



第二十一卷

四川植物志

四川出版集团
四川科学技术出版社

四川植物志

《四川植物志》编辑委员会

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前 言

四川省位于青藏高原东缘长江上游地区和我国的西南内陆腹地，介于北纬 $26^{\circ} 03'$ — $34^{\circ} 19'$ 和东经 $97^{\circ} 21'$ — $108^{\circ} 31'$ 之间，幅员 48.5 万平方千米。辽阔的地域、复杂多样的地貌类型、明显的气候分异孕育了丰富的植物多样性，主要表现为植物种类繁多，区系成分复杂，植物演化途径多样。全省地形大致可分为盆地和高原两大部分。东部为著名的四川盆地，这里河流纵横，丘陵起伏，在海拔 200—700 米之间（长江河谷仅 100 米左右），为四川主要农业区。盆地周围群山环绕，北部有秦岭、大巴山为屏障，减弱了北来寒流的侵袭；太平洋、印度洋暖流沿长江和横断山脉水系进入盆地，形成盆地温暖湿润的环境。盆地东部地层，由于自第三纪以来，未经剧烈变动，因而保存了世界上其他地区早已绝种的一些古老植物以及一些单种属或少种属古老、孤立的类型。四川西部为高原和高山峡谷地形，这里海拔在 3 500 米以上，峡谷纵列，雪山重叠，最高的贡嘎山，主峰海拔高达 7 500 多米；海拔 4 000—5 000 米以上的高峰也较多。在这一地区有南北纵行的横断山系，这是四川省地理特色之一。这一山系给植物区系的组成带来深刻影响。高原西北部有大面积沼泽、草地分布，为青藏高原的重要组成部分，是四川的主要牧区。四川复杂的地理条件和生态环境，孕育了繁多的植物类型，是我国植物资源最丰富的地区之一，约有高等植物 1 万余种，仅次于云南，居全国第二位，许多类群资源蕴藏量极为丰富，特别是川产珍稀植物为世界瞩目。但由于种种原因，对四川植物的种类、分类缺乏系统整理，资源家底不清，远远不能满足对植物资源的保护和利用的需要，因此，编写《四川植物志》实显重要。

四川省特殊的地理位置和多样的地貌及气候为植物的生长提供了有利的条件。丰富的植物种类，是四川省的宝贵财富，清理好四川省丰富的植物种类，是对全国物种多样性的一个贡献，将为研究植物的系统演化、植物区系、植被、生态系统等提供科学依据。在经济建设和环境保护中，《四川植物志》是基础的科学资料，编写《四川植物志》的目的就是通过对四川省植物资源进行科学而系统的清理，使其能为四川省的经济建设和科学发展提供不可缺少的基础资料。《四川植物志》作为科学资料，具有十分重要的和不可替代的科学价值。生物多样性的重要性已为世界所重视，而要认识和研究生物多样性，必须首先知道物种多样性，《四川植物志》的编写，就是对四川省物种多样性的研究和记载，其科学意义是不言而喻的。《四川植物志》对开展利用植物资源具有极其重要的科学指导作用，在社会主义市场经济体制下，地处中国内陆的四川省，必须充分发挥自然资源优势，特别要重视植物资源丰富的优势，以加速本省经济的发展。四川植物种类多，类型齐全，还保存了一些被

称为“活化石”的类群，如水杉 (*Metasequoia glyptostroboides*)、银杉 (*Cathaya argrophylla*)、珙桐 (*Davidia involucreta*)、芒苞草 (*Acanthochlamys bracteata*) 等都是世界著名的珍贵植物。被子植物的起源与植物地理学上的一些重大理论问题的解决，都可能有助于对四川及邻近地区相关植物的研究。研究四川植物在理论上具有独特的意义。

