

RESEARCHES OF ACAROLOGY IN CHINA



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PREFACE

As was the case in scientific researches in other fields, scientific researches on Acari was almost stagnant in China before liberation (1949). At that time only a few number of species were recorded in this country and many of them were introduced from foreign references. It was more difficult to read about Acari biology and know the relationship between Acari and diseases. Since 1950's, especially in the last 10 years the scientific researches on Acari has advanced greatly in China, not only on fauna, taxonomy, ecology and biology, but also on the harmfulness and utilization of Acari and its relationship to diseases. Meanwhile, some other researches have been carried out, such as researches on heredity, fine-structure by electron microscope, immunology and biochemistry. These researches have developed satisfactorily and laid a foundation for future study and application of Acari. To promote the understanding between the Chinese and the foreign acarologists, we decided to write this book so as to introduce the advances of acarological studies in China especially those in recent years.

This book is based on Chinese materials, of which most of them have been published and others, though not published, are of great value. This book consists of four parts: (1) Brief introduction of Chinese acarologists, (2) Agricultural acarology, (3) Medical acarology, and (4) Water mites. The end of this book is attached a complete catalogue, in which documents on Acari published in China in 1930—1990 can be traced.

A large number of scientific works about acarology have been published, such as: "Advances in Acarology" (Xin Jieliu and Xu Yinqi, 1965), "Economic Insect of China" (Fasc. 15, Ixodoidea, Deng Guofan, 1978; Fasc. 17, Gamasina, Pan Zongwen and Deng Guofan, 1980; Fasc. 21, Tetranychoida, Wang Huifu, 1981; Fasc. 39, Acari Ixodoidae, Deng Guofan and Jiang Zaijie, 1990), "An Outline of Ticks and Diseases" (Chen Guoshi, 1983), "Essentials of Acarology" (Xin Jieliu, 1984), "Agricultural Acarology in China" (Chief-edited by Ma Enpei, 1984), "Sand Mites of China" (Wen Tinghuan, 1984), "The Acarology of Agriculture" (Kuang Haiyuan, 1986), "Acarology" (Li Longshu and Li Yunrui, 1988), "Agricultural Acarology" (Xin Jieliu, 1989) and "An Outline of Chinese Ticks and Mites" (Deng Guofan et al., 1989). These works describe Acari researches in this country from different angles. From 1963 to 1988, four national symposia on acarology were held in China and the Fourth Symposium was held on a large scale. A symposium on the First Congress of Acarology was held at Taiwan Agricultural Research Institute, Taiqing (Taiching), Taiwan, May 17—18, 1989. These meetings encouraged the researches and development of acarology in China. In 1987, the Specific Committee of Acarology, Entomological Society of China was founded in Wuhan. Prof. Deng Guofan and Prof. Li Longshu are head and the vice-head respectively, Prof. Wen Tinghuan, Prof. Jiang Zaijie and Prof. Ma Enpei are members of this committee.

In the publication of this book we have received great support and help from famous Chinese acarologists Prof. Xin Jieliu (Shin Kai-lo), prof. Deng Guofan (Teng Kuo-fan), Prof. Xu

Bingkun (Hsu Ping-kuan), Prof. Wen Tinghuan. We are indebted to **Zong Zhixin**, Chief technician of Shanghai Museum of Natural History, who has made the photographs in this book, to **Mr. Zhang Jiubiao**, assistant of Bengbu Medical College, who helped us to deal with the characters by computer, and to **Prof. Wang Huifu, Prof. Wen Zaigen, Prof. Kuang Haiyuan, Prof. Wu Weinan and Lin Jianzhen**, who have provided us with valuable materials.

**Bengbu Medical College
April 1990**

**Chen Xingbao,
Ma Enpei**

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ACAROLOGISTS

Chen Xingbao, Jiang Zaijie, Ma Enpei, Dong Huiqing

CHEN XINTAO (CHEN HSIN-TAO, 陈心陶) (1904—1977)— He received his Bachelor degree from Fujian Christian University in 1925 and then went to Harvard University, U. S. A. where he received his D. Ph. in comparative pathology in 1931. Before his death in 1977, he was the head and professor of Teaching and Research Section of Parasitology, Zhong Shan Medical University. He made many important contributions to parasitology and was a leading scientist in China and a world known parasitologist. He devoted his life to helminthology and made many major advances in this field.

