Book Review

Barnett, J. R. (Ed.): Xylem Cell Development. 307 pp. Ltd., Tunbridge Wells, Kent: Castle House Publications 1981. $ 62.50

There are few modern books dealing with the formation of the xylem, and this book is therefore a welcome addition to an important area of plant science. As pointed out by the editor in his preface, the emphasis in this book is on the cellular rather than on the whole tissue level. The introduction by R. D. Preston presents a brief survey of the subject. The anatomy and development of the primary xylem is discussed by T. P. O'Brien in a well documented review. The editor, J. R. Barnett, has contributed a long chapter on the development of the secondary xylem. Unfortunately, this review does not give an entirely balanced view of the subject, since so much space has been devoted to the author's own research with *Pinus* and *Aesculus*. Perforation plates in vessels are discussed by B. A. Meylan and B. G. Butterfield. The lignification phase of xylem differentiation is treated in Chapter 4 by A. B. Wardrop. The major part of this chapter is concerned with the biochemistry and physiology of lignification. Cell cycle and cell division in xylem differentiation are discussed by J. H. Dodds and biochemical changes by P. B. Gahan.

In one of the best chapters in this book, R. A. Savidge and P. F. Wareing review the role of plant growth regulators in the differentiation of vascular tissues. In this thorough and extensive (231 references) survey of a difficult and far from fully understood topic, much attention is devoted to the reactivation and division of the cambium, the formation of the annual rings, and the role of the needles in the conifers. The cambial reactivation by auxin in diffuse-porous and ring-porous hardwoods is also discussed. In Chapter 8, M. P. Denne and R. S. Dodd discuss the influence of the environment on xylem differentiation, a subject that in the past has not attracted the attention it deserves. The last two chapters deal with two important wood defects. Formation of spiral grain is treated in a concise, yet informative review by J. Maddern Harris. Included here is also a discussion of waivy grain and the new concepts recently developed by Wodzicki and his co-workers, entailing moving cambial domains and oscillating auxin waves. In Chapter 10, B. F. Wilson has presented a thoughtful review of the strains and stresses associated with formation of reaction wood. The position taken here is that there is a continuum in this respect from normal to reaction wood. It is now generally assumed that growth stresses arise during differentiation of the secondary wall in tracheids and fibers. The four different hypotheses that have so far been advanced to explain the origin of these stresses in especially compression wood are critically evaluated. There can be little doubt that lignification, as argued by J. D. Boyd, is the most likely cause. Wilson also points out, however, that Boyd's theory is less successful in predicting growth strains generated by compression wood with a microfibril angle less than 40° or by tension wood. His conclusion is that none of the present hypotheses seem adequate to explain all growth strain phenomena.

Some of the chapters in this book would have benefited from a more careful editing and proof reading. There are two Figs. 2.44, and the captions to Figs. 2.42 and 2.43 have been interchanged. The references abound in misprints, including wrong names. German titles of articles cited are often unintelligible. In the references of one chapter, the author lists only the first name when there are more than two investigators, an undesirable practice. These blemishes notwithstanding, this is a book that can be recommended to all scientists interested in the properties and formation of wood. A comparison with the recent, similar book by L. W. Roberts, "Cytodifferentiation in Plants" is not without interest. Both books are excellent, but at least to this reviewer there is still an advantage in having an integrated, uniform treatment of a complex subject presented by only one author. Unfortunately, such books are becoming increasingly rare. *T. E. Timell*