REVIEWS

Xylem structure and the ascent of sap. M.H. Zimmermann, 143 pp., illus., 1983. Springer-Verlag, Berlin, Heidelberg, New York, Tokyo. Price: US\$ 23.30 or DM 54.00 (cloth).

This is the first instalment of a new series in wood science published by Springer and edited by T.E. Timell. Its subject matter is one of the most exciting in tree biology and its author M.H. Zimmermann guides the reader through the complexities of wood structure and function in a captivating way. The book is not a reference textbook in the traditional sense but an 'idea' book as the author explains in his introduction.

The book starts with a survey of the structure of the conducting units (vessels, tracheids) and the three-dimensional vessel network in hardwoods and monocotyledons. The cohesion theory of sap ascent is treated subsequently, and additional concepts like 'designed leaks', 'capillary water storage' and 'sealing' are introduced. The hydraulic architecture of plants and other structural adaptations are the subjects of two chapters. The final chapters deal with failure and senescence of xylem function and pathology of the xylem.

Apart from concepts and theories which many readers will be familiar with from Zimmermann & Brown's well-known textbook on tree structure and function and from other recent papers by the author and his co-workers, the book contains many original ideas and hypotheses (admitted to be speculative in the introduction) not published before. Most important of these are perhaps the extensions of the cohesion theory by the concepts of air-seeding through designed leaks in the vessel wall, capillary storage and various sealing mechanisms. Future experimentation will have to prove the validity and significance of these concepts, but it seems likely that here are three mechanisms which offer subtle possibilities for the xylem to react to severe stress, making speculations on the function of certain anatomical parameters by some of us redundant. On the other hand it is a pity that at this stage the hypothesis of air-seeding through designed leaks is not provided with structural backing. This leaves the reader with questions like 'how often are vessels in touch with air spaces or embolised elements?' or 'which pores in the vessel wall are suitable for the passage of air bubbles?'. It might be that air-seeding is more important in the primary xylem of leaves and petioles where intercellular spaces abound than in secondary xylem where intercellular spaces are less in evidence (at least in a great number of species).

This review is not the place for discussing

all other ideas presented in the book. Some of these are not only of fundamental importance for our understanding of the functioning of living trees, but have also vast consequences for the practical field of tree pathology.

This book shows that the interdisciplinary field between plant anatomy, physiology and physics is still a most fruitful area of enquiry. The author gives full credit to predecessors from the nineteenth century who worked in a period when physiology and anatomy were still pursued as an integrated part of plant biology. Even the work of Leonardo da Vinci on tree architecture receives attention.

'Xylem structure and the ascent of sap' makes stimulating reading and should be compulsory for all with an interest in trees and wood – be it students, teachers or research workers. The price is not too high for this attractively published book.

Pieter Baas

The wood properties of Radiata Pine. R.K. Bamber and J. Burley, 84 pp., illus., 1983. Commonwealth Agricultural Bureaux, Farnham Royal, Slough SL2 3BN, U.K. Price: UK£ 10.00 or US\$ 21.00 (paper).

This book reviews present knowledge on one of the most important species in modern forestry, *Pinus radiata*. It has become an exquisite monograph doing full justice to fundamental aspects and their significance for applied wood science and forestry. Wood anatomy is comprehensively discussed in chapters 3 and 7, and anatomical characters are also invoked to contribute to an understanding of density variation (chapter 4), earlywood and latewood (chapter 5), growth related effects (chapter 8), permeability (chapter 11) and durability (chapter 12). Other chapters deal with nomenclature and classification, spiral grain, silvicultural practice and wood quality, moisture content in the living tree, and genetic and environmental control of wood properties. A selected, but quite full annotated bibliography concludes the book.

The primary use of this monograph will doubtlessly be for all colleagues in forestry and the forest products industry dealing from time to time with Radiata Pine. However, thanks to its scope and readability it can also be warmly recommended for specialised teaching, because it shows so well how the different aspects of structure, wood quality, forestry practices, breeding, and wood processing hang together, and should be studied as an integrated whole for sound management at all stages from the forest floor to the end-user.

Pieter Baas