

青藏高原横断山区科学考察丛书

川西地区大型经济真菌

中国科学院青藏高原综合科学考察队

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内 容 简 介

本书较系统地阐述了川西地区大型经济真菌的种、属组成,种的形态特征、生态习性、分布和经济价值;共记载大型经济真菌 245 种,分隶于 89 属 35 科 13 目,其中食用菌 170 种,药用菌 90 种,外生菌根真菌 97 种,毒菌 40 种,木腐菌 22 种;有分属、分种检索表,图解检索表及彩色照片 11 版。

本书可供国土资源管理部门、生命科学、真菌学、农、林、医药、卫生防疫、商业及外贸有关人员和蘑菇爱好者参考。

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《青藏高原横断山区科学考察丛书》序

辽阔的青藏高原,包括西藏全部、青海南部,以及四川西部和云南西北部,大部分地区海拔在 4000m 以上,四面以巨大的落差急剧下降,衬托出世界屋脊的磅礴气势,素有世界第三极之称。由于青藏高原独特的地质历史和自然条件,丰富的生物组成和生物群落类型,成为地球上一个独具特色的地理单元。青藏高原蕴藏着丰富的自然资源,又是许多少数民族生活和居住的地区,且地处边陲,合理保护和开发这一地区的自然资源,对发展经济,改善人民生活,以及巩固民族团结和加强国防建设都有重要的意义。

为了探索青藏高原形成和演变的历史,研究自然条件的特点及其对周围环境的影响,研究自然资源的数量和质量及其合理开发利用的途径。解放以后,中国科学院对这里进行了多次科学考察,特别是自 1973 年起组织了青藏高原综合科学考察队,对这一地区进行了更为全面、系统的综合性研究。

1973—1980 年期间,考察队重点对西藏自治区进行了考察。其科学成果将集中反映在陆续出版的《青藏高原科学考察丛书》(西藏部分)及论文集和画册中。有些成果在实际生产中已得到推广和应用,在国际和国内产生了深远的影响。

考察队从 1981 年起将考察研究的重点转移到横断山区。横断山地处我国西南的藏东、川西和滇西北一带,是青藏高原的一个组成部分。在行政区域上包括西藏自治区的昌都地区,四川省阿坝、甘孜、凉山及云南省丽江、迪庆、怒江和大理等地(州)区,总面积约 50 万平方公里。

横断山脉在地质构造上处于南亚大陆与欧亚大陆镶嵌交接带的东翼,是我国东部环太平洋带与西部古地中海带间的过渡地带。地质构造复杂,新构造运动活跃。本区地势由西北向东南倾斜,大部为高山峡谷,山脉、河流南北纵贯,相间并列,高差很大,自然地理条件独具一格,生物区系绚丽多采,且富含古老和孑遗类型,是研究生物和地学中许多重大理论问题的关键性地区。

横断山脉自然资源丰富,尤以多种矿产、水利、森林、草场等资源最为丰富。但是随着人口的增长和开发利用的加剧,自然资源承受的人类压力日益加大,有些地区生态平衡遭到了破坏。为了合理利用自然资源,必须研究本区的自然资源特点,探索其合理保护利用与开发的方向和途径。

横断山区科学考察工作主要围绕六个课题进行:① 横断山脉形成的原因和地质历史;② 横断山区自然地理特征及其与高原隆起的关系;③ 横断山区自然垂直地带的结构及其规律;④ 横断山区生物区系的组成;⑤ 横断山区自然保护与自然保护区;⑥ 横断山区自然资源的评价及其合理开发利用。

为了使科学考察研究更密切地与当地的经济开发工作结合起来,在自然资源评价与开发利用方面着重抓了农业自然资源条件与自然资源系列制图;亚高山暗针叶林采伐与更新;地方能源的综合利用;畜牧业发展战略及干旱河谷农业自然条件与开发利用等 5 项

