The book is intended to fulfil three main purposes: a reference work for professional botanists who wish to use hybrids for research or teaching purposes; an authoritative source of information for the field botanist who wishes to discover hybrids in the wild; and, a stimulus for further research, as for the first time the gaps and deficiencies in our knowledge of British hybrids are precisely defined. Doubtless it will succeed well in the first two instances. One can readily agree with Professor Valentine's statement in the foreword that, " this book is a worthy addition to the roll of standard works on British Botany ". It will unquestionably have a wide circulation and no library which contains a copy of the ubiquitous C.T.W. will be complete until it also contains a copy of *Hybridization and the Flora of the British Isles*. Success in the third purpose, the stimulation of significant new research, seems much less certain. Unfortunately it will take more than a book, however good, to create from the present undirected patchwork of isolated specialists, the mission-orientated fusion of minds and modern methods needed to bring taxonomy back into the mainstream of biological research. The science of hybrids needs hybrid science, and until the incompatibility barriers preventing easy convergence of classical taxonomy, cytogenetics and biochemical studies in our universities are overcome, the prospects for new research seem sterile. As real success in the third object will require not only the right conjunction of minds and methods, but money also, it will be hard won in view of the present low ebb of financial support for non-applied research.

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FLOWERING PLANTS: EVOLUTION ABOVE THE SPECIES LEVEL. G. Ledyard Stebbins. Published by Edward Arnold Ltd., London, 1974. Pp. xviii+399+59 text figures. £13·50.

G. Ledyard Stebbings is a scientist of renown in the field of genetics and evolution and this book will further enhance his reputation. Written in an attractive, uninhibited and highly individual manner, it is a personal account of its author's conclusions regarding the origins of flowering plants. Compared with most modern textbooks it is refreshingly unusual in its frequent use of the personal (" I favour an intermediate view . . .") and the direct (" These biologists have had minimal experience with actual populations living under natural conditions, and this only second or third hand "). The author offers the reader not only evidence, ideas and conclusions, but also his feeling for, and about, the subject (" My motivation . . . has been largely curiosity and wonder "); all of which makes for easy and compulsive reading.

The principal barrier to understanding the evolution of flowering plants above the species level is the extreme poverty of the fossil record of the angiosperms, which, with respect to the all-important reproductive organs is so fragmentary as to be essentially worthless. While tracing individual phylogenies in the absence of a fossil record involves so many uncertainties that satisfactory results will probably never be achieved, the prospects for arriving at a full understanding of evolutionary trends are by no means hopeless. Applying the principle of genetical uniformitarianism, it is possible to extrapolate from our present knowledge of evolution at lower levels. Thus, Stebbins sees transpecific evolution as basically a projection into the palaeontological time scale of the population-environment interactions responsible for changes at lower levels which involve the five basic processes of evolution—mutation, genetic recombination, natural selection, chance fixation of genes, and reproductive isolation.

The meaningful interpretation of evolutionary trends must involve a complete synthesis of evidence from fossils, comparative morphology and anatomy, morphogenesis, chromosomes and biochemistry; and must be based upon known biological processes, particularly the action of genes and growth substances, rather than idealistic morphology confining attention to adult structures. Trends based on changes in single characters are unimportant, especially as reversibility of such trends in evolution is always possible. Only trends involving adaptation of groups or associations of characters should be considered. Moreover, the relative importance of such trends is indicated by their degree of irreversibility determined by the number and complexity of the separate factors which contribute to them. Every morphological character that is used to distinguish families and orders can vary at the level of the genus and species, and sometimes within a population. Thus, Stebbins believes that the origin of new major categories such as genera and families does not require the evolution of distinctive characters which are different from those which separate at least some contemporary populations and species.

Stebbins sees adaptive radiation as the unifying concept that brings together all evolution and which can be recognised at all levels from the divergence of races within a species to the divergence of dicots and monocots within the angiosperms. Evolutionary change is based upon directional and diversifying selection, which takes place in association with a changing environment. An important principle that is valid for long-term evolutionary trends, but not a significant factor at the level of contemporary populations, is evolutionary canalisation, *i.e.* the epigenetic nature of successive adaptations. Thus, the way in which a population will respond adaptively to a changing environment depends to a large degree upon the adaptations that it has already required as a result of previous adaptive radiations.

Adaptive radiation is most likely to occur in marginal or transitional habitats in regions with maximum environmental challenge, especially those with strong seasonal variation in which precipitation is periodically inadequate, and frosts minimal, but present. Stebbins believes that the angiosperms arose in such habitats, and that only evolution in a climate having a marked seasonal drought and a short growing season can account for the origin of all those features which together make the angiosperms so distinctive. Only under such conditions would strong selection pressures exist for speeding up the reproductive cycle, thereby favouring morphological reductions as well as the rapid endosperm and embryo development that results from double fertilisation. Consequently, he discounts past theories which place the origin and differentiation of the angiosperms in tropical rain and cloud forests. There is no evidence that speciation is more active in these communities which, according to Stebbins, are in reality museums, owing their richness in numbers of species, genera and families to a low extinction rate which has resulted in a greater number of representatives of most families being preserved. The communities in which the angiosperms really arose probably contain few primitive or ancestral forms, as they have seen continued high rates of extinction in which successively more adapted forms have competed successfully with their less adapted ancestors.

Contrary to most evolutionists, Stebbins believes that the first angiosperms were low-growing woody shrubs, and that the original trends of growth habits in angiosperms were adaptive radiations from these, in one direction to trees and in the other to herbs. However, reverse adaptation of these trends within evolutionary lines has been frequent.

This book is the first to interpret the phylogeny of flowering plants in the light of modern knowledge of developmental genetics and ecology. It contains a wealth of material so that it is impossible to list even the main conclusions here. Many of Professor Stebbins's conclusions are at variance with views widely held by others; nevertheless, this book will certainly influence evolutionists for a long time to come.

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CROP GENETIC RESOURCES FOR TO-DAY AND TO-MORROW. Edited by O. H. Frankel and J. G. Hawkes. Cambridge University Press, 1975. Pp. 492. £13.

This volume is the second of a series of syntheses emerging from the International Biological Programme which terminated in 1974. It may be thought of as a successor to *Genetic Resources in Plants* (1970, edited by Frankel and Bennett, I.B.P. Handbook, No. 11).

General awareness of the need for genetic conservation has developed only in the last decade and no one has done more to promote it than Sir Otto Frankel. That the situation with regard to primitive cultivated plants is now serious and is rapidly becoming worse seems certain; indeed, the editors, in their introductory survey, write that: " By 1985 most of the genetic resources in their ancient centres of diversity may well have disappeared." The purpose of the book, however, is not only to warn and exhort but to describe progress in the past decade, to expose the underlying principles of collection and conservation and to discuss methods of maintenance and information retrieval.

The book has six sections containing, in all, 37 chapters. Several chapters are concerned with underlying genetic problems and, of these, I thought that the attempt by Marshall and Brown to define a theory of sampling strategy was both interesting and probably rather important. Other chapters are concerned with the practical problems of exploration and with accounts of recent expeditions for specific purposes. Evidently, there has been considerable collecting activity in many crops but the gaps are huge and the evidence of genetic erosion all too plentiful (*e.g.* Ochoa on Andean potatoes, Frankel's survey in chapter 6). Another group of chapters deals with the evaluation of collections, especially for disease resistance but also for some chemical characters. Under the heading conservation and storage it becomes clear that the technology necessary for the long-term storage of many seed-propagated crops is now pretty well established and that " seed-banks " are growing in number and effectiveness. But a great many other crops must be collected and maintained as clones, with all the hazards and expense