

7. Scientific Articles

- In 2006, 208 SCI-index scientific articles have been published, among which 152 articles were published with KIB staff or students as the first authors, 65 articles published on TOP 30% SCI-index journals.
- KIB heads the list of all CAS biology relevant institutions in terms of scientific articles per capita, and ranks second in CAS with regard to ratio of input-output of research funds, and academician Sun Handong has been rated as No. 1 six years in a row among researchers in CAS biological institutions.
- Articles published on journals of TOP 30% of related fields, please see pp. 12-15.

8. Scientific and Technological Awards

8.1 Award for Outstanding Contributions of Yunnan Province

Winner: Zhou Jun

Award for Scientific and Technological Outstanding Contributions of Yunnan Province is the highest-level award for science and technology in Yunnan Province. Usually this award can be given to only one winner and vacancy is acceptable. According to the Ordinances for Scientific and Technical Awards of Yunnan promulgated on Jun. 27th, 2000 by Yunnan Provincial Government, the winner of Award for Scientific and Technical Outstanding Contributions of Yunnan Province must have made great breakthrough in scientific and technological frontiers, or made remarkable contributions to development of science and technology, or achieved significant social and/or economic benefits in terms of scientific and technological innovation, transfer of scientific and technological achievements and industrialization of high-techs. The candidate must have accomplished great technological invention, technological innovation in scientific and technological activities, especially in field of high-techs, and must be active in enhancing market-oriented industrialization of achievements, accelerating the leapfrogging development of a specific technology and revolution of industrial structure, achieving immense social and/or economic benefits and contributing tremendously to the social and economic development.

Academician Zhou Jun has been dedicating his efforts to research of plant chemistry and plant resources in Yunnan for more than 40 years, who inaugurated the systematic studies on plant glucosides, Yunnan Baiyao and plant cyclopeptide. He has carried out profound studies on triterpenoid, steroid, phenols, cyclopeptide, alkaloids and structure of glucosides of over 100 species plants of important medical value belong to *Panax*, *Paris*, *Dioscorea*, *Aconitum*, *Cynanchum* and several genera of Caryophyllaceae. Prof. Zhou has published 281 scientific articles, among which 235 articles were





quoted by another 1,772 articles, 101 articles were included in SCI-E index and 98 articles were included in Chinese Science Citation Database. In his monographs including 'Acorns' and 'The Oil Plants in China', academician Zhou identified over 400 new compounds and a great many compounds with potential for application and/or important bioactivity. As the major inventor and a collaborative researcher, Prof. Zhou has developed the drugs including 'gastrodin' and 'Gongxuening', reaping immense social and economic benefits. The accumulative sales revenue of 'gastrodin' and 'Gongxuening' is about RMB 244 million and 567.32 million (RMB 233.44 million in profits), respectively. Long-term production and using of other research achievements such as diosgenin and colchicine also creates great economic and social profits.

Academician Zhou firstly claimed that the base of TCM compound is combinatorial natural chemistry bank with multiple-target mechanism, which is also accepted by many pharmaceutical experts. On basis of plant chemistry, plant genetic relationships and phytogeography, Prof. Zhou has studied the interrelationships among *Panax ginseng* and American ginseng, clarifying the relations among *Panax* species, the result of which was introduced into PRC Pharmacopoeia and the academia of pharmacy so as to enhance the research and development of *Panax notoginseng* and other *Panax* species. Through systematic studies on the chemical ingredients of *Cynanchum*, *Asclepiadaceae*, in combination with original evolution of chemical ingredients, Prof. Zhou concluded that the thin-root plants were different from thick-root plants of *Cynanchum* in terms of chemical ingredients and advocated the name *Vicetoxicum* being resumed, which was accepted swiftly by international taxonomists. Prof. Zhou is the first home scientist who conducted studies on plant cyclopeptide and built up a new method system for testing plant cyclopeptide. More than 100 cyclopeptide structures of over 20 plants of *Caryophyllaceae* have been identified and over 60 plant cyclopeptide been named. Based on analyses of amyllum, axunge and tannins of *Fagaceae* plants, Prof. Zhou published the first scientific article concerning phytochemistry and taxonomy, 'Accumulation of useful substances in plants and studies on relations: distribution of tannins in *Fagaceae* plants', the research results were frequently cited in domestic books concerning grain plants. As the editor-in-chief of 'The Oil Plants in China', a monograph that includes systematic studies on distribution of China's main oil plants and structures of fatty acid and also is the most comprehensive monograph on oil plants in China, Prof. Zhou presented the idea that physic nuts could take the place of diesel oil.

In addition, academician Zhou is also the founder of State Key Laboratory of Phytochemistry and Plant Resources in West China, who has bought up many senior scientists in the field of phytochemistry, significantly enhancing the development of phytochemistry and plant resources in China.

Academician Zhou has not only made immense contributions to basic and theoretic studies of phytochemistry and plant resources, but achieved tremendous social and economic benefits in terms of transfer of scientific achievements in the field of pharmacy in Yunnan.



