The problems in soil microbiology, as well as the chief contributions, are emphasized. Most of the literature quoted is quite old. In some instances, this is desirable, because it gives credit to the investigators who discovered important processes and directs the student's attention to some of the classics. In other cases, recent significant work is not mentioned.

From the standpoint of the microbiologist, relatively little attention is paid to the nature and characteristics of the organism concerned with the various soil processes, but the significance of their activities in soil fertility receives excellent treatment. The author's long interest and activity in soil microbiology are reflected in the pages of the book.

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## The Earth Sciences

***Traité de Paléontologie.*** Vol. I, ***Les Stades Inférieurs d'Organisation du Regne Animal—Protistes, Spongiaires, Coelentérés, Bryozoaires;*** Vol. II, ***Problèmes d'Adaptation et de Phylogenèse—Brachiopodes, Chétognathes, Annélides, Géphyriens, Mollusques.*** Jean Piveteau, Ed. Paris: Masson, 1952. Vol. I: 782 pp. Illus. 8300 fr.; clothbound, 8900 fr. Vol. II: 790 pp. Illus. 9000 fr.; clothbound, 9700 fr.

These are the first two of seven volumes covering the field of fossil animals. ("Traité de Paléozoologie" would be a better title, as fossil plants are excluded.) The major phyla of invertebrates, except the arthropods and echinoderms, and some minor phyla are treated in these volumes, to which 16 collaborators, all French with the exception of one Belgian, have contributed. The remaining invertebrates are to be dealt with in the third volume, and four volumes are to be devoted to the vertebrates.

Volume I starts with a series of introductory chapters on the history of paleontology; fossilization; principles of systematics; paleontology, chronology, and ecology (very brief); and on phylogenesis of the animal kingdom.

The systematic part gets off to a good start with the most complete treatment of fossil protists in any one book. Of the 13 groups of protists in this volume, discussion of all except the foraminifera is the work of Georges Deflandre, who is responsible for much of the modern literature on the 12 groups.

Jacques Sigal wrote the useful chapter on the foraminifera, except the part on the fusulinids, which is by Raymond Ciry. Classification of the foraminifera is still in a state of flux. Sigal's classification is most like Glassner's 1945 arrangement, although Sigal recognizes 61 families and Glassner 33. The chapter closes with a lengthy and valuable account of the ecology and paleoecology of foraminifera.

Sponges are rather summarily treated by Léon Moret. The archaeocyathids are given only four pages. The coelenterates are taken up piecemeal, without any synthesis of the classification of the phylum. The important rock-forming stromatoporids are inadequately treated in the chapter on hydrozoans.

The corals take up a third of Volume I. The Paleozoic "madreporarians" (tetracorals, tabulates, and heliolitids) are admirably handled by Marius Lecompte. His adoption of English terminology for the vegetative forms of tetracorals, because it is the best available and for the sake of uniformity, is a significant indication of the breadth of treatment. He proposes a new superfamily classification of the tetracorals that emphasizes septal structure. At the outset, however, he serves warning of the possibly unevaluated hazards of deceptive homeomorphy. He also recognizes the difficulty of establishing phylogenetic relations in the tabulate corals.

The chapter on post-Paleozoic "madreporarians" (hexacorals or scleractinians of other authors), by J. Alloiteau, evidently aims at complete generic coverage, unlike other parts of the volume. Presumably, it is based on a thesis presented by Alloiteau at the Sorbonne in 1952 (p. 682, item 1). Although still unpublished, the thesis may be assumed to be the source for the numerous new generic names cited as "Alloiteau, 1951." Some of these are based on new, undescribed, and unfigured species, also cited as "Alloiteau, 1951." Page 542 promises a later discussion of the modes of colony formation, but through some inadvertence that important subject is not again mentioned. In the systematic part terms are used without any explanation to describe modes of colony formation. Alloiteau's classification is a modification of that proposed by Vaughan and Wells in 1943. Three new suborders and many new families and subfamilies, some of which are of faulty orthography, are added. The classification is based primarily on the concept that the surface aspect of the septa reveals the trabecular structure.

Volume I closes with a chapter on bryozoa, by Emile Buge, that does not come up to the standard set for the other phyla. The classification is essentially an abbreviated version of Bassler's 1934 classification in *Fossilium Catalogus.* The general discussion of morphology is brief, and the relatively few genera in the systematic part are too briefly diagnosed. A closing résumé of the ecology of bryozoa and their association with other animals is informative and stimulating.

Aside from 42 pages on worms and wormlike animals, Volume II is taken up by the brachiopods and mollusks. Many paleontologists and zoologists would disagree with class rank for bryozoa, brachiopods, annelids, and other wormlike animals under a phylum Vermidians (*"embranchement des vermidiens"*).

