中国湖南主要经济木材解剖性质及彩色图鉴

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S781.1-64/1

科学出版社
北京

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Wenbin Fang　Yiqiang Wu

Science Press
Beijing

内 容 简 介

本书是木材鉴定的范例和基础，为便于同国内外学者进行学术交流，采用中英文体裁，描述了 24 科 38 属 50 种中国湖南主要经济木材解剖性质。第一章材料与方法。第二章木材体视特征的测定与计算。第三章木材鉴别与利用：分针叶树材（5 科 10 属 16 种）和阔叶树材（19 科 28 属 34 种）编制木材宏观构造、显微构造检索表；每种木材从学名、英文名、别名及商用名、树木及分布、木材宏观构造、木材显微构造、木材体视特征、木材标本、木材加工性质到木材利用作了详细描述，并附有实木和显微三向切面特征的精美彩色照片，计 308 幅，图文并茂，直观明了，便于比较，增强了检验性和科学性；木材体视特征应用于木材鉴定，为木材名称的鉴定赋予了新的内容，在木材工业生产上具有指导意义。第四章木材鉴别与命名对木材鉴定的目的、准备、原则、方法和步骤以及木材命名的法则作了精辟概述。

本书可供国内外林业大专院校、林业科学研究院（所）、木材质检所、商检局（所）、木材检测站及从事木材研究的科技工作者参考。

图书在版编目(CIP)数据

中国湖南主要经济木材解剖性质及彩色图鉴/方文彬，吴义强著. —北京：科学出版社，2011

ISBN 978-7-03-029847-8

Ⅰ.①中… Ⅱ.①方… ②吴… Ⅲ.①经济林-木材识别-湖南省-图解 Ⅳ.①S781.1-64

中国版本图书馆 CIP 数据核字（2010）第 259360 号

责任编辑：李秀伟 李晶晶/责任校对：朱光兰

责任印制：钱玉芬/封面设计：美光制版

科学出版社 出版

北京东黄城根北街 16 号

邮政编码：100717

http://www.sciencep.com

北京佳信达欣艺术印刷有限公司 印刷

科学出版社发行 各地新华书店经销

*

2011 年 1 月第 一 版 开本：787×1092 1/16

2011 年 1 月第一次印刷 印张：28 3/4

印数：1—1 500 字数：650 000

定价：168.00 元

（如有印装质量问题，我社负责调换）

前　言

中国湖南气候温和、雨量充沛、植物种类繁多，其中木本植物2000多种。要区分这些树木的木材种名，就要进行木材鉴定，这是一项复杂的技术过程，而鉴定基础是木材组织结构以及组织率的变异，其核心是木材细胞特征。为了提高科学鉴别木材的水平，做到木材种名准确、按质定价、合理利用，促进木材工业的发展，作者著成《中国湖南主要经济木材解剖性质及彩色图鉴》一书，供国内外林业科学工作者、大专院校师生、木材科学研究人员参考。

本书共描述了24科38属50种中国湖南主要经济木材，其中针叶树材5科10属16种，阔叶树材19科28属34种。每种记载内容包括种名、英文名、别名及商用名、树木及分布、木材宏观构造、木材显微构造、木材体视特征、木材标本、木材加工性质和木材利用等部分。每种摄有实木和显微三向切面特征的精美彩图，有些针叶树材还摄有立木树冠和成熟材树皮的彩图；典型的木材薄壁细胞中晶体和纤维形态亦附有彩图。全书彩色图版（Plates of Color Photograph）均附在每个物种的中文介绍后，英文对照部分图版不再重复出现。

本书的一个特点是将木材三向切面（横切面、径切面、弦切面）的特征摄制成彩色照片，图文并茂，直观明了，便于比较，增强了检验性和科学性；另一特点是每种均有木材体视特征数据，作为木材图鉴出现，这对于木材名称鉴定和木材加工利用具有积极的意义。

