

BOOK REVIEWS

A. C. DUTTA: *Botany for degree students*. XX + 804 pages, 615 figures. Oxford University Press, Bombay, Calcutta, Madras, 2nd ed. 1968. 25/- Sh.

One of the difficulties for university teachers and students in botany in developing countries is the fact that most available textbooks are written for students in Europe and the USA; the student consequently is supposed to have a knowledge of physics and chemistry as taught in those parts, and of the regional flora from which a large number of examples are taken to illustrate the general principles of morphology, physiology, ecology, etc.

Mr. Dutta's textbook has been primarily written for students preparing for the two- or three-year degree examination of Indian universities (pass standard), and, possibly, for students in other Asiatic countries where English is understood. Without neglecting the flora of other parts, the author emphasizes the vegetation and the crops of India, and as such his book will be highly welcome to all botany students in the paleotropics.

The book consists of ten parts: morphology, histology, physiology, ecology, cryptogams, gymnosperms, angiosperms, evolution and genetics, economic botany, and paleobotany. The text contains a wealth of information on these subjects, but on the whole the author is keener on giving facts (among them many on the historic development of a subject) than on showing the connections between them and thus adding to the reader's understanding.

The chapters on morphology are well adapted to the needs of the Indian student: almost all examples are from plants growing in India or cultivated there. The text is illustrated by many figures, most of them original drawings by the author. This part includes such items as pollination, fertilization, embryo development, seed germination, and dispersal of seeds and fruits. The morphology of gymnosperms and cryptogams is not included. The chapters on anatomy (including histology and cytology), too, are confined to the angiosperms.

On the whole these chapters are fairly adequate, but when bio- or phytochemical aspects are dealt with, the author often is beside the mark. Consequently the next chapters, on physiology, are the least satisfactory of the book. Physical and chemical aspects are often introduced in rather an unsatisfactory manner, e.g.: "Effect of Rays of Light on Photosynthesis. – It is a known fact that white light is composed of seven colours arranged in the following order: Although photosynthesis normally takes place in white light, it is only a few of the above rays that are required for this function." (p. 309).

Apparently the students are not supposed to have a more than elementary knowledge of physics and chemistry: the chemical symbols for the elements are used, but not one structural formula of even a simple organic substance is given. Consequently it would be difficult to show the connections between different metabolic processes and, on the whole, no attempt is made in that direction.

Whatever the student's level may be, it is no excuse for erroneous statements, many of which are to be found in these chapters, e.g.: "In plants fats are usually present in the form of oils. Oils are of two kinds, viz. *fixed* or non-volatile, . . . , and *essential* or volatile. . . ." They: ". . . are decomposed by the enzyme *lipase* into fatty acids and glycerine. By this decomposition a large amount of heat is liberated." (p. 162 and 322). "Starch is formed from glucose under the action of an enzyme (phosphorylase). The action is reversible." (p. 158). "As the hydrolysing enzymes break down proteins into amino acids during the germination of seeds, in the reverse way these enzymes condense back the amino acids into proteins" (p. 312/313) (The relation between DNA, RNA and protein synthesis is briefly mentioned in the chapter on genetics.) Root pressure is explained as a result of the cortex cells alternately taking up water from the outside and becoming turgid and then by their wall pressure pressing it out towards the xylem, becoming flaccid in the process (p. 280/281). These few examples may warrant the conclusion that part III and the biochemical and physiological items in the other parts should be thoroughly revised by one of the author's colleagues with a more specialized knowledge of plant biochemistry and physiology.

Good descriptions of a large number of simple experiments enliven the text.

In part VIII an introduction is given to the principles of ecology, followed by a paragraph on the vegetation of India, which is original and seems adequate, in spite of its conciseness. It is not always that one finds such a treatment in a textbook of botany, and its inclusion in the present one is to be applauded.

The taxonomic part is sometimes fairly up to date, sometimes not. The paragraphs on cryptogams and gymnosperms seem rather antiquated. The examples for elucidating the life-cycles of cryptogams could perhaps in many cases have been chosen from locally more readily available representatives. It is regrettable that paleobotany receives such a superficial treatment, particularly because of the very important contributions to this discipline by the Indian school. The great differences between the groups of Gymnosperms should have been much more emphasized on morphological and paleobotanical grounds.

It is somewhat surprising that the chapter on the principles and systems of classification precedes the treatment of the Angiosperms, as if it applied solely or primarily to this group, which has some slight historical but, of course, no other justification.

The families of Dicotyledons treated more at length seem well chosen from a local point of view. The floral formulas seem of little value in present day taxonomy, and the complete absence of chemotaxonomical and almost complete absence of anatomical data relating to Angiosperm taxonomy are most regrettable. The Monocotyledons are sadly underrepresented.

The glossary of plant names listing local names of about 340 species in a considerable number of Indian languages should prove useful.

The inclusion of a chapter on economic botany is an indication of the importance of agriculture and agricultural research for the Indian student of botany. The chapter on genetics, too, seems to have been written with its importance for plant breeding in mind. This bias towards the utility of plants for mankind explains why the vitamins, mentioned in the chapter on growth, are discussed as nutrients for man and not with regard to their importance for the plants producing them.

H. P. Bottelier
K. U. Kramer

M. H. ZIMMERMANN and C. L. BROWN: *Trees, structure and function*. With a chapter on irreversible thermodynamics of transport phenomena by M. T. TYREE. 134 figures, 13 tables, XIII, 336 p. 1971. Berlin, Heidelberg, New York, Springer Verlag. DM. 72.-, U.S. \$ 19.80.

According to the preface the authors have confined themselves to subjects more or less typical for trees, and did not intend their book to be a general tree physiology. This restriction has enabled them to give an admirable account of several aspects of the relations between form and function in trees.

Three chapters are concerned with the primary and secondary growth and the correlations responsible for the shape of the tree and the typical differences between the species in this respect. The second major subject is the transport of solutes in the xylem and the phloem, supplemented by a highly welcome chapter on the steady state thermodynamics of translocation by M. T. Tyree.

The last chapter contains a description of storage, mobilization and circulation of assimilates. Here the absence of the biochemistry of the first two phenomena is felt as an omission.

The trees of the title are either Gymnosperms or Dicotyledons; the arborescent Monocotyledons are only mentioned in two half page paragraphs on xylem transport and storage of assimilates, respectively, and in a few casual remarks.

Recent as well as older literature have received full consideration.

The book is highly recommended to everyone interested in tree physiology.

H. P. Bottelier