

dependence has been admitted by Government spokesmen and others, who have insisted that the first need is to secure the effective utilization of existing knowledge, and have recognized, too, the dependence of such utilization upon the effective dissemination of scientific and technical information. The proposal for a national reference library of science and technology, which forms an essential part of the scheme, and which was intended to relieve the congested conditions which at present hinder the efficient use of the library of the Chemical Society and others, was a step to that end long overdue.

The Department of Scientific and Industrial Research has already re-orientated its policy so as to encourage the more effective dissemination of both scientific and technical information, and thus made the need for such a central library more urgent. Moreover, while Governments have procrastinated, the outflow of scientific and technical literature throughout the world does not stop but rather increases. Libraries which were overtaxed ten years ago are still more overstrained to-day: conditions and expedients, which could be accepted for a short period while plans for adequate accommodation were being formulated, become intolerable when delay is indefinite.

Now the whole scheme is in abeyance. It may be that economic conditions, on a short-term view, are so serious that immediate action on the scheme is impossible, in spite of its importance for the future of science and technology in Britain. Having proceeded thus far, however, every opportunity must be taken to remind the government of the day of its existence—and of its vital importance.

A BOTANIST'S QUO VADIS: INTEGRATION OR SPECIALIZATION

Phylogeny and Morphogenesis

Contemporary Aspects of Botanical Science. By Prof. C. W. Wardlaw. Pp. viii+536. (London: Macmillan and Co., Ltd., 1952.) 42s. net.

MANY of those who belong to the older generation of biologists may recognize in biology at the present time something of the welter of confusion in aims and ideas that marked the similar period after the First World War. It is therefore an appropriate moment to ask whether we are going to witness another transformation in the climate of biological thought similar to that which overtook the biological subjects after 1920. Revolution in techniques is obviously taking place. Will this produce a generation of botanical specialists, or is it possible to offer an idea which will serve to integrate further advances? At such a time it is stimulating to receive a book by an eminent botanist which looks at the present position and attempts to resolve it.

Prof. Wardlaw's central position is that of a morphologist and, as his title indicates, he sees in phylogeny and morphogenesis twin aspects of a unified treatment of plant form which may serve as

a focal point for further botanical developments. His detailed consideration of these matters, ranging over a wide field, starts with the comparative study of the phylogeny of ferns and other pteridophytes (as suggestive examples). This leads to a consideration of the morphology and origin of leafy shoots and the questions associated with the origin of a land flora. The antithesis of this comparative treatment is next developed—the idea of causal morphology leading to the developmental study of morphogenesis. Three chapters deal with the influence of genes on the development of form; then come three more chapters devoted to biochemical aspects of this problem. There follows an inquiry into the physical and mathematical considerations involved, and this leads to a survey of experimental studies on morphogenesis in which the author's own work on ferns figures prominently.

The point of view adopted is thus that morphogenetic processes have necessarily a genetical basis. The primary action of genetical factors upon growing cells is held to be biochemical in nature; but simultaneously, and often as a direct consequence, physical factors become operative and are largely involved in the detailed determination of form and structure in the tissues. But because form is regarded as a product of evolution, it follows that the findings of phylogeny and of the comparative method will be of advantage to the morphogeneticist, just as enhanced knowledge of morphogenesis must lead to a better understanding of phylogeny.

Prof. Wardlaw thus suggests that, while contemporary botanical science is feeling boldly in a number of directions, this does not mean that its students must necessarily become more specialized and its study more dispersed. He clearly sees the possibility of integrating these diverse lines of advance around the twin subjects of phylogeny and morphogenesis. This is not very far away from the late-Victorian doctrine that the study of evolution should be the main motive underlying biological research, although no doubt the emphasis is now placed differently. In particular, the morphological consequences of this doctrine are restated in modern terminology and in the light of modern work. It is clearly impossible to say how this point of view may represent the future of botany. A majority of present-day students of this subject appear to have a greater interest in the *processes* by which the living organism functions than in its form. For this reason the dynamic aspects of morphogenesis are likely to prove more popular than the comparative. Thus growth and organization, which are essentially dynamic and which we can study as existing processes, are beginning to attract more attention than evolution as the fundamental properties of living organisms. If so, it is around these that it may prove possible to integrate the future of botany, whatever an individual's special field of interest may be. This, at least, might well be an alternative statement of the note on which this book ends.

It would be unusual in a work of this type if the specialist in any section of the vast and diversified field surveyed could not find some point of criticism. It would be unjust to direct attention to these in a short review without being able to survey in much greater detail the wealth of information the book contains. It must suffice to say that such a book has been greatly needed. Its publication will stimulate thought and inquiry in a fundamental field.

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