本书对木材鉴定的目的、准备、原则、方法和步骤以及木材命名的法则亦作了概述。

值本专著出版之际，感谢国家自然科学基金委基金项目（No. 30671634；No: 31070496）、国家“十一五”科技支撑计划课题（No. 2008BADA9B0102）、国家林业公益性行业科研专项（No. 200704020）、国家“948”项目（No. 2009-4-51）、国家教育部留学基金（No.［2007］1108）、湖南省杰出青年基金项目（No. 09JJ1003）在经费方面给予的大力支持；感谢李松、卿彦、姚春花、宋烨、秦志永、何伟、吴毅等研究生为本专著的出版付出的辛勤劳动；同时感谢留学法国的袁姗姗博士和留学美国的谢新峰博士对全书英文全面细致的校对。

在本书撰写过程中，参加试材采集的有黄玲英、罗建举、李飞云和洪元贞等同志，深表感谢！

本书不妥之处，欢迎专家和读者指正。

方文彬　吴义强

2010年6月

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Preface

Hunan Province, located in the south of China, has a mild climate and abundant rainfall. There are a wide range of plants in this area, including about 2000 species of woody plants. It is a complicated technical process to identify the wood from these species. Wood identification is based on wood anatomic structures and the variation of tissue rate, and the key is the characteristics of wood cells. In order to improve the level of scientific identification of wood, clarify wood species name, set prices according to wood quality, and promote the development of wood industry, the authors edited this book to provide a reference for forestry scientists, teachers and students in universities, colleges and institutions, and others interested in wood science.

This book described 24 families 38 genera 50 species of the major commercial wood in Hunan, including 5 families 10 genera 16 species of conifer species and 19 families 28 genera 34 species of broadleaf species. The record of each species includes Latin name, English name, commercial name, the tree and distribution, macroscope structure, microscope structures, the stereology characteristics, wood specimen, wood machining properties and wood utilization. Each species has colorized photographs of solid wood and microscopic three-section features; for some conifer species, the photographs of the crown of a standing tree and the bark of a mature tree were also included. Colorized photographs of the crystals in typical parenchyma cells and the morphology of the wood fibers were included as well. For each species, plate of color photograph is attached to the Chinese introduction part, therefore in the English introduction part, photographs plates are not included so as to avoid repetition.

The book used exquisite colorized photographs to display the three-section characteristics of wood (cross section, radial section and tangential section), which is well-illustrated, stereological, clear, and easy for comparison. It is a handbook that gives the stereological characteristics data of each species, which has great significance for wood identification and wood processing and utilization.

The purpose, preparation, principles, methods and steps of wood identification were described and the wood classifying rules were discussed in this book.

We are grateful for the funding supports from National Natural Sciences Foundation of China (No. 30671634; No: 31070496), National Key Technology R&D Program in the "Eleventh Five-year" Plan of China (No. 2008BADA9B0102), National Forestry Special Fund for Public Welfare Industry (No. 200704020), National "948" Project (No. 2009-4-51), State-sponsored Study Abroad Program from Ministry of Education

(No. [2007] 1108) and Hunan Province Outstanding Youth Fund (No. 09JJ1003). We also give great thanks to the graduate students Song Li, Yan Qing, Chunhua Yao, Ye Song, Zhiyong Qin, Wei He and Yi Wu, for their painstaking work on English for the publication of this book. At the same time, we thank Dr. Shanshan Chang and Dr. Xinfeng Xie for checking the English translation and proof reading.

We would like to make a grateful acknowledgement to Lingying Huang, Jianju Luo, Feiyun Li and Yuanzhen Hong for their excellent work on samples collecting.

Your suggestions and comments will be highly appreciated.

Wenbin Fang Yiqiang Wu

June 2010

Abstract

This book, published in both Chinese and English, provides the fundamental information about wood indentification, as well as the wood anatomical properties of 50 important commercial wood species(24 families 38 genera) from Hunan Province. The first chapter introduced materials and methods. Chapter Ⅱ was about the measurement and calculation of wood stereological characteristics. Chapter Ⅲ was about identification and utilization of wood: compiling wood macrostructure and microstructure keys in softwood (5 families 10 genera and 16 species) and hardwood (19 families 28 genera and 34 species). For each tree species, the Latin name, English name, commercial name, trees and distribution, wood macroscope structures, wood microscope structures, wood stereological characteristics, wood specimen, wood machining properties and wood utilization were described in detail, and 308 pieces of exquisite colorized photographs of solid wood and three sections of microscope features were attached. Therefore, the book is well-illustrated, intuitive, clear and convenient for comparison. Stereological characteristics of wood are used in wood identification, which give the new content to wood name identification and provide instructive guide for wood industry. Chapter Ⅳ gave a detailed overview of wood identification, such as purpose, preparations, principles, methods and steps as well as the timber classifying rules.