XU BINGKUN (HSU PING-KUEN, 徐秉锟) (1923—1991) — He received his Bachelor degree from Fujian Christian University in 1945 and his Master degree from Lingnan University in 1948. he was the head and professor of Teaching and Research Section of Parasitology, vice-president of Zhong Shan Medical University and chairman of Research Committee of Parasitic Diseases in Guangdong Province. He was one of the best known parasitologists in China and his contributions to Chinese parasitology were outstanding.

At the beginning of 1950's, Prof. Chen Xintao and Xu Bingkun began to carry out research work on trombiculid mites and tsutsugamushi disease. In the classification of trombiculid mites, they erected 2 new genera and 30 new species during 1955—1966. From 1956 to 1958 they observed and described the life cycle of 3 species of trombiculid mites and found the difference of genitalia between male and female. In the study of bionomics they discovered the regularity of distribution of breeding place and elucidated the relationship between the fluctuation of population quantity and the epidemiology of tsutsugamushi disease. The studies on the correlation between the source of infection, vectors and fluctuation of susceptible persons, and the studies on the basis of bionomics in prognosis and preliminary report were made. These discoveries have played an important role in the control of tsutsugamushi disease.

XU YINQI (HSU YIN-CHI, 徐荫祺) (1905—1985) — He obtained his Bachelor of Science in biology in 1926 from Suzhou University, Master of Science in 1929 from Yanjing University, and D. Ph. in entomology in 1932 from Cornell University, U. S. A. Before his death in 1985, he was the head of Teaching and Research Section of Parasitology, Shanghai Medical University and professor of parasitology and medical entomology.

He was one of the pioneer scholars in the subject of zoology in China. He was engaged in the research work of China's crickets, mayflies and trematodes. He began to study trombiculid mites and tsutsugamushi disease from 1950. From 1970 to 1985 he was studying the relationship between Demodicidae and demodicosis. Professor Xu, one of the pioneer workers of acarology in China, was a vice-chief of the Specific Section of Acarology in the Entomological Society of China. He had made remarkable contributions to acarology in China. Many Chi-

nese acarologists, including Wen Tinghuan, Qiu Minghua, Lu Buyan, Teng Bin, Chen Xingbao et al., were trained by him.

He was a member of Entomological Society of America, member of the Council of Entomological Society of China, vice-chairman of Shanghai Parasitological Society and Shanghai Entomological Society. In 1932 he attended the 100th Anniversary of Entomological Society of France and the 5th International Congress of Entomology held in Paris, France. He was one of the members of Editorial Board of "Acta Entomologica Sinica," and "Acta Parasitologica Sinica".

WANG FENGZHEN (WANG FENG-CHEN, 王凤振) (1906—1978)—He graduated from Beijing University in 1932. In 1936 he went to Germany and received his Doctorate from Rostock University. Before his death in 1978, he was the head and professor of Teaching and Research Section of Biology, the Norman Bethune University of Medical Science. He carried out the research mainly on the classification of spider in Germany. Later he also engaged himself in the research of acarology. He was a famous zoologist and one of the pioneers in investigating spiders and acarology in China. He did much work in training biological investigators in acarology, and made preparation for the first national symposium on acarology in China. He studied the distribution and ecotype of tick in the Northeast of China. Under the direction of Prof. Wang Fengzhen, many acarologists recorded many species of ticks from different provinces. In 1965 he discovered 3 new species of gamasid mites.

XIN JIELIU (SHIN KAI-LO, 忻介六) —He was born in 1909 and graduated from Agricultural Department of Kyoto University in 1930. Then he went to Germany where he was awarded the Doctor's degree at Rostock University.

Professor Xin was the head of Teaching and Research Section of Entomology in Fudan University; vice-chairman of Entomological Society of China, the head of the Specific Section of Acarology of Entomological Society of China; chairman of Shanghai Entomological Society; and editor of "Acta Entomologica Sinica". Since retired, he has been an honorary member of the Council of Entomological Society of China and honorary chairman of Shanghai Entomological Society. On November 2, 1989, Fudan University and the Council of Shanghai Entomological Society celebrated his 80th birthday.

He has published "The Pests of Storage", "Forest Entomology", "The Artificial Rearing of Insects, Mites and Spiders", "Essentials of Acarology" and "Agricultural Acarology", and has edited "Names and Terms of Acarina". Besides, he has edited "Advances in Acarology" (1965) in collaboration with Prof. Xu Yinqi. From the beginning of 1950, he studied the morphology and life cycle of *Aleuroglyphus ovatus*. His studies provided a foundation for further research on other stored product mites. He has worked on taxonomy and ecology of phytoseiid and eriophyid mites and has discovered many new species from several regions of China. Many Chinese acarologists such as Wang Xiaozu, Ma Enpei, Shen Zhaopeng, Yuan Yilan, Liang Laihong, Yang Qingshuang, Wu Qianhong, Dong Huiqing and Zhang Zhiqiang are his students. Therefore, the study of agricultural acarology in China today has become fairly well established.

