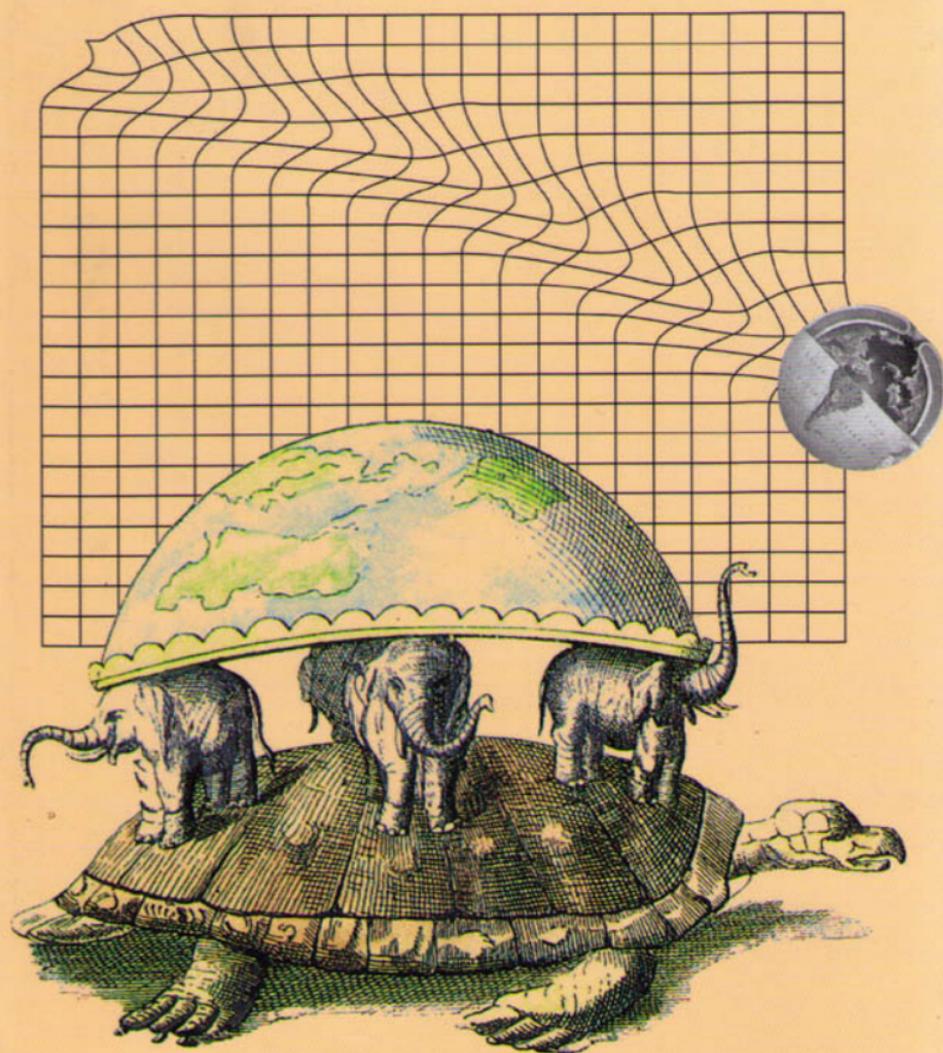


DISCARDED SCIENCE

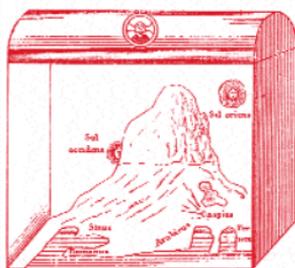
Ideas that seemed good at the time...

