THE BEST AUSTRALIAN SCIENCE WRITING 2014

EDITED BY
ASHLEY HAY

For Nigel Beebe, and for Huxley Hay Beebe – A.H.

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Contents

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Weather and mind games

Tom Griffiths

As a teenager I read Charles Darwin's *Voyage of the Beagle* and was intoxicated by the glimpse of a young questing mind wrestling with experience, evidence and argument. In my final year at school we studied Alan Moorehead's *Darwin and the Beagle* and learned how this voyage came to change our understanding of the world. Darwin's insight into the origin of species and the process of natural selection was carefully and anxiously developed over decades in his home at Down House in Kent and then forced into the open by Alfred Russel Wallace's 1858 letter from the feverish jungles of Malaya. Two great and very different offspring of competitive, industrial Britain had arrived at the same idea. It was at heart a beautifully simple concept but its full scientific implications are still unfolding today. As I read Darwin's account of his South American excursions and learned of Thomas Huxley's eloquent defence of *On the Origin of Species*, I yearned to live at a time when a grand and transformative scientific idea burst upon the world.

Be careful what you wish for.

Even while I was at school, a revolutionary new idea was already emerging, but its power remained hidden. It was a scientific insight that was eventually to reveal itself as even more

radical and challenging than Darwin's. The science of climate change had its foundations in the mid-19th century with the discovery of ice ages, and it had a breakthrough moment in the year of the publication of *On the Origin of Species*, 1859, when Darwin's friend, John Tyndall, discovered the influence of greenhouse gases on the temperature of the planet. A century later, in the late 1950s, Charles Keeling began to measure a steady, relentless upward trend in atmospheric CO_2, and by the final decades of the 20th century, ice cores from both Greenland and Antarctica delivered a sense of urgency and crisis about global warming. The ice core data revealed the historical delicacy and instability of Earth's climate and confirmed that CO_2 levels, which have risen rapidly since the Industrial Revolution, are the highest for at least three million years and therefore new in human history. Scientific alarm began to influence public debate and in 1988 the Intergovernmental Panel on Climate Change was established to distil complex, emerging scientific information for government and business.

The theories of evolution and of anthropogenic climate change both had a long, slow gestation followed by a sudden crystallisation, rapid scientific acceptance and some trenchant public resistance. In the early 19th century, the link between animals and humans became a subject of dangerous fascination, for it raised questions about 'the mode of creation', about organic origins and spiritual destiny, and therefore about the relationship between science and religion. The beak of a finch thus seemed connected to the salvation of a human. In popular discourse, Darwin's idea became condensed into a contest between apes and angels.

Charles Darwin delayed publication of his insight into the transformation of species because he feared its effect on the religious beliefs of his society, and those of his devout wife, Emma. We have a compelling picture of Darwin as a tortured soul,

bunkered down with his barnacles in Kent, and meticulously gathering a fortress of detail with which to defend his idea when the time came to reveal his secret. It was, he wrote, 'like confessing a murder'. He applied scientific scepticism to his theory with the double force of his critical faculties and his emotional fears. In his wife's religious faith he had the loving embodiment of all that he wished not to upset. If you visit the museum that was once Darwin's home, you can open a hall cupboard and see a replica of the securely wrapped parcel labelled by Darwin: 'Only to be opened in the event of my death'. It was the first account of his great idea, a 200-page manuscript completed in 1844, a ticking time-bomb at the centre of the elegant Georgian home.

The publication of *On the Origin of Species* 15 years later did indeed unleash a storm – but it was ultimately not quite as bad as Darwin had feared. By the time Darwin died, 23 years after the publication of *Origin*, he was celebrated enough to be buried in Westminster Abbey and he was hailed as a hero and icon. As Iain McCalman's compelling collective biography, *Darwin's Armada*, reminds us, the key battles within Victorian Britain for acceptance of Darwin's theory and its associated scientific culture 'were over in a surprisingly short time'. By 1868, Joseph Hooker could address the British Association, as president, and conclude that few scientists now openly rejected the theory.

Of course, the idea of natural selection continued to be refined by scientists and, in the 20th century, was challenged and ultimately strengthened by the discovery of the gene. And religious resistance to evolutionary theory continued; indeed, at times it has even grown. In the United States today, polls keep telling us that up to 40 per cent of Americans reject the theory of evolution and believe that the Earth was created less than 10 000 years ago. Since the 1960s, 'creation science' has become active and politically powerful, challenging not only Darwin but also

the scientific method, and seeking 'equal time' in the US school curriculum.

