

The Naked Experts

by
Brian Martin

Department of Mathematics, Faculty of Science, ANU, Canberra

Experts — whatever their expertise — no longer enjoy the public's uncritical admiration of trust. Increasingly, their objectivity is questioned and there is a growing reluctance to accept that their often limited expertise either gives them a monopoly of the truth or the right to a more powerful voice in public affairs than any other member of the public. Some put this revolt down to a 'new irrationalism' in Western society. But are the experts themselves really to blame? Often using irrelevant or inaccurate arguments, they have frequently shown themselves to be ciphers of vested interests. Brian Martin discusses the record of Leslie Kemeny, Australia's most vociferous pro-nuclear 'expert' and asks: Why are the experts' clothes so threadbare?

Since the late 1960s, public trust in scientific experts has taken a severe battering in Western industrialised countries. This has caused soul-searching in many circles, not least within the scientific community itself, where considerable demoralisation has set in. Gone are the heady days of rapid exponential growth in funding for science, during which the public prestige of the profession was bolstered internally by the enthusiasm of youthful would-be scientists. This period, particularly the three decades since the beginning of World War II, has been succeeded by almost stationary funding, 'the switch from science' by students (including the best ones), and by public scepticism and even hostility. The scientists ask, what went wrong?

One answer has been given by those, such as Passmore, Ashby, Burhop and Shils, who diagnose a new irrationalism in Western society.¹ The 'youth culture' and 'counter-culture' of the late 1960s rejected many of the products of Western society and, such commentators argue, in doing so it also incorrectly rejected some of society's premises, including rationality. The evidence for this, it is claimed, lies not only in an increase in interest in mysticism and Eastern religious doctrines, but also in 'unthinking' opposition to developments such as fluoridation, artificial fertilisers and food additives, modern medicine and the peaceful uses of nuclear technology.

This interpretation by the critics of 'anti-science' is flattering to scientists and others supporting what is conceived as technological 'progress', but on closer inspection the culprit—'anti-science'—is hard to identify, much less convict. While it is true that some people read astrology columns, visit naturopaths and meditate, it has yet to be shown that any major change to habits of this sort has occurred or, if it has, that this change is linked to attitudes about orthodox science. Even amongst those who seldom come in contact with the 'alternative culture', and years after this culture was the focus of media attention, trust in scientific experts is as low as ever.

Secondly, the critics of anti-science have a hard time identifying their opponents, aside from the often criticised Theodore Roszak.² A belief in the potency of

anti-science would be more persuasive if a few more people could be identified who clearly subscribed to it. Finally, the critics of anti-science completely overlook the political critique of science, which is coherent, organised and readily identifiable.³ These points suggest that the focus on 'anti-science' obscures rather than clarifies the reasons for public distrust in scientific experts.

Scientists or Publicists?

The interpretation outlined here is based more on the rationality of the public and less on the rationality of science and scientists. In the two decades after the end of World War II, citizen protest movements in the West were weak, in particular because of the Cold War, which allowed dissidents of any kind to be labelled as subversive, and because of continued economic growth, which muted discontent. During this time the scientific community became to a large extent incorporated into the government/industrial/military complex.⁴ Many scientific experts became almost by definition defenders of their patrons in government or industry. But for the most part, the scientists who defended the established institutions did not need to take their case to the public, since there was little public opposition to the policies, practices and products of these institutions.

This picture is a familiar one but, of course, it is not complete. Opposition to official US nuclear weapons policy developed among nuclear scientists in 1945 and persisted, flaring especially during the debate over atmospheric testing.⁵ Rachel Carson's *Silent Spring* sparked public concern over pesticides in the early 1960s, a concern which had been brewing within the scientific community for a number of years.⁶

The late 1960s brought an upsurge of public discontent over the direction of social development, following the easing of the Cold War and the expansion of the South-East Asian War. One feature of this re-emergence of social protest was a questioning of technological developments such as pesticides and super-sonic transports, and a questioning of institutions such as education, medicine and the military.

In response to public criticisms of established policies and practices, a certain fraction of the normally cloistered experts entered the public debates over war planning, nuclear radiation, IQ and the like. And when this happened, public trust in experts plummeted because, I would argue, the public saw that all too often the experts had no clothes.⁷ The experts in the public debate—or at least a sufficient fraction of them—were seen to have irrelevant and inaccurate arguments, to behave more like publicists than ‘objective scientists’, to reflect the influence of vested interests, and to be truly expert only in areas irrelevant to the real issues—which in most cases were social and political rather than technical. Indeed, far from being irrational, the public *correctly* perceived the failure of the experts to live up to the image they had fostered. Also aiding this process was the emergence of ‘counter-experts’ who argued cases contrary to those supporting the positions of the established institutions, and who were seen to be at least as credible as the experts.

Needless to say, the attitude of ‘the public’ is more complicated than this outline would suggest: my point here is that much of the growing public distrust of experts is well grounded. This is not to suggest that experts have anything but the best of intentions (‘All persons believe in their own virtue’—Parenti⁸). It is for each person to decide whether to trust or distrust a particular expert. Nor is my purpose to condemn experts in general: rather it is to bring into discussion some of the problems in trusting them blindly. The experts are not hesitant to point out their own strengths: it is up to others to point out their limitations.⁹

An Expert in Action: the Case of Leslie G. Kemeny

From about 1976 onwards, Mr Leslie G. Kemeny has been one of the most active of the scientists and engineers who have supported nuclear power in the Australian public debate over uranium mining and nuclear power. He has written numerous articles in magazines and newspapers and letters to newspapers and given numerous talks, all supporting the case for nuclear power. By my assessment, Kemeny has been one of the four most prolific public advocates of nuclear power in Australia, the others being Sir Philip Baxter, Sir Ernest Titterton and Mr John Grover.

During the time of his participation in the public debate, Kemeny has been Lecturer and (since 1977) Senior Lecturer in the School of Nuclear Engineering at the University of New South Wales. His record of experience is not unimpressive. He graduated in mechanical and electrical engineering from the University of Sydney; was a design engineer with the Electricity Commission of New South Wales; won a Metropolitan Vickers Overseas Exhibition in 1955; was on the design team for the Berkeley nuclear power station in the UK; held a Harwell research fellowship; held a lectureship at the University of London; has consulted on nuclear marine propulsion and nuclear desalination; has attended numerous international conferences on nuclear topics as an Australian representative; and has travelled extensively in Europe, North America, Japan, China and South-East Asia studying resource and energy, as well as nuclear, developments.¹⁰

Because of his high activity in the public debate as a self-declared pro-nuclear expert, and because of his

ostensible qualifications to play this role, Kemeny’s pro-nuclear writings* provide a suitable basis for assessing whether his public activity as an expert is likely to inspire public trust in pro-nuclear expertise.

