

Forest Products and Wood Science: An Introduction

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There are few publications that cover the wide and varied field of forest products, and wood science and technology, in the way that this classic text does at the introductory level. This is the fifth edition of the textbook first published by Haygreen and Bowyer in 1982. In this edition, the authorship has been amended by adding Dr Ruben Shmulsky as a new contributor, and the contents have been extended to improve the coverage of commercial composite products used in North America.

I am not aware of any other text that attempts to cover this field for a broad audience as has been done here: the nearest is the classic wood science work by Brown, Panhin and Forsaith (1952)¹.

The new edition has 19 chapters, one more than the first edition. It consists of four main sections:

1. Basic wood and bark properties and structure including juvenile and reaction wood of both hardwoods and softwoods (Chapters 1–7)
2. Physical properties of wood including wood durability and wood protection (Chapters 8–12)
3. Products and manufacturing processes including structural and nonstructural panels, composites and pulp and paper (Chapters 13–16)
4. Global supply of raw materials, energy from wood and environmental implications arising from the use of wood (Chapters 16–19).

Each chapter has an impressive and updated bibliography; some chapters also include supplemental reading materials, and some references have web links to information and resources, particularly in Section 4. There is a thorough and practical appendix consisting of 10 tables extracted from the *USDA Wood Handbook*². This is particularly useful as a source of data on a range of physical and mechanical properties, and information on nomenclature, of commercial timbers from North America together with a good number imported from South America and Africa but only a few from Australasia. Although the appendix has changed little in scope, the data have been presented in both SI and imperial units, thus enabling easy comparison with the many varied published data sets including

those from older US publications. Combined units are generally used throughout the whole book.

Unlike the first edition, the table of contents includes only chapter headings and omits the major topics within each chapter. This, in my opinion, is an unfortunate deletion, as the details now omitted were very useful for locating specific topics. While not exhaustive, the single subject and author index works well for finding specific information except for those species in the appendix.

In keeping with the first edition there is a review following each chapter, with questions on the material covered. This is a great aid to learning each chapter, but it lacks answers, selected answers or specific links to where the answer may be found in the chapter. Answers — or links to them in the text — would aid understanding of the material, particularly when the book is used as a college or reference text by readers not familiar with the topic.

Overall the quality of the book has been maintained at an excellent standard — the previous illustrations have been reproduced with little loss, although there are few additions. The original drawings and graphs were boxed and appeared quite distinctive, whereas in the current edition the boxes have been removed and, in my view, this has reduced the impact of the illustrations.

The basic process of tree growth, which is so important for laying down the foundation for a thorough understanding of wood science, is particularly well presented in the first chapter of this book. Wood structure is covered thoroughly but without specific discussion of methods of wood identification, although some references have been provided. A further very positive aspect of the book is that numeric, fully worked examples are provided in Section 2 chapters dealing with physical, mechanical and other wood properties.

In Chapter 6 dealing with juvenile and reaction wood, new research results have been added. In the introductory part, the definition of juvenile wood based on Rendle (1960) and originally used in the first edition has been replaced with an unreferenced version which claims that the width of the juvenile zone decreases upward towards the tree crown. This view is based on research by Yang *et al.* (1986)³, who suggest a somewhat different way of identifying the extent of juvenile wood in *Larix* spp. (larch). Unfortunately not a single reference is made in the text to the extensive publications of D.J. Cown, nor for that matter to other findings of Australasian research on wood quality or the effects of silvicultural practices

¹Brown, H.P. Panshin, A.J. and Forsaith, C.C. (1952) *Textbook of Wood Technology*. 2 vol. McGraw-Hill, New York.

²United States Forest Products Laboratory, USDA Forest Service (1999) *Wood Handbook — Wood as an Engineering Material*. General Technical Report 113. Forest Products Society, Madison, Wis. Available as: <http://www.fpl.fs.fed.us/documnts/fplgtr/fplgtr113/fplgtr113.pdf>.

(Chapter 12) — a grave omission. The book relies largely on research based on North American species and allied publications.