ZHANG ZONGBAO (CHANG T. P., 张宗宝) (1910—1975) —He was an associate pro-

essor and head of Section of Zoology and Entomology in Epidemiological and Microbiological Institute, Chinese Academy of Medical Sciences. He was a member of the Specific Section of Acarology, Entomological Society of China and an editor of the journal "Insect Knowledge". He discovered 4 new species of gamasid mites. He summarized and published "Advances in Relationship between Gamasid Mites and Human Diseases" in 1965. He studied the fauna, ecology and role of vector of ticks and gamasid mites. He died in 1975. He had made some contribution to acarology in China.

YU ENSHU (于恩庶) —He was born in 1918 and graduated from Northeast Medical University in 1949. He is a professor and a vice-head of Fujian Research Institute of Epidemic Diseases. He began his investigations on trombiculid mites and tsutsugamushi disease in 1951. During 1953—1959 he engaged in the study of epidemic regularity, ecology, immunology and control methods of tsutsugamushi disease in Fujian, so that the incidence of disease had been greatly reduced and fatality rate had dropped to zero. He successfully isolated *Rickettsia orientalis* from 5 species of trombiculid mites, 1 mixture containing 2 species of gamasid mites, 11 species of rats, pig, rabbits and chicken. He found a new method of isolating rickettsia in 1980. In 1985, he successfully analysed the antigen types of tsutsugamushi, and now is engaged in the study of live vaccine for preventing tsutsugamushi disease. He is chief editor of "Chinese Journal of Zoonoses".

DENG GUOFAN (TENG KUO-FAN, 邓国藩) —He was born in 1920 and studied biology at Furen (Fujian) University, Beijing. He took his Bachelor degree in 1945 and Master degree in 1947. Thereupon he became research assistant at the Laboratory of Entomology, Academia Sinica. In 1950's he studied and worked in the area of medical entomology, especially Ixodidea. After then he became an associate professor and a professor at the Institute of Zoology and continued his research on ticks and gamasid mites. In 1978 he published his principal work, "Economic Insect Fauna of China" (Fasc. 15, Ixodoidea which lists approximately 80 species). A new volume of Ixodidae (Fasc. 39, Acari, Ixodidae, 1990) was published in collaboration with Prof. Jiang Zaijie, and it contains information about 101 species of ixodid ticks now recognized in China. His research has dealt with various aspects of the study on ticks, including species descriptions, geographic distribution, morphological and biological researches, and the relationships to the diseases. He has published many works on parasitic mites, and along with Pan Zongwen, is the author of Volume 17 on the Gamasina in the series on the "Economic Insect Fauna of China", and he, in collaboration with other acarologists, published "An Outline of Chinese Ticks and Mites" in 1989.

He is officially retired, but he continues to work at the Institute of Zoology, where he maintains an office and directs graduate students. He also continues as chief editor of "Acta Zootaxonomica Sinica", a member of the Council of Entomological Society of China, and as the chief of the Specific Committee of Acarology, ESC.

LI LONGSHU (LI LUNG-SHU, 李隆术) — He was born in 1920 and graduated from Agricultural College of Sichuan University in 1941. He took his Master degree from the Division of Entomology, Graduate College of Nanjing University in 1944. Upon graduation he worked as

a fellow of Rockefeller Foundation, U. S. A. and associate professor of Entomology in Sichuan University. Since 1952 he has been in the Southwest Agricultural University as a professor, tutor of doctor graduate student, chairman of the Department of Plant Protection and president of the University Association of Science and Technology.

Since 1944 he is responsible for programs of research on the ecological study of stored grain pests and agricultural mites with emphasis on some major species of economic mites and eco-systematic study of citrus orchard, the project supported by the National Natural Science Foundation of China. He studied the taxonomy, biology and ecology of agricultural mites including tetranychid, tarsonemoid, cunaxid and oribatids.

He has been elected to serve as vice-chairman of the National Society of Plant Protection, vice-chairman of the Speciality Society of Stored Grain of the Chinese Cereals and Oils Association, he is in charge of the Specific Committee of Acarology of Entomological Society of China, chairman of the Sichuan Provincial Society of Plant Protection.

He is one of the editors of "Acta Entomologica Sinica", editor reviewer of "Bee Science Review" of U. S. A., the adviser of "Journal of Grain Storage", member of ecological commentary group of National Natural Science Foundation Fund Committee, he has been invited as a participant in the Network of Acari of Australia.

