STRATIGRAPHICAL STUDIES OF CALIFORNIA

Miocene Stratigraphy of California
By Robert M. Kleinpell. Pp. ix+450+22 plates. (Tulsa, Okla.: American Association of Petroleum Technologists; London: Thomas Murby and Co., 1938). 22*s.* 6*d.*

THE geological pioneer in any newly explored area distinguishes certain broad stratigraphical units, based primarily on lithic characters, and secondarily on the contained fossils. He correlates these units roughly with those on the familiar time-scale. As subsequent research, in the course of years, is extended in area and intensified in each locality, palæontological evidence becomes increasingly important, and problems of interpretation and correlation arise. Does a well-marked lithic change, say, from shale to sandstone or limestone, correspond to a definite moment of time, or did it take place earlier here than there? What faunal aggregates may be trusted as exact age-indexes (zone-fossils), and which give ecological evidence (facies-fossils)? How can time-divisions based on Foraminifera be correlated with those based on Mollusca, echinoids or vertebrates? All these problems are faced by Mr. Kleinpell in his revision of the Miocene of California.

The Neogene of California is disposed in tectonic basins, about a dozen in number, from Humboldt in the north to Los Angeles in the south. About half-way along is the Paso Robles basin, and in this lies the Reliz Canyon, which provides the author with his type section. The aerial photograph serving as frontispiece shows the area to be sufficiently arid to give a practically continuous exposure; but one must admire the painstaking determination with which so many successive associations of Foraminifera were collected, identified and tabulated. Such labour would scarcely have been thought of without the stimulus which the search for oil has given to the detailed study of Foraminifera.

The first half of the text consists of discussions on matters of correlation, which are not only of great importance to all who are concerned with the Tertiary geology of the Pacific slope of North America, but also to all geologists interested in the problems outlined in the first paragraph of this notice. The author introduces a new series of divisions (with new names) which he believes to have a precise age-value, replacing such well-known terms as Monterey Shale, which will always keep their broad stratigraphical and physiographical usefulness, but are misleading when taken as corresponding to the same duration of time wherever they occur. This first part is illustrated by maps, sections and tables, the largest of which occupy a pocket in the cover. Bibliographical references are very full. The second half is a systematic catalogue of Foraminifera, illustrated by twenty-two plates. There do not appear to be any new species.

This should be the standard work on the Miocene of California for years to come. A. M. D.

IN PRINCIPIO ERAT VERBUM

An Ecological Glossary
Compiled by J. Richard Carpenter. Pp. ix+318. (London: Kegan Paul and Co., Ltd., 1938.) 15*s.* net.

THERE are two ways of compiling a glossary: the critical and exclusive, and the complete and impartial. Dr. Carpenter adopts the second method. Its advantage is that it brings all the varying terms and expressions together and reveals in a striking way the inconsistencies and unresolved conflicts found in a comparatively new science such as ecology. Its disadvantage is that it conceals the dead words and meanings among the living. A compromise, relegating obsolete words and meanings to smaller print or brackets seems desirable and might be suggested for future editions.

Ecology, like genetics and other recent disciplines in biology, applies to both plants and animals. It is interesting to examine its terminology from this point of view. Evidently botany was the predominant partner at the time the special terminology was in process of formation, as all the basic terms for associations appear to rest on plant criteria. Only in such ancillary matters as bird-watching do we find an infiltration of terms based on zoology. This may, of course, be due in part to the fact that the plant constituents of a society are more fixed than the animal ones and less liable to wander out of the picture; but it seems probable that zoological terms will bulk more largely in future editions. The glossary shows certain inconsistencies in terms which ecology shares with genetics, for example, 'variation'; and Dzierzon's 'theory' or 'concept' is just a fact.

The sight of more than three thousand technical