The Range of Kemeny’s Arguments

Most of Kemeny’s writings are composed of one or more of three components: a recitation of existing nuclear developments; statements that the hazards of nuclear power are very low; and criticisms of opponents of nuclear power. But do his writings stand up as a cogent argument? Does he answer the criticisms of the anti-nuclear movement? To answer those questions, it is worth examining Kemeny’s treatment of the major issues raised by the anti-nuclear movement in Australia, and asking, in relation to each, whether Kemeny treats the issue at all; and, if so, whether he responds to the anti-nuclear case. Here is my brief assessment.¹¹

1. Environmental Hazards arising from the Nuclear Fuel Cycle.

Kemeny devotes considerable space to presenting the pro-nuclear case regarding hazards. Thus, he states that the risks from nuclear power are less than the accepted risks of daily life; that the nuclear fuel cycle is 200 times safer than coal; that radioactive waste disposal is not a problem; and that no member of the public has been hurt through the nuclear fuel cycle. But Kemeny seldom replies to the counter-arguments. For example, he has never** mentioned nor replied to an Australian comparison which indicates that, within large ranges of uncertainty, the risks to human life and health from the generation of electricity from nuclear and coal cycles are comparable.¹² Nor, for example, has he mentioned—when asserting that total radioactivity is *reduced* by the nuclear fuel cycle¹³ that the radioactive isotopes generated by the nuclear fuel cycle are both more toxic and less well contained than are the products of unmined uranium ores.

In addition, in making comparisons between nuclear and other hazards, Kemeny uses several techniques which tend to show nuclear power in a favourable light¹⁴—never mentioning, for example, the unique characteristics of nuclear hazards such as the enormous scale of devastation possible from a military attack on a nuclear power plant or reprocessing plant.

In summary, Kemeny makes many statements about what he considers to be the low level of hazard from the nuclear fuel cycle, but seldom replies to arguments raised by opponents of nuclear power about what they regard as the major health hazards. For those who follow the debate, Kemeny’s arguments about risks are less than comprehensive.

2. Proliferation of nuclear weapons capabilities via expansion of the nuclear power industry.

Proliferation is seen by many people as the central hazard arising from the spread of nuclear technology.¹⁵

* Written views rather than speeches or radio interviews are used here because of their accessibility and reliability as a record of considered views.

** In this and later similar contexts, it is assumed that universals such as ‘never’, ‘not’ and ‘only’ are qualified by ‘to my knowledge’. A full list of articles and letters by Kemeny consulted for this analysis is available from the author, Department of Mathematics, Faculty of Science, Australian National University, Canberra ACT 2600, Australia.

Kemeny has not responded to these concerns in any detail, but rather has made a number of bald assertions in the few paragraphs he occasionally devotes to proliferation. For example, he asserts that 'Thermonuclear bombs can be built without the use of commercial power reactors and that whether mankind has 200 or 2000 nuclear power stations by the year 2000 will have little effect on the world's nuclear arsenals'.¹⁶ No more detailed justification is given. Elsewhere he claims: 'A world short of energy would be a far more dangerous (place) to live in than one in which energy costs are stabilised and environmental pollution minimised by the use of a very good, energy dense fuel, uranium.'¹⁷ Hence, he argues, 'The danger to mankind from the world's nuclear armouries will not be increased but lessened by the spread of peaceful nuclear technology.'¹⁸ Again, no further argument or evidence is offered to support this contention. In summary, Kemeny seldom mentions the proliferation issue, makes exceptional claims with no supporting arguments or evidence, and does not respond to anti-nuclear arguments.

3. Political and social threats and restraints of a nuclear society (terrorism, reduction in civil liberties, centralised political and economic power).

The longest treatment by Kemeny of any of these issues is two paragraphs¹⁹ in which he says that 'these phenomena (the police state and international terrorism) already exist and have no real connection with any future regulatory treaties or policies associated with nuclear fuels' and that a terrorist 'could find easier methods safer to him or her than by attempting to steal a few kilograms of plutonium'. By providing no further argument or evidence, it is clear that Kemeny fails to come to grips with the issues or the anti-nuclear arguments.

4. Economic and employment disadvantages of nuclear power.

In a few articles,²⁰ Kemeny reproduces figures taken from other sources showing the alleged lower economic cost of nuclear power for producing electricity compared to coal and oil. He has never mentioned, nor commented upon, the numerous critical examinations of the economics of nuclear power—those, for example, by Bupp and Derian, Sweet and Jeffery.²¹ On a couple of occasions he has mentioned the number of Australian jobs that might be generated by uranium mining, but has never dealt with the argument that investment in other industries could produce several times as many jobs as investment in uranium mining.

5. Impact of uranium mining on Aboriginal culture.

This issue, a key one in the minds of many Australian people, has not been mentioned by Kemeny in his writings.

6. Inadequacy of nuclear power as a solution to energy problems.

The arguments against nuclear power—that it currently provides only about 2 per cent of world primary energy and so is not yet essential; that it provides only base-load electricity and not low cost liquid fuel (the shortage of which is the only real energy 'crisis'); and that massive nuclear power programmes to satisfy ever-growing energy use may be unfeasible due to shortages of capital and the long



Courier Mail

Anti-uranium demonstration in Brisbane, 1977. There were 400 arrests. Kemeny is adamant that the anti-nuclear movement is funded by powerful right-wing interests and should be 'recognised for what it is — anti-working class activism aimed at maintaining the last 'status quo' for a fortunate minority'. He gives no evidence to back these claims. Ironically, in Europe and the USA, the anti-nuclear movement is often branded as a tool of East European interests.

times between planning and completing nuclear facilities—are not mentioned by Kemeny.

7. Advantages of a 'soft energy path' based around conservation and renewable energy technologies.

This is the one area in which Kemeny appears to address issues raised by opponents of nuclear power, in an October 1981 article in *Quadrant*.²² Prior to this, the few paragraphs he devoted to conservation and renewable energy technologies²³ were simply dismissive: 'Science is many decades away from being able to harness an infinite, cheap, non-polluting supply of energy from any of these sources (sun, wind and tide)'.²⁴ No substantiation was given for the statement.

