to prefer being caught in a theft to returning what we have borrowed, especially when we have acquired capital, by usurious interest.* Pliny (77a)

In modern research work, acknowledging your sources is a key part of the discipline. Indeed, failure to acknowledge them is a major academic crime, that of plagiarism. At least one Vice-Chancellor, David Robinson of Monash, was forced to resign because of such conduct (Rodan 2004).

Pliny's successors were less scrupulous than he. His work was copied, adapted and plagiarised for centuries. Indeed, as Europe sank into the Dark Ages, and then moved into the Middle Ages, Pliny's work was taken as an infallible source of knowledge. Which is a pity, because, for all his learning and ethical scruples, Pliny was prone to believing the most absurd stories. As the modern skeptic, Michael Shermer (2001), would say, he had no filter: he seems to have been unable to weigh up the evidence, and decide what was plausible and what was not.

Let's look at a few examples of Pliny's claims. He has a fearsome passage on the destructive powers of a menstruating woman:

*On the approach of a woman in this state, must<sup>3</sup> will become sour, seeds which are touched by her become sterile, grafts wither away, garden plants are parched up, and the fruit will fall from the tree beneath which she sits. Her very look, even, will dim the brightness of mirrors, blunt the edge of steel, and take away the polish from ivory. A swarm of bees, if looked upon by her, die immediately; brass and iron will instantly become rusty, and emit an offensive odour; while dogs which may have tasted of the matter so discharged are with madness, and their bite is venomous and incurable.* Pliny (77b: 278)

Clearly, every Roman legion should have had a few, to spread misery and despair in hostile lands. On the other hand, menstruating women also have their uses, as Pliny makes clear:

*... it is said that if a woman, while her monthly sickness is upon her, be set into the wind abroad with her belly naked, she will scare away hailstorms, whirlwinds, and lightnings; yea, and avert any violence of the weather whatsoever.* Pliny (77b: 278)

What amazes me about statements of this kind is not that they are wrong. What amazes me is that many of them are easily testable, and yet they went essentially unchallenged for over fourteen hundred years! This suggests that the doubting, seek-the-evidence approach characteristic of modern science and of skepticism is a fragile bloom, prone to perish when the climate is not right.

For me, the key problem with Pliny is not that he was always wrong; he wasn't. The problem is that he mixes truth and falsehood together indiscriminately, so that there is no obvious way of sorting out one from the other. Occasionally they are mixed in the same sentence, like this:

*Seldom do women shed their hair clean, and become bald: but never was there any gelded man known to be bald: nor any others that be pure virgins and have not sacrificed unto Venus.* Pliny (77b:131)

The statements that women rarely go bald, and that eunuchs do not go bald are plausible, but where does Pliny get the idea that male virgins do not go bald? This mixture of truth and falsehood is perhaps the greatest danger in Pliny. Instead of going through endless examples of his errors, let us look at a couple more, and then go to the important skeptical principle he recounted.

*If the rheum cause the mur, the pose<sup>4</sup> or heaviness in head, I find a pretty medicine to rid it away, by kissing only the little hairy muzzle of a mouse.* Pliny (77b: 315)

Poor mouse! It would be minding its own business when a creature the size of a ten-storey building — in proportion to the mouse — oozing catarrh and phlegm from assorted

orifices, insists on kissing it. This is blatant cruelty to animals. Note that Pliny claimed that he himself found this to be a useful medicine. Perhaps he tried it out, with apparent success. The dangers of anecdotal evidence of this kind should be familiar to all skeptics (Bratman 2005).

The last example is perhaps less ludicrous, but far more easily testable.

*And here I cannot choose but note unto you by the way, the strange property and wonderful nature that egg-shells have: for so hard, compact and strong they be, that if you hold or set an egg endlong, no force nor weight whatsoever is able to break and crush it, so long as it standeth straight and plumb upright, until such time as the head incline to a side and bend one way more than another* Pliny (77b: 300)

Test this by all means. Eggs are stronger than one might think, but you will have a clean-up to perform afterwards.

Pliny's influence lasted for over 1400 years, until the rise of scholarship in the west led to a tidal wave of criticisms, and the ultimate discrediting of his *Natural History*. However, Pliny is not all error and, buried within this massive work, I found a beautiful illustration of the working of Occam's Razor.

As most skeptics will probably know, Occam's Razor is a short precept formulated by William of Ockham, a theologian, politician and thinker of the fourteenth century. Occam's Razor is deceptively simple. It states: "*It is vain to do with more what can be done with fewer.*" (Caso 2001) Although it looks simple, Occam's Razor is crucial for skeptics. It means that whenever a natural explanation exists for a phenomenon, there is no need for a supernatural one. So, for example, when Barry Williams (1993) demonstrated that a 'filmed UFO' could be explained by the planet Venus, there was no longer any necessity to postulate a UFO: it is vain to postulate both a UFO and Venus, when Venus alone can explain the evidence.

## Witchcraft Trial

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Pliny gives an excellent example of Occam's Razor in action, though he shows no sign of seeing the logic which underlies it. The story begins with a lowly farmer who is rather too good at his work:

*There was one C. Furius Cresinus, late a bondslave, and newly enfranchized, who after that he was set at liberty, purchased a very little piece of ground, out of which he gathered much more commodity than all his neighbours about him out of their great and large possessions: whereupon he grew to be greatly envied and hated, insomuch, as they charged him with indirect means, **as if he had used sorcery, and by charms and witchcraft** drawn into his own ground that increase of fruits which should otherwise have grown in his neighbours' fields. Pliny (77b: 167)(Emphasis in the original)*

The picture is a vivid one. The lowly ex-slave out-produces the better endowed farmers around him, and the resentful muttering starts. One can imagine the furtive discussions: "It cannot possibly be that we are not doing as well as we could. He must be doing something wrong. I bet it's sorcery"<sup>5</sup>.

Cresinus was indicted. This was not a time of hysterical witch-hunts, but he knew that if he were found guilty of using sorcery, charms and witchcraft, he would face a large fine. The problem was, what could he do? How do you prove that you are not guilty of doing these illegal activities? In later ages, this impossible problem led to the death of tens of thousands of accused 'witches' (eg, Trevor-Roper 1969; Shermer 1997).

Cresinus was almost certainly uneducated, but I suspect he was a man of considerable ability — and not just at farming. When the day of the trial came, he had his defence ready. He,

*... brought into the common place his plough with other instruments and furniture belonging to husbandry: he presented likewise in the*

*open face of the court his own daughter a lusty<sup>6</sup> strong lass and big of bone; yea, and . . . well fed and as well clad. He shewed himself . . . his tools and plough irons of the best making, and kept in as good order; main and heavy coulter<sup>7</sup>, strong and tough spades, massy and weighty plough-shares, and withal his draught oxen, full and fair. Pliny (77b: 167)*

This was the start to his defence. Cresinus was showing that he had good equipment, good farm animals and a strong and hard-working daughter. What is more, he took good care of all of them. Then he began to speak.

*"My masters" quoth he "you that are citizens of Rome, behold these are the sorceries, charms, and all the enchantments that I use" (pointing to his daughter, his oxen, and furniture abovenamed) : "I might besides" (quoth he) "allege mine own travail and toil that I take, the early rising and late sitting up so ordinary with me, the careful watching that I usually abide, and the painful sweats which I daily endure; but I am not able to represent these to your view, nor to bring them hither with me into this assembly." Pliny (77b: 167-8)*

This is a clever speech. Cresinus begins with a joke. He points to the humdrum means by which he raises his crops — the spades, ploughs, oxen and so on — and refers to them as his sorceries, charms and enchantments. Then comes a masterstroke. He diverts attention from the fact that he cannot prove his innocence, and instead talks about something else he also cannot prove — or perhaps he can. He points to the daily slog of work on his farm, the hours he puts in and the sweat he produces. Now probably many of his hearers would have seen Cresinus or his daughter working long hours on the property. Although he cannot 'bring hither' this evidence, his hearers might well have known how hard

he worked, and have accepted this point as well.

How did the assembled citizens react to Cresinus's defence? Pliny tells us the verdict was swift:

*The people no sooner heard this plea of his, but with one voice they all acquit him and declared him unguilty without any contradiction. Pliny (77b: 168)*

Pliny's conclusions from this story are rather disappointing. He hardly goes beyond what Cresinus himself said.

*By which example, verily, a man may soon see, that good husbandry goeth not all by much expense: but it is painstaking and careful diligence that doth the deed. Pliny (77b: 168)*

In fact, Cresinus was using a form of Occam's Razor in his argument. Faced with a charge of using magic to increase his crops, he showed that he had good equipment and maintained it well, that he had good help on his farm, and he probably appealed to common knowledge in saying that he was a hard worker. In short, Cresinus was arguing that his fellow citizens did not need magic to understand how he raised such crops: there were perfectly good explanations for his productivity without witchcraft. And, since Cresinus was able to explain his prosperity in mundane terms, there was no point in multiplying the explanatory entities. Apart from modern scientific explanations, it is hard to think of a more elegant example of Occam's Razor — more than a millennium before William of Occam!

I am tempted to rename Occam's Razor as Cresinus' Razor, since the latter's use of it was so much earlier. That will probably never be accepted, as the idea is now enshrined in the name of Occam. Still, whenever we apply the Razor, it would be good to remember the clever ex-slave who thought it up by himself, and the Roman citizens who accepted its validity.

**Continued on p 38 ...**

# Clarifying a Mystery

***The Mystery of the Tunguska Fireball*, Surendra Verma, Allen & Unwin, Crows Nest, 2006**

It's not often one gets to review two very different books, from different publishers, but by the same author; this is one of those occasions.

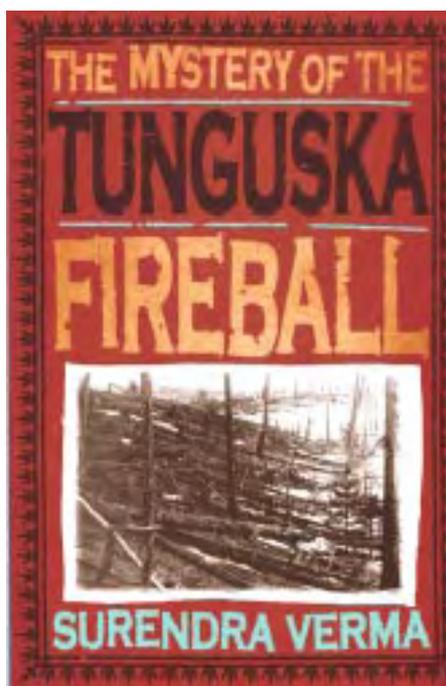
Few Skeptics would be totally unaware of the cataclysmic event that occurred in a remote part of Siberia on 30 June 1908, when an explosion left vast numbers of flattened trees over a wide area. Most would also have heard any number of explanations for this devastation, ranging from plausible speculation to wild-eyed fantasy, but not many of us would have had enough information to come to a reasonable conclusion about its cause. In this book, Surendra Verma seeks to provide that information.

Part of the problem lies in the fact that it was a full 19 years after the event before any sort of scientific investigation was conducted at the site. For a start, the site was of such remoteness as to make Oodnadatta look like an outer suburb, and then there were the small matters of a world war, two revolutions and a civil war to take into account. A number of other expeditions were mounted over the next 50 years (interrupted by yet another world war) but still very little has been discovered to confirm exactly what it was that released energy consistent with around a 15 megaton (perhaps?) explosion.

Initially it was thought that the Tunguska object was a meteorite, but there were certain aspects of the site that made this seem unlikely. The next favourite was a small comet, but again this explanation seemed to lack some evidence. From then on, the speculation became even more esoteric, a mini black hole, an antimatter meteor, various other sorts of exotic matter, an un-

derground explosion and, of course, a crashing space ship, a laser message from an ET that went astray and even the result of a bungled "death ray" experiment by (who else?) Nikola Tesla.

This then is the task the author has set himself — to collate all the reports and speculation and to present them in a way that makes the story comprehensible to a lay reader and to provide sufficient data to make it possible to reach a tentative conclusion. No easy task, with a



cast of characters whose Russian names are the sort of thing that makes *War and Peace* such a trying read. Surendra Verma handles the task with aplomb, in a non-pedantic, colloquial style. He assembles his facts, reports all the hypotheses, listing the points in their favour and those against and, having provided plenty of information, invites readers to come to their own conclusions. He has his own favourite, but he does not push it. Along the way he also presents us with a primer on the latest theories of planetary for-

mation as well as thoughts on the Great Extinctions that have almost decimated life on Earth on five occasions in the past.

A couple of curiosities emerge from the story, not ones particularly germane to the subject, but the sort of things that appeal to this reviewer. First, of the many astronomers who have proposed hypotheses about Tunguska, two of them, one British and one American, were named Whipple. As far as I can discover FJW (UK) and the better known (for his work on comets) Fred (US) were not related; not surprising had they been named Smith, but Whipple? Second, from an Australian author of Indian heritage, I was a little surprised it took Surendra more than 200 pages to use a cricketing analogy, but there it is on p 232 when he says that dinosaurs were "clean bowled by a fireball from the sky".

Definitely a worthwhile book for anyone who has ever puzzled over this mysterious event.

***The Little Book of Scientific Principles, Theories & Things*, Surendra Verma; Reed New Holland, Sydney 2005**

This is a very different book from the same author. It contains no less than 175 capsule (mostly one page) explanations of various scientific laws, principles, theories and even some oddities. Listed chronologically, from Pythagoras' Theorem to the Theory of Everything, it is a handy reference (or reminder) of the commonplace and the esoterica of scientific knowledge. It would be a handy gift for student grand/children coming to grips with science.

As with his Tunguska book, the author skilfully imparts information without seeming to preach. Highly recommended.

**Barry Williams**

# Young Man on the Move

## A new generation of Skeptics emerges

Andrew Mayne is the second in a series of three interviews with younger skeptics. First was Lawrence Leung and the last will be Brian Brushwood. Andrew Mayne is known within the skeptic community as Andrew Harter but is also known among magicians as Andrew Mayne. He is a 33-year-old skeptic with more than a passing resemblance to Prince William. In person he is thoughtful and measured in his responses, while on stage he is vibrant and engaging. He has creatively promoted his work, including his two *Wizard School* DVDs, tying in nicely with the Harry Potter mania. He's published several books and DVDs on magic, and is an advisor for *Skeptical Magazine's* Junior Skeptic section.

**Richard Cadena:** *How did you get your start in skepticism?*

**Andrew Mayne:** As a kid I was always interested in magic and science. As I got older, I was very interested in how the two played together. Why were people fooled? What was it that made people come to the conclusion that these things didn't have explanations? I would see some of the principles I knew being used to deceive other people into believing that there were really paranormal or magical things going on. I was curious about that. I started reading books, such as by Richard Dawkins, which revealed things to me about

how the world worked and how people sometimes didn't appreciate that.

**RC:** *Most skeptics, when they were young, had some area of pseudo-science that they were interested in but later recognise that wasn't the case.*

**AM:** When I was 9 or 10, I used to watch a show called *The Tomorrow People*, a British show about these kids who had ESP, could teleport and all that. I was fascinated by this. Now I didn't believe it was true but it got me to pick up books on ESP and to try and find out more.

As a kid, I guess that was when I sort of realised I was a critical thinker. I found that experiments they described and the demonstrations they had were very vague, they didn't really give many details. I would test my own friends for ESP. I made my own Zener cards out of note cards and I would test them. I could see how other people could say, "I got a pretty good run here" but with the other runs, if I add them together, overall there was nothing there. I wanted to, I really wanted to believe. I'd still like to believe those things are true.

**RC:** *Your career has been a mix of magic and skepticism.*

**AM:** When I was about 19 to 25, I spent most of that time as a magician, on the road, performing at resorts, and overseas. Between those times, when I was back home, I



*Richard Cadena, is an occasional interviewer of prominent Skeptics. He is an IT specialist, born in the USA and now resident in Adelaide*

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would go to classrooms as a magician and talk about critical thinking. It's always interested me, since I was in high school; I was invited in as a speaker to talk about the psychology of magic, the psychology of deception.

**RC:** *Could you talk about your involvement with the JREF?*

**AM:** When I was 15, my dad took me to see James Randi's lecture. My dad had been a big fan of Randi's ever since he can remember back. Dad would wake me up to watch Randi on the *Tonight Show*. Dad spent 30 years in law enforcement [he] was super cop. My dad was always interested in trying to do the right thing and going after the real bad guys and that is why he really respected what Randi did. That is why he introduced me to Randi's work and his books.

So Randi had been a friend of our family since I was a teenager. I could go to him with questions about magic and he knew I had an interest in science so if I had question pertaining to science he could call up Martin Gardner and get an answer for me. When I decided I wanted to focus my energy on pushing magic in a different area, besides just doing shows in sequined jackets with big box tricks, Randi had started the foundation at that point; I went to him and told him I'd be interested taking what I've been doing in classrooms and maybe doing it through the auspices of his organisation. Randi thought that was a great idea. So at that point, he brought me under his wing and would send me out to colleges and places like that, then to laboratories as a representative of the JREF.

**RC:** *Could explain more about your role in education?*

**AM:** I'm not trained as a teacher, which is a job I have an immense amount of respect for. I'm a magician who has had some experience explaining some of how my techniques

work, not the principles; I don't want to teach people how magic tricks work but I want to teach people how we are deceived and how we can perceive the world.



Andrew Mayne

My involvement in education started off when teachers would use me as an example to bring into a classroom and talk about what I do. That evolved into sitting with committees of teachers who would say, "What is your idea as an entertainer to present this, what are your ideas as someone who has an idea of what we are trying to get across?"

I was a spokesperson for South Florida Critical Thinking Partnership where there were a bunch of teachers and there was me who would facilitate what they were trying to do through entertainment.

**RC:** *How have you been able to gain access to those people? Has it slowly evolved over time or do you have contacts?*

**AM:** This conference [TAM in Las Vegas] for example, there are a number of highly committed teachers who have come here, on their own dime, to pick up stuff they are going to take back to the classroom. They didn't get grants, they didn't get money, and the head of the de-

partment didn't give them a thousand dollars to pay for them to come out here.

I meet a lot of these people. When they find out what I'm been doing, they respond to that. They ask, "what can we do, how can I help, how can I use your materials, where can I go?" You find these people and you network. At some points I've done stuff on a county level with schools, sometimes I talk to with people on a state level and say 'have you guys thought about this?'

**RC:** *Do you have a website where people go to find your resources?*

**AM:** At this point no. I have some magic teaching clips ([www.fastfocus.tv](http://www.fastfocus.tv)) on a site that is not mine. We are in the process of developing, through the JREF, a page with a bunch of resources. Most of what I offer now, besides me visiting the classroom or running

a program for a year at a school, is the stuff I've been developing for public television in the US.

**RC:** *Do you see your future with the JREF as sometimes you do minimal work and other times you have lots of involvement?*

**AM:** You've got to focus on your strengths and what you can bring to this. Randi brought me on board to go into classrooms and help with the claimants (of the \$US1,000,000 prize). The more he sent me out into classrooms, the more he encouraged me to find ways in which we could encourage a basic understanding and appreciation of science, the more I liked doing that.