8.2 Systematic and Chemical Studies on Important Natural Product of Plant Cyclopeptide

Type and Class of Award: Science and Technology Progress of Yunnan Natural Science First-class Award

Type and No. of Projects: Yunnan Natural Science Foundation 2001B0055M, National Natural Science Foundation of China 95C088Q

Completion Unit: Kunming Institute of Botany, Chinese Academy of Sciences

Main Contributors: Zhou Jun, Tan Ninghua, Li Chaoming, Zhao Yurui, Jia Aiqun, Ding Zhongtao, Cheng Yongxian

Main Contents and Impacts:

The project started in 1991 and it has successively received financially support from 12 projects sponsored by the KIB State Key Laboratory of Phytochemistry and Plant Resources in West China, Yunnan Natural Science Foundation and National Natural Science Foundation of China with total fund amounting to RMB 700,000 yuan. Plant cyclopeptide is a very important plant metabolite and also a new thing in natural product chemistry. Studies on plant cyclopeptide have a history of nearly half a century ever since the discovering and identification of the structure of cyclolinopeptide A in 1959. Prior to the 1990's, only 150 cyclopeptides had been identified, which were mainly cyclopeptide alkaloids. Some important structures and problems of function, however, have not been resolved in studies of plant cyclopeptides.

The project firstly began its studies on plant cyclopeptides at the beginning of the 1990's and the research team has spent nearly 15 years carrying out continuing studies on plant since the founding of cyclopeptide A and cyclopeptide B of *Pseudostellaria heterophylla*. This project mainly includes studies on six aspects including establishment of chemistry system of plant cyclopeptides, finding of new plant cyclopeptide, studies on structure and biological significance of plant cyclopeptides, biosynthesis of plant cyclopeptides, basic researches on utilization of plant cyclopeptides and academic summary and new academic perspectives on plant cyclopeptides. Main research results can be described as follows:

8.2.1 An integral system for research of plant cyclopeptides including testing, extraction, isolation, purification, plain structure, absolute configuration, solution conformation and crystal structure studies was established. It should also be noted that another thin-layer testing method for plant cyclopeptides and a complete identification system for plant cyclopeptides that still works today, was established.

8.2.2 From 28 species of Caryophyllaceae and Annonaceae, 112 plant cyclopeptides had been found, among which 79 were new plant cyclopeptides.

8.2.3 Firstly claimed a new classified method of structures of plant cyclopeptides and put forward the new phytochemistry and taxonomy idea that the Caryophyllaceae plants can be classified by plant cyclopeptides.

8.2.4 Preliminary proved the enzyme cyclization reactions of cyclopeptide B of *Pseudostellaria heterophylla* and concluded that plant protein is the primary metabolites and other plant cyclopeptides are indirect genetic products.

8.2.5 A new quality-control method for medical material of *Pseudostellaria heterophylla* based on the contents of cyclopeptide A and B of *Pseudostellaria heterophylla* was described. It also noted that cyclopeptide in red ginseng and other overall cyclopeptide demonstrated anti-tumor activity.

8.2.6 The publication of a review about plant cyclopeptides on the world leading journal, *Chemical Reviews* (Impact factor 20.233 in 2004) symbolizes that the research achievements on plants cyclopeptide received wide recognition from the international academia.

The research team of this project has published 68 scientific articles (monographs), 40 SCI-index articles and 50 articles have been quoted for 355 times, 16 graduate students completed their dissertations based on research of this project and relative





articles were once selected to the keynote report on international conferences. The research team has already grown into a dominant research team of plant cyclopeptides in the whole world, receiving wide concerns, tracking and cooperation with counterparts, both home and abroad. The research achievements hold the internationally leading position with regard to testing method of plant cyclopeptides, finding of new compounds, classification of new structure, biosynthesis, academic summary and new academic ideas, generating tremendous influences to development of this specific research field.

8.3 Studies on Species Resources and Taxonomy of Plants of *Colocasia*, Araceae

Type and No. of Projects: Yunnan Natural Science Foundation 2001B0058M, National Natural Science Foundation of China 30170102

Completion Unit: Kunming Institute of Botany, Chinese Academy of Sciences

Main Contributors: Long Chunlin, Li Heng, Cheng Zhiying, Cao Limin, Cai Xiuzhen, Li Sumei, Liu Yutao, Tang Anjun, Luo Jifen.

Main Contents and Impacts: Plants of Araceae are well-known economic plants with ten species altogether and eight of them can be found in China. Except for *Colocasia konishii*, all the Chinese species inhabit in Yunnan and adjacent areas. This project mainly focused on conservation of *Colocasia* plant germplasm resources and taxonomic studies.

Main Results Achieved:

8.3.1 Collected and conserved 62 pieces of *Colocasia* plant germplasm resources belong to 13 species and two varietal species, the highest in the world in terms of number of germplasm resources and species.

8.3.2 Have conducted research on species resources of plants of *Colocasia*, supplying basic materials for the Diversity Center of *Colocasia* Plants. Efforts were also focused on conservation technologies, providing technological support for long-term conservation of *Colocasia* plants.

8.3.3 Enriched the characteristics and taxonomic description through studies of morphology, cytology and molecular biology, reported the cell chromosome numbers of eight species and conducted DNA sequencing of 10 species, supplying new proofs for cytology and molecular biology for taxonomic revision of *Colocasia* plants.

8.3.4 Based on the research results, five new species were finally identified.

8.3.5 Twenty scientific articles, six of which were included by SCI, have been published on Chinese and foreign leading journals on basis of the research results.

8.3.6 Two postgraduate students completed their MSc. theses on the research results.

8.3.7 Two patents were submitted.