综合专题的考察研究。

横断山区的综合科学考察研究工作由中国科学院-国家计委自然资源综合考察委员会负责组织领导。参加此次考察研究的包括中国科学院有关研究所、高等院校和地方科研与生产部门等单位计 40 余个,约 300 多人,涉及 40 多个专业。

《青藏高原横断山区科学考察丛书》将系统地总结青藏高原综合科学考察第二阶段的成果。

《青藏高原横断山区科学考察丛书》计划由横断山区农业自然条件与农业自然资源评价、四川省金川县农业自然条件与农业自然资源评价、横断山区的地方能源资源、横断山区亚高山暗针叶林采伐与更新的研究、横断山区(川西部分)畜牧业战略发展的研究、横断山区干旱河谷的环境条件与农业资源的开发利用、横断山区地质构造、横断山区的沉积岩及沉积盆地演化、横断山区基性超基性岩、横断山区富碱侵入岩带地球化学和成矿、横断山区花岗岩类地球化学、横断山区锡矿带地球化学、横断山区地层、横断山区古生物、横断山区哺乳动物化石与生活环境、横断山区地热与水热活动区名录、腾冲地热、横断山区自然地理、横断山区地貌与第四纪地质、横断山区气候、横断山区的冰川、横断山区泥石流、横断山区土壤地理、横断山区森林、横断山区草场、横断山区植被、横断山区沼泽与泥炭、横断山区湖泊综合研究、横断山区中小河流及水资源、横断山区自然垂直带结构特征及分布规律、横断山区植物、横断山区家畜种群生态、横断山区鱼类、横断山区哺乳动物、横断山区鸟类、横断山区两栖爬行动物志、横断山区甲壳动物、横断山区昆虫、横断山区土地资源开发与农业布局等专著组成。我们希望它能在探索青藏高原的奥秘和我国社会主义建设中发挥积极的作用。

中国科学院青藏高原综合科学考察队

THE SERIES OF THE SCIENTIFIC EXPEDITION TO THE HENGDUAN MOUNTAINS OF THE QINGHAI-XIZANG PLATEAU

PREFACE

The vast Qinghai-Xizang Plateau, consisting of the Xizang (Tibet) Autonomous Region, the southern part of Qinghai, western part of Sichuan and northwestern part of Yunnan Provinces, is often eulogized as the third polar of the world. The major parts of the Plateau are 4,000 metres above sea level, while the areas around drop drastically setting off the tremendous momentum of the roof of the world. The particularities of the geological history and physical conditions, the variety of biological composition and the different types of bio-communities make the Qinghai-Xizang Plateau a unique geographical unit. As the Plateau, being rich in natural resources, lies on the border regions where inhabit many national minorities, the rational conservation and utilization of the natural resources in this region are of particular importance in developing economy, improving the local livelihood and consolidating national solidarity as well as strengthening national defence.

Ever since the foundation of new China, many scientific surveys have been carried out in this region so as to make a better understanding of the history of the formation and evolution of the Qinghai-Xizang Plateau, to study the characteristics of its natural conditions, their effects on the environment around and the quantity and quality of the natural resources and thus, to find a way of exploiting and utilizing them rationally. Especially after the forming of the Comprehensive Scientific Expedition to the Qinghai-Xizang Plateau in 1973, an even more comprehensive, systematic integrated research has being made on this region.

A survey was mainly carried out on the Xizang (Tibet) Autonomous Region during the period of 1973—1980. The scientific findings of the survey, part of which have already been extended and applied to actual production and have brought a far-reaching influence both in and outside China, will be concentratedly compiled in the series of the scientific expedition to the Qinghai-Xizang Plateau (Xizang Volume), proceedings and pictorials. Since 1981, the survey team has shifted its major researching area to the Hengduan Mountainous Region which is a constitutional part of the Qinghai-Xizang Plateau and is located in the east of Xizang, west of Sichuan and northwest of Yunnan Provinces in southwest China. The total area of this region is about 0.5 million square kilometres and administratively speaking including the Qamdo districts of Xizang, Erba, Cangzi, Liangshan of Sichuan and the Lijiang, Nujing and Dali districts of Yunnan.

