

Correspondence

Geophysical Theory

SIR,—May I, while thanking Professor Runcorn for the greater part of his review of the new edition of *The Earth* (*Nature*, 227, 525; 1970), reply to his critical remarks concerning certain parts of it?

He refers to my "robust prejudices" and states that I indulge in "selection (selective?) quotation". I admit to a prejudice, namely that in an alleged explanation the conclusions should follow from the hypotheses, and that if the hypotheses lead to conclusions different from the facts there is something wrong with them. This prejudice is shared by most scientists.

As for selection, I admit that I have not read everything published in support of continental drift. I think that I have given reasons why the alleged explanation does not explain things that have happened and explains too many things that have not happened. On the other hand, I have not seen any work by a supporter of drift that even mentions that there are difficulties.

From Runcorn's review it would be inferred that I have not treated imperfection of elasticity apart from fracture. Following on the work described in the book (p. 331 *et seq.*) Crampin and I^{1,2} have recently published further work, and the form that we find forbids convection and continental drift. It gives quantitative explanations of facts far beyond the original data. Most seismologists concerned with damping use a law that departs even more than ours from one type that permits convection.

Since the final proofs were passed, there have been extensive and severe criticisms of continental drift from the geological point of view by Meyerhoff³ and Biswas⁴.

Yours faithfully,

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¹ Jeffreys, H. and Crampin S. *Mon. Not. Roy. Astron. Soc.*, 147, 293 (1970).

² Jeffreys, H., *Nature*, 225, 1007 (1970).

³ Meyerhoff, A. A., *J. Geol.*, 78, 1 (1970).

⁴ Biswas, B., *Rising Continents, Deepening Oceanic Basins, and their Changing Configuration* (B. Biswas, Calcutta, 1970).

Wayward Bacterium

SIR,—Permit me to call to your attention evidence of a misconception on the part of your writer responsible for the article "Lunar Bacteriology—Bacillus by Rocket" (*Nature*, 226, 1000, 1970). The question is asked, "But how did the bacterium escape through the tight sterility net applied to all extraterrestrial space missions?"

Early in the decade of the 1960s there was concern for terrestrial contamination of the Moon; but as the matter was studied, it became apparent that, though terrestrial life might survive on the Moon, it could not multiply in that adverse environment, and it could therefore be no threat to lunar life if it existed. Subsequently the only biological constraint on lunar missions has been the expressed opinion of the International Committee on Space Research (COSPAR) that careful sterilization is desirable for drills designed for deep lunar subsurface boring. NASA has gone one step further, however, and on the basis of a recommendation by the Space Science Board of the National Academy of Sciences has kept its lunar landing hardware as biologically clean as was practi-

cal. This action resulted in approximately 5×10^6 viable spores being aboard Surveyor 3 at the time of launch, as compared with 1×10^8 to 1×10^9 spores for a spacecraft assembled without cleanliness controls.

In contrast is the constraint placed on planetary missions. COSPAR has recommended that launching states assure that there shall be only one chance in one thousand of contaminating a planet deemed important for the investigation of extraterrestrial life during the period of biological exploration. NASA has closely adhered to this requirement by biasing the trajectory of non-sterile flyby missions away from the planets sufficiently so that the probability of direct impact is very small and no ejecta can reach the atmosphere. When missions are launched to land capsules on Mars, those parts of the missions intended to land on the planet's surface will be sterilized to the extent that they will have a probability of less than 1×10^{-3} of contaminating the planet.

The United States is very aware of and is actively engaged in meeting its responsibility to protect the planets from biological contamination carried on its spacecraft. Its responsibilities with regard to the Moon have been more than met.

Yours faithfully,

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French Nuclear Tests

SIR,—The welfare of South Pacific communities is increasingly at risk in the face of relentless testing of nuclear weapons in French Polynesia. Public outcry in Europe prevented France from continuing her test programme in Algeria. However, the protesting voices of small South Pacific governments have been ignored.

We are faced with increasing evidence of the hazards of uncontrolled radioactivity. While the extrapolations of Sternglass¹ may overstate the threat, we cannot be complacent. Similar, more moderate, warnings by Gofman and Tamplin² and others on the dangers of the infamous "permissible" level of radiation are generally accepted in the scientific community.

While the lasting danger to the people of the South Pacific lies in a general atmospheric contamination which will be shared, to an extent, with the rest of the world, a more immediate threat exists from contaminated fish. Certain of the large migratory fish such as tuna might feed on smaller fish dependent on heavily contaminated plankton drifting from the test area. Such deadly migratory fish could turn up in catches all over the Pacific.

Coral reef organisms have a great capacity for concentrating radionuclides. Data of Odum and Odum³ show a thousand fold concentration in coral. Molluscs also are notoriously efficient concentrators of radionuclides and these organisms constitute a major part of the diet of South Pacific Islanders.