The lengthy chapter on brachiopods is a tour de force, as it appears to be Jean Roger's first contribution to brachiopod literature. He leaned on Schuchert's and LeVene's 1929 comprehensive listing of genera and higher categories in *Fossilium Catalogus*

and on literature since 1940. Incomplete coverage of the literature of the 1930s results in omission of the results of some important monographs. The classification adopted is an unsatisfactory compromise between Cooper's 1944 avowedly nonphylogenetic pigeonhole arrangement, based on shell structure, and Beecher's classification as modified by Schuchert. Generic coverage is uneven. It is practically complete for the inarticulates and about 75 per cent complete for the articulates.

Colette Dechaseaux adopts a slight modification of Douvillé's 1912 classification of the lamellibranchs. Dall's 1895 classification, popularized in the Eastman-Zittel textbook and widely used in America, is barely mentioned in the historical summary of classifications. Generic coverage is poor in many of the families. The account of shell structure by Gabriel Lucas, dealing with a little-used taxonomic tool, and the systematic part covering the rudists, are certain to be widely read and used. The discussion of the morphology of rudists and the generic diagnoses are much better than for other lamellibranchs.

The chapter on gastropods, by Geneviève and Henri Termier, is not likely to be useful to a beginner or a specialist. The classification is fantastic.

Volume II closes with three chapters on the cephalopods that reach a high standard. The chapters on nautiloids and ammonoids, except the clymenids and goniatites (by Gaston Delépine), were written by Eliane Basse (Eliane de la Goublaye, Vicomtesse de Ménorval), and the chapter on dibranchs by Jean Roger. These chapters bring together better than anywhere else a useful summary of modern views. The classification of the nautiloids rests heavily on Flower and Kummel (1950), and the classification of the ammonoids on the views of Arkell, Spath, and C. W. Wright. The ammonoid arrangement represents a clean break with Douvillé's classification (unpublished, but distributed to his students at the Ecole des Mines), which has dominated French work since the turn of the century.

The textbooks and treatises on which several generations of students in Western Europe and America have grown up are badly outdated, leaving a vacuum that is being filled by Piveteau's *Traité*. The format of the *Traité* is good. With few exceptions, the line cuts and the halftone and collotype plates are satisfactory; in fact, many of the line cuts throughout the volumes and the halftones of rudists are superb. No enlargement, however, is shown for the illustrations of protists (other than foraminifera), and none of the illustrations for gastropods, nautiloids, and ammonoids has any indication of enlargement or reduction. Uneven treatment is to be expected with so many collaborators, as is the emphasis on Western European genera. The uneven treatment is well illustrated by the bibliographies. Some represent open doors to the essential literature, others are avowedly limited to recent contributions, and others are inadequate from any point of view. Some trivial items have been admitted in two bibliographies. All the bibliographies have one defect—there is no indication whether a publication consists of one page or of hundreds. The one real drawback, however, is that not many students will be able to afford these volumes.

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[1] I am indebted to the following paleontologists for advice: P. E. Cloud, Jr., (Paleozoic corals, brachiopods); H. M. Duncan (bryozoa); A. R. Loeblich, Jr., (foraminifera); J. B. Reeside, Jr. (cephalopods); J. W. Wells (sponges, coelenterates in general, and scleractinians in particular).

***Europe.*** 2nd ed. Samuel Van Valkenburg and Colbert C. Held. New York: Wiley; London: Chapman & Hall, 1952. 826 pp. Illus. $7.50.

This is a book on Europe which will not only serve as a textbook, but can be recommended to anyone interested in world problems. This is because the authors are conscious throughout of the many problems that beset the nations of Europe today. Some of these are basically geographic—arising from the location of Europe as a whole or of its individual countries, from natural endowment or climatic conditions. Other problems can be better understood if one knows the geographical setting in which they arise.

There is a certain emphasis on climatic influences and national heritage, an emphasis retained from the first edition and its coauthor, the late Ellsworth Huntington. Indeed, a few chapters on physical geography, and that on the march of civilization, have been preserved as a tribute to the memory of this original thinker. Nonetheless, others of Huntington's contributions have been omitted, such as the chapter on races. The discussion of ethnographic features was reduced sharply, although still retaining much of the original contribution. Thus the maps of cephalic index complexion and stature are still there, although the text which they illustrated is gone. Most of the chapters have been completely rewritten, however. No attempt has been made simply to bring obsolete chapters up to date. Europe of 1952 is no longer the Europe of 1935! Quite rightly the authors treat human geography as an ever-changing aspect of the earth's surface as much as they stress the lasting features of its physical nature.