《四川植物志》的内容包括苔藓植物、蕨类植物、裸子植物和被子植物。苔藓植物以布罗氏 (V.F. Brotherus, 1924—1925) 的系统为基础，参考近年国内外有关系统编排；蕨类植物基本采用秦仁昌 (1978) 的系统；裸子植物采用郑万钧 (1961) 的系统；被子植物采用恩格勒 (Engler) 植物科志第 II 版 (1964) 的分类系统，分科编号，但各科不一定按顺序出版。《四川植物志》对所记载科、属、种的形态特征、地理分布、生态环境、科学意义和用途等均作了系统而详细的描述。为了方便读者使用本书，识别植物，书中列出了分属和分种检索表；所记载的植物，每卷约有 60% 的种类附有图版。《四川植物志》是按《四川植物志》编写规格进行编写的。在编写过程中，全面检索国内外文献，反映最新研究成果，图文并茂，产地到市县，并且记载了生境和海拔等资料数据，便于读者实地考察；对重要的经济种类列出了具体用途，有利于开发利用。书中使用了国内通用的中名，同时尽量列出地方土名，有助于澄清长期存在的名称混乱。书中按照《国际植物命名法规》的要求对类群进行了分类学处理，使其成果能够进行国际交流。

《四川植物志》为传世专著，为确保编写质量，在研究方法上，特别注意文献的考证、标本鉴定和种群的划分等问题。《四川植物志》自 1981 年陆续出版以来，在国内外均有较好的影响和较高的评价，但后续各卷 (册) 的编辑出版，任务还很艰巨，尚需省内外植物学科技工作者共同努力，始能完成《四川植物志》这一巨著。《四川植物志》编委会为著作权集体管理组织，行使著作权或者与著作权有关的权利。凡使用《四川植物志》已出版各卷 (册) 专著，应当同《四川植物志》编委会 (法人代表) 订立许可使用合同书，未与编委会签订书面合同书，另一方当事人不得使用。《四川植物志》著作权受《中华人民共和国著作权法》保护，单位或个人不得侵犯其权利或剽窃该项研究成果。

重庆市于 1997 年设立直辖市，原四川省行政区发生较大变化，重庆市及所辖市、区、县已不属四川省，但为了保持《四川植物志》项目的连续性、统一性和完整性，《四川植物志》仍按原四川省所辖行政区范围编写。《四川植物志》在编写过程中，承蒙中外学者和同行的帮助和指导，对此表示十分感谢。由于水平有限，本志不免有缺点、疏漏，希读者批评指正。

《四川植物志》编辑委员会

PREFACE

Sichuan Province (26°03'—34°19' N and 97°21'—108°31' E) in Southwestern China locates in Eastern Tibet Plateau and the upper reaches of Yangtze River, and covers an area of more than 485,000 square kilometers. The far-flung terrain, complex and diverse landforms, clear climatic differentiation gesture endue the region with abundant plant diversity, showing the characteristics of various plant species, miscellaneous flora, and diverse evolvments. The whole landform in Sichuan can be divided into two sections, i.e., basin and tableland. The former locates in the eastern Sichuan, and the latter distributes around the Basin. Sichuan Basin characterized by reticular river and rolling hill (a. s.l.200m-700m) is the main agricultural region and plays important roles in economic and social development in Sichuan. The basin surrounded by many mountains, such as Mountains Qingling and Daba in Northern Sichuan, and Mountain Hengduan in Western Sichuan. As barriers, Mountains Qingling and Daba defend the invasion of cold snap from the north, and in turn lead to warm winter in the region. Meanwhile, the warm current coming from Pacific and Indian Oceans enter the basin along with Yangtze Rive and water system of Mountain Hengduan, and result in the humid and warm climate in Sichuan Basin. In particular, the antiquity and isolated plant (or type) of single (or few) genus and species that have already become extinct in other regions of the world are conserved in this area because the stratum in the east of Sichuan basin does not undergo acute alteration since tertiary. Western Sichuan is characterized by distributing plateau, alpine, valley, jokul and cliff widely. The average altitude of this section is above 3500 metres, and many peaks range from 4000 to 5000 metres. For example, the peak of Mt. Gongga, the highest mountain in the region is 7500 metres. Western Subalpine forest, the second largest forest region in China, is the main body of Mountain Hengduan which is one of the 25 hotspots in biodiversity conservation in the world. The unique and complex physiognomy in Mt. Hengduan provides diverse habitats for plant biodiversity. As an important component in Tibet Plateau,

Northwestern plateau consisting of large area of wetland and grassland is the main pasture in Sichuan. As described above, the complex geographic condition and ecological environment breed abundant plant species diversity, which makes Sichuan become one of the second largest provinces in plant resources except for Yunnan Province, and attract the global eyes. However, there is a lack of enough information on systematical investigations and classifications on plant resources due to various reasons, which is difficult to make needs of plant resource protection and utilization. It is very important to compile *Sichuan Flora*, therefore.

The special geographic position, multiple physiognomy and climate are favorable to plant growth and reproduction. These abundant plant species is valuable wealth of Sichuan. It is very important for the species investigation in China to systematically investigate and list plant catalog in Sichuan, which is helpful to provide science basis for deeply studying the plant system evolvement, plant community, vegetation and ecological system. In the process of economy construction and environment protection, *Sichuan Flora* is the basic scientific information. To compile *Sichuan Flora* is to provide indispensable and basic information for the economy construction and scientific development of Sichuan Province by systematically and scientifically categorize the plant resources. *Sichuan Flora* possesses important and irreplaceable significance as the scientific data. In the world, the significance of biodiversity has been concerned. In order to understand and study the biodiversity, the first thing of all is to know biodiversity. The compiling of *Sichuan Flora* namely is studying of species diversity in Sichuan Province. Its scientific significance is gone without saying. It possesses very important scientific guidance effect for exploitation and utilization of plant resources. At the socialistic economy system, because Sichuan Province located in the inland of China, in order to accelerate its economy development, it must adequately take advantage of predominance of nature resource, especially must attach importance to the predominance of plant resources. The kinds of plant are very abundant, the types of plant are very complete in Sichuan. There are some plant species such as *Metasequoia glyptostroboides*, *Cathaya argyrophylla*, *Daridia involucrata* and *Acanthochlamys bracteata* etc, these plant are honoured by living fossil, and are famously rare and precious plant in the world. The account for some important theoretic issue such as the origin of angiosperm and some questions

associated with plant geography all depend upon the research of Sichuan Province and its adjacent region. It has particular significance in theory to study the plant in Sichuan Province.

Sichuan Flora consists of moss, fern, gymnosperm and angiosperm. The arrangement of moss is based on the Brotherus's system (1924-1925) and refers to recently related systems in domestic and foreign country. The arrangement of fern is based on the Ching Renchang's system (1978). The arrangement of gymnosperm is based on the Cheng Wanchun's system (1961). The arrangement of angiosperm is based on the Engler's syllabus der pflanzenfamilien II (1964). The sequences are according to numbers family, but the publication is not always according to the sequence. The morphologic characters, geography distribution, ecological environment, science significance, ecological utilization etc of the family, genus and species recorded in this flora are systematically and detailedly described. In the interest of the convenience for readers to use *Sichuan Flora* to identify plant, the key of genus and species are listed in book and many plate are attached, the plate account for percent 60 of the whole book. *Sichuan Flora* is compiled according to the specification draw by compilation committee. Picture and language both are luxuriant. The producing area is itemized to county. Furthermore, the growing environment of plant and altitude are recorded in *Sichuan Flora*. This is very convenient for reader to make on-the-spot investigation. The concrete useness of plants that have important economical value are listed in this book. This is in favor of exploitation and utilization. The universal Chinese names of plants are used in this book, at the same time; the nicknames are listed by all means. This is helpful to clarify the long-standing denomination confusion. The classification of plant in this book is strictly according to the request of international code of botanical nomenclature. This is be propitious to international communion.

Sichuan Flora is a monograph that will be handed to many following generation. In order to ensure the compile quality, we especially pay much attention to the matter such as textual research of literature, identification of plant specimens and the classification of species etc. It has been lasted above 30 years since *Sichuan Flora* was published at 1981. The work of the compilation of *Sichuan Flora* is very hardly. Now, the *Sichuan Flora* is published to seventeenth volumes, but the task of future are yet very arduous. This needs the

collective efforts of botanist inside and outside province to finish this magnum opus.

Chongqing was set up as municipality directly under the central government at 1997. The governmental region of former Sichuan Province happen many changes. Chongqing, under its jurisdiction is already not parts of Sichuan Province. However, the region still is regarded as that of former Sichuan Province in order to retain the continuity, oneness and integrality of *Sichuan Flora*.

In the process of compiling *Sichuan Flora*, we have received many advice and help of colleagues from associated universities and institutes. We are deeply grateful to them. Because our knowledge level is limited, there are many unavoidable defect and mistake in *Sichuan Flora*. We hope that readers point out these mistakes so that they can be corrected.