The Hengduan Range is complicated in geological structure and active in new tectonic movements. It lies on the east flank of the juncture area where south Asia

and Eurasia are mounted. It is the transition region between the east zones encircling the Pacific and the west zones of ancient mediterranean. The altitude of this area declines from northwest to southeast. Most parts of the area are characterised by a series of paralleled mountain ranges and rivers from south to north, and with a sharp altitudinal differentiation. Its unique physical conditions and variety ecosystems being rich in flora and funa with abundant relic species, give the area a critical nature for the fundamental research in the field of biology and earth science.

The Hengduan Mountainous Region is abundant in natural resources, among which multi-mineral products, hydrological resources, forest and grasslands account for the great part. But with fast growth of the population and an extensive exploitation and utilization of the natural resources, the human pressure on natural resources has vastly increased which even caused ecologic equilibrium damagement in some part of the area. In order to make a more reasonable utilization of natural resources, it is necessary to study the characteristics of the resources in this region so as to work out certain ways and methods for protecting, utilizing and exploiting them rationally.

There are six major subjects in the research work being carried out in the Hengduan Mountains:

1. The geological history of the Hengduan Range;
2. The physiographical characteristics of the Hengduan Mountains and their relationship with the rise of the Plateau;
3. The structure and rule of the altitudinal belts of the Hengduan Mountains;
4. The composition of bio-communities in the Hengduan Mountains;
5. The natural conservation and nature reserves in the Hengduan Mountains;
6. Evaluation of the natural resources in the Hengduan Mountains and their rational development and conservation.

Five intergrated projects have also been given special attention in the research on natural resources evaluation, exploitation and utilization. They include as following: compilation of a series of maps on the conditions of agricultural resources; deforestation and regeneration of subalpine coniferous forest in subalpine areas; the multiple utilization of local energy resources; strategy for the development of animal husbandry and finally the management of the natural resources in the arid valleys. This has been done in line with the purpose of linking scientific research closely to the development of the local economy.

The intergrated survey on the Hengduan Mountainous Region is organized by the Commission for Integrated Survey of Natural Resources under the Chinese Academy of Sciences and the State Planning Commission. There are more than 300 people, coming from more than 40 institutions including different institutes of the Chinese Academy of Sciences, universities and local scientific research and production departments engaged in natural resources research. A series of scientific publications on the Hengduan Mountains will provide the results acquired from the second phase of the integrated scientific survey in the Qinghai-Xizang Plateau. It is desi-

igned that this series will be consisted of 39 volumes and 48 monographs. It is also expected that this series will play an important role in exploring the wonders of the Qinghai-Xizang Plateau and in the construction of China.

The Comprehensive Scientific Expedition to the Qinghai-Xizang Plateau, Chinese Academy of Sciences

前 言

本书汇集了作者 1983—1986 年对青藏高原川西地区(包括阿坝、甘孜藏族自治州和凉山彝族自治州部分地区)大型真菌资源考察、研究所得的结果,它属于《青藏高原横断山区科学考察丛书》的一个分册。