During a *Q&A* discussion on ABC TV in 2011, an audience member disparaged climate change science as 'just a theory – like gravity'. Inadvertently, he was making a good parallel. Our understanding of anthropogenic climate change is indeed a theory – like gravity, electricity, germs, the heliocentric solar system, evolution, relativity and plate tectonics. But in science, 'theory' is a very strong word. It does not mean an untested hypothesis; it does not mean a vague, esoteric concept. Rather, it describes a consistent form of scientific knowledge not yet disproved by experiment. Resilient scientific theories describe complex phenomena extremely well, continue to be refined and improved by experimentation and observation, and have impressive explanatory and predictive power.

Good scientists subject their own work, and that of others, to rigorous scepticism: it is the scientific method. Darwin's methodical analysis of the possible weaknesses of his theory gave him the structure of his book. 'I have felt these difficulties far too heavily during many years to doubt their weight,' he wrote near the end of *Origin*. And at the beginning of the book he explained: 'No one ought to feel surprise at much remaining as yet unexplained in regard to the origin of species and varieties, if he make due allowance for our profound ignorance in regard to the mutual relations of the many beings which live around us.' A good theory is fertile and identifies uncertainty; it can remain true at the same time as it generates new and exciting research into areas of weakness. 'The theory of evolution is not just getting older, it is getting better,' declared the palaeontologist Steven Stanley in 1981. And the theory of climate change is also getting older and better – and more forbidding. It has accurately predicted many observed manifestations of global warming – from sea-level rises to increased temperatures to acidification of the

oceans – although sometimes these changes have come about a little more quickly than had been estimated. Caution – of which Darwin at Down is the exemplar – is another hallmark of good science.

The theory of evolution opened up a new worldview, chiefly of the past but also with implications for the future. Family history – across deep time – became natural history. Natural selection was radical in its vision of a totally contingent natural world, one ruled by chance and improbability rather than by a steady and progressive purpose or a predetermined set of stages. People who resisted or rejected the theory of evolution argued about origins, creation, history and natural history. But they also felt the future was at stake – the prospect of a godless world and their personal destinies in heaven. At the end of *Origin*, Darwin argued eloquently that there is 'grandeur in this view of life', that 'from so simple a beginning endless forms most beautiful and most wonderful have been, and are being, evolved'. And he also finished the book with words of confident hope about the earthly future of humanity: 'Hence we may look with some confidence to a secure future of great length', he wrote, because humanity under the influence of natural selection 'will tend to progress towards perfection'. Here the scientist begins to look for a way of selling his idea to Victorian industrial society, and allows the chaos at the heart of his theory to be conceived as 'progress'. Thus Darwin succumbed to the progressive culture that his own theory undermined.

Today, climate scientists are like Darwin: the implications of their science frighten them, and the politics of their society can intimidate them. The theory of anthropogenic climate change met with swift scientific acceptance but has been followed by a sustained and strengthening public counterattack. The backlash has been deep and powerful because this new idea does not have the reassuring ethic of progress on its side; instead it requires a

critical reassessment of the implications of the Industrial Revolution. And the balance of the problem it poses lies more in the future than in the past. It does not promise 'a secure future of great length'; it threatens it. It demands political action, which the theory of evolution did not. And for that action to have significant effect, it must be global. Competition will need to be moderated by co-evolution. Further refinement of Darwin's theory awaits humanity's decisions this century about its own evolutionary fate.

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You are sitting at the dinner table with old friends you haven't seen for a while. The atmosphere is warm, friendly and celebratory. Then, suddenly, climate change slips into the conversation. The mention of global warming immediately precipitates a light frost. There is some wariness and a sounding-out of positions. Then one old friend leans forward, slightly conspiratorially but also with the conviction that he is delivering some welcome information, and tells you that a friend of his uncle's is an absolute whiz with computers and has crunched the numbers of the climate scientists and found that they have made a basic error that changes everything. What do you say? This kind of conversation is happening – or dying – at dinner tables, barbecues and pub bars around the country.

Climate change has become dangerous social territory. It now surpasses religion, politics and sex as a taboo subject. It threatens to disturb polite conversation with anger, resentment and anxiety, and can hijack any serious attempt to discuss the worrying predicament of our grandchildren. It is only human to find ways to doubt or reject what is so difficult and frightening to confront.

I will return to this common and disabling reflex of denial. But first let us acknowledge that there is a different kind of

denialism – and it deserves the name – that is a strategic and knowing political act in the face of established facts. It is consciously fraudulent, motivated by malice aforethought, driven by cynical opportunism and greed, and frequently funded by the carbon-polluting industries. Sadly, there is nothing surprising about this cunning exertion of naked power for short-term self-interest. 'Doubt is our product' was the message of an infamous tobacco company memo in 1969, and the confection of doubt continues to be a successful corporate tactic. (Not everyone who smokes gets cancer. Not every year is hotter than the last.) In their book *Merchants of Doubt*, Naomi Oreskes and Erik Conway document how, from the 1950s, the tobacco industry poured money into manufacturing a phony 'debate' about the rapidly emerging scientific theory that smoking was a cause of lung cancer and other diseases. Having created an apparent debate, the industry then convinced the mass media that responsible journalists had an obligation to present 'both sides' of it. Research funded by tobacco companies cherry-picked scientific data, focused on unexplained or anomalous details, and exploited 'normal scientific honesty to spin unreasonable doubt'. The same tactics were used decades later by the carbon polluters, and *Merchants of Doubt* makes shockingly clear that sometimes it was even the same people orchestrating them. *The Australian* newspaper is an unashamed exponent of disinformation on this issue, and it is appropriate that its middle-back page is entitled 'Weather and mind games'.

In the 1960s and '70s, people who knowingly conspired with the tobacco industry to delay popular understanding of the links between smoking and lung cancer seemed self-seeking and highly irresponsible. Looking back now, we judge them even more harshly. In 2004, in a landmark federal case in the United States, the tobacco industry was found guilty of fraud and corruption. But that was half a century after the verdict of scientists

began to emerge clearly. Those were decades of profits for a cynical few, pocketed through the merchandise of doubt. How, in 2050, will we judge those who, for personal gain, intentionally propagated misinformation about climate change science? How do we judge them today?

The political denial of climate science gathered momentum in the late 1980s when NASA scientist James Hansen testified about global warming to a US Congressional hearing, the IPCC was formed, the Berlin Wall fell, and American conservatives began to look for a new enemy of the free market economy. But political denialism has strengthened, especially in the past few years, and it has succeeded in presenting science as ideology and in replacing evidence with opinion. Critics of climate change science often invoke the word 'belief' as if the issue is one for personal decision. Former prime minister John Howard calls himself an 'agnostic' on climate change. And those who articulate the science and its implications are branded as 'high priests' of an 'evangelical' movement or 'cult'. 'Environmentalism', which is a political stance, is depicted as 'religious', and climate science is portrayed as its core belief. In an article in the *Monthly* in August 2012, Robert Manne declared the dark victory of the denialists and tracked how funding of their activities has shifted from mainly fossil fuel interests to include an increasing number of conservative foundations advocating a libertarian, anti-regulatory ideology. In the US, the issue has polarised dramatically between Democrats and Republicans just in the past decade, and a similar party-political divide has solidified in Australia.

In such an adversarial culture, I think that use of the word 'consensus' to describe the scientific position can be seriously misleading. The word was generated by the IPCC process which, although founded on the best science, relies on intergovernmental negotiations to produce agreed statements. 'Consensus' sounds like politics, not science; it evokes compromise

and negotiation. It suggests that majorities are instrumental and sometimes temporary. It seems to allow for contrary or dissenting opinions, without the need to offer new evidence. It possibly undermines public understanding of the status of an accepted scientific theory.

Australia has its own band of paid or cynical denialists and, although they are mischievous and dangerously influential, their motivations are so clear and selfish that they are essentially boring. I am more interested in the everyday dinner-table reflex. Doubt is not only the 'product' of industries protecting their livelihoods; it is also the natural refuge of humans confronting an unwanted reality. We are all prone to this willing blindness and comforting self-delusion. Overcoming that is our greatest challenge.

Clive Hamilton is an Australian political analyst who has been steeped in the climate literature and policy debates for years and quickly recognised the political urgency of the issue. Yet for a long time he could not emotionally accept what it really meant for the future of the world. It was only in September 2008 that he finally allowed himself to concede that it is now too late to prevent far-reaching changes in the Earth's climate and 'to admit that we simply are not going to act with anything like the urgency required'. That emotional shift induced some relief – relief at admitting what his rational brain had been telling him, relief at saving energy on false hope, and relief at being able to let go of some anger – but it also initiated turmoil. To resolve that grief and disturbance, he wrote a grim book entitled *Requiem for a Species*. It is driven by a historical quest 'to explain why humanity failed to respond to the existential threat posed by global warming'. Hamilton's insight into his own protective, unconscious instinct enables him to find some compassion for his fellow humans as they expertly deploy strategies of denial and dissociation.