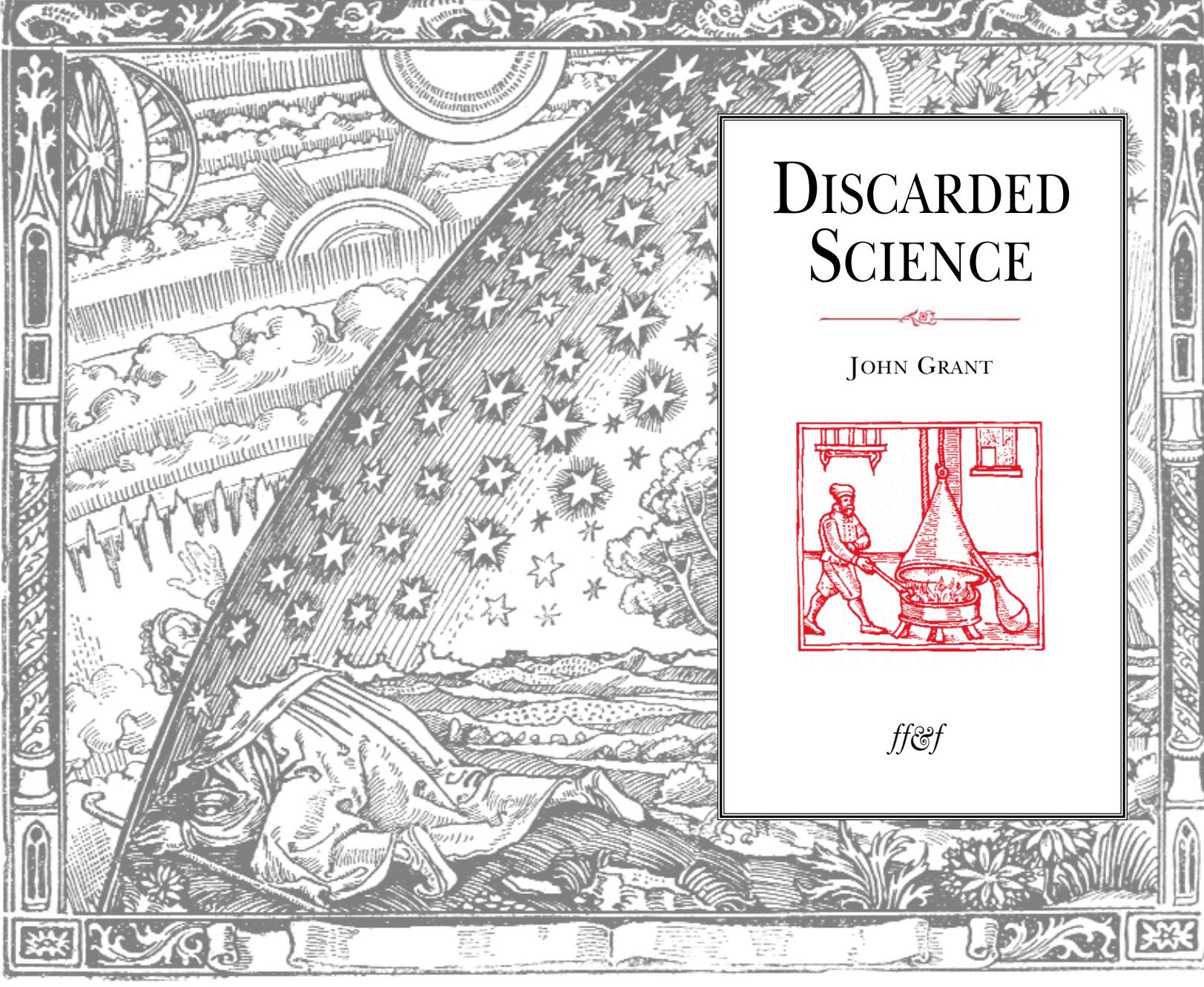


John Grant

DISCARDED SCIENCE

JOHN GRANT





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ff&f

This one's for The Spammers: Randy M. Dannenfeler, Bob Eggleton, Gregory Frost, Neil Greenberg, Jael, Stuart Jaffe, Karl Kofoed, Todd Lockwood, Aaron McLellan, Lynn Perkins, Tim Sullivan and Greg Uchrin.

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INTRODUCTION

ALL MANNER OF DISCARDED SCIENCE

Nothing but experience could evince the frequency of false information, or enable any man to conceive that so many groundless reports should be propagated, as every man of eminence may hear of himself. Some men relate what they think, as what they know; some men of confused memory and habitual inaccuracy, ascribe to one man what belongs to another; and some talk on, without thought or care. A few men are sufficient to broach falsehoods, which are afterwards innocently diffused by successive relaters.

