

an appeal beyond the strictly scientific world, in which it is assured of a lasting and important place. The author's further researches, completed too late for inclusion in his monograph, show the British otter population to be declining sharply in England and Wales, and we may hope that this fascinating account of the whole group may stimulate conservationists to action before it is too late.

The publishers are to be congratulated on a handsome volume, worthy of its contents. GAVIN MAXWELL

GRASSHOPPERS IN NEW ZEALAND

The Grasshoppers (Acrididae) of New Zealand

Their Taxonomy and Distribution. By R. S. Bigelow. Pp. 111 + 40 plates. (Christchurch, N.Z.: University of Canterbury, 1967.) N.Z. \$3.30.

ALTHOUGH the peculiar nature of the fauna of New Zealand has long been well known, many of the less conspicuous groups have been poorly studied and as a result have sometimes been believed to be hardly represented in New Zealand. Among these have been the grasshoppers, familiar insects in most parts of the world but scarcely mentioned this century in the literature on the New Zealand fauna. This apparent neglect stems partly from the remarkable fact that nearly all the New Zealand representatives of this typically warmth-loving group are confined to the higher altitudes of the South Island mountains. As Dr Bigelow explains in his book, the reason for this reversal of the usual distribution pattern shown by these insects must lie in the effect of the Pleistocene glaciations on the New Zealand grasshopper fauna, coupled with its isolation from any large land-mass since the remote past. It seems that the present alpine grasshoppers must have occupied the lowlands during the glaciations and, being adapted to cool conditions, have been forced into the mountains during the relatively warm interglacial periods. The two species that are confined to the lowlands at the present time are probably postglacial immigrants: one is the highly mobile migratory locust and the other has close relatives in Australia.

The aim of Dr Bigelow's book is to provide a firm taxonomic basis for further work on New Zealand grasshoppers and there is no doubt that this object is amply achieved. After a discussion of the taxonomic characters that he has found useful, the author gives a practical key for the identification of the species and devotes the remainder of the book to full descriptions of each species (six of them newly described), with measurements and distribution data based on a collection of approaching 5,000 specimens. The next is very fully illustrated by about 200 figures grouped into forty plates at the end of the book.

Fifteen species of grasshopper are at present known from New Zealand, and Dr Bigelow suggests that not many more are likely to be found. With the exception of the migratory locust they are all endemic, flightless species and all but three are confined to the somewhat cooler and more mountainous South Island. It is interesting to contrast this with the grasshopper fauna of the British Isles, which are similar in climate and size to New Zealand. There are eleven British species, all with a strong preference for the lowlands and most common in the warmest parts of the country; they are all post-glacial immigrants from the European continent, to which there was a land connexion until about 8,000 years ago.

Dr Bigelow is to be congratulated on producing this thorough work, which should act as a spur to further studies of the zoogeography and evolution of the New Zealand grasshoppers and provide more evidence for students of the palaeogeography of the southern hemisphere. DAVID R. RAGGE

DEVELOPING PLANTS

Morphogenesis in Plants

A Contemporary Study. By C. W. Wardlaw. Pp. 451. (London: Methuen and Co., Ltd., 1968.) 90s. net.

PROFESSOR WARDLAW is well known as a prolific writer on morphogenesis in plants. He has also contributed many publications on plant diseases including the standard work on the diseases of the banana, but he will be remembered by most botanists in this country for the long series of articles on experiments with fern shoot apices which appeared from 1943 onwards.

The present book bears the same primary title as Wardlaw's Methuen Monograph produced in 1952, but it is not merely a new edition of this; it is a new book, much longer and better, as well as incorporating more modern work. In the past, Wardlaw's writing has not appealed to everyone. What used to exasperate some of his readers was his penchant for generalities when what they wanted was the facts and some discussion of their immediate significance. Other readers enjoyed the broad concepts that Wardlaw wrote about. It should be said at once that this new book will appeal to those who criticized his previous books. There are more interesting facts to the page than in any of his other morphological books and reviews. The comment is usually brief and to the point and beautifully summarized. The reason for the difference is partly that the previous books and reviews were often concerned with phylogeny and, as in all subjects in which little is known, phylogeny in botany provokes long futile discussion and few modern botanists have the time or the inclination for it. This book is not concerned with phylogeny and, to a large extent, it explores recent experimental studies not reported in Wardlaw's earlier books. It is true, however, that Wardlaw still gives to generalities a status not merited in logic, for example, in the argument on leaf growth centres and phyllotaxis (page 123). Similarly my preference for induction instead of deduction leads me to disagree with him on homology (page 323). The fact that two organs such as stamens and carpels are given different names implies that they are different. To say that they are homologous implies that they are the same up to a certain point in development. If one takes this point back far enough all organs on a shoot are homologous. What is the value of the word "homologous" then without giving an ontogenetic account of the organs compared?

The bulk of the book is about the shoots of vascular plants, but two chapters are devoted to embryos. There is also a chapter on roots and another on lower plants, but neither of these is developed to the level of the rest of the work discussed. The section on embryos includes work on the embryo-like organisms produced from free cells and other organs in culture *in vitro*, but curiously omits the work of Bell, Diers, Jensen, Mühlethaler, etc., on the fine structure of eggs with its interesting genetic implications. Similarly the chapter on differentiation of tissues does not discuss the ultimate causes of differentiation. Some will heave a sigh of relief; others will wonder how it is possible so to avoid the fashion.

Wardlaw was brought up in the heyday of morphology in a department presided over by Bower, one of the world's most distinguished morphologists. Since that time morphology has suffered an eclipse brought about by comparative morphologists and the evident futility of most of their phylogenetic conclusions. Regard for morphology has recently increased particularly due to the physiological interest in development, genetical interest in chromosome morphology and biochemical interest in the fine structure of cells. But, to some extent, Wardlaw is still on the defensive in this book though anyone interested in plants must be interested in what he tells us about the development of form. Development is treated as a physiological problem and, in dealing with it