The French Defence Minister, M. Debré, while in Tahiti recently, had the audacity to say that atomic scientists had "proved that the nuclear tests left no radioactive contamination in the area". British, New Zealand and

Australian government reports⁴⁻⁶ give extensive data to the contrary and R. S. Cambrey (personal communication), senior author of the British report, points out that about 75 per cent of the long-lived activity in the southern hemisphere in 1969 was due to the 1968 nuclear tests. This percentage is presently rising as the 1970 series nears completion.

Can the scientific community remain complacent in the knowledge that the French government intends to continue testing in the South Pacific next year, and under conditions of reduced safety? M Debré has underlined his government's lack of respect for the people of the area by recently announcing a reduction of what he terms "the surfeit of useless precautions".

I call on responsible scientists to use their influence, through the various scientific organizations, to enlighten their governments on the radiation hazards to which South Pacific communities are exposed and to impress on these governments the need to pressure France, as a humanitarian gesture, to cease nuclear testing in the South Pacific.

Yours faithfully,

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¹ Sternglass, E. J., *New Scientist* (July 24, 1969).

² Gofinan, J. W., and Tamplin, A. R., *Environment*, **12**, (3), 12 (1970).

³ Odum, H. T., and Odum, E. P., *Ecol. Monogr.*, **25** (3), 291 (1955).

⁴ Cambrey, R. S., *et al.*, Report, *AERE R6212* (HMSO, 1969).

⁵ National Radiation Laboratory, *NZ Dept. of Health Report No. NRL-F33*, (1969).

⁶ Gibbs, W. J., *et al.*, *Austral. J. Sci.*, **32**, 238 (1969).

Journal Dissemination

SIR,—One major impediment to the further development of science and advanced technology in developing and underdeveloped nations is that scientific journals reach us much more slowly than they reach laboratories in the developed nations. There are two reasons for this: our library budgets are small, so that to maintain a maximum coverage we are limited to seairmail subscriptions. Second, in many cases the postal services are so bad that even after the journals reach the country they may be delayed several months before reaching the laboratory.

It has been suggested that the IATA might accept the shipment of scientific journals at reduced rates, but this piece of special pleading would, we suppose, be resisted since many other people may also feel that they merit special consideration.

We make the following proposal: that every scientific journal should be published in two forms simultaneously, in the present form and in microfiche (or microfilm). Any subscription to the journal would automatically consist in a subscription to one copy in each form. The microfiches could easily be sent by airmail letter post (this would be much faster even than present airmail subscriptions because letters receive very much higher

priority than parcels or printed matter even when the latter are sent airmail) at a very low cost and if the conventionally bound journal took several months to arrive by sea it would not matter so much. The additional cost of making the microfiches centrally and in such numbers would be very small and the problem of copyright would not be more acute than at present since the microfiches would be sent only to people who receive the journal by subscription in the normal way.

We are aware that certain journals are already offered in both forms but with the subscriber having to make the choice between them. We believe that our proposal is superior and that the additional cost would be sufficiently small that the price of subscriptions need not be raised significantly.

Finally, we feel that the proposal would also benefit science libraries with more favourable postal services since they would need to keep the bound journals only for a year or two while keeping a complete record of the literature on microfiche.

Yours faithfully,

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Citation Indexing for Studying Science

SIR,—E. Garfield's list (*Nature*, **227**, 669; 1970) of authors most cited in 1967 features a selection of authors of techniques for cytology, which prompts comment on the objectivity he claims for citation indexing, in the light of current writing and editing practice in this field leading to arbitrary omissions.

A citation index will, for example, disregard the large number of times the term Feulgen is used, without bibliography and yet with precise meaning. Lead citrate staining is mostly mentioned with a citation; uranyl acetate, used for the same purpose and perhaps reported in the same sentence, without one. Citation practice for embedding media is varied and not always apt. Fixation with glutaraldehyde ranked frequent citation for a time; that with osmium tetroxide rarely does unless particular buffers are added. Because these techniques rarely form "key words", there is no automatic check on this selectivity.

This does not deny that the authors frequently cited are important and welcome influences in several fields. An appreciation of the state of their fields, however, and of their influence on them, will escape index researchers content with the objectivity gained by not reading the literature.

Yours faithfully,

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Announcements

University News

Professor Jack Diamond, Beyer professor of mechanical engineering, will succeed **Professor S. G. F. Brandon** as a pro-vice-chancellor of the **University of Manchester** in October. **Professor R. A. C. Oliver** is retiring from the Sarah Fielden chair of education and will be succeeded by **Professor Frank Musgrove**, University of Bradford.

Mr John B. Wilkinson, head of the Unilever Research Laboratory, Isleworth, has been appointed visiting professor in the Department of Chemistry, **University of Surrey**.

Professor Peter V. Hobbs has been appointed professor of atmospheric sciences in the **University of Washington**, Seattle.