He has been invited to attend 1st, 2nd, 3rd and 4th National Congress of Acarology, and National Stored Grain Congress as a member of the Chairman Group of the International Seminar of Stored Grain as an academic adviser of Chinese Delegation in 1981; the VI International Congress of Acarology as a vice-head of Chinese Speciality Group in 1982; as the head of Chinese Delegation of Agricultural Ecology for U. S. A. in 1986; a member of Chinese Delegation to attend XVIII International Congress of Entomology in Canada in 1988; a member of Chinese Delegation to attend 5th International Working Conference on Stored- Product Protection in France in 1990.

QUAN LIHUA (全理华) — He was born in 1921 and graduated from Wuhan University in 1949. He is a professor (Researcher) and works in Military Medical Institute, Shenyang. He is a member of Entomological Society of China. Now he is engaged in studies of the taxonomy, biology and ecology of Acarina and other medical entomology.

LU LIANGAO (陆联高) — He was born in 1922. In 1944, he graduated from Agricultural College, Nanjing University. At present he is working in Sichuan Grain School as a senior lecturer and he is a member of the Council of Grain and Oil Society of China. He began to study taxonomy, biology and control technique of mites occurred in stored products in the early of fifties. In 1986 and 1987, he investigated the mites of stored products in 36 counties or cities, Sichuan Province, and found 54 species belonging to 4 suborders, 18 families and 36 genera. He published his monograph of "The Mites of Stored Products" in 1980.

YANG ZIQI (杨子琦) — She was born in 1922 and graduated from Jiangxi Agricultural College in 1955. She studied mites and taught the pests of fruit and vegetable for many years. At present, she is studying predatory mites and the controls of spider mites on citrus, tea, trees, vegetables, flowers and grasses in Jiangxi Province.

HUANG KEJUN (黄克俊)—He was born in 1922 and graduated from Department of Biology, Shanxi State University in 1950. During the period of 1947—1950, he was a postgraduate in Beijing Union Medical College. Now he is a professor of biology in Changzhi Medical College of Shanxi. In addition, he is the head of Changzhi Biology Society, and vice-chief editor of Practical Combination of Chinese-Western Medicine Magazine. He is actively engaged in researches on acarology and completed “The Study on Life History of Beijing Dog Ticks”, and “The Investigation on Ticks in Shanxi”. At the Sixth International Academic Discussion on Mites and Ticks held in the University of Edinburgh in Britain in 1982, he was invited as a full representative.

YAO WENBING (姚文炳)—He was born in 1924 and graduated from Medical College at Beijing University. He is a professor of parasitology in Nei Mongol (Inner Mongolia) Medical College. He is studying, currently, the life history and ecology of ticks and parasitic mites, especially in the ecology of ticks, he has done much significant work.

LI FANG (李芳)—She was born in 1924 and graduated from Yanjing University, Beijing. She joined the American B-B-B Biological Association in 1949. As an assistant, she worked from 1949 to 1952 in Department of Parasitology, Beijing Union Medical College. Since then she has worked in the Norman Bethune University of Medical Science (NBUMS) in Changchun. Now she is one of the professors of parasitology there.

Recently she worked with her colleagues on *Demodex* and published a series of papers mainly on the Journal of NBUMS. Some were published with her colleagues as the first author. Li Fang attended the Symposium of Demodicidosis held in Qingdao, China in 1988 with the presentation of papers mainly on the scanning electronic microscopic studies of *D. brevis* and *D. folliculorum*.

ZHU WENBING (朱文炳)—He was born in 1924 and graduated from Southwest Agricultural University in 1953. He is a professor of entomology in Department of Plant Protection, Southwest Agricultural University. His major research field is about the taxonomy and ecology of mites and its enemies.

ZHANG CIREN (CHANG TZE-JEN, 张慈仁)—He was born in 1924 and graduated from Fujian Agricultural College in 1950. He is a research fellow and former deputy director of Department of Plant Protection, working at the Research Institute of Pomology, Chinese Academy of Agricultural Sciences. He is engaged in researches on the population dynamics, biology and chemical control of vegetable and orchard pests, especially *Panonychus ulmi* Koch, *Tetranychus viennensis* Zacher, and their predator. Since 1981 he has studied the technique and implementation of Integrated Pest Management (IPM) of orchard. He has edited “Integrated Pest Management of Apple Orchard” in collaboration with research assistant Dou Liandeng in 1989. He is the director of the Plant Protection Council of Jinzhou, and one of the editors of journal “China Fruits”.