Samuel Johnson, as reported by
James Boswell, *Life of Johnson*, 1778

IN 1938 THE YOUNG Italian sculptor Francesco Cremonse buried in France most of a "classical" statue of Venus. When this statue was "discovered" shortly afterwards, the experts enthused over it and the French government classified it as a part of the national heritage. Cremonse promptly confessed responsibility for creating the sculpture, and was of course disbelieved – who was he to argue with the experts? He was taken seriously only when he produced the missing parts of the statue – its legs, one arm, and its nose. Even so, his outrageous claims might have been swept under the carpet had he not



Atlas bears the world on his shoulders.
From William Cuninghame's *The Cosmographical Glasse*, 1554.

been able to produce the night-club singer who had been his model – complete with legs, arms and nose.

In the field of discarded science one finds, constantly, a similar reluctance on the part of most of us to accept that one or other of our favourite hypotheses is nonsensical. True, some are so overtly misguided that no one sane would take them seriously – for example, there was a Black Forest group, Vegetaria Universa, active in the 1960s, which claimed that the Universe is made entirely of vegetables. But some equally hare-brained ideas are widely shared. Take for example the ancient-astronaut hypotheses of Erich von Däniken (b1935) and others, or the bizarre ideas of the late Immanuel Velikovsky (1895–1979).



The motivations for producing and/or believing in spurious hypotheses are several.

Some hypotheses – indeed, some full-fledged theories – are simply **defunct science**: in their day they represented the cutting-edge of theoretical science but they've since been superseded by other versions that accord more accurately with reality, or they've been realized to be totally at odds with reality and been replaced wholesale by something that is at least, so far as we can establish, closer to the truth. As science slowly evolves – as our knowledge of the Universe slowly progresses in the direction of completeness, even if as yet maybe nowhere approaching that ideal closely – ideas and hypotheses from seemingly different disciplines suddenly take on new relationships: can be seen as the myriad pieces of a single, very large jigsaw. Those pieces that simply will not fit, no matter how much we manipulate them, naturally come under greatest scrutiny. Perhaps, just perhaps, getting them to fit will involve a paradigm shift – the removal of all the other pieces of the jigsaw in order to start afresh. More likely, they're from the wrong puzzle and should never have got into this one's box in the first place.

Some jigsaw pieces very obviously do not belong to the puzzle at all. We should in theory look at them closely, of

course, just in case our first impressions might have misled us; but the chances of this being so are slender. There have been instances where "manifestly wrong" pieces have turned out to fit into the larger puzzle after all: for a single example, we can think of Alfred Wegener's hypothesis of continental drift, which for decades was ridiculed by Earth scientists. But continental drift is one of the very, very rare exceptions. Most of those misshapen, incongruously coloured hypotheses are rightly rejected on sight as **pseudoscience**: at a cursory glance they might look like science, but they aren't. While in one sense the pseudosciences are astonishingly unimportant – not only do they make no contribution whatsoever to the advance of human knowledge but very often they could impede it – in another, societal sense they can be of very great importance indeed: through their capacity to deceive the unwary, the uneducated or (to be frank) the bigoted and the stupid, they can sway whole societies, and often can cause untold misery.

A subject bedevilled by pseudoscience is race. The racist pseudosciences were in large part born from the **ideological corruption of science**, a further spawner of a plethora of bad science. The ideology concerned can be religious or it can be political. The ideology can even be, on the whole, a benevolent one. There are growing signs at the moment of science being corrupted by the wholly spurious notion that somehow truth can be determined by democratic vote: if polls show that 60% or 70% of the people don't accept that humankind is the product of Darwinian evolution, for example, that's accepted by some as "proof" that Darwinian evolution must be false. More often, though, the ideology concerned is malicious, or at the very least pernicious in its intent towards science. The corruption of science by religious ideology has been such a constant and pervasive theme throughout history that, had I allowed it to, it would have been mentioned on many more pages of this book than it is; in the vast majority of instances, however, I've assumed the reader will understand that religious belief has moulded the social climate responsible for the acceptance of false science. Elsewhere the corruption of science has been deliberate and politically motivated; the examples that spring

at once to mind are the Nazi promotion in Germany of "non-Jewish" science, the Stalinist suppression in the USSR of honest genetics in favour of the populist, "peasant" pseudo-genetics propounded by T.D. Lysenko (1898–1976), and the ongoing attempts by the George W. Bush Administration in the US to stifle science that clashes with its neoconservative ideology.

The ideological corruption of science blends naturally into **antiscience**, the emotional rejection of *all* scientific conclusions, often because those conclusions have been reached by "them" and must therefore be antithetical to "us" – i.e., must be false. This motive clearly spurs quite a lot of the religiously rooted corruption of science: it is easier for a demagogic preacher to persuade his congregation that science *in toto* is the instrument of Satan, and therefore to be rejected wholesale, than it is for him to offer any rational, or at least quasi-rational, counter to whichever piece of science it is that he doesn't happen to like. That shouldn't be taken to mean, though, that religion is the root of all evil so far as antiscience is concerned: there are other motivations, such as that strange form of inverse snobbery in which the highly educated are somehow regarded as less well informed than the uneducated. Here anti-science shades into the **conspiracy-theory** worldview whereby the clever are inferior to the stupid and thus must be plotting to the detriment of the latter. Conspiracy theories abound, manifestly, among the adherents of the pseudosciences: the denizens of orthodox science are secretly conspiring to ignore or denigrate *my* theory. This gives the pseudoscientist a false feeling of importance, because the truth almost always is that scientists are ignoring him because they have better things to do with their time – like genuine science – than spell out the reasons why hogwash is hogwash.

Yet another contributor to the corruption of science is fraud. Fraud by the layman is usually described as hoaxing, is most frequently done for profit, and is perhaps best described as deliberate pseudoscience; at least some pseudoscientists are anyway spurred solely by the profit motive – just go browsing on the internet and see how many sham astrologers ask for your money in the first five minutes – and therefore are really

fraudsters in all but name. But the more serious issue here is fraud perpetrated by scientists themselves, perhaps in the pursuit of career advancement, perhaps in the hopes of fame and glory, occasionally – as per the faking by Cyril Burt (1883–1971) of his IQ studies – for reasons that are essentially ideological. Scientists like to pretend that fraud within the scientific establishment is rare and anyway rapidly detected, thanks to the scientific process itself – the process of peer review, attempted replication of experiments, and so on – not to mention, of course, the inherent honesty of scientists. Well, perhaps. Serious cases of scientific fraud are sufficiently numerous that whole books have been written about them, and the frequency of such frauds seems to have been steadily increasing. There have already been several spectacular cases since the start of the 21st century.

There is of course overlap between all these categories of motivations for producing or subscribing to bad science. Although I hesitate to pick on Creationism, it is at one and the same time defunct science and a "democratic" pseudoscience, is corrupted by (in this instance religious) ideology, is sustained in large part by antiscience prejudices, is riddled by fraud – particularly in its guise of Intelligent Design, although the Creationist selectivity in the insistence on a literal reading of the Bible is in itself fraudulent (let's ignore the parts about it being okay to rape virgins and so on, and focus instead on the Genesis account of Creation) – and is fuelled to a great extent by the conspiracy theory that "materialists" will do just about anything in their relentless quest to undermine society's morals and deprave us all.

In the wake of the 2004 tsunami that devastated huge areas of the Indian Ocean border and exacted a horrific death toll, science was very swift to identify causes and propose means of ensuring that, in any future such event, the consequences could be at least minimized. The contrasting irrational response was exemplified on the Indonesian island of Aceh. There it was officially proclaimed by Islamic clerics and lawmakers that the tsunami had been caused by the sinfulness of Aceh women, and the Sharia police moved into full over-

drive persecuting women for such tsunami-causing crimes as failing to wear headscarves. What proof could the lawmakers offer that it was the shameless women who were responsible for the disaster? Well, none. Did the persecution help mitigate the plight of the disaster's survivors, such as lack of sufficient medical care and homelessness? Well, no. Did it offer a theological camouflage for the sado-sexual pleasure the male persecutors gained from maltreating and humiliating attractive women? There, science might be able to offer an answer.

Similar irrationality falls easily from the lips of influential Christian Fundamentalist demagogues who, to the dismay of their more rational titular coreligionists, dominate the US airwaves – and from no lips is the fall readier than those of the Reverend Pat Robertson (b1930), founder of the Christian Coalition and the Christian Broadcasting Network. In the lead-up to the 2005 Dover, Pennsylvania, trial over the teaching of Intelligent Design in the science classes of the district's schools (see page 188), the electorate of Dover took the opportunity, in the November 2005 election, to oust all eight members of the school board who had supported the scheme. On November 10, on his daily TV show *The 700 Club*, Robertson warned:

I'd like to say to the good citizens of Dover: if there is a disaster in your area, don't turn to God – you just rejected him from your city. And don't wonder why He hasn't helped you when your problems begin. I'm not saying they will, but if they do, just remember; you just voted God out of your city. And if that's the case, don't ask for His help because he might not be there.