So a lot of what I've been working on is parallel to the purposes of the JREF but if I take some risks that if it doesn't work out it is only my fault. If I'm going to spend four months talking to some group about the television project and not have it pan out, I'd rather do that and not have the JREF have to pay for someone to do that. So my goals have

## Young Man

been to take what Randi taught me and find new mediums in which to use it. A lot of that is television and lot of that is just finding ways to entertain and educate.

**RC:** *So you're a volunteer or a...?*

**AM:** I pop in there every now and then and add my two cents, whether it's asked for or not. I just started my own non-profit, the Children's Media Lab to make video content available to schools and public television.

**RC:** *Do you have a strategy to reach those who don't know about you?*

**AM:** There are opportunities to do more outreach but part of what I wanted to do was solidify what we were going to try to bring. It's one thing to say to a teacher, "you've got to teach critical thinking and that is all you have to say".

That's not enough. You need to bring tools. I've only been in this for a short period of time compared to Randi and others. I've tried to figure out what kind of tools would be helpful? Some tools are self-explanatory. When I put together a three-minute clip for public television, a kid is going to find out without a teacher. So much learning exists outside of the classroom.

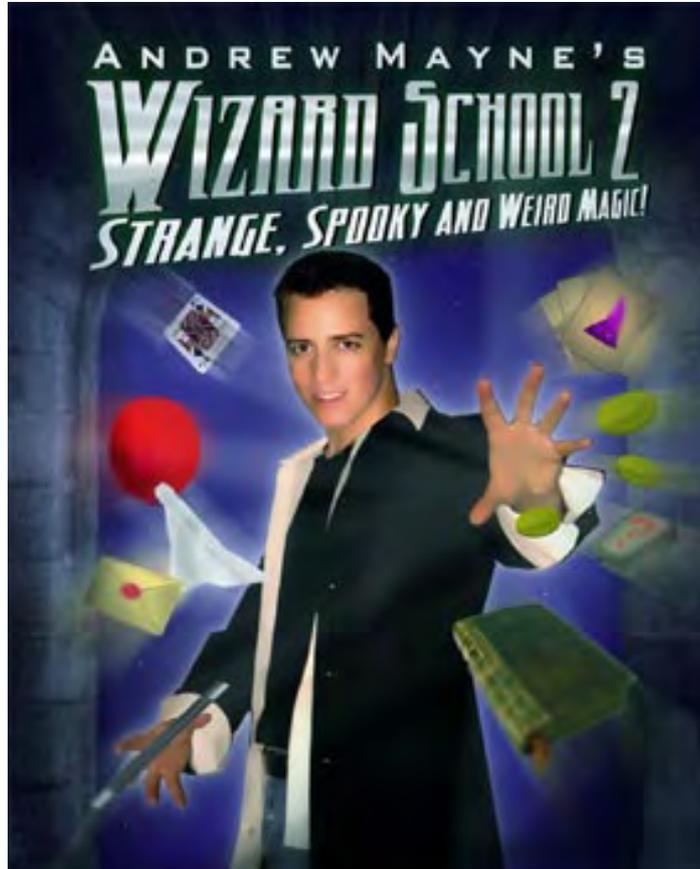
There are tools we can develop for teachers, and we are going to do more outreach programs, going to teacher's conferences — instead of skeptics' conferences — and saying we've got this material for you, this is what it can do. It is free or it's available at almost no cost. That is one part. The other part is outside of school, creating these resources for kids to stumble upon so they say, "this is interesting, this talks to me, I want to find out more about scientific thinking".

**RC:** *How do you handle being viewed as Randi's successor?*

**AM:** I don't think that's the way it is.

Penn put it eloquently; it is like trying to replace Elvis. That is absolutely correct, you can't do that.

Randi wants to know that what he has been doing is going to continue.



There are going to be people out there pointing out the frauds, pointing out the bad people, and looking out for people who haven't had the benefit of reading *Skeptic* magazine. There are people like that, doing a wonderful job — Michael Shermer is a hero of mine. Watching how the Skeptic Society has grown. *Skeptic* magazine was published and has grown. He is doing a lot of what Randi has done.

Watching Penn & Teller perform, these guys put on a show where you see them entertain you while they show they are critical thinkers. They did a program, *Bullshit*, which for someone in children's television it's hard for me to say the name, but that's the name so I have to say it <laughing>. They do a fantastic show.

There are these people out there doing great stuff. The torch has been

passed on. Randi started lots of fires in people and got them going. He got Penn & Teller going; he was very inspirational to Shermer, to me. No one person can sit in Randi's chair,

he's a little guy but he has very big shoes and nobody can fill them.

**RC:** *Would you want to be the leader of JREF?*

**AM:** The next phase of that really requires someone with a different experience base than I have. There is a lot we can do to find grant money for teachers to develop curriculum, organising more conferences; that is a skill set I don't have. That is what a leader of JREF has to be capable of doing. As far as someone who speaks on behalf of JREF, we are putting together more and more people we feel comfortable with. So when it comes to astronomy we can say why you don't talk to Jack Horkheimer or Phil Plait, when it comes to physics we've got Dr Bob Park.

Randi can do a lot of those

things; we can't replace him, but to come close takes a pool of people with a lot of talent.

**RC:** *Sometimes skeptics' conferences can seem anti-religious. Could you comment on how we sometimes miss the importance of religion?*

**AM:** My sister-in-law is from the Dominican Republic. I've been to different South American countries and we, living in major cities in the USA, forget what religion means to people in other parts of the world. It's not just a matter of whether or not you believe there is some higher power; it is a matter of culture. You get married in a church not just because you have a belief about it but because that is what you do. That is where invite your friends, that is what everyone is involved with. I grew up in the Pacific Northwest and was raised Protestant. For me church wasn't really about the

things they told me about how the world worked. It was about potluck dinners, going roller-skating, and playing softball with a bunch of my friends. It had a very heavy tie to the community. When we start talking about religion this and religion that, we have to remember that people have a different perception. If you're brought up in that environment and you hear someone saying religion is all bad you'll think, 'Gee, I like getting together with my friends.' As a kid I'd get the same stuff out of it that other people get out of secular activities. Sometimes we tend to forget that religion means a different thing, not just that one thing.

**RC:** *What is next for you?*

**AM:** Last summer I opened up an office at Universal Studios in Orlando. Since then things have really taken off. I've got some exciting television stuff in the works. Also with the Children's Media Lab I've got a little bit of a foothold in getting on public television on short segments. I just shot a pilot for an educational show with one production group. I've also been presented with a development deal with another production group that has a big presence on television. It's a really crazy time right now.

**RC:** *You mentioned that you are involved in a program for kids at the JREF.*

**AM:** I'm trying to put together a special program to fund children's educational content, whether it is a classroom videos or something else. Fortunately, I'm in the position now where I have the production experience and I've got some of the capabilities to facilitate that.

**RC:** *I've just interviewed Brian Brushwood. Can you tell me what you know about him?*

**AM:** I just met him here. One of our interns is a big fan of his, studied from him and spoke very highly of him. Brian came to TAM because he

wanted to see what other people were saying about talking about critical thinking and skepticism. That is encouraging.

You've probably gone to a number of conferences and I can remember maybe eight years ago when it was a bunch of old white guys sitting in a room talking about stuff. It is getting more diverse in every possible way, which is a wonderful thing.

I see a young man out there talking about going to college campuses, and he seems to be very entertaining, talking about "I do magic but I also do things about Bigfoot". It is terrific.

**RC:** *What do you see for the future of skepticism?*

**AM:** In the last 10 years, I would argue, there has been a tremendous amount of skepticism and critical thinking. It doesn't call itself by that name. It is *South Park* and the way they treat popular figures like John Edward and other people who make stupid claims; or the *Daily Show* with John Stewart which is reaching out to a whole new generation; Penn & Teller's show on *Showtime*; or *Mythbusters*.

Ten years ago, cable channels were around but people were trying to imitate what the three big networks were doing. There was one way of looking at things but that has changed. Political correctness is still there, don't criticize somebody else's beliefs or ideas. Some people still hold to that but now some people say "hey, I want to be able to criticize and analyse anything". We see that all the time now.

It's a great time to be a skeptic. It is a great time. There is so much out there for us.

**RC:** *Thank you very much.*

**AM:** Cool, my pleasure.



## Witchcraft from p 34

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### Notes.

1. I am using two versions. A shortened one-volume version (Pliny 77b) and a full-length version on the internet (Pliny 77a)
2. The other book is the introduction.
3. New wine
4. ie, a heavy cold with lots of catarrh
5. Jews and overseas Chinese would probably smile ruefully upon seeing this passage: so often their industry and productivity has been the target of resentment from surrounding populations. The latest example seems to be in Honiara.
6. Stop thinking that. It means strong and hard-working.
7. The cutting blade of a plough



# Everybody Knows

## Knowing what isn't so

My sceptical brain, barely functioning through a post-dinner port haze at a Rotary Club dinner, was stirred by a presentation by a local naturopath who waxed lyrical over “natural” therapies, defending them by invoking ‘ancient wisdom’. This struck a nerve with me, because as coincidence would have it, a close friend, suffering from cancer, is using Traditional Chinese Medicine to battle her disease. When I asked why she did that, her response was that Traditional Chinese Medicine is part of a ‘system of ancient wisdom’.

So I was a little sceptical when the naturopath said that flax seed oil was beneficial for prostate cancer. With some spare time at hand after receiving yet another government subsidy to this idle farmer in a marginal electorate, I thought that this one should be easy to check. And it was.

A quick check of the Australian Prostate Cancer Foundation website found a reference to US leading cancer specialist, Dr Charles Myers, warning during a recent lecture in Sydney of the potential of flax seed oil to promote (rather than control or prevent) prostate cancer; a bit more checking found a comprehensive article by Dr Myers in the *American Prostate Forum* saying that:

*First, there is no evidence that increased alpha-linolenic acid extracts or flaxseed oil provides any benefit to prostate cancer patients. Second, clinical studies that are available suggest that alpha-linolenic acid may*

*actually be dangerous for prostate cancer patients.*

It went on to say that a recent study that found that:

*... those with the highest intake of alpha-linolenic acid had a 440% increase in risk compared with those at the lowest level.*

Now, Dr Myers based his article on six research papers, so one would think that the case was rather conclusive: no evidence exists to show that flax oil is beneficial in prostate cancer conditions, and five of the six papers cited showed that it is downright dangerous. So, I thought it might pay to ask the Australian Naturopathic Practitioners Association what they thought of all this. So I did.

On 8 May 2006, I sent the *Prostate Forum* article to the Australian Naturopathic Practitioners Association, pointed out that local naturopaths are prescribing flax seed oil, and asked them:

*In view of the overwhelming evidence that the only effect from prescribing flax oil for prostate cancer is now known to be more than a fourfold increase in prostate cancer and with no known benefits, will the ANPA take action?*

A similar email was sent to the Therapeutic Goods Administration.

While waiting for replies, a check was made of the wonderful works of Stephen Barrett, MD, who runs the famous *Quackwatch* website. Readers



Ken McLeod is a boutique farmer on the NSW South Coast, who clearly has too much time on his hands..

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might not be aware that he has also established a similar website dedicated to exposing the stupidity of naturopathy, *Naturowatch*.

Where Dr Barrett gets his energy from beats me; I suspect however that it has a lot to do with chelation therapy potentiating his feng shui. He is to be congratulated for all that unpaid work he puts in to expose the deluded and dishonest. His new site explains much to this naïve clodhopper. What got me going, to the extent that I had to drop the application form for a government subsidy (for a fact-finding mission to the Riviera), and fire up the boiler on this old computer, was the comment from a naturopath student that Dr Barrett was kind enough to put on his website as a reader response, actually a 'Reader Protest' which said:

*I am a student of naturopathic medicine, and upon perusing your web site felt the need to comment to you. I am furious and at the same time saddened, if that is possible; how dare you write articles titled "Ayurvedic Mumbo-Jumbo" and "Aromatherapy, Making Dollars out of Scents"? Why do you need to be so incredibly flip-pant and dismissing, what are you afraid of? It is you who are unfairly misleading the public. You critique/criticize and dismiss medicinal practices (ayurvedic, CTM, herbalism), from countries that are thousands of years old, seducing the general public with stats, tests and the scientific method. What you are forgetting to mention to people is that Allopathic (western) medicine is less than 400 years old, a mere infant in the life cycle of medicine and healing. Allopathic medicine is responsible for countless numbers of deaths due to ..."* (etc)

I think that what the Protesting Reader was saying is that some naturopathic therapy is to be preferred because it is thousands of years older than our modern 'Allopathic' medicine.

So, the idea that some therapy is more valuable because it is 'ancient wisdom', or 'everybody knows' is deeply ingrained in society, especially naturopathic circles. Therefore, in

the anonymous recesses of the pages of *the Skeptic*, seen only by its dozens of readers, let me challenge that.

### What everybody knew

First of all, everybody knew that stomach ulcers were caused by too much acid, which in turn was caused by too much stress. The medical profession was surprised, but not resistant, to the news that stomach ulcers were caused by a bacterium, *helicobacter pylorii*. If we as a society had stuck to that misconception, we would still not have a cure.

Everybody knew, at least Pope Gregory XVI did, that democracy was evil, and said so in an 1832 encyclical, *Mirare Vos*, which condemned freedom of the press, freedom of conscience, parliamentary rule, "the unbridled lust for freedom," and democracy. I prefer Winston Churchill's philosophy: "Democracy is the worst possible system — apart from all the others".

Everybody knew that masturbation, or self-abuse as it was called in polite society, would make you go blind and your palms go hairy. Indeed a whole industry was devoted in the late 1800s to printing books warning society about the evils of masturbation and how to detect the vile persons who did it. Churches also weighed in with all sorts of dire predictions of the fate awaiting them. However, recent research has shown that high ejaculation frequency, including masturbation, is related to decreased risk of total prostate cancer.

Everybody knew that the sun orbited the earth, so what a fool Galileo was to support Copernicus' theory that the earth orbited the sun. Perhaps he was wise to recant in 1633, because he had seen what happened to Giordano Bruno, 33 years earlier.

Back then, everybody knew that our Earth was the only place where life existed, and the stars were windows in heaven where angels could look down on the earth. Giordano Bruno was not very wise in proposing that "the cosmos is infinite", that the cosmos contained many worlds which also contained the living creations of God. For such impertinence, in 1600, the Vatican had Bruno's jaw clamped shut with an iron gag, a long spike

pierced his tongue, and another spike stuck in his palate, lest he utter his despicable beliefs to the crowd, and then burned him at the stake. Note that the Vatican has admitted it was wrong in Galileo's case, but not in Bruno's.

Everybody knows, at least those who watch commercial TV, that if it's natural it must be good. Nine out of ten commercials, it seems to me, slip in the winning argument in favour of their product, that it is 'natural'. From yoghurt to perfumes to baked beans, the word "natural" boosts sales, if not your health. But does this mean that one should welcome syphilis, arsenic, malaria, cancer, arthritis, earthquakes, and the rest? Of course not, and neither should we welcome the blatherings of so-called natural therapists who advocate some herb purely on the basis that it is natural or ancient wisdom.

We could go on and on; it could make a good dinner party game — who can name the most 'ancient (or modern) wisdoms' that turned out to be rubbish. Droughts are caused by witches... The world is flat ... The Egyptian pyramids were granaries... The Easter Island statues were built by refugee Incans... Christopher Columbus discovered America... Bad smells from swamps cause malaria... genocide is OK... Osama bin Laden is a CIA agent... Saddam Hussein had weapons of mass destruction....

So, the outcome of all this is that it is simply not rational, and can be harmful, to promote some therapy or any other human belief or action, on the basis that "everybody knows" or it is "ancient wisdom". Next time someone tries that one on you, think of the result of imbibing flax seed oil and all those poor sods who are still taking it. No, it may be boring and expensive and time-consuming, but the only effective therapy is that revealed by double-blind placebo-controlled clinical trials.

And no, I never did get replies from the Australian Naturopathic Practitioners Association or the TGA.



# Nuclear Energy for Australia?

**Nuclear Energy for Australia?  
Australian Science Festival  
August 16, 2005  
Bradman Theatre  
Canberra Convention Centre**

In a world where global warming and its effects are major causes for concern, the subject of nuclear energy has become a topic of serious discussion. On Tuesday August 16, 2005 the Canberra Skeptics organised a public forum to address the subject *Nuclear Energy for Australia?*

We acknowledge the invaluable support and sponsorship of the Australian Science Festival and the Australian Government for including the Forum as part of Science Week.

The speakers were Professor Aidan Byrne, Dr Colin Keay, and Emeritus Professor Michael Denborough. The Forum was moderated by Pete Griffith, President of Canberra Skeptics. Transcripts of the presentations, slightly edited for the print format, follow.



**First Speaker**

*Professor **Aidan P. Byrne**, FAIP, joined the ANU in 1981 as a PhD scholar. After completing his PhD degree in Nuclear Physics he held positions with the University of Melbourne and spent over two years in Germany as a von Humboldt fellow. He returned to the ANU in 1989 and commenced a joint appointment between the Department of Physics, Faculty of Science and the Department of Nuclear Physics, Research School of Physical Sciences and Engineering. He is currently Head of the Department of Physics in the Faculty of Science. His research interests involve the use of gamma-rays as probes in the examination of the atomic level structure of materials (especially semiconductors). His email is: [aidan.byrne@anu.edu.au](mailto:aidan.byrne@anu.edu.au)*

This talk is about nuclear power and, in particular, the physics of it, and some of the engineering about, nuclear power; the hard dry stuff. Later I will get on to the other more tricky issues. I first want to present a little bit of the history and explain about the source of nuclear energy and how a reactor works.

## **History of Nuclear Fission**

In 1935 we already had a good understanding of what the atomic nucleus consists of — protons and neutrons. At this time Enrico Fermi was firing neutrons into nuclei and he discovered that they get absorbed onto the nucleus to make new isotopes. For example, we can take uranium 238, add a neutron and make a new radioisotope. In general these radioisotopes are not stable; they decay producing new elements, some of which are themselves radioactive.

The next critical point in the understanding of fission was the work of Otto Hahn, who was looking at the products from neutron irradiation of uranium. He observed that barium nuclei were produced, which was very surprising since Fermi was only seeing elements close to the starting point. Hahn saw something with the mass of half the original constituent. Hahn published his work in January 1939 and he went on to get the Nobel Prize in 1944. By February 1939, Lise Meitner and her nephew Otto Frisch understood what the process was about; when the neutron gets absorbed by some heavy nuclei the internal energy of the system is quite large and sufficient to have the sys-

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tem fly apart. Meitner and Frisch coined the words “Nuclear Fission” for this process.

Two more years saw the first nuclear reactor, when Enrico Fermi built the first atomic pile in a squash court in Chicago. Four years later we had the first nuclear bomb test. This year (2005) we commemorated the anniversary of the end of a war that caused 60 million deaths, and that end was brought about, in part, by nuclear means.

Between 1945 and the mid 1960s there was a very, very complicated, heated environment, with a fine mix of political and scientific dimensions. Issues such as national security, national pride, and resource uncertainty, coupled with an extreme, unjustifiable cold war military escalation.

