

Plant Evolution and Diversity

Six specialists, Robert F. Scagel, Glenn E. Rouse, Jane R. Stein, Robert J. Bandoni, W. B. Schofield, and T. M. C. Taylor, from the University of British Columbia, cooperated to bring together in this book, **An Evolutionary Survey of the Plant Kingdom** (Wadsworth, Belmont, Calif., 1965. 670 pp., \$11.50), modern thinking about plant diversity, by using information from various research fronts. The mycologist of the group was responsible for bacteria, slime molds, and fungi; the two phycologists for algae; the bryologist for lichens and bryophytes; the paleobotanist for pteridophytes and fossils; and the higher-plant taxonomist for the angiosperms. The book, which grew out of their 1-year course on the plant kingdom, is nicely coordinated; the terminology used in the parts is consistent, where possible, and in general the continuity is smooth. The liberal integration of recent work from physiology, cytogenetics, and electron microscopy is especially commendable. For only one person to write a book such as this today in the face of so much recent work, to say nothing of the special knowledge required in each division, would be a formidable task.

A two-column, easy-to-read format is used, and most of the illustrations, which include photographs and salient line drawings, are very good. A well-chosen glossary is provided; and the references selected for the bibliographies not only pertain to the chapters, but will lead the pupil to stimulating new approaches and experiences.

A student (or a professor, for that matter) who really knew and could handle all of the ideas and information given here would be an excellent botanist indeed. In contrast to what I take to be the recent vogue of "watering down" the factual basis of our knowledge of plant diversity, a text as complete as this one calls attention to the true complexity of the world of plants, and to the enormous information-content needed to comprehend plants. A merely generalized knowledge of "cell biology" or "plant physiology" (as these terms are usually used) can give only a remote shadow of what plants—as plants—are really like and of what they really do. The same may be said of the simplistic "plant morphology," of the typologist.

No specialist, of course, is likely to find his own specialty as well treated

in this book as are the other subjects. As a vascular plant student, I might have preferred to see more on the angiosperms, which were awarded only 60 pages (compare the algae, with 155 pages). Also, there are unquestionably many specialistic details that will need to be modified in future revisions as the book receives more and more use.

The sizeable volume will probably be chosen by, and for, numerous college students at the upper-division and graduate level, who today seem to be looking more to their texts as references and relying on their lecturers for delimiting the choice of subject and viewpoint. The book will serve as a student's textbook, its avowed function, but it may also be selected by professional biologists as a convenient work to have in their personal research libraries.

The unifying concept in the presentation was evolution, as opposed to the so-called "typological" or "type method" approach. As we study this book, the fact becomes manifest that we really know little about the broad phylogeny of plants, partly because of their abominable fossil record, and partly because of our disagreements about homologies. Some students may be disappointed by this; but others, on the contrary, will find these very problems intellectually stimulating.

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Earth Sciences

A. O. Woodford's **Historical Geology** (Freeman, San Francisco, 1965. 522 pp., \$9.50) is an unusual book. It will be challenging to students who use it and can be read profitably by any geologist. Instead of giving the entire history of the earth the once-over lightly, Woodford chose episodes to focus on fundamental concepts in historical geology and on the evolution of life. The book has no professional or provincial bias. Those who are not familiar with the author's background will not realize that he is primarily a petrologist and that his training and practically all of his professional career have been in California.

The first eight chapters furnish a background for the remaining eight which deal with sequential episodes. Woodford has always been interested

in the history of the development of geology, and that interest is shown in chapters 1 and 3. Chapter 3 traces the building up of a geologic column in England and Wales. Many parts of that column have become standards for the rest of the world. Chapter 2 deals with ancient life and chapter 4 with stratigraphic assemblages. The contrast between eugeosyncline, miogeosyncline, and platform are effectively brought out in chapters 5 and 6, "The Grand Canyon platform and the Cordilleran geosyncline," and "Platform and geosyncline in east-central North America," respectively. Much of chapter 7 ("Correlation by fossils") is drawn from Woodford's essay, under the same title, published in *The Fabric of Geology* (1963). Evolutionary sequences and stratigraphic gaps (Woodford prefers the more sophisticated term lacunae) are illustrated by Brinkmann's elegant statistical analysis of some 3000 specimens of the Jurassic ammonite genus *Kosmoceras* collected from a 42-foot sequence of Oxford Clay. The chapter includes an extended discussion of the Jurassic zones and stages of western Europe and their recognition elsewhere. Chapter 8 is an up-to-date account of radiometric ages, a much better term than the misleading absolute ages. It is concluded that at the present time in most cases (a weasel phrase, to adopt a light touch, on p. 180) correlations based on fossils seem (another weasel) to be safer guides than correlations based on radiometric ages.

The sequential episodes begin with the Precambrian, with special emphasis on the Canadian Shield and South Africa. Three "systems" (author's quote), each comparable to all the Mesozoic systems or even all the Paleozoic systems, based on stratigraphic relations and radiometric ages, are recognized and named in the Lake Superior region. It is suggested that at least six, possibly seven or eight, "systems" are represented in South Africa, which may eventually furnish the best world standards. Then follow successively the Cambrian and its trilobites, the evolution of the four classes of fishes from Ordovician through Devonian and the Old Red Sandstone as the nonmarine Devonian standard, the rise of Silurian and later Paleozoic land floras, and Gondwanaland and its overtones of paleomagnetism and continental drift. The one Mesozoic episode is appropriately titled "The reptilian heyday." "The age of mammals" and "The Pleistocene," the concluding chapters, are fol-