An independent approach, unfettered by formal adherence to rules, is also shown by the way individual countries are treated. Each country is discussed according to its particular character, following an individual outline, and so a vivid treatment of each country is assured. On the other hand, the unity of Europe is never lost from sight. Possibly, it is easier for an observer from another continent to realize this essential unity than for a European to do so. Consistently, throughout the book, much stress is laid on the difference between the highly developed northwestern Europe A and the backward southern and eastern Europe C—a concept introduced by the French economist Delaisi. This division does not follow political boundaries. For example, Italy, with its northern

provinces, belongs to Europe A, southern Italy to Europe C, with a transitional Europe B zone in between.

The text is illustrated by numerous and, in the great majority, very good maps. Many are entirely new, others have been completely redrawn. The book is also illustrated with a relatively small number of beautiful photographs. However, their small number, one or two for each country (only Italy and the Netherlands rate three), raises a difficult problem. The authors apparently felt that the omission of photographs from the first edition was not satisfactory. On the other hand, the presentation of all or of the most important distinctive feature by photograph, as was done in such a fine way by maps, would necessitate an almost prohibitive price for the book. Therefrom, apparently, resulted a not quite satisfactory compromise of publishing only a few characteristic photographs. A good bibliography concludes this useful and well-written book.

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***Principles of Invertebrate Paleontology.*** 2nd ed. of *Invertebrate Paleontology.* Robert R. Shrock and William H. Twenhofel. New York–London: McGraw-Hill, 1953. 816 pp. Illus. $12.00.

***Invertebrate Fossils.*** Raymond C. Moore, Cecil G. Lalicker, and Alfred G. Fischer. New York–London: McGraw-Hill, 1952. 766 pp. Illus. $12.00.

Fourteen years have elapsed since an American textbook in invertebrate paleontology last appeared. They were years marked by continued expansion in petroleum exploration and consequent demand for trained paleontologists; years marked also by important systematic discoveries calling for revision of teaching materials.

These two books are similar in scope and plan. Both are aimed at the student-specialist, so we still lack an American book suitable for a student of more general interests. Both use a stereotyped approach, with each phylum or lesser group discussed in terms of the morphology of living representatives (if any), geological distribution, ecological significance, and classification. The differences between the two books are minor, but real. Shrock and Twenhofel's material seems to be consistently better integrated and more effectively presented for student use. Some of their chapters—e.g., those on the insects and the conodonts—are excellent, whereas those by Moore *et al.* are merely adequate.

In such books the quality of the illustrations is of great importance. Except for one page of halftones, which reproduced badly, Moore *et al.* have chosen to use bold ink drawings which, in some cases, especially in the section on echinoderms, are quite unattractive. In dealing with such forms as smooth brachiopods, ammonites, and ostracods, the problem of shading to suggest contour while still conveying the gross appearance of the fossil has not been solved. Shrock and Twenhofel use a variety of illustrative techniques. There are many photographs, generally very well reproduced; and where drawings are used, the line is thin enough to make a pleasing page. Bibliographies in both books are adequate, with Moore *et al.* showing a tendency to load the lists with relatively trivial American titles and to omit important European studies, which Shrock and Twenhofel include. It is odd, for instance, to see such detailed work as Moore's echinoderms with no mention at all of Whitehouse's basic research on the Haplozoa.

After studying these books carefully and trying parts of them on students, I feel that, although each is better than any previous American text, Shrock and Twenhofel is definitely to be preferred for both teaching and reference.

I confess to ignorance of economics, but the reasoning that led McGraw-Hill to bring out these two books in a specialized field in rapid succession baffles me. I am sure the combined sale of the two will be approximately what either of them would have enjoyed by itself. How large that sale will be I do not know, for I feel that, even in these days, $12.00 is too much to ask a student to pay for a single textbook. McGraw-Hill seem to agree, for I understand that they plan to keep in print the earlier Twenhofel and Shrock *Invertebrate Paleontology,* which is still a good book that is half the size and sells at half the price of the new ones.

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***Advances in Geophysics,*** Vol. 1. H. E. Landsberg, Ed. New York: Academic Press, 1952. 362 pp. Illus. $7.80.

When the term "geophysics" was mentioned a few years ago the listener might picture a few hardy "doodlebuggers" stretching wires over the countryside, attaching instruments, and then drilling shot holes in which a charge of dynamite might be exploded. Turkey growers might claim that the explosion ruined their hatching eggs, but the petroleum geologist knew it would demonstrate the best location to drill for oil. Those better informed might also have included students of earthquakes in the school of geophysicists, but geophysics went no further in the eyes of most.

The science of geophysics is the application of physical principles and measurements to a study of the earth, and this includes all branches of physics to all parts of the earth. When the reader learns that the present book does not even list "earthquakes," "seismograph," or "petroleum" in its index, he realizes that the branches of geophysics must be many.

