

then proceeds to consider how such a control may be exercised; in particular he reviews the importance of cytoplasmic factors during early embryonic development. It is this section of the book that I find the least satisfactory. Gurdon is at pains to point out the need for the study of experimental systems in which such cytoplasmic factors can be identified and studied at the biochemical level. With Gurdon I have little doubt that such factors will exist and that they can be identified. Assuming that the final goal of such experiments is to determine, at the molecular level, just how such factors interact with the genes and, as a consequence of such interaction, control gene activity I think that it can be questioned how far the analysis can proceed without considering the gene's structure itself. Knowledge of some of the biochemical components that control individual genes may not be as great a breakthrough as might at first sight be hoped. Indeed we have, especially in hormonally induced systems such as the chick oviduct, mammalian uterus or hepatoma cells, a fair idea of what such cytoplasmic factors look like. We can even determine that they interact, either with DNA itself or with the proteins associated with the DNA, and can measure the binding constants of these interactions. But can we learn how the whole circuit is designed by knowing the structure of a few of the switches? Logically we cannot. It is the design of the circuit which is the major problem of developmental biology. It is likely that the molecular structure of the chromosome reflects the design of the circuit and it is exciting that real progress is now being made in this field. But we are very ignorant indeed of the genetic structure of the eukaryote gene. It is the lack of any consideration of the consequences our understanding the genetic structure of the eukaryote chromosomes, and of the genes themselves, will have on the way we consider how the genes are controlled that I regret in this book.

Gurdon is to be praised from not falling in with the fashion of building general "models" of genetic circuitry. Whilst fun to discuss amongst friends after dark such models are rarely of use to one who, as Brenner once said, is faced, in the bath on Sunday night, with the problem of doing an experiment on Monday morning. Such models usually suffer from the facts that they try and explain too much and that they assume so much that an extra *ad hoc* hypothesis added here and there to 'account' for some new data is rarely noticed for the degrading process that it is. Gurdon keeps very close to the experimental evidence throughout this book. There are matters here and there with which one may not agree but these are essentially ephemeral and will soon be settled one way or the other by experiment.

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HYBRIDIZATION AND THE FLORA OF THE BRITISH ISLES. Edited by C. A. Stace. Published in collaboration with the Botanical Society of the British Isles by Academic Press. London, New York and San Francisco, 1975. Pp. 626. £14.90.

For some years past there has been an increasing need for a list of the inter-specific hybrids which occur in Britain and of their geographical distribution. The main reason why such a list is required lies in the fact that although a great deal of information on hybrids, both descriptive and experimental,

exists, it is widely scattered in books and journals. Moreover, there is a large but unknown quantity of unpublished information in field and laboratory notebooks. At the second Conference of the Botanical Society of the British Isles in 1950 Professor D. H. Valentine suggested that the Society might usefully sponsor the compilation and publication of such a list. This proposal was revived by Dr S. M. Walters at a meeting of University Lecturers held in Cambridge in 1969; and very soon afterwards was taken up by Dr Stace (Reader in Plant Taxonomy at the University of Leicester). The result is this book—*Hybridization and the Flora of the British Isles*.

The broad purpose of the book is to bring together for the first time as much as possible of the scattered information regarding British hybrids under one cover. This object has been admirably achieved by the collaboration of a total of 86 specialists who contributed accounts covering every one of the 975 hybrids that have been recorded in the British Isles. Many of these accounts have been enriched by the addition of unpublished information obtained either by the contributors themselves or by their colleagues and correspondents. Proof (if it be needed) that a new and comprehensive list of hybrids was badly needed comes from the fact that the last list of British Vascular Plants published by Dandy in 1958 contained 538 hybrids while this new book, published only 17 years later, contains 626 accepted and a further 122 possible ones.