Emotional denialism can take many forms – avoidance, hope, anxiety, even a kind of torpor when people truly begin to

understand what will happen to the world of their grandchildren. In a book entitled *Living in Denial*, an American sociologist of Norwegian descent, Kari Marie Norgaard, studied an educated and environmentally conscious Norwegian community of about 14 000 residents (to which she gave the fictional name Bygdaby) during the unusually warm winter of 2000–01. Norway is a country where there has been a relatively high acceptance of the science of global warming, and Norgaard chose a place where climate change will swiftly bring economic challenges. It is also a community where people are 'sincere in their concerns for the wider world and engaged in so much political activity on its behalf'. Yet the people she studied 'lived in denial'.

Norgaard found that climate change was a conversation stopper. What she observed was a culture of habitual avoidance where people accepted the science but failed to integrate that knowledge into everyday life or to transform it into social action. The well-educated, open-minded, environmentally conscious global citizens of Bygdaby recognise what global warming means, are disturbed by it, and yet are able to live in a parallel emotional universe where it is rarely mentioned or acted upon. In the words of Kjersti, a teacher in the town: 'We live in one way, and we think in another. We learn to think in parallel. It's a skill, an art of living.' Climate change is both deeply disturbing and almost completely submerged; it is simultaneously common knowledge and unimaginable.

What about the climate scientists themselves? How do they deal with the frightening revelations of their daily work? How do they sleep nights? What do they tell their children? These are the questions that shape *Feeling the Heat*, a fine book by the Walkley Award-winning Australian journalist Jo Chandler. She follows climate scientists to Antarctica, the tropical rainforests and the Great Barrier Reef, 'traversing the frontiers of the climate story'. Early in her writing, Chandler is sipping a Christmas drink with

friends in an Australian backyard and finds herself confessing in public her worries about 'drought and sea levels, monsoons, methane and the mysterious mechanics of the deep ocean'. 'People drift away', she writes, 'as if I let slip a fart or a faux pas'.

Chandler is trying to find a way to write about the revolution we are living in without people drifting away and without conducting trench warfare. Her solution is to communicate the passion and dedication of the scientists, these 'explorers of extremity'. We see their excitement as they follow their curiosity and pursue puzzling questions; we see their resilience and optimism in the face of bleak findings; we see the dawning of sickening sense as scientific scepticism meets hard evidence; we also see the withering of hope as they experience the resistance and paralysis of social and political systems that should be activating change. Chandler's book reveals the scientific method in rich detail, as fine minds struggle with complex systems, depressing outlooks and their responsibilities as citizens.

I think she is right to take her readers into the hearts and minds of the scientists, for they are engaged in surely one of the most exciting and vertiginous intellectual endeavours in the history of humanity: to get a firm understanding, quickly if possible, of how climate change is playing out, and will continue to play out, in the ecosystems of the globe. It is the colossal story of our time and perhaps if we would allow ourselves to be more caught up in the exhilaration of it, we might also find the political will to do more about it.

This is a quest that has secured my own urgent sense of wonder. In January 2012, I was fortunate to join Australia's centenary voyage to Mawson's huts in East Antarctica, which was also the major marine science expedition of the summer. On board *Aurora Australis* was an impressive team of oceanographers, biologists, glaciologists and climate scientists. Every day I benefited from conversations with passionate and dedicated researchers

who were both intrigued and disturbed by what they were discovering. Among other things, they were researching the consequences of a collision between a giant iceberg and the tongue of the Mertz Glacier, a fascinating natural experiment in ocean circulation and sea-ice production – and just how 'natural' was such an event now? One evening, as we sailed near the Mertz Glacier, a distinguished oceanographer confided to me that in 20 years' time he thinks that climate scientists will regret that they did not speak out more forthrightly about the grim implications of their findings. He is a brilliant communicator himself, and his passion and sincerity are luminous. But a good scientist, he explained, is objective and therefore wary of politics. Where his science intersects with a highly political issue, he might be inclined to protect its objectivity by being extra conservative and a touch restrained. That is why the future of the planet is probably a little more frightening than we know.

