

PLANT ATLAS OF THE JINGGANGSHAN REGION IN CHINA

中国井冈山地区原色植物图谱

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Science Press
Beijing

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科学出版社
北京

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ISBN 978-7-03-049821-2

Science Press (Beijing)

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16 Donghuangchenggen North Street, Beijing 100717, CHINA

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Thanks for

Administration of Jinggangshan National Nature Reserve, Jiangxi Province; Administration of Nanfengmian Provincial Nature Reserve, Jiangxi Province; Administration of Qixiling Provincial Nature Reserve, Jiangxi Province and Administration of Taoyuandong National Nature Reserve, Hunan Province

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致谢

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Foreword

Plant Atlas of the Jinggangshan Region of China is one of the achievements of the project “Integrated Study of the Biodiversity of the Jinggangshan Region of China”. More than a thousand species of plants were photographed and identified in a short period of time. This achievement was the result of the hard work and passion of a dedicated group of researchers. I read the book with great interest and praise it for its tight structure and concise information. In my opinion, the book is distinct in the following five aspects. First, it fully embraces the characteristics of the large area typical subtropical montane evergreen broad-leaved forest, and the more than ten survived subtropical humid monsoon evergreen broad-leaved forest in the Jinggangshan Region. Second, through the presentation of the rich diversity of bryophytes (such as epiphyll liverworts), ferns (such as Cyatheaceae, a tree fern), gymnosperms (especially Coniferales, such as Taxaceae, Cephalotaxaceae, Podocarpaceae and *Abies* of Pinaceae), angiosperms (especially Hamamelidaceae and Ericaceae), and many endemic, relict, rare and endangered species of China in the region, the book clearly illustrates the key features and importance of the region for flora in Eastern China. Third, the book adopts the world newest molecular phylogeny system (such as APG IV, etc.) in the systematic arrangement of the species in all groups of plants: Bryophyta, Pteridophyta, Gymnospermae, and Angiospermae. This treatment fosters an awareness, use, learning, comparing, and evaluating this new system in China. Fourth, most of the plant species in the book include photographs of flowers, fruits and associated plant communities and habitats, demonstrating the passions and patience of the authors. The many skyward-facing view of the canopies of the trees showing their 3-D architecture are stunning and impressive. Finally, the distribution maps of some typical or important species in the Jinggangshan Region provide a foundation for the protection of the ecosystem and for research. Overall, the book illustrates the value and charm of biodiversity and the landscape of the Jinggangshan Region.

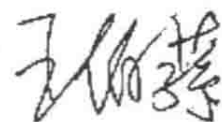
I enjoyed reading the book very much, and am truly pleased to prepare the preface on the occasion of its publication.

Wang Bosun
March 16, 2015

序

《中国井冈山地区原色植物图谱》是“井冈山地区生物多样性综合科考项目”的系列成果之一。作者以极大的努力，满怀兴趣和爱好，在短时间内完成了千余种植物照片的拍摄和鉴定工作，殊为不易。本人阅后认为，全书结构严谨、文字简明，在5个方面很有特色：一是，通过特征性植物群落，充分展现了井冈山地区“典型的亚热带常绿阔叶林和残存的数十片湿润性季风常绿阔叶林”植被特征；二是，以井冈山地区丰富的苔藓（如叶附生苔）、蕨类（如树蕨——桫欏）、裸子植物（尤其是松柏目，如红豆杉科、三尖杉科、罗汉松科、松科的冷杉属等）、被子植物（如金缕梅科、杜鹃花科等），以及大量的中国特有科属、孑遗种、珍稀濒危种为例，清晰地阐明了该地区植物区系的特征及其在中国东部的重要性；三是，在植物系统编排上，苔藓、蕨类、裸子植物、被子植物均采用国际上最新的高等植物分子发育系统树（如APG IV），为大家借鉴、熟悉、学习、比较和质疑提供了触摸对象；四是，大部分植物有花果、群落或生境照片，体现了作者的热情和耐心，特别是针对乔木种类，尽力用仰视拍摄的方式，以表现茎干的筑形（分支），或通直或弯曲，体态或刚健或多姿，极具震撼力；五是，绘制了特征种在井冈山地区的分布图，为进一步的生境保护和研究奠定了基础。整体上，本书展示了生物多样性、生态景观的价值与魅力。

