

BOOK REVIEWS

ANATOMY OF THE DICOTYLEDONS, VOLUMES I AND II, by C. R. Metcalfe and L. Chalk. Pp. lxiv + 1,500 + Plates. Clarendon Press, Oxford. 1950. £6 6s.

For over half a century the standard work of reference on the anatomy of the Dicotyledons has been Solereder's *Systematic Anatomy of the Dicotyledons* published in 1899, the English translation by Boodle and Fritsch from the original German appearing in 1908. Drs. C. R. Metcalfe and L. Chalk have produced, in the *Anatomy of the Dicotyledons*, a work which may well become the standard work on this subject for the second half of the present century. This volume aims at providing a summary of our present knowledge of the anatomy of the vegetative organs of the Dicotyledons, it has been written mainly so as to emphasise the taxonomic and phylogenetic value of histology, thus perpetuating but also extending Solereder's chief aim. A large mass of new material has become available for study during the past forty years which has enabled generalisations to be based on a surer foundation and has provided the means of filling many of the gaps in Solereder's work; studies of the secondary wood have also made extensive progress in recent years and much information of value to wood anatomists has been added. This, as the successor to Solereder's classic work, is therefore in effect a new book providing a comprehensive survey of the anatomical characters of leaf, axis and wood of dicotyledonous plants in relation to taxonomy. Some attention has also been given by the authors to ecological and developmental anatomy and to the economic uses of plant materials, thus providing a mine of useful information now made accessible to all who have to deal with plant products of economic importance and with their microscopical structure.

The choice of anatomical characters which may be used to indicate taxonomic affinity is fraught with difficulties, for a similar anatomical response may arise in the members of unrelated groups which are found in the same ecological environment, whilst, on the other hand, some diagnostic characters of no ecological significance have arisen independently in unrelated families. Bearing in mind these factors, the authors have drawn up a list of those characters whose taxonomic value has become well established. These include the hairs, stomata, epidermal cells, veins, petiole, cell contents, cork, endodermis, "pericyclic" sclerenchyma, medullary rays, abnormal bundles, and characters of the wood. It is suggested that the following more descriptive terms be used for the four main types of dicotyledonous stomata:—type A—the "ranunculaceous" or anomocytic (irregular-celled) type: type B—the "cruciferous" or anisocytic (unequal-celled) type: type C—the "rubiaceous" or paracytic (parallel-celled) type: type D—the "caryophyllaceous" or diacytic (cross-celled) type. Since the work is concerned only with the vegetative organs, the anatomical characters of flowers, fruits and seeds are omitted. The anatomy of fruits and seeds has, however, been adequately summarised by Netolitzky.

In order to show the taxonomic significance of anatomical characters the main work is arranged systematically as a description of each family, using a modification of the system of classification described by Bentham and Hooker

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in their *Genera Plantarum*. The monograph on each family indicates the range of anatomical characters observed in the different genera and the descriptions have been arranged under the general plan of Summary (general, wood); Leaf; Axis (stem, wood, root, anomalous structure); Taxonomic notes; Economic uses; Genera described; Literature. The text is freely illustrated, some of the diagrams are from the original Solereder but the greater number are new figures drawn according to a definite plan and employing throughout a uniform system of shading to indicate the different tissues. The work is based upon the examination of a very wide range of materials and of prepared slides from all parts of the world and no large groups of known dicotyledonous plants are omitted from this monumental compilation. The authors and their assistants are to be complimented upon the broad concept upon which the work is based and upon the authoritative anatomical evidence presented with such lucidity. No attempt has been made to over-stress the taxonomic notes for each family, although many valid suggestions are made. The genus *Krameria* is raised to the status of a separate family *Krameriaceæ* distinct from either the *Polygalaceæ* or the *Leguminosæ-Cæsalpiniaceæ*. The phylogenetic implications based upon a study of anatomy are fully discussed and these support the view that angiosperms may be polyphyletic in their evolution from the Cretaceous period, some phyla only being derived from a Magnolian or allied ancestor.

Although the authors have made use of anatomical characters to provide evidence of relationship between families or genera rather than to distinguish between species or groups of less than specific rank, they have also produced much evidence for the use of microscopical methods in the identification of individual species. To pharmacognosists or public analysts who are faced with the problems of identifying unknown samples, this work will provide much help. An examination of such material will allow it to be assigned to its correct family, by reference to thirty-six pages of tables which contain lists of families in which certain diagnostic features occur; these include all the diagnostic characters employed in the microscopical characterisation of leaf, stem, wood or root as well as the aids to diagnosis provided by plant habit and geographical distribution. From these tables one must turn to the description of families for further identification of genus or species and since these sections are not primarily designed for this purpose the work is more difficult. We have here no complete or artificial key for the identification of leaf, stem, wood or root of every dicotyledonous plant, we have however a most comprehensive description of the anatomical characters of the Dicotyledons. Detailed pharmacognostical studies have produced much anatomical information which is recorded in this treatise, although much of the work of the last six years is only included by references in the list of the literature.

The two volumes, extending to 1,500 pages, are well produced, the diagrams and plates are clear and distinct whilst the text appears to be almost completely free from typographical errors and the work is fully indexed. A most useful character of the book is a bibliography of 2,535 references covering the period 1908 to present date; no references given by Solereder in the English translation of 1908 are quoted and thus the two publications provide a complete bibliography of the anatomy of the Dicotyledons. To pharmacognosists and to all others concerned with plant anatomy this publication is indispensable.

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