

NEEDHAM RESEARCH INSTITUTE NEWSLETTER

Newsletter No. 12

EAST ASIAN HISTORY OF SCIENCE TRUST

July 1992



CHANGES IN THE INSTITUTE

With this issue the Newsletter has entered a new phase. Firstly, Dr. Michael Loewe, who was responsible for all the past issues of the Newsletter, has relinquished his service. I have to take this opportunity to thank him for what he has done to bring out such a useful publication and one which has formed an indispensable link between the Institute and its well-wishers. Secondly, this issue is the work of Jovana Muir who will, however, shortly be leaving the Institute to resume her studies at Cambridge University. On behalf of the Institute I wish to thank her for her good work and to offer her our good wishes. Last, but not least, our Librarian Dr. Hilary Chung, who has been a rich source of information to the Newsletter and the Institute alike, will also be leaving soon to take up an academic appointment in Edinburgh. Again I have to express my gratitude for her service and wish her well in her new appointment.

Prof. Ho Peng-Yoke

CHARITABLE TRUST FUND APPEAL

This issue devotes its main attention to the Lu Gwei-Djen Memorial Charitable Trust. In gratitude for her unswerving devotion to the project, Dr. Joseