

BOTANY

Rhizobia in China

By Chen Wenxin and Wang Entao. 2012. Beijing Science and Technology Press, 16 Xizhimen South Street, Beijing 100035 China. 496 pages. 108.00 CNY. Cloth.

Rhizobia are soil diazotrophs that form a symbiotic association with legumes, and fix nitrogen after becoming established inside root nodules of legumes (Fabaceae). OLINK "http://en.wikipedia.org/wiki/Root_nodule" "no"Rootnodule") In general, they are Gram-negative, motile, non-sporulating rods. Rhizobia belong to a paraphyletic group that fall into two classes of the proteobacteria, the alpha- and beta-proteobacteria. Most of them belong to the order Rhizobiales, but several rhizobia occur in distinct bacterial orders of the proteobacteria. The taxonomy of rhizobia has changed considerably over the last 20 years, with the original genus *Rhizobium*, a member of the alpha-Proteobacteria, now divided into several genera. There are currently six phylogenetically distinct genera of rhizobia. The taxonomy of these organisms is still in flux due to rapidly advancing analytical techniques.

Nitrogen is the most critical nutrient needed to support plant growth. Unfortunately, atmospheric dinitrogen is extremely stable due to triple bonds which can only be broken by energy intensive ways, including electrical N_2 fixation by lightning, the Haber-Bosch process and biological N_2 fixation in legumes by bacterial symbionts. The reduction of atmospheric dinitrogen into ammonia has been considered the second most important biological process on earth after photosynthesis. Biological fixation of nitrogen can contribute large amount of plant usable nitrogen to the soil nitrogen pool. Estimates of the amount of fixed N_2 range from 57–600 kg/ha per year and vary widely. Symbiotic nitrogen fixation is noted to reduce the need for excessive synthetic fertilizer additions by replacing man-made nitrogen with a naturally produced form. Simply by utilizing crop rotation with legumes could save millions or billions of dollars currently being spent on synthetic nitrogen forms used extensively in monoculture agriculture, namely continuous corn production. Biological fixation of nitrogen was the leading form of annual nitrogen input until the last decade of the 20th century. It is gaining attention once again as sustainability becomes a central focus to feed a world population of over 7 billion people.

So far, many works relating to rhizobia research are occurring on North American and Europe, but less in other regions. Actually, rhizobium research has been done in many areas, but not all of their works have been reported, thus, less been known to the outside world. The recently published book *Rhizobia in China* systematically reported the rhizobium research works in China in the last 30 years, which may strengthen rhizobium research in China, promote information exchange

internationally and the application of rhizobia in the agriculture, forestry and animal husbandry.

The book of *Rhizobia in China* is divided into 20 chapters and four parts. The first part is general introduction, mainly including the rhizobium characteristics, function, origin and evolution, classification history and classification system, molecular mechanisms of rhizobium and legume symbiosis, genomics and post-genomics research on rhizobium. The second part is rhizobia diversity and systematics of modern research techniques and methods. The third part is rhizobium resource diversity in China and the descriptions of genus and species. The fourth part is rhizobium ecology in China, including the geographical distribution of rhizobia, application history and prospect, rhizobia selection principles and methods, the mutualism effects between the inter-cropping leguminous crops and gramineous crops, as well as rhizobium role in the restoration of the environment.

The book is by far the most systematic monograph on Chinese rhizobium research. The book not only systematically introduced the worldwide latest achievements in the field of rhizobium research in recent years to Chinese readers, but also the main results of Chinese rhizobium research to the world. The book has obvious theoretical and application values, but, there are still a number of weaknesses or some points need to be improved. The first and second parts have not sufficiently and systematically introduced the progresses made in rhizobium research worldwide in recent years. The number of literature citations was relatively small and scattered. New discoveries in recent years in this field were not introduced comprehensively, and even some much more important results were not mentioned. Some of the introductions to the earlier and popularly recognized knowledge on rhizobium need to be compressed so as to save some space. The recent changes in rhizobium classification system and the latest and important results in rhizobium molecular biology have not been clarified enough. Of course, completely doing all these works mentioned above may not be the compulsory responsibility for the book focusing on introducing the rhizobia of China, but a concise generalization, refining and introduction to the latest advancements in this field still could be done if more effort was made. The third part on the rhizobium resource diversity and genus, species description is the core of the book, with a large amount of information. However, since so far there have not been so many in-depth mechanistic studies on rhizobia in China, this part can only be written based on the actu-

al situations and real materials in such a manner to represent the present. Hopefully, along with the gradual accumulation of the in-depth, systematic and mechanistic research results on rhizobia in China, this part of the book would be further strengthened and enriched in the second edition.

The title of the fourth part is the rhizobium ecology in China, but the contents were somewhat erratic. When writing this part, the authors probably found that there were less material directly related to this subject, thus, they collected some material that was not closely related to this subject. For the structural integrity and coordination of the whole book, it might be better if the present fourth part would be treated as follows: deleting the title of part four, but some contents might be included in the first part of the book, and some others

might be included in the third part of the book; new chapters or sections may be set up if necessary.

Small defects cannot obscure the great virtues. As a first most systematic monograph on Chinese rhizobium research, the book might be of especially obvious values to the researchers outside China who would be interested in the rhizobia in China.

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Erratum The Canadian Field-Naturalist 126(4)

In response to the review of *Contributions to the History of Herpetology*. CFN 126(3): 344-345, the book's editor Kraig Adler pointed out (personal communication to FRC 12 May 2013): "Only one small correction. Mrs. Martof used a kitchen knife, not a gun. She told the police she slipped while cutting some pizza. But Bernie was stabbed up under his rib cage several times!"

Erratum The Canadian Field-Naturalist

It has come to our attention that sections of many of the book reviews by Li Dezhi and Qin Aili were copied from sources without attribution. The journal and the authors apologize for this oversight.