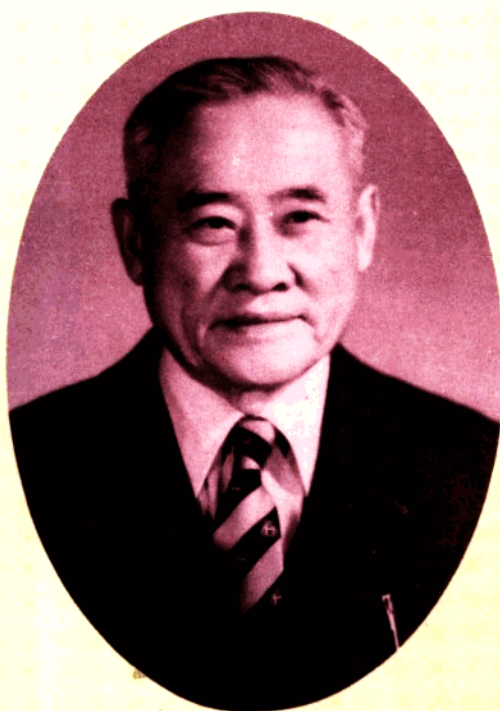


# 曾呈奎文选

(上)



海洋出版社

叶嘉莹院士题  
曾奎

98.6.18

# 曾奎文选

卢嘉锡题



SELECTED WORKS OF C. K. TSENG

(上 册)

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## 内 容 简 介

本书辑录了曾呈奎先生 1933—1993 年 61 年中公开发表过的,有关藻类(主要是海洋藻类)的重要论文 116 篇,包括:分类及区系研究、形态和光合作用、栽培及栽培生物学、资源和海藻工业、水产农牧化、生物技术五大部分。书前有作者自传和作者著作总目。可供与海洋学、海洋生物学、藻类学、水产等有关的大专院校师生及科学工作者参考。

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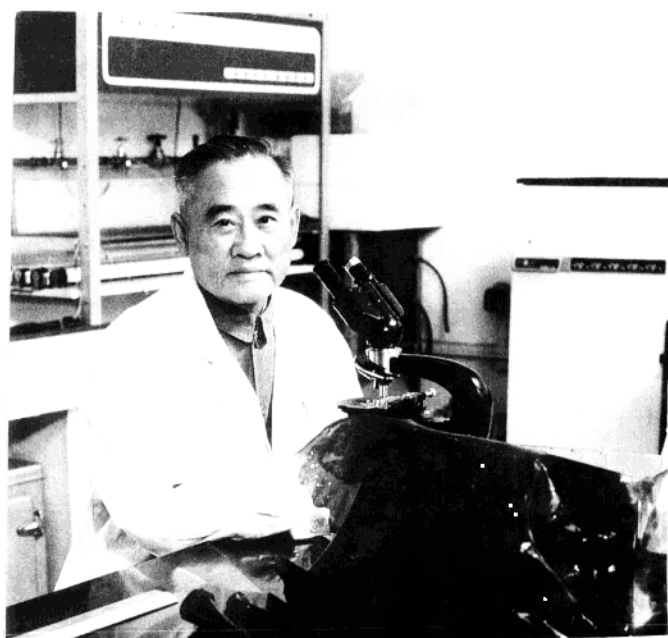
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1975 年 10 月，美国 Ford 总统与作者握手。中间 2 人是黄镇大使和周培源团长



1975 年 10 月，中国科技代表团全体人员和美国 Princeton 大学校长 W. G. Bowen 一起。  
前排左 4 是 Bowen 校长，左 3 是周培源团长，右 2 是中国科学院朱永行局长



1975 年 10 月，中国科技代表团部分成员和 Woods Hole 海洋研究所  
Fyre 教授一起。前排左 1 是 Fyre 教授



1945 年作者在美国 Logana Beach 潜水，进行石花菜栽培研究



## 序 言

曾呈奎教授是一位蜚声国内外的海洋生物学家,是我国海洋科学的开拓者和奠基人之一。他一生致力于海洋生物学的教学和海藻学的研究以及海洋科学的组织领导工作。如今他桃李满园、硕果累累,为我国的海洋科学事业作出了重大贡献。