幸而阅之，甚感欣慰，乐为之序。



2015年3月16日

Preface

The Jinggangshan Region is located in the center of the Wanyang Mountain Range and the middle of the Luoxiao Mountain Range. The Luoxiao Range is an extensive mountain system that runs from south to north on the border of Hunan and Jiangxi provinces in Eastern China. It was formed by fold orogeny and fault rock uplift extending over 516 km in length and 175-280 km in width. From north to south, it includes five medium sized mountains in a northeast to southwest direction; Mufu Mountain and Jiuling Mountain in the north, Wugong Mountain and Wanyang Mountain in the middle, and Zhuguang Mountain in the south. Jinggangshan is located between 26°09'53"N-26°50'01"N and 113°50'54"E-114°22'22"E, with a total area of 70,874 hm², including the Jinggangshan National Nature Reserve, Qixinling Provincial Nature Reserve and Nanfengmian Provincial Nature Reserve, all in Jiangxi province, as well as Taoyuandong National Nature Reserve in Hunan. The boundaries of these reserves are adjacent to each other. The main peak of the Luoxiao Range is Nanfengmian, at an elevation of 2120.4 m.

Three large mountains in the east, west and the south are on the periphery of the Luoxiao Range; Wuyi Range to the east, which runs in a north-south direction and belongs to west of the East China Sea, and west coast of the Pacific Ocean; Nanling Range to the south, which runs in an east-west direction adjacent to the Tropic of Cancer, and the north coast of the South Sea of China, and Wuling Range to the west, which runs in a north-south direction. At some distance to the west are Emei Mountain, Shennongjia, and Qinba Mountain. The four mountains ranges around the Luoxiao Mountain Region form a 111-shaped landform in Southeastern China. Two large rivers flow between the mountains, the Xiangjiang River draining the watershed to the west, and the Ganjiang River, draining the watershed to the east. Tongting Lake and Poyang Lake are formed in their downstream areas and flow into the Yangtze River to the north. As a whole, the terrain of the Jinggangshan Region and the Luoxiao Range is precipitous. The central core and surrounding areas form a huge mountain, river, lake pattern of four ranges, three rivers and two lakes.

The Jinggangshan Region, the Luoxiao Range and surrounding areas are under the influence of the summer monsoon. The mild climate, abundant rainfall, and diverse natural geographic features support rich biodiversity. Between 2010 and 2014, the Jinggangshan Administrative Bureau of Jiangxi Province and the Taoyuandong National Nature Reserve of Hunan province carried out a thorough investigation around the main peaks of the middle section of the Luoxiao Range. The study showed that geologically, the Jinggangshan Region belongs to the northwest margin of the ancient Cathayian Plate, the southeastern part of the junction belt between the Yangtze Plate and the Cathayian Plate, and the South China Caledonian orogenic belt (VII). In terms of climate, the region is located in the middle subtropical humid monsoon zone. The vegetation is characterized by typical mid subtropical evergreen broadleaved forests. Some monsoon influenced broadleaved evergreen forests are preserved at low elevations in ravines. According to Udvardy's (1975) geographical regionalization, these forests are classified as belong to the Chinese Subtropical Forest Province. Wu (1996) and Zhang (1993) classified the area as the Central China Region and Sino-Japan Forest Sub-Kingdom (or East Asian Kingdom), respectively. The region harbors 323 families, 1290 genera, and 3745 species of higher plants. The 2868 species of insects and spiders are in 27 orders, 306 families, 1732 genera, while the 455 species of terrestrial vertebrates are in 4 classes, 30 orders, 97 families and 285 genera. The Jinggangshan Region also offers outstanding natural landscapes; cliffs of Bijia Mountain, pine forests on ridges, seas of azaleas, the rich biodiversity trail, the five waterfalls of Longtan, the sea of clouds of Huangyangjie, Luoxiao ridge: Nanfengmian and Lingfeng ridge, orchid and *Alsophila* valley of Hexilong, the grand canyon of Xiangzhou, epiphyllous liverworts in Xiangzhou, *Buxus microphylla* elfin forest on Wuzhi Peak, Jinghua Stream and Jiuqushui River at Taoyuandong, *Tsuga chinensis* forest at Lishuzhou, the *Abies* forest at Dayuan, as well as different representative forest zones and 52 types of vegetation associations. All of these are among the amazing attractions of the area.