In his *Quadrant* article, 'Alternative energy: the myth and the reality'²², Kemeny states that the effectiveness of solar technology is increasingly questioned; that all solar technologies may be net consumers of energy; that many solar demonstration plants have been failures; and that solar energy 'would represent the greatest drain on the earth's heavy metal and raw materials of any technology yet devised by man'.²⁵

Kemeny does not come to grips with any of the comprehensive scenarios for a 'soft energy future'.²⁶ Nor does he treat, in his October 1981 article, the role of conservation, which he had dismissed in earlier comments. Furthermore, the accuracy of several of his claims about solar technology can be questioned. In summary, in most of his writings Kemeny makes at most a few unsubstantiated statements about conservation and renewable energy technologies, while in one

article he appears to address a number of claims about 'alternative energy'.

How Relevant are Kemeny's Arguments?

Roughly one third of Kemeny's writings are simply glowing accounts of the extent of nuclear developments around the world. The clear implication of this material is that investments in nuclear power demonstrate its benefits and superiority: 'The only alternative is nuclear power for at least the next 50 years. And 39 countries on both sides of the Iron Curtain—the 19 of which have it and another 20 which have decided to use it—all agree'.²⁷

That this does not constitute an argument for nuclear power is clear: just because many countries have nuclear power does not necessarily make it a good thing, any more than the prevalence of smoking, gambling or nuclear weapons justifies their existence. In essence, Kemeny slurs together the concepts of investment, necessary investment and beneficial investment: 'The facts of nuclear electricity generation in overseas countries . . . provide a positive and stimulating contrast to the negative statements so often heard. Australia's trading partners have no alternative but to move steadily ahead with their nuclear programmes'.²⁸ For anyone who is able to distinguish these concepts, Kemeny's portrayal of nuclear developments will read more like public relations than like scientific argument.

Kemeny's glowing accounts of the development of nuclear power around the world are also potentially misleading. When he says (or implies) that 'countries' agree that nuclear power is the 'only alternative', he glosses over the distinction between different parts of society, in particular governments and citizens. While it is true that many governments or their agencies have supported nuclear power, it is equally true that there has developed strong citizen-based opposition to nuclear power in virtually every part of the world where this opposition is allowed.²⁹

And How Accurate?

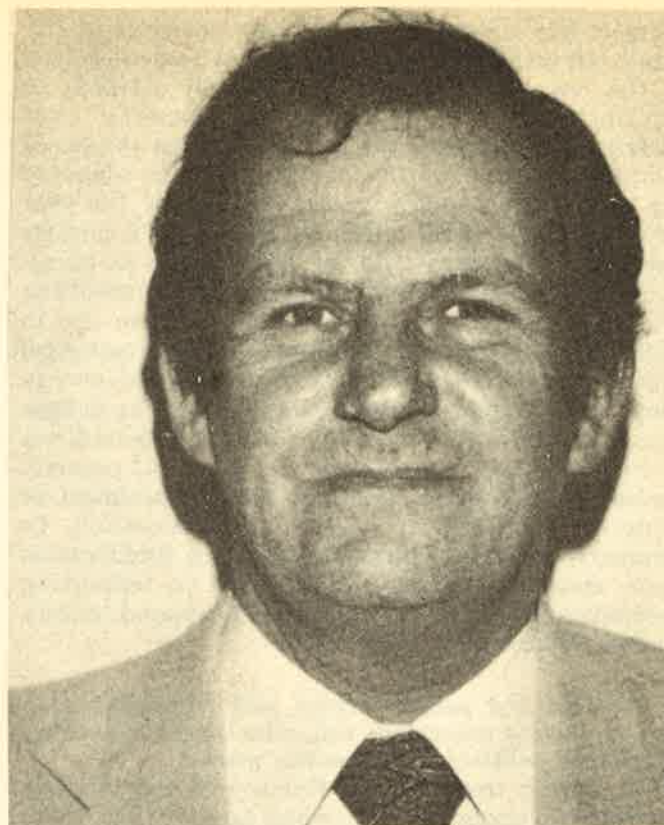
Experts are expected to be accurate in their statements, and to acknowledge and correct any inaccurate statements. How do Kemeny's statements stand up on this basis?

First, the bulk of Kemeny's writings for the public debate are not technical material relevant to the nuclear debate, but are accounts of growing nuclear programmes, attacks on opponents of nuclear power, and general pro-nuclear statements. Hence there are relatively few technical statements to evaluate concerning the issues central to the debate.

Second, Kemeny provides very few references in any of his articles. It is often difficult to challenge data presented from unknown sources. The very lack of references will reduce the credibility of Kemeny's statements for some readers.

Third, Kemeny has made some mistakes which he has been slow to acknowledge. Concerning the bomb survivors in Hiroshima, he has stated: 'Despite the tragedy of 1946, international experts in radiation biology and genetics have not found an incidence of genetic malformation, cancer or leukemia amongst these people above that of the national average'.³⁰

The evidence is not sufficient to determine whether or not radiation exposure from the 1945 nuclear weapon explosion has increased the rate of genetic



Leslie G. Kemeny. "Kemeny's inaccuracy and his lack of acknowledgement of errors are at variance with normal expectations for an expert."

defects, but the evidence is incontrovertible that cancer and leukemia rates have increased substantially, as pointed out by Diesendorf.³¹

In his reply to Diesendorf, Kemeny does not correct his mistake (aside from his use of the year 1946 instead of 1945) but instead says:

'Within the limits of uncertainty associated with medical diagnostics nothing in this report ('The Delayed Effects of Radiation Exposure Among Atomic Bomb Survivors, Hiroshima and Nagasaki, 1945-1979') and the many others dealing with the issue ('the radiobiology of high level radiation') which I have on file, changes the veracity of the third paragraph of my (article) which relates to the first and second generation progeny of the Hiroshima survivors.'³²

As noted above, Kemeny's original error was about cancer and leukemia rates, but he has responded as if the only question concerned genetic effects. Furthermore, the third paragraph to which Kemeny refers is completely irrelevant to the issue.*** In analysing Kemeny's response, Sibatani concludes: 'In fact Kemeny failed to contradict the charge made by Diesendorf but successfully obscured the issue by his rhetoric'.³³

Similar cases can be found elsewhere in Kemeny's writings. Thus, Kemeny³⁴ referred to a talk by a solar energy expert, Edward Lumsdaine of the University of Tennessee, citing statements critical of solar energy out of context and giving the impression that Lumsdaine opposed solar energy. Lumsdaine replied that he took 'strong exception to the impression that

*** In fact, most of the highly visible advocates of nuclear power in Australia fall into one of three categories: nuclear scientists and engineers; people working for uranium mining companies; and politicians (Martin 1980: 14-19).

