 Watsonia, **8**, 412–422 (1971).

Book Reviews

The Oxford Book of Wild Flowers. Pocket Edition. Edited by S. Ary and M. Gregory. Pp. vii + 222 with 580 illustrations by B. E. Nicholson. Oxford University Press, London. 1970. Price £1.25.

This is not another book of coloured pictures of British wild plants to add to the growing number of such productions but 'a small replica of the library edition' of a work first published in 1960 and twice reprinted, with corrections, in 1962 and 1965. That it lives up to its latest title by fitting neatly into a jacket pocket is its first recommendation—indeed it could be carried by hand into the field without being an encumbrance. In order to achieve this reduction in size the illustrations have, of course, become smaller and the print of the text has just about reached the limit for ease in reading. Two chapters, on 'Flower Families' and 'Ecology of Plants,' have been sacrificed, no doubt to allow for a proportionate decrease in thickness; their loss, though a pity, should not detract from the declared 'first purpose' of the book—'to enable the user to identify the wild flowers of the British countryside'.

The items retained are: an Introduction, telling the user how to set about his purpose and instilling a sense of discretion in picking specimens; a Glossary, limited to one page, explaining the few technical terms used; Illustrations in colour of some 550 species and in black and white of 30 more, the latter mainly of trees and shrubs, where shape of leaf, flower and fruit rather than colour is significant; a page of text opposite each plate (which includes from 5 to 8 figures), giving a simple description with brief habitat notes and times of flowering of each species, aided by black and white drawings of particular morphological details; 4 pages of 'Tree Shapes', summer and winter, of 14 common trees; a page devoted to 'Naming Plants' and just over a page to 'classifying Plants', wherein some explanation of the use of Latin names and the basic principles of classification are given with, wisely, no attempt to delve too deeply into the intricacies of taxonomy; a 7-page index to scientific and English names to end the volume.

Also, several species closely allied to those illustrated are described in the text, thus enabling about twice the number to be covered. The plates are primarily arranged by flower colour but the family to which each species belongs is always stated. The English name is the first detail given, followed by the scientific name, which is taken from the *Flora of the British Isles* by Clapham, Tutin & Warburg (1952). Omitted entirely are grasses and sedges (pocket-size works on these groups, usually left until later by the beginner, are now-a-days available). Critical genera such as *Rubus*, *Rosa*, *Euphrasia*, *Taraxacum* and *Hieracium* are sufficiently dealt with as aggregate species or by major groups.

The Introduction makes it clear that the main 'user' envisaged is the one 'with little or no botanical training', so the value of the book is mainly to be assessed by the adequacy of its figures plus descriptions to guide the beginner to a correct identification of his plant. Perfection in colour reproduction is notoriously difficult and prohibitively expensive to attain, so it must not be looked for in such a modestly priced work as the present one. Some figures are of high standard, the majority are from just to completely adequate and a few are scarcely or not at all adequate. Figure 3 on p. 113, for example, would not assist many learners to identify the common milk-wort; whereas the 'berried' species of Ericaceae on p. 121 are clear and distinctive, not enough distinction is evident between the heath species on p. 119. Now and again inaccuracies occur, such as depicting *Veronica officinalis* on p. 175 with an apparent terminal spike-like inflorescence instead of with axillary racemes. On the same page, fig. 1

does not represent *Veronica persica* as a characteristically creeping, prostrate plant, nor does the text opposite indicate this; it is indeed an example of the tendency to formalise and to miss the essential habit of many species. Such faults as these, however, are not so serious as to impair the usefulness of the book as a whole; tested on a beginner it gave the correct answer for a half-dozen plants in a very reasonable time. It has no pretensions to being 'a must' for the expert or a necessity for the knowledgeable, but its very handy size, general adequacy and moderate price recommend it to the beginner and to those seeking a suitable gift for their young relatives.

E. B. BANGERTER

Phytochemical Phylogeny. Edited by J. B. Harborne. Pp. xiv + 335. Academic Press, London. 1970. Price £5.50.

Phylogenetic speculation is a pursuit which none will begrudge the taxonomist who wishes to indulge in it as a relief from, and a reward for, the rigorous discipline of his professional way of life. Others also are lured by its attraction, and among these now appear the chemists engaged in various aspects of the study of plant life and plant products.

