



Magnificent Chinese and American Redwoods

神奇的中美红杉树

Editor-in-Chief: Chen Momei

主编：谌谟美



科学出版社

www.sciencep.com

S791.35
C674

Magnificent Chinese and American Redwoods

神奇的中美红杉树

Editor-in-Chief: Chen Momei

主编: 谌谟美

Science Press

科学出版社

Beijing

北京

Copyright © 2009 by Regents of the University of California/Science Press, Beijing/Chen Momei, Berkeley

All rights reserved. No part of this book may be reproduced or transmitted in any form or by any means, electronic or mechanical, including by photocopying, facsimile transmissions, recording, rekeying or using any information storage and retrieval system, without permission in writing form from the author, except that brief passages may be quoted.

For information about permission to reproduce selections from this book, write to Chen Momei, University & Jepson Herbaria, 1001 Valley Life Sciences Bldg. University of California, Berkeley, CA 94720 - 2465, USA.

图书在版编目(CIP)数据

神奇的中美红杉树(汉、英)/谌漠美主编. —北京:科学出版社,2009
ISBN 978-7-03-023899-3

I. 神… II. 谌… III. 水杉-植物保护-对比研究-中国、美国-汉、英 IV. S791.35

中国版本图书馆CIP数据核字(2009)第003477号

责任编辑:孙红梅 李小汀 / 责任校对:赵燕珍
责任印制:钱玉芬 / 封面设计:耕者设计工作室
编辑部电话:010-64006589

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>

丽源印刷厂印刷

科学出版社发行 各地新华书店经销

*

2009年6月第一版 开本: B5 (720×1000)
2009年6月第一次印刷 印张: 26 1/2 插页: 24
印数: 1—2 000 字数: 368 000

定价: 60.00 元

(如有印装质量问题, 我社负责调换〈新欣〉)

编 委 会

主编：

湛谟美

美国加州大学伯克利分校，加州大学杰普生标本馆

编者：

布伦特·D. 米什勒

美国加州大学伯克利分校，加州大学杰普生标本馆，综合生物系

张宪春

中国科学院植物研究所

威廉·J. 利比

美国加州大学伯克利分校，环境科学、政策和管理系

张昂和

美国生物资源中心，中国项目部

布鲁斯·G. 鲍德温

美国加州大学伯克利分校，加州大学杰普生标本馆，综合生物系

王沙生

北京林业大学

Editorial Board

Editor-in-Chief:

Chen Momei

University and Jepson Herbaria, University of California, Berkeley

Editors:

Brent D. Mishler

University and Jepson Herbaria and Integrative Biology, University of California, Berkeley

Zhang Xianchun

Institute of Botany, Chinese Academy of Sciences, Beijing

William J. Libby

Department of Environmental Science Policy and Management, University of California, Berkeley

Zhang Anghe

Bio-integrated Resources Center, Berkeley

Bruce G. Baldwin

University and Jepson Herbaria and Integrative Biology, University of California, Berkeley

Wang Shasheng

Beijing Forestry University, Beijing

谌漠美教授

森林病理学和真菌学专家

美国植物病理学会理事

国际生物农业中心真菌病原鉴定专家

北美及中国食用菌专家

谌漠美教授，现在加州大学伯克利分校（University of California, Berkeley）从事森林病理学和真菌学研究。兼任北京师范大学客座教授，中国农业科学院科学顾问等。1954年毕业于北京农业大学（现中国农业大学）植物保护系，曾任中国林业科学研究院森林病理研究室副主任，多次参与国内外大型科学考察。于1975~1976年参加中国科学院青藏高原科学综合考察，合作出版了《西藏真菌》（1983）和《西藏森林》（1985）等专著。

20世纪80年代初，先后应美国威斯康辛大学和加州大学伯克利分校邀请，27年来从事森林真菌病理地理及国际检疫研究教学，发表论文专著百余篇，其专著由加州大学伯克利分校选为杰作常年展出。留美期间为推进中美科研交流做出重要贡献，1987年在加州大学伯克利分校接受中国科学院副院长亲自颁发的中科院科学技术进步特等奖。



