

for the Xanthophyceæ (Heterokontæ) and, to a less extent, for the Chrysophyceæ and Dinophyceæ permit a further development of this view. At the same time, more flagellate types have proved to show obvious relationships with these diverse lines of development and, as a result, the Flagellata (in the old sense of the term) have almost disappeared as an independent group. Most of the forms now fall naturally into the different algal groups.

Further, the great extension of cytological work now permits a general view of cytological problems in the algæ; while, in the light of this work, the problems relating to alternation of generations can be adequately reviewed in the forms of more lowly organisation. Although Prof. Fritsch disclaims any attempt to deal fully with the physiology and ecology of the algæ, it will be found that the sections dealing with these topics, though brief, are both full and suggestive. Moreover, because the different main groups of algæ produce parallel growth forms and very similar structures, the distinctions between these main groups are primarily and largely physiological. The nature

of the pigments present, the chemical structure of the wall and of the food reserves thus become of fundamental importance and are necessarily treated in detail. At the same time, this peculiar feature of the algæ makes it very difficult to relate fossil forms with any certainty to any of the groups now living, and Prof. Fritsch rightly stresses the need for caution in dealing with interpretations which have been advanced.

This critical and well-balanced attitude is, indeed, one of the outstanding features of the book. A second feature which will strike the reader is its thoroughness. Perhaps this will be only fully apparent to those who have some claim to specialised knowledge of the algæ. To these, the exhaustive lists of references will be a joy, and, it may be said, probably a revelation. Although the book will certainly prove extremely valuable and will be generally welcomed as a textbook of the best type, it is much more than this. One may venture to predict that as a statement of principles and as a source of information, it must long remain the standard work on the subject.

W. H. P.

Short Notices

- (1) *Handbuch der Experimentalphysik*. Herausgegeben von W. Wien und F. Harms. Unter Mitarbeit von H. Lenz. Band 17, Teil 2: *Technische Akustik*, Teil 1. Pp. xv+538. 44 gold marks. Band 17, Teil 3: *Technische Akustik*, Teil 2. Herausgegeben von E. Waetzmann. Pp. xi+434. 36 gold marks. (Leipzig: Akademische Verlagsgesellschaft m.b.H., 1933, 1934.)
- (2) *The Voice: its Production and Reproduction; a Treatise on Voice Training, Production and Reproduction*. By Douglas Stanley and J. P. Maxfield. Pp. xii+287. (New York: Pitman Publishing Corporation; London: Sir Isaac Pitman and Sons, Ltd., 1933.) 10s. 6d. net.
- (3) *Acoustique*. Par Prof. Adrien Foch. (Collection Armand Colin: Section de physique, No. 166.) Pp. 210. (Paris: Armand Colin, 1934.) 10.50 francs.

(1) THE first two volumes under notice, written by nearly twenty experts and forming a comprehensive survey of present-day knowledge of all applications of acoustics, show how acoustics has become largely a branch of electricity. In most experimental acoustical researches now, the pressure fluctuations of the sounds are first converted into electrical fluctuations by such devices as the microphone and the indispensable thermionic valve, and are then studied as purely electrical fluctuations. The general methods used are described in a 150-page section on methods of measurement which follows a theoretical section on the basic ideas used in technical acoustics. Greater detail is to be found in the sections on the micro-

phone, telephone and loud speaker. The propagation of sound in free space covers such applications as echo-sounding. Propagation over longer distances is treated in the sections on broadcasting and long-distance telephony. Speech and hearing are treated in a section on medical acoustics. Musical instruments, broadcasting, sound recording and reproduction magnetically, by gramophone records and sound films, noise prevention and shock absorption all receive detailed treatment.

(2) The second work, dealing with voice, is a more advanced treatment than the earlier volume published as "The Science of Voice" (1929). For the new work the co-operation of J. P. Maxfield, known in Great Britain as joint author of the first serious treatment of gramophone acoustics, secures the accuracy of the physical treatment. Maxfield's brief, but very clear, outline of methods used in sound measurement is well illustrated, and is followed by Stanley's treatment of voice-production, covering all aspects of vocal technique. The whole book is a serious contribution to a subject still full of unsolved problems. An excellent index is provided.

(3) Prof. Foch's little volume, which forms one of the Collection Armand Colin, the aim of which is "Vulgariser sans abaisser", is an excellent well-balanced treatment of general acoustics. There is no English book of similar size and price which covers so wide a range and is so up-to-date, and the volume would be suitable for all university students of physics. Some of the mathematics is of an honours degree standard. To have covered so wide a range without being superficial is a remarkable achievement.