The book contains an introductory section (90 pages long) intended to provide a broad review of the whole subject of hybridisation as a background to the systematic account which follows it. This section is lucidly executed and wide ranging in scope. It seeks to place the work on British plants in its world-wide perspective, while giving wherever possible British or Continental examples. Thus it avoids the monotonous (for European readers) reliance on American examples found in previous and now somewhat outdated reviews of the same subject. However, the author chose to avoid "too long discussion" of those subjects for which good modern reviews exist, which was probably a mistake in several instances. For instance, the section on chemical studies seems strangely thin for a book published in 1975. Similarly, the exciting possibility of comparing taxa using DNA hybridisation is dismissed in 15 lines, while the possibility of investigating the plausibility of putative parent species of hybrids by comparing DNA amounts measured by quantitative Feulgen microdensitometry is not mentioned at all.

The book contains some 626 pages, most of which are devoted to the systematic account which includes all the hybrids recorded from the British Isles together with 465 hybrids between British species which have been found abroad but not in the British Isles. The information presented in the systematic account is extremely detailed and comprehensive, though not excessively so.

For instance, enough details of the appearance of a hybrid are given to enable one to get a reasonable idea of how to recognise it, but a full description is not given. Similarly, only key references are cited when recent reviews of a hybrid are available. The following information is given for those hybrids which are well documented and/or almost certainly authentic:

- a. The valid binomial together with important synonyms.
- b. A general description including information on morphology, fertility, introgression, variation, etc.
- c. The ecological and geographical distribution.

- d. A survey of experimental work including the results of artificial hybridisations and details of the appearance and cytological and genetical behaviour of any artificial hybrids obtained, together with observations on the pollination, fertilization and meiotic behaviour of natural hybrids.
- e. The chromosome numbers of the two parent species and the hybrid.
- f. Background literature.

It is hard to fault the book's coverage and treatment of the systematic account. Indeed one can only praise and admire its editor's zeal and ability. In a relatively short time he has co-ordinated the work of 86 contributors, while himself compiling a very large number of entries, to produce a book of high scientific value which contains a mass of well organised material.

Of course, it would be foolish to expect the systematic account of a reference work such as this to make easy reading. Nevertheless, the subject of hybrids is a source of much interest and controversy, so that arguments concerning the interpretation, significance and treatment of hybrids are inevitably woven into the fabric of the systematic account. The search for rarities was once fashionable and supposed hybrids were never so common as in those days. Consequently, many of the so-called hybrids are merely fanciful identifications. Also in consequence, the systematic account is enriched and enlivened by the opinions of the contributors as they assess the evidence for some unlikely combination of species reported long ago, like *Senecio jacobaea* L.  $\times$  *S. vulgaris* L. recorded in 1931 from Aberdovey which was "almost certainly a plant of *S. squalidus* which had been infested with caterpillars!"

There is still ample room for disagreement today firstly because the term hybrid means different things to different disciplines. The definition of a hybrid used by a geneticist who is concerned with pure lines and individual genes is unacceptable to the taxonomist who is concerned with taxa. Thus Darlington's 1937 definition of a hybrid ("a hybrid is a zygote produced by the union of dissimilar gametes") is dismissed as of no practical value, while his assertion that "Systematists have generally been content to use it (the term hybrid) as a label for misfits" is, according to Dr Stace, "blatantly untrue . . . and probably reflects a distaste for taxonomy". Similarly, Stebbin's 1959 evolutionary definition of a hybrid (a cross "between individuals belonging to separate populations which have different adaptive norms") is also unacceptable because it avoids mentioning any taxonomic ranks, and for this reason Wagner suggested adding to it, "and which would be separated in ordinary taxonomic practice as readily defined phenetic species". Dr Stace suggests that, for solely taxonomic purposes, the definition of a hybrid as a cross between individuals of different taxa is both useful and meaningful, and has the dual advantages of simplicity and wide application. Clearly, a hybrid need only be a hybrid to be a genetical hybrid, but, it takes a taxonomist to make a taxonomic hybrid. Besides, any definition is only as good as its ease of practical application. While taxonomists and others will continue to debate the definition of a hybrid in principle, taxonomists will continue to disagree in detail among themselves as to what constitutes a taxon, and hence, as to what is a hybrid; but that is a cross which they have to bear. Until agreement on these matters is reached Dr Stace's view that "it may be desirable to retain the term hybrid in a flexible sense, with a precise meaning dependent upon the context" is realistic.

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 Stebbins 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