Catastrophism still unexplained

SIR—Despite Napier and Clube's frequent (and frequently changing) statements on the nature of terrestrial catastrophism and possible extraterrestrial causes, they were not the first to point out that the Sun's motion in the Galaxy might be the causative agent, as stated by John Maddox (*Nature* **315,** 627; 1985). At least one earlier suggestion of this idea was a quite excellent paper by K.A. Innanen and colleagues entitled, "The interaction of the spiral density wave and the Sun's galactic orbit"[1] which appeared in 1978. That paper noted and displayed a figure showing the coincidence between galactic plane crossings and the boundaries between geological periods on the Earth.

Also, if I remember correctly, Napier and Clube[2] suggested that the important mechanism would be the Sun's passage through galactic spiral arms which happens every 250 Myr or so, as opposed to galactic plane crossings which occur every 33 Myr.

The periodicity in the terrestrial extinction record is certainly in grave doubt at this time. But I suggest that if there is any real periodicity it is most likely associated with a period of which we are already aware, that is the Sun's epicyclic z-motion about the galactic plane, rather than any of the artificial constructs we have seen suggested, such as the hypothetical death star or planet X. However, the problem of finding the extinction mechanism which might be associated with the Sun's epicyclic motion still remains unsolved.

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1. Innanen, K.A., Patrick, A.T. & Duley, W.W. *Astrophys. Space Sci.* **57,** 511–515 (1978).
2. Napier, W.M. & Clube, S.V.M. *Nature* **282,** 455–459 (1979).

Conference costs

SIR—It cannot be good that British scientists are unable to attend conferences in their own field held in their own country, a situation that now prevails.

American colleagues report to me that they come to conferences in the United Kingdom in the hope of meeting their British counterparts, only to find that apart from invited speakers, British academics, both staff and graduate students, are largely missing.

The cause is simple: *money*. Conference fees are now enormous (to pay presumably for the air fares of the overseas speakers), and there was even an institution which ran a "hundredth birthday" symposium from which its own staff were excluded unless they paid a large fee! At the same time, in order to stay afloat, the universities that host the conferences are charging "economic" (meaning swingeing) rates for accommodation and meals, while they and other publicly funded institutions are unable to reimburse anything but the smallest sums for attendance at conferences. (My own institution now pays a maximum of £40 a year, barely the train fare to London, and this by national standards is generous.) Erosion in the real value of salaries makes it difficult, particularly for younger staff with mortgages and children, to find the several hundred pounds that a conference may cost out of their own funds. British scientists are thus deprived of the international contacts that they should have, and of much needed opportunities to keep abreast of their fields.

Remedies are not so simple, but here are two suggestions: as all universities are levying enormous accommodation charges on each others' staff, they are in effect taxing their own staff for carrying out a necessary part of their work. An immediate convention should be set up by the Commitee of Vice-Chancellors and Principals allowing British academics to be charged for accommodation at cost when attending a meeting at another university in this country. Second, the Royal Society should consider extending its system of grants for attendance at conferences overseas to include attendance at conferences in the United Kingdom.

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Value-free science

SIR—The idea of value-free science has been defended by two of your correspondents over the past several months, Bernard D. Davis (*Nature* **311,** 294; 1984 and **315,** 176; 1985) and M. Hammerton (**313,** 343 and **315,** 536; 1985). Unfortunately, they have not satisfactorily answered the points raised by Mark Diesendorf (**313,** 92 and **314,** 666; 1985).

Davis's illustration of the risk of fallout from nuclear weapons provides an excellent illustration of the different ways in which values are embodied in science.

Research related to nuclear weapons and fallout comes overwhelmingly from the governments of nuclear weapons states. That means that these governments influence the direction of scientific development. After all, values are involved in choosing a particular facet of the world to study and about which to formulate knowledge.

Knowledge about nuclear weapons and fallout is selectively useful to the governments of nuclear weapons states because they are the ones who can hire experts to apply it. Community groups do not have much use for nuclear science. Scientific knowledge is value-laden because it is selectively useful to different social groups.

Knowledge about hazards from fallout has often been used to justify continued nuclear weapons testing, ignoring the fact that the "benefits" of testing accrue to governments and militaries while the hazards literally fall on many people who obtain no benefit at all. Much scientific knowledge is value-laden because it serves to justify policies and practices of certain groups. Another example is the setting of "acceptable" levels of exposure to radiation: acceptable to whom?

In the past, defenders of nuclear technology have often adopted the hypothesis that there is a threshold beneath which radiation exposure poses no risk to health. This illustrates how the content of scientific knowledge can embody values.

These and other points are elaborated and illustrated in my study *The Bias of Science.*

It is futile to try to argue away or exorcise values from science, since this only obscures the role of the social context of science. More appropriate is the aim of making the values open and apparent, so that the direction and use of science can be a subject for public debate.

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Paul Rosbaud

SIR—The Houghton Mifflin Company will publish in 1986 a book about Dr Paul Rosbaud, scientific adviser to Springer Verlag in Berlin until 1945. After the Second World War, Rosbaud became associated with various scientific publishing activities in Britain until he died in 1963. Copies of letters, papers and so on associated with Rosbaud would be deeply appreciated by the undersigned. Particularly welcome would be any reminiscences about Rosbaud before 1946.

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Faith in God

SIR—In his review of Hugh Montefiore's book *The Probability of God* (*Nature* **315,** 353; 1985), John Maddox seems to imply that religious belief is almost some kind of moral and/or mental inadequacy. I would say rather that belief in God — any god — must ultimately be irrational, for it involves a step of faith. If belief were to be rational, that is, if the existence of God could be proved, then it would be meaningless, for surely a god whose existence can be proved by the activities of man is no god at all.

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