The book under review appears almost simultaneously with another important publication: the Symposium on Major Evolutionary Events and the Geological Record of Plants (*Biol. Rev.*, **45**:317–454 (1970)). For the palaeobotanical material the sources must overlap and the conclusions reached must necessarily in large measure agree. Both rest heavily on the palynological evidence, and it is this, both palynologically and phytochemically, which would seem to hold great promise for future developments in knowledge of the early history of present-day plants. One chapter, that by G. Shaw on 'Sporopollenin', deals specifically with the contribution from this quarter, sporopollenin itself being a collective term for the nitrogen-free, cellulose-free resistant wall material of pollen grains.

As regards the phylogeny of the higher plants, phytochemistry is tending to work backwards from the situation as it exists at present. How does evolution seem to be working here and now? Proteins, fats, nucleic acids, enzymes, and all manner of secondary constituents are dealt with in detail in this connection. The situation in the primitive vascular plant is surmised, and the likely course of evolution therefrom traced. For the higher plants there is no one chapter devoted to a comprehensive survey —the phytochemical material at present to hand will scarcely allow of this; but for the origin of plants as such the first chapter, by P. Echlin, does succeed in drawing together numerous threads and reaching positive conclusions.

This book, therefore, is only a scratching of the surface of the subject claimed in its title. There is no doubt that chemistry will have a massive contribution to make, all in good time, to the phylogeny of plants, the more effectively as it becomes organised under some such heading as 'Chemical Taxonomy' or 'Biochemical Systematics'. The immediate need is for an interpretation of morphology in terms of chemistry, and this is dramatically growing in the current expansion of knowledge of plant hormones and the way in which they determine and affect the structure of the plant and its organs. It is here that the so-called 'secondary' plant constituents become of such importance. They are the substances that differ as between plants, and it is from them that the linkages are being forged with the morphological characters on which systematics is based. What can already be achieved in this direction is well illustrated by the chapter by J. McClure on the secondary constituents of aquatic angiosperms; but at a more detailed level those by B. L. Turner on molecular approaches to population problems at the infraspecific level and T. J. Mabry on sesquiterpene lactones in *Ambrosia* are equally significant. These chapters are selected as dealing more especially with higher plants, but the fungi and unicellular organisms are not omitted from consideration.

E. C. BATE-SMITH

Principles and Methods of Plant Biosystematics. O. T. Solbrig. Pp. xiii + 226 + 70 figures. The Macmillan Company, London. 1970. Price £5.

This attractively produced introductory textbook of plant biosystematics is clearly aimed at the American college student who has studied elementary botany or biology. It is not assumed that the reader has had a course in genetics. The first hundred pages are about the principles of biosystematics. The seven chapters discuss the process (*sic*) of speciation and the forces that control it. Chapter headings read: Synthetic Theory of Evolution, Patterns of Phenetic Variability, Breeding Systems, Speciation, Hybridization, The Species Problem and Classification. In the middle of the book there is a complete change of approach. Part II, again of some hundred pages, reports on special techniques for the study of species, with chapters on Genetics, Cytology, Chemistry, Mathematics and Statistics.

There are several excellent chapters in the book, those on plant variation and breeding systems being very useful. The section on techniques leaves the reader in no doubt as to the importance of the different approaches to plant variation. Nevertheless, despite good material, this remains a disappointing book. It may convince the reader that modern techniques are used by students of evolution, but the basic construction of the book, in two more or less self-contained areas, means that there is serious fragmentation of content. To give but one example, polyploidy is discussed most fully and from first principles in Chapter 9; but much of this material is needed at an earlier point, for instance in Chapter 7. A student with little or no genetics might find the going hard.

Throughout the book the author has chosen up-to-date examples to illustrate his theme. One is disappointed, however, by his parochial attitude. Almost all the examples are from the work of United States biosystematists. This approach gives a student no notion of the excellent studies carried out in Poland, Canada, Japan, etc.

A number of omissions and errors have been noted. The text contains practically no mention of apomixis. It is unfortunate that an error in the formula for variance in Chapter 11 has escaped correction in proof-reading and there is no definition of OTU's in the section on numerical taxonomy or in the glossary, which makes Fig. 11–3 inexplicable for the beginner. The first name given to a plant is not necessarily the valid name. Mendel did not propose the principles of inheritance. The section on Linnaeus's view on classification is very misleading. The glossary defines analysis of variance but nowhere is this analysis discussed in the text. Also certain controversial areas of the subject are not presented in sufficient balance; for example Thoday and Boam's experiments on disruptive selection in *Drosophila* have now been repeated and extended by many geneticists, often with quite different results (Thoday & Gibson, *American Naturalist*, **104**: 219–30 (1970), give a full bibliography of the researches in this area).