Out of that environment a number of nuclear power solutions emerged, all very different in character. For example, the American reactors essentially came out of submarine reactor designs; the UK reactors, approaching the problem from a completely different aspect, used natural or metallic uranium; the Canadians developed a reactor that worked on natural uranium which did not require enrichment; the French, without access to uranium resources, considered a breeder program. So we have ended up with a very diverse range of different reactors.

### Sources of nuclear fission energy

Before considering different reactor types, it is important to realise where the energy comes from in these processes. With chemical energy it's obvious. What one does is to take a mixture of gases, like methane and oxygen, break the chemical bonds, and then re-form them into different molecules. The energy comes about because the CO<sub>2</sub> and the water are more stable than the initial constituents, and if we look at this reaction we find that it releases 8 electron volts of energy. (One electron volt is equivalent to 1.6 x 10<sup>-19</sup> joules). The situation with nuclear fission is slightly different, with one nucleus, say a uranium nucleus, that splits apart. The energy output of this is 200 MeV— 200 million electron volts

— 25 million times more! This is the crucial feature of nuclear power; chemical reactions provide us with most of the energy that we have in the world today, but nuclear fission reactions provide an energy source that is millions of times more condensed. It is for this reason that we really cannot negate, and cannot neglect, nuclear sources of energy. When it comes to building a reactor based on fission by thermal neutrons there are very few isotopes that are suitable. In fact the only natural source that we can use is uranium 235. The abundance of this isotope is just less than 1% of the stable uranium isotope.

We can also use the plutonium isotope, <sup>239</sup>Pu, by using Fermi's neutron capture trick by taking stable <sup>238</sup>U, to make the radioisotope <sup>239</sup>U and allow that to decay to <sup>239</sup>Pu. This isotope has a half-life of 24,000 years which is essentially stable, but it is highly fissile.

### How reactors work

The simplest way to build a reactor is to take a large block of fissile material, for example <sup>235</sup>U, or <sup>239</sup>Pu. Fission would occur spontaneously and two lighter nuclei and a number of neutrons would be produced. These neutrons will cause other fissions, and the new neutrons will cause further fission and at the end the system will grow in an unstable manner and — as everyone knows — continued growth is unstable. (That's true with reactors, and true for populations.)

The solution in building reactors is to try and build a device that is controllable so the unstable growth can be restricted. The first requirement is to partition and dilute the monolithic mass of fuel. The best way of diluting is to realise that you are actually starting off with a dilute form and you then only concentrate it slightly from the initial concentration. What starts off as fissile material at a concentration of about 1% can be enriched to up to 20% to make a satisfactory reactor fuel.

Partitioning is required both to get the heat out and keep the fuel apart. This process creates a problem since, because of the dilution, the neutrons that you've made from your fuel get captured on inactive parts of the ma-

terial. The solution here is to use a bit of nuclear physics that says that if you slow your neutrons down, the reaction yield from the fissile component goes up by a factor of about 600. The process of slowing neutrons down is called moderation and water and graphite are typical moderators found in reactors.

Reactors also need a mechanism to allow control of the flux of these neutrons. The physical realisation of this takes many forms, but the key ingredient you have to have is a situation where you have sustainability. You have to have exactly the same neutrons going into your system as you have coming out of your system. If you have less, the reactor switches off and if you have more, it goes out of control: so the engineering for reactors is designed to have sustainability.

There are many manifestations, with the most common sort of reactor being the pressure water reactor (PWR). This reactor uses water as a coolant and water as a moderator, eg Three Mile Island.

This reactor is an example of a pressurised water reactor (PWR). The layout is not too dissimilar from any thermal power station except that the source of heat is generally much smaller than that of a comparable gas or coal fired station. The reactor core produces heat, and is cooled by water circulating through a heat exchanger much like the radiator in your car. The radiator produces steam which drives turbines, and from this point on it just looks like a conventional power station.

There are other variants of this design, for example the cooling water can drive the turbines directly — a boiling water reactor (BWR). Together boiling water reactors and pressurised water reactors comprise about 80% of all the reactors in the world. Other reactors have been built, such as the CANDU reactor that uses natural uranium as a fuel; it requires deuterated water, D<sub>2</sub>O, (heavy water), as a moderator.

### Accidents

It is important to review the major accidents associated with reactors as these have defined what's happened

## Nuclear Energy

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to nuclear power over the last few decades. Two accidents feature: the first is the Three Mile Island (TMI) accident in March 1979 and the other the Chernobyl accident in April 1986.

The synopsis of that accident was that there was a blockage of one of the coolant feed pumps. The system had been designed to accommodate such occurrences and up to a certain point the reactor functioned normally. In this particular case however, the safety valve, designed to release pressure from an overheating reactor, failed to close. As a consequence a small swimming pool's worth of water escaped from the core and went into the containment area for this reactor. Again, this possibility is built into the design of these reactors and what should have happened in this case is that relief water should have gone back into the reactor. Here is where a real error occurred; the valve allowing this to happen was left closed. That should not have been allowed to happen. The consequence of that is that the reactor lost all of its cooling water and parts of it melted and as a result some of the radioactive material went into the containment vessel but very little got outside the immediate reactor environs. From a safety point of view this was a serious breach of operational procedures, but in terms of public health, it did not have serious consequences. From the reactor manufacturer's point of view, particularly in the US, it was a complete disaster.

The Chernobyl accident was a much more serious event. Details of this accident and the consequences can be found in a number of reports from the IAEA, including the 2002 report *Chernobyl: Assessment of Radiological and Health impacts* and the 2005 report *Chernobyl's Legacy: Health, Environmental and Socio-economic Impacts*. This type of reactor is not found outside the former Soviet Bloc countries and has graphite as a moderator and water (which is also a moderator) as a coolant. This combination works fine when you have a reactor running at normal power, but when this reactor is run at low power the combination of the two moderators is problematic.

Again this reactor accident happened with human intervention causing an error — the operators of that reactor were doing an experiment. Specifically, they were attempting to determine whether, if they had a situation where the power to the reactor went off, would they be able to control the reactor with the power generated by the reactor itself as it cooled down. In the process of running this test, they bypassed all of the safety features and the automatic control process of the reactor. Then they switched the reactor off until it was running at a very low power. It was known from various isolated incidents that these reactors are unstable at low power. As a consequence of this the reactor core got very hot, very quickly and the water boiled explosively. Unlike the TMI reactor, the Chernobyl reactor did not have a containment vessel to contain escaping material. The explosion blew the top off the reactor building and started a fire in the reactor that burnt for 10 days.

This was unquestionably a serious accident, compounded by the lack of information distributed about that specific type of reactor and the response during and after the accident itself. The immediate consequences of the reactor damage were dramatic, with radioactive material spread over a large part of Europe and the response caused immense, immediate disruption. The reactor lost somewhere between about 20% and 60% of the fission products (the amount is variable because it depends on the chemistry of the specific elements) and a small amount, about 3.5%, of the core.

Accidents do happen in all areas of activity. We hear routinely of accidents involving aircraft for example. Accidents will also happen in the nuclear industry, but it is important to properly assess the risk and consequences. We are now nearly 20 years on from Chernobyl and we are now in a better position to address the question as to what are the long-term consequences. About 110,000 people were evacuated from the proximity of this reactor within the first few days, and about 600,000 people were involved in cleaning up this accident. Today about

270,000 continue to live in areas contaminated with <sup>137</sup>Cs.

The medical implications and consequences of the Chernobyl accident are now clearer. Fifty-nine people have died to date, most of them either firemen or plant workers. One unanticipated consequence was a significant increase in the incidence of thyroid cancer, with about 2,000 cases identified since the accident. Thyroid cancer is caused by the absorption of radioisotopes of iodine, which is one of the elements emitted most easily from reactors. A complication in this case was that people in the neighbouring regions of this reactor were not told about the accident until days after it occurred. The short half-lives of the iodine isotopes means that preventative measures must be taken immediately. It is worth noting that thyroid cancer has a relatively low mortality rate and the death toll of 59 includes a handful of deaths from this cancer.

If media reports are to be believed, the death toll from this accident is stated to be much higher, with some sources claiming millions! This is not true. Indeed, in comparison to other areas in the former Soviet Union, there has been no increase in leukaemia, no increase in other cancers and no birth anomalies that can be attributed to this accident. The health consequences outside the former Soviet Union territories are incredibly difficult to discern. It is possible to make estimates of the future mortality rates based on the amount of radiation released; these vary between about 2,000 and 20,000 people could die, with the latest best estimate lying around 4,000. These deaths are however very difficult to distinguish given that, over the 60 year window that these deaths will occur, many millions will die from other causes. The extra effect from the accident is thus very difficult to discern. An additional complication involved here is that a large number of people were moved forcibly, causing major dislocation stress. This process will itself cause illness independent of any radiological consequences.

These are serious accidents. We can't ignore them, but the impact is perhaps no worse than a number of

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other accidents that we've had recently. If we compare Chernobyl, for example, with the tsunami that we had at the end of 2004, or recent hurricanes or earthquakes, the effect is relatively minor.

### **Nuclear waste**

Nuclear reactors produce two sorts of waste. One is the fission products and the other is actinides produced by neutron radiation of the reactor materials. Now these are intrinsically different in character in the sense that nearly all of the fission products are relatively short-lived and have little future potential for use. The best solution here is to store the reactor material on site, for a period of say 10 years until this reactor material is transportable, then move it to long-term storage or for reprocessing for extraction of the unused uranium.

The other waste stream is the actinides. Many are similar in that they have short half-lives, but others have very, very long half-lives and they have the potential to be reprocessed for use either as fuel or, potentially, for weapons. In this case it is very important to sequester that material for a long time. This can be done. It is not impossible. Geological time scales are of the order of millions of years and one of the solutions is to do what is proposed in Finland and build a waste repository in crystalline granite, 500 metres below the surface. The fuel rods are first enclosed in metal canisters, placed in holes in the rock and backfilled with clay that is essentially impervious to water. The facility can then be filled with rock and left alone. The Americans are working on the Yucca Mountain solution where they engineer mechanical barriers that will last for tens of thousands of years. Beyond that time the material will have no more radioactivity in it than the rocks themselves.

Another solution people are looking at involves drilling boreholes, four kilometres deep, about a meter in diameter. You put the waste down the bottom, and fill it up. It is gone for an appropriate amount of time, unable to be easily retrieved. An advantage of this method is that there are many

regions around the world, including in Australia, where it's appropriate to construct such a facility.

### **Costs of nuclear power**

What are the costs? Again there are a number of different estimates here. One recent report is from the Royal Academy of Engineering in the UK. An equivalent American one can be found in the 2003 report on the Future of Nuclear Power from the Massachusetts Institute of Technology. The results are fairly similar, with only a little variation. In both of these cases nuclear power is competitive with coal and gas. If the costs of carbon mitigation (getting rid of the CO<sub>2</sub> waste) is included, then the costs for fossil fuels almost double. In the UK case, nuclear power then becomes the cheapest. It is worth noting that this includes the waste storage problem and the more expensive costs for the reactor construction.

Alternative energy sources have also been included in the Royal Academy of Engineering's study and all of these, including biomass and wind, are more expensive. Solar is not included in the UK comparison as it is so expensive as to make it completely uneconomic.

### **How much uranium do we have?**

Again this is a topic of much debate as the answer depends to a large extent on how much one is prepared to pay. At the current price of around \$65/ kg, we have only something like 4 or 5 million tons of uranium in the world. If we're prepared to pay a little bit more, we will have something like 16 million tons, enough for 500 years at the current usage of nuclear power. If we can extract uranium from seawater (and people are proposing this can be done at less than about \$300 per kilogram), then we have 4 billion (4,000 million) tonnes, enough for well into the foreseeable future.

An important point here is that, in contrast to fossil fuels, the costs for reactor fuel forms a much smaller component of the total costs, and hence electricity costs are relatively insensitive to increasing uranium ore price.

The reason for this is the high energy density provided by fission. The low energy density of coal means one needs incredible volumes of material for a given amount of power. In order to produce 1 gigawatt-year of electrical energy one needs about 2.2 million tonnes of coal. The concentration of uranium in ore is fairly low so that it needs about 100,000 tonnes of ore which is then refined to produce about 200 tonnes of metal. This has to be further enriched, and about 20 tonnes of this would be put in a reactor each year. It certainly does cost energy to mine and enrich uranium, but the assertions that it requires more energy than one produces are simply wrong, with the actual energy cost being only a few percent.

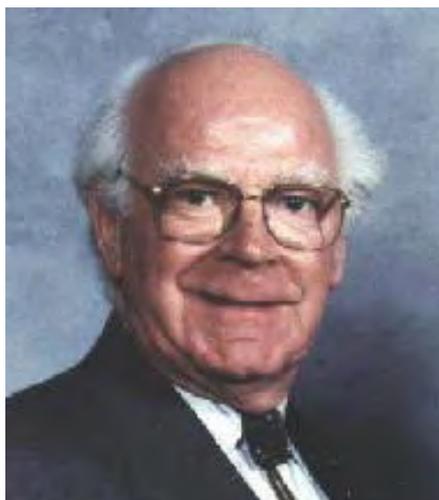
Although the waste issue features prominently in the debate about nuclear power it tends to get ignored in the discussion of electricity produced using coal. The burning of 2.2 million tonnes of coal produces 8 million tonnes of CO<sub>2</sub>. Australia is the world's worst per capita CO<sub>2</sub> producer and the implications of an increasing concentration of CO<sub>2</sub> in the atmosphere may have truly monumental implications. Burning coal also produces ash, containing a range of toxic chemicals that, unlike radioactive waste — which decreases in toxicity with time — will always remain toxic. Burning coal also produces uranium (and similar amounts of thorium), with about 4 tons of uranium being produced from 2.2 million tonnes of coal.

### **The need for nuclear**

It is almost unavoidable that the demand for energy will increase in the near term. Indeed, reports such as that from Princeton's Carbon Mitigation Initiative predict a doubling within 40 years. The simple cause will be the increased energy demand from such countries as China and India. At the same time we are facing a climate crisis where the CO<sub>2</sub> concentration is also increasing and the consensus of scientists is that CO<sub>2</sub> will have a real effect on our climate. As the discussion from the Princeton group highlights, the solution is not simple, nor is it singly focused.

We cannot compensate for carbon emissions by any one technique that we have available. We cannot do it by efficiency only, we cannot do it by solar power only, we cannot do it by wind power; we have to use all of those ingredients to try to minimize the amount of carbon emission. Nuclear power is one of the components that we should be considering because the need is immediate and a number of other technologies are not yet proven on the appropriate scale. Some countries already have a major commitment to nuclear power; others are already factoring in a significant build-up. Nuclear reactors that are intrinsically safer are being designed and built so that an accident on the Three Mile Island scale would not be possible. Waste repositories are being developed to store used material from reactors in a way that will be isolated for the appropriate time scales.

The way forward is not just with nuclear power. The way forward is with a combination of things, such as improved efficiency, and renewable energy resources; but at the same time Nuclear Power has demonstrated that it is capable of producing a safe, clean and continual supply of energy and so needs to be considered.



### Second Speaker

*Dr Colin Keay is a retired associate professor of physics with doctorates in physics and astronomy. This background has led to an interest in nuclear and reactor physics which he taught at graduate level. He now focuses on a national need for nuclear electricity to maintain Australia's prosperity. He founded the Hunter Skeptics 15 years ago and remains its president.*

*Dr Keay's booklets on nuclear matters mentioned in this presentation are available from:*

*[www.enlightenmentpress.com](http://www.enlightenmentpress.com) or the Australian Skeptics web site [www.skeptics.com.au](http://www.skeptics.com.au)*

It's a pleasure to be here even though I had to travel from Newcastle to get here. I'm very tempted to ask you to sing the National Anthem as a kick-off, but I'll concentrate on just one of the early lines of that Anthem; line number 5, the one that comes after girt, if you remember it. Our land abounds in what?

### Nature's gifts.

These boons that Nature has granted to Australia are boons that we cannot really ignore if we are going to take our place in the modern world. What are those boons? Aidan has already mentioned one — Australia has approximately, or actually more than, one third of the world's total of ura-

nium, and we probably have a lot more that awaits discovery. We also have the best and most stable terrain in the world with the oldest rock provinces, approaching four billion years, for the storage of nuclear wastes.

These are boons that Nature has given Australia and we would be silly not to take advantage of them. In taking advantage of them we need to stop exporting uranium yellow cake. That doesn't sound very pro-nuclear but there's a very good reason. The reason is that despite the agreements that John Howard says we have with the recipient countries of our uranium, we have no guarantee at all that those shipments of uranium are not going to finish up in weapons or be used for weapon production. Now I don't like nuclear weapons very much at all, possibly not quite as much as Professor Denborough, but I like even less the idea of *more* nuclear weapons.

### Nuclear fuel cycle

How can we sell uranium without running into that problem? The answer is to take the bull by the horns and initiate the full nuclear fuel cycle. You will find a diagram of the nuclear fuel cycle in this booklet that I've prepared. What we do is mine the ore and convert it to a gaseous form, and then we enrich it. The word enrichment conjures up all sorts of horrors and when the media, and other writers, talk about enrichment, people almost automatically think that enrichment means weapons. Well that's wrong.

Natural uranium contains 0.7% of the fissile uranium  $^{235}\text{U}$ , and the remaining 99.3% is  $^{238}\text{U}$  which is not directly fissionable. Professor Byrne showed this quite clearly in his presentation. Nuclear reactors, like the pressurised water reactors and the boiling water reactors that Professor Byrne described, run on about 5% uranium  $^{235}\text{U}$  content. That requires an enrichment of about seven times in the fraction of  $^{235}\text{U}$  to bring it up to 5%. That was accomplished in Australia as recently as 1983 when the government pulled the plug on the program of enrichment that was being conducted. All the bugs have been

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sorted out. The director of the project was Dr Clarence Hardy, who is still alive and still very active in promoting nuclear energy.

Now it's a far cry from producing reactor grade uranium to weapon grade uranium. For weapons grade uranium you need upwards of 95% of the fissionable  $^{235}\text{U}$ . Then you can make a bomb if you've got that degree of enrichment — that's an enrichment of a *further* 20 times. ie, one gets up to reactor grade by a factor of seven; to weapons grade you need another factor of 20 making an enrichment of 140 times over all. That requires an enormous enrichment program, whereas to enrich to reactor grade is much more manageable. It has been done in Australia and can be done efficiently for the production of reactor fuel.

So we enrich the uranium to 5% and now we can manufacture fuel rods. We manufacture them to the specifications of the reactors of overseas countries that require uranium to produce clean green energy. We should not sell the fuel rods, we should lease them to countries on a return and replace basis. If they try any monkey business with the fuel rods (try to extract plutonium after they've been in the reactor) they don't get any more fuel rods. Full stop. That means that the total amount of plutonium that they can possibly hope to get is probably not enough to make even one nuclear weapon. So we're keeping an effective control over the process and we're adhering to the Nuclear Non-proliferation Treaty.