The book can be used as a reference for wood scientists working in domestic and foreign forestry universities, colleges and institutes, forest science research institutes, lumber quality testing institutes, commodity inspection bureaus, and lumber examine stations.

著 者 简 介

方文彬，男，1934 年出生，广东省信宜市人。中南林业科技大学材料科学与工程学院，教授，硕士研究生导师，中国著名木材科学家，世界华人交流协会荣誉博士。1956 年毕业于广州林业学校，分配到华南林业科学研究室工作，1958 年后，先后在广东林学院、中南林业科技大学（原中南林学院）工作，从事木材解剖与鉴定、木材科学与技术的教学与科学研究 40 余年，在木材解剖和古木名称鉴定方面有较深造诣。主持了国家“八五”科技攻关“不同培育措施对人工林木材性质的影响”，获国家科技进步奖二等奖；参加“银杉木材构造和性质的研究”、“杉木木节对受弯大构件承载能力影响的研究”，分别获国家林业部三等奖和湖南省科技进步奖四等奖。编著了《木材构造与性质》，参著了《中国主要人工林树种木材性质》、《银杉木材构造和性质》、《海南主要经济树木》，参编了《实用家具及装潢材料手册》。译著 1 本，发表了以《针、阔叶树材组织率的研究》和《湖南战国古墓木材的鉴定》为代表的论文 60 多篇。

Wenbin Fang, male, was born at Xinyi of Guangdong Province in 1934. As a professor and graduate supervisor in the College of Materials Science and Engineering at Central South University of Forestry and Technology, Professor Fang is one of the well-known wood scientists in China, and holds honorary doctorate of World Chinese Interchange Association. After graduated from Guangzhou Forestry School in 1956, he worked at the Forestry Laboratory of South China. In 1958, he went to the Guangdong Forestry College and then to Central South University of Forestry and Technology. Engaged in teaching and scientific research of wood science and technology for more than 40 years, Professor Fang has done tremendous researches on wood anatomy and wood identification, and has great accomplishments on identification of ancient wood. He took charge of the National Key Technology R&D Program in the "Eighth Five-year" Plan of China on "Effects of Different Cultivation Measures on the Wood Properties of Planted Forest", and won the 2nd prize of National Science and Technology Progress Award of China. He also participated in the project of "The Structure & Properties of the Wood of *Cathaya argyrophylla*" as well as the project of "Study on the Effect of Knot of Chinese Fir Wood on Loading-bearing Capacity of Bending Structural Members", which respectively won the 3rd prize of Science and Technology Progress Award of Chinese Forestry Ministry and the 4th prize of Science and Technology Progress Award of Hunan

Province. He edited the book *Wood Structures and Properties*, co-authored *Wood Properties of Main Tree Species from Plantation in China*, *Structure & Properties of the Wood of Cathaya argyrophylla* and *Major Economic Trees in Hainan* and co-edited *Practical Handbook of Furniture and Decoration Materials*. He also translated one book and has published more than 60 articles, including *Study on the Rate of Tissue of Conifer and Broadleaf Species* and *Identification of Wood from Unearthed Ancient Tombs in Warring States Period in Hunan*.