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How can intelligent, learned, civic-minded people feel that they can reasonably reject, doubt or be 'agnostic' about the theory of anthropogenic climate change? And how can some of them also feel that they must prosecute their case in public? In *Feeling the Heat*, Jo Chandler shares my dismay and considers their motivations:

> Sometimes it is blatant – it's about greed. Sometimes it is more obscure – it is about reputation, about relevance, about fear, perhaps, of facing the poisoned legacy our life choices have bequeathed, however unwittingly, to those who come after us. Sometimes it is about horror of the unknown, and that I can understand. Sometimes it is entirely baffling, and I have to wonder what kind of madness or delusion or anxiety drives it.

We have considered healthy scientific scepticism and fraudulent political denialism, and somewhere between those two poles are to be found the contrarians. As Clive Hamilton puts it: 'The contrarian is a loner, perhaps cranky, but also genuinely independent of mind.' I want to consider three Australian contrarians on climate change, three retired professors – of history, political science and geology: Geoffrey Blainey, AC, Don Aitkin, AO, and Ian Plimer. They perfectly fit the profile of climate change sceptics – older, educated, once-powerful men. They are seeking our attention on this issue. Should we give it to them? This is a good question, and one that climate activist Anna Rose considered when she was asked to enter a dialogue on ABC TV with the climate sceptic and former senator, Nick Minchin. Minchin was the powerbroker responsible for Tony Abbott's rise to the leadership of the federal Liberal Party in 2009, and the decisive issue was climate. Nick Minchin 'remains unconvinced' by climate science. As Rose wrote in her book, *Madlands*, 'the whole idea of the [ABC] show played into the denialists' strategy of framing the science as disputed'. But Rose decided to go ahead anyway because the documentary would reach a diverse audience and might possibly change some minds. We have to believe in the creative potential of dialogue with our fellow citizens.

Geoffrey Blainey is our pioneering climate historian. He has an abiding interest in the historical physics and geography of the globe – one of the early fruits of that curiosity was his famous book, *The Tyranny of Distance*. In 1971 he wrote an article called 'Climate and Australia's history' and in 1981 he argued in *A Land Half Won* that 'delusions of climate' should be added to the list of vital causes of the British settlement of Australia. Captain Cook and Joseph Banks had chanced to visit Botany Bay in a wet autumn and imagined they were seeing it at its worst, but 18 years later Governor Phillip landed his fleet in a dry summer and found a very different landscape. Blainey's quizzical intellect,

quirky, original insights and literary flair make him a brilliant historian.

He has always relished a bit of social and academic mischief. In 1984 he drew trenchant criticism for comments he made about the social dangers of large-scale Asian immigration. In 2003, he favourably reviewed *The Fabrication of Aboriginal History* by Keith Windschuttle, a controversial book that was strongly condemned by most experts in the field.

Blainey is a genuine contrarian. His teachers and colleagues labelled him an individualist, a maverick. In academic debates, he has been the generalist and populist who enjoyed unsettling the authority of the specialist. Although a university professor, he began and ended his professional career outside academia, as a freelance historian. At a time of rapidly increasing professionalism and specialisation in the discipline of history, Blainey never despised the public; as a writer he has often taken on the mantle of speaking for them, and as an academic he has always been a loner.

Blainey is sceptical of intellectual fashion and has made its swings a subject of historical analysis in a book called *The Great Seesaw: A new view of the Western world, 1750–2000*. In the late 1960s and 1970s, green politics overtook him in a way that clearly irritated him, just as multicultural politics did a little later. He sees environmentalism as akin to a religion and as having benefited from the decline of Christianity. The green movement is not only a cult; it is a professional one. It is an evangelical crusade and, in Blainey's narratives, has worshippers, an altar, a halo, a sense of the sacred, and a Garden of Eden. It also fosters guilt. Reasonable people are thereby made 'unconscious captives'.

Blainey has decided that climate science is an intellectual fashion, and that it has gone too far – eventually the pendulum will swing back, and the great seesaw of optimism or pessimism in the Western world will go to the other extreme. 'There is a

brittle quality in these extreme moods', he believes, and 'whatever is fashionable can suddenly become unfashionable'. He criticises climate scientists for saying 'this is simply a question for scientists, keep out'. Blainey cautiously endorsed Ian Plimer's book, *Heaven + Earth: Global warming – the missing science* with the words: 'Those who say that the latest "climate change" is unique are really making a profound appeal to history. Professor Ian Plimer is a leading historian of climate change, and takes his evidence from the layers of rocks. He strongly challenges the prevailing theory of human-induced global warming.' It is not a ringing endorsement, but Blainey is happy to set the cat among the pigeons.

