

to Miss Pert, who deserve the thanks of radiata foresters and research workers in many countries for their initiative. With this bibliography, and with C. W. Scott's monograph, "*Pinus radiata*" (FAO Forestry and Forest Products Study No. 14, 1960), the seeker for published information about the remarkable pine is well on the way to his goal.

G.C.W.

PHYSIOLOGY OF TREES, by Paul J. Kramer and Theodore T. Kozlowski. 1960. McGraw-Hill Book Co., New York. 642 pp. Price \$12.50.

THE PHYSIOLOGY OF FOREST TREES, edited by Kenneth V. Thimann. 1958. The Ronald Press Co., New York. 678 pp. Price \$12.00.

TREE GROWTH, edited by Theodore T. Kozlowski. 1962. The Ronald Press Co., New York. 442 pp.

A statement to the effect that few professional foresters equip themselves with a knowledge of plant physiology, and that trees have been used experimentally by few plant physiologists, prefaces the second of these three volumes. Together, they provide not only an excellent survey of the extent to which the latter deficiency is now being overcome, but they also present means whereby the forester may revitalize an understanding that is fundamental to much of his practice.

The first book has already become a standard text for forestry courses. Its comprehensive and balanced presentation will ensure that only further advances of knowledge can supersede it. The approach adopted by the authors is functional and ecological, rather than biochemical. Details of metabolism are introduced only if they are needed to explain the effects of environment on physiological processes underlying growth and reproduction.

The sequence of chapters proceeds from growth and structure, through photosynthesis, carbohydrate and nitrogen metabolism, assimilation and respiration, to translocation and accumulation. There are then four chapters devoted to mineral nutrition and water relations. Reproduction and the physiology of seeds are each treated separately. The final two chapters, on internal factors affecting growth and environmental factors affecting growth, return to the unifying theme of the introduction.

Sub-headings within chapters add greatly to the clarity of presentation, and these are all readily referred to in the subject index. Unfortunately this does not include the names of individual tree species. The numerous figures are well-chosen and beautifully clear, further enhancing the lucidity of text.

Each chapter is followed by a brief list of general references, and there is a complete author index; but one of the most valuable features for the pertinacious reader is the bibliography of over 1,700 references.

The book edited by Thimann comprises papers presented at the first International Symposium on Forest Tree Physiology, held at

the Harvard Forest in 1957. Contributors to this meeting were selected to provide the broadest possible coverage of the field by active workers on some problem of tree physiology. Inevitably some of the papers are highly specialized; but these are more than counterbalanced by the neat deductions of several workers, using the simplest of equipment and a little originality of observation. For the field man particularly, the fascination of these deductions and much of the book's value will reside in the discussions which follow all but two of the papers.

Arrangement of the text is in nine parts, embracing 35 papers in all. The individual sections (number of papers contained in parentheses) are concerned with: water relations and sap movement (7), photosynthesis (3), general biochemistry (4), mineral nutrition (2), phloem transport (3), root growth (4), other growth phenomena (3), photoperiodism and thermoperiodism (4) and reproduction (5). Each paper is followed by a list of selected references. There is an author index and a good subject index, which includes specific and other names of plants.

Tree Growth contains the formal contributions to an International Conference on Forest Tree Growth, convened at the University of Arizona in 1960. It is a pity that only four of the discussions are included, and that these take the form of comment by individual chairmen, thereby sacrificing the interplay of ideas and independent and sometimes contradictory observations that are a feature of the second book reviewed above.

The 27 papers vary greatly in content, in comprehensiveness of treatment, and in their originality of approach. Four of them are concerned with studies of tree meristems; another four deal with genotypic and ecotypic variations of growth; and the last four papers are concerned with the growth of stands of trees, and with predicting their development. Further contributions consider the effects on growth of rainfall, photoperiod, temperature (two papers), soil moisture, climate, and endogenous factors. Papers about the direct effects of photosynthesis and of water deficits on growth precede a straightforward summary on mineral nutrition and a new aspect of mycorrhizal development. Finally, there are papers on the generally neglected topics of root-grafting and on the role of carbon dioxide in the soil.

The compendium is dedicated to A. E. Douglass, the pioneer of dendrochronology, but it contains only one paper directly concerned with this subject.

Although putatively an international conference, only five of the 52 participants actually came from outside North America. This deficiency is also reflected in the literature cited by most of the contributors, and in the author index: much recent European work appears to have been neglected. For these reasons the rather flimsy subject index cannot be used to give good leads into relevant topics that one may wish to pursue further. The book may be recommended to most readers of *N.Z. Journal of Forestry* as a useful and interesting supplement to the first two volumes. It provides neither a good introduction to, nor a good survey of, tree growth.

D.S.J.