Overall, the Jinggangshan Region is an ecotone with complicated natural geography, magnificent landscapes, and a changeable climate. The eastern oceanic monsoon climate interacts with the northwestern dry, cold continental monsoon climate. Such unique and complex environments have promoted the evolution and development of rich biodiversity and have preserved numerous relict species, living fossils, rare and endangered species, endemic species of China, endemic species of the Jinggangshan Region, and various rare plant associations. The Jinggangshan Region is an important channel and natural barrier to north-south migration and the east-west spread of plants and animals. The region is also one of the most important biological refugia for Tertiary and Quaternary elements on the Asian continent. Thus, it is a special area for interpreting the distributional changes and evolution of biotas during and after the glacial periods.

From 2010 to 2014, the authors of this book conducted floristic surveys in the Jinggangshan Region and made numerous field trips to collect specimens and photograph the vegetation, scenery and biodiversity, followed by an enormous effort to identify and curate the collections. The work resulted in 3460 photographs of 200 families, 632 genera and 1119 species of plants, including 35 families, 45 genera and 54 species of bryophytes, 16 families, 56 genera and 85 species of pteridophytes, 6 families, 18 genera and 25 species of Gymnosperms, and 143 families, 513 genera and 955 species of Angiosperms. One to five (or to eight) photos were selected to illustrate each species. Photos were taken of the whole plant, a leafy branch, a flowering branch, a fruiting branch, the plant community, habitat, and close up views of plant parts of particular interest. The descriptions in the book are simple, emphasizing key diagnostic features, habitat, geographic distribution, and economic value, with special notes on the conservation status and economic values of the species, indicating whether they are relict species, living fossils, endemic to China, endemic to Jinggangshan, or rare and endangered in China (i.e., if they occur on any of these lists: IUCN Red List of Threatened Species, China Species Red List, State Key Protected Wild Plant List, and CITES). Medicinal plants, ornamental plants, and economic plants are indicated to demonstrate the value of the plants and plant resources. The book adopts the modern molecular phylogenetic classification system in the arrangement and organization of the species. The book is in both Chinese and English to facilitate international exchange, comparison with the floras of neighboring regions, and for use by students and professionals.

This book was completed under the direct sponsorship of the Jinggangshan Administrative Bureau. We are particularly grateful for the generous support from many experts and leaders, including Ding Xinquan, Mei Liming, Long Bozhou, Chen Min, Chen Chunquan, Zeng Xianwen, Liu Xinzong and Ye Juxin. We are also grateful to the on-site forest engineer Zeng Xiangming and Huang Zifa for their extensive help in the field, and to Shen Hongxing and Yang Shulin, leaders of the Taoyuandong National Nature Reserve Administrative Bureau, Hunan Province, for their assistances during our supplementary survey on the west slope of Taoyuandong during 2013-2014. Some of the photographs of Gymnosperms (especially Coniferales), Ericaceae, Hamamelidaceae, Orchidaceae, endemic families, genera, and species taken in the Jinggangshan region were provided by invited experts and amateurs of botany and ecology. Here, we especially like to mention Ms Wang Xiaolan, who has made six trips to Jinggangshan in four years to photograph different species. Mr. Ye Huagu, Li Deqing, Liu Bing, Liu Jun, Liu Yan, Wang Chen, Yu Xunlin, Zhu Renbin, Lin Qingwen, Chen Shipin, Wu Shuang, Chen Bin, Jiang Shan, Zhang Li, and Zhu Jianhua also contributed many photos to the book. We give our sincere thanks to all of them, as well as those not mentioned, for their support!

The field studies and publication of this book were funded by the Jinggangshan Administrative Bureau. The investigation of Taoyuandong in 2013-2014 was supported by funding from the Taoyuandong National Nature Reserve. In addition, compilation of the book was also supported by a grant from The Basic Work Special project of the National Ministry of Science and Technology of China for The Integrated Study on Biodiversity from Luoxiao Range in China (2013FY111500) and funds for building biology and ecology excellence at Sun Yatsen University. We sincerely thank Profs. Ye Huagu and Li Zexian from the South China Botanical Garden of the Chinese Academy of Science, Prof. Li Bingtao from South China Agricultural University, Prof. Zhang Xianchun from the Institute of Botany, Chinese Academy of Science, the senior engineer Wu Zhenhai from Northwest Agricultural & Forestry University, and Prof. Ye Chuangxing from Sun Yatsen University for critically reviewing the identification of species in the book, and Dr. David E. Boufford, Harvard University Herbaria, Dr. Si He, Missouri Botanical Garden, and Dr. Jenny Xiang (Qiuyun Xiang), North Carolina State University, and Dr. Daniel Potter, University of California, Davis, for correcting the English.