D. BRIGGS

Trees and Shrubs—Their Identification in Summer or Winter. C. T. Prime and R. J. Peacock. 6th edition (revised and enlarged by C. T. Prime). Pp. 139. Heffer & Sons Ltd, Cambridge. 1970. Price 65p.

This attractive new paperback is a substantially enlarged and revised sixth edition of the authors' booklet of 1935 *How to identify Trees and Shrubs from Leaves and Twigs in Summer or Winter*. The short introductory chapter introduces the reader to the trees and shrubs of our country, their biology, important diagnostic features and their place in the landscape of Britain. Then follow two keys, one for use in summer and the other in winter, with a short introduction on 'How to use the Keys'—which the author has rightly labelled 'Important'. This is a feature far too rarely provided by the authors of keys intended for use by non-specialists, and, when provided, usually neglected by those casually wishing to name plants. The keys have obviously been

compiled with great care and it is clear that serious thought has been given to the selection of the simplest channels through which the user can be led to a correct identification. The keys contain a number of trichotomous leads but, while most systematists are of the opinion that keys should be uniformly dichotomous on grounds of simplicity, it must be admitted that these particular examples seem to be without any undesirable complexities. The reviewer's son (aged 13) experienced no problems in using the keys under trial conditions. Then follow concise descriptions of about a hundred species, including all the common natives, with a selection of the more frequent and interesting introductions. For each species a paragraph after the introduction mentions points of historical interest, horticultural aspects, related species, economic uses and autecological attributes. As always in Dr Prime's work, biological information is prominent, and it is clear that the book stems from much time spent observing the living plants and is in no way a library or herbarium compilation. The work concludes with twelve photographs of barks and buds in close-up and twenty pages of drawings by R. J. Jones of leaves, twigs and silhouettes. The leaves and twigs are excellent, being drawn with great directness and simplicity, capturing the essential features with a minimum of superfluous detail. The silhouettes are much less successful and lack the authority and conviction of the other drawings. As in most books the reviewer can find minor points for comment. Thus, under Gooseberry we find the rather odd statement 'A native of Central and Southern Europe, probably wild only in the North of England'; likewise the Giant Sequoia of California (here referred to by the unusual vernacular name Mammoth Tree) is treated as a species of *Sequoia* along with its relative the Redwood. Specialists today seem to be agreed that it should be accorded recognition as the monotypic genus *Sequoiadendron*, a procedure which incidentally allows the retention of the familiar epithet *giganteum*. Although this book was originally produced for teaching purposes and has already passed through five editions, it is clear that in its new form it has evolved into a work of more general utility. At 65p it is not unduly expensive by modern standards and can be confidently recommended to the beginner who wants to learn to identify our trees and shrubs in a thoroughly scientific manner and not merely by facile (and error-prone) picture-matching. More experienced users of this book will find many new and interesting pieces of information, which are likely to stimulate even the most jaded of botanical palates.

J. F. M. CANNON

Cellular Differentiation in Plants and Other Essays. C. W. Wardlaw. Pp. 160. Manchester University Press, Manchester; Barnes & Noble Inc., New York. 1970. Price £2.

Definitive treatment for the professional and simplified texts for the beginner are the necessary partners in the advancement of learning. Informal discourse, on the other hand, is a beneficial luxury. It enables us to read why the writer, admitting that actions and opinions are not exclusively determined by 'the facts', thinks as he does. In this vein, Professor Wardlaw has written these essays, mentioning his regret that the senior botanists of his youth did not similarly express themselves.

The good-natured banter of the first essay, 'On writing botanical essays', serves to assure us that our author is still his old self and we embark on the main business with 'Aspects of cellular differentiation in plants'. The design is historical as it is part of Wardlaw's intention to show how problems of differentiation have been handled by workers of different interests and periods. Considerable attention is given to the impact of molecular biology. This and the following essay, 'Reconciliations among apex lovers', will certainly help Honours and research students, and also teachers, to find their bearings. Discussion predominates and factual material is present in just the right amount. These essays are ideal for tutorials.

The notions of preformation and epigenesis enter into the treatment of these themes and in the next essay, 'Enigmas of Epigenesis', Wardlaw gives them further attention.

He does not, however, consider the philosophical analysis of the concepts as, for instance, Woodger has done.

