the way toward exciting fields of research.

The complexity of the book itself should warn prospective earth scientists that those who wish to make real advances in the field will require not only the common sense, keen powers of observation, lively imagination, and strong backs of the traditional geologist but a thorough grounding in mathematics, physics, and chemistry as well.

An earlier work by Garrels, *Mineral Equilibria*, forms the core of the present work, which, because of revision and the addition of new material, is about twice the size of the earlier book and is considerably more than twice as valuable.

In addition to the revised discussion of mineral-solution equilibria at 25°C and atmospheric pressure, a chapter on the effect of temperature and pressure variations on these equilibria has been added to broaden the scope of the book. A much expanded discussion of solution chemistry includes such unique material as the role of complex ions in natural waters, surface chemistry, and the use of ion sensitive electrodes for ion activity measurements. Much of this work is based on research by Garrels and his co-workers.

The introductory chapters on the fundamental laws of solution chemistry and the problems at the end of each chapter have been added to make the book more useful as a textbook. The material remains very specialized and is too advanced for the average student who does not have previous training in physical chemistry. Few graduate geology departments could afford the luxury of a course for which this book would be useful as a primary text. The book has little continuity and is arranged more like a symposium volume than a unified work. This is no drawback to its use as a superior reference book.

The individual chapters are very well written, even engagingly so, and include historical notes and complete bibliography. The many illustrations and problems deal with geologic systems and are likely to be more interesting, even to the nongeologist, than the examples used in most textbooks on the subject. The careful editing and high quality of the book are typical of those published in the Harper Geoscience Series.

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Human Genetics

To inform and to recruit are presumably the aims of every textbook. Most manage to serve the former end with greater or lesser competence, but recruitment is quite another matter. Success in this instance is directly proportional to the intellectual excitement the author succeeds in instilling in the reader. Some authors capture the excitement of their sciences; others do not. Maurice Whittinghill has not. Wherein he has failed is not immediately obvious, but one is eminently aware that his book, **Human Genetics and Its Foundations** (Reinhold, New York, 1965. 447 pp., $8.95), is not as entertaining to read as Curt Stern's *The Principles of Human Genetics*, for example, nor does one sense that element of expertness which typifies Knudson's *Genetics and Disease*. These observations notwithstanding, Whittinghill's *Human Genetics and Its Foundations* will undoubtedly find a niche amidst the growing array of useful textbooks in human genetics. It is not, however, a book for the specialist or even the serious student of human heredity. It is more an effort to teach the basic principles of genetics, using illustrations drawn from man, and the general approach might be characterized as "classical."

Whittinghill elects to develop his subject under four headings: Monohybrid Genic Segregation; Regular Chromosomal Behavior; Biological Interactions; and Mutation and Evolution. The nature of the treatment of these major topics is adumbrated by enumerating the chapters in the section Biological Interactions, where one finds chapters entitled "Biochemical pathways from the genes," "Sex influences upon phenotypic differences," "Reduced penetrance and varied expressivity," "Marker genes and disease risks," "Prenatal interactions," and, finally, "Heredity, environment, and phenotype." The material subsumed under each of these chapters, as well as that in the other sections, is, in general, adequately presented and largely error-free. There are, however, certain aspects of the presentation which do not please me. There is, for example, a preoccupation with diagrams that sometimes serve to confuse rather than enlighten. The MN-locus is constantly referred to as the Landsteiner locus—a convention which can hardly be called universal. Moreover, might not the ABO, P, and Rh loci equally well be designated as "the Landsteiner locus"? At a time when the content of human genetics beggars easy comprehension, it is patently unfair to the student to clutter his mind with "regionalisms." Finally, Whittinghill's language occasionally borders on the picaresque, as witness the following remark—"Among the census records of 5,000,000 births there *lurks* a slight influence of the age of the father on the sex ratio of offspring." But, there are a goodly number of fine features associated with the book which warrant mention. For example, the reader is supplied with a large number of problems of graded complexity, and he is directed to a generally well-selected and representative cross-section of the literature, particularly that of the last decade. And clearly, Whittinghill has made a concerted effort to make the book timely.

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The Sugawara Volume

Professor Ken Sugawara, to whom the volume **Recent Researches in the Fields of Hydrosphere, Atmosphere, and Nuclear Geochemistry** (Maruzen, Tokyo, Japan, 1965. vi + 404 pp.) is dedicated on the occasion of his 65th birthday, is a Japanese chemist who has worked extensively in the fields of limnology, oceanography, atmospheric chemistry, and geochemistry, and who has devoted a good deal of his time to international organizations concerned with these disciplines. The editors, Yasuo Miyake and Tadashiro Koyama, and the committee that planned the volume have therefore presumably invited contributions in all these fields, so the range of topics covered is broad.

Among the 25 articles, six deal with limnological subjects. These include two articles on the preservation of chlorophyll derivatives in sediments; one article is by Gorham and Sanger, the other by Belcher and Fogg. The latter is especially significant in that it describes a method for deducing the previous trophic state of lakes from the "chlorophyll"/epiphasic carotenoid ratio of their sediment extracts. It would be worthwhile to test this procedure on lakes of known recent eutrophication. Of the two articles on photosynthesis, one by Saijo and Saka-

moto and one by Ichimura and Aruga, the latter is interesting in its description of algal adaptation to light and temperature, and of the lack of light inhibition in sessile algae and algal blooms. Koyama presents a fairly lengthy study of the mechanism of methane production in paddy and lake soils, and Tanaka briefly discusses manganese in lake waters.