### Processing

That means that we're dealing with what's called the 'front-end' of the nuclear fuel cycle — we can do reprocessing after that cycle. We have not advanced very much in reprocessing in this country — we've only had one reactor in operation, at Lucas Heights, and we haven't needed to do so. But in the past 50 years there have been massive advances in reprocessing technology and techniques, and it is now much more manageable than it was even two or three decades ago. So what we should do is to take the spent fuel, reprocess it, salvaging the plutonium and the uranium from

it. The uranium is put back into the enrichment cycle; the plutonium we mix with depleted uranium from the enrichment cycle to produce what's called MOX fuel — Mixed Oxide Fuel.

Since 1960, some reactors have actually operated with mixed oxide fuels. They're perfectly good for running a reactor, and one of the advantages of the mixed oxide process is that it can get rid of weapons grade plutonium. Indeed, only a couple of months ago, the first American reactor to run on former weapons grade plutonium in the mixed oxide form, started burning those fuel rods. So it's a good way of getting rid of military plutonium stocks and getting peaceful energy out of the process.

Furthermore, if we do the reprocessing thoroughly, the high level waste can be minimized. As Professor Byrne mentioned there are reactors that can essentially break down the actinides from the spent fuel and, if they are taken out of the mix, the disposal of the high level waste is much, much easier than it otherwise would be. That minimises the amount of stuff you have to ultimately bury underground.

This whole thesis is contained in one of the books I have published. Some years ago I got very upset at the number of distortions and lies and fallacies that were put around about peaceful nuclear energy. Initially I had gathered about 20 of these distortions when I was lecturing in nuclear and reactor physics. Then I did a presentation to the Australian Skeptics in *the Skeptic* magazine and by then I had 30 fallacies; I called them the Dirty Thirty. And then I gathered more — and when I got up to 40, I published them in the first edition of a booklet and recently I brought out a second edition which has 46 fallacies — all of them answered. So many of the questions that you have about nuclear energy are answered in this booklet which addresses the fallacies that have been put about by people who want to denigrate nuclear energy.

### Radiation

Nuclear radiation is something that should not be greatly feared — and I say this despite the fact that it can be

lethal. As far as Chernobyl is concerned, as the guest of the Soviet Academy of Sciences, I visited the Chernobyl fallout zone in 1990 just four years after the disaster, and I was able to see for myself the conditions in the area. I was amazed at how people were trying to return — and succeeding in returning — to their previous lifestyle. It turned out that the evacuation of over 100,000 people from Pripjat — a forced evacuation — was virtually unnecessary, because the radiation levels were not high enough to warrant it.

It's not really appreciated that there are parts of the world where the radiation levels are over 50 times the average levels that we have here in Australia. This information in one of my booklets, *Nuclear Radiation Exposed*, which contains a chart; not an original chart — there are versions of it from the Australian Radiation Laboratories and from the American Nuclear Association — but it enables you to work out how much radiation you receive from your food, how you live, where you live, and so on. It is not generally recognised that each one of us is quite radioactive, due to potassium 40 and carbon 14 in our own bodies. Each one of you is popping away with radiation at the rate of about 300,000 reactions every minute, so if you are sitting next to someone you are irradiating them and they are irradiating you: and if you sleep in very close proximity to your wife you are increasing the dose both to yourself and to her very considerably.

Radiation is not the killer it's made out to be. The lethal dose of radiation is about 6,000,000 micro sieverts, the number of micro sieverts that we get on average in Australia is 2,000. The minimum is about 1,600 but in parts of Australia it can go up to very much higher than that.

### Alternative energies

Alternative energies cannot provide the base load power that's essential for a civilised country like our own. You might be interested to know that just under two years ago, Denmark finally announced that it was going to build no more wind farms. They'd

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happily sell wind turbines because they're good at making them — and it's a good income earner — but they're not building any more farms because Denmark had the most expensive power in Europe. They had to buy power when there was an excess of power from the wind and from other sources and so they found that they had to actually pay to get rid of power. They have been saved by membership of the Nordic Power Grid, which means at times when the wind is not blowing, ie, no wind power input at all, they buy electricity from Norway — which is about 95% hydro-powered — and also from Sweden which is about 50/50 hydro and nuclear. Shock horror, they were having to pay for nuclear power!

Germany has had a shock as well. Early in 2005 a 490-page report drew attention to the fact that Germany was in a perilous position as far as power was concerned. The green lobby in Parliament wanted to expand the wind power but they've got about as much wind power as their grid can possibly manage. The report showed that the cost to consumers went up from 1.4 billion euros to 5.4 billion — a more than threefold increase. Plus the German Government was up for improving the grid system at a cost of a further 1.1 billion euros.

So wind power doesn't come cheap. I'm giving you those figures to back up the points made by Professor Byrne. The comparisons of various sources of power are in my book, *Nuclear Electricity Gigawatts*, subtitled *Supporting alternative energies*.

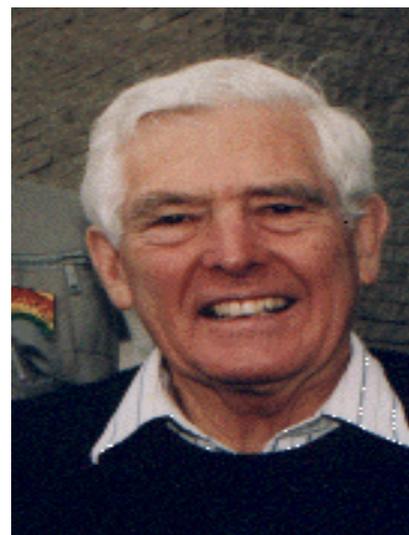
In other words alternative energies cannot hack it alone — they have to be supported by a good base load electricity supply. This is particularly true of solar power. About seven years ago, in Singleton, Australia's largest solar farm came into production with great fanfare. Isn't it rather odd that in the succeeding seven years there hasn't been another solar farm like it built in Australia? I wonder if it could be economics? I really don't know.

In the southern hemisphere there are four leading economies, Brazil, Argentina, South Africa and Australia. Australia is the only one without a nuclear power program. South

Africa is very innovative and is working with China to produce a very advanced reactor called the Pebble Bed modular reactor. Argentina has a nuclear industry which is actually producing the replacement research reactor for Lucas Heights. Brazil has an active nuclear power program. Australia — nothing!

When we look at the geopolitical situation in the Pacific Basin we find that China has just ordered another eight major reactors, and Japan is going ahead with nuclear reactors: in fact it has brought one on line recently with a construction time of barely four years, so they're really going for it. South Korea is investing heavily in nuclear energy and is offering to share it with North Korea in the interests of peace. Nuclear energy can be a force for peace.

There's no question about it, just as there's no question that there's not a firm link with nuclear weaponry. And if you look at the question of enrichment of uranium you can see why enrichment can be taken just so far — but it's not essential to proceed right down the path towards weapons. When you fill your car with petrol just pause for a moment to think that if you put a little bit of gelatinous agent into the petrol, what do you get? Napalm — which kills. So what we use peacefully in our cars can be a killer. When you use a skin cream on your hands, you're applying glycerine: with a fairly minor chemical process you can turn it into nitro-glycerine which will blow your head off!



### Third Speaker

*Emeritus Professor Michael Denborough, after a spell as Reader in the University of Melbourne Department of Medicine, Royal Melbourne Hospital, in 1974 joined the ANU as a professor in the John Curtin School of Medical Research, where he remained until his "retirement" in 1994. In 1970 he initiated scientific protests against the French nuclear tests in the Pacific, in 1982 he convened the symposium "Australia and Nuclear War" at ANU, and in 1984 when PM Bob Hawke reversed the anti-nuclear policies of the ALP (which resulted in the formation of the world's largest uranium mine at Roxby Downs in South Australia) he founded the Nuclear Disarmament Party.*

*Michael.Denborough@anu.edu.au*

There are lies, damned lies and the spin put out by the nuclear industry. The reason that we are here today is because since October 2004 there has been a vigorous, expensive campaign carried out by British Energy to try to change the properly horrendous image which the public has of the nuclear industry, and because British Energy is in serious financial trouble, to the tune of 60 billion pounds, because of its urgent need to decommission a large number of its old nuclear reactors, and try to deal with waste.

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They appointed Craig Stevenson, formerly Monsanto's top UK lobbyist, as head of government affairs, and Helen Liddell, the former energy minister (who has since been made Britain's Ambassador to Australia), on top of paying one million pounds to another PR firm. The Nuclear Decommissioning Agency has poached Jon Phillips, who ran a successful campaign for a fifth terminal for Heathrow, despite furious public opposition. Nirex, the waste disposal body, has taken on the public relations firm Promise to promote a multimillion-pound rebranding and naming exercise, and UKAEA has employed Grayling Political Strategy to help raise its profile. These people all have great skills at calling "Black" "White" and have come up with the completely ridiculous suggestion that nuclear power is the answer to the grave problem of global warming which we face.

The campaign has focussed also on the alleged shortcomings of alternative energy sources. They have been targeting businessmen, politicians and senior business journalists. Businessmen and politicians have been prepared to listen because all that they are interested in is a fast buck, without any consideration for the long-term consequences. Some nuclear physicists have been prepared to listen because it has given them some sort of hope that their life's work is of benefit to humanity, instead of facing up to the reality that all their presumably well-intentioned efforts are leading to the destruction of all life on this planet. It has even attracted support from some self-promoted environmentalists, such as James Lovelock. One wonders how many discreet breakfasts he has had with the industry at the Army and Navy Club in Pall Mall.

The topic should really be The Nuclear Industry, as nuclear power and the production of nuclear weapons are intimately related. I am wearing a badge that says, "The earth is flat, pigs can fly, and nuclear reactors are safe", and I think that that is a very accurate assessment of the situation. Anyone who believes that nuclear power is safe is also capable of believ-

ing that pigs can fly and that the earth is flat.

Our species *homo sapiens*, although a more accurate generic term should be *homo insapiens*, is standing on the very brink of an abyss, and our predicament has been inflicted on us by the nuclear industry. Einstein came to recognise this late in his life, and he said that if he had known what his formula would lead to he would have become a watchmaker. In fact we are extremely lucky to have survived so far. I remember vividly the Saturday in 1962 when the Cuban Missile Crisis occurred and it seemed inevitable that, for the sake of their false ideologies, Kennedy and Khrushchev were going to destroy us all, without even telephoning one another. Fortunately Khrushchev backed off, he and Kennedy telephoned one another and this led to the banning of atmospheric nuclear tests in the Northern Hemisphere, which had been going on since 1945.

Since then even more frightening nuclear incidents have continued to occur; the best known one involved a Colonel Petrov. In the crazy days of Mutually Assured Destruction when tens of thousands of US and Soviet nukes were pointed at each other, the triggers to destroy the world lay in two hands — in the US it was the President and in the USSR it was a senior military officer. In 1985 it was in the hands of a Colonel Petrov in the USSR, when he received a computer message informing him that the US had released a massive nuclear strike on the USSR. He was under strict instructions that if this occurred he must press the nuclear trigger to retaliate. Fortunately for us all, for once in his life, he disobeyed his instructions and *Homo Insapiens* survived.

Whilst hectoring other countries about nuclear weapons, the US is by far the worst offender. It still has 8000 nuclear weapons deployed, 2000 of them on hair-trigger alert, is continually upgrading them, and is planning to send nuclear weapons up into space, thereby abrogating the Anti-Ballistic Missile Treaty with Russia, and as a result Russia is developing new nuclear weapons. The US is also

spending billions of dollars on developing new nuclear weapons and has withdrawn the funding to decommission Russia's old nukes. Not to be outdone Tony Blair is about to spend billions of pounds on upgrading nuclear weapons for Trident submarines.

We Australians are involved in this madness right up to our necks because we host the US's biggest nuclear base outside their own country at Pine Gap, near Alice Springs, and are an integral part of the US's plans to put nuclear weapons into space at Tidbinbilla Space Station, near Canberra. Raytheon, the enormous US arms manufacturer, pays the employees at Tidbinbilla. Today NASA and the US Military are one and the same thing.

Countries who wish to develop nuclear weapons almost invariably use the excuse that they need the equipment for peaceful nuclear power. You may all be familiar with what has been happening in Israel, North Korea, Iran, Pakistan and India. An extreme example of the folly of the nuclear industry is Zimbabwe, which also has nuclear weapons ambitions. Half the 12 million people in this Central African country are starving due to the maladministration of Mugabe and 40% have AIDS, but none the less Zimbabwe Defence Industries, with the collaboration of both Iran and North Korea, are trying to develop a nuclear bomb from nuclear material which was looted from a US-provided nuclear reactor in the Congo, when Mugabe supported Joseph Kabila's army there. When Iranian President Muhammed Khatami visited Zimbabwe in March 2005, he and Mugabe issued a joint statement insisting on their nuclear rights and backing each other's nuclear programmes.

A.Q.Khan, the Pakistani nuclear physicist, has sold nuclear information to all and sundry on the black market, and so terrorist groups have the knowledge to build nuclear weapons, if they have not already done so.

Another concern is that the 150 nuclear power stations in the US are highly vulnerable to terrorist attacks. Another serious problem with nuclear power is the accidents which occur. The worst of these was at Chernobyl

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in April 1986 when 1,600 square miles of country were severely contaminated with radioactivity, and nuclear fallout was carried all over Europe and indeed all over the world. Whole towns of people had to be evacuated. It is estimated that 100,000 people in Russia have died as a result of the accident since then, and a huge variety of medical problems have occurred such as thyroid cancer in children, severe genetic defects, including a heart condition in children, known as "Chernobyl heart", and leukaemias and other cancers. I

It is frightening to realise that all this human carnage was produced by 3% of the radioactive waste products from Chernobyl. Tenuous attempts, costing hundreds of millions of dollars, are still being made to contain the other 97% in a rickety concrete and steel sarcophagus, but there is no great confidence that these will be successful, and it may well be that the next major global nuclear accident will again be at Chernobyl.

Other notable accidents have occurred at Three Mile Island in the US and in Japan, and they are occurring regularly all over the world. The authorities always try to cover them up. A massive leak at the nuclear reprocessing plant at Sellafield in Cumbria recently, which included waste from Germany, Holland and Switzerland, went undetected for nine months, and will keep it closed for several more months, leading to at least 300 million pounds being lost in revenue this year alone. Sellafield plutonium has been contaminating the population of the UK and Ireland for a long time. Evidence for this has come from a study of the plutonium content of 3,000 teeth in children all over the UK. All the teeth contained plutonium and there was a fall off in the concentration of plutonium in teeth from children who lived at varying distances from Sellafield.

Closer to home the uranium miner Energy Resources of Australia has recently been fined \$150,000 over a series of contamination incidents at its Ranger mines in Kakadu National Park. The BHP uranium

mine at Roxby Downs has contaminated the Great Artesian Basin with radioactivity. Another environmental problem associated with Roxby Downs is the enormous amount of water (35 million litres per day) it uses continually in our parched environment.

Despite opposition from the local inhabitants in Sutherland Shire the Government has commissioned an Argentinean company to build a new nuclear reactor in a suburb of Sydney, Lucas Heights, and there are already strong concerns about the structural integrity of the new reactor. Cracks have appeared in concrete below where the reactor would sit, and there are doubts about how accessible areas in the concrete might be to future checking once the core of the reactor goes in. There is no arrangement yet for disposing of the nuclear waste from the reactor.

One of the main reasons given for building a new reactor is that it is needed for nuclear medicine. This is false. With the exception of technetium, all the isotopes needed in nuclear medicine can be made in an apparatus called a cyclotron, and there is one of these in Melbourne, and another in Sydney. Technetium can be imported at a very low cost. It is interesting that the US imports all its medical isotopes. In any case, we should be developing safer techniques for medical diagnosis. The real reason for the Lucas Heights reactor is to remain in the nuclear weapons madness with the big boys.

Next, there is no way to store nuclear waste generated by nuclear plants, and these wastes last for tens of thousands of years and are highly dangerous to human health. The major storage centre for US military waste is in the Yucca Mountains, and in this area there are four well recognised earthquake fault lines. In the UK the Nuclear Free Local Authorities (NFLAs) have finally forced into the open a secret list of 537 potential underground nuclear dump sites throughout Britain covertly selected by the nuclear industry's waste management executive. These include cities such as Barnsley, Doncaster,

Hull, Southend on Sea, Caithness, Winchester and numerous sites in the West of Scotland, East Anglia and Wales.

Some years ago there was a move by a private company, PANGEA, to bury the UK's nuclear waste in South Australia. The life of the dumping site was 40 years, although the life of the harmful radioactive material was tens of thousands of years. Fortunately the plot was defeated. South Australia, and the rest of Australia, have suffered enough already from the UK atmospheric nuclear tests at Maralinga.

There is another harmful effect of the nuclear industry and that is depleted uranium (DU). This is a by-product of nuclear power and is used to make weapons because it is so dense and can inflict maximal injury. DU was used extensively by the US in the First Gulf War (300 tons of it) and even more so in the recent invasion of Iraq (2,200 tons and rising). This has led to radioactive contamination of vast areas of the country and to an increase in the incidence of genetic defects and cancers in children.

I think that we should look at the Nuclear Industry in eschatological terms. Either we close the industry down now or we will all be destroyed. This will apply not only to *Homo Insapiens*, but also to all species on this planet except cockroaches, which are resistant to radioactivity. It will mean also that all Music, Literature, Art — and most of all Love — will have been meaningless.

As I mentioned earlier, there is a ridiculous current proposal by the Nuclear Industry to say that the only way to save the planet from the ravages of climate change is to expand Nuclear Power. This is complete nonsense and should not even be debated. You do not solve a problem by creating a far greater problem. Nuclear power is far more expensive than other sources of energy, and needs a hefty government subsidy. It also produces a lot of carbon dioxide. Every stage in the process uses fossil fuels (oil and gas) — with

the exception of fission itself. Uranium ore has to be mined and then milled to extract the uranium oxide from the surrounding rock; it has to be enriched; the waste has to be processed and attempts made to store it; nuclear power stations have to be constructed, maintained and then eventually chopped into bits and stored away.

Global warming and global dimming are indeed very serious problems and, once again, are caused by our short-term greed, without any consideration for long-term consequences. Just as we must close down the nuclear industry, we must take immediate action against global warming by appropriate measures such as energy conservation and efficiency, and the development of renewable energy resources. Either alone will not suffice but numerous studies have detailed that, when combined, they can deliver the major reductions of greenhouse emissions which are required to stabilise the atmospheric concentrations of those gases. Instead of spending US\$1 trillion each year (half by the US) on weapons, we could be supporting these projects which are of vital importance to us all.

We are at a crossroads and the choices are clear-cut. We can either continue along the nuclear path, which will lead inevitably to the destruction of our planet and all life on it, or, we can close down the nuclear industry, and use our determination, common sense and scientific skills to develop a safe environment for us all. The choice is ours.



Moderator (Pete Griffith)

## Discussion

**Moderator.** The Panel has agreed to field questions. Is there anyone called Dorothy Dix in the audience? We intend to publish the Proceedings, so please identify yourself and any affiliation when asking your question.