The book does provide information about wood products and the importance of wood as a raw material in our energy-hungry world. A strong message is relayed about advances in timber technology over the past few years. The last chapter of the book contains a timeline spanning five decades and illustrating how new products have been developed — progress has been impressive. This again, however, focuses on products from the North American perspective, with little indication of trends that may be useful for Australasia. Some of the processes used for composites of northern temperate hardwoods species, for example flake-board, may not work well with eucalypts. Similarly some data in the appendix should be viewed with caution — for example the durability of species (Table 4, p. 512) needs to be considered in the context of the wood being used in the USA. It is likely to be only indicative of performance of these woods if used in Australia.

While reading such a large book I was delighted to find at least one typo (page 318, '*Eucalyptus regnana*' should be *Eucalyptus regnans*).

On the positive side, Chapter 17 compares wood fibres with agricultural fibres including straw, hemp and kenaf for

papermaking and related fibre technologies. This is a useful contrast of a wide range of feedstocks and some of their attributes. Probably the greatest change from the earlier edition to the present one is the inclusion of structural and non-structural panels, including wood-composite products available now on the North American market.

In conclusion, this is a very well written introductory text — such a text is important because it provides a foundation of knowledge in the discipline of forest products and, via its rich body of reference material, it is a good stepping stone to more advanced works. Developments in wood technology are well described and have been updated thoroughly for the North American scene, and when viewed in that light it can serve as a useful introductory text for academic programs and readers interested in the basics of wood science and the workings of wood processing.

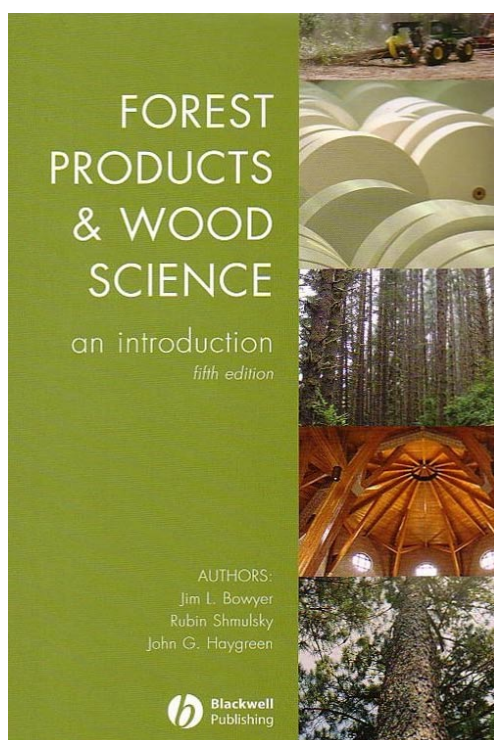
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³Yang, K.C., Benson, C.A. and Wong, J.K. (1986) Distribution of juvenile wood in two stems of *Larix laricina*. *Canadian Journal of Forest Research* **16**, 1041–1049.

Library of Congress Cataloging-in-Publication Data Shmulsky, Rubin. Forest products and wood science : an introduction / Rubin Shmulsky, P. David Jones ; drawings by Karen Lilley. 6th ed. p. cm. Includes bibliographical references and index. Wood-based materials discussed include solid wood products, engineered composites, energy, and paper and fiber products. Also discussed are the basic processes involved in the production of the principal wood products and how wood properties affect their use and performance. Related issues examined herein include the use of wood for energy and chemicals, environmental implications of wood-based materials, and the global wood supply picture. Timell, T.E. Springer Series in Wood Science. Books on Wood Anatomy, Transport Processes, Growth Stresses, Wood-Water Relations, Biomass, Natural Products, Fibers a.o. Tsoumis, G. (1991). Science and Technology of Wood: Structure, Properties, Utilization. Van Nostrand Reinhold, New York. Walker, J.C.F. et al (1993). Forest Products and Wood Science. An Introduction. Iowa State Univ. Press. An easy-to-understand introduction to wood; how it's grown, harvested, logged, treated, and turned into thousands of useful products. Individual trees can also be selectively felled from mixed forests and either dragged away by machine or animal or even (if it makes economic and environmental sense) hauled upward by helicopter, which avoids damaging other nearby trees. Sometimes trees have their bark and small branches removed in the forest before being hauled away to a lumber yard for further processing, though they can also be removed intact, with the entire processing done offsite. Roundwood and sawnwood are what you might call natural wood products, because they involve using cut pieces of tree more or less in raw form.