Dr. Landsberg has made no small contribution to the scientist's library by assembling these papers. The articles, eight in all, include such subjects as higher atmospheres, shoreline hydrography, gravity, aeromagnetics, and the processing and statistical studies

of geophysical data. The articles have been clearly presented, and in most cases a table of symbols and a bibliography are given. The figures employed are clear and well reproduced, although one might desire more illustrations of equipment. The appearance of the book is pleasing, and the choice of type and the general make-up are well done.

The first paper, on the "Automatic Processing of Geophysical Data," might not seem important to some, but in research bureaus where a mass of data is being accumulated each day a process of this sort is necessary. The methods employed by geophysical departments of the various petroleum companies could have been included here. The article on statistical methods is also important. Although these techniques are being used more generally in the field of geophysics, they should be employed with care. As the literature has shown in the past, too many untrained statisticians have brought forth weird theories by the improper use of accurate data.

The studies on the atmosphere and estuarine hydrography are clear and comprehensive. Dr. Woollard's paper on gravity is excellent, both for interest and for coverage, as is Balsley's article on aeromagnetics.

To the expert or advanced student the book provides little that is new in that person's respective field. The papers are too brief to contain the fine points specialists would be seeking. The book has fulfilled the end of explaining some of the branches of geophysics to the uninitiated, however, and Dr. Landsberg is to be commended for this. It is hoped that future volumes will prove as helpful.

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***Volumetric and Phase Behavior of Oil Field Hydrocarbon Systems.*** M. B. Standing. New York: Reinhold, 1952. 123 pp. Illus. $10.00.

This book will be a welcome addition to the tools available to the petroleum engineer, the scientist, and the field man associated with measuring and interpreting the behavior of oil field hydrocarbon systems. Available but widely scattered data have been compiled with an appreciable amount of original material into a working manual for reservoir hydrocarbon calculations. The book is liberally interspersed with usable graphs and many sample calculations in sufficient detail for any good student to follow with ease. It should be particularly helpful in training laboratory technicians, and the chapter on "Sampling Methods and Apparatus" can be profitably read by many a field engineer.

Oil field hydrocarbon systems are treated in three classes: gases, condensate systems, and dissolved gas systems, with supporting chapters on general phase behavior of hydrocarbons, sampling methods, and reservoir material-balance calculations. This latter chapter will be valuable to the newcomer for its clear discussion and examples of the use of laboratory PVT data in reservoir calculations based on the Schilthuis equation and others. Three valuable charts, in a pocket on the inside back cover, enable approximation of formation volumes of both condensate and dissolved gas systems, and bubble-point pressures of the latter, from readily available field data such as gas-oil ratio, gas and tank oil gravities, and reservoir temperatures and pressures. These empirical correlation charts will save the practicing reservoir engineer much time in approximating and checking calculations on the physical properties of reservoir fluids.

The book is not for the advanced scientist looking for extensions and innovations of theoretical treatment. It does, however, do an excellent job of definition and explanation of the necessary terminology and theory for the working calculations. The book is aimed at the practicing reservoir engineer and technician and will be greatly appreciated by them.

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## Psychology

***Psychoanalysis as Science.*** Ernest R. Hilgard, Lawrence S. Kubie, and E. Pumpian-Mindlin. Stanford, Calif.: Stanford Univ. Press; London: Geoffrey Cumberlege, Oxford Univ. Press, 1952. 174 pp. $4.25.

This volume presents the Hixon Lectures on "The Scientific Status of Psychoanalysis," delivered at the California Institute of Technology. The contents concern the frequent question of whether the discipline of psychoanalysis is a science, and how its methods, theories, and findings may be subjected to scientific investigation and validation.

Dr. Hilgard, chairman of the Department of Psychology at Stanford, opens the series with a discussion of "Experimental Approaches to Psychoanalysis." He presents a thoughtful selection of the extensive experimental work done on psychodynamics with animals, children, and adults. The evidence tends to confirm certain psychoanalytic concepts and theories. As Hilgard carefully points out, however, to show that theoretical relationships proposed by psychoanalysts are plausible does not solve the problem of how the relationships are caused, or prove that the analytic method is scientific. Experimental studies of psychotherapy of human neurosis and of artificially induced neurosis in humans and animals show satisfactory correspondence with the predictions of psychoanalytic theory. Although these touch only the more superficial problems posed by psychoanalysis, they indicate the way toward more profound critical studies.

"The Position of Psychoanalysis in Relation to the Biological and Social Sciences" is the final lecture, given by Pumpian-Mindlin, chief of the Mental Hygiene Clinic in the Los Angeles Veterans Administra-