**Steve Symonds:** *Professor Denborough, you were talking there about the cost of nuclear energy and you said that apart from the fuel itself there's the cost of mining the uranium, etc. But surely that cost applies to any form of power station, coal or oil or hydro-electricity, and this is going to be the same everywhere as far as the infrastructure is concerned? It's the cost of the fuel to the environment that you have to look at.*

**Professor Denborough.** That's a very important question. A point, which I forgot to mention, was the economic comparison between energy conservation and the nuclear industry. Careful studies have been done showing that conservation of energy is 7-times better than relying on nuclear energy. The important thing is we've got to concentrate on conservation of energy and on renewable energy sources. At the ANU we've got the world's greatest solar energy research institute and Bruce Hall uses solar energy all the time; this has not been funded by governments because they're greedy little bastards and they just want money from uranium. They should be investing in solar energy.

And there are other great things being carried out at the ANU. They're putting water down into hot rocks and getting energy that way. This is a safer way of getting energy. These are the things we should be investing in. We should be getting rid of the dangerous forms of energy. But first of all, conservation is the way to go.

**Moderator.** I have asked the speakers to keep their replies brief, so I'd like anyone who's asking a question — and who wants to preface their question with a statement — to know they're allowed one lung-full of air to do that. I think Professor Byrne would like to answer the question.

**Professor Byrne.** It's true that nuclear power stations are slightly more expensive than conventional stations to build. I think your point is absolutely right; whether you build a gas-fired station or a nuclear station they both cost money and they both use resources. As I tried to demonstrate in my talk, the amount of coal that you have to mine is significant — twenty times more than the amount of uranium ore that you have to process, so the energy cost of processing the uranium is much less. Using new centrifuge techniques enrichment costs less than 1% of the total energy output — it is just not true what they say about consuming CO<sub>2</sub>-producing resources.

**Hugh Sadler.** *My lung full of air is first of all to say that there is a very big difference in the capital cost of a nuclear power plant compared with, say, a gas turbine power plant — and the economics depend crucially on the discount rate that you apply to the analysis; you get favourable results if you use a low discount and unfavourable results if you use a higher one.*

*My question is mainly to Dr Keay. I was rather surprised that he still retains a 1970s level of enthusiasm for the back end of the nuclear fuel cycle. Are we going to have a better sort of reprocessing plant than the one at Sellafield and the one at Cap La Hague, which are the only two "commercial" reprocessing plants operating in the world today? Both have atrocious radiological records.*

*And I was also surprised to find him — and I thought possibly also*

## Discussion: Nuclear Energy

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*Professor Byrne, advocating the use of mixed oxide fuel. This has to be moved from the reprocessing plant into the fuel fabrication cycle in the face of the changed world environment with regard to terrorism. Even when this was first proposed in the 1970s there were a number of perceptive people, such as Ted Taylor, who were arguing that there was a very severe terrorist risk of only a small part of this mixed oxide fuel being seized and used to make a dirty bomb.*

**Moderator.** I'm not sure what the question was but perhaps the speakers would like to address this.

**Dr Keay.** I'm not sure that I can manage it in one lung-full either. As far as the reprocessing is concerned, the gentleman mentioned a couple of reprocessing plants. They date back several decades, and the technology and the techniques used have moved on a great deal since then. The problems are not as great as they were years ago. As far as terrorism is concerned, back in 1978, during the Windscale Enquiry, Greenpeace claimed that terrorism was a real problem. Mr Justice Parker discounted that; he said nuclear electricity has been generated safely for 25 years without ever...

**Hugh Sadler** (*interjecting*). Judge Scott did not discount it, so why don't you talk about what Mr Justice Scott said...

**Keay.** What I'm saying is that at the Windscale Enquiry, the judge said there hadn't been any notable terrorist action in 25 years and that he didn't regard that as being a major problem. All I can say is that another 25 years have gone by and there still hasn't been a terrorist attack. If you go back to the nuclear fuel cycle that I put up on the board, reprocessed nuclear fuel contains a considerable amount of higher isotopes of plutonium. Thus it is almost impossible for the plutonium in the mixed oxide fuel to be used in a nuclear weapon — so it's not going to be much profit to a terrorist to hijack the plutonium in that fuel. If a terrorist really wants to terrorise using nuclear means the easiest way is to get hold of one of the existing nuclear weapons and use that.

**Byrne.** Can I make a comment? Something I didn't have time to go into is, which fuel cycle is the optimum one? The line that the Americans have been pushing for many, many years is that one should do a single passthrough. You mine the uranium, put it in a reactor, then put it in the ground — end of story. And that's quite a good solution provided you know exactly what uranium resource you have, provided you know how much it costs, say, to extract uranium from seawater. The numbers that I put up there are the best numbers we know. I think it's very important to try and quantify exactly how much uranium there is in the world. One doesn't necessarily have to go down a reprocessing route unless one wants to use nuclear power for hundreds of thousands of years. Okay, so one doesn't necessarily need to do that.

**Alan Parkinson.** *I don't want to pre-empt a talk that is coming up on this subject in the ABC Ockham's Razor series, but I would like to introduce something that has not been mentioned, and that is Australia's own nuclear power project at Jervis Bay. When we set about that project we had a handful of engineers and scientists with firsthand experience in the design and construction of nuclear power reactors. We do not have that expertise now. All of those involved are retired, as I am. We also — and this was a big mistake with Jervis Bay — had no nuclear regulatory organisation for that project. The people who were looking at the safety of the reactor were employed by the AAEC, which is now ANSTO, and therefore they were not independent of the project itself.*

*So, long before we can have any nuclear power project in this country, if we are to have one, we need to first of all have a truly independent nuclear regulatory organisation. I'm not denigrating ARPANSA in this, but they have responsibility only for Commonwealth sites. A nuclear power project would be a State project and therefore the States must be involved in the regulatory framework; then when we have that we can employ*

*nuclear engineers and scientists for a project.*

*Dr. Keay's fuel cycle that he illustrated was similar to proposals in the 1960s and 70s for an independent nuclear fuel cycle within this country. Nobody mentioned the Windscale reactor accidents. They were not power stations of course; they were just built to produce plutonium. One of the reactors caught fire and spread fission products all over the Windscale area. And nobody mentioned research reactor accidents such as the SL-1 in which one operator leaning over a control rod for a moment moved it to critical, and he was pinned to the ceiling of the building.*

*And just to show how silly some people can be about radiation, I was asked the other day by a person how smoke alarms work, and when they found out that they contain Americium-241, which is radioactive, they sent the alarms back and said they didn't want them — they'd rather risk the fire than the radiation!*

**Denborough.** I wonder if I could respond to the question — but first of all, I don't think that person was so silly. You can buy fire alarms without radioactive americium without any difficulty ... you just have a battery. So if they prefer that, why dictate to them they should have a radioactive one? And I'd like to ask a question if I might. How do you get an independent regulatory authority?

**Alan Parkinson.** *You make it totally independent of the people who are building the reactors.*

**(Interjection.)** *And the government?*

**Alan Parkinson.** *I gave a talk in 1978 to an engineering conference in Adelaide saying there should be an independent state/federal regulator responsible through Parliament and not to a Minister.*

**Moderator.** We do have independent organisations like the ACCC, so I don't see that as a problem.

**Robyn Curnow.** *Professor Byrne you said that you would explain the story behind the picture that you showed at the start of your talk.*

**[Editor's Note:** We were able to reproduce the picture for this article. It can be found by googling Mülheim

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Kärlich Reactor and some perseverance.]

**Byrne.** The Mülheim Kärlich reactor ....that's a very interesting reactor. It's Germany's newest reactor and its largest. It was commissioned, unfortunately, in March 1986 — as opposed to April 1986 — and it remained in operation for only 13 months. Local groups raised the concern that no audit for the earthquake risk for the Rhine Valley had been done before commissioning that reactor. Because of the long protracted debate that followed, the reactor didn't reopen after the 13 months operation. It was a brand new reactor, costing several billion dollars. It was mothballed and was eventually decommissioned.

It's a bit like buying a Mercedes car and finding you can't register it in the ACT because the brakes haven't been tested on ACT roads. So depending on your point of view it's a triumph for the Green movement — or a catastrophe. One of the reasons nuclear power stations are so expensive to build is that it's actually very difficult to get finance for them because of the risk — because of what might happen. You might build your power station and then not get it commissioned, and that's exactly what happened with that reactor there, sitting on the Rhine River.

The Rhine River is an artery that runs through central Europe. I took that photo just after another accident in Basel — a chemical accident which spilled toxic chemicals into the Rhine River, killing all the fish for hundreds of kilometres. As a consequence of that accident we are not closing down the chemical industry but we did, because of Chernobyl, close down the nuclear industry. That's the choice that we made then but it may not be the right choice given that waste from coal burning is going to have a serious impact on our planet.

**Robin Shannon.** *My question is for Professor Denborough. We have to do something about global warming obviously.*

**Denborough.** Sure!

**Robin Shannon.** *The other speakers raised some problems with solar only being available during the day — and thus we need nuclear power for*

*the moment anyway. What would be your response to the problems with alternative energy at the moment?*

**Denborough.** As I mentioned, this PR exercise, which has been going on for a year now... has been aimed at denigrating other forms of energy production — that's one of the games. And all the spin in the papers and so on is about denigrating renewable sources of energy. I think the main point really is that we should be conserving energy. As I mentioned earlier, conserving energy, is 7 times more efficient than having a nuclear power industry producing energy. Very many studies have shown that the combination of renewable energy resources, which are still in the development stage — but in a high stage of development and could become much better — plus saving energy, is sufficient to hold down the greenhouse gas. There are numerous studies, which you could look up on the Internet.

**Robin Shannon.** *What about the baseline problem that was talked about before ... that renewable energy has peaks and troughs? You have lots of solar energy during the day and not during the night. What do you do?*

**Byrne.** Can I just jump in? There are a couple of points that I actually disagree with Michael on there. If you want to go and look at this issue, look up carbon mitigation on the Internet. Go to the Princeton website where they discuss the various things that you have to do to try and ameliorate this increase in carbon dioxide, which will happen if we do nothing. One of these alone will not do it. We need 8 or 10 different components.

And the sorts of components we need are an increase in nuclear power by a factor of two — that's one component only. We need to make vehicles twice as efficient as they are. That's very hard to do, as that's not a trivial efficiency. We need to increase wind power by a factor of about 100. We need to increase solar power by a factor of about 700. There is no simple solution to coping with the peaks and troughs other than to have a very expensive storage system. That makes the whole process more expensive. At the end of the day we should

be investing in renewable energy resources, and we should be investing in research in these activities — but somehow you have to smooth out the peaks and troughs and you have to do it an economic way. One of the things that actually dismays me in this country is the lack of uptake of renewable energies like wind resources. And why aren't people taking it up? One of the reasons is because it is expensive — and unless you can deal with the economics of these things you will not solve the problem.

**Keay.** Intermittent sources of power like wind and solar create real problems for any grid system, as has been discovered in Denmark and Germany. They've got very real problems in trying to get rid of excess power when the wind is blowing everywhere, and to make up a deficiency of power when they've got no wind or sun. Now what happens is, when you get to about 20% penetration by an intermittent energy source — like wind — the actual saving you get is nearer 6 or 7%. In a letter in the *Sydney Morning Herald* a week or two ago, a correspondent asked how many windmills or what area of solar panels would be needed if Sydney was to convert to solar or wind power. The answer, which I gave, is that to satisfy Sydney's power needs, you would need 44,000 Kooragang-sized wind turbines each with a rating of 600 kilowatts, or 1200 square kilometres of solar panels. The respondents to that correspondence said, "that's no problem, there's plenty of area out beyond Bourke, you can have all these panels". Of course the problem is that it doesn't make up for the intermittency and you still have the issues of transporting the power from the outback into Sydney, which is not a trivial problem. As I think I mentioned in relation to the German study, the amounts that need to be spent on the grid infrastructure are very considerable, and you cannot get away from that problem. Denmark has given away wind power and Germany looks as if it's not going to expand wind power as much as they had hoped.

**Richard Gray.** *My question is directed to any of the panellists. I understand that a normal coal-fired*

## Discussion: Nuclear Energy

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*power station emits more uranium over its lifecycle than a nuclear powered station — a normally functioning nuclear power station — does over its lifetime simply because of the trace amounts of uranium in coal which are emitted through the exhaust. And I've seen reports that this is measured in the tonnes. Is this another myth?*

**Byrne.** It's not an urban myth — it's true. Uranium occurs in around two parts/million in coal. If you burn two million tonnes of coal, two parts/million is four tonnes of uranium. [Moderator's note: during the actual discussion the figure of forty tonnes was used in error]. Two million tonnes of coal is required to produce one gigawatt of electricity per year. The uranium is in the fly ash at a concentration of 20ppm. See for example, [geology.cr.usgs.gov/energy/factsheets/163-97/FS-163-97.html](http://geology.cr.usgs.gov/energy/factsheets/163-97/FS-163-97.html)

**Richard Gray.** *And that goes straight into the atmosphere obviously?*

**Byrne.** No. The uranium doesn't go into the atmosphere. It goes into the ash. It depends on what you do with the ash. Now the ash can get stored somewhere, so it's a radioactive waste — oh, we don't talk about that — but it does get stored. It also gets used for building, as a component of cement. But, again I wouldn't worry about that; the amount of radiation from it is not a serious issue. Radiation is around us everywhere, it's ubiquitous. We've lived with radiation for as long as we've been on this planet. We will continue to live with radiation. It's not a major issue. But there is uranium there, there's thorium there, and there's radon — all of these things — plus chemicals like selenium, arsenic, cadmium, which are very, very toxic chemicals .... forever.

**Denborough.** This is an interesting point but it seems to be highly unlikely to be true. Does this apply to coal from wherever it's mined? This figure of 40 tonnes ... is this wherever the coal is mined? Because it's not widely known by many people.

**Byrne.** It's variable. It varies...

**Denborough.** Varies — yes, you've quoted the upper thing, haven't you?

**Byrne.** No, it varies. It varies. It can be that high. It can be that high.

**Denborough.** Can be, yes.

**Byrne.** But if it's low... if it's low it's still in a few parts per million, which is still a few tonnes. It is in the parts per million — it is not less than that.

**Denborough.** Oh, it's coming down!

**Byrne.** Well it's still 2 tonnes so... I mean it's still a finite amount.

**Moderator.** Can we have a question which doesn't get the speakers at each others' throats, please?

**Nick Ware.** *I am a retired x-ray microanalyst. I used to work on the SynRoc Project many years ago and I'd like to hear from all three members of the panel. Two are saying all you have to do to get rid of nuclear waste... let's dig a hole and put it in it and one is saying that no proven method of nuclear waste disposal exists. Well I've got a little bit of SynRoc here, which was made 25 years ago now and I would like their comments. It seems to me that it is the height of folly to just dig a hole and put waste down when you know that fluids in the biosphere are going to dissolve it and take it up into the biosphere. To avoid forever having problems you really want to get rid of this waste for at least millions of years. Well SynRoc will do it for 500 million years, and that's proven. You've only got to look at the minerals that make up SynRoc, or even the new versions of it using pyrochlor, to see that even with 20% concentration of radioactive nuclear waste in this material you don't lose one atom. For example, the mineral zirconolite found in Sri Lanka is 680 million years old. And in metamict, although the crystal structure is gone, not one atom of uranium or thorium has left this structure.*

**Byrne.** I think SynRoc is a wonderful idea. There's no question that it is possible to trap radioactive elements in rock matrices — it is a very, very sensible solution. You can do it, and it's worth doing — no problem. At the moment I believe ANSTO has got a contract to set up a prototype facility at the Sellafield reactor to encapsulate plutonium. It is a very, very clever Australian invention — we should be proud of it. It is a way of

encapsulating radioactive materials. I have no problem with it at all.

**Denborough.** Yes, I think that's a very important point. The thing that surprises me, of course, is that the SynRoc story has been around for decades and if it was so good why hasn't it been developed? I just don't understand it — it's anomalous. The other thing is that not everyone shares your enthusiasm for SynRoc. In the recent government enquiry into the new nuclear reactor the specific question was asked whether they would want to manufacture SynRoc at the reactor and the answer was it should be done by private industry — in other words, keep it at arm's length. And I find that difficult to understand too.

**Nick Ware.** *I quite agree with you. It should not be done by private industry. Most of the nuclear cycle should be kept away from private industry.*

**Denborough.** Well if it's so good, why the hell don't they do it at Lucas Heights?

**Nick Ware.** *It's being done in America. It's been used since 1997 in the hot form.*

**Moderator.** So basically SynRoc is usable, but we're not doing it here and I guess that's a political decision.

**Owen Collins.** *I just wanted to ask Professor Byrne for his opinion on the future of fusion as a nuclear alternative. I'm thinking of projects like the ITA project in Europe.*

**Byrne.** One of the things I showed on my overheads was the time between when we understood the physics of nuclear fission and when we had our first reactor, and that was two years. Okay, two years between understanding the physics of a process and having essentially a working reactor. Now fission is a simple process. Fusion is a very, very tricky process. It involves taking hydrogen atoms, putting them together under high temperatures and high pressures. We are still learning how to do that. The standard line with fusion is that it will take another 50 years at least before we're able to master that technology. The fission process is the one we understand. Fusion, the building up of atoms, is a much, much trickier thing to do. It is going to take

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a long time. It is a large-scale process and it is not at all certain at this stage whether the process can be scaled in an effective way. It's a tricky process involving lots of different ingredients which need to be correct before the system will work. It is also not clear whether it would be easy to integrate such a system into a power distribution network ...

**Jim Lissaman.** *I'd like to make four points, if I may. On the issue of storage, which is fundamental to any intermittent power source, in making that workable we should be looking at pump-storage and maximising that as a method of providing an alternative to baseline power sources such as nuclear power. We could do a lot more about that. With pump-storage basically you use the intermittent power to pump the water up to the top of a hill, then you allow the water to drain down the hill to generate hydropower in the period when you want it — when the wind isn't blowing and the sun isn't shining.*

*As for the economic side of things — if you took away the massive subsidies governments have placed in the nuclear industry's hands and got a realistic figure for the dollars/kilowatt hour, then you truly have a better comparison with alternative energy sources. I think that's fundamental. We should be talking about level playing fields.*

*Now the greenhouse aspect is surely something that we should all be fundamentally concerned about. When you take into account the fact that if you use a once-through fuel cycle you will eventually run out of high-grade nuclear ores, and once you start getting into the lower grade nuclear ores you then end up with a greenhouse energy debt in the fuel cycle, and that's been very well demonstrated by many, many scientists of good repute. And why does it cost you more to build a nuclear power station than a gas turbine? ... simply because you don't have to have a bloody great containment zone around the gas-fired station. Fairly obviously you have an enormous investment in energy-rich components to protect the nuclear core.*

*And finally, in regard to fusion, I think 93 million miles is probably the*

*right distance to have between yourself and an operating fusion reactor.*

**Byrne.** There are a few points — one is pumping of water. That's actually a very good idea. I think I'd have to say that the damming of rivers to create lakes for hydropower has gone out of fashion. It's now not environmentally acceptable to dam large areas and fill them with water. So your idea is basically a good one — that you pump water uphill and let it run down — but, again, this meets with a lot of resistance where it has been proposed. You mentioned the costs of fuel for nuclear power as you deplete your resources. I think it's very important that we actually quantify how much uranium there is in the world before we can make intelligent judgments about how long it is going to last, but at least we know it's going to last several hundred years, so we've got several hundred years to do that. But we should do it soon because it affects policy decisions. It is not true that the processing of these things costs you more in CO<sub>2</sub> and that the energy density of this material is enormous — it's just not true. There was one other point that you mentioned ... the subsidies. That was very interesting. The web is a source of interesting things, but do not trust anything...look everywhere. Do not trust the nuclear industry, do not trust the anti-nuclear industry — you've got to look around and decide what you think is the best. The Massachusetts Institute of Technology did a recent survey on nuclear power. They've costed it in detail without subsidies and it is still competitive with gas and with coal. Now gas is interesting because you can have gas turbines that run very efficiently — up to 50% efficient, which is tremendous. But if you convert gas to electricity, you will waste half the energy. The best way to use gas is to reticulate it — to pipe it into your homes or your factories and burn it directly so you use 100% of the fuel. The generation of electricity with gas is incredibly wasteful. We shouldn't be doing it. We waste half the energy immediately where we could conserve it. So they're very complicated issues. You raised some good points there, but I

don't think you've got the facts quite right.