吴义强，男，1967 年出生，河南省固始县人。中南林业科技大学材料科学与工程学院，博士，教授，博士研究生导师，院长。全国优秀教师、湖南省教学名师、湖南省高校学科带头人、木材科学与技术国家重点学科带头人、新世纪百千万人才工程国家级人选、国务院学位委员会学科评议组成员。现为日本木材学会会员、美国林产品学会会员、中国林学会高级会员，中国林学会青年工作委员会副主任委员、中国林学会生物质材料科学学会理事、中国林学会木材科学分会常务理事、全国林业生物质材料标准化技术委员会副主任委员。1991 年毕业于中南林业科技大学木材科学与工程专业。先后于中南林业科技大学和日本国立爱媛大学分别获木材科学与技术硕士学位和生物资源利用学博士学位。毕业后，长期从事教学和科研工作，并同时致力于木材性质（主要在木材解剖学、物理力学、化学等）、木材功能性改良、木材干燥、木基复合材料等领域的科学研究工作。在木材科学研究领域，首次提出的“木材细胞瞬间皱缩理论及最大瞬间皱缩理论”引起了国内外同行较广泛的关注。主持国家自然科学基金项目、国家“十一五”科技支撑计划课题、国家林业公益性行业科研专项、国家引进国际先进林业科学技术项目（国家“948”项目）、国家教育部留学基金、国家人力资源与社会保障部留学归国人员择优资助重点类项目、湖南省杰出青年基金项目等省部级及其以上项目 20 余项。先后荣获湖南省自然科学优秀论文一等奖、第二届梁希青年论文一等奖、湖南省科技进步奖三等奖、湖南省技术发明奖三等奖和国家科技进步奖二等奖。近年来在国内外重要学术期刊和国际学术会议上发表科学论文 100 余篇，其中 SCI、EI、ISTP 收录论文 50 余篇，授权和公开国家发明专利 20 余项。负责并主讲的《木材学》课程被评为国家级精品课程。

Yiqiang Wu, male, born 1967 at Gushi of Henan Province, is the doctoral supervisor and dean of College of Materials Science and Engineering at Central South University of Forestry and Technology. Up to now, he has been honored with the title of National Outstanding Teacher and Outstanding Teacher of Hunan Province. Due to his endless efforts in teaching and scientific research, now he is an academic leader of colleges and universities in Hunan, the disciplinary pace-setter of national key discipline "wood science and technology" of Central South University of Forestry and Technology, member of "National Hundred, Thousand and Ten Thousands Talent Project", member of Subject Assessment Group of the State Council Degree Committee. Moreover, he is also a member of Japanese Wood Society, member of the U. S. Forest Products Society, senior member of Chinese Society of Forestry, vice chairman of Youth Working Committee of Chinese Society of Forestry, director of Biomass Materials Science Branch of Chinese Society of Forestry, executive director of Wood Science Branch of Chinese Society of Forestry, and vice chairman of National Forestry Biomass Materials Standardization Technical Committee. In 1991, he graduated from Central South University of Forestry and Technology with a bachelor's degree in wood science and engineering. Later, he obtained master's degree in wood science and technology and doctor's degree in bioresources utilization respectively from Central South University of Forestry and Technology and Japanese State-run Ehime University. The research interests of Professor Wu are wood properties (including anatomic properties, physical and mechanical properties, and chemical properties), wood functional modification, wood drying and wood-based composites. In the field of wood science, he innovatively proposed the theory of "instantaneous shrinkage of wood cell and the maximum instantaneous shrinkage", arousing widespread interests at home and abroad. Up to now, he has undertaken more than 20 projects at provincial, ministerial or national levels, covering projects of National Natural Sciences Foundation of China, National Key Technology R&D Program in the "Eleventh Five-year" Plan of China, National Forestry Special Fund for Public Welfare Industry, National "948" Project, State-sponsored Study Abroad Program from Ministry of Education, Key Program for Oversea Returned Scholars Sponsored by Ministry of Human Resources and Social Security and Hunan Province Outstanding Youth Fund Program. Besides, Professor Wu has won the 1st prize of Excellent Natural Scientific Papers Awards in Hunan Province, the 1st prize of Liang Xi Youth Research Papers Awards, the 3rd prize of Provincial Scientific and Technological Progress Awards of Hunan Province, the 3rd prize of Hunan Provincial Technical Inventions Awards, and the 2nd prize of National Science and Technology Progress Award of China. He has published over 100 scientific papers in important academic journals and international conferences and symposiums, of which more than 50 were cited by SCI, EI and ISTP. He also holds more than 20 state invention patent rights, and the course "Wood Science" that he lectured was awarded the National First-Class Course.

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