Changing fields

D.H. Tarling

The Earth's Magnetic Field.
By Ronald T. Merrill and Michael W. McElhinny.
Academic: 1983. Pp.401. Hbk £39.50, $67.50; pbk £17.50, $30.
Reversals of the Earth's Magnetic Field.
By J.A. Jacobs.
Adam Hilger, Bristol and Accord, Massachusetts: 1984. Pp.230. £19.95, $35.

DURING the past decade there has been a dramatic increase in our knowledge of the behaviour and origin of the Earth's magnetic field. This revolution, if so it can be called, stems from (i) the greater information on the present field, available from satellite monitoring, (ii) on its past behaviour, as provided by palaeomagnetic studies, and (iii) from improved concepts of the nature of magnetohydrodynamic processes. It is no longer necessary to avoid questions of the origin of the geomagnetic field by simply stating that it is dynamo, and is now possible to discuss how that dynamo may operate and how it is driven. The problem has not been solved, but at least certain constraints are now accepted and we can pose hypotheses that are testable by further observations.

Merrill and McElhinny make it their aim to combine accounts of advances in observatory studies with those in palaeomagnetism and theoretical dynamo concepts in order to allow geomagnetic theoreticians to speak to palaeomagnetists, and vice versa. They have certainly provided a readable text; although some mathematical background is required for the more theoretical chapters, it is not beyond that which could be expected from a final-year geophysics undergraduate. The real surprise, given the book's title, is the lack of attention which is paid to satellite observations and to aeronomy. I would also have liked to have seen more critical appraisal of such things as the evidence for and significance of the frequency of polarity changes in the past, or the evidence for possible asymmetric polarity changes in the Precambrian — most such discussion does not go beyond that previously reviewed in other books. However, such a comment should be taken as a compliment about the generally excellent level of reviews presented.

The production is good, and the book is well indexed and, with some exceptions, well referenced — although one wonders why the historical references are not included. Mention of one reference published in June 1984, a week after receipt of the book for review, also contrasts starkly with the omission of any reference to Thellier's archaeomagnetic summary paper of 1981.

Jacobs's book deals with only one aspect of the geomagnetic field — its ability to reverse — but this is, perhaps, the most important contribution that has and will still come from palaeomagnetic studies. The style is, as always, highly readable and the mathematical content is much less than in Merrill and McElhinny. Although Jacobs devotes the whole book to this one aspect — plus a few asides into climatic effects — the textual space is essentially similar as his book is only half as thick. There is, however, much greater and thorough discussion of the actual observations, Merrill and McElhinny being more concerned with consequences. Jacobs, for example, discusses the petrology: polarity correlations which are dismissed as a "data artefact" by Merrill and McElhinny. While such an assessment is probably correct, the argument is of interest. Another of R.L. Wilson's observations — the far-sided nature of the time-averaged palaeomagnetic pole — is similarly given greater consideration by Jacobs.

It is difficult to choose between these two books. For a graduate or postgraduate course on "pure" geomagnetism I would, in any case, marginally prefer the better balance towards aeronomy provided by W.D. Parkinson's *Introduction to Geomagnetism* (Scottish Academic Press/Elsevier Scientific, 1983). All three books really need to be in any geophysics library. Pedagogically I would be happy for any student to read either of these newer contributions. Both give helpful accounts of the solid-Earth aspects of geomagnetism and, to some extent, are complementary to one another — Jacobs providing a clearer general appraisal of the present data and Merrill and McElhinny giving a better appreciation of the implications of those data to geomagnetic theories. □

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Pieces of a life

William Cooper

Random Variables.
By Lord Rothschild.
Collins: 1984. Pp.238. £12.50.

"Perhaps I can deal with your questions by telling you why we invited you to speak. You have had a rather unusual life, more like someone two hundred years ago. You have changed your job so often."
"25 years in a laboratory at Cambridge studying the biophysics of reproduction", I protested.
"Yes, but you were for 10 years the Research Director of Shell, and then you became a *sort* of civil servant. And you're a banker."
"Banker," I protested again: "Never."
"But you are called Rothschild."
Stunned, I was not quick enough to remind Colonel B. that the London telephone directory contains Rothschilds who are dentists, accountants, doctors and one who simply calls him or herself Trading Company.

Do you pick up something of an authorial tone of voice in that extract? It is the tone of voice binding together this collection of pieces which Lord Rothschild presents under the title of *Random Variables*, artlessly recognizing in his preface that there is "a remote chance that a mathematician might be taken in by the title". A mathematician, quite possibly several readers of *Nature*; and, as a matter of fact, the present reviewer — thus disclosing my sole cause for any disappointment in the book: I was rather hoping for some amusingly far-fetched metaphor to make itself apparent. But no. "An abstract concept in mathematics", says Lord Rothschild, "not a subject for discussion here, even if the common reader were interested". So much for the likes of me! It's an entrancing book and I enjoyed every minute of it.

The eponymous variables consist of recollected episodes in the author's life, personal encounters that have caught his fancy, a speech or lecture here and there, comments on certain bits of government; plus two extended and fascinating pieces of family history. There is no common thread, other than the audible expression of the author's personality — clever, inquisitive, shrewd, high-spirited, and, no matter how deeply he is concerned, instinct with a fine carelessness that to me is most attractive. "This book, unlike that of my cousin Baron Guy de Rothschild", he says, "contains little or nothing about the *signes extérieures de la richesse*". What about *signes intérieures*? one feels inclined to ask. A wonderfully fine carelessness . . . .

I suppose one would have to credit Colonel B. with an equally if antithetically fine carelessness; when he says a *sort* of civil servant, he is referring to Lord Rothschild's having been the first head (appointed by Mr Edward Heath, then Prime Minister) of the Government's Think Tank. Two of Lord Rothschild's variables are about the Think Tank, and they include personal encounters with Mr Heath and Sir Burke Trend and Sir William Armstrong, in which Lord Rothschild displays a novelist's knack of showing his characters being *themselves* — which aren't necessarily the selves they think they are projecting. Mr Heath dutifully makes statements which in effect carry the conversation forward not one iota. Sir Burke and Sir William hover in the background, their antennae anguishedly sensitive to the presence, in Lord Rothschild, of someone who may *rock the boat*. "Victor, if forced by circumstances to answer", Sir Burke says to him afterwards, "you may say that the Central Policy Review Staff is taking an interest in such-and-such a subject. That is as far as you may go. You may not say that you are