

*o*-phenanthroline. Two of the new papers are longer than the others: one describes the effect of x-rays on the metabolism of *Lactobacillus*, and the other discusses oxygen transport by illuminated chlorophyll.

It is indeed interesting, and in many ways helpful, to have collected in one volume a considerable number of important papers concerned with the methodology of investigation and the biochemical activities of cancerous and of photosynthetic systems. Those working in these areas certainly need to be familiar with this material. It must, however, be emphasized that much of the methodology is based on manometric techniques, and that many other means exist for investigating metabolism, which are of equal importance with manometry and which are not discussed in this book.

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## Oscillating Theories

**Fundamentals of Mid-Tertiary Stratigraphical Correlation.** F. E. Eames, F. T. Banner, W. H. Blow, and W. J. Clarke. Cambridge University Press, New York, 1962. viii + 163 pp. Illus. Plates. \$9.50.

This book, written by four paleontologists of the British Petroleum Company, is an ambitious attempt to synthesize what is known about marine Oligocene faunas, on a practically worldwide scale. According to the interpretations they adopt, discrepancies that have bothered some paleontologists are neatly resolved: discrepancies such as the absence of reticulate *Nummulites* in American deposits long accepted as of Oligocene age, the occurrence of *Pliolepidina* in the Eocene in America, and the appearance of *Miogypsina* s.s. and of some essentially Neogene and Recent molluscan genera in American deposits currently considered of late Oligocene age.

In part 1 (by the four authors), Oligocene and lower Miocene are traced from the Mediterranean region through the Middle East to East Africa and the Indo-Pacific region. The alleged Oligocene of the southeastern United States and the Caribbean region is examined. L. R. Cox, of the British Museum (Natural History), has con-

tributed a general survey of the Oligocene and Aquitanian (early lower Miocene) marine molluscan faunas of parts of Europe. In an appendix the generic name *Palaeonummulites* is resuscitated for nummulitids that have been referred to *Operculinella* and *Operculinoides*. In another appendix *Pliolepidina*, in a restricted sense, is given an exclusive early Miocene age.

In part 2, Blow and Banner discuss late Eocene to Aquitanian planktonic Foraminifera and zones based on those fossils. Trinidad and the Lindi area on the coast of southern Tanganyika are taken as standards. Two late Eocene zones in the Lindi area are substituted for Bolli's one zone of the same age in Trinidad, and the overlying Oligocene *Globigerina oligocaenica* zone of the Lindi area, missing in Trinidad, is added to Bolli's succession of zones. Some 50 species and subspecies, almost half of which are new, and a new genus are described. Seven lineages are traced in a final discussion of the evolution of some late Eocene to early Miocene species.

Discrepancies are resolved at a price that is likely to be unacceptable to American paleontologists. This price is the almost complete wiping out of marine Oligocene and the great expansion of Aquitanian in America. Oligocene, based on the occurrence of *Globigerina oligocaenica*, is recognized, however, at three American localities: the lower part of the Alazan shale of the Tampico area in Mexico, an unspecified locality in Cuba, and an unspecified locality in the Dominican Republic. The Cuban and Dominican specimens were identified by Bolli and Bermúdez.

It is difficult to reconcile an Aquitanian age with the Eocene stamp of the extensive molluscan fauna of the Vicksburg group of the southeastern United States—an Eocene stamp as marked as that of Oligocene European molluscan faunas. Wherever the American species *Pliolepidina toberi* is associated with larger Eocene Foraminifera—and it is generally so associated—the Eocene fossils are claimed to be reworked. The implication that all of the Gatuncillo formation of Panama is Aquitanian, with reworked Eocene fossils on an extensive scale, surely is not intended.

At the turn of the century, Dall claimed that all the Miocene of the Caribbean region and of southeastern United States, except the very latest, as

well as a little Eocene, were Oligocene. The pendulum has now swung to the other end of the arc. The Oligocene of the southeastern United States and almost the entire Caribbean region is Miocene and some Eocene is thrown in for good measure. Time will tell whether the pendulum will stay there.

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## Yesteryear in Nigeria

**Barth's Travels in Nigeria.** A. H. M. Kirk-Greene. Oxford University Press, New York, 1962. xii + 300 pp. Illus. Maps. \$6.10.