He resents the exclusive authority of the climate scientists, and positions himself – as he did in the immigration debate in 1984 – as the champion of the everyday perceptions of ordinary people. He resists doomsayers and is an advocate of the positive ledger of national life. He feels that most historians wear black armbands and drink from half-empty glasses. His long career as a historian of mining, mining companies and mining towns (Queenstown, Broken Hill and Mount Isa) schooled him in the economic importance of mining and inclines him to defend it from attack. He is critical of the interference of international bodies in his country's sovereignty. And he still probably carries a deep emotional wound from the attacks on him by his professional colleagues about his views on Asian immigration in the 1980s. Marginality was suddenly no longer self-imposed, and he developed sympathies for the underdog or whistleblower in intellectual battles. A prominent 'consensus' of 'experts' represented in an 'international body' championed by 'greens' was sure to attract his attention. But he is unable or unwilling to separate environmentalism and climate science. Contrarianism has been an immensely creative scholarly style for Blainey, and a successful professional strategy. But there is a studied naivety and

innocence about him, and a carelessness for the consequences of the game he is playing.

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Professor Don Aitkin is another persistent contrarian whose intellectual habit has led him to question climate science. He calls himself a 'dissenter' and, like Blainey, styles himself as a champion of the ordinary punter. Aitkin is a distinguished scholar of political science, an academic leader, and a conscientious and civic-minded member of his community. He was vice-chancellor and president of the University of Canberra from 1991 to 2002, vice-president of the Australian Vice-Chancellor's Committee 1994–95, foundation chair of the Australian Research Grants Committee and a member of the Australian Science and Technology Council. His community service includes his time as chair of the National Capital Authority, chair of the NRMA/ACT Road Safety Trust, and many formal roles in support of music and the arts. He admires the environmental histories of Eric Rolls and George Seddon and thinks we should learn to live more lightly on the planet. When a person with such a strong commitment to environment, research and public education declares climate science to be a 'fashionable bugbear', it is a matter of deep concern and interest.

Don Aitkin does not reject climate science completely, but believes it is greatly exaggerated. 'The evidence seems quite equivocal to me', he writes on his blog. 'I remain agnostic'; 'I am a dissenter'. In two successive *Ockham's Razor* talks on ABC radio in 2008, he was more dismissive. He concluded on the basis of his own exploration of the science – which he confesses on his blog relies a bit on Wikipedia and 'Professor Google' and on infamous sceptics like 'the sharp-eyed Joanne Nova' – that 'human activity is unlikely to be a major cause of any warming'.

And anyway, he argues, 'On the evidence it is not obvious that an increase in the earth's atmospheric temperature would be a bad thing.'

What are the contours of Aitkin's stance? He finds climate change a very interesting issue and believes in, and welcomes, debate and disagreement, although he does like to have the last word. He believes there is much more controversy about the science than the media is willing to tell us, especially *The Conversation* or the ABC, of which he has become a strong critic. He questions whether the Bureau of Meteorology is a science agency or a PR bureau. His experience in managing research culture and funding means he has some good criticisms of the anonymous peer review process, and he is well placed to advance important arguments about the value of humanities research, especially in its constant battle to secure a share of funding from the sciences. He is proud that Australia is 'unhampered by elitist traditions'. His lifelong commitment to education is an expression of his desire to empower people, for he believes that a good democracy depends on people being willing 'to talk to one another about issues, to write letters, to stand up for what we believe – to engage in "the great conversation" [quoting Manning Clark] of Australian public life'.

Because of these views, Aitkin feels that climate science, like any other public issue, should be available for him to shape through debate, and the climate scientists annoy him by referring to a 'consensus' that doesn't include him. He didn't consent! Instead he offers dissent. Like Blainey, he became impatient with the 'goodies vs baddies' view of the world and especially with the 'high priests' of environmentalism and their 'quasi-religious fervour' and self-righteousness. He feels that climate science is anti-democratic; it shuts him out and tells him what to do. And he doesn't like being told what to do. Although he celebrates effective social regulations about smoking and the wearing of car

seatbelts, he argues that 'people have to come to accept the virtue of the law'. During Earth Hour, which he considers a 'wank', his instinct is to set all the house lights blazing (but he confesses that 'domestic counsels' prevail). On the issue of global warming, he rejects the idea that scientists have any special 'authority' on a matter about which every educated taxpayer can and should form a respected opinion. One can hear the pain of a humanities scholar who has long battled with his scientific colleagues for respect and equality at the budget table.