Professor Chen Momei

Specialist in forest pathology and mycology

Member of the Forest Pathology and Mycology Committee, American Phytopathological Society (APS)

Tree rust identification expert, CAB International

Expert on edible mushrooms of North America and China

Chen Momei is currently a visiting professor at Beijing Normal University and a consultant scientist at the Chinese Academy of Agriculture. She was born in Beijing. She is now a Chinese American and resides in California, USA. In 1954, she graduated from the Department of Plant Protection, China Agricultural University. Afterwards she did graduate training in the field of forest science with Russian forest pathology experts. She had taught at the North West Agriculture & Forestry University and Inner-Mongolia Agriculture University for almost 20 years. In 1987, the Chinese Academy of Forestry appointed her to the position of professor. She served as professor and vice director of the forest pathology laboratory in the Chinese Academy of Forestry, as committee member of the Chinese Plant Protection Society, and general secretary of forest pathology of the Chinese Forestry Society. During 1975 – 1976, she was one of four women in a team of 400 scientists with the Integrated Scientific Expedition in Tibet, which was a project initiated by the Chinese Academy of Science. From this project, she co-authored the monographs “Tibetan Fungi” (1983) and “Tibetan Forest” (1985) published by Science Press, Beijing.

From 1982 to 1984 Chen Momei was appointed visiting scholar at the University of Wisconsin-Madison, and continued her research in forest fungi phytogeography and international quarantine. In 1984, she was appointed visiting scholar at the University of California, Berkeley, and made significant contributions to China-America scientific exchange in these universities. In 1987, Chen Momei received the Science and Technology Advancement Award from the Chinese Academy of Sciences. She has published 104 scientific articles, including 18 monographs. “The Forest Fungi Phytogeography” (2002) includes one new genus, seven new species of rust fungi, and presents new evidence and theories on flora analyses and proposed Fungal flora names. This monograph is presented by the University and Jepson Herbaria, UC Berkeley.

序 言

尽管本书以古代植物的谱系作为主题，但是它确实建立了与现代世界极其相关的三个方面的联系。首先，它涉及现在生物多样性的破坏，植物系谱受到严重干扰，诸如由于自然生境的破坏和人类造成的气候变化。现存红杉树在万难中才存活下来，然而它们又遇到了历史上前所未有的、来自人类的挑战。那些小一点的生物和大树共享生存环境，而这些并不出众的生物也面临了类似的威胁。写这本书是希望能引起中美两国的公众对这些自然遗产濒危标志的关注，更加理解它们的重要性，加强对两国红杉自然群落的保护。

其次，这本书也在两国人民的语言和文化的交流上起到桥梁作用。中国和美国是世界上两个重要的大国，它们在某些方面相似，却又并不那么相同。在国际合作和相互了解方面，我们在很多领域有加强交流的必要。“红杉的保护”，这个主题是生物进化中古老而深厚的一部分，在两个伟大国家生命谱系上具有特殊的生物学意义。作为一个彼此都很感兴趣的重要领域，它顺理成章地成为双方合作的目标。这本书在中英文方面提供了高水平的科学资料，也为两国的学生提供了学习专业语言的绝好材料。此外，它也能增进两国在古往今来的联系上的认知。

第三个联系是发生在科学和自然保护组织之间，本书使得美国加州大学伯克利分校、中国科学院（及其相关研究所）和许多大学、非营利组织保护红杉联盟等机构近百年来进行的大量珍贵合作得以整合、更新。加州大学伯克利分校的教授们，比如杰普生和钱尼，他们曾经参与红杉树的科学研究，更通过保护红杉联盟用实际行动参与红杉的自然保护。钱尼教授与中国的植物学界合作，发现并描述了水杉。最近，谏谟美（伯克利大学，大学和杰普生标本馆的研究人员）发起了一系列的中美植物学合作项目，包括这本精致的著作。在中美两国开展的现代分子遗传学、生理生态学和系统演化学方面的研究，将继续发扬这个长期合作的传统，同时也提高我们