Either (a) this remarkable statement is completely irrational or (b) there is a God, Robertson has a direct line of communication with Him, and God has told him He likes ID. If the relationship is that close, should Dover in future be hit by any unheralded catastrophe, there is an obvious first course of action open to the survivors: sue Pat Robertson. After all, he will have failed to intercede with God to prevent the disaster and thus will be an accomplice to it.

Blaming disasters on God – even pre-emptively, like Robertson – is nothing new. In November 1755 the most

destructive earthquake ever to strike the northeastern US hit at Cape Ann, some 50km south of Boston. The Reverend Thomas Prince, of South Church, Boston, knew at once who was to blame: Benjamin Franklin (1706–1790), for having invented the lightning conductor. Before Franklin's scheme of putting pointed metal rods on tall buildings had been universally adopted, God had been able to express His wrath by blasting something with lightning. Now that the presumptuous Franklin had taken that option away from Him, He was having to use earthquakes instead.



Arthur C. Clarke (b1917) formulated a famous Law: "When a distinguished but elderly scientist states that something is possible, he is almost certainly right. When he states that something is impossible, he is very probably wrong." It is not so many years ago that many "distinguished but elderly" scientists told us that spaceflight was impossible. Again, we have G.W.F. Hegel (1770–1831), around 1800, saying that no object in the Solar System remained to be discovered; the first asteroid was found at the beginning of 1801. Auguste Comte (1798–1857) told us in 1835 that we would never know the true natures of the stars, which would forever remain, for us, only useful celestial signposts; within a few decades of his death the spectroscope told us so much about the chemistry – and hence the physics – of the stars that we knew more about them than about the planets of our own Solar System. Thomas Aquinas (1225–1274), in listing those few things which God cannot do, included the construction of a triangle whose interior angles add up to more or less than 180°; yet this is something which we can all do, by the simple expedient of drawing the triangle on a curved surface.

The point of all this is that the "sensible" theories of the respectable are just as likely to be erroneous as are the outpourings of the amateurs. The illustrious are not immune – far from it. W.E. Gladstone (1809–1898) thought the ancient Greeks were colour blind – owing to the lack of "colour-words" in the works of Homer. George Bernard Shaw (1856–1950) had a

theory that disease epidemics are due to laundries, because infectious handkerchiefs are sent there.

The way in which credence in spurious claims can build up in the popular mind can be illustrated by the tale of King Tutankamun's curse. "As we all know", this supposed curse devastated the archaeological team responsible for opening up the tomb. In truth, the only one of the principals to die soon after the tomb was opened was Lord Carnarvon (1866–1923); his death came as no surprise at the time, though, because he had been ailing for some while – he had been in fragile health ever since an automobile accident in 1901, and the very reason he became interested in Egyptology was because, after recovering from the immediate effects of the accident, he had taken up the habit of wintering in Egypt. The remaining principals survived on average for a further 24 years after the expedition, reaching an average age of 73. Howard Carter (1874–1939) lasted another 16 years.

And then there are scientists themselves. The important physical chemist Robert Boyle (1627–1691), who around 1662 deduced Boyle's Law concerning the behaviour of gases, in an unrelated field of research suggested it might be a good idea to interview miners to find out if they ever met any demons. Among those who refused to believe meteorites could fall from heaven was Sir Isaac Newton (1642–1727), who made his opinions plain in 1704. He could not envisage any possible source for them, and therefore he declared the idea unfeasible. Francis Bacon (1561–1626), renowned for having derived the Scientific Method, was not entirely the cold rationalist we tend to imagine: another of his notions was that witchcraft could have its origins in the actions of malign spirits.

