

a long introduction, in which Dr. Mazlish himself discusses historical analogy, deftly but inconclusively, we are treated to seven separate surveys of United States railroad history. These reveal in convincing detail the economic, social and political effects of the railroad expansion, but tell us virtually nothing about the likely effects of the space programme. Each contributor dutifully mentions space exploration at the end of his chapter, but often only to say that any analogy is doubtful. In short, the question that NASA wished to see answered is never properly tackled at all: the authors are like a pack of industrious detectives who efficiently scour the ground while their quarry lurks in a tree above.

Although the book does not fulfil its declared aim, the studies of railroad history may be of interest to economists and historians. Stylistically, the book is often heavy with detail: there are, for example, tables giving United States steel production yearly from 1871 to 1890, the proportion devoted to railways, etc. But there are also illuminating insights. For example, R. W. Fogel challenges the conventional view that the improvements in transportation brought about by railroads were the key to American industrialization. He prefers to emphasize that the diversion of resources into railroad construction delayed the advent of motor transport by several decades. Is there a lesson here for the space explorers? It is difficult to tell, because the analogy between rail and space travel is so imperfect: both often leave behind a plume of steam, it is true, but rail travel merely improved transportation between known areas, while space exploration opens up new areas. This fundamental difference sabotages the book's few real attempts at pursuing the analogy.

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present British scene where belated enthusiasm for barrage schemes and large-scale redirection of river water must be tempered by the high costs of such projects.

The purport of the title is emphasized many times throughout the book. Prof. Kazmann's thesis is that the concept of 'classical hydrology' is dependent on the assumption that the data are 'clean', that is, the result of natural circumstances alone. Such conditions are becoming increasingly less common because the numerous side-effects resulting from man's activities exert a modifying influence on the hydrological data, which are the foundations of modern hydrology. He goes further; given a continuation of the process, the data would become so 'dirty' that it would be impossible to distinguish between natural hydrological events and those induced by man in the form of dams and diversions, surface- and ground-water abstraction, and sewage disposal. This point of view seems over-pessimistic. Man's activities have been complicating hydrological data for centuries past, and indeed only rarely can water development projects be undertaken without incurring some form of hydrological side-effect. One might go so far as to say that most data have been of the dirty variety since scientific hydrological measurement first began.

Prof. Kazmann has attempted to cover too wide a field in too little space, and at the same time has tried to satisfy too many diverse interests. His central theme is the effect of man's activities on the hydrological cycle, and the significance of modern versus classical hydrology. The book would have been improved had it been more specifically directed to those ends. While *Modern Hydrology* will make a stimulating and worth-while addition to library shelves as a work of reference, it is unlikely to supersede any of the accepted hydrological text-books.

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HYDROLOGY—CLASSICAL AND MODERN

Modern Hydrology

By Raphael G. Kazmann. (Harper's Geoscience Series.) Pp. xiv+301. (New York: Harper and Row, 1965.) 79s.

THE inception of the International Hydrological Decade in 1965 and the water shortages of the same year have helped to stimulate an interest in one branch of the geosciences—hydrology. In his introduction to *Modern Hydrology*, the editor quite rightly states that an up-to-date, authoritative but readable work is needed by newly interested administrators, lawyers, legislators and planners as well as by academics and professional hydrologists. The comments that follow will help indicate whether the book under review fulfils the undoubted need.

The dust cover claims the book to be "a succinct but thorough discussion of the hydrologic cycle, the development of water resources, and the effects of this development on future projects". Its organization of the material is refreshingly simple; after an introductory chapter, the basic components of the hydrological cycle are examined in turn, the two concluding chapters being an account of water resources development, and final summation. Within the terms of reference given, the contents of the chapters on "Precipitation" (22 pages), "Evaporation" (14 pages), "Surface Water" (70 pages) and "Ground Water" (80 pages) are no more than adequate. One must deplore the absence of material in both text and illustrations from sources outside the United States in a work dealing with the principles, methodology and practical application of hydrology, and presumably aimed at a world-wide market. The meat of the book is contained in the chapters on "Water Resources Development" (38 pages) and "Summation and Outlook" (26 pages). The remarks of the author on the organization and financing of large-scale water development works are forthright and thought-provoking. They are directly applicable to the

SOIL BIOLOGY

Bodenbiologie

Von Georg Müller. Pp. 889. (Jena: Veb Gustav Fischer Verlag, 1965.) 153s. 5d.

BODENBIOLOGIE, which was intended to fill a gap in the German literature as well as to supplement the more general literature of soil science, has certainly achieved its purpose. The author is to be congratulated on covering the extensive field of soil biology so thoroughly. Soil biology is the newest and perhaps most important branch of the soil sciences; it is developing rapidly and any attempt to integrate the separate studies of soil bacteriology, mycology and zoology into a unified discipline must be welcomed.

Prof. Müller divides his book into five main sections: soil organisms; methods, considerations of numbers and occurrence of soil organisms with reference to site conditions; activities of soil organisms; and influence of cultivation practices on the life in the soil. In the first section the morphology, systematics, ecology and physiology of the soil microflora (bacteria, fungi, algae and lichens) are discussed in much detail followed by a similar treatment of the soil fauna (from protozoa to mammals).

The section on methods concentrates rather on procedures for counting and isolating organisms, but also deals with all the usual laboratory techniques for studying the organisms in culture and refers also to soil sampling and to statistics. The effects of a variety of soil factors and conditions on different organisms and their populations in soil are treated in the third section. The fourth large section is an account in detail of the biochemical activities of organisms with more emphasis on the microflora (of which more is known) than the fauna, and attention is paid to the part played by different organisms in mineralization, humification and weathering processes. An important fifth section describes the effects of various treatments such as irrigation, cultivation, fertilizing