保护这些神奇树种及其生境的能力。

布伦特·米什勒

美国加州伯克利大学，加州大学和杰普生标本馆主任，综合生物系教授

Preface

This project, even though focused on ancient plant lineages, makes three important connections that are extremely relevant to the modern world. The first relates to the biodiversity crisis, a serious loss of lineages through habitat destruction and human-caused climate change. The living redwood species are tough survivors, but they are threatened as never before in their history due to the activities of *Homo sapiens*. Many smaller, less charismatic organisms that share the environment with these keystone species, and depend on their presence, are threatened as well. This book will hopefully focus public attention in both China and the United States on these endangered symbols of our natural heritage, increase understanding of their importance, and stimulate increased conservation efforts of both the redwoods and the natural communities they support.

The second connection is between people, bridging language and cultural barriers. China and the United States are two large and important countries that are similar in some ways yet very different in others. For international cooperation and understanding, there is a critical need for greater communication on many levels. Conservation of the redwoods, a deep branch of the tree of life now unique to these two great countries, can be seen as an important shared interest and a natural goal for bilateral cooperation. This book, by providing high-quality scientific material in both English and Chinese, will provide excellent practice for students in either country learning a new language, and increase awareness of both the ancient and modern connections between these countries.

The third connection is among scientific and conservation organizations, renewing nearly a century's worth of collaboration among the University of California, Berkeley, The Chinese Academy of Sciences (and its associated institutes) and universities, and Save the Redwoods League. UC Berkeley professors such as Willis Linn Jepson and Ralph W. Chaney were heavily involved in both the science of the redwoods, and their conservation, through their activities in Save the Redwoods League. Professor Chaney collaborated extensively with Chinese botanists on the discovery and description of the dawn redwood. In recent times, Chen Momei (a research associate at the University and Jepson Herbaria at UC Berkeley), has initiated a new series of collaborations between Chinese and American botanists including this fine book. Modern studies of molecular genetics, physiological ecology, and phylogeny—underway in both the United States and China—will continue to enhance this long tradition of collaboration and advance our ability to conserve these amazing trees and their habitats.

Brent D. Mishler

Director of the University and Jepson Herbaria and Professor of Integrative Biology, University of California, Berkeley.

前 言

郑度（自然地理学，中国科学院院士，中国科学院地理科学与资源研究所）

水杉（*Metasequoia glyptostroboides*）原是杉科的单种属植物。水杉属植物在上白垩纪（K2）广布于北半球的高纬地区，至新生代的古近纪（E）和新近纪（N），其分布区有所扩大，种数有10余种之多。第四纪冰期来临，该属植物大多灭绝，仅存分布于中国中南部的的水杉一种，成为中国特产的孑遗珍贵树种，也被誉为“活化石”。柏科有另两个单种属植物，即巨杉（*Sequoiadendron giganteum*）和北美红杉（*Sequoia sempervirens*），产于美国西部的加利福尼亚州。

近二十年来，中美学者和业余爱好人士多次前来中国水杉的故乡，即四川石柱（现属重庆市）、湖北利川和湖南龙山等地参观考察，大家成为很好的朋友。这本关于中国水杉和美国红杉神奇故事的著作，以双语文字分别阐述了有关这三种珍贵针叶树种的自然历史、生境、群落以及自然保护等内容。它将有助于中美两国人民的相互理解，加深彼此之间的友谊，也将提高人们对于自然和生物多样性保护的认识。让我们共同努力，促进人与自然的和谐发展，建设我们地球家园的美好明天。

布鲁斯·G. 鲍德温（Bruce G. Baldwin，维管束植物系统分类和生物系统分类学家，美国加州大学伯克利分校）

以前，杉科除了水杉（*Metasequoia*）、红杉（*Sequoia*）和巨杉（*Sequoiadendron*）三种红杉树及其相近的属（比如 *Athrotaxis*, *Cryptomeria*, *Cunning-*

hamia, *Glyptostrobus*, *Taiwania* 和 *Taxodium*) 外, 还有 *Sciadopity*, 而基于不同基因地区的所有杉科植物的分子系统演化基础研究表明, 它们不是一个自然单系, 除了日本金松 (*Sciadopitys*) 以外, 该科现归属于金松科 (*Sciadopityaceae*)。杉科中的一些属, 如红杉, 比杉科中的其他属更接近柏树, 如 *Cunninghamia*。根据这些新发现, 针叶树种分类学家将柏科 (*Cupressaceae*) 和杉科 (*Taxodiaceae*) 合并为一个单科, 根据国际命名法的优先性原则, 通称为柏科 (*Cupressaceae*)。