In May 1872 the great French astronomer Joseph de Lalande (1732–1807) published a long article in *Le Journal de Paris* patiently explaining to his readers all the reasons why thoughts of manned flight in hot-air balloons were the most foolish of pipedreams. On June 5 1783, just 13 months later, the Montgolfier Brothers made their first flight. This was not a good time for technological prediction in Paris. In July 1783, mere weeks after the Montgolfiers' flight, the engineer Claude,

Marquis de Jouffroy d'Abbans (1751–1832), launched a small paddle-wheel steamboat, the *Pyroscaphe*, on the Seine. In response to the successful voyage, the government handed the invention to French Academy of Sciences for evaluation. They replied that the invention was a waste of money and steam-powered water transport a matter not worth pursuing. A few years later, still unable to get any backing, Jouffroy d'Abbans had to flee from the Revolution. Ironically, when in 1803 the US engineer Robert Fulton (1765–1815) lifted steam-powered transport emphatically back into consideration, it was on the Seine that he performed his pivotal test voyages.

The history of science is littered with countless similar examples of scientists proving profoundly *wrong* – especially when working outside their chosen fields. People who have scientific training can be as much amateurs as anyone else when they stray into disciplines where their level of knowledge is not especially higher than that of the lay person. The classic example of this – the one that's almost always cited – is that of the excursion in 1973 of the distinguished mathematician John Taylor (b1931) into the alien field of parapsychology, when he investigated batches of British children who claimed to be able to emulate the much-vaunted "psychic" powers of Uri Geller. Parapsychology is a science insofar as the study of "psychic" claims should be done scientifically. (The term is more generally used to embrace the claims themselves, in which case parapsychology is probably more properly termed a pseudoscience, although even then it doesn't fit the definition very well – which is why there's not a great deal on the subject in this book.) In the scientific study of "paranormal" claims, it's a fundamental requirement, as a safeguard against fraud, to have a good working knowledge of conjuring, since almost all of the effects exhibited by "psychics" are attained in this manner: if an effect can be reproduced using sleight-of-hand, then there's every reason to believe this was how it was done in the first place. Taylor did not have this basic conjuring knowledge – and nor did it seem to occur to him that any of the little darlings involved in his testing might resort to straightforward cheating . . . which of course, being bright kids, many of them

did. (The rewards for cheating were high: you were a "success".) Taylor soberly reported all kinds of fraudulent cutlery-bending as if his tests had been completely waterproof when in fact, to even an amateur conjurer, they were patently permeable.

Similarly, Edgar Mitchell (b1930) has a doctorate in science from the Massachusetts Institute of Technology and was the sixth man to walk on the Moon. He later founded the Institute of Noetic Sciences, based in California, which explores "powers of consciousness" and "phenomena that do not necessarily fit conventional scientific models", and gives public speeches endorsing some cheerfully fringe ideas, such as extraterrestrial-hypothesis ufology (see page 219): "A few insiders know the truth, and are studying the bodies that have been discovered."

Countless other examples could be cited; many will be found in the pages of this book.



It is of course the case that some elements – perhaps many – of the science of today may become the discarded science of tomorrow: the trick is knowing which elements those are, something virtually impossible to do from within one's own timeframe. The process of discarding ideas in favour of new and better ones is part of the healthy growth of science.

Spend 20 minutes surfing the World Wide Web and you'll realize that there are thousands of voices demanding that humanity take on board one new paradigm shift or another: if only we would accept that the answer to life, the Universe and everything is 42 then all the rest of human understanding would fall neatly into place. As Douglas Adams's parodic statement of the sum of all knowledge suggests, almost all of such claims are nonsense: many of them have been considered and rejected long ago, for good reason, and there is equally good reason why almost all of the rest have never been seriously considered. It is astonishingly rare for a paradigm shift to be triggered from outwith the scientific community, and it's not hard to see why: in almost all cases, no matter how much amateur theorists may batter against the wall of scientific indif-

ference – like angry wasps against a window – the reason their theory is not being taken seriously is that it has fundamental flaws that are immediately obvious to anyone with even just a modicum of extra knowledge that the amateur does not possess. It's no real wonder that amateur theorists often feel themselves persecuted by the "lords of ivory-towered academia", or whatever – a regrettable situation to which there seems no easy solution: as noted above, scientists have limited amounts of time they can spend dissecting each and every new hypothesis that to them is quite patently nonsense. They don't have time even to *read* all of them. And there's the major deterrent to entering into any dialogue with an amateur theorist: nine times out of ten, whatever the scientist says, the theorist will not listen. (For a dramatic example of this obdurate deafness in action, spend a few minutes perusing the "Wacky Evolutionists" section of www.objectiveministries.org.)