In the last essay, Wardlaw looks back on the recent phase of experimental morphology and reflects on the probability that many of the exhibits should be put in the rather negative category of *disorganizations*. Optimism reasserting itself, he is soon surveying the possibilities of *neo-organizations* which 'transcend the parental genetic limits'.

Austerity is not a part of the style of these essays and some readers may crave for it by the end. The embellishment is, however, an expression (an epigenesis?) of the author's natural (preformed?) gaiety. It is worth much to have a discussion of conflicting attitudes without too firm a set of jaw.

F. CUSICK

Flora of Norfolk. C. P. Petch and E. L. Swann. Pp. 288 + 115 coloured illustrations. Jarrold & Sons, Ltd, Norwich. 1968. Price £2.25.

The *Flora of Norfolk* was published to coincide with the Centenary of the Norfolk and Norwich Naturalists' Society. Its somewhat lavish production is a gesture by the publishers to Norfolk natural history. In order to attract buyers it has 26 pages of colour photographs, some bad, some good, and a few very good indeed; all are of flower portraits and not always typical of the Norfolk flora. I would like to have seen some general pictures of Norfolk habitats and well-known botanical sites besides these plant portraits.

There are three preliminary chapters: those by Swann on the history of botany in Norfolk and by G. P. Larwood on the geology and fossil floras are very concise, but that of Petch on the plant communities leaves something to be desired. It is doubtful if the terms 'fen' and 'bog' can be defined without recourse to the plant communities that are associated with them. Certainly the type of 'bog' or mire seen in several Norfolk sites, but especially at Buxton Heath, should have been mentioned. Considerable work has been done on the hydrosere of the broadland marshes by Dr Joyce Lambert; but her classic papers are not mentioned and the east river valley associations are dismissed in two lines. 'True fen', it is said, is characterised by having *Cladium mariscus* dominant; this is a marshman's definition rather than that of an ecologist. There might well have been mention here of Nature Reserves in Norfolk, as the county has the oldest, if not the most active, Naturalists' Trust and has been subjected to some intense study by the Nature Conservancy.

The bulk of the Flora deals with the distribution of some 28 taxa of Characeae, 361 of Bryophyta and 1563 of vascular plants. The problem for the compilers has been, of course, the old one—what to leave out rather than what to put in. I feel the result has not done justice to the careful and detailed notes that I know at least one of the authors has on his files. Both have known and worked in the county for some 40 years. Tight budgets and perhaps a rush to produce the book for the Centenary may be the cause of the scanty, often variable notes on each species. There is a regrettable although understandable bias for records from Vice-County 28; both authors have lived or based themselves in the west of the county and Norfolk is well over 80 miles across. Nicholson's *Flora* (1914) was biased in the opposite direction; but, because of the changing landscape, pollution of the Broads and suchlike, the balance is not redressed. However, if past and present records had been amalgamated, trends and distribution would have been shown, or at least the need for confirmation would have been exposed. An example of this is seen under *Potamogeton coloratus*, where Petch and Swan give no records for v.c.27, whilst Nicholson gives 6 from the Broads. First or other historical records are given on some occasions and not on others; and some obvious ones have been missed out, e.g. *Carex divulsa*, first recorded and described as a new species by Stokes from v.c.28. The typeface is clear, but lack of varia-

tion in size or the use of bold face makes finding a particular genus or species very difficult.

Probably the most irksome aspect of the *Flora* is the lack of any decent map giving even the rudiments of the National Grid. Throughout the text reference is made to the 10km squares (by a two-figure reference which, however, is not ambiguous). But unless the reader knows the county well he cannot form a picture of the distribution of its flora without recourse to at least the $\frac{1}{4}$ in. O.S. map. Other maps, or at least one showing soils, would have been useful.

Most botanists will, by now, have bought this book; but to those who are still undecided I can recommend it as well worth the price. Like most (but fortunately not all) County Floras, it is not a book for the young or uninitiated—in spite of the pictures.

A. C. JERMY

Grass: a story of Frankenwald. Edward Roux. Pp. xx + 212 with 18 plates + 44 text figures. Oxford University Press, Cape Town. 1969. Price £4.

Primarily this is a lively record of co-operative human endeavour: a history of the early years of research at the biological field station of the University of the Witwatersrand. It describes the experiments and discusses the conclusions of the scientists who have worked there since 1931.

