

the conservation ethic. After reading them, every reader will feel constrained to seek to define for himself (since no one else has yet done so satisfactorily) just what conservation is, what it means, and whether it is a way of life, a state of mind or a field of knowledge, or some or all of these things, or none.

Readings in management occupy more than half the book and cover a wide range of subject, type of resource, regional setting, objective and research technique. They are grouped into chapters dealing with the managerial experience, resources and economic development, scientific and technological change, and the choice of alternatives. Among the selections offered (and to quote only about a third of the titles) are accounts of the Columbia Basin and Tennessee Valley Authority projects; the management of the Harvard Forest; the conflict between fish and power resources in the Pacific Northwest; soil erosion control; conservation and stock reduction on a tribal range; wilderness perception and use; natural resources and economic development; the diffusion of agricultural innovations; and a safe minimum standard as an objective of conservation policy. Taken together, the papers "suggest a picture of managerial activity marked by less success than is normally assumed", and a "failure to anticipate change or to accommodate differences in value", both of which are intractable managerial problems.

This is a happily conceived, efficiently contrived and unusually stimulating book; every chapter of it arouses thought. It is well produced, tastefully laid out, a pleasure to handle and good value for money. It should be compulsory reading for resource managers and conservationists, however defined.

W. J. EGGLING

JURASSIC STRATIGRAPHY

Jura

By H. Hölder. (Band IV of the *Handbuch der stratigraphischen Geologie*.) Pp. xii+603. (Ferdinand Enke Verlag, Stuttgart, 1964.) DM 129.

THE appearance of a new book on world Jurassic stratigraphy is bound to provoke comparisons with the well-known synthesis of W. J. Arkell published ten years ago, almost exactly a century after the publication of *Der Jura*, by F. A. Quenstedt, the first major treatise on the Jurassic. *Jura*, dedicated appropriately to the memory of these two eminent scholars, differs in important respects from its immediate predecessor, to which, indeed, it forms an admirable complement.

While a three-page 'retrospect' at the end of Prof. Hölder's book is no substitute for the five general chapters in *Jurassic Geology of the World*, which make stimulating reading for all types of geologist, there are a number of compensating advantages. In the first place there is a much fuller emphasis on the classical areas of Europe, especially central Europe. An abundance of illuminating text-figures replaces the admittedly often beautiful but less useful photographs in Arkell's work. Taking into account also the flood of new literature in the past decade, which receives due attention, these features suggest that Hölder's book may actually prove more valuable as a reference work for the practising Jurassic stratigrapher.

The book is divided into two sections, with emphasis respectively on chronology and regional geology. Some compromise is involved here. Thus the type sections of the English Middle and Upper Jurassic are considered better dealt with in the chronological section, whereas the English Lias and south German Malm, where type sections are not considered necessary, are treated in the regional section. Such an approach is rather inconvenient for the reader, who is obliged to consult both sections to learn all he can about a given part of the Jurassic in a classical European area.

After a critical review of the evolution of the zonal concept, the development of successive Jurassic stages in

the type areas and neighbouring regions is fully considered; the section ends with a palaeontological appendix devoted to a discussion of several interesting fossil groups.

Difficulties concerning the definition of the top of the Jurassic are not hedged, and Casey's correlation of the Jurassic-Cretaceous boundary in the boreal realm with the Tithonian-Berriasian boundary in the Mediterranean is viewed with scepticism. The regional section includes a concise but fair review of recent work on the British Jurassic, though the author adheres to the outdated concept of posthumous axes of uplift.

In contrast to the ample treatment of the European Jurassic, the rest of the world is dealt with somewhat cursorily and the information is not always up to date. Thus the Franciscan Group of California is now known to range in age from Tithonian to Cenomanian, and is considered to be a eugeosynclinal equivalent of the Knoxville. The Nevadan orogeny is likewise known to straddle the Jurassic-Cretaceous boundary, and no major founded Pacific landmass need be invoked to account for the origin of the Franciscan sediments.

The cost of Prof. Hölder's fine and well-produced book is unfortunately high, but it deserves a place on the shelves of geological libraries throughout the country. One is provoked to the reflexion that, with its traditional emphasis on stratigraphic correlation by means of ammonites, it may prove to be the last comprehensive Jurassic treatise of its kind. While important correlation problems remain, notably in the Upper Jurassic, interest has begun to shift towards a much fuller understanding of the rocks and of the fossils as representatives of past life. It is indeed astonishing how few detailed sedimentological and palaeoecological investigations have been undertaken in a geological system that has received intensive scrutiny for more than a century. A. HALLAM

ATMOSPHERIC AND SPACE ELECTRICITY

Problems of Atmospheric and Space Electricity

(Proceedings of the Third International Conference on Atmospheric and Space Electricity, Montreux, Switzerland, May 5-10, 1963.) Edited by Samuel C. Coroniti. Pp. xiv+616. (Amsterdam, London and New York: Elsevier Publishing Company, 1965.) 200s.

PROBLEMS of Atmospheric and Space Electricity is a valuable document, well edited and handsomely produced. The proceedings and extensive discussions will certainly be regarded as historic; within a very few years space-probes and directed satellites will have produced information on the atmospheres of other planets to compare and contrast with that of our own.

Though the workers represented at Montreux and their predecessors have had great successes, including the discovery and elucidation of the cosmic rays, knowledge of the electrical state of our own atmosphere is still far from complete. We have, as yet, a very limited amount of information about its outer edges, the ionosphere and the exosphere. It was, therefore, with some sense of urgency that this gathering of 160 workers in terrestrial atmospheric electricity met to survey their subject before it becomes translated to other worlds. Cosmic rays have already left their purview, the maintenance of the general ionization of the lower atmosphere has been largely reduced to order, though bedevilled by the fouling from atomic-bomb fallout. Two outstanding problems occupied most of their attention: the mechanism of thunderstorms and the electrical state of the ionosphere.

Thunderstorms offered the opportunity for a full-scale debate, almost a battle, between rival experimenters and theorists. On the one side were Latham and Mason with their well-authenticated evidence that thunderstorm charges arise from the impact of supercooled droplets of water on larger particles of soft hail, effectively at a