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第二十一卷

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ANGIOSPERMAE

Redactors Yi Tongpei, Jia Minru(M.J.Chia) & Fan Jicai

Autors of the Various Families on this Volume

8. Betulaceae Yang Chingchow(Sichuan Forest Inventory and Plan Institute)
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16. Olacaceae Yi Tongpei (Sichuan Agricultural University)
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90. Guttiferae Yi Tongpei (Sichuan Agricultural University)
105. Crassulaceae Wu Jialin & Wu Guangdi (Sichuan School of Chinese
Materia Medica)
135. Burseraceae Yi Tongpei (Sichuan Agricultural University)
136. Meliaceae Yi Tongpei & Fan Jicai (Sichuan Agricultural University)
236. Plumbaginaceae Yi Tongpei (Sichuan Agricultural University)
244. Oleaceae Yi Tongpei & Fan Jicai (Sichuan Agricultural University)
330. Palmae Yi Tongpei & Fan Jicai (Sichuan Agricultural University)

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8. 桦木科 BETULACEAE

落叶乔木或灌木，小枝光滑、被毛或具腺体。单叶，互生，有时被毛或具腺体，叶缘具重锯齿或单锯齿，稀浅裂或全缘，叶脉羽状；托叶分离，早落，稀宿存。花单性，雌雄同株；雄花序顶生或侧生，雄花具苞鳞，花被或有或无，雄蕊 2—20 枚，稀 1 枚，花药 2 室；雌花序直立或下垂，具多数苞鳞（果时称果苞），花被或有或无，子房 2 室或不完全 2 室，每室胚珠 1—2（其中 1 枚败育），花柱 2 枚，分离，宿存。果序球果状、穗状、总状或头状，果苞木质、革质、纸质或膜质，宿存或脱落。小坚果有翅或无翅，或坚果，全部或部分为果苞所包裹，或不为果苞包被，胚直立，无胚乳。

6 属，100 余种。主要分布北半球，桤木属 *Alnus* Mill. 分布至中美洲及南美洲。我国 6 属，约 80 种，广泛分布全国各地，其中虎榛子属 *Ostryopsis* Decne. 仅产于东北部和西南部。四川产 6 属，约 46 种、10 变种，除高山草地和干旱河谷地区外遍布全省各县市。

科的模式属：桦木属 *Betula* Linn.

本科许多种为四川森林组成的重要树种，其中有的种类常被选为造林树种。

分属检索表

1. 雄花单生于每片苞鳞的腋间，无花被；雌花有花被；小坚果或坚果无翅，连同果苞排成总状或聚生成头状…………… I. 榛族 *Coryleae* Ascherson
2. 果簇生成头状果序，直立或斜伸；花粉粒孔不显著突出，外壁较厚。
 3. 坚果，大部或全部为果苞所包裹；果苞钟状或瓶状；花药药室分离，顶端具簇生毛…………… 1. 榛属 *Corylus* Linn.
 3. 小坚果，为果苞完全所包裹；果苞囊状；花药药室不分离，顶端无毛…………… 2. 虎榛子属 *Ostryopsis* Decne.
2. 果序总状，下垂；花粉粒孔显著突出，外壁较薄。
 4. 果苞叶状，亚革质或纸质，扁平，具裂片，包着小坚果基部…………… 3. 鹅耳枥属 *Carpinus* Linn.
 4. 果苞囊状，膜质，完全包着小坚果…………… 4. 铁木属 *Ostrya* Scop.
1. 雄花 2—6 朵生于每片苞鳞的腋间，具 4 枚膜质花被；雌花无花被；小坚果具翅，连同果苞排成球果状或穗状…………… II. 桦木族 *Betuleae* (Döll) Ascherson
 5. 果苞木质，成熟后宿存，具不明显 5 浅钝裂，每果苞内具小坚果 2；果序球果状；雄蕊 4，花粉粒通常具 4—5 孔，外壁明显带状加厚…………… 5. 桤木属 *Alnus* Mill.
 5. 果苞革质，成熟后脱落，具明显 3 裂片，每果苞内具小坚果 3；果序穗状；雄蕊 2，花粉粒通常具 3 孔，外壁无明显带状加厚…………… 6. 桦木属 *Betula* Linn.

I. 榛族 *Coryleae* Ascherson