曾呈奎教授早年在厦大理学院植物系就读时,师从著名植物学家钟心煊教授,学习植物学,钟先生根据他的学习兴趣和基础建议其专攻海藻学,曾呈奎教授接受老师建议,从而受益匪浅,终于在海藻学方面作出了卓越成就。厦大毕业后,曾呈奎教授留校任教一段时间后又到岭南大学研究院继续学习、从事海藻学的研究。四十年代,他留学美国,获美国密芝根大学硕士和博士学位,后转入美国 Scripps Institution of Oceanography 从事琼胶加工方法的研究,并涉足海洋生物学。回国后,他又和助手开展了用马尾藻提取褐藻胶的研究。同时,以曾呈奎教授为首的研究集体对我国沿海的海藻资源、海藻分布和区系特点进行了大量的调查研究,为我国的海藻科研工作奠定了基础。紫菜和海带的生物学基础研究解决了人工栽培中的关键问题,奠定了我国海藻栽培业的科学基础,促进了规模产业的形成和发展。此外,他们还开展了海藻比较光合作用研究,探讨了海藻不同门类的进化过程,探讨了藻类进化的三条途径和光合生物系统发育关系,丰富和发展了生物进化论。

曾呈奎教授早在 1946 年就和童弟周教授办起了山东大学海洋研究所,1950 年又与童弟周、张玺教授共同组建了新中国第一个海洋研究机构:中国科学院水生生物研究所青岛海洋生物研究室(中国科学院海洋研究所前身),并长期担任领导职务,对他的发展壮大作出了重要的贡献。

几十年来,曾呈奎教授共发表论文二百五十多篇,专著八部。这部《曾呈奎文选》共收录他的代表性论文一百一十六篇,反映了他在海藻分类学和地理分布、海藻形态学和光合作用、藻类栽培和栽培生物学、海藻资源和工业、海洋农牧化和生物技术等各方面的研究成果。曾呈奎教授以其开创性的工作推动了我国海藻学研究和海藻栽培业及海藻工业的发展,《文选》所反映是其贡献的一部分。

我与曾呈奎教授由相识到相知,深为他孜孜不倦、献身科学的精神所折服。借这本《曾呈奎文选》出版之际,谨向曾呈奎教授致以崇高的敬意,并祝愿他老骥伏枥、老而弥笃,为国家培养更多的人才、为海洋科学事业做出更大贡献!

衷心祝愿曾呈奎教授健康长寿!

唐嘉锡

一九九四年二月十日于中国科学院

## 祝贺《曾呈奎文选》出版

《曾呈奎文选》即将出版面世,我感到由衷的高兴。众所周知,曾呈奎院士不仅是我国海洋界德高望重的老一辈科学家,也是国际著名的海藻科学权威,因此《曾呈奎文选》的出版,不仅是中国海洋界的自豪,也是国际海洋科技界的大喜讯。值此文选出版之际,我谨代表我国海洋界的同仁,向曾老致以最热烈的祝贺和最诚挚的敬意。

《曾呈奎文选》系由曾呈奎院士亲自从他浩瀚的科学论著中精选出的116篇论文所组成,范围覆盖了海藻分类学及区系分布、海藻的形态学和光合作用、经济海藻的栽培及栽培生物学、海藻资源及海藻的开发利用、海洋水产农牧化、海洋生物技术等领域,内容极其丰富,资料十分翔实。本文选比较集中、系统地反映了曾老半个多世纪以来从事海洋教学和科研活动所取得的丰硕成果和辉煌成就,是曾老多年心血的结晶,闪烁着曾老智慧和经验的光芒。

曾呈奎院士在推动我国海洋科学发展中的贡献是多方面的,特别是在海藻科学领域,曾老堪称当代国际泰斗。由于曾老长期的刻苦钻研和勇敢攀登,使我国在海带、紫菜等大型底栖经济海藻的研究工作,不论在分类、区系、形态、生态、生理、生化方面,或在人工育苗、良种培育、人工养殖、资源开发、加工利用等方面,我国在研究、开发的深度和广度上,都处于国际领先地位;我国大型经济海藻的产量和产值,都位居世界第一。我国在本领域的突出成就,曾老具有不容争议的功劳。