The research reported mainly concerns one problem: what are the factors which determine the course of secondary succession in the High Veld? For anyone with only a theoretical knowledge of ecology, here is an exciting account of the practice. The chapters deal piecemeal with the complex environment without losing sight of its wholeness. In the process, a number of traditional axioms of pasture management in Africa are found to be surprisingly inadequate. The proper use of the world's resources is the real subject of this book.

J. LEWIS

Millefiori della Valle d'Aosta. Degiovanni Luciana. Pp. 285 + 125 plates in colour. SGS, Torino. 1969. Price 2,500L.

This book provides brief descriptions, frequencies, localities and medical uses for about a thousand of the more interesting plants of the Val d'Aosta. In spite of shortcomings, it is to be recommended as an inexpensive guide to a rich botanical area for which information is not otherwise readily available.

J. E. LOUSLEY

Index to European Taxonomic Literature for 1966. R. K. Brummitt and I. K. Ferguson, Pp. 245. *Regnum Vegetabile.* Vol. 53. International Bureau for Plant Taxonomy and Nomenclature, Utrecht. 1968. Price £1.25 (I.A.P.T. members), £2.90 (others).

Index to European Taxonomic Literature for 1967. R. K. Brummitt and I. K. Ferguson. Pp. 202. *Regnum Vegetabile.* Vol. 61. International Bureau for Plant Taxonomy and Nomenclature, Utrecht. 1969. Price £1.65 (I.A.P.T. members), £3.40 (others).

As the number of botanical publications in the field of taxonomy and related disciplines is increasing every year, it has become more and more difficult for individual botanists to keep up to date with recent discoveries, and they have to spend much valuable time searching through the literature relevant to their studies. Since the work on the *Flora Europaea* was initiated this problem has become more acute, especially to the contributors of that *Flora*. The existing reference and abstract periodicals *Fortschritte der Botanik* (covering various fields of botany) and *Excerpta Botanica*

(taxonomy and chorology), which are devoted to all plant groups from different parts of the world, were too incomplete with regard to the European taxonomic literature on vascular plants, especially from East Europe. This gap was filled when the International Bureau for Plant Taxonomy and Nomenclature began to publish annually an *Index to European taxonomic literature* in the *Regnum Vegetabile*.

The first issue of this *Index* (for 1965) was compiled by R. K. Brummitt and published in 1966 as *Regnum Vegetabile*, vol. 45. The next two are mentioned above, and the fourth (for 1968) is in the press for spring 1971.

The *Index* covers firstly the whole of Europe (as defined in *Flora Europaea*, vol. 1, p. xvi (1964)), as well as neighbouring areas, such as Madeira and the Canary Islands in the West, N. Africa in the south, and Cyprus, Asiatic Turkey, Syria, Lebanon, Israel, Jordan and the Caucasus in the East.

The compilers have examined the literature received at Kew, the British Museum (Natural History), the Department of Forestry of the University of Oxford, the Department of Agriculture of the University of Cambridge and the Ministry of Agriculture (London).

The *Index* is easy to use. All items are treated uniformly and organised in alphabetical order. The author's name is given first, then the title of the publication, followed by a reference to the periodical or publisher if it is a book. Next is given the year of publication followed by an indication of whether the summary is in a language other than that of the publication itself. The title is given in its original form (Cyrillic scripts are transliterated), followed by whatever language translation of it the author has given in the publication. Useful information regarding new taxa described is also included and an indication given (by the use of heavy type) that these have been validly published.

The *Index* begins with some smaller chapters covering topics of general interest, such as biography, bibliography, botanical institutions and gardens, phytogeography, mapping and chromosome surveys. These are followed by a chapter on the Floras, grouped according to the countries. The main bulk of the *Index* consists of references to papers and books dealing with the taxonomy of vascular plants arranged systematically.

The *Index* for 1966 contains more than 3100 references and includes about 1600 new names of various taxa, while that for 1967 has about 3500 references and more than 1500 new names.

These references are supplemented by an appendix, consisting of a list of the full titles of the periodicals that are abbreviated in the main part of the *Index*. In the issue for 1966 the compilers have cited 712 periodicals and a further 196 are given in the issue for 1967.

The references are compiled by the authors and grouped with great skill and care, so that this *Index* is of immense value, not only for students of the European Flora, but also for all botanists who are studying the taxonomy, ecology and distribution of any taxon of vascular plants.

The whole *Index* is well prepared and nicely produced. The compilers and publishers should be congratulated on such an important contribution to the study of the systematics of European vascular plants.