(Kemeny's) comments create about my position and the lecture', which Lumsdaine said was 'a call for energy conservation and sensible use of energy whether it is solar or from other sources'. Lumsdaine also said that he was 'saddened to see that people with special causes attempt to capitalise on these remarks'.³⁵ Yet Kemeny later continued to cite the Lumsdaine statements in the same manner.³⁶

In his article about 'Alternative energy', Kemeny stated; 'The cost is enormous and the quantity of manufactured materials used may ensure that all devices based on solar energy—water heaters, air conditioners, power towers, windmills, photovoltaic units and biomass fuels—will be net consumers of energy'.³⁷ For this statement he provides no references or calculations, and fails to cite the long-available and overwhelming evidence that his statement is wrong for most of the solar technologies he has listed. For example, a large wind generator will generate the energy required for its original construction in 6 to 12 months of operation³⁸ (NE 1977; ETSU 1977). When challenged on this point,³⁹ Kemeny failed to provide any substantiation of his original statement.⁴⁰

In these and other cases, Kemeny's inaccuracy and his lack of acknowledgement of errors are at variance with normal expectations for an expert.

Attacks on Opponents

A large fraction of Kemeny's writings on nuclear power are taken up with attacks on the motivations and credibility of opponents of nuclear power. A few examples out of many should illustrate this point:

□ 'The anti-nuclear initiatives of prejudiced pressure groups, thriving on half-truths and innuendos, are being used to scare an ill-informed public';⁴¹

□ 'The clearly defined scientific issues are lost sight of, or deliberately clouded over, by political activists, pseudo-environmentalists and emotionally motivated malcontents';⁴²

□ 'The anti-nuclear movement must be recognised for what it really is—anti-working class activism aimed at maintaining the last "status quo" for a fortunate minority';⁴³

□ 'Mr. Robotham is clutching at straws with the usual emotional approach of the anti-nuclear lobby';⁴⁴

□ 'The dedicated anti-technology intellectual is contradictory and parasitic';⁴⁵

□ 'The anti-nuclear "silly season" is on again. Australia swarms with imported, articulate but ignorant opponents of uranium mining and peaceful nuclear energy'.⁴⁶

Kemeny makes little attempt to document such statements; apparently disagreement with the pro-nuclear stance is sufficient to warrant these sorts of attacks. Contrary to Kemeny's statements, an investigation of the anti-nuclear movement will show the presence of a wide range of people, including many members of the working class and of the scientific community.²⁹ Nor has Kemeny shown any evidence that the anti-nuclear movement is, as he has claimed, is, 'supported by immense funds from affluent right-wing interests'.⁴⁷

While attacks on the motivations and personal credibility of scientists are more common within the scientific community than usually acknowledged, such attacks are usually seen by scientists and public alike as lapses from the scholarly behaviour that might be expected of objective experts. The large amount of

space devoted by Kemeny to attacks on opponents; the discrepancy between his assessments of opponents and the assessments of these people by many who personally know them; and the lack of backing for his statements; cannot help but be seen as a strong divergence from what is normally considered the appropriate behaviour for an expert.

Vested Interest

It has been noted that public advocates of nuclear power are especially likely to include those who have a direct financial interest in nuclear power (such as uranium mining company executives) and those in careers which are likely to be benefited or justified by the expansion of nuclear research.⁴⁸ Kemeny clearly fits into the latter category.**** (Note that this says nothing about the motivations of advocates of nuclear power.)

Experts can lose credibility if they appear to have some financial or career stake in the issues on which they pronounce, since they are in a situation of conflicting interests: to 'objectivity' and to a particular stance on the issue.⁴⁹ Kemeny never hides his position in nuclear engineering, so readers are never in doubt about the possibility of a conflict of interest.

The Relevance of Expertise

Although experts often come forth or are brought forth to support particular policies, practices or positions, on many occasions their expertise is irrelevant to the issue at hand. Kemeny's technical expertise—reflected in his training and technical experience—is mainly in engineering, in nuclear engineering in particular. The quality of this expertise is not readily determined except by other experts in the same discipline. But, in any case, it is not obvious that expertise in nuclear engineering has great relevance to the great bulk of issues raised by nuclear power—issues which are social, political, economic and ethical in nature. So while Kemeny has authored technical papers on 'Stochastic identification and parameter estimation of nuclear power systems and nuclear fuel channels', it is unlikely that this gives him any special insight into comparisons of risks, power supply planning, the threat of nuclear proliferation or the psychology of opponents of nuclear power.

However, Kemeny claims for himself expertise broader than nuclear engineering, noting for example that he 'has had the opportunity to work with fossil, hydrocarbon and liquid fuels, wind and solar energy'.⁵⁰ There is little technical output to support his claim about expertise in wind and solar energy, aside from an article about an assistance project in Bangladesh. As part of the project, 'We built the first tube-well pumping windmill in Bangladesh'⁵¹ at the Agricultural University of Bangladesh at Mymensingh. Prior to the commencement of the project, the average annual wind speed at the site was measured as 1.7 miles per hour.⁵² This wind speed is simply too low for effective use of a windmill. Kemeny notes: 'As one academic remarked, perhaps a little wistfully, "our wind conditions aren't

**** The third paragraph of Kemeny (October 1980) reads as follows: 'The Australian visitor to an average Japanese family, will soon elucidate from his host the atmosphere of informed realism which prevails in most minds concerning all aspects of nuclear energy. There would be a large measure of agreement concerning the economic and environmental benefits of nuclear energy.'

ideal, but we have plenty of students who can blow at the sails together",⁵³ It is also appropriate to note that such a siting for a windmill is not a good recommendation for one's expertise in wind power.

Objective? Trustworthy? And 'Expert'?