曾呈奎院士还根据我国近海传统渔业资源日益衰竭的形势,在我国首先提出海洋农牧化的战略思想,为恢复和养护我国近海渔业资源,推动我国浅海滩涂增殖养殖业的发展,保持我国海洋渔业生产的持续增长,起到了指明前进方向、奠定理论基础的重大作用。

曾呈奎院士不仅是一名在海洋科学研究上硕果累累的优秀科学家,而且是一名在推动我国海洋事业发展方面贡献卓著的杰出活动家。我国海洋事业发展的每个时期和每个领域,几乎都有曾老的功劳和奉献。早在四十年代,曾老就曾积极策划并创建了我国最早的海洋科研机构——山东大学海洋研究所;新中国成立前后,曾老和童弟周教授一起,积极策划、筹建了中国科学院水生生物研究所青岛海洋生物研究室,1957年,将该研究室扩大成为海洋生物研究所,1959年,进一步扩大成为中国科学院海洋研究所。在此期间,曾老还积极倡议和参与筹划,改建成功了我我国第一艘海洋调查船——“金星”号;亲自参与了我国第一个“十二年科学规划”的编制,把海洋科学工作正式纳入了国家规划;并和其他海洋科学家一起,策划和组织了我国历史上第一次也是规模最大的一次全国海洋普查。六十年代初期,根据国内外海洋事务发展的形势,曾老和其他有识之士一起,倡议并积极推动了国家海洋局的建立,使我国的海洋工作从此进入了一个新的历史时期。另外曾老还积极倡议和参与组建了中国海洋湖沼学会、中国海洋学会、中国水产学会、中国环境学会等民间学术团体;积极参与国际藻类学会和国际海藻协会的一系列活动,策划和组织召开了多次国际性藻类和海藻的学术会议,成功地宣传了我国在海藻研究和开发利用方面的巨大成就,增加了国际社会对我国海洋科学事业的了解,扩大了我国的国际影响。此外,曾老还创办、主编了多种有关的权威性学术刊物,热情指导和支持了它们的办刊工作,为传播科技信息,交流科研工作经验,作出了重要的贡献。

我们学习《曾呈奎文选》,不仅要学习曾老严谨的科学态度,严密的科学方法和严格的科学

论断,尤其重要的是要学习曾老在攀登科学高峰中的奋发拼搏、刻苦钻研、不畏艰难、勇于探索的敬业精神和献身精神。为了掌握大型底栖海藻的种类和分布,曾老不仅几乎踏遍了我国的海疆,而且在美国的东西海岸,也曾留下了曾老辛勤探索的身影;为了攻克海藻的物质提取和开发利用难题,曾老曾经连续奋战在实验室,夜以继日,忘餐废寝;为了揭开大型底栖海藻的秘密,曾老曾多次亲自潜入海底进行现场观测和科学实验,甚至在七十多岁的高龄,仍不顾危险,带头潜入我国西沙海域的海底进行探索。所有这一切,为我国广大海洋科技工作者树立了艰苦奋斗、勇敢拼搏的光辉典范。

学习《曾呈奎文选》,我们还要特别强调学习曾老在长期的科学实践中,一贯紧密联系生产、联系实际,把为经济建设服务作为科研活动的唯一宗旨这种崇高的精神境界,不断提高我们贯彻执行“科学技术面向经济建设”这一科技工作方针的自觉性,加快科技成果的推广應用和转化,使海洋科学技术在加强我国海洋管理、兴办海洋产业、发展海洋经济中发挥更大的作用。

国家海洋局局长

严宏谟

一九九四年三月三十日

## MY RESEARCH LIFE FOR THE PAST SIXTY THREE YEARS

I was born in June 1909 and received my primary school education in Amoy (now spelt as "Xiamen"), Fujian Province, China. I received my high school education in both Amoy and Zhangzhou and graduated from the Xinyuan high school (Talmadge College) with honour in 1926. My ambition to study agriculture at Nanking University was objected to by my parents, because Nanking (now spelt as "Nanjing") was too far away from Amoy. I was, however, permitted to go to Fukian Christian University at Foochow (now spelt as "Fuzhou") to carry on my university education. This was, however, interrupted in December, 1926 because I participated in a strike against the school which refused to register with our new government. In the summer of 1927, I resumed my university education at Amoy University, then a private university, and enrolled in the Botany Department and 3 years later was appointed an assistant in the department. Since 1930, for a period of sixty three years, I have been devoting practically all my time and energy to seaweed studies.