LIU QINXUAN (LIU CHIN-HSUAN, 刘芹轩)—He was born in 1924 and graduated

from Agronomy Department of Beijing Agricultural University. Now he is a research fellow in Plant Protection Research Institute of Henan Academy of Agricultural Sciences and an associate chairman of Henan Entomological Society. He is one of the earliest researchers in studying red spider mites in China. He has been working on the integrated cotton pest management for long time.

WANG JIAOBIAO (王醮标)— He was born in 1924 and graduated from the Medical College of National Tongji University in 1951. After graduation, he studied in the Eastern Chinese Branch College of Central Hygienic Research Institute where he received the training of parasitological science for one and half years. He was an associate professor of Department of Parasitology, Jiangxi Medical College. Since 1953, he has been interested in the research on fauna of trombiculid mites in Jiangxi Province and published a few articles of trombiculid mites that included 5 new species. Recently he is editing a book "Fauna of Trombiculid Mites in Jiangxi".

WANG DUNQING (王敦清)— He was born in 1925 and graduated from the Department of Biology, Zhejiang University in 1950. He was appointed as a researchist in Fujian, Plague Prevention Bureau from 1953—1960, and continued his research work in Fujian Research Institute of Epidemic Diseases from 1960—1981. Now he works in Fujian Medical College as a professor and the head of Teaching and Research Section of Parasitology. He began to study the taxonomy of fleas, trombiculid mites and gamasid mites in 1950. Since then he made a survey of these ectoparasites throughout the Fujian Province. He discovered 4 new species of fleas, 23 new species of trombiculid mites. In 1963—1965, he studied the transovarid transmission of *Richettsia tsutsugamushi* in two types of *L. deliense* and the hybridization of both types. In 1984, he studied the morphological characters of two types of *L. deliense* and considered the type A is a new species. Under his direction, his students carried out the studies on genetics and biochemistry of trombiculid mites. These studies will hopefully contribute to the taxonomy of trombiculid mites. In 1982, he attended the VI International Congress of Acarology in Edinburgh England. In 1987, he attended the International Symposium "Biosystematics of Haematophagous Insects" in Liverpool, England.

In 1990, he attended the VIII International Congress of Acarology in Ceske Budejovice, Czechoslovakia. He was admitted to the Fellowship of the Royal Entomological Society of London on the second day of Dec., 1987.

TENG BIN (TUNG BING, 滕斌)— He was born in 1925 and graduated from Shandong Medical College in 1952. He was the head and professor of the Department of Parasitology, Shandong College of Traditional Chinese Medicine. Since 1952, he has made a lot of research on ticks, gamasid and trombiculid mites in Shandong Province. He collected 11 species of ticks, 21 species of gamasid mites and 12 species of trombiculid mites, and found 6 new species of trombiculid mites. The investigations on *Demodex folliculorum* was made in 1979, and found that the infestation rate increases progressively with age. During the year of 1986, he has conducted the investigation on mites in the sputum of Chinese herb workers in the hospital of Chinese traditional medicine in Jinan, 34 species of mites were collected belonging to plant and soil mites. At present, he is engaged in research work on the Chinese herb mites.

WEN TINGHUAN (WEN TIN-WHAN, 温廷桓)—He was born in 1926, studied biology at Suzhou University and obtained his degree of Bachelor of Science in 1948. Now he is a professor of parasitology and is the head of Division of Microbiology and Parasitology, Faculty of Medical Laboratory Sciences, also is the chief of Medical Acarology Laboratory, Institute of Basic Medical Science, Shanghai Medical University. Since the beginning of 1950's he has started and persevered with his research on medical acarology mainly on trombiculid, gamasid and house dust mites.

His early work is the biology of chigger in relation to scrub typhus. In 1956, he discovered the spermatophores of the leeuwenhoekiiid and trombiculid mites, and observed the complete indirect mating process. He carried out the studies on functional morphology of the adult genitalia, as well as of the larval gnathosoma, and detailed structures of them have been reported. In 1958, he started the research on gamasid mites in relation to the epidemic haemorrhagic fever.

In 1984, he published in collaboration with the other 27 authors a book "Sand Mites of China (Acariformes: Trombiculidae and Leeuwenhoekiiidae)" which has provided important data and information for studying the chigger fauna and taxonomy. In his monograph 353 species and subspecies of the sand mites distributed in China were compiled. Among them three new tribes, three new genera and two subgenera were erected, and 150 new species including 10 new subspecies were described.