Papers dealing with oceanography include Sugiura's on oxygen and phosphate relationships of the Kuroshio current, Uda's on oxygen distribution in the Pacific, and a rather inappropriate one by Rakestraw on silicate and oxygen—inappropriate in this volume because 10 of its 13 pages are tables. All three authors give their oxygen results in terms of milliliters per liter, a mode of expression that I find peculiarly unsuitable. Two papers on methods, one by Smith and Hood on *p*H measurement and one by Richards and Kletsch, will be useful, although the title of the latter, "The spectrophotometric determination of ammonia and labile amino compounds in fresh and sea water by oxidation to nitrite," reveals its weakness. The method is sensitive but too all-embracing and would be dangerous for use in waters rich in dissolved organics.

Papers by Kitano on factors influencing the formation of low magnesium calcite, high magnesium calcite, and aragonite and by Lowenstam on the strontium and magnesium contents of coexisting calcites and aragonites show how this sort of problem can be approached experimentally and observationally. Kitano finds the peculiar fact that, whereas glycine inhibits calcite formation, glycylglycine stimulates it. Would that he had investigated glyglygly.

Zobell contributes a good review of hydrostatic pressure as a factor affecting the activities of marine microbes and also provides appropriate words of introduction regarding Professor Sugawara. Finally, Warren Wooster's bland article on international oceanography completes the oceanographic picture. A quick calculation based on his estimate of the number of oceanographers shows them to be a rare breed—one in a million—but this should surprise few oceanographers.

The atmospheric portion of the title derives from two papers: a seven-page one in which Iwasaki and six (!) other authors describe what seem to be almost indefinable variations of chemical composition in rainfalls and one by Kuroda on xenon isotopes of the atmosphere.

Contributions on nuclear geochemistry include, among others, that of Kuroda (mentioned above), a carefully reasoned approach by Ingerson and Pearson to the problems arising from use of carbon-14 to estimate the age of groundwaters, and a study of the behavior of strontium-90 (Sr^{90}) in Lake Haruna (Japan) by Hanya and others. Hanya and his associates conclude that Sr^{90} must reach the lake only by direct precipitation onto its surface, as runoff is depleted in the isotope. They find the ratio Sr^{90}/stable Sr in aquatic plants and animals mirrors that of the water and conclude that no Sr^{90} is being deposited on the lake bottom. Because this last conclusion is based on one sediment sample that was probably mixed with prefallout material, it is not particularly convincing. Two papers, by Miyake and others and by Torii and others, deal with the distribution of uranium, radium, thorium, and the like in the sea; two are concerned with the isotopic composition of lead in sediments (Chow and Tatsumoto) and lavas (Patterson). A neat paper by Goldberg and others compares ages determined on a Caribbean core with the ionium/thorium and the ionium/proactinium methods and concludes that if the ionium/thorium result is based on hydrochloric acid–leached material the results are comparable.

The contribution by Hodgson and others, which does not fit any of the three categories, is simply a speculation about the likelihood of three major mechanisms for oil field formation.

The range of subjects covered in this volume makes sense only in the light of Sugawara's interests and work. On any other basis the range is too broad and the treatment too shallow for the volume to be really useful. Because this ailment seems to afflict a great many books these days, it might be worth considering the alternative of limiting the contributions to *Zeitschrifts* and similar honorary volumes to a small number of articles, preferably reviews such as Zobell's in this volume. After all, the honor bestowed on the recipient lies as much in quality as in quantity. I suspect that most copies of this volume will turn up in institutional libraries rather than in private collections.

With regard to the mechanical details of this volume, the arrangement of the articles, which at first seems to be random, turns out to be on the basis of the date on which the manuscript was received! The volume, or should I say the reader, suffers from careless editing, with virtually every article having its complement of typographical errors—in one case five errors in fourteen lines. The structure of some sentences in the introduction and in several of the essays is rather unusual; this is understandable but not entirely excusable.

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Botany

In the introduction to **Native Wild Plants of Northeastern United States and Eastern Canada** (Warne, New York, 1965. 231 pp., $3.95) the author, F. H. Montgomery, states that "over 4600 species of plants occur within the area covered by this guide." Herein is the dilemma that faces any author of a popular work on plants—what to include and what to leave out? Montgomery has made a selection of some 400 species, all intended to be indigenous and most of them herbaceous. He has omitted species in a number of common families, including grasses and sedges, and included but one representative in each of several others. For a more adequate coverage of common wild plants, the companion volume *Weeds* (also by Montgomery) must be used.

The author points out in his preface that the book is intended to be intermediate between the usual type of popular handbook and the advanced type of text. The introduction deals briefly with such matters as habitats, distribution, and plant naming and is followed by a 15-page key. Extended use of the key must precede any attempt at sound criticism, but the stressing of vegetative characters does not, in my opinion, eliminate pitfalls, even in the early steps of using.

The text follows essentially the sequence of families and genera in *Gray's Manual.* Brief descriptions are given and complex terminology avoided when possible. Perhaps of greatest value are the 298 line drawings which conveniently are placed very near the descriptions. In many instances, for example *Dentaria diphylla* and