Quite apart from its unique value as the only biography of Barth in English, this book is a godsend to everyone interested in the history and geography of the central and western Sudan. It will be appreciated especially by those who have been unable to procure the increasingly rare original editions of Barth's journal or who hesitate to wade through five ponderous volumes.

The author opens with a brief but full biography, followed by a critique of the *Travels and Discoveries*, an evaluation of Barth's work in the light of present knowledge, and an impressive essay in critical bibliography. Then come a series of extracts, from the original English text, covering the most important phases of Barth's travels, trials, and adventures in the region that extends from Lake Chad to Sokoto; this is all smoothly connected by seemingly effortless résumés of the intervening material. One does not need to be interested particularly in Barth, or even in Nigeria, to be charmed by the many vivid word-pictures of landscapes and of native life; the photographic reproductions of Barth's colorplates (in black-and-white) are equally fascinating and informative.

Kirk-Greene's delightful, easy-flowing style and his extraordinary mastery of a very complex subject give the deceptive impression of a skillful novelist, so experienced that he can write effortlessly and almost without thought. And yet no one who is familiar with Barth's work at first hand can help being impressed profoundly by, and appalled at, the amount of labor that must have gone into such an admirable summary.

I am writing this review in the heart

of the Sahara, under conditions which make it not entirely certain that I will get home alive; and so I feel more keenly than I used to a faint but poignant hint of what Barth felt during most of his 5 years in central Africa. Kirk-Greene can make even the most sedentary chair-bound reader feel it too, for he is as outstanding a writer as he is a scholar. From either point of view *Barth's Travels in Nigeria* can be described only as a masterpiece.

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## On Teaching Methods

**Elements of Chemistry.** Raymond B. Brownlee, Robert W. Fuller, William J. Hancock, Michael D. Sohon, and Jesse E. Whitsit. Revised by Paul J. Boylan. Allyn and Bacon, Boston, ed. 2, 1962. viii + 696 pp. Illus. Plates. \$5.68.

This book has obviously been very carefully planned in a sincere effort to give what, in the judgment of Paul Boylan who revised it, is a useful tool for learning and teaching high school chemistry. A pattern of development is set in the first chapter and is followed with practically no variations to the end of the book. First there is a study outline which, through the medium of 5 to 16 specific questions, calls attention to specific topics that are covered in the chapter. Then come well-identified discussions of specific topics. Distributed among the discussions are two to five sets of "test yourself" questions, which are in italics and thus are easily identified. Following the discussions and questions is a summary, then a list of the key words that have been encountered in the chapter, and then a group of questions and, in some chapters, numerical problems. There follows a list of student activities—that is, special projects. Last is a list of references for further reading.

Although such a well-defined pattern of development, from the first chapter to the last may, in the judgment of many teachers, represent too much rigidity and regimentation it does have merit; there is practically no question, by either student or teacher, as to what is to be learned and taught.

It is with respect to the order in which certain topics are presented, the amount of material covered, and the

relative emphasis on facts and on reasons behind these facts that I take issue with the method used in the revision.

The modern theory of the structure of the atom is based on experimental facts. So is the periodic table. A first exposure to chemistry, and for most students high school chemistry is their first exposure, should emphasize this. Accordingly, treatment of the structure of the atom and of the periodic classification of the elements should not be presented until the student knows some of the facts, reasoning, and thinking on which these concepts are based. Once the foundation has been properly laid, then and then only, is he prepared to use these concepts to correlate and explain new facts and to arrive at logical explanations and conclusions.

It seems to me that the book is too long and that it recites too much factual information to be most useful as a high school textbook. The statement in the preface that "the main concern of the text is with modern chemical theory and principles" is not borne out. Facts are important and must be stressed, but they should be examined in a perspective of reasons and principles.

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## Miscellaneous Publications

(Inquiries concerning these publications should be addressed, not to Science, but to the publisher or agency sponsoring the publication.)

**Brazil, University of Minas Gerais.** *Publicações de Anatomia*, vol. 4. Liberato J. A. Di Dio, Ed. The University, Minas Gerais, Brazil, 1960. 14 papers, published during 1958, by Di Dio and others, are reprinted.