It's therefore within the scientific community that it's most interesting to look around for straws in the wind that might indicate future paradigm shifts. As a recent example, there's the work announced in early 2006 by physicists George Chapline of the Lawrence Livermore National Laboratory and Robert Laughlin of Stanford University – with colleagues including Emil Mottola of the Los Alamos National Laboratory and Pawel Mazur of the University of South Carolina – on the hypothetical celestial objects they've called dark energy stars.

Although the concept of black holes has been part of the cosmological mainstream for some decades, and has roots that go back far further than that, there have always been some problems with it. For example, quantum mechanics states that information can never be lost from the Universe, yet information (ordered matter or energy) falling past the event horizon of a black hole would indeed be entirely lost – at least from our universe. Again, according to quantum mechanics time can never be "frozen", yet the prediction of the black-hole model is that energy (light) will be stretched out infinitely at the event horizon so that, to an outside observer, it will appear to freeze there forever.

Chapline and Laughlin were working on superconducting

crystals and the phenomenon called quantum critical phase transition when they discovered an unexpected result: the spin of the electrons seemed to show time slowing down. For some reason this reminded them of the hypothetical situation at a black hole's event horizon, and so with Mottola and Mazur they reanalysed the way a massive star should collapse, but insisting that in this model it should do so according to strict quantum mechanical principles. They found the end product of such a collapse would be not a black hole but a "quantum critical shell" containing an energy-rich vacuum – and, notably, no singularity. This vacuum would have a strong antigravitational effect, just like the "dark energy" currently being posited by cosmologists as the cause of the Universe's expansion. There would still be, as per a black hole, a powerful gravitational field drawing matter and energy in from outside, but within the shell there would be a repulsive force – which would be able to eject at least some raw matter and energy back out through the shell. Much of the ejecta would take the form of positrons and gamma rays . . . and, wait a minute, there's a hitherto-unexplained excess of positrons at the centre of the Galaxy, where it has been supposed a supermassive black hole resides. Could this object instead be a supermassive dark energy star? Likewise, the spectrum calculated by the team for the gamma-ray emissions is very similar to that of the enigmatic gamma-ray bursts astronomers have for some while been studying.

The hypothesis can be used to tie together a couple of other important cosmological puzzles. The enormous energy release of the Big Bang would be expected to create countless miniature dark energy stars (just as it would create countless mini black holes under the current theory), and these would have exactly the predicted properties of the hypothetical dark-energy particles that make up the "missing mass" of the Universe. Even more intriguingly, the team calculated the strength of the repulsive vacuum energy there would be inside a dark energy star the size of the Universe and discovered that it matches the deduced value for the dark energy that cosmologists have invoked to explain the Universe's expansion.

The new hypothesis also predicts that infalling matter will

cause dark energy stars to radiate in the infrared. This infrared radiation should be detectable by new instruments coming online in the near future, so within a decade or so it ought to be possible to put the hypothesis to the test by direct observation.

If Chapline and the others are proven to have been correct in their speculation, we will witness a paradigm shift in our understanding of the nature of the Universe – not least because, if the Universe is indeed an enormous dark energy star, then it becomes legitimate to wonder if there could be anything outside it . . . and if we could someday penetrate the quantum critical shell.

The dark-energy-star hypothesis is a perfect example of how a good scientific hypothesis should be. It has been born from experimentation and direct observation. It explains a great deal that was outwith the boundaries of the original experiment. The theorists themselves have been able to point to a way in which one of its predictions can be tested, as a result of which testing the hypothesis will either stand or fall – or, conceivably, stand but in a modified version. Further, the theorists are perfectly content to abide by the results of that testing: they show no signs that they will cling to their hypothesis if the results prove negative.

This is where this hypothesis stands in marked contrast to all but a tiny few of the "paradigm-shifting" theories put forward by amateurs.



Defunct science, pseudoscience, the ideological corruption of science, antisience, conspiracy theories, hoaxing, fraud – you'll find instances of all of them here. You'll also find examples of just plain, straightforward, honest mistakes committed by people who've had the best of intentions but somehow simply got things wrong. Some of those mistakes, I ruefully have no doubt, will be mine: let me ask you in advance to forgive me for any of my own misapprehensions, biases or erroneous preconceptions that have crept in. Like Oscar Wilde's piano player, I'm doing my best.