A. MELDERIS

Modern Methods in Plant Taxonomy. Edited by V. H. Heywood. Pp. xv + 312. Published for the Botanical Society of the British Isles and the Linnean Society of London by Academic Press, London and New York. 1968. Price £4.20.

A detached observer might find it remarkable that plant taxonomy apparently provides, simultaneously, a stereotype of all that is drab, outmoded and dispensible in botany, and an ever-rolling bandwaggon upon which new developments in the plant sciences (and outside them) seem perennially ready to climb. This implies no disrespect or

ingratitude to those who have enriched systematic botany with their contributions in the past, or are so enriching it now, but it epitomises a situation in which any survey of the present state of the subject is likely to be of more than passing interest.

The present volume contains the text of the contributions to the conference organised by the B.S.B.I. in association with the Linnean Society, held in Liverpool in September 1967. The occasion was an impressive one. The speakers were well chosen to cover a broad field, and included some very eminent names. As a result, the book contains a well-balanced and fascinating cross-section of plant systematics in the 1960s. The decision not to print the discussion that followed the papers was undoubtedly right; one's great regret (obviously shared with the editor) is that this has deprived us of the contribution to the conference made by Professor Takhtajan.

After a general introduction by the editor, the papers are presented in four groups: 'the continuing role of the herbarium in modern taxonomic research', 'the role of experimental data', 'biochemistry, computers and taxonomy' and 'geography and ecology'. It is eminently right that the book should begin with A. Cronquist and J. P. M. Brenan's outlines of the functions of major herbaria. These, after all, are the places where most of the real and useful work of systematic botany is done. J. McNeill contributes a valuable and instructive discussion of the functions and problems of regional and local herbaria; it is a little sadly that one wonders whether the Liverpool University herbarium will always exist in as favourable a *milieu* as it did in 1967. C. R. Metcalfe gives a down-to-earth appraisal of the value of systematic plant anatomy, touching briefly on the comparable (if currently more fashionable) field of chemotaxonomy. The second group of papers embrace the field which has become known as 'experimental taxonomy'; much work in this category is concerned with microevolution rather than with systematics as such. D. M. Moore's paper on the karyotype occupies an interesting borderline position; the chromosomes may be regarded simply as providing additional characters to supplement those drawn from other sources, or their behaviour may be studied to draw directly phylogenetic conclusions. O. T. Solbrig gives a useful discussion of the relation between morphological and genetic discontinuity. C. D. K. Cook analyses three cases of heterophylly in aquatic plants, ranging from a situation with a strong element of heteroblastic development in *Synnema triflorum* to the autoregulatory mechanism, switched by photoperiod, of *Ranunculus aquatilis*, and discusses the taxonomic consequences of these situations and of plasticity in general. W. H. Wagner's paper on interspecific hybrids includes a consideration of the evolutionary effects of hybridisation, and of the practical taxonomic treatment of hybrids. The third group of papers brings us back to pure taxonomy, allied with new techniques. D. E. Fairbrother's paper will be valued as a condensed introduction to the techniques and literature of chemotaxonomy and systematic serology. J. Cullen discusses, critically but not antagonistically, some of the problems that are likely to arise in the practical application of numerical methods. M. B. Dale gives a brief outline of the sequence of procedures in a numerical taxonomic investigation, with a note on list-structures as a possible means of representing data. M. P. Johnson & R. W. Holm compare numerical classifications of *Sarcostemma* obtained using correlation coefficients and taxonomic distance with floral and vegetative characters and conclude (not surprisingly) that the non-specificity hypothesis holds only in part, and that detailed analysis of character-sets may be of great interest in evolutionary and ecological studies. W. T. Stearn briefly discusses principal component and cluster analyses of data from *Columnea* and *Alloplectus* in relation to a taxonomic revision of the Jamaican species of these genera. The final group of papers includes a short general consideration of adaptive relationships by D. A. Wilkins, a stimulating paper on ecogeographical relationships (and a good deal else besides) in relation to taxonomy by F. J. F. Fisher, and a substantial review of the evolution of patterns of infraspecific differentiation by F. Ehrendorfer.