在 1983、1984 年参加横断山地区野外考察期间,共采得大型真菌标本 2068 号。经室内研究已定种共 280 种,隶属于 93 属, 35 科, 13 目。其中有新种 5 个: 异囊绒盖牛肝菌 *Xerocomus heterocystides* Ying sp. nov.、小绒盖牛肝菌 *Xerocomus parvus* Ying sp. nov.、近迷孔绒盖牛肝菌 *Xerocomus subdaedaleus* Ying sp. nov.、拟菱红菇 *Russula pseudovesca* Ying sp. nov. 以及西宁林氏鬼笔 *Linderiella xiningensis* Wen sp. nov. (已另文发表)。国内新记录种 33 个,包括红菇目 Russulales 2 属 21 种、伞菌目 Agaricales 4 属 6 种、牛肝菌目 Boletales 3 属 4 种、花耳目 Dacrymycetales 及柔膜菌目 Helotiales 各 1 属 1 种。四川省新记录种 73 个,分隶于 45 属,其中主要的有伞菌目 20 属 27 种、红菇目 2 属 18 种、牛肝菌目 6 属 10 种、非褶菌目 Aphyllophorales 10 属 10 种。

在已鉴定的大型真菌中,有经济意义的有 245 种,包括食用菌 170 种、药用菌 90 种、外生菌根真菌 97 种,毒菌 40 种以及木腐菌 22 种。其中担子菌 238 种,分隶于 86 属, 33 科, 11 目;子囊菌 7 种,分隶于 3 属, 2 科, 2 目。

研究表明,该地区大型经济真菌资源是相当丰富的,我国已报道的食用菌及药用菌种类约三分之一在该地区有分布,菌根真菌及毒菌种类约半数在该地区也有分布。

170 种食用菌中既有我国传统优质的种类,也有不少世界各国著名的种类,如在日本被誉为食用菌之珍品的松口蘑 *Tricholoma matsutake* (Ito et Imai) Singer; 亚、非著名的鸡枞 *Termitomyces albuminosus* (Berk.) Heim; 欧、美广为食用的松乳菇 *Lactarius deliciosus* (L.) Fr., 血红乳菇 *Lactarius sanguifluus* (Paul.) Fr.; 西欧市场的蓝黄红菇 *Russula cyanoxantha* (Schaeff. ex Schw.) Fr., 东欧以干品或腌渍品出口的美味牛肝菌 *Boletus edulis* Bull.: Fr., 以及亚洲东部地区作为重要食用菌的侧耳 *Pleurotus ostreatus* (Jacq.: Fr.) Quél. 等。

药用菌除冬虫夏草 *Cordyceps sinensis* (Berk.) Sacc.、猪苓 *Polyporus umbellatus* (Pers.) Fr.、灵芝 *Ganoderma lucidum* (Leyss.: Fr.) Karst. 等传统名品外,还有近年来新发掘的对心血管系统、消化系统、肝脏以及肿瘤等疾病有一定疗效的药用菌,如猴头菌 *Hericium erinaceus* (Bull.) Pers.、云芝 *Coriolus versicolor* (L.: Fr.) Quél.、毛木耳 *Auricularia polytricha* (Mont.) Sacc.、冬菇 *Flammulina velutipes* (Curt.: Fr.) Sing.、小蜜环菌 *Armillariella mellea* (Vahl: Fr.) Karst.、发光小蜜环菌 *Armillariella tabescens* (Scop.: Fr.) Sing. 等。

毒菌中,有少数为剧毒种类,如鹿花菌 *Gyromitra esculenta* (Pers.) Fr., 误食后可引起肾损害导致溶血以致死亡;氏族丝膜菌 *Cortinarius gentilis* (Fr.) Fr. 为国内新记

录种,据文献该菌可引起肾衰竭。

本书分概论和大型经济真菌分类与描述两部分。概论介绍大型真菌的生物学性状,包括大型真菌分类范畴,将多种大型真菌子实体按菌盖、菌柄、子层体的形态结构及其相互间的关系归纳为 9 种类型,进而以图解检索方式示明大型真菌主要类群的特征及分类和代表属种示意图,便于有关人员了解、掌握大型真菌的分类基础知识;最后还简述了标本的采集及保存方法。大型经济真菌分类与描述的第一部分为 89 属的系统分类检索表;第二部分是 89 属 245 种大型经济真菌的形态描述及用途:以属为单位,属下有分种检索表,对每种形态特征、生态习性、产地及经济价值(附文献出处)均有详细描述,其中 46 种还附有彩色照片。

