HISTORICAL PLANT GEOGRAPHY

An Introduction to Historical Plant Geography

By E. V. Wulff. Authorized translation by Elizabeth Brissenden. (A New Series of Plant Science Books, Vol. 10.) Pp. xvi+224. (Waltham, Mass.: Chronica Botanica Co.; London: Wm. Dawson and Sons, Ltd., 1943.) 4.75 dollars.

THE study of the areal distribution of plant species, genera, and families is what is generally understood in Great Britain by 'plant geography' or 'phytogeography', as distinct from the wider field of 'plant ecology'. It is in this sense that Prof. Wulff employs the term in the title of his book which, however, is expanded to "Historical Plant Geography" (without altering what we should regard as the proper content of a phytogeographic text) in order to convey the emphasis required by the author's outlook: "Historical plant geography has as its aim the study of the distribution of species of plants now existing and, on the basis of their present and past areas, the elucidation of the origin and history of development of floras, which, in turn, gives us a key to an understanding of the earth's history".

No branch of science could, more than this, need the fullest and most unreserved international co-operation, and it is a welcome sign that it should have been possible during war-time to get the work of a distinguished Russian botanist translated into English, and that this work should have been published through the activities of an enlightened Dutch *émigré* organizing botanical publications in the United States. British workers have in the past contributed much to the foundations of this subject, as can be shown by the mere mention of the names of Lyell, Forbes, J. D. Hooker, Darwin, Wallace, Willis, Ridley and Guppy. Nevertheless, it cannot be denied that in recent years it has lost much of its attractiveness as a subject of research to British botanists, probably in part because of a rather nebulous character consequent on its lack of exactitude and experimental techniques in comparison with other aspects of botanical investigation.

The subject, all the same, has moved steadily forward, and a considerable bulk of work done by Continental, and especially by Russian, phytogeographers is in this book made available to English-speaking botanists, while a very concise foreword by Hugh M. Raup makes a most helpful survey of the very significant American literature which has appeared on the subject in the last few years. The present volume is the first of three by Prof. Wulff and comprises a general and theoretical treatment of the principles of plant geography; the second, already written, is a "History of the Floras of the World", and the third, in preparation, deals with the changes in floras caused by man's activities. We hope that in due time all three volumes will appear in English, but meanwhile the first of them is most opportune. This is particularly so since the last few years have furnished to the phytogeographer such valuable new tools and so much fresh evidence, that a phase of expansion of the subject clearly lies ahead. Of this our botanical students are vaguely or not at all aware, and this first English text to reveal the new potentialities must therefore be valuable and welcome.

We can best convey the content of the book by the chapter headings: (1) historical plant geography: scope, relation to allied sciences, methods of investigation; (2) history of the science; (3) areas, their

centres and boundaries; (4) the origin of areas; (5) types of areas; (6) parallelism in the geographical distribution of plants and animals and correlation between the distribution of parasites and that of their host-plants; (7) artificial factors in the geographical distribution of plants; (8) natural factors in the geographical distribution of plants; (9) the migrations of species and floras and their causes; (10) historical causes for the present structure of areas and the composition of floras; (11) concept of floral elements.

Though impartially surveying the subject as a whole, Dr. Wulff emphasizes throughout his own attitude, that the primary object of the study is the revelation of the history and of the mechanisms by which present areal distributions were achieved. He stresses that we must bring to this study every scrap of relevant evidence of fossil plants—"the importance of such data should not be underestimated, since they constitute the only direct evidence available for establishing the history of a flora". This attitude also involves the recognition of the results of pollen analysis and other studies bearing directly upon the history of vegetational migration and equally upon palaeoclimatology. Dr. Wulff assigns very great importance to large climatic changes in altering the geographical range of plants. He insists also that "Biogeographical conclusions only find definite confirmation, when it is possible to base them on a geological foundation. . . ." The search for such foundations leads the author to consideration of the alternative hypotheses of submerged continents, sunken land-bridges, and continental drift, as bases for explanation of present and past plant distribution. He considers that the phytogeographic data decisively support the latter type of explanation despite the present inadequacy of the Wegener hypothesis for the Pacific region. It is interesting to find that so experienced a phytogeographer considers the influence of man to have been relatively unimportant, and he agrees with Willis in stressing the inability of introduced species to spread into undisturbed natural communities. Indeed, it is suggested that both cultivated plants and their associated weeds have lost many of the adaptive mechanisms needful for such expansion. Slowness of natural distribution is also emphasized: "Plants are dispersed as a result of the transport of their seeds by natural means only slowly and gradually, gaining new territory step by step". There is no strong preference for one school of thought as against another, a broad objective width of approach characterizing the whole book, the author, for example, accepting and explaining relic distribution areas with the same clarity and fairness that he gives to the patterns formed by the expanding groups where new species are being created.

Dr. Wulff rejects no type of evidence bearing on the history of floras: study of the characters of the distribution areas themselves, critical taxonomic and morphological investigations of the group concerned, the modern cytogenetical evidence, ecological adjustment of the species, the effectiveness of dispersal mechanisms, the nature and distribution of plant parasites and hosts, all are laid under contribution, as is indeed logical and inevitable. That the results are not always clear and beyond question is due to the sparsity of available data. Dr. Wulff has shown from how wide a field such evidence must come, and on how wide a front advance in this subject is now recommencing.

H. GODWIN.