Modern Methods in Plant Taxonomy partakes of the usual strengths and weaknesses of symposium volumes. Each contributor can write with authority about his own

corner of the field, but the general effect is inevitably somewhat disjointed and the reader is left to make his own broad synthesis. What, in fact, is the field of plant taxonomy? Clearly it embraces and must always be centred around the practical systematic work that produces the Floras and monographs that we notice chiefly when they are missing. A number of topics considered in this book, such as chemotaxonomy and numerical classificatory techniques (which may well be seen as the major fields of advance of the 1960s), are extensions of, or ancillary to, traditional taxonomic methods. Systematists have no doubt always been interested in the origin of the entities they classify, and since the time of Darwin phylogenetic speculation has seemed a natural and legitimate part of a systematist's work; since the rise of genecology the interest has shifted largely (and profitably) from a macro-evolutionary to a micro-evolutionary level. Sometimes the phylogenetic tail has tried to wag the taxonomic dog, but on the whole the contributions to this book maintain a more critical and level-headed perspective than could have been expected a few decades ago. Phylogenetic conclusions are still in essence descriptive and demand their own explanation and synthesis, and this is perhaps why I, at least, found the final chapters of this book the most stimulating. It is in this region that the boundaries of systematics are most diffuse, and the connections with neighbouring disciplines richest. There is no hard-and-fast line between experimental taxonomy and population genetics. We cannot understand the effect of genes and of natural selection without considering the limitations on the possible imposed by pathways of development. The evolution and functioning of genetic systems are very closely linked with patterns of taxonomic differentiation on the one hand and ecosystemic relationships on the other. If present-day ecosystems are built up of (to borrow a phrase from Margalef (1968)) 'prefabricated parts' called individuals and species, we can surely only understand these parts by considering their function in the overall design, the production-line on which they are made, the transport systems by which they reach their destinations, and the mechanisms by which they are fitted into their places alongside the other components of the ecosystem. Phytogeography and dispersal have also been traditional interests of systematists. Perhaps, as the recent book by MacArthur & Wilson (1967) suggests, their problems are neither as isolated from the field we are considering nor as intractable as they have sometimes appeared. However, the next great synthesis of the living world will no doubt have to wait for a latter-day Darwin. Meanwhile, we can be grateful to the organisers of the conference, the contributors and the editor for giving us as good a book as this. Probably the honours botany student or the incipient postgraduate systematist will gain the most from it, but parts at least will be of interest to the keen amateur, and there will surely be few professionals who will not learn from it something new about how the other half of the taxonomic world lives. The book is well produced, and the price is not exorbitant by present-day standards.

REFERENCES

MACARTHUR, R. H. & WILSON, E. O. (1967). *The theory of island biogeography*. Princeton.
MARGALEF, R. (1968). *Perspectives in ecological theory*. Chicago.

M. C. F. PROCTOR

Viruses in plant hosts. Form, Distribution and Pathologic Effects. K. Esau. Pp. viii + 225 University of Wisconsin Press, Madison, Milwaukee and London. 1968. Price $10.00.

This book is based on the subjects covered in a series of three lectures given by Professor Katherine Esau at the second J. C. Walker Conference held in Madison, Wisconsin in 1968. These conferences deal with restricted subject-matter discussed in greater depth than is usually possible, and the subject in 1968 was the morphological and anatomical aspects of plant disease.

Professor Esau largely restricts her subject to two plant viruses, beet yellows and tobacco mosaic, which she and her colleagues have investigated over a number of

years. Other viruses are discussed, but in less detail, and for this reason the title of the book is perhaps somewhat misleading.

By its comprehensive coverage of the development of virus-related protein and its relationship with cell components and cell type, the transport of virus, and the effects of infection on the cell, this book neatly collates the observations on beet yellows and tobacco mosaic. In addition, there are 137 superb electron micrographs which illustrate the ultrastructure of infected cells, and are of exceptionally high quality.

S. M. ROBB

Evolution and Phylogeny of Flowering Plants. John Hutchinson. Pp. xxv + 717 with 517 text figures. Academic Press, London and New York. 1969. Price £8.50.

The subtitle to this book (*Dicotyledons: Fact and Theory*) gives a clue to its contents. In it, Dr Hutchinson has found room to discuss (and often illustrate) many of the most extraordinary and interesting genera of Dicotyledons that he was unable to treat in sufficient detail in his previous works on the families and genera of Flowering Plants. Here one finds reasons for many of the decisions about family relationships that are incorporated in his well-known classification (but not, it must be added, for the basic division of the Dicotyledons into Lignosae (mainly woody) and Herbaceae (mainly herbaceous)). Each Dicotyledon family in that classification is described informally and its relationships discussed. A more detailed description of the type genus is included, often with a citation of its type-species; and references are also made to other genera that have especially remarkable characters or some economic importance. To complete the factual side, Dr Hutchinson has included a large number of line drawings and some maps, many of them depicting the above-mentioned type species and mostly from his own pen. These in themselves make it a fascinating book to browse through.