这本专著融合了对水杉、海岸红杉和巨杉的历史记载与最新描述, 为广大读者提供了一个欣赏这些宏伟树种的全新视角。更重要的是, 对于中美两国的植物学家、环境保护者以及政府官员而言, 这本书提供了更直接、也更易理解的有关红杉树的信息和长期保护这三种红杉树的重要性, 从而为两国的学者和相关人员建立了更亲密的纽带。

威廉·J. 利比 (William J. Libby, 森林和遗传学, 美国加州大学伯克利分校)

几百万年前, 地球上曾经生长着很多种红杉树。可是当后来人类出现时, 这些红杉树只剩下了稀有的三个种。有两个种存活在美国的西部, 另外的一个种——水杉, 就生长在中国的中南部。今天, 这两个国家的人民需要更密切地互相了解与帮助。这本双语书的出版, 不仅可以在语言和文字上增加两个民族之间的理解, 也可以使两国人民共同学到一些关于红杉树的知识。这是多么具有象征意义的一件事啊!

戴安·M. 欧文 (Diane M. Erwin, 古植物学家, 美国加州大学伯克利分校)

这本书跨越了文化和政治的边界, 是对红杉的发现、它们的自然历史, 以及国际科学合作精神的美好贡献。这种精神持续到今天, 丰富了我们对此

些珍贵的针叶树种群的了解。谌谟美及合作者编译的这本书，介绍了有关活化石水杉发现的历史和其他树种的故事。从最初日本的研究人员三木茂在1941年对水杉化石进行的描述，到1943年王战对活水杉的重大发现，再到1948年，胡先骕和郑万钧对中国水杉的正式描述，中国代表着水杉最后的原始生存地。中国对水杉的保护和发展付出的努力被全世界的植物学家大力称赞。这本书用中英双语发行，对中英文读者都具有特殊的价值。

蒋有绪（植物及森林生态学，中国科学院院士，中国林业科学研究院）

中国的水杉和美国的红杉曾有共同的祖先，这是中美两国古老而又现实的自然与文化的见证。我的挚友谟美，以巨大的热忱，极富创意地把这些联结中美两国古今的故事奉献给人们。我们会记住她为中美两国人民和自然科学所做的贡献。

保罗·C·西尔瓦（Paul C. Silva，海藻分类学家，资深国际命名法规学家，美国加州大学伯克利分校）

加利福尼亚州的人们享有壮丽的自然环境，拥有美国内陆海拔的最高点和最低点，景色诱人的优胜美地和太浩湖，以及全世界最高大、最古老的树。像圣堂般耸立的海岸红杉和威严的巨杉时刻激励着人们。然而，比起那些在中国偏远地区发现的红杉近亲——活化石水杉这种“古董”而言，它们却显得有些逊色了。科学家们将活化石命名为 *Metasequoia glyptostroboides*，通称为水杉。这种树现在被种植在世界各地，特别是加州大学伯克利分校的校园里。在这样一个中美经济越发相互依赖的时刻，谌谟美适时地编译了这本中英文双语读物，让我们可以从方方面面了解这些宏伟的生物。

Initial Remarks

Zheng Du (fellowship of Chinese Academy of Sciences, Institute of Geographic Sciences and Natural Resources, Chinese Academy of Sciences)

Dawn redwood (*Metasequoia glyptostroboides*) is a monotypic genus of the family Cupressaceae. *Metasequoia* was widely distributed in high latitudes of the Northern Hemisphere in the early Cretaceous period (K2). During the Paleogene Period (E) and Neogene Period (N) of the Cenozoic, its distribution was extended and the genus included more than 10 species. In the Quaternary ice age, the genus became nearly extinct, with only one species—dawn redwood—surviving in central China. This priceless tree species was honored by naming it a “living fossil”. The Cupressaceae includes two other related genera, the giant sequoia (*Sequoiadendron giganteum*) and the coast redwood (*Sequoia sempervirens*), both found in California.

