

enough at the best of times, that is marred by sign errors. There are other indications of hasty preparation and inadequate proof reading. Why give a glossary of symbols when additional definitions (for example of m) are introduced into the text? Why give two diagrams of travel-time curves (pages 75 and 78) when one suffices and is there any need, even in a student text, to give diagrams of upper mantle velocity distributions (page 84) that conceal quite so many complexities of the observed situation?

There follow chapters dealing with oscillations and vibrations, the internal structure of the Earth (which ends with an entirely theoretical discussion of creep and the Q of materials), the radioactivity and ages of rocks and the temperature within the Earth. The latter chapter follows entirely conventional lines, based on thermal conduction theory although we are warned (page 171) that such calculations only apply to those parts of the Earth that are "rigid". Having been told in a previous chapter about the creep of rocks and that most of the mantle is at temperatures at which creep is "almost certainly important" (page 136), the student will wonder about the consistency of pursuing this particular line of enquiry. A quite erroneous description is given of phonon thermal conductivity (page 174), valence bands are described as localised electron states (page 175) and exciton energy transport is said to dominate other modes of the heat conduction process (page 176). A completely garbled account is given of the fundamentals of thermal convection theory, and the matter is not clarified by a quite incomprehensible fig. 7.11. I was very irritated by the implication that all is still confusion and ignorance in such an important problem of planetary physics, where definite progress has been made in the past ten years.

The remaining chapters deal with the permanent magnetisation of rocks, the geomagnetic field, movements of the Earth's crust and "The Earth among the Planets", the latter being largely concerned with the constraints placed on the density distributions in planets by classical astronomical observations and theoretical equations of state. Little reference is made to the new insights that have sprung from the space programme.

It is perhaps no criticism of a book intended for students that there are so few actual references to the work of living earth scientists, although a few names are dropped from time to time. Perusing the biographical notes at the end of the book, a student could be forgiven for believing that planetary science was the exclusive preserve of titled British scientists and finished with

the death of that well known geophysicist, Lord Rutherford. He will however find the questions at the end of most chapters a challenge to his understanding—even if they are a little contrived.

Since the publishers have performed their side of the production so satisfactorily, it is a pity that so much is unsatisfactory in its contents. I fully appreciate how difficult it is to be the expert in all branches of planetary science that such a title demands, but a little more care in preparation could have made this a much better book.

D. C. TOZER

Too brief a tale

A Revolution in the Earth Sciences: From Continental Drift to Plate Tectonics. By A. Hallam. Pp. vii+127. (Clarendon: Oxford; Oxford University: London, April 1973.) £4 boards; £1.75 paper.

THIS is a narrative historical account of the concept of continental drift. It is written in much too short a space to tell a story so deeply enmeshed in personality and full of drama. Dr Hallam deliberately aims to write "quite sparingly" and his book thereby takes on an encyclopaedic character. All the principal papers are described, though often in no more than abstract form, but the background is largely missing. He tells what was written, but not what was thought. Nor does he explain the extent of knowledge and ignorance at crucial times in the narrative.

Dr Hallam has painted a stark and static picture of the players. He has barely painted the scenery at all.

DAVID DAVIES

Substitutions

Aliphatic Nucleophilic Substitution. By S. R. Hartshorn. Pp. viii+172. (Cambridge University: London, November 1973.) £3.80; \$12.50.

THIS book is a useful member of the series of chemistry texts published by the Cambridge University Press and is certainly worth a place in any college or university library.

The author has given a clear account of nucleophilic substitution; the various methods of determining the type of reaction are discussed in detail and the problem of the "borderline" cases emphasised, an important feature since many undergraduates fail to appreciate this problem and believe that all substitution reactions fall into clear-cut categories. I was very pleased to see a section on the catalysed reactions, as the effects of silver and mercury salts on these reactions are often ignored.

In other places the treatment seems a little thin: for instance, eight pages of the book are devoted to secondary deuterium isotope effects and yet ambivalent nucleophiles only merit half a page and Kornblum's name does not appear in the list of references. Some space should have been used to discuss the important synthetically useful reactions and their limitations: dozens of graduates go out into the world each year believing that *t*-butyl bromide plus sodiomalonate ester constitutes a useful synthetic reaction. In the index there is no reference to diethyl malonate or β -keto esters and the list of solvents does not include dimethyl sulphoxide.

A. S. BAILEY

Techniques for structure

Co-ordination Chemistry: Experimental Methods. By K. Burger. English translation edited by Ian T. Millar and D. W. Allen. Pp. 372. (Butterworth: London, 1973.) £10.

TITLES must be brief, so may be incomplete. This book describes experimental methods for providing structural information in coordination chemistry and does not cover measurements of equilibrium constants or the kinetics of complex formation. In a masterly introduction the author sets the perspective and in his final, the eleventh chapter, he shows with examples from glyoxime complexes how the various methods can be combined.

The intervening chapters each deal with specific techniques giving the principles, an outline of the methods and the type of information obtainable. The balance has been influenced partly by the length of time for which the technique has been available; Mössbauer spectroscopy has advanced so much since the Hungarian edition was published in 1967 that the chapter on it was rewritten and is now as long as that on IR and Raman spectroscopy despite their more general applicability. Post 1967 references are rare in the rest of the book, and the new technique, electron spectroscopy for chemical analysis (ESCA), provides most of these.

There is a particularly clear explanation of shielding effects in the chapter on nuclear magnetic resonance (by L. Brajer). In the first three sections on X-ray structure analysis (by Korecz) there is confusion between atoms and lattice points while the illustration of an electron density map, also on the dust jacket, is not of a coordination compound; Burger himself writes well on the results. An interesting account of thermal analysis (by G. Liptay) shows that this must be combined with other methods if structural information