Fascinating? Yes, but also exasperating. The text is an amalgam of factual exposition and opinion with, every now and then, a 'hit' at some person, persons or viewpoint with which the author disagrees. This provides entertaining reading; but, for the reviewer at least, it raised doubts as well as smiles. Not all the facts *are* facts. To take one example, if *Xylopia* is 'the only truly natural genus common to the tropics of both hemispheres' (p. 22), then what about the genus *Annona* (Custard Apples), which is native to both Africa and America? Likewise, not all the theories are in accord with the most recent research. Thus the Cactales continue to repose among the 'mainly woody' Lignosae, quite divorced from the Portulacaceae and other Centrospermous families, although evidence continues to accumulate from various sources, chemical as well as morphological, that these groups are closely related. Again, the Eucryphiaceae are still included in the Guttiferales, although in the reviewer's opinion it is quite anomalous in that order and appears to be much more at home near the Cunoniaceae, where Bausch placed it in 1938 (Bausch 1938).

Despite the inaccuracies scattered through the text, however, the reader of this distillation of a lifetime's experience of Dicotyledon taxonomy will obtain a clear picture of the characters of the various Hutchinsonian orders and their suggested inter-relationships, as well as much information not otherwise easily accessible. Whether the student mentioned so often in the text will be able to afford the book is another matter. It is well produced, with remarkably few printing errors. Anyone interested in the inter-relationships of flowering plant families—or even those merely fascinated by the variety of form that they exhibit—should make a point of dipping into this book. They may well decide that, even at £8.50, it is very good value.

REFERENCE

BAUSCH, J. (1938). A revision of the Eucryphiaceae. *Bull. Misc. Inf. R.B.G. Kew*, **1938**: 317–349.

N. K. B. ROBSON

Numerical Taxonomy. Edited by A. J. Cole. Pp. xv + 324. Academic Press, London. 1969. Price £3.

This is a symposium volume, consisting of papers presented at a colloquium on numerical taxonomy held at St Andrews University in September 1968. The papers cover a very wide range of subjects in the field, from the more abstract mathematical aspects to its application in fields as diverse as business enterprises, social geography and botanical taxonomy.

There are 18 papers in all, arranged quite arbitrarily on alphabetical sequence of authors' names. This is slightly disturbing at first; but since there are probably as many ways of classifying the papers as there are methods which they enumerate, it is as reasonable a system as any other. Of these papers seven are either on botanical topics or by botanists and two are geological; zoology, geography, economics, biochemistry and microbiology are represented by one each, while the remaining four are by theoreticians with computing backgrounds. All the authors are convinced that numerical taxonomy is a Good Thing. There are therefore no papers reiterating what it is and why it should be used. Discussion in general in many of the papers revolves round comparisons of different methods.

Goronzy (on business enterprises), McNeill *et alia* (on Caucalid Umbellifers) and Wilmot and Grimshaw (social geography) restrict their techniques to cluster analysis, while Boyce and Ivimey-Cook (on anthropoids and the genus *Ononis* respectively) use both cluster analysis and Principal Components-type techniques. Among the papers concerned with applications of numerical methods is one by Parker-Rhodes and Jackson, who give an ecological/fungal classification using a programme originally devised for linguistic work. This scheme is unusual in that it allows overlapping classes to be formed.

Two papers deal with the comparison of classifications. Sneath's is a useful review article, dealing with the comparisons in qualitative rather than quantitative terms. Jackson's is a theoretical paper dealing with the comparison of classifications, either with themselves or with the original data, and concluding with a graphical technique of potential use in determining the 'goodness' of a classification.

The volume is produced by offset from typewritten copy and is thus slightly tiring to read, though the type-face is slightly shaded and therefore easier than some. Misprints are refreshingly few. Each paper is followed by a transcript of the ensuing discussion. These proved helpful in clearing up difficulties encountered in the texts of some of the papers. An appendix gives specifications or sources of the programmes used by the contributors.

This book is not for the beginner, but as a source book of ideas and improvements for someone already involved in numerical taxonomy, it should prove reasonable value for money—the price is not exorbitant for this day and age.

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