In the past 20 years, many Chinese and American scientists and amateurs have explored the native habitat of dawn redwood—in such places as Shizhu (Chongqing Province), Lichuan (Hubei Province), and Longshan (Hunan Province)—and have become good friends. This monograph on the magnificent Chinese and American redwoods describes the three precious species of conifers, their natural history, habitat characteristics, efforts towards conservation, and other aspects.

Written bilingually in Chinese and English, the book will improve cross-culture understanding between Chinese and American citizens, build friendships, and advance public appreciation of nature and the importance of preserving biodiversity. Let us work together toward harmonious relations between humankind and nature resulting in a better tomorrow for our homeland, planet earth.

Bruce G. Baldwin (Professor of Integrative Biology and Curator of the Jepson Herbarium, University of California, Berkeley)

The family Taxodiaceae traditionally comprised the redwoods (*Metasequoia*, *Sequoia*, and *Sequoiadendron*) and closely related genera (i. e., *Athrotaxis*, *Cryptomeria*, *Cunninghamia*, *Glyptostrobus*, *Taiwania*, and *Taxodium*) along with *Sciadopitys*. Molecular phylogenetic studies based on different gene regions have all shown that members of Taxodiaceae do not constitute a natural (monophyletic) group without inclusion of members of the cypress family, Cupressaceae, and exclusion of the genus *Sciadopitys* (now in its own family, Sciadopityaceae). Some members of Taxodiaceae, such as the redwoods, are more closely related to cypresses and relatives than to other members of Taxodiaceae, such as *Cunninghamia*. In response to these findings, conifer taxonomists now generally treat members of the two families (Cupressaceae and Taxodiaceae) within a single family. The name of that common family must be the Cupressaceae, which has nomenclatural priority over the name Taxodiaceae.

By bringing together historical and modern accounts of *Metasequoia*, *Sequoia*, and *Sequoiadendron*, this volume provides a new perspective on these magnificent trees that will enhance appreciation of redwoods by readers everywhere. Most importantly, this book will serve to build stronger ties between American and Chinese botanists, conservationists and governmental officials, who will now have more readily accessible information on redwoods in their respective countries and on the importance of ensuring that all three modern redwood taxa are preserved.

William J. Libby (Professor Emeritus, Forestry & Genetics, University of California, Berkeley)

Over many millions of years, various species of redwood lived in many regions of Earth. By the time humans arrived, only three species remained. Two survived in the western United States, and one in south-central China. Today, the peoples of these two countries are increasingly interdependent, and increasingly eager to learn about each other. This book provides a way to improve reading comprehension of each other's language, while also learning something about the redwoods that are, in both countries, iconic.

Diane M. Erwin (Museum Scientist, Paleobotany Collection Curator/Manager, Museum of Paleontology, University of California, Berkeley)

This book is a wonderful tribute to the Redwood's discovery, their natural history, and the spirit of international scientific cooperation that transcended cultural and political boundaries—a spirit of international collaboration that today continues to enrich our understanding of this majestic group of conifers. Among the book's highlights, Chen Momei and her colleagues have successfully compiled one of the most accurate comprehensive historical accounts of the “living fossil” dawn redwood (*Metasequoia*), from its initial description by the Japanese researcher Miki in 1941 as a fossil species, to Wang's remarkable discovery in 1943 of *Metasequoia* trees growing in China, to the formal description of the Chinese *Metasequoia* by Hu and Cheng in 1948. China represents the last native home of the dawn redwood and so this country's effort to help conserve these trees is loudly applauded and widely appreciated by botanists around the world. This book is printed in both Chinese and English and so is of especial value to readers of these languages.