### Ramble of a Scientist

#### 1. How I Started on My Seaweed Research

In 1928 I took a course in "General Phycology" under Professor H. H. Chung, a Harvard graduate, who used almost entirely American class materials in the course. However, as a young man eager to learn I enjoyed the class very much.

When I was appointed to be an assistant in Botany in the summer of 1930. I had to keep busy gathering class materials, including freshwater and marine algae, from local sources. I was surprised to learn that quite a few species of seaweeds were utilized by our people for food, for feed and as fertilizer, and even more surprised that they cultivated a kind of seaweed under the local name *Chicai*, a species of the genus *Gloiopeltis*. I initiated a research project on the economic seaweeds of the Amoy region which was later extended to include cultivation of the *Gloiopeltis* and study of its uses and trade. It took me fully two years to finish my first research project on the *Gloiopeltis* and the other economic seaweeds of the Amoy region. It was surprising, indeed, that China in the Song Dynasty about 1000 years ago, started aquaculture of *Gloiopeltis* without

any knowledge of its life history. The littoral rocks on which the *Gloiopeltis* grew in abundance were cleaned by scraping with knives and other metallic tools at certain time of the year and eventually the *Gloiopeltis* would grow there in abundance. It was even more surprising to note that the littoral rocks together with the weeds were assigned as properties of certain families. Each family had a territory in the sea in which the rocks belonged to the family.

The paper on the *Gloiopeltis* and the other economic seaweeds of the Amoy region was completed in the summer of 1932. I was then awarded a junior fellowship by the Rockefeller Foundation which enabled me to carry on my postgraduate work at Lingnan University (in Canton, now Guangzhou), where I took a course on Economic Botany under Professor F. A. McClure, who was much impressed with my discussions with him on the *Gloiopeltis*. After I showed him my manuscript, he suggested its publication in the Lingnan Science Journal, then one of the very few scientific publications in China. He helped me to correct my English and the paper finally appeared in the first number of the Journal in 1933. That was my first paper ever published. Before the publication, Professor McClure and I did some investigation in Canton. We found that the seaweed was exported from Amoy to Hong Kong and then from Hong Kong to Canton where it was used by the silk factories in sizing the silk we called "Xiongyunsha" or "Youchou".

During my study on the economic seaweeds of Amoy, I encountered great difficulty in the naming of seaweeds, especially in the determination of the species of *Gloiopeltis*. In the early thirties, it was very difficult to find a good authority on seaweeds, especially Pacific seaweeds. Since the Chinese seaweeds flora must be quite similar to the neighboring Japanese counterpart, I sent a letter to Dr. Kintaro Okamura, then the only Japanese phycologist renowned in seaweed taxonomy in early 1932, requesting him to determine the *Gloiopeltis* for me. Drs. W. A. Setchell and N. L. Gardner of the University of California, Berkeley, were the other Pacific seaweed taxonomists; Dr. Gardner had also determined a number of species collected by Professor Chung in the twenties. Therefore I sent another specimen of the *Gloiopeltis* to Dr. Gardner for his opinion. Both of them replied in about a month, but their opinions were different. Dr. Gardner wrote that it was a new species of *Gloiopeltis* but Dr. Okamura held it was *G. furcata* (P. et R.) Ag. I hesitated for a while but finally had to agree with Dr. Okamura since Chinese flora must be quite similar to the Japanese counterpart. From this example, I came to believe in the difficulty of seaweed taxonomy, and that before I could do anything in my choice of seaweed cultivation, I should be familiar with their names. Thus I had to take up seaweed taxonomy as my first study target. That was in the summer of 1932 before coming to Lingnan University. Therefore when I came to Lingnan University I took up the marine algae of Amoy as my thesis subject for M. Sc. degree since I had then a fairly good collection of Amoy seaweeds and a small reference collection of Amoy seaweeds collected by Okamoto in the twenties and determined by Dr. K. Okamura. My thesis on my taxonomic study of Amoy seaweeds was approved by my major Professor, Dr. Franklin Metcalf and I was conferred a M. Sc. degree in June, 1934. In the years at Canton I collected seaweeds from Swatow (now Shantou), Hong Kong, Hainan and Pratas Island.

