

reviews

Secrets of the Earth's core

Thomas H. Jordan

The Earth's Core. (International Geophysics Series.) By J. A. Jacobs. Pp. viii+253. (Academic: New York and London, 1976.) £8.50; \$22.

THE Earth is stubborn in yielding her secrets, and locked most tightly in her depths are the mysteries of her core. The core is separated from us by nearly 3,000 km of rock, so it is no wonder that our papers about its composition, state and dynamics are often prefaced by words like 'assumption', 'hypothesis' and 'paradox'. Pressures within the core are as yet inaccessible by static laboratory apparatus, but fall short of the domain in which the elegant theories of degenerate electron gases may be applied. Nearly everyone agrees that iron and nickel are the dominant atomic species in the core, but further statements about its composition depend heavily on models for the Earth's early history, a subject perhaps still better suited for religious thinkers than natural philosophers. The important questions of core dynamics seem to provide the most secure remaining refuge for the back-of-the-envelope, order-of-magnitude geonomist. For example, the average heat flux across the core-mantle interface is one of the great unknown quantities of terrestrial physics, a number whose demonstrated bounds are virtually useless.

Therefore, few geoscientists would be surprised to learn that, until now, the Earth's core has not been the title subject of a scholarly treatise. This deficiency has been remedied by Professor Jacobs, who has produced a very readable monograph of 253 pages. His narrative sketches the lines of evidence which, when suitably tangled, form the web of our understanding about the core. His treatment of this subject has been divided into five chapters the titles of which outline the content of the book: general physical properties of the Earth; origin of the core; thermal regime of the Earth's core; Earth's magnetic field; constitution of the core. As a bonus he concludes with a sixth chapter on the cores of other planets, paying due homage to the current emphasis on comparative planetology. This last chapter also serves to cheer us up: at least we Earth scientists know

this planet *has* a core, a conclusion that is uncertain for even the best studied of our neighbours.

The book is comprehensive: space is given to nearly every subject of current interest, although few are treated in any depth. Particularly valuable are the author's discussions of recent attempts to model the physical parameters of the core using seismic methods, his summary of the controversy that has surrounded the so-called Kennedy-Higgins paradox, and his synthesis of the evidence regarding core formation. The chapter on the magnetic field is adequate, although a more thorough treatment of the dynamo problem could have been attempted.

Throughout the book the mathematical level is very elementary, long derivations are absent, and equations are generally used only in a narrative

fashion. In spite of this lack of fancy mathematics, or perhaps because of it, the subject matter is modern and the information content is high. It is a good reference for specialists engaged in core research who wish to know what other specialists are up to. The bibliographies which follow each chapter are excellent, with nearly seven hundred references (including multiple citations), over half of which have been published since 1970.

This book should be an excellent text for graduate courses dealing with the internal constitution of the Earth. It will be interesting to see if, in five or ten years, this is still true. □

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Introduction to physiological psychology

Brain and Behaviour: A Textbook of Physiological Psychology. By Hugh Brown. Pp. x+413. (Oxford University: New York and London, March 1976.) £9.25.

THIS introduction to physiological psychology has grown out of a series of lectures for undergraduates. The author initially grapples with the problem of providing a balanced grounding in the principles of nervous function and I think he succeeds in his aim of holding the attention of the reader while proceeding at a somewhat breathless gallop through the first half of the book. The text is chatty and is liberally punctuated with anecdotes, photographs and excellent illustrations. Jargon is kept to a minimum and there is a glossary of terms at the end, ranging from ablation and acalculia to Witzelsucht and the Young-Helmholtz theory. Each chapter ends with a few well chosen suggestions for further study.

The reader is then propelled rapidly through, and sometimes over, the second half of the book, which covers a selection of behavioural correlates of physiological functions. There are sections of about 20 pages each on motivation, emotion, consciousness, frontal lobe localisation, learning,

personality and psychopathology; and then on to glimpses of social and aggressive behaviour, wanted and unwanted actions of drugs; and the book comes to a close with a brief discussion of the mind-body problem. Comments on the composition of this section must, to some extent, reflect personal biases; I missed any discussion of recent attempts to link neurotransmitter systems with reinforcement mechanisms, and the neuropharmacology of mental disorders receives scant attention. There are occasional jarring lapses into simplistic clichés—for example, "if mental illness could be reduced to a chemical problem . . ."; and, incidentally, imipramine is not a monoamine oxidase inhibitor.

The book is largely successful in its aim: it is interesting but not indigestible. As an hors d'oeuvres the basic ingredients are well selected, nice to look at, and they whet the appetite. One big snag is the price—an hors d'oeuvres at £9.25 probably means that most students would have to do without the main course.

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