In quite a number of ways, Kemeny in his public advocacy of nuclear power does not fit the image of the objective, trustworthy expert: he addresses only some of the issues and seldom replies to anti-nuclear arguments; he presents large amounts of irrelevant material; he is subject to inaccuracy, and on occasion fails to acknowledge his mistakes; he continually denigrates opponents; he speaks from a position representing a potential conflict of interest; and his expertise is mostly irrelevant to the issues, or of doubtful quality. Of course, not all members of the public who read Kemeny's writings will be aware of—or swayed by—these factors, but their impact often can be felt indirectly. For example, people familiar with the issues will pass their assessment of Kemeny's arguments and accuracy on to others; and people with acquaintances in the anti-nuclear movement can form their own opinion about the motivations of opponents of nuclear power. My judgement is that many people will decide, correctly or incorrectly as the case may be, that they have good reason not to trust Kemeny as an expert on the issues of nuclear power.

The Failure of the Experts

The argument here is that in many areas of science which become the subject of public debate, many of the experts who defend positions agreeable to powerful organisations do not behave in the manner normally expected of an objective scholar. The experts often trade on their status rather than maintaining the standards of behaviour normally expected of experts: they do not respond to the arguments of opponents; their points may be irrelevant or inaccurate; they attack their opponents' bona fides; they claim objectivity but present value-laden arguments; and their expertise is largely irrelevant to the broad issues at stake.

The initial response to criticisms is normally silence. For example, the content of the most influential critique, by R. and V. Routley, of Australian forestry policy and practice⁵⁴ has never been rebutted in any depth. More common than reasoned argument are attacks on those who raise the criticisms. Thus, attempts were made to block publication of the Routleys' book.⁵⁵ In other cases attempts have been made to block promotion, deny appointment or tenure, and dismiss critics of corporations and governments causing environmental impacts.⁵⁶

Such a response is the opposite of what might be expected from scientists concerned first and foremost with the truth. Those who delve more deeply into the issues often find that it is the critics who have more faithfully adhered to conventional scholarly ideals.⁵⁷ Another area where this pattern prevails is occupational health and safety.⁵⁸

The failure of experts to behave in the way that might be expected of them is especially clear in areas in which any dissent is automatically relegated as unscientific. One such area is fluoridation, in which leading scientists have suppressed debate on scientific as well as ethical aspects, and demanded acquiescence to

accepted medical-dental policy, not allowing any sort of debate on the issue to be considered legitimate. The established view has become so entrenched that any scientist who disagrees is almost automatically labelled a crank. Yet as Barnes⁵⁹ notes, those scientists critical of fluoridation have not been shown to be irrational—they merely deviate from the Establishment position. Furthermore, there is growing scientific evidence for the existence of adverse effects on a minority of the population from fluoridation⁶⁰ and of inadequate experimental design and statistical analysis to establish the benefits claimed for the procedure.⁶¹

A similar situation has prevailed regarding the ideas of Immanuel Velikovsky, who claims that, on the basis of historical evidence, major planetary catastrophes occurred a few thousand years ago. When Velikovsky's ideas were first published in 1950, many scientists launched a vicious attack on both Velikovsky and his views, and among other things attempted to halt publication of Velikovsky's book. Many of Velikovsky's attackers did not condescend to read his work. The opposition did not subside in the following decades.⁶² Whatever the eventual evaluation of Velikovsky's ideas, the violation of scholarly norms has been so blatant that many sociologists of science have been at pains to explain away the scientific community's behaviour.⁶³ But contrary to the apologists, part of the explanation seems to be that the interdisciplinarity and popularity of Velikovsky's ideas posed a threat to the professional status of scientists—a status based on specialisation and control over the opportunity to propose and publicise theories.⁶⁴ In any case, the public behaviour of opponents of Velikovsky has not been an edifying example of experts in action.

The following example speaks for itself. In 1975, Fred and Merrelyn Emery of the Centre for Continuing Education, Australian National University, published a book which, among other things, discussed the neurological effects of television viewing.⁶⁵ In response to a press article about the book in a university publication,⁶⁶ six professors and heads of departments (zoology, physiology, pharmacology, psychology, neurobiology, behavioural biology) wrote a letter⁶⁷ which strongly criticised the book and abused the authors. The six professors outlined what they considered to be 'The current limits of scientifically acceptable investigation of the nervous system' and after criticising the Emerys and their work concluded that the article about the Emerys' book 'reflects upon the standards of brain research done in this University by those who are in it for the sake of finding out how a nervous system really works rather than for the support or refutation of a particular social issue'. It would seem that the professors' case rested primarily on their collective prestige, since not only had they not read the Emerys' book, but their specific criticisms did not stand up to scrutiny.⁶⁸

As indicated earlier, a common pattern is nonresponse by experts supporting the positions of powerful bodies when the challenge is small. In several areas in which a fundamental challenge has been made to the rationale of a field of activity—such as transport planning⁶⁹ or military research⁷⁰—the very existence of criticism is hardly acknowledged by the experts.

When public pressure is added to the criticisms, response becomes more likely, as in the case of nuclear power since the mid-1970s. But the response is usually

simply promotion of the standard viewpoint, with attacks on vulnerable or symbolic opponents rather than consideration of the most cogent criticisms. For example, while critiques of medicine abound,⁷¹ it is hard to find a single satisfactory direct response to the criticisms. But there are plenty of attacks on 'alternative medicine'. Similarly, a study of the US Federal Drug Administration⁷² found that while there were areas (such as reducing food-borne disease and ensuring proper packaging and labelling) in which action would have greatly helped the consumer, these were given cursory attention while much regulatory effort was spent chasing 'quacks'. With such discrepancies between the model and reality of behaviour of medical and health experts, it is no wonder that many people decide, for better or worse, that they can no longer fully trust their doctors.

The above examples are samples of a phenomena common in many other areas, including women's health, IQ, politics, economics, town planning and education. The burden of proof should fall on those who say, contrary to the evidence indicated here, that the experts involved in public debate have set a high standard of scholarly behaviour when defending positions helpful to powerful bodies.

Why Have the Experts Failed?

While the major object here has been to point out some of the ways in which experts who enter public debates on the side of powerful interests differ from the standard public image of experts, it may be useful to outline some possible reasons for this. Since the incorporation of the scientific community into the government/industry/military complex, the large majority of scientists are beholden, directly or indirectly, to government, industry or military interests. Indeed, the scientific community adheres to scientific paradigms which selectively serve the interest of its patrons—not least by focusing on narrow technical problems without examining what the research is used for, but also by promoting the belief that scientific knowledge is separate from its applications. So while the scientific community's belief system stresses freedom and professional autonomy, in reality it is largely a servant of power.⁷³

When the orthodox view on an issue such as nuclear power, fluoridation or cosmology begins to be questioned by significant numbers of members of the public, this poses a threat to politically powerful scientists in two possible ways. First, government or industry interests, to which portions of the scientific community are committed and by which they are supported, may be at stake—as in the case with nuclear power, supersonic transports, pesticides or military research. The government and industry interests, thus, have a strong incentive to promote public trust in and acquiescence to their subservient experts,⁷⁴ and to encourage their experts to help attain this objective. Second, the internal power hierarchy of the scientific community may be under threat, especially if critics are in subordinate positions or from competing disciplines.