**British Museum (Natural History).** *Fossil Amphibians and Reptiles*. W. E. Swinton (127 pp., ed. 3. 5s.). *A Short Guide to the Exhibition Galleries of the Natural History Museum* (39 pp., ed. 9). *Bulletin: Zoology*, vol. 8, No. 6, pp. 285–312: "On a collection of freshwater gastropod Mollusca from the Ethiopian highlands," C. A. Wright and D. S. Brown (12s. 6d.). The Museum, London, 1962.

**Chicago Natural History Museum.** *Fiel-diana: Anthropology*, vol. 36, No. 11, pp. 243–275: "The Red Ocher culture of the Upper Great Lakes and adjacent areas," Robert E. Ritzenthaler and George I. Quimby (\$1); *Geology*, vol. 14, No. 6, pp. 99–104: "A reconstruction of the shield of the Arthrodire, *Bryantolepis brachycephalus* (Bryant)," Robert H. Denison (\$0.25); *Zoology*, vol. 44, No. 10, pp. 67–68: "A new species of land snail from Bolivia," Fritz Haas (\$0.15). The Museum, Chicago, 1962.

**Smithsonian Institution.** *Miscellaneous Collections*, vol. 144, No. 2: "Dimensional relationships for flying animals," Crawford H. Greenewalt. Smithsonian Institution, Washington, D.C., 1962. 46 pp. Plates.

**Union of International Associations.** Publ. No. 173, "Annual international congress calendar, 1962" (96 pp., \$4); a list of the scheduled international meeting for the years 1962 to 1967 inclusive. Publ. No. 174, "International initialese" (44 pp., \$1); provides full name, whether in English or French, of some 1800 sets of initials now used by international organizations, both governmental and nongovernmental. Publ. No. 175, "The first ten years of international associations," compiled by E. S. Tew (40 pp., \$1); an analytical index of articles and surveys published in vols. 1–10 of U.I.A.'s magazine, entitled during 1949–50 *Monthly Review of the Union of International Associations*, during 1951–53 *NGO Bulletin*, and 1954 to date, *International Associations*. U.I.A., Palais d'Egmont, Brussels 1, Belgium.

**U.S. Joint Committee on Atomic Energy.** Radiation protection criteria and standards. *Index to Hearings and Selected Materials of May 1960*. The Committee, Washington, D.C., 1961 (order from Superintendent of Documents, GPO, Washington, D.C.). 97 pp. \$0.30.

**U.S. Office of Education.** OE-13017, "Literacy and basic elementary education for adults," Betty Arnett and Edward Warner Brice (126 pp., \$0.55). Superintendent of Documents, GPO, Washington, D.C., 1961. A selected annotated bibliography, including lists of educational information sources.

**U.S. Public Health Service. National Institutes of Health.** Publication No. 897: "Highlights of research progress in general medical sciences, 1961." Superintendent of Documents, GPO, Washington, D.C., 1962. 61 pp. \$0.25. A statement concerning items of interest on research studies and research training programs supported by the division of general medical sciences; prepared as background material for submission at the fiscal 1962 Congressional hearings on appropriations.

**University of Wisconsin.** *Geophysical and Polar Research Report*, No. 1: "Geophysical studies in Victoria Land, Antarctica," John G. Weihaupt (123 pp., 1961); No. 2: "Reconnaissance residual and regional magnetic maps of the Arctic Ocean basin," (preliminary report) Ned A. Ostenso, Richard J. Wold, G. P. Woollard (4 pp., maps, 1962); No. 62–3: "Summary and discussion of the geophysical and glaciological work in the Filchner Ice Shelf area of Antarctica," John C. Behrendt (65 pp., 1962); No. 62–2: "Evaluation study of airborne gravimeter operational test," Richard Coons, William Strange, George P. Woollard (66 pp., 1962); *Technical Report*, No. 62–1: "Evaluation study of airborne gravimeter operational test," William Strange, Richard Coons, George P. Woollard (40 pp., 1962). Geophysics and Polar Research Center, Madison, Wis.

**Voluntary Health and Welfare Agencies in the United States.** An exploratory study by an ad hoc citizens committee. Schoolmasters' Press, New York, 1961. 88 pp. \$1.