In a riposte to an *Ockham's Razor* talk by the renowned American climate scientist, Dr Stephen Schneider, in 2008, Aitkin wrote:

> I am increasingly struck by the similarity of the [anthropogenic global warming] debate to the struggle between the Church of Rome and the Protestant dissenters in the 16th century and afterwards. The Church claimed the right to mediate between the believer and God, while the Protestants argued that each of us could establish a personal communication with God. Throughout your talk I could hear someone talking in the tones of 'received wisdom'. My sceptical, protestant mind begins to object as soon as I hear anyone talk like this, no matter how many years they have worked in a field, no matter how many peer-reviewed papers they have published, no matter what their title. They are claiming authority. I don't accept it.

Thus a former vice-chancellor and manager of peer review and elite research finds himself rejecting the insights of carefully accumulated and rigorously tested knowledge.

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The third figure I want to discuss is Ian Plimer, who may seem an odd choice, for he lacks the political independence of the typical contrarian and is an active participant in the trench warfare that characterises this debate. A former professor and head of the School of Earth Sciences at the University of Melbourne, he is the most prominent Australian scientific warrior against the theory of anthropogenic climate change. He is on the boards of mining companies (and proudly declares those interests); his last book was launched by John Howard; and he is Tony Abbott's chosen authority on climate change. What makes him interesting is his earlier history of fighting for peer-reviewed science against creationism. For this and related geological work, he was awarded Eureka prizes, including one for his 2001 book, *A Short History of Planet Earth*. I was at the award ceremony in Sydney to honour him and the other prize-winners and I warmly shook his hand. He has done much to promote the public understanding of science and to explain the scientific method, and his contribution was celebrated by his professional peers. He championed science as dynamic, exciting, and as an unfinished story wedded to evidence. He was named Australian Humanist of the Year in 1995.

Now Plimer is a bitter and angry critic of the very processes he once defended, declines to submit his climate arguments to peer review, and accuses the IPCC of being 'underpinned by fraud'. His book on climate science, *Heaven + Earth*, was critically condemned by scientists. Australia's foremost coral specialist, JEN 'Charlie' Veron, declared that every original statement Plimer made in the book about corals and coral reefs 'is incorrect and most are the opposite of the truth … This is unusual, even for pseudo-science'. *Heaven + Earth* finishes with a quote several pages long from Viscount Monckton of Brenchley and then some words from Pope Benedict XVI. What happened to Ian Plimer?

Plimer became a public figure in the 1980s and '90s through the vehemence and theatre of his attacks on 'creation science'.

In 1988 he challenged an American advocate of creationism in a debate about evolution by donning insulating gloves, holding a live electric wire out to his opponent and encouraging him to grab it. Electricity – just a theory, like evolution, like gravity. Plimer explained that he was using tactics he 'learned in the mining world … you take no prisoners'. In the early 1990s, he legally pursued an elder of the Hills Bible Church in Sydney, Allen Roberts, for claiming in a series of public lectures that a boat-shaped rock formation in eastern Turkey contained Noah's Ark. The case over whether Roberts had breached the Trade Practices Act ended up in the Federal Court in 1997. Mr Justice Sackville, whose judgment began with a quote from Darwin's *Voyage of the Beagle*, found that Roberts had made false and misleading claims and fined him for using a published illustration without permission, but rejected Plimer's argument that the Trade Practices Act could extend beyond the commercial realm to cover false claims made in public. The judge, who commented on the 'considerable personal antipathy' between the parties, refused to oblige Plimer by imposing an injunction against Roberts expressing his views. Mr Justice Sackville added:

> Having regard to the way in which the issues were ultimately framed in this case and the conclusions I have reached, it has not been necessary for me to decide whether I should accept Professor Plimer's evidence on all matters addressed by him. Had it been necessary to do so, I would have had to consider whether Professor Plimer's zeal for his cause coloured his evidence.

Plimer lost a lot of money in the litigation.

In his book *Telling Lies for God: Reason vs. creationism*, Plimer was Darwin's champion, explaining the strength of the theory of evolution and of accepted scientific theories in general. A

distinguishing quality of good science, he declared, is 'ruthless peer review'. People have no trouble accepting the theories of gravity, electricity and continental drift as 'facts'. Like the theory of evolution, they are 'testable, reproducible and open to international public scrutiny'. He was incensed by the 'blatant scientific fraud' peddled by creation 'scientists' and by their desire to insert creationism in the school curriculum. In 2011 he published a book for schoolchildren on climate science (the one launched by John Howard), *How To Get Expelled From School*. Plimer now seeks to insert his own views of climate science into schools, to be taught alongside or instead of the established science curriculum.