**Andrew Robbins.** *With coal-fired power we're not paying the true cost of that power. Economics doesn't take into account the hidden costs to the environment, so we're going to have to go for carbon sequestration, or some massive cost to rehabilitate the earth as it is. Are we letting ourselves in for the same thing with nuclear power? Are we taking into account the long-term environmental costs in these economic arguments?*

**Byrne.** I'll stick my head in the noose. Look, the difference between coal-fired power and nuclear power is the energy density of materials. So the waste problem that you have to deal with for nuclear is very small: there's a relatively small volume of material that you can deal with effectively. The problem with CO<sub>2</sub> is that it's an enormous volume that's very, very hard to deal with — and that's expensive. So you have to weigh those two factors up.

**Unknown Interjector** *What's the time frame?*

**Andrew Robbins.** *It's 100,000 years that you have to look after these things. I mean the pyramids have been here for six thousand — I'm not sure that any structure man has built has lasted 100,000 years.*

**Byrne.** No, but the rocks have been there [for] 4.2 billion years. So we have rocks in Australia that have been around and stable for 4.2 billion years. Geological timeframes are of that order.

**Ben Smith.** *I noticed that this evening the two nuclear physicists had very little to say about nuclear weapons. In 1989 I was in what was then East Berlin and a Russian scientist who worked in a nuclear power station told me that scientists who work on nuclear weapons could work in nuclear power stations and vice versa. I heard the same thing from French scientists. This deeply concerns me. So many of your colleagues throughout the world today are working on nuclear weapons — ever larger, ever smaller, ever more efficient. Does that at all concern you? Would you like to tell us what a medium size nuclear weapon detonated above say a city the*

## Discussion: Nuclear Energy

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size of Sydney would do to its population? Perhaps Michael Denborough might like to have something to say about that.

**Keay.** Well can I chip in here? I came to this panel on the understanding that the subject was nuclear energy for Australia — there wasn't mention of nuclear weapons.

**Ben Smith.** Well, they're connected.

**Keay.** To the same degree as gasoline is to napalm or glycerine is to nitro-glycerine?

**Unknown Interjector.** That's a totally different order of things.

**Moderator.** I think we probably should stick to the subject of the forum. Weapons are another issue. I know that Professor Denborough believes the two are related and clearly you do too. So I'm going to now ask the three speakers in reverse order just to summarise their position.

**Denborough.** I think the last question was an extraordinarily important one and I don't think it can be just dismissed like that. You can't talk about nuclear power on its own because nuclear power is intimately related to nuclear weapons and that is the greatest threat that the whole world faces. To try and say, "Come and talk about nuclear power" and nothing else is garbage.

So that's put simply. I think that we've had a very useful discussion. I think one of the things I would like to stress again is that we've got to take global warming seriously, and the main way to go is to conserve energy, and that's 7-times more important and more efficient than nuclear power. In addition, we've had some very good suggestions from the audience about other ways of conserving energy ... and providing the energy which we will need. I think cars are now available which you can drive without the energy consumption that was needed in the past... and so on. There are all sorts of ways. We should

be putting our scientists and our brains to solving that problem and stop this nuclear madness. Thank you.

**Keay.** I was at some pains, as I think many members of the audience will appreciate, to draw a distinction as far as nuclear weapons are concerned. When the word enrichment is mentioned, enrichment does not necessarily imply weapon-grade material. I pointed out that enrichment can be conducted to a much lesser extent, and the uranium is still useful for peaceful power production. I am against nuclear weapons, probably half as much as Professor Denborough who seems to be very committed against them. I don't believe in them. But I do remember — because I lost relatives in the Second World War — that nuclear weapons were responsible for the termination of that war....

**Denborough.** [interjecting] Not true.

**Keay.** .... That's a very doleful connection but, ah, I think it needs to be said. The problem is a geopolitical one. We have to have some kind of international safeguard to prevent nuclear weapons being developed by rogue countries. I think that's the biggest peril that we have. I want to see a better world for my five grandchildren, and I think nuclear power will do it as long as we can control nuclear weapons — controlling them by virtue of trying to suppress the nuclear industry is in my view counterproductive because as long as we've got independent countries around the world, if they want nuclear weapons the know-how is there and they'll jolly-well get them, and that's what we have to prevent.

**Byrne.** Maybe I'll come back to the power issue. I think what's really important for us is to realise whatever we do, the energy consumption of the people on this planet is going to go up: it's going to double in about 40 years.

And it is not a question about either/or. We must conserve energy. We must consider renewable resources. We must do our best on all of these fronts. It's not a question of saying "just do energy efficiency" or "nuclear power" ... we have to do all of them. At the moment we have about 20% of electricity generated by nuclear power. We cannot just switch it off. It is going to be with us. And an increase, a modest increase in nuclear power, will ease the burden. Whatever you do, generating power, it costs you somewhere. There is no free lunch. Coal power has its problems, solar power has its problems, wind power has its problems, and nuclear physics/nuclear power stations have their problems. What we have to do is try and sit down rationally and assess what the options are — and what is the best way to do it.

### Further reading:

*The Future of Nuclear Power*; Massachusetts Institute of Technology 2003  
[web.mit.edu/nuclearpower](http://web.mit.edu/nuclearpower)

*Chernobyl: Assessment of Radiological and Health impacts*; and *Chernobyl's Legacy: Health, Environmental and Socio-economic Impacts*; International Atomic Energy Agency. [www.iaea.org](http://www.iaea.org)

*The Costs of Generating Electricity*; The Royal Academy of Engineering March 2004 (ISBN 1-903496-11-X)  
[www.raeng.org.uk](http://www.raeng.org.uk)

*Carbon Mitigation Initiative*, Princeton Environmental Institute  
[www.princeton.edu/~cmi/](http://www.princeton.edu/~cmi/)

Books by Colin Keay, The Enlightenment Press: [www.enlightenmentpress.com](http://www.enlightenmentpress.com)

*Nuclear Common Sense*

*Nuclear Energy Fallacies*

*Nuclear Energy Gigawatts*

*Nuclear Radiation Exposed*



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# Idealism & Materialism; Religion & Science

**John Warren**  
**Annandale NSW**

In his comment (*the Skeptic*, 25:4) on an article of mine, Michael O'Rourke has raised a number of issues which bear on those age-old questions: How do we understand our relation to the world and how do we use that understanding? Michael thinks that I misunderstand the terms *idealist* and *materialist*. He clarifies the difference between those two concepts 'very crudely' as: 'for idealists the world is an Idea, while for materialists the world is a Thing'. He goes further and recommends a reading of Bishop Berkeley as an antidote for materialist misconceptions.

It is, I think, a matter of some practical concern for Skeptics because one of our great aims is to encourage people to separate reality and evidence-based belief from belief in disembodied spirits and the output of astrologers, fortune-tellers and assorted charlatans who peddle their fictions as reality.

My own understanding is that idealists are that class of people who believe that there is a realm beyond the natural one we live in — a supernatural world. That world is occupied; for some by an Absolute Idea, for others by a variety of gods and spirits or an Intelligent Design. The characteristic of all these supernatural beings or forces is that they have pre-ordained a plan for the development of the world and we, together with our world, are just the working-out of that plan. It follows that our relation to the supernatural is one-sided, we cannot influence it; our

role is, like Rumpole of the Bailey, simply to obey.

Materialists and Idealists have very different, almost diametrically opposed, ways of viewing the world.

Bishop Berkeley was a leading philosopher of Idealism in the 18th Century. His major work was *A Treatise Concerning the Principles of Human Knowledge*. That work was not an investigation into the nature of knowledge, it was, rather, a manipulation of words to justify a pre-established concept. Berkeley, like other Idealists, was a firm believer in the existence of God or His equivalent and a realm occupied by immaterial beings with immaterial minds. Berkeley sets out his aim in writing the essay in the first sentence of the Preface:

*What I here make public has, after a long and scrupulous inquiry, seemed to me evidently true, and not unuseful to be known, particularly to those who are tainted with skepticism, or want a demonstration of the existence, and immateriality of God, or the natural immortality of the soul.*

Berkeley wanted to crush the unbelievers. Since his philosophising was directed to that specific end he did not, could not, contemplate the nature of knowledge separate from his belief that God was behind it all. His position was summarised in the following paragraph in the essay:

*It is evident to anyone who takes a survey of the objects of human knowledge, that they are either ideas actually imprinted on the senses, or else such as are perceived by attending to the passions and operations of the mind, or lastly by ideas formed*

*by help of memory and imagination, either compounding, dividing, or barely representing those originally perceived in the aforesaid ways.*

If, by that formulation, Berkeley meant that there are two sources of ideas in the brain: the one as a result of external stimuli acting on our nervous system; the other arising from reorganisation of those ideas within the brain itself, I, for one, would agree with him. However, Berkeley starts with the belief that there is a supernatural world and that world is peopled by minds without bodies; that is, the mind can have an existence without a body or brain. It was a short step then for him to conceive that an idea can also exist without a physical brain.

Berkeley developed a principle: *esse est percipi* — to be is to be perceived. In other words, things of our world only exist while a mind perceives them and since all human minds die the world can only continue to exist while an everlasting mind continues to perceive it; and the only everlasting mind is the mind of God. Which is the conclusion Berkeley set out to reach in the first place.

On the contrary, materialists believe that the mind is a product of the brain's processing of all the information provided through the body's sensory organs. A mind is impossible without a human body and brain. Individual bodies and minds die but the ideas which they generate live on forever by being passed on, in one form or another, to future generations. Ideas, however they are formed, are untrammelled.

**Continued p 60 ...**

# Rights – Another View

**Nicholas Cowdery**  
**Sydney**

James Allan (Some Skepticism About Rights and Their Effects; *the Skeptic* 26:1) urges us to be skeptical [sic] about bills of rights, so let's do so. Let's look at the matter objectively and draw some rational conclusions.

But first some disclosures. I am a lawyer (but I am not in the business of promoting new areas of practice for my colleagues, even Martin Hadley). I am a lifelong atheist (well, since the age of six) and therefore not attracted to any basis in faith for natural law and natural rights. It's a jungle out there and as a jungle dweller all I want is a reasonable measure of protection from the predators. I support a charter of rights.

Professor Allan's historical account of rights is OK, as far as it goes. It is a big subject. He identifies himself as a utilitarian liberal, one who talks "in terms of ... fundamental human rights". One of the protections they offer is the individual's protection against the state and, if for no other reason, that is sufficient to my mind to support a charter of rights in a form that is not constitutionally entrenched and that does not override the will of the people expressed through parliament.

That can be achieved. In a speech given on 16 May 2006 the NSW Attorney General, Bob Debus MP, said:

*In the common law world, Australia is the only country that has neither a constitutional nor statutory bill of rights. I used to be content with that position, but now I find myself restless, having witnessed and, to a*

*lesser extent, participated in some of the major legislative responses to the threat of terrorism. I know I am not alone in experiencing this shift. That is why I flagged consideration of a community consultation process to determine whether a Charter of Rights would enjoy community support... What we are talking about is not a Bill of Rights, but a document that clearly outlines and preserves principles that Government should take into account when drawing up laws... There is value in consolidating the rights contained in existing legislation and getting community feedback on these and other proposals;*

and he cited freedom of expression, freedom of association and the right to vote as being among the rights to be addressed.

It matters not that "proclaimed human rights are said to exist whether recognised or not in a particular jurisdiction's legal system" (per Professor Allan). First, the division of the globe into legal jurisdictions is quite arbitrary and the extent to which individually they protect their inhabitants is very mixed — statutory recognition of aspects of life is an evolving process. Secondly, why on earth cannot a community, with appropriate education and consultation, decide just what rights it does want to have declared and protected to some greater extent by law? This already occurs indirectly, incompletely and lamely through the usual lawmaking process — but clear identification and pronouncement must be a step forward.

Professor Allan says that "Most of today's rights defenders and rights advocates — explicitly or implicitly

— are natural law adherents. They support rights in natural law terms and with all the hints of absolutism that implies." Well, in my experience in Australia and internationally over the last 15 years or so that is not the case; but even if it is, identification of rights to be addressed specifically and the means adopted for their protection should always be the result of consultation and agreement among the population generally and "absolutism" would have no place in that outcome.

Professor Allan also cautions against the recency of the "renaissance of rights-based thinking", being post World War II. So what? Does that mean that no new idea can be a good one? Or that no revived idea can be useful? If the need for protection of our rights — or values or liberties or freedoms or however you describe them — is present, why not use effective means to pursue it?

Who would doubt that the inroads into our freedoms by the Commonwealth Government in the cause of protecting us from terrorists call for a response? As Lord Bingham of Cornhill, in striking down one anti-terrorism measure in England, said:

*The real threat to the life of the nation, in the sense of a people living in accordance with its traditional laws and political values comes not from terrorism but from laws like [this law]. That is the true measure of what terrorism may achieve. It is for Parliament to decide whether to give terrorists such a victory.*

Parliament needs the guidance of a charter of rights in making such decisions.

Apart from a very small number of officials, who would doubt that, by degrees and with stealth, we have

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reached a truly offensive position with David Hicks' continuing imprisonment at Guantanamo Bay; or in our handling of asylum seekers in Australia?

The protection of rights is not inimical to utilitarianism (which focuses on our improved welfare). Emotionalism need not enter the debate (and should not). The declaration and enforcement of rights need not lead to excessive litigation or "an excessive politicisation of the judiciary". It all depends on how the charter is framed. Legislation can always be made to trump the judicial process.

Professor Allan says:

*The issue is, who do you want deciding the contentious issues, elected politicians (with all their admitted faults but also all their accountability) or unelected judges (with next to no accountability, other than to their own consciences)?"*

Well, judges are actually very accountable — they work in public, their decisions and their reasons are subject to public scrutiny and they are subject to appeal. Professor Allan finds fault in the fact that if judges (on an appellate court) cannot agree, they decide by a vote. And politicians don't?

For my part, I would **much** prefer to have contentious issues decided by judges in accordance with the rules made by politicians. It is called democracy under the rule of law and exactly that is possible with a charter of rights, objectively considered.

*Nicholas Cowdery QC is the Director of Public Prosecutions for NSW*

# Limits on the State, Not Demands from It

**Peter Arnold  
Edgecliff NSW**

My qualifications for contributing something on rights are not on a par with those of Prof James Allan (26:1). However, having grown up in South Africa in the apartheid era, and having been involved in the anti-apartheid movement of the 50s and 60s, I have some practical experience of rights. I wish to explore some aspects missing from Prof Allan's discussion.

First, the United Nations' famous declaration is about 'human' rights. This has always struck me, not only (*pace* Peter Singer) as being tautologous, but as obscuring what I would see as being more important, namely the rights of the individual. Based on my practical experience in South Africa, and leaving aside philosophers' and politicians' epistemological debates, the fundamental issue of rights concerns the position (and protection) of the individual in relation to the state.

Second, my mention of South Africa underscores my second point: rights matter in the breach, not in the observation. It is when individuals are deprived of their rights, as against the might of the state, that bad things happen. The possession of rights is neutral: good things might happen; bad things might happen. So I would see that the rights of the individual make far more sense if defined in the negative, rather than in the positive.

For example, "the state shall not imprison a person without a fair trial" is a far stronger statement of

the rights of the individual than the almost Kafkaesque claim, "every person is entitled to a fair trial". The first sets a categorical limit on the power of the state (think here of Magna Carta, which uses phrases such as "No man shall be forced..." and "No town or person shall be forced..."), while the second makes a weak, arguable (and therefore beloved of lawyers) claim on the state (think here of the UN declaration, with its frequent use of "Everyone is entitled to...").

Third, this type of weak claim on the state lends itself to extension to many more claims on the state, such as every person being "entitled" to a decent education, social security, health care, safe roads, etc, as of "right". The list is almost endless, as seen in the UN Declaration, which is no more than a catalogue of claims on the state's beneficence.

Negative rights, which prevent the state from doing things which are inimical to the interests of the individual, are a much stronger guarantee of the individual's liberties than these "begging" claims on the state to do helpful things.

Fourth, we must consider the consequence of these "begging rights", namely that, if "the people" are "entitled" to these services, then some other people must provide them. The state cannot teach, it cannot design roads, it cannot heal people. All of these services can be provided only by people with professional training and experience. The one thing, of course, which the state can do is the one in which professionals play no role: providing money through social welfare programs.

## Forum: Rights

Claims on the state to provide services which can only be delivered by professionals creates the never-ending conflicts between the state and the professionals, whether teachers, academics, nurses, doctors or whomever, seen in almost all rights-driven western societies.

### Limiting rights

Far more logical for rights to be stated in the negative: that the state shall not deny any individual a particular service on the grounds of that person's ethnicity, poverty, religion, race, colour, political affiliation etc. This does not mean that the state must provide everything for everybody. Demand is insatiable and rationing inevitable; but the negative statement goes a long way towards ensuring fairness in the rationing process.

Prof Allan conceded that he "cheated a bit" in dismissing Benthamite utilitarianism. Indeed, he supports it as a ground for establishing rights, as I do. But his argument stops short of the logical extension, and necessary qualification, of utilitarianism, namely provision against de Tocqueville's "tyranny of the majority".

Bentham's "greatest happiness for the greatest number" might well be served by the provision of subsidised Macdonald's hamburgers and French fries, accompanied by subsidised cans of Toohey's or Carlton's at football matches (whatever code) on the weekends. But would that make for a good or a wise society? One is reminded of the Roman emperors' *panem et circenses*. Utilitarianism needs de Tocquevillean modification

to, as Prof Allan puts it, "increase social welfare".

I agree with him heartily when he talks of the need for a hierarchy of rights. I would, after my South African life, very much wish to see an Australian Bill of Limiting Rights, amendments to our Constitution which put limits on the power of all Australian governments, and which does so in an hierarchical manner, so as to take decisions on conflicting rights out of the hands of judicial majorities.

What I would vehemently oppose would be an Australian Bill of Begging Rights, where every pressure group (including those with whom we Skeptics so frequently clash) put in their bid for a handout (by arguing that it is their "right"ful entitlement).