本书所载科考研究结果填补了川西地区大型经济真菌利用研究方面的空白,并为开发利用该地区大型经济真菌提供了科学依据。

经研究鉴定的标本均保存于中国科学院微生物研究所真菌标本室。

非本次科考所采而标本室已入藏的川西地区标本,经复查或修订后引证的种则以标本室(HMAS)号标明。

本研究工作中,参加野外考察与标本拍摄的有文华安、苏京军;参加室内研究工作的有应建浙、文华安和宗毓臣;黑白线条图由韩者芳描绘。

作者

1937 年 4 月

Foreward

This book on "THE ECONOMIC MACROMYCETES FROM WESTERN SICHUAN" is one volume of "THE SERIES OF THE SCIENTIFIC EXPEDITION TO THE HENGDUAN MOUNTAINS OF THE QUINGHAI-XIZANG PLATEAU". It is the results of studying macrofungal resources in western part of Sichuan Province, consisting of Aba, Ganzi, and Liangshan Automonous Prefectures.

Its content falls into two portions. The first portion is an introduction, including the biological characteristics of macromycetes, the illustrated key to morphology of representative genera concered in this book, and the collection and preservation of macromycetes. The second portion deals more specifically with the classifications and descriptions of economic macromycetes. Hence in this portion, keys to genera and species for each order and family are given. Morphological characteristics, habitat, distribution and economic importance or utilization for each species are described in detail, accompanied by 46 color photographs.

This book incoporates 245 species distributed among 89 genera, belonging to 35 families, and 13 orders. Basidiomycotina covers a great number, i.e. 238 species, 86 genera, 33 families, and 11 orders, while Ascomycotina amounts to 7 species, 3 genera, 2 families and 2 orders respectively. Among them, there are 170 species edible, 90 species medicinal, 97 species mycorrhizal, 40 species poisonous, and 22 species woodrotting.

As mentioned above, macrofungal resources are rich in western part of Sichuan Province. In fact, the edible and medicinal macrofungi identified by the authors in that region amounts to one third of the total number of both edible and medicinal fungi which have been reported in China, while the poisonous and mycorrhizal species around half of the total number respectively.

A number of macrofungi inlcuded in this book, such as *Boletus edulis* Bull.: Fr., *Flammulina velutipes* (Curt.: Fr.) Singer, *Lactarius deliciosus* (L.) Fr., *Lactarius sanguifluus* (Paul.) Fr., *Russula cyanoxantha* (Schaeff. ex Schw.) Fr., *Tricholoma matsutake* (Ito et Imai) Singer, *Termitomyces albuminosus* (Berk.) Heim, etc., having been considered as seasonal delicacies from mountain and forest, are famous both home and abroad. Among the edible ones, 33 species have been found to have anti-tumour activity or inhibit remarkably the growth of Sarcoma in white mice. *Hericium erinaceus* (Bull.) Pers. has the effect in treating tumours of the alimentary tract of human being. Apart from the anti-tumour activity, quite a number of macrofungi have been found to possess specific curative effects, *Armillariella tabescens* (Scop.: Fr.) Singer which was first used in China, is effective for treatment of cholecystitis, the others, such as *Auricularia polytricha* (Mont.) Sacc., etc., possess the effect of lowering blood cholesterol; *Ganoderma lucidum* (Leys.: Fr.) Karst., as well as *Armillariella mellea* (Vahl: Fr.) Karst. have some effect on the diseases of cardiovascular system. In summing up, it can be seen that the potential medicinal

effect of macrofungi, whether edible or inedible, is great.

For those who are interested or are engaged in research on utilization and exploitation of economic macromycetes, this volume may serve as a reference book.

The materials studied are deposited in the Herbarium Mycologicum Instituti Microbiologici Academiae Sinicae.

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