This move from defending the scientific method to fighting climate science seems dramatically contradictory. But Plimer would presumably argue for continuity between his two campaigns, one to expose 'fraudulent creation science' and the other to reveal that the IPCC is 'underpinned by fraud'. He would also see himself as defending science against two evangelical, religious positions. But his lone, zealous advocacy against the scientific community now seems very like the creationism he reviled years earlier. Creationism, he explained in 1995, began in reaction to the publication of Darwin's *Origin*. 'Creationism is about power … Creationism thrives on insecurity. Creationism provides simple, authoritative, dogmatic answers to complex problems.' Creationism picks over the carcase of science 'like hyenas' rather than providing new, accepted evidence. Creationists misquote, use information out of context, fabricate data and 'exploit the tolerant democratic process' by seeking equal representation in schools. Plimer concluded that 'the collective might of millions of scientists today must surely disprove creationism', But now he is contemptuous of 'consensus', dismisses peer review and resents 'the demonising of dissent'. He pugnaciously claims to 'knock out every single argument we hear about climate change'.

Why does an admired scientist turn on his peers and

professional culture? In *Merchants of Doubt*, Oreskes and Conway analyse why a respected physicist and former president of the US National Academy of Sciences, Frederick Seitz, worked to create doubt about the link between tobacco and lung cancer well after the evidence was clear. It was partly his long reliance on tobacco industry funding, but also because he had developed a grudge against the scientific community he once led. His ardent right-wing politics and his support for the Vietnam War and nuclear armament had made him unpopular among his mostly liberal academic colleagues and led to his increasing social and intellectual isolation. He mixed more easily with corporate executives. He was attracted to being the arbiter of who among his scientific peers would win grants from the huge tobacco industry biomedical research funds he controlled.

At home in 'the rough and tumble of the zinc-lead-silver mining town of Broken Hill' (as he put it), Ian Plimer found that his field of climate history had been hijacked by a bunch of younger atmospheric and oceanographic experts. He may have begun as a contrarian, but the heat of battle has forged him into something else. In 'Charlie' Veron's words, Plimer is now 'very careful to keep facts from spoiling a good story'.

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I am going to give Charles Darwin the last word, for his advice about the likely reception of his theory of evolution is relevant to us today. At the end of *The Origin of Species*, he anticipated opposition to his theory and expressed his confidence in the responsibility and conscience of leaders of opinion, especially those of the new generation. He saw the task ahead as one not only of the communication of facts, but also of thoughtful public advocacy and education:

Anyone whose disposition leads him to attach more weight to unexplained difficulties than to the explanation of a certain number of facts will certainly reject the theory. A few naturalists, endowed with much flexibility of mind, and who have already begun to doubt the immutability of species, may be influenced by this volume; but I look with confidence to the future – to young and rising naturalists, who will be able to view both sides of the question with impartiality. Whoever is led to believe that species are mutable will do good service by conscientiously expressing his conviction; for thus only can the load of prejudice by which this subject is overwhelmed be removed.

This. Here. Now. p. 41
TB and me p. 224

Weathering the storm

Peter Meredith

The white Holden VE Commodore has 'Storm Chasing & Lightning Research' emblazoned on its side. The driver is Mike O'Neill, 51, who does what the sign claims. He's wearing dark chequered shorts and a black T-shirt with 'Do not follow in adverse weather' printed on the back. I'm in the front passenger seat. It's 1.50 p.m. and we're heading south on the Stuart Highway from Darwin in search of storms. The sun is shining, the sky is a deep blue and I'm having doubts of finding any.

O'Neill, a printer by trade, has been chasing storms and photographing lightning for about ten years. It's more than a hobby for him; it's a labour of love. On any other chase, his front passenger seat would be cluttered with gear. There would be a video camera on a dash-mounted tripod and a laptop stand bolted to the floor. The laptop would be showing near real-time radar images of the region, courtesy of the Bureau of Meteorology (BOM). There would also be two digital SLR cameras, a couple of tripods and a high-speed video camera. Today, the gear has made way for me, so we pull over occasionally to check the laptop.

Today's forecast is the same as it's been for days: showers and a gusty storm. Locals tell me this 2012–13 wet season has been disappointingly dry, and showers and gusty storms have been in