In this situation, a number of self-appointed—or sometimes hired—scientific supporters of the orthodox position may join the public debate. Their role in practice is to reinstate the status quo: public acceptance of the policies and practices which serve govern-

ment and industry, and trust in the experts who speak on behalf of these interests. That role—and this is the key point—is largely incompatible with fulfillment of the normal public expectations for an expert. By actively joining the public debate, the experts have already strayed from their usual role. By being committed to a particular viewpoint; by conceiving this viewpoint as the sole truth and not responding to criticisms; and by using castigation of opponents as a justification for their commitments; the experts drastically diverge from the image of the 'objective', knowledgeable scholar.

Looking at the situation another way, an expert who behaved like experts might be expected to behave—who treated criticisms and contrary viewpoints openly and fairly, acknowledging that alternative viewpoints might be valid; who highlighted agreements and differences of fact and values; and who encouraged members of the public to pass judgement on at least the values involved in the issues—would be a poor servant of elites in government, industry and the scientific community itself. After all, it is quite possible as a result of full and open debate on the issues that the public perception of the public interest might diverge from the interests of the elites.

As noted above, the experts who join the public debate to defend positions beneficial to government and industry certainly do not conceive their roles in these terms. It seems clear that they sincerely believe in the causes they support, that they see the debate as one between those who know (the experts) and those who don't know, and that to them the opposing arguments are so weak or unscientific that little response to them is required. And when fundamental conceptual differences or value judgements underlie the dispute, the experts are unlikely to be able to fully comprehend the contrary view.

A Sad Reflection on the Scientific Community

The experts who join public debates are not always powerful or prestigious scientists, though this often is the case. Does their failure to live up to the image of the expert say anything about elite scientists generally, or about the vast majority of scientists who do not participate?

That non-participation is itself a highly significant—but seldom remarked on—feature of public debates involving scientists: it constitutes the almost complete failure of public peer review. Within the normal functioning of the social system of science, evaluation of one's works by scientific peers is a highly regarded method by which assessments are made of the adequacy and value of scientific work—in addition to being the basis of the process used to decide on appointments, promotions, research grants and publication of research articles.⁷⁵

There are various inadequacies and abuses in the peer review system,⁷⁶ but these are nothing compared with its virtual absence from public disputes involving scientists.⁷⁷ It might be expected that scientists who, in public disputes over issues, are not accurate; do not respond to counterarguments; attack the motivations of opponents; and do not demonstrate the appropriate expertise; would be publicly called to task by other scientists. But in practice, scientists who publicly defend positions supportive of the interests of government, industry or scientific elites are almost never

publicly criticised for irrelevance, inaccuracy or vindictiveness except by known and active critics of those positions. For example, it would be hard to cite a single instance in which a scientist, not identifiably an opponent of nuclear power, has openly criticised factually incorrect or inconsistent statements by the leading advocates of nuclear power in Australia.

The reasons for the failure of public peer review can readily be traced back to the links between government, industry and the scientific community and to

the power structure of the scientific community itself. For the present argument, it is only necessary to note that the failure of public peer review is one more good reason why members of the public cannot reasonably be asked to put their trust in the experts.

ACKNOWLEDGEMENTS

Mark Diesendorf and Rosemary Walters provided valuable comments on the text. Leslie Kemeny declined to comment.

References:

1. See For Example: John Passmore, 'The Revolt against Science', *Search* 3 (11-12), 415-422 (Nov-Dec), 1972. John Passmore, *Science and its Critics*, Duckworth, London, 1978. Eric Ashby, 'Science and Anti-Science' in *The Sociology of Science* (ed.) Paul Halmos, Keele, Staffordshire, 1972, pp 209-226. E.H.S. Burhop, 'Science in contemporary society — is there a crisis?', *Science, Medicine and Man*, 1, 1973, pp 75-85. Edward Shils, 'Anti-science: observations on the recent 'crisis' of science' in Ciba Foundation Symposium, *Civilisation and Science: In Conflict or Collaboration?* Associated Scientific Publishers, Amsterdam, 1972, pp. 33-49.
2. Theodore Roszak, *The Making of a Counter Culture: Reflections on the Technocratic Society and its Youthful Opposition*, Garden City: Doubleday, 1969. Theodore Roszak, *Where the Wasteland Ends: Politics and Transcendence in Postindustrial Society*, Faber and Faber, London, 1973.
3. See Hilary Rose and Steven Rose (eds), *The Political Economy of Science: Ideology of the Natural Sciences*, Macmillan, London, 1976. Hilary and Steven Rose (eds), *The Radicalisation of Science: Ideology of the Natural Sciences*, Macmillan, London 1976. Rita Arditti, Pat Brennan and Steve Cavarak (eds), *Science and Liberation*, South End Press, Boston, 1980. Also the journals: *Science for the People*, *Radical Science Journal*.
4. Hilary Rose and Steven Rose, *Science and Society*, Allen Lane, London, 1969. Hilary Rose and Steven Rose, (eds), *The Political Economy of Science: Ideology of the Natural Sciences*, Macmillan, London, 1979.
5. Robert Gilpin, *American Scientists and Nuclear Weapons Policy*, Princeton University Press, Princeton, 1962. Eugene B. Skolnikoff, *Science, Technology and American Foreign Policy*, MIT Press, Cambridge, Massachusetts, 1967.
6. Frank Graham Jnr., *Since Silent Spring*, Houghton Mifflin, Boston, 1970
7. Frank von Hippel, 'The Emperor's new clothes — 1981', *Physics Today*, July, 1981, pp 34-41.
8. Michael Parenti, *Democracy for the Few*, St. Martin's Press, New York, 1974, p 51.
9. Harold J. Laski, *The Limitations of the Expert*, Fabian Society, London 1931. Jethro K. Lieberman, *The Tyranny of the Experts: How Professionals are Closing the Open Society*, Walker and Company, New York, 1970.
10. Leslie G. Kemeny, 'Nuclear star rises for base load energy', *Energy Resources and Technology*, 3(3) April 1981, pp 16, 22.
11. For an elaboration of the themes considered here, see Brian Martin, *Nuclear Knights*, Rupert Public Interest Movement, Canberra, 1980, pp 10-13.
12. Charles Kerr, 'Health effects of nuclear power', *New Doctor*, No. 7 (December) 1977, pp 17-22.
13. Leslie G. Kemeny, Letter, *Sydney Morning Herald*, 6, July 4th 1977; Letter, *Sydney Morning Herald*, April 21st 1979.
14. Brian Martin, *Nuclear Knights*, Rupert Public Interest Movement, Canberra, 1980, pp 28-29.
15. Ranger, *Ranger Uranium Environmental Inquiry First Report*, Australian Government Publishing Service, Canberra, 1976.
16. Leslie G. Kemeny, Nuclear Politics, *Sydney Morning Herald*, 17, April 7th 1979.
17. Leslie G. Kemeny, 'A Call for Reason in the nuclear debate', *Australian*, April 5th 1978, p 7.
18. Leslie G. Kemeny, 'Two views of anti-nuclear Nader: emotive and political overtones' *Sydney Morning Herald*, August 11th 1977, p 7.
19. Leslie G. Kemeny, 'The uranium neurosis', *Australian*, November 18th 1976, p 9.
20. Leslie G. Kemeny, 'The 1980s all set for a surge in nuclear power', *Canberra Times*, February 11th 1980, p 2: 'A bridge to span the next few dangerous decades', *Canberra Times*, February 12th 1980 p 2: 'The nuclear alternative — full speed ahead in the 1980's', *Energy Resources and Technology*, 2 (8), October 1980, pp 21-24: 'Nuclear Energy: safe, clean and inevitable', *Quadrant*, 25, May 1981, pp 35-39: 'World presses on with nuclear energy', *Canberra Times*, May 26th 1982, p 21.
21. Irvin C. Bupp and Jean-Claude Derian, *Light Water: How the Nuclear Dream Dissolved*, Basic Books, New York, 1978. Colin Sweet, 'Nuclear Power and Energy Costs in the UK', *Energy Policy*, 6, June, 1978, pp 107-118. J.W. Jeffery, 'The real costs of nuclear power in the UK' *Energy Policy*, 8, 1980, pp 344-346.
22. Leslie G. Kemeny, 'Alternative energy; the myth and the reality', *Quadrant*, 25 (10), October 1981, pp 60-63.
23. Leslie G. Kemeny, 'The great uranium debate', *Sydney Morning Herald*, June 8th 1976: 'Nuclear power: the only energy alternative say 39 nations', *AMIC Newsletter* (Australian Mining Industry Council), October 1976, pp 4-5: 'Australia's uranium: national liability or international asset?', *Reader's Digest*, November 1977, pp 23-29 (28).
24. Leslie G. Kemeny, 'Australia's uranium: national liability or international asset?', *Reader's Digest*, November 1977, pp 23-29 (28).
25. Leslie G. Kemeny, 'Alternative Energy; the myth and the reality', *Quadrant*, 25 (10), October 1981, pp 60-63 (63). Emphasis in original.
26. See Especially Amory, B. Lovins, *Soft Energy Paths: Towards a Durable Peace*, Penguin, Harmondsworth, 1977.
27. Leslie G. Kemeny, 'Nuclear power: the only energy alternative says 39 nations', *AMIC Newsletter* (Australian Mining Industry Council), October 1976, pp 4-5 (5).
28. Leslie G. Kemeny, 'The nuclear alternative — full speed ahead in the 1980's', *Energy Resources and Technology*, 2 (8), October 1980, pp 21-24 (22).
29. Jim Falk, *Global Fission: the Battle over Nuclear Power*, Oxford University Press, Melbourne, 1982.
30. Leslie G. Kemeny, 'The nuclear alternative — full speed ahead in the 1980's', *Energy Resources and Technology*, 2 (8) October 1980, pp 21-24 (21).
31. Mark Diesendorf, Letter, *Energy Resources and Technology*, 3 (1), February 1981, p 16.
32. Leslie G. Kemeny, Letter, *Energy Resources and Technology*, 3 (4), May 1981, p 70.
33. Atuhiro Sibatani, Letter, *Energy Resources and Technology*, 3 (7) August 1981, p 58.
34. Leslie G. Kemeny, Letter, *Canberra Times*, May 20th 1981, p 24.
35. Edward Lumsdaine, Letter, *Canberra Times*, July 10th 1981, p 2.
36. Leslie G. Kemeny, Letter, *Canberra Times*, 2, August 2nd 1981: 'Alternative energy: the myth and the reality', *Quadrant*, 25 (10) October 1981 pp 60-63 (60-61).
37. Leslie G. Kemeny, 'Alternative Energy: the myth and the reality', *Quadrant*, 25 (10), October 1981 pp 60-63 (62). Emphasis in the original.
38. *Vindenergi in Sverige*, Namnden for Energiproduktionsforskning, Report 2, Stockholm 1977: *The Prospects for the Generation of Electricity from Wild Energy in the UK*, Energy Technology Support Unit, UK Department of Energy, No 21, HMSO, London 1977.
39. Mark Diesendorf, Letter, *Quadrant*, 25 (12) December 1981, pp 79-80.

