

approached it from the point of view which, thanks largely to the often decried "laboratory system," we are enabled to do at the present time. In fact, until botanists had given up restricting their attention to species, and to the grosser external characters of plants, it was not possible for them to apprehend how intimately the welfare, and consequently the distribution, of the organism and of the species is bound up with minute and often apparently trivial details of structure. It is true that the general characters of what we may term the *Habitus* of groups of plants had been more or less clearly defined. Humboldt and Grisebach had already distinguished numerous dominant types, and had indicated the general nature of their relationships.

But what we want to find out is the causal *nexus* which exists between the plant, and the locality or conditions in which it lives. It is this, the biological, aspect of the question which is the important one for to-day. We are deeply conscious that life is a struggle between conflicting organisms more or less adapted to the conditions of life to which they are exposed. We know, too, that in this struggle, no factor is without its due weight in determining the final result. But we cannot hope to unravel the tangle of reasons which may account for the presence of this type here and its absence there, nor can we appreciate the nice adjustment between the individual constituents which compose the type, until we are in a position to investigate the inter-relations existing between the adaptation and the environment to which it responds. Before this could be, it was first necessary to obtain an insight, not only into the minute details of anatomy, but also into their connection with the functions discharged by the organism as a whole. Only then can we appreciate the true meaning of the peculiarities presented by members of such characteristic floras as alpinas, epiphytes, mangrove swamps, and the like.

It is not that the problems of distribution have hitherto attracted but little interest—far from it—but that before they could be successfully grappled with, a laboratory training formed an indispensable preliminary. But it is only a preliminary. It is all very well to study collections of plants, whether in the form of pickled material, or herbarium specimens, or even as living beings in hot-houses. It is only by travelling, and seeing the things as they actually grow under natural conditions, that one is in a position to estimate the importance of this or that structure, and its relation to the welfare or existence of the species. It may not be necessary to travel far in order to make some progress in this study. Our own country affords abundant opportunity to those who know how to use their eyes; still, there can be no question but that it is in tropical regions that the *purposefulness* of structural modifications most forcibly obtrudes itself on the mind of the observer.

The questions involved are most fascinating, and they are most intricate. Hence it is the more important that we should address our inquiries in an orderly manner if we are to successfully analyse and classify the numerous factors concerned. To indicate how this may be done is one of the objects of Prof. Warming's book, and he may fairly claim to have largely succeeded in his efforts.

He discusses, in the first place, the general effect of physical conditions on plant-life; and his remarks are

always interesting, even where we do not quite agree with the conclusions to which he arrives. He then gives a short classification of the different characteristic groups of plants, which he assembles in four different divisions—the Hydrophytes, Xerophytes, Halophytes and Mesophytes, the last including what we may term normal vegetation. The key-note to his treatment of these four divisions is given in the ideal which he keeps before him, that of ascertaining the manner in which each type and each species places itself in harmony with its surroundings by means of morphological, anatomical, and physiological differentiation and adaptation. The book is essentially one of classification of these adaptations, and of the varied environments inhabited by plants, and it is one which ought to be read not only by botanists, but by all who care for the general questions concerning the distribution of living forms in water and on land.

J. B. F.

#### OUR BOOK SHELF.

*Rivers and Canals. The Flow, Control, and Improvement of Rivers, and the Design, Construction and Development of Canals, both for Navigation and Irrigation; with Statistics of the Traffic on Inland Waterways.* By Leveson Francis Vernon-Harcourt, M.A. In 2 vols. Vol. i., Rivers; vol. ii., Canals. 651 pp. and index; with 13 plates of illustrations. (Oxford: Clarendon Press, 1896.)

THE first edition of Mr. Vernon Harcourt's book on rivers and canals was published in 1882, and has been regarded as one of the standard books on the subjects of which it treats. The present edition is not merely a revise of the former one, but has been almost entirely rewritten, and the subjects rearranged and brought up to date. The wide experience which the author has had, from being frequently called upon professionally to investigate and report on matters relating to rivers and harbours, and the active interest he has taken in the various navigation congresses which have been held in this and other countries during the last few years, fully entitle him to write with authority on the theory of river engineering, and the principles to be observed in carrying out works of improvement. The theoretical part of the book is supported by descriptions and illustrations of the chief works which have been carried out for the control and improvement of rivers, and the construction of canals. The book is written in a style that is thoroughly readable, and is not encumbered with detailed facts and information which, although of great value to an experienced engineer, are not required by a student or reader who wishes to become acquainted with general principles. On the whole, as would naturally be expected, the views expressed by the author are sound, and such as have received general acceptance by the most experienced engineers of this and other countries. There are, however, some matters dealt with on which engineering "doctors differ," and in these cases Mr. Vernon Harcourt would, perhaps, have added to the value of his book if he had given a little more credit to the views of other engineers who have devoted their attention to the same subject. The illustrations are very clear and effective, and add considerably in elucidating the descriptions in the text. In fact, both the author and the publisher deserve the thanks of the engineering profession for bringing up-to-date a work bearing on the management of our harbours and rivers, on the efficiency of which the prosperity of the navigation and commercial interests of this country so largely depend.