I returned to Amoy in 1934, moved to Qingdao in 1935, to Canton and Hong Kong in 1938. In these years I collected seaweeds in different places along the China coast from Dalian in

the North to Hainan in the South, including places in the Provinces of Liaoning, Hebei, Shandong, Jiangsu, Zhejiang, Fujian, Guangdong and Hainan. After I had a representative collection of Chinese seaweeds. I decided on further seaweed taxonomic study abroad.

In the first period of my research from 1930—1940, I published 13 scientific papers, including papers on seaweeds from Amoy, Hainan, Tsingtao (now Qingdao), Chefoo (Now Yantai) and on marine algae new to China.

## 2. My Life in the United States

I went to Ann Arbor, Michigan, U. S. A. in 1940 to study my collection of Chinese seaweeds under Professor W. R. Taylor. I was awarded a University Fellowship. During the two years stay at Ann Arbor I utilized almost every minute of my time to my seaweed taxonomy studies. I remember, during my second year at Ann Arbor, my regular work schedule was from 1 p. m. to 8 a. m. I scarcely had four hours of sleep every day. I successfully defended my thesis in spring, 1942 and was awarded a D. Sc. degree.

It was then about five months after the Pearl Harbour attack by the Japanese and the U. S. was at war with Japan, the Pacific was no more a peaceful ocean and normal traffic between China and the U. S. practically stopped. I talked with my teacher about my work and Prof. Taylor persuaded me to apply for a Rackham Postdoctoral Fellowship. There were then only two such fellowships at the University and it was indeed very difficult to be granted one of the two fellowships, but with the help of Prof. Taylor I was awarded a Rackham Postdoctoral Fellowship. In the early forties, a postdoctoral Fellowship was still quite a new thing and no obligation was involved in the ten months tenure. I utilized the opportunity to visit the marine stations and institutions on the West Coast. I thought at that time that the Japanese would be defeated soon by the Americans.

What should I do? I could utilize only a small part of my time to visit the marine biological laboratories and institutions and returned to Ann Arbor to carry on my taxonomic studies of Chinese and American materials, and became eventually an algal taxonomy specialist. That was, however, not the object of my seaweed studies. As I mentioned before, the aim of my seaweed study was not only to name the different kinds of seaweed but eventually to utilize them and scientifically cultivate them in large scale called "marine agriculture" at that time, mariculture nowadays. The more I thought about the persons with iron tools scraping over the rocks for the cultivation of *Gloiopeltis*, the more I was determined to work at scientific seaweed cultivation. But scientific algal mariculture still did not exist then. Even the Japanese *nori* cultivation in the early forties was not scientific enough, because they were cultivating something the "seeds" of which they never saw; they had to depend on Mother Ocean to give them the "seeds" of the *nori*. To work at scientific algal mariculture. I must have the fundamental knowledge of the ocean. Thus, during my Pacific coast visit of marine stations and institutions, I finally decided that I must go to an oceanographic institution to take courses on oceanographic physics and chemistry and the institution I selected was the Scripps Institution of Oceanography.

At Scripps Institution I took two courses, one on Physical Oceanography under Professor H. U. Sverdrup, the Director, and another on Oceanographic Chemistry under Professor E. G.

Moberg. I enjoyed the courses very much. It was, indeed, very fortunate, for me to take the two courses especially that on Physical Oceanography since I broadened my field of knowledge and came to know something about the environment in which I was to eventually start my seaweed cultivation. I especially appreciate knowing Dr. Sverdrup, a well-known Norwegian oceanographer appointed to the directorship of the Scripps Institution a few years ago.