Besides, he is engaged in researches on the house dust mite allergy and asthma in China. He has started the project since 1970, not only the mite faunal and the allergy epidemiological surveys, but also the immunological and clinical studies on the mite atopy have been conducted by his team at the SMU. A technique of culturing *Dermatophagoides farinae* in large scale has been developed by him successfully, and the immunotherapy with the mite allergy using highly potent pure *D. farinae* whole body extract produced in his laboratory has been achieved satisfactory effect in this country.

In 1986, he went to the USA as a visiting scientist at Dr. R. Traub's Laboratory, Department of Entomology, MSC, Smithsonian Institution, Washington D. C. At the same time he was appointed the consultant for IAIDP, NIAID, National Institutes of Health, on dust mite problem. In 1987 and 1990 he attended the 1st and the 2nd International Workshop on Mite Allergy and Asthma held in Bad Kreutzhach FRG and Minster Lovell, UK respectively.

He is a member of the Council of Entomological Society of China and a member of Specific Committee of Acarology, ESC. He is the associate-editor of "Entomotaxonomia" and a standing member of the Editorial Committee of "The Chinese Journal of Parasitology and Parasitic Diseases". Recently he was appointed as a standing member of the Editorial Committee of the Fauna of China, Academia Sinica.

GU YIMING (KU YI-MING, 顾以铭)—He was born in 1927 and graduated from the Medical College of National Central University in 1951. WANG JUSHENG (WANG CHU-SHENG, 王菊生), his wife and schoolmate, was born in 1926. After graduation from the university, they were sent to the Eastern Chinese Branch College of Central Hygienical Research Institute where they received the training of parasitological science for one and half years. Now Gu Yiming has been promoted to professor of Teaching and Research Section of Parasitology

in Medical College of Nanjing University, while Wang Jusheng is a professor of same section in Guiyang Medical College.

From the beginning of 1960's, they carried out their research work on trombiculid mites and gamasid mites, mainly on the fauna in Guizhou Province. They discovered 3 new species of trombiculid, and created 3 new genera and 36 new species of gamasid mites. Besides they published a lot of articles on mosquitoes, sandflies, cestodes and flukes other than many articles on trombiculid and gamasid mites. They have made definite contribution to parasitology in China.

MENG YANGCHUN (孟阳春)—She was born in 1927 and graduated from Beijing Medical College in 1952. She studied as a postgraduate student in the Institute of Medical Parasitology and Tropical Medicine in USSR, took her degree of Candidate Doctor of Medicinal Science. At present, she is a professor of Teaching and Research Section of Parasitology, Suzhou Medical College, and is a member of Expert Committee on Parasitic Diseases, Ministry of Public Health and the vice-chairman of the Entomological Society in Jiangsu Province. Since 1957 she researched several aspects of gamasid mites and other medical mites. She worked on the fauna of gamasid mites in Jiangsu Province and studied the feeding patterns, life cycle and ecology of some gamasid mites. She proved the function of chemoreceptor organs of the first tarsus in gamasid mites by amputation, sealing with paint and electrophysiological technique and observed the structure of chemoreceptor with SEM and TEM.

In connection to control, she found the high effectiveness of organophosphorus insecticides and little effects of organochloride insecticides for gamasid mites. She has also studied on the effectiveness of repellent against gamasid mites with seven repellents. She reported ten cases of mass attacks on human beings by gamasid mites.

Recently, she made scientific researches on the disease transmission via gamasid mites—experimental study on biting, trans-stadial and transovarian transmission of epidemic haemorrhagic fever virus by gamasid mites. She also observed survival of three species of laelaptid mites and predatory ability of two species of macrocheles mites on fly control. She guides her graduate students' studies on genetics and biochemistry. In 1990, she attended the VIII International Congress of Acarology in Ceske Budejovice, Czechoslovakia.

QIU MINGHUA (裘明华)—He was born in 1927 and graduated from the Department of Biology, Suzhou University in 1950. In 1983 he became a professor of parasitology. Recently he works in Zhejiang Medical University. From the beginning of 1950's, he began the research on trombiculid mites, mainly on biology of *Neoschongastia gallinarum*. In morphology, he described scutal variations of larva, nymph, adult and abnormalities and variations of nymphs. In the life habits, he studied the geographical distribution, animal host, breeding place, seasonal distribution, rate of crawling of larva, time of detaching from host and histopathology caused by penetration of the larvae. He also observed the survival of larvae and nymphs, the effects of temperature and moisture on the viability of larva and nymph and overwintering of chicken mite.