It is not the people, as individuals, who need rights graciously conceded by the state; it is the power of the state which must be limited to allow people their freedom to consider, to decide and to follow courses of action which do not deprive other people of those same freedoms.

Prof Allan is quite right when he says that we Skeptics are skeptical about a bill of rights. We are, if they are "begging rights". But if they are hierarchically-ordered limits on the power of the state, what I refer to here as "limiting rights", then I doubt that we Skeptics (other than the lawyers amongst us!) would find much to argue about.



### ... Idealism from p 60

One can imagine some denizen of the supernatural world in any form one likes and the works of artists are full of such varied imaginings. Little green men from outer space are easily pictured in the mind but they remain as abstract ideas until one can capture one and examine it in reality.

It is the material basis of science that any idea, hypothesis or theory (and there are many of them, good, bad or indifferent) is not accepted into the useful body of scientific knowledge until it has been applied in practice and shown to work. If it works it's true, at least until a situation is found in which it doesn't work and it must be revised.

Nearly 300 years have now passed since Berkeley's *Treatise* was published. The developments in human understanding and control of little things like electrons and atoms which have taken place in that time should have eliminated any further wordy debates about Idealism versus Materialism or the existence of an immaterial world. The fact that it has not is an indictment of our education system.

There are many problems now and to come in the future which require continued and deeper understanding of the material nature of the world. The intellectual base for that task is disarmed if future generations are allowed, through lack of adequate teaching, to continue to accept the belief that the world is in any way controlled by supernatural beings. In the first issue of the scientific journal *Nature* in November 1869, Wordsworth's words were printed at the masthead:

*To the solid ground of Nature trusts  
the mind which builds for aye.*

That thought remains relevant today and should be the guiding principle for teaching throughout the nation's schools.



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# Fluoridation: Unsafe, Ineffective and Unethical

**Dr Mark Diesendorf**  
**UNSW, Sydney**

In the previous issue of *the Skeptic* (Autumn 2006), an article appeared under the name of a private dentist, Don Wilson, who spent several pages attacking me for my opposition to the fluoridation of water supplies. Genuine sceptics will no doubt be cautious about believing such an article, which is based mainly on rhetoric and anecdote rather than substance, and oozes insinuations and personal abuse. Nevertheless, since silence could be interpreted as consent, a response is required.

I have high respect for the ability of dentists to repair teeth in small, almost inaccessible spaces. But, superb technicians as they are, most dentists receive very little scientific training: just first year undergraduate science plus some bits and pieces in later years. Very few private dentists would have any scientific research experience at all. So it is inappropriate for Wilson to pose as a scientist.

Since Wilson referred selectively to my career, I should mention that I have 38 years of postdoctoral scientific research experience in a variety of fields, both disciplinary and interdisciplinary. At various times I have been a Principal Research Scientist in the CSIRO Division of Mathematics & Statistics, Senior Lecturer in the Human Sciences Program at ANU, and Professor of Environmental Science at the University of Technology, Sydney. I have published peer-reviewed papers on fluoridation on and off since 1980.

I wasn't born an opponent of fluoridation, but first became interested in this controversial issue as a young scientist when I was secretary of the Society for Social Responsibility in Science. In following up an enquiry from a concerned citizen, I discovered that the

pro-fluoridation claims disseminated by the Australian Dental Association and health 'authorities' — namely that fluoridation is entirely safe and inert in the human body apart from protecting teeth — were contradicted by many scientific and medical papers published in refereed journals<sup>1</sup>. The public was and is being misled, just as they were misled about the safety and effectiveness of mass chest x-rays for the early detection of tuberculosis.

Over the decades the scientific evidence of health hazards from the long-term ingestion of low doses of fluoride has increased steadily<sup>2</sup>. Evidence has also emerged that fluoridation is largely ineffective in reducing dental caries, at least in permanent teeth<sup>3,4</sup>.

These are two of the reasons why only 8 countries have made a substantial implementation of fluoridation — USA, Australia, New Zealand, Ireland, Colombia, Singapore, Israel and Malaysia have imposed fluoridated drinking water on more than half their populations. Almost all European countries have rejected it, or discontinued it after small-scale trials. Yet Europe is not suffering an epidemic of dental caries. Indeed, according to World Health Organisation data, children in the Netherlands have teeth equal to or better than any of the fluoridated countries<sup>5</sup>.

Here I'll briefly address the risks and alleged benefits of fluoridation and the ethical violations involved in this mass medication, answering some of Wilson's criticisms along the way.

## Uncontrolled dose

Water supplies in most Australian towns and cities contain fluoride naturally at concentrations of 0.1-0.2 parts per million (ppm). Fluoridation involves increasing those concentrations by a factor of 5 to 10 to bring it up to about 1 ppm, which is the same as 1 mg of fluo-

ride per litre of water. It is misleading to pretend that this is a small 'adjustment'. Unlike vitamins, fluoride is *not* an essential nutrient and there is no scientific definition of 'optimal concentration'. Dentists define this concept in an arbitrary manner in terms of a trade-off between exaggerated benefits and just one of the adverse effects, dental fluorosis. So fluoridation is mass medication.

Mass medication violates the ethical principles that medications should be prescribed individually by your doctor, who should take into account your age, gender, body weight, other medications, etc, and that patients should give informed consent to medication.

While the fluoride concentration is normally controlled within broad limits, the daily fluoride dose is not, because it depends on the quantity of tap water ingested. So fluoridation is mass medication with an uncontrolled dose. This is a serious ethical violation, especially when the safety margin is small for the average 'patient' and non-existent for some. Some members of the community drink much more water than average: e.g. outdoor workers, athletes, and people suffering from certain diseases. In addition, infants fed on milk formula reconstituted with fluoridated water receive a daily fluoride dose that is the same as that ingested by many adults in fluoridated areas and is at least 100 times the fluoride dose ingested by breast-fed babies. These are well-established scientific facts, which Wilson and his collaborators attempt to suppress or obscure with charges of 'emotion'.

What are the health implications for big consumers of fluoridated water?

## Risks

After one of the most thorough reviews of the literature in 60 years, a prestigious 12-member panel of the US National Academy of Sciences (NAS) has

unanimously found that the US Environmental Protection Agency's 'safe' drinking water standard for fluoride (the Maximum Contaminant Level Goal, or MCLG, currently set at 4 ppm) should be lowered<sup>2</sup>. This is necessary to protect children against severe dental fluorosis and adults from bone fracture and Stage II skeletal fluorosis.

When people drink fluoridated water, about half the fluoride is excreted by the kidneys (provided they are working properly) and almost all of the rest is stored in the bones. Over the years the stored fluoride can damage bone structure and cause calcification of bones and joints. This disease is known as skeletal fluorosis. In its early forms it is virtually indistinguishable from arthritis. In its more advanced forms it can be observed on x-rays.

Skeletal fluorosis is a major public health problem in several countries where there are significant natural concentrations of fluoride in drinking water, most notably India, China and some Persian Gulf countries. Wilson is fond of using the word 'half-truths', yet his discussion of skeletal fluorosis creates the false impression that skeletal fluorosis is only seen when fluoride concentrations are over 4 ppm in one paragraph and over 8 ppm in another, or where there is fluoride pollution from coal burning.

The facts are that skeletal fluorosis has been studied in many communities that are not exposed to coal-burning, where fluoride concentrations in drinking water are below 2 ppm. It has been even studied at 0.7 ppm in one Indian village — a fact that was acknowledged in the pro-fluoridation NHMRC (1991) report, Section 6.4, although it was omitted from the misleading executive summary.

Incidentally, the Tasmanian Royal Commission, much loved by your other pro-fluoridation author, Graham Keith (also in *the Skeptic*, 26:1), dismissed the substantial evidence of skeletal fluorosis on the grounds that it was observed in 'native' populations and was therefore irrelevant to Australians. Unfortunately this is the 'scientific' level achieved by many of those with a pro-fluoridation bias.

In the USA the MCLG of 4 ppm was originally derived by assuming that the

'average' adult drinks 2 litres of water per day. NAS found that many people drink far more water than this. Using NAS's exposure analysis, it can be readily shown that some people will exceed a 'safe' intake of fluoride *even at 1 ppm*.

NAS found many important adverse effects at low water concentrations. These include lowered IQ in children in Chinese studies at levels of 2.5-4.0 ppm; increased hip fracture rates in the aged at levels between 1 and 4 ppm; adverse effects on the human thyroid; and increased uptake of aluminum into the brains of rats at 1 ppm. While NAS concluded that 4 ppm is *not protective* against bone fractures for a lifetime exposure, it did not indicate what level is protective, leaving that for the US EPA to determine.

NAS made many research recommendations to fill huge data gaps on health impacts. What it didn't say, but I am prepared to do, is that, because of their stubborn adherence to the dogma that 'fluoridation is safe and effective', both American and Australian health authorities have severely limited research into fluoride's health effects on any tissue other than the teeth. Particularly shocking is NAS's revelation that no efforts have been made in either Australia or the US to track the levels of fluoride in urine, blood or bones of citizens. Such baseline research is critical to explore potential connections between fluoride exposure and reported health effects, such as hypothyroidism, neurological effects, skeletal fluorosis, bone fractures and other diseases.

In this context we can interpret Wilson's statement, implying that there is no skeletal fluorosis in Australia, as worthless and misleading. There has never been a scientific study of skeletal fluorosis in high-risk groups in Australia and, to make things worse, GPs are not taught how to identify the disease. Much of Wilson's other comments on the adverse effects of fluoridation are also unscientific nonsense. He even castigates me for allegedly speculating about osteoporosis, although I have never used the term in any publication.

A recent epidemiological study finds that boys exposed to fluoridated water in their 6th, 7th and 8th years had a 5-fold increased risk of getting osteosarcoma (bone cancer), compared to

matched controls for each age, before the age of twenty<sup>6</sup>. While I would be the first person to point out that several more studies would be needed before labeling fluoride as either a carcinogen or a cancer promoter, there is supporting evidence from studies on male rats; from the observations that fluoride is a known mutagen in laboratory studies and the fact that mutagens are often carcinogens; and from the fact that in boys the excess cancer is seen in an organ (bone) where other fluoride-induced diseases are known to occur.

### Alleged benefits

While there are many propaganda exercises claiming enormous benefits for fluoridation, there is not one Grade A study, according to the impartial UK York University Review, proving that it is effective<sup>7</sup>. However, the results from lower grade studies are mixed — there are several that find little or no benefit from fluoridation, eg, in New Zealand<sup>8</sup>, the USA<sup>9</sup> and Australia<sup>4</sup>. Incidentally, Dr John Colquhoun, the author of the two NZ studies cited, was the former head of the Fluoridation Promotion Committee of New Zealand. He found no difference in dental caries in permanent teeth between unfluoridated Christchurch and all the other major cities of New Zealand, which are fluoridated.

One of the most recent studies to find no benefits in permanent teeth was conducted in South Australia by Armfield and Spencer (2004)<sup>4</sup>. It is ironic that the latter author is one of the foremost promoters of fluoridation in Australia. I imagine that his sponsors and pro-fluoridation colleagues are annoyed with him for publishing this revealing paper. Although the results are clear-cut, the authors are reported in the media to be claiming that anti-fluoridationists have 'misinterpreted' them, because the purpose of the study was not to test the benefits of fluoridation. However, it is well known that many scientific advances are unexpected and the goals of a study are often irrelevant to its outcomes.

The absence of benefits from ingested fluoride is not surprising, because leading international dental researchers, such as Ole Fejerskov and Brian Burt, now recognise that the

mechanism of action by which fluoride reduces tooth decay<sup>10</sup> is, to quote the US Centers for Disease Control, “predominantly topical”, ie, acting on the surface of teeth. In plain Australian, people are being conned into drinking the stuff when actually they should clean their teeth with it and spit it out. Graham Keith’s claim, that fluoride’s principal mechanism is systemic, is decades out of date.

Colquhoun also published the long record of NZ dental data in 5-year-olds that showed a very large decline in caries *before* fluoridation or any other use of fluoride was implemented. My own peer-reviewed study of the phenomenon of declining dental caries in the 1960s<sup>3</sup> was published in one of the world’s leading general science journals, *Nature*. It reviewed many studies from around the world, including pre-fluoridation Sydney, and showed that there were very big reductions in caries in both fluoridated and unfluoridated communities.

In a pathetic attempt to denigrate the *Nature* paper, Wilson creates the false impression that it was criticised by NHMRC (1991). In fact, the NHMRC report was so biased towards fluoridation that it didn’t cite my paper or indeed any of the dozen peer reviewed publications on fluoridation by the three scientists — Dr Philip R.N. Sutton, Dr John Colquhoun and myself — who made the original submission to NHMRC that triggered the enquiry. NHMRC did criticize some supplementary data on caries in Australian capital cities that I submitted to the enquiry, but the criticism was rhetorical, and not backed up by any published scholarly analysis.

NHMRC and the Australian Dental and Medical Associations endorsed fluoridation in the 1950s, without any proper scientific evaluation, and have been pushing it ever since, so their criticisms of my work have to be seen in the context of that predetermined policy position.

The bone of contention was as follows. Under Freedom of Information, I had obtained from the School Dental Service the averages and standard deviations of dental caries in all the state capital cities of Australia by age from 1977 to 1987. These data showed

clearly and consistently, for all age groups from 6 to 12 years, that dental caries had declined dramatically in both fluoridated and unfluoridated cities over that period. Furthermore, they showed that by 1987 average tooth decay in unfluoridated Brisbane was the same as in fluoridated Adelaide and Perth and less than in fluoridated Melbourne<sup>11</sup>. True, the raw data were not available to me and so I could not do a statistical analysis, and that was the NHMRC’s criticism. But then, neither do Health Departments and pro-fluoridation dentists when they campaign to impose fluoridation onto country towns, as discussed in the next paragraph. At least with my data the sample sizes were very large for each city and the standard deviations were much less than the means, so there are reasonable grounds for confidence in the accuracy of results.

Wilson refers to a debate in a NSW country town (presumably Deniliquin) where NSW Health “provided clear DMFS scores which showed their children had a significantly higher decay experience than that (sic) of a neighboring community that had water fluoridation”. These appeared to be carefully selected unpublished data giving averages, without statistical analysis. Indeed, the child population of Deniliquin is so small that it is unlikely that any comparison with a neighboring town would be statistically significant. But, this is impossible to verify scientifically, because NSW Health would not provide a copy of the analysis, if it exists, only the alleged results. That is not science, but snake oil. True scientists would make all the raw data from the Australian Child Dental Health Surveys available to all interested researchers, not just averages and standard deviations.

### Conclusion

There is such a small margin between negligible benefit to teeth and several significant risks to health — and no safety margin for some high water consumers and some people with kidney disease — that it is time to halt fluoridation forthwith. Calling for more research after it has been halted is fine. But, to do — or pretend to do — that research while continuing to dose mil-

lions of Australians daily, without firm knowledge of what levels will cause damage to health, is irresponsible and harmful.

Many proponents of fluoridation use science as a marketing tool, but have little understanding or interest in the scientific method or the results of peer-reviewed studies that contradict the policy stances of their professional associations or health departments. Instead, they impose fluoridation on the community through the power of their organisations, suppressing contrary evidence and denigrating less powerful scientists and professionals who dare to question the practice. Wilson’s article is a typical example. I submit that I am the real sceptic and that Wilson and those who hide behind him are the ones who need to be exposed.

My article, ‘Are the proponents of fluoridation suppressing scientific evidence and debate?’ can be downloaded from [www.sustainabilitycentre.com.au/FluoridePublics.html/](http://www.sustainabilitycentre.com.au/FluoridePublics.html/). For a wealth of sound analysis and references, I recommend the website of the Fluoride Action Network [www.fluoridealert.org](http://www.fluoridealert.org), convened by Dr Paul Connett, Professor of Chemistry at St Lawrence University USA.

### Notes

1. For a review of my understanding of the health hazards as of 1990, see Diesendorf M 1990, ‘Health hazards of fluoridation: a re-examination’, *International Clinical Nutrition Review* 10(2): 304-21.
2. National Academies 2006, *Fluoride in Drinking Water: A Scientific Review of EPA’s Standards*: [www.nationalacademies.org/morenews/20060322.html](http://www.nationalacademies.org/morenews/20060322.html)
3. Diesendorf M 1986, ‘The mystery of declining tooth decay’, *Nature* 322: 125-9.
4. Armfield JM and Spencer AJ 2004, Consumption of non-public water: implications for children’s caries experience, *Community Dent Oral Epidemiol* 32: 283-296.
5. WHO data at: [www.whocollab.od.mah.se/countriesalphab.html/](http://www.whocollab.od.mah.se/countriesalphab.html/). Pro-fluoridationists sometimes claim that Europe’s excellent teeth are the result of having fluoridated salt. But, this practice is uncommon and voluntary — unfluoridated salt is available.
6. Bassin EB et al. 2006, ‘Age-specific fluoride exposure in drinking water and osteosarcoma (US)’, *Cancer Causes and Control* 17:421-8.
7. McDonagh MS et al. 2000, ‘Systematic review of water fluoridation’, *BMJ* 321: 855-9.

**Continued p 68 ...**

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# Letters

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## More on Fluoride I

**Professor Tony Adams**  
(Former Chief Medical Officer Australia)  
Avoca Beach NSW

Congratulations to both Don Wilson and Graham Keith on their excellent articles on fluoridation in the autumn edition.

Gosford in NSW, where I now reside, shares the dubious honour with Geelong, Warrnambool and Brisbane of having resisted fluoridation these last 40 odd years. The Central Coast Community Dental Health Forum here — made up of the local branches of the Australian Dental Association, Divisions of General Practice, Public Health Physicians and others — has had zero success in persuading the Gosford City Council to fluoridate the water supply (despite damning evidence that shows caries rates in Gosford children to be significantly worse than those in Sydney or neighbouring Wyong who have had fluoride for 40 years). The Council also refuses to refer the matter to the NSW Health Department for a decision.

Several long serving councillors have made a career out of being opposed to fluoridation and trot out the emotional pseudoscientific nonsense pushed by Diesendorf and others to support their opposition.

It is my firm opinion that the whole problem throughout Australia lies with the way the early legislation was framed giving the decision making power to local government. In no other area of public health does this pertain. Imagine the chaos if individual councils could decide if their children should be immunised or if their citi-

zens should be compelled to wear seat belts. Public Health is now a highly specialised scientific discipline requiring expertise found only in State (or Federal) Health Departments.

The obvious solution is to amend state and territory Public Health Acts to make the fluoridation of all reticulated water supplies mandatory. Quebec for example has used its Public Health Protection Act to do this since 1977 with great success.

If we don't follow suit we will still have significant population groups in Australia denied the benefits of fluoridation another 40 years from now.

## More on Fluoride II

**Paul Connett, PhD**  
St Lawrence University NY USA

I was forwarded a copy of the pro-fluoridation article by Graham Keith, who is described as an engineer. I was intrigued that Mr Keith pointed out that I spoke in Warrnambool, his home town, in October 2004 on the "risks associated with fluoridated water supplies" but failed to share with your readers any of the arguments I presented. Instead, he says that I do not "deal directly with health authorities" on this issue and then tries to paint me as a conspiracy theorist. This is nonsense. I have studied the science of this issue for 10 years - with an open mind. I am appalled that a handful of governments continue to force this dangerous nonsense on their citizens.