The Authors

March 16, 2015

前言

井冈山地区地处罗霄山脉中段，万洋山脉东南坡。罗霄山脉，是一座位于中国大陆东部、湘赣两省交界处、南北走向的大型山脉，是以褶皱造山与断块隆升形成的重要山脉，南北纵长516 km，东西宽175-280 km，自北至南又包括5条东北-西南走向的中型山脉，北段为幕阜山脉、九岭山脉，中段为武功山脉、万洋山脉，南段为诸广山脉。井冈山地区的地理位置26°09′53″N-26°50′01″N、113°50′54″E-114°22′22″E，总面积70,874 hm²，包括边界上相连的江西井冈山、七溪岭、南风面和湖南桃源洞4个自然保护区，主峰南风面海拔2120.4 m，也是整个罗霄山脉的主峰。

在罗霄山脉外围，东、南、西，横亘着3条大型山脉，最东部为南北走向的武夷山脉，再往东为环太平洋西岸，南面为东西走向的南岭，再往南为北回归线地区及南海沿岸，西侧为南北走向的武陵山脉，再往西为广阔的中国内陆山地，包括峨眉山、神农架、秦巴山地。四大山脉即罗霄山脉、武夷山脉、武陵山脉、南岭山脉在大陆东部形成了一个巨大的“山字形”地貌。“山字形”地貌向北延伸，在凹地间形成两片大型流域，左侧为湘江流域，右侧为赣江流域，下游汇水区形成著名的洞庭湖、鄱阳湖，北界直抵长江流域。整体上，井冈山、罗霄山脉地区地势险峻，自中部核心区向四周环绕，构成一个“两湖、三江、四脉”的巨大“山、水、湖”格局。

井冈山、罗霄山脉及周围区域，属大陆东部季风气候区，气候温和，雨量充沛，自然地理环境优越，孕育形成了丰富的生物多样性。2010-2014年，江西井冈山管理局、湖南桃源洞自然保护区，主持了对罗霄山脉中段主峰东西两侧地区的全面考察。研究表明，在地质上，井冈山地区属于扬子古板块与华夏古板块结合带南东侧，华夏古板块北西缘，华南加里东造山带(VII)；在气候上，处于中亚热带湿润季风区；在植被地理上，以典型中亚热带常绿阔叶林为特征，在低海拔、沟谷地区保存有季风常绿阔叶林(季雨林)；Udvardy (1975)称之为中国亚热带森林省(Chinese Subtropical Forest)，Wu (1996)、Zhang (1993)称之为华中地区、中国-日本森林植物区(或东亚植物区)；在生物区系组成上，目前为止共记录野生高等植物共323科1290属3745种，昆虫和蜘蛛共27目306科1732属2868种，陆生脊椎动物4纲30目97科285属455种。在自然景观方面，井冈山地区也是比较突出的，笔架山悬崖峭壁、山脊松林、环腰分布的物种长廊、杜鹃花海，龙潭五瀑，黄洋界云海，罗霄山脊——南风面、酃峰脊顶，河西垄兰花谷、杪楞沟，湘洲大峡谷、叶附生苔，五指峰小叶黄杨矮林，桃源洞镜花溪、九曲水，梨树洲南方铁杉林，大院资源冷杉林，还有各类代表性的地带性森林植被，52类珍稀植物群落，无不是令人称奇的山水绝景。

总体看来，井冈山地区是一个自然地理复杂、生态景观壮丽、气候多变的生态交错区，东部海洋性季风气候与西北部内陆型干冷季风气候在此交汇，孕育、形成和促进了生物多样性的演化和发展，从而保存有丰富的孑遗种、活化石、珍稀濒危种、中国特有种、地区特有种，以及各类地带性植物群落和珍稀群落，是生物区系南北迁徙、东西扩散的重要通道和天然屏障，也是亚洲大陆东部第三纪、第四纪冰期最重要的生物避难所之一，对揭示冰期、冰后期生物区系的恢复和演变有着重要意义。