In 1980's he described a bat tick *Argas (Carios) sinensis* in Chongqing, also studies the life history, morphology of the adult and nymph. In 1987, 9 species of ticks parasitizing on giant panda.

were reported in Sichuan Province and the relationship between ticks and giant panda was studied.

Otherwise, he also observed mange of giant panda, the *Sarcoptes scabiei* infesting lynx and the nodular scabies in Sichuan, China.

He is a member of Council of China Zoological Society, Membership of the Standing Committee of the Society of Medical Parasitology, China Preventive Medical Association and the vice-chairman of Zhejiang Zoological Society.

CHEN GUOSHI (陈国仕) — He was born in 1927. He graduated from the China Medical University in 1951. Afterwards he specialized in parasitology mainly studied Ixodid biology at Kirov Medical Academy in Leningrad. He passed the State Examination for postgraduate certificated for specialists in parasitology, the Examination for required courses for Doctorate at this Medical Academy in 1956. After returning to China he spent many years in the teaching and biomedical research on parasitology, arbo-infections with natural foci and zoonoses. Since 1956, he has been the deputy-director of the Department of Vector Biology and Control at the Institute of Microbiology and Epidemiology, Academy of Medical Science in Beijing. Now he is the director of the Department of Epidemiology, a senior scientist and a professor of preventive medicine at Center for Infections Diseases (the 302 Hospital), Postgraduate Medical College, Chinese Medical University. His basic research is concerned with studies on epizootic-epidemiology and natural foci of zoonoses such as Tick-borne Encephalitis, hemorrhagic fever, spotted fever, Q fever and some bacterial infections. He is a member of the Advisory Board of IJA., USA. He was invited to attend the VI International Congress of Acarology in 1982, and as an accredited scientist he was also attended the VI International Congress of Parasitology in 1986.

SHEN YUNZHONG (SHEN YUN-CHUNG, 申允中) — He was born in 1927. He had studied in the Department of Zoology of National Lanzhou (Lanchow) University for two years, and graduated from the Medical College of same university in 1953. He is a professor of the Department of Parasitology, Fourth Military Medical University. From the 1950's, he began the research on medical entomology, mainly on ticks. At present, he is engaged in researches on the geographical distribution, morphology, ecology, animal hosts, seasonal distribution of ticks and the relationships to the diseases.

HUANG LIANGLU (黄良炉) — He was born in 1927. In 1951, he graduated from Jiangxi Agricultural College. Now he is an associate researcher of Research Section, Institute of Citrus Research, Chinese Academy of Agricultural Sciences. He studies the biology, ecology and chemical control of citrus mites, including *Panonychus citri*, *Eotetranychus kankitus*, *Phyllopruta* sp. and *Eriophyes sheldoni*, etc.

LI CHANGJIANG (LI CHANG-CHIANG, 李长江) — He was born in 1927 and graduated from the Department of Biology, Fujian University, in 1951. After graduation he worked in the Department of Biology at Kunming Medical College. He studied the tick fauna of Yunnan Province and described the morphology of several species of ticks. One new species of

macrochelid mite was found by him. He is an associate professor and in 1979 was pointed to a new post in the Electronic Microscope Laboratory in the same College.

YIN SUIGONG (YIN SUI-KUNG, 殷绥公) — He was born in 1928. In 1951, he graduated from the Department of Biology, Suzhou University. From 1958 to 1962 he worked in the Shengyang Medical Institute, and from 1963 to 1969 in the Jilin Medical College. Now he is a professor in the Department of Plant Protection, Shenyang Agricultural University. He studies the taxonomy of Acarology, and discovered 5 new species of Tetranychoidae, Laelaptidae, Macrochelidae and Pachylaelaptidae in China.

YU ZIZHONG (YU CHI-CHONG, 余自忠) — He was born in 1928. Now he works in the Control and Research Institute of Epidemic Diseases of Yunnan Province as the head and chief technician. From 1959, combined with other workers he was engaged in classification and ecology of trombiculid mites and the study of relationship to diseases, up to the present, he has erected a new genus and two new subgenera, and discovered 58 new species.

ZHANG MINRU (CHANG MIN-RU, 张敏如) — He was born in 1928 and graduated from National Northwest Medical College in 1953. He is a professor in Xian Medical University where he is carrying out research work on trombiculid mites, especially on the fauna of the trombiculid mites in Shaanxi Province.

TIAN QINGYUN (田庆云) — He was born in 1928 and graduated from Shanxi Medical College in 1959. Now he is the head and associate professor of Teaching and Research Section of Parasitology, Shanxi Medical College, where he is carrying out the research on trombiculid mites and ticks in Shanxi Province, especially the study of the ecology of ticks.

DOU GUILAN (窦桂兰) — She was born in 1929, and graduated from the Department of Biology, Beijing University. Now she works in the Institute of Preventive Medicine as an associate professor. From 1957 to 1958, she investigated the kinds of ticks, gamasid mites in Heilongjiang Province and Hainan Province, and observed the seasonal distribution of *Ixodes presulcatus* in Heilongjiang Province. In 1984 and 1985, she studied the anatomy and histology of some ticks of Ixodidae and carried out the studies on life cycle and biology. These researches have created an excellent condition for further study of tick-borne disease.

PANG CHUNJI (逢春积) — He was born in 1929 and graduated from the Fourth Military College in 1954. He obtained his degree of Candidate Doctor of Medical Sciences at Kirov Military Academy, Leningrad, USSR, in 1959. Under the guidance of Academician E. N. Pavlovskyi, he investigated the ticks of genus *Ornithodoros* as the vector of tick-borne relapsing fever in China and USSR. Since 1962 he had worked as a research associate in the Department of Medical Entomology at Institute of Microbiology and Epidemiology, Academy of Military Medical Sciences, Beijing, China. From 1970 to 1979, he had been the head of Department of Experimental Biology and carried out the study of experimental ecology of medical entomology, including ticks studies on the tick cell cultures and their infection with spirochetes of Lyme di-

sease in China.

JIANG ZAIJIE (CHIANG TSAI-CHIE, KIANG TZAI-TZE, 姜在阶)—He was born in 1930 and graduated from the Department of Biology, Beijing Normal University in 1952. He obtained his degree of Candidate Doctor of Biological Science at Leningrad University, USSR, in 1960. Then he became a lecturer in the Department of Biology, Beijing Normal University. Later he was promoted to an associate professor, professor and the head of Teaching and Research Section of Zoology. He is serving as a permanent council member of Entomological Society of China, and a member of Specific Committee, ESC and a member of the Editorial Board of the Journal "Insects Knowledge". In the late fifties he began his studies on ticks. His main fields of research are as follows: reproductive biology of ixodid ticks, thermostability of ixodid ticks, sex pheromone of ticks, morphology and taxonomy of immature ticks, morphology and function of receptors of ticks. His projects of research were "Studies on ticks biology and taxonomy of immature stages" and "Studies on ticks chemical receptors and pheromone glands and their physiological functions". The present project of his research is "Study on ticks diapause". The new volume of "Economic Insect Fauna of China, Ixodoidae" will be published in cooperation with Prof. Deng Guofan. He attended the XVIII International Congress of Entomology in Vancouver, Canada in 1988, the 1st Asia-Pacific Conference of Entomology in Chiang Mai, Thailand, in 1989, and the VIII International Congress of Acarology in Ceske Budejovice, Czechoslovakia in 1990.

WANG XIAOZU (WANG SIAO-CHU, 王孝祖)—He was born in 1930 and graduated from Fudan University, Shanghai in 1953. From 1953 to 1972 he worked in the Institute of Zoology, Academia Sinica, Beijing. He studied the taxonomy of Acaroides at Zoological Institute, Academy of Science USSR, Leningrad from 1959 to 1962. In 1973, he was transferred to Shanghai Institute of Entomology, Academia Sinica. He is an associated professor. He has undertaken the research work in mites of stored food products, especially in the field of systematic Acaroides, Cheyletidae. He erected 1 genus and described 5 species. In recent years, he is devoted to study on the systematic classification of soil mites — Oribatei. In 1984, he co-operated with Aoki Jun-ichi from Japan and Wen Zaigen discovered 5 new species of Oribatei.

CHEN XIWEN (CHEN SHI-WEN, 陈熙雯)—She was born in 1930, graduated from Biology Department of Zhongshan University in 1955 and finished her studies as a postgraduate student in the same place in 1958. Now she is a professor of Entomology and Acarology in the Department of Biology, Jiangxi University, majoring in the research work of taxonomy, biology, ecology of phytoseiid mites, its protection and utilization, and found more than 10 new species. In 1985 she succeeded in utilizing *Amblyseius orientalis* to prevent and control *Panonychus citri*.

YU XIN (于心)—He was born in 1930 and graduated from Chinese Medical University in Shenyang in 1950. Now he is a research fellow working in the Xinjiang Institute for Endemic Diseases Control and Research where he is engaged in research of plague and forest encephalitis with emphasis on studies on morphology, fauna and medical significance of ticks. He studies basically the geographic distribution of forest encephalitis in Xinjiang, with *Ixodes persulca-*