

started bravely with Part 1, the Angiosperms, in a single volume of text and illustrations in 1952. Gymnosperms, Pteridophytes and Bryophytes (Part 2)—the illustrations only—followed in 1957. The present Part 3 is the text to the Gymnosperms and Bryophytes—the text for the Pteridophytes is still to come. This seemingly rather confused situation simply reflects the dilemma of the integrator in a field where research is outpacing the integration: Prof. Erdtman has elected “for various reasons” to postpone a description of Pteridophyte spores to a later volume.

But the present work is much more than merely a text to a volume of illustrations. It carries an additional twenty-four plates, and numerous half-tone illustrations in the text. These are of the usual excellent quality which has become the hallmark of Erdtman and his students at Solna. They include ordinary-light micrographs of acetolysed spores in distilled water; electron micrographs of shadowed replicas, to show exine topography; and thin sections of exine taken with phase contrast and ultraviolet. The refinement of technique in illustration since Volume 1 is a tribute to the painstaking application to the problems of spore illustration made by Prof. Erdtman and his students.

The body of the work is a description in catalogue form of spore and pollen morphology with the original figures of Volume 2 greatly augmented by new photographs. In every genus there are detailed references to the specimens examined and to the relevant literature. Occasionally, one regrets that Prof. Erdtman's enthusiasm for a logical and consistent terminology has taken us far from terms already well entrenched in 1957. Under his ‘N.P.C.’ system the monolet proximal aperture of a moss spore now falls into the same ‘character’ category as the (distal) colpus of, say, a cycad. As a result, some may be sorry to see the proximal aperture of *Splachnum* (katalept) referred to as a ‘colpus’ (with or without inverted commas!)—the same term being applied to the distal ‘furrow’ of cycad pollen.

There are two areas which show up in the book as being particularly in need of further work. First, our knowledge of the megaspore membrane within the seed of the gymnosperms and its structure and homologies with the microspore exine is sparse. (The megaspores occupy four pages, the pollen seventy.) Secondly, there is still lack of knowledge of orientation with respect to the tetrad in some pollen and spore types; even in such a large and well-studied genus as *Ephedra*, for example, there is controversy as to whether the elongated axis is polar or equatorial. Since any comparative pollen morphology must be based on the basic orientation of the spore, this is a feature of fundamental significance.

This work is a valuable contribution to the various fields of botany through which palynology ramifies—Quaternary palaeobotany, gymnosperm and bryophyte systematics and the more refined study of cell wall formation in general. There can be no greater praise of the book than to say that Prof. Erdtman has maintained the high standard of illustration, meticulous observation and description that he set in his own earlier work.

W. G. CHALONER

THE SIPHONOPHORA

A Synopsis of the Siphonophora

By A. K. Totton, assisted by H. E. Bargmann. Pp. vii + 230 + 40 plates. (London: British Museum (Natural History), 1965.) 220s.

SOME animal groups are easier to describe and classify than others, especially when creatures have hard skeletal characters. The softer-bodied animals have, however, given great trouble and, among these, the planktonic siphonophores are extreme examples. Not only are they liable to crumple and distort on preservation, but

they consist of polymorphic colonies carrying floats, swimming organs, stomachs, stinging tentacles, sexual and asexual bells. Any one of these parts is liable to break off and a preserved collection may consist of fragments belonging to a number of different species. It is no wonder that the early systematists got into a muddle and different parts were assigned to wrong parent species. Even to-day many species are known only from fragments and the complete animals still remain to be described. But their beauty and strangeness have attracted the most famous zoologists, among the first to write large works on them being T. H. Huxley and Ernst Haeckel. In more modern times, however, the leader in the field was undoubtedly Henry B. Bigelow, who produced a classical work in 1911 based on the fine collections of the *Albatross*, to be followed by a number of subsequent reports.

Now we have before us *A Synopsis of the Siphonophora*. The author is A. K. Totton, whose first published work on siphonophores was in 1932 when he reported on the collections of the Great Barrier Reef Expedition. Totton, who was on the staff of the British Museum (Natural History), has had the unrivalled collections of the *Discovery* investigations at his disposal, but he has never been content to examine preserved material and, as a true naturalist, has spent much time in the field studying the living animal and its development, more especially at Villefranche, where upwelling at times brings rare species to the surface.

A quick perusal of his synopsis shows at once the leading position that Totton himself has earned in the study of this difficult group. He states that about one hundred and thirty certain species are now known. A check on the identity of these species shows that twenty-five can be attributed to Totton, who has thus named more than twice as many species as any other author, Bigelow coming second with eleven. Out of one hundred and fifty-three text-figures, some one hundred and twenty are Totton's own drawings, and of the forty plates twelve include original photographs by him.

The synopsis is not a comprehensive monograph. It lacks much information on general biology, on histology and geographical distribution, as Totton himself admits. Some of the species descriptions are indeed also somewhat cursory, and full synonymy lists are not given under the species. Synonyms should also have been included in the index. The possibilities of writing full-scale monographs such as A. G. Mayer's *The Medusae of the World* are growing less. It is all a matter of time. It is only those who have given many years to a study of a group who are competent to undertake the task and the coverage of the literature grows ever more time-consuming.

It is, however, becoming very essential that those with the knowledge should gather it together and make it available for those who follow. It is certain that in some groups, in which there is confusion in synonymy and of which the specific descriptions are scattered through a wide range of publications, young workers are deterred from entering the field. The publication of a comprehensive work always seems to produce a quick response of new workers.

The phylogeny of the siphonophores has always intrigued zoologists, and among these Walter Garstang was pre-eminent. In his introductory pages, Totton has given an informative review of the work and ideas of the most prominent investigators of the past. Included on the title page is the name of Dr. Helene E. Bargmann, the value of whose assistance can well be appreciated in putting together a work of this nature. Among the many attractions of the *Synopsis* are the reproduction in the plates of so many of the illustrations of the earlier naturalists and the amusing frontispiece.

The whole volume is splendidly produced and should long remain a standard work and an encouragement for the recruitment of future investigators. F. S. RUSSELL