To put the record straight. I do deal with health agencies, regulatory and scientific bodies. For example, I was invited by several bodies for my input

on this issue. For example I was invited by a) the York University team to peer review their 2000 report; b) the Irish department of Health to give testimony to their Fluoridation Forum (October 2000); c) the Association for Science in the Public Interest (2002), the American College of Toxicology (2002) and the US Environmental Protection Agency to debate the science of the fluoridation issue (2003) — but unfortunately in none of these cases were the organizers able to find one single fluoridation proponent to defend this practice in debate. I was also the only opponent of fluoridation who was invited to present his concerns before the National Research Council panel, which was asked by the US EPA to examine fluoride's toxicity at low levels and in particular review their safe drinking water standard (more correctly called the maximum contaminant level goal — MCLG — which is currently set at 4 ppm).

After, a three year study this panel has produced a 450 page report (March 22, 2006) which has been described as the most comprehensive and important review of fluoride's toxicity ever conducted. As a result of their study the NRC has recommended that the MCLG be lowered and that the EPA conduct a new health risk assessment to determine what the new standard should be.

Even at 4 ppm, this standard offers very little margin of safety for those drinking water at 1 ppm, especially when you consider that water engineers cannot control how much water people drink. There will be less margin of safety if the standard is lowered. Also, bearing in mind the discussions the NRC provide in chapters on the brain, the endocrine system and the

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bones, it is highly likely — if science rules and not politics — that the new MCLG will be less than 1 ppm, which will of course sink water fluoridation once and for all.

I am happy to say that the NRC panel listened very carefully to the science that I presented to them on August 12, 2003, because much of what I said has been included in their report. It is a pity that either, Mr Keith didn't come to the meeting in Warrnambool in October 2004, or if he did, that he didn't take any notes he was prepared to discuss with your readers.

Hopefully, Mr. Keith will now take the time to catch up with the modern scientific literature which provides many, many health concerns on this practice. Sadly, the Victorian Health Authorities appear to be as ignorant on these matters as Mr. Keith — with less excuse, because they are paid by the taxpayers to keep up to date on issues which impact the public health.

### Response.

#### **Graham Keith Warrnambool VIC**

For thirty years I have observed anti-fluoridationists pulling stillborn rabbits from hats. Dr Connett's response to my article, written in typical anti-fluoridationese, bears the hallmarks of being just another one. Until he convinces the World Health Organisation, the National Health and Medical Research Council, the Australian Dental Association, and the Royal Australian College of General Practitioners of the value of his findings, I shall continue to regard him as a latter-day Dean Burk.

His technique of scaring people at public meetings is very unprofessional. I was invited to debate against Dr Connett at his Warrnambool meeting in October 2004, but having experienced a fluoride debate at Warrnambool several years ago, which degraded into a 'hot gospel' affair with foot stamping and hand clapping, I declined.

### More on Fluoride III

#### **Tom Edgar Glen Aplin QLD**

Two articles and both pro fluoride? I am not qualified to argue the medical/chemical angles but I viewed these two articles as being close to an advertorial for the "Fluoride" industry. It was interesting to see the old political ploy of either glossing over or ignoring important points. I have no brief against fluoride use to combat tooth decay. In my case my forbears are from the heavily fluoridated area of Carlisle (UK). Consequently good teeth good bones.

At seventy years I was kicked in the chest by a horse, both feet. I admit to being flattened for a good ten minutes but no fractures. Sounds like an ad for fluoride. Ah! It is **calcium** fluoride. The naturally occurring substance not the aluminium industry's by-product. Obviously the calcium part would also be beneficial. This difference is studiously ignored by the fluoride protagonists.

One other area, briefly mentioned and then ignored, is compulsory medication of the **whole** population to benefit the few. At nearly eighty I don't think I need the dubious benefits attributed to fluoride and I respectfully point out that most of the population, being well over school age, would also derive none.

Following the preceding there is the matter of economics. Fluoridation of the water supply is not cost effective. Estimates of water usage generally, gives less than 7% to drinking by humans. 93% goes to watering crops, washing cars, industry, etc. For every litre of urine 7 litres of water is flushed down the toilet, eventually ending in the rivers and streams.

Sodium Fluoride is an accumulative chemical, and I can only see (facetiously) fish flashing finer fangs. It would be cheaper to offer **free of charge** fluoride tablets for all who desired them. So some would not take advantage of them? That is their choice. Far better that they should have that choice than the bulk of the people not being given the choice of saying 'No Thanks'.

### More on Fluoride IV

#### **Victor Stevens, Rivett, ACT**

The latest *Skeptic* front cover heralded a water fluoridation story with the banner: "fluoride ... the facts". THE FACTS. Grand. But in the event it was just a free hit for two fluoridationists. They were quite entitled to, and did, argue their positions forcefully. They had had facts to present and they presented them. Fine. But SOME of the facts, not THE facts as stated on the cover. In any large, long running public debate there are always facts on both sides. The cover should have announced "fluoridation defended", or "dentist defangs Diesendorf", or some such wording. That is, unless the stories contained all the facts that /the editor/ decided we needed to know, which for a skeptic would be a worry.

Another problem with introducing the stories with "the facts" is that it appears to give some sort of Skeptics seal of veracity to the articles, which actually contain statements that are at least debatable. For example, Keith seems to present a pollyanna version of history when compared to the Realpolitik described in Wendy Varney's book *Fluoride in Australia*, in which one can read more comments from Justice Crisp. My favourite is the bit where Crisp explains how you can add up lots of bad studies to make them equal one good study. And when writing about the Australian visit of anti-fluoridationist Paul Connett, Keith says "He does not deal directly with health authorities...", whereas I read on the *Fluoride Action Network* website [www.fluoridealert.org](http://www.fluoridealert.org) a detailed account of Connett's meeting with Dr Robert Hall, Chief Health Officer and Director of Public Health, Victoria, and Professor Eric Reynolds, School of Dental Sciences, Uni of Melbourne on 25 Nov 2004. On the same website I also read about Connett testifying, by invitation from Ireland's Ministry of Health and Children, before their Fluoridation Forum panel in October 2000. So Keith's statement

seems to be less like a fact and more like a porky pie.

Engineer Keith claims a 50% reduction in tooth decay with fluoridation, dentist Wilson is more cautious, quoting from Professor Spencer who, if I read him right, says that in a non-fluoridated area 3 out of every 25 children in the 5-15 year-old age bracket would have one more filling than their chums in a fluoridated region. Which is the fact?

Don Wilson's assurances that we can trust the health authorities are less believable after reading the accounts in Brian Martin's book, *Scientific Knowledge in Controversy*, of the bully-boy tactics used by establishment figures to silence any challenge to the pro-fluoridation paradigm. An example of this can be found at [www.sustainability.com.au/F\\_SilenceBarrier.pdf](http://www.sustainability.com.au/F_SilenceBarrier.pdf). On p 55 of *Fluoridation: Breaking the Silence Barrier* Diesendorf gives details (fully referenced) of a blatant lie told by the Australian Dental Association to the ACT Assembly inquiry into fluoridation.

On the claim of special benefit of fluoridation to lower socioeconomic groups, I am reminded of a late old Labour Party stalwart once warning me that: unless it is a proposal to directly lift the poor out of poverty, be wary of any scheme promoted by well-off people who say it will especially help the poor. The *York Review*, to which Wilson referred in his article, found: "The evidence about reducing inequalities in dental health was of poor quality, contradictory and unreliable."

By reading both Don Wilson's and Mark Diesendorf's papers, the thoughtful reader can compare them and so arrive at a position regarding the facts of the matter. Having the editor intimate that one or the other is the factual one is unhelpful.

Even if the editor is better at doing my thinking than I am, I would rather do it myself. So please, no more simplistic "the facts" endorsements on the front cover — let the writers speak for themselves.

### Editor responds

I wouldn't dare try to tell our readers what to think — Skeptics are such argumentative people, as will become evident from reading this issue. If you had read the Editorial in the last issue you will see it explicitly stated that publication in *the Skeptic* does not mean endorsement of the ideas expressed. Generating debate from people with differing viewpoints is important to Skeptics, and the more information that is provided, the better it enables non-specialists to come to reasonable conclusions.

In future, I'll try to avoid using provocative banners on the cover, which are there to encourage people to read, not to mislead. I was toying with "Nude Celebrity Romp" for this issue, but have been dissuaded by calmer heads.

### Advice to young authors

#### Mark Lawson Sydney NSW

One of the many problems that Helen Dale (Darville-Demidenko) faced in her battle with the media is that no-one was thinking creatively on her behalf. Several times in her article on the fuss caused by her book, *The Hand That Signed The Paper* — when it was "revealed" that she had an English rather than an ethnic background — she states that defamation actions are for rich people. Well they are, but as a journalist of more years of service than I care to remember, if the media hounds are baying too loudly then silence them with tough legal letters alleging defamation and demanding compensation. If there is any remaining noise, issue writs.

The letters and the writs will obviously cost something, but far less than a full legal action, and will at least make the legal watchdogs employed at all the media houses nervous. You will be bluffing of course but the in-house lawyers may not realise that, especially if you hint that you do have the resources for a full legal action. Many

more legal actions are started than ever see the inside of a court room. If you pick your ground carefully — that is, issue letters over articles that are genuinely defamatory — then the media lawyers will be obliged to advise their employers that the ever-enthusiastic journalists have, yet again, laid the paper open to an action involving substantial damages. Persuading a barrister to front the actions on the understanding that fees will be paid out of a quick settlement will also be relatively easy, if there is a genuine grievance. Once senior lawyers and barristers start writing letters everyone becomes nervous. Trust me.

The media houses could always call your bluff or simply ignore the letters — as they probably would for someone like Rodney Adler — but where the issue is not important in any sense, such as a fuss over an assumed name for a prizewinning novel, they will err on the side of caution. Journalists will be told to stick to reporting the facts, and to check those facts. Opinion pieces will be toned down or rejected — particularly pieces from non-staff writers. All this can be achieved without going near a court room, and it is never a good idea to go near a court room.

Another under-used tactic is to write to a journalist who gets basic facts wrong to point out errors, remembering to put 'not for publication' at the top of the letter (otherwise it may form the basis for another story). Also send the letters to the news editor and the media organisation's library. The library will electronically attach the letter to the story being corrected. One thing journalists **will not** do is check registry listings. They may have an hour or less to write the story, not days, and will rely on what's already in the files. Even feature writers seldom have the leisure to undertake the sort of registry checks Helen mentions, unless there is a reason to do so.

None of the above should be construed as a defence of my own profession. Media coverage can and does get out of hand over certain issues. I am merely setting down a few tips for those who may find themselves at the centre of such a frenzy. Another tip,

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which I am sure Helen now appreciates, is that if a media organisation offers \$160,000 for an interview then take it! Work out a few short, sharp quotable quotes beforehand, setting out your side of the story, and go for it.

I also note with astonishment Helen's statement that four books were written about the Darville-Demidenko fuss. Four! And each one longer than her novel. She is right, more people need to get a life.

## Soul Searching

**John Wearne  
Fremantle WA**

In 1907 Dr Duncan MacDougall of Havergill Massachusetts weighed terminal patients before and immediately after their last expiration, to test whether a soul fled the body at the moment of death. His equipment was good and he took great pains in trying to achieve accurate results. But no modern journal would have accepted the findings because the number of patients was too small for satisfactory statistical analysis. Ethical committees would probably never allow a repeat of the experiments today. For a long time, though, one could often read that the soul weighed 21 grams. Interest faded away especially since devout Jews, Moslems, Buddhists and Christians never believe that the soul could be weighed, just as it couldn't be captured and bottled. In 2003 a movie was made with the title *21 Grams*. Dr MacDougall repeated his experiment on a number of dogs and found no change of weight after death, supporting the orthodox belief that only Man has a soul.

With no supporting factual evidence, how can the existence of the Soul be so widely accepted? Recently I went to a party in Canada. My parents and some friends were there. It was undoubtedly I, me, myself having the experience. I was not just reading about it or hearing someone describe it. I was there. Waking next morning I remembered that my parents were long dead; that I had not travelled for

years. So I had been dreaming, which is mysterious but not mystical. In some Asian cultures though, it is believed that, in dreams, the soul goes walkabout. A sleeper should only be roused gently, lest his distant, wandering soul might be unable to find its way back to its owner.

Christian Scripture makes no predictions for our souls until Judgement Day but popular mythology has them resuming social life with old acquaintances. My dream apparently drew on folk memory.

This could possibly have been building up for a very, very long time. Sleeping dogs often act as if dreaming. Perhaps all the 'higher animals' dream. Certainly, *Homo sapiens* does and presumably has done so since he first evolved. Perhaps his ancestors dreamed. In any case, "we" have been dreaming for millennia, possibly even before we had acquired the power of speech.

It is hard for us to imagine having thoughts which are not expressed in words but this is the case for all the rest of the animal kingdom. And was for us until quite recently, in evolutionary history. Animals can communicate much information, so large-brained *Homo* would have excelled in this. He would have been aware that he dreamed. Living communally, he would have come to observe that his fellows dreamed. He would have developed ways to comment on his dreams and perhaps mime their content.

I guess that, once the anatomical and physiological developments had made speech possible, clever *Homo* would've rapidly mastered them and soon invented the language they made possible. The doctrines and mythologies of the immortal Soul could blossom, to become part of our cultures.

Some dreams are pleasant but some can be nasty and frightening. So there are nasties in the spirit world, giving rise to a few more mythologies. Primitive man, living very close to Nature, considered himself just a part of it, not a superior being. As he had a soul, so must everything else, even every stick and stone. This idea was refined and

extended to become the religion "Animism".

Shreds of it survive in all the common religions, which number in the thousands if one includes all the sects and sub-sects and schisms and charismatics and.... all of them require a belief in the immortal Soul. But there's still no convincing evidence for it.

## Euthanasia

**Iolanda Grey  
Turramurra NSW**

To liken the "water fluoride controversy" to the voluntary euthanasia debate is like reducing the life-and-death debate to chalk and cheese. ("Fluoride: Is it really that hard to swallow" - Don Wilson, Autumn 2006).

I'm a skeptic who's also a passionate supporter of people's right to choose how they live and how they die. Unfortunately I can't agree with you Don — I'll never give the issue of fluoridation the same status as voluntary euthanasia.

The euthanasia debate is far more fundamental, more controversial and more emotive. With a little education Australians should be able to make the best decisions for their children's health and that of their own when it comes to water fluoridation. Unfortunately the euthanasia debate is far more complex and is being stifled by the religious minority.

Over 70% of Australians approve of voluntary euthanasia for a person who's hopelessly ill and experiencing unrelievable suffering with absolutely no chance of recovery. Yet the largely religious minority have wrested control to the extent that in some circumstances it's even illegal to phone or email someone about euthanasia.

And if anybody else feels like I do, why not join any of the state Voluntary Euthanasia Societies, or Philip Nitschke's EXIT International at [www.exitinternational.net/](http://www.exitinternational.net/)

As Greens Party Senator Kerry Nettle said in 2005, "History shows us that social change does not start in chambers like this; it starts in the hearts

and minds of committed and passionate individuals”.

Please join the societies and start campaigning for your freedom to choose.

### Hyphen-ation

**Jef Clark**  
**Capalaba QLD**

I very much enjoyed the article by Mike Robinson on hyphenation (26:1) even though he introduced his article by giving examples of over-use (spot the deliberate mistake) from my own article in a previous *Skeptic*. I plead guilty to some overuse, but I must defend both fast-track and Comb-Over. I would have preferred fast-track to go the whole hog and blend down. But then you have the problem of deciding whether it should be fastrack (ie, a fast rack?) or fasttrack (!).

Comb-Over is a name Mike (*Letters* 26:1)! Mr Comb married Ms Over, and they had a son who featured in my anecdotes. Surely he is entitled to use the usual practice with blended surnames.



### ... Fluoridation from p 63

8. E.g. Colquhoun J 1987, 'Child dental health differences in New Zealand', *Community Health Studies* 11:85-90; Colquhoun J 1994, 'Is there a dental benefit from water fluoride?', *Fluoride* 27:13-22.

9. Brunelle JA & Carlos JP 1990, 'Recent trends in dental caries in US children and the effect of water fluoridation', *J Dental Res* 69 (special issue): 723-7; Yiamouyiannis J 1990, 'Water fluoridation and tooth decay: results from the 1986-1987 national survey of US schoolchildren', *Fluoride* 23:55-67.

10. From this it should be clear that I accept the Grade A studies showing benefits from fluoridated toothpaste, which typically has 1000 times the fluoride concentration of fluoridated water.

11. Diesendorf M 1990, 'Have the benefits of water fluoridation been over-estimated?', *International Clinical Nutrition Review* 10(2): 292-303.



# Farewell to a Good Friend

We were shocked at the sudden death, while on assignment in Tasmania, of the distinguished journalist Richard Carleton. While Mr Carleton was widely known for his hard-hitting journalism, less well known was his long and supportive association with Australian Skeptics.

Richard Carleton became involved, along with Phillip Adams, when Dick Smith brought James Randi to Australia in 1979 to conduct tests of a number of water divining claims. This enterprise led indirectly, some months later, to the establishment of Australian Skeptics. In 1984 he was also involved in the "Steve Terbot" hoax and again, in 1988, joined with James Randi in organising the "Carlos" hoax that exposed large sections of the Australian media to the accusation that their uncritical acceptance of outrageous claims not only provided much free publicity for them, but also encouraged belief. While these lessons might have had an immediate salutary effect, sadly it didn't last.

Richard remained in contact with the Skeptics, on a number of occasions contacting our office with questions or suggestions for stories, several of which went to air. His most recent story on a Skeptical theme concerned a charlatan peddling dangerous pseudo-medical treatments in the Hunter Valley, but there have been many others. Few Skeptics will forget his confrontation, in his usual style, of Shirley Maclaine with the question "Is there anything you wouldn't believe?"

Richard also, when his busy schedule allowed, attended a number of the Sydney Dinner meetings; as an accomplished amateur magician, he always enjoyed our magic nights. He was a speaker at our 1991 Naylor Convention in Sydney, where he spoke on *Skepticism and the Media* and would very likely have been, job permitting, one of the speakers at our upcoming Convention on the same theme.

On a personal note, I always enjoyed Richard's company on the occasions when we met and I remember well the first time. It was during the Carlos affair, and I had mentioned to a work colleague that I would be meeting him. In all seriousness she assured me that the reason why Richard was so aggressive in his interviews was that he was a very short man, "almost a midget". When I met this man who was several inches taller than me, I could not refrain from passing on this "intelligence", which caused him much amusement. When I introduced Richard at the 1991 Convention, I announced him as "the tallest midget in Australia".

Richard Carleton's hard-hitting interviewing style won him both admirers and detractors, but Australian Skeptics never had a better friend in journalism. He was far too young, at 63, to have signed off. We will miss him.

We extend our deepest sympathy to his wife, Sharon, and the rest of Richard's family

**Barry Williams**

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