

the importance of soil organic materials in controlling plant growth.

Chapters 5 and 6, dealing with humus formation and the distribution of organic matter in the main soil types of the Soviet Union, together with Chapter 7, which is concerned with the changes in soil organic matter under different soil management regimes, will be a very considerable help to pedologists as distinct from soil chemists. A summary of the various methods used for investigating soil organic matter will be found helpful particularly to workers beginning a study of problems of soil organic matter. The final part of the book has a short survey of the main soil types in the Soviet Union prepared by N. N. Rozov which, although containing little new, is of considerable help to readers unfamiliar with the major Russian soils.

The task of preparing a translation of any work is always made difficult by the need to compromise between the exact translation of the original and the desire to render it in a naturally flowing form in the new language without obscuring the meaning. There are a number of occasions on which the translators have not achieved the latter as, for example, in the use of aromatic "rings" and "nets" when writing of the structure of humic materials. Although the general presentation of the volume is good, there is a surprising group of misprints and imperfections in the type in Chapter 2; on page seventy-one, for instance, there are three errors within ten lines. These are, however, small matters and soil scientists will all be grateful to have a revised "Kononova" in English.

ALAN BURGESS

LOWER PLANTS IN AMERICA

The Hepaticae and Anthocerotae of North America East of the Hundredth Meridian. Vol. 1. By Rudolf M. Schuster. Pp. xvii+802. (New York and London: Columbia University Press, 1966.) 144s.

THIS is a scholarly and admirable work. It is perhaps pertinent that it starts with a quotation from Richard Spruce the study of whose work would often reward present hepatic systematists. Professor Schuster is conversant with Spruce's and others' work as is shown in the 100 page bibliography.

This is the first volume of a projected three volume work which will include all of the approximate 450 species of liverworts known in North America, Greenland and the Arctic Archipelago east of the hundredth meridian. The author states that he has attempted to make the text sufficiently elementary for non-professional botanists, and sufficiently comprehensive for specialists. He has probably succeeded, but he is obviously unaware of the zeal of amateur bryologists.

The book is divided into general, and specialized morphological and taxonomic sections. Throughout Schuster summarizes his predecessors' work skilfully, discusses theories concisely, and gives numerous original observations and views. The general section, though crammed with information on every aspect of hepaticology, is chaotically organized. Thus, if we want information on the origins and evolution of the class Hepaticae we find it in Chapters 2 (relationships and ancestors), 3 (possible ancestral types and origins), 5 (their age, origin and fossil history), and in the specialized section (phylogeny of the sub-class Jungermanniae). These references are widely separated by subjects such as dispersal mechanisms, nuclear cytology and genetics, and culturing techniques. Chapter 4 is a jumble of unrelated topics such as evolutionary peculiarities, species concepts, culture, collection, literature and nomenclature.

Schuster divides the Hepaticae into two sub-classes, Jungermanniae and Marchantiae; the former starts the specialized taxonomic section. Keys to all levels of taxa are abundant and normally well constructed, but in a key

to genera without asexual reproduction gemma characters are frequently used. Six genera are described—*Haplo-mitrium*, *Herberta*, *Lophochaete*, *Blepharostoma*, *Ptilidium* and *Trichocolea*—so, but for the nomenclatural confusion surrounding *Herberta*, there is nothing potentially controversial. Each species is given full and carefully prepared treatment consisting of an original description (with diagnostic features italicized), notes on distribution and ecology based on personal study over several years, and on differentiation and variation. The volume is illustrated with over eighty plates of superb drawings mostly by the author.

The index is poor and inclusion of a subject therein seems to have been arbitrary. I recommend this work highly, but hope very much for a complete index in the final volume.

A. R. PERRY

SOURCES OF BIOLOGY

Biological Science

By William T. Keeton. Pp. xiii+955. (New York: W. W. Norton and Company, Inc., 1967.) \$9.50

Development in Flowering Plants

By John G. Torrey. (Current Concepts in Biology.) Pp. viii+184. (New York: The Macmillan Company; London: Collier-Macmillan, Ltd., 1967.) 21s.

APART from appealing to lethargic tendencies in their readers, who are not inclined to consult more than one source for their information, there seems to be little in favour of single volumes which purport to deal with the whole of biology. Students, for whom these books are usually intended, can usually find more comprehensive treatments of ecology, physiology, embryology and so on in volumes devoted to these topics. Better still, they can go to original papers, which are not usually beyond their comprehension in the biological sciences—this does not necessarily apply to the physical sciences where there seems to be many more papers which are too high powered for the undergraduate mind. The polemics which tend to abound in biological literature can be found in the raw here, and the various arguments can be judged on their individual merits. This seems to be preferable to spoon-feeding by the authors of multifarious volumes. Thus, Keeton's *Biological Science*, as its name implies, starts out at a disadvantage.

In the four parts; the chemical and cellular basis of life—the physical and chemical background; the biology of organisms; the perpetuation of life—reproduction; the biology of populations and communities, and the origin and diversity of life, the author has arranged his material sensibly. Each topic is treated in sufficient detail to make this a useful book in a school library, as a supplement to the text-books. But it can hardly be more of a success, because nobody is likely to read it right through; such a large volume can only function as an encyclopaedia.

Torrey's *Development in Flowering Plants* is, in contrast, a small volume and concerns a small aspect within the scope of biological science. It is obviously difficult to write a small book when there is as much experimental evidence and hypothesis as in the case of plant development. The author has, however, succeeded in collecting together much of what is perhaps the more significant information into a useful introduction to the subject. The coverage is comprehensive; it includes all aspects of development and differentiation, stressing the causal aspect, from seed to fruit, with abscission and senescence receiving brief mention too. The treatment of each topic is insufficient for the student, and he must go to other sources to collect much of his information. This book, however, may well help him to put this information into perspective, and if there should be any non-specialists interested in plant development it will serve as a painless introduction for them.

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