40. Leslie G. Kemeny, Letter *Quadrant*, 25 (12), December 1981, p 80.
41. Leslie G. Kemeny, 'The Great Uranium Debate', *Sydney Morning Herald*, June 8th 1976.
42. Leslie G. Kemeny, 'Japan opts for large-scale use of nuclear power', *Canberra Times*, January 6th 1977, p 2.
43. Leslie G. Kemeny, 'The 1980s all set for a surge in nuclear power', *Canberra Times*, February 11th 1980, p 2.
44. Leslie G. Kemeny, 'Faith and the nuclear future', *Australian Financial Review*, April 24th 1980, p24.
45. Leslie G. Kemeny, 'The nuclear energy battle', *Weekend Australian Magazine*, 10, October 25-26th 1980.
46. Leslie G. Kemeny, 'World presses on with nuclear energy', *Canberra Times*, 21, May 26th 1982.
47. Leslie G. Kemeny, 'The 1980s all set for a surge in nuclear power', *Canberra Times*, 2, February 11th 1980.
48. Charles Schwartz, 'The corporate connection', *Bulletin of the Atomic Scientists*, 31 (8), October 1975, pp 15-19; Brian Martin, *Nuclear Knights*, Rupert Public Interest Movement, Canberra, 1980, pp 14-19.
49. Mark Diesendorf, 'Sounding the alarms: the dilemma of the scientific expert' in *Focus on Social Responsibility in Science*, (ed) Wren Green, New Zealand Association of Scientists, Wellington, 1979, pp 61-83.
50. Leslie G. Kemeny, Letter, *Quadrant*, 25 (12), December 1981, p 80.
51. Leslie G. Kemeny, *A case study of a technical aid project sponsored by the Australian Development Assistance Department and a non-governmental organisation*, First International Conference on Technology for Development November 24-28th 1980, The Institute of Engineers, Barton, Australia, 1980, pp 326-331 (326).
52. Leslie G. Kemeny, *A case study of a technical aid project, jointly sponsored by the Australian Development Assistance Department and a non-governmental organisation*, First International Conference on Technology for Development, November 24-28th 1980, The Institute of Engineers, Barton, Australia, 1980 pp 326-331 (331).
53. Leslie G. Kemeny, *A case study of a technical aid project, jointly sponsored by the Australian and Development Assistance Department non-governmental organisation*, First International Conference on Technology for Development November 24-28th 1980, The Institute of Engineers, Barton, Australia, 1980, pp. 326-331 (326).
54. R. and V. Routley, *The Fight for the Forests*, Research School of Social Sciences, Australian National University, 1975.
55. R. and V. Routley, *The Fight for the Forests Affair*, R. Routley, Philosophy Department, Research School of Social Sciences, Australian National University, P.O. Box 4, Canberra ACT 2600, Australia, 1980.
56. Brian Martin, 'The Scientific Straitjacket: the power structure of science and the suppression of environmental scholarship', *The Ecologist*, 11 (1) January-February 1981, pp 33-43.
57. See the treatment of environmental controversies in: Joel Primack and Frank von Hippel, *Advice and Dissent: Scientists in the political Arena*, Basic Books, New York, 1974; Phillip M. Boffey, *The Brain Bank of America; an Inquiry into the Politics of Science*, McGraw-Hill, New York, 1975; Frank von Hippel, 'The Emperor's new clothes—1981' *Physics Today*, July 1981, pp 34-41.
58. Rachel Scott, *Muscle and Blood*, E.P. Dutton, New York, 1974; Samuel Epstein, *The Politics of Cancer*, Sierra Club Books, San Francisco, 1978.
59. S.B. Barnes, 'On the reception of scientific beliefs', in *Sociology of Science*, (ed) Barry Barnes, Penguin, Harmondsworth, 1972, pp 269-291 (281).
60. George L. Waldbott (with Albert W. Burgstahler and H. Lewis McKinney), *Fluoridation: the Great Dilemma*, Coronado Press, Lawrence Kansas, 1978; Mark Diesendorf, 'Is there a scientific basis for fluoridation? A review of the report by the Royal College of Physicians', *Community Health Studies*, 4 (3), 1980, pp 224-230.
61. P.R.N. Sutton, *Fluoridation: Errors and Omissions in Experimental Trials*, Melbourne University Press, Melbourne, 1960.
62. Alfred se Grazia, *The Velikovsky Affair*, Sidgwick and Jackson, 1966; Robert McAulay, 'Velikovsky and the infrastructure of science: the metaphysics of a close encounter', *Theory and Society*, 6, 1978, pp 313-342; see also the journals, *Pensee* and *Kronos*.
63. For example: Michael Polanyi, 'The growth of science in society', *Minerva* 5, 1967, pp 533-545; Norman W. Storer, *The Social System of Science*, Holt, Rinehart and Winston, New York, 1966.
64. Robert McAulay, 'Velikovsky and the infrastructure of science: the metaphysics of a close encounter', *Theory and Society*, 6, 1978, pp 313-342.
- Brian Martin, 'The determinants of scientific behaviour', *Society for Interdisciplinary Studies Review* 2, 1978, pp 112-118.
- C. Leory Ellenberger, 'Heretics, dogmatists and science's reception of new ideas', *Kronos* 4, Summer 1979, pp 60-74.
65. Fred Emery and Merrelyn Emery, *A Choice of Futures: To Enlighten or Inform*, Centre for Continuing Education, Australian National University 1975.
66. ANU Reporter new feature — an in-depth look at 'A Choice of Futures: To enlighten or Inform', *ANU Reporter* 6(13), August 22nd 1975, pp 4-5.
67. S.A. Barnett, P.O. Bishop, D.R. Curtis, C.A. Gibb, G.A. Horridge, and R.F. Mark, Letter, *ANU Reporter*, 6 (15), September 26th 1975, p 11.
68. Fred Emery and Merrelyn Emery, Letter *ANU Reporter*, 6 (15), September 26th 1975, p 11.
69. Ivan Illich, *Energy and Equity*, Calder and Boyars, London, 1974.
70. Robin Clarke, *The Science of War and Peace*, Jonathan Cape, London, 1971. Also many other books on this subject.
71. 'Critical bibliography 1: medicine', *Radical Science Journal*, No. 9, 1979, pp 148-160.
72. James S. Turner, *The Chemical Feast*, Grossman, New York, 1970.
73. David Elliott and Ruth Elliott, *The Control of Technology*, Wykeham Publications, London 1976.
- Hans J. Morgenthau, *Science: Servant or Master?*, New American Library, New York, 1972.
- Hilary Rose and Steven Rose, *The Political Economy of Science: Ideology of/in the Natural Sciences*, Macmillan, London 1976.
- Hilary Rose and Steven Rose, *The Radicalisation of Science: Ideology of/in the Natural Sciences*, Macmillan, London, 1976.
- Brian Martin, *The Base of Science*, Society for Social Responsibility in Science, (ACT), Canberra, 1979.
74. David Dickson and David Noble, 'The new corporate technocrats', *Nation* 233, September 12th 1981, pp 208-212.
75. Jerome R. Ravetz, *Scientific Knowledge and its Social Problems*, Clarendon Press, Oxford 1971.
76. Clyde Manwell and C.M. Ann Baker, 'Reform peer review', *The Behavioural and Brain Sciences* 5, 1982, pp 221-224.
77. Frank von Hippel, 'The Emperor's new clothes — 1981', *Physics Today*, July 1981, pp. 34-41.