In March 1943 I was asked by Dr. Sverdrup to take charge of the agar project on behalf of the institute which had just signed a contract with the U. S. Fish and Wildlife Service to study American agar resources and to find ways and means to increase the home supply of agar. The U. S. had a small agar factory in Los Angeles and for years had been depending on Japanese import for her needs. The war against Japan naturally stopped import of agar from Japan. Shortage of agar was greatly felt and the U. S. was forced to declare agar as a war material. The U. S. Fish and Wildlife Service sent Dr. Victor Scheffer with his assistant down to Scripps to cooperate with the Scripps Institution. Our discussion of the project resulted in the following division of labor, the Fish and Wildlife Service worked on the chemical side and the Scripps Institution on the biological side.

The project started in May. I broke down the biological problems into two, the raw material *Gelidium cartilagineum* and possible substitute material problems. I, therefore, started a survey of the economic seaweed resource of the U. S. and their uses as well as factories processing these products. Three experiments were carried out with the agarweed, *Gelidium cartilagineum*; 1) growth of the *Gelidium* under natural conditions and the environment; 2) growth of the *Gelidium* under artificial conditions; 3) photosynthesis of the *Gelidium* in respect to carbon dioxide concentrations, light and temperature.

The experiment on the growth of the *Gelidium* under natural conditions was conducted undersea since the *Gelidium* grows most luxuriantly on rocks about 10 meters below the sea surface. I had to dive in a diving suit about once a month, tag each selected plant with a number and measure its growth rate and at the same time collected a bottle of water which I brought back to my laboratory and analyzed its contents of nitrate and phosphate.

In the experiment on the growth of the *Gelidium* under artificial conditions, several *Gelidium* plants were collected with their substrates from the field and placed in a specially made tank with seawater regulated to descend about 1—2 meters once in two to three minutes to simulate agitation. The *Gelidium* grew well enough and growth rate was taken.

In the photosynthetic studies, a shaking machine was devised and fragments of the *Gelidium* were employed in the experiments; and photosynthetic rates in different CO<sub>2</sub> concentration, light intensity and temperature were investigated. I was fortunate enough to have Dr. Beatrice Sweeney as my cooperator.

Regarding substitution material for agar manufacture. Dr. Harold Human of Duke University found a good source of *Gracilaria verrucosa* on the East coast, I also made a search of the *Gracilaria* resources on the West coast and found a good source in San Diego. The material was regularly collected and tested for its agar content. The agar was found to be of good quality but the gel had more syneresis and was inferior to that from *Gelidium cartilagineum*.

There were then three factories engaged in the extraction of seaweed products. I visited several times the Kelco Co. at San Diego, the American Agar Co. at Los Angeles and the Krimko Co. at Chicago. The Kelco Co. employed the local giant kelp, *Macrocystis pyrifera* for the extraction of algin, the American Agar Co. the local agarophyte, *Gelidium cartilagineum* for the extraction of agar and the Krimko Co. the local carrageenophyte *Chondrus crispus* of Maine in the extraction of carrageenin. A fair knowledge of the uses of algin, agar and carrageenin was obtained from the producers of these seaweed products.

People were quite curious why we studied seaweeds and their uses. I was asked by members of such clubs as the Rotary Club and the Lion Club to give lectures on seaweeds and their uses. I talked about what seaweeds are, why we study them and especially pointed out the fact that some seaweed products are in the ice cream, chocolate milk, puddings etc. they eat. It was indeed a fact that almost every American does eat something involving some kinds of seaweed products such as algin, agar and carrageenin. The Americans listening to my lecture were all surprised and thankful to me for the information.

When I was collecting seaweeds in La Jolla one day about fifty years ago, I met two boys who followed me and were curious why I collected seaweeds. I told them that seaweeds were not all undesirable but some were nice to eat and some supplied us with such valuable colloidal substances as algin, agar and carrageenin. They followed me to my laboratory and helped me sort out the specimens. In my trips to the U. S. in the seventies and eighties, I met both of them and was indeed surprised to learn that they had selected studies of the seaweeds as their careers and were very good scientists employing seaweeds in their research.

In late August 1946, right after the strike of the Pacific sailors, and normal maritime communication with China was resumed, I decided to return to China after six years' stay in the U. S. and asked the Director for approval of my resignation from my job at Scripps. I was indeed surprised to hear a joyous affirmative answer to my request. Sverdrup said to me, "the war is now over; you should return to your mother country to help rebuild China". I was even more surprised when he said "I shall also return to Norway in a couple of years." I said that he was already an American citizen and he replied that he loved Norway as much as the U. S. and had kept Norwegian citizenship until sometime after the declaration of war by the U. S. when it was necessary that some of the work Sverdrup participated in could only be carried out by U. S. citizens.

In this period I published 29 papers, 13 on taxonomy, 15 on uses and industry and 1 on photosynthesis.

### **My Return to China**

I returned to China in December, 1946 and accepted the appointment to the National University of Shandong as Professor and Chairman of the Department of Botany and Associate Director of the Institute of Oceanography of the University. I also accepted the appointment as Chairman of the Department of Fisheries to take care of the department until I found a new chairman.



I was later appointed to take charge of purchase of scientific equipments from the U. S. These four jobs kept me very busy, especially in the selection of personnel for the two departments. In autumn of 1947 I found a new chairman for the Department of Fisheries but I was further engaged in other university business. On June 1949 Qingdao was liberated and in July, Dr. T. C. Tung, Chairman and Professor of the Zoology Department and I were invited to a national meeting on Science and Technology in Beijing where we talked with Professor Kezeng Zhu of the Academia Sinica on the necessity of establishing an Institute of Oceanography in New China. In the spring of 1950, three representatives from the Academia Sinica came to Qingdao to talk over with the University on the appointment of Dr. Tung and I to new posts at the to-be-established Marine Biological Laboratory. The Marine Biological Laboratory was established on August 1, and Professor Tung and I were appointed to head the laboratory.

The Academia Sinica Marine Biological Laboratory was promoted to the Institute of Marine Biology in 1957 and to the Institute of Oceanology in 1959. Most of my accomplishments flowered and bore fruit in New China, and covered three periods. In the first period (1950—1966) I served as a research professor in charge of the botany group. As the first Associate Director of the institute, I had to devote a great part of my time to the running of the institute, since the Director, Professor Tung, had to serve concurrently as Vice President of the University of Shandong (1951—1954), Associate Director of the Division of Life and Earth Sciences of the Chinese Academy of Sciences (1954—1957), and Director of the Division of Life Sciences (1957—1966). In this period I published 70 scientific papers and 2 books. In the second period (1966—1976) during the so-called “Cultural Revolution” when practically all scientists in China were prevented from active science research, I published only two papers. In the third period (1976—1993) after the cultural revolution, 138 scientific papers and 6 books were published.

In September to October, 1975, I had the opportunity to revisit the U. S. A. after I left that country in December, 1946. I acted as vice-Chairman of the Chinese Delegation for Science and Technology. The Chairman was the late Professor Peiyuan Zhou, the renowned Physicist and past President of the Chinese Association for Science and Technology. We went to Washington D. C. and attended a party celebrating founding of the People's Republic of China on October First. In the party a member of the State Department approached me, introduced himself and told me that President Ford of the U. S. A. would like very much to meet with me as an old school-mate. I remembered vaguely that Mr. Ford was a Michigan football player when I was a post-graduate student thirty something years ago. The next day the entire Chinese delegation was invited to visit with President Ford. When we were waiting at the visiting room, President Ford came in with some officers and I was introduced to him. The White House photographer took a picture of me shaking hand with President Ford with Professor Zhou and Ambassador Huang standing beside me. It was indeed a very memorable meeting. The delegation was divided into 2 groups, one under Professor Zhou to visit some scientific institutions and the other under me visiting principally marine science institution, such as the Woods Hole Oceanographic Institution, Lamont Geological Survey, Scripps Institution, etc. Our visit to the Scripps Institution of Oceanography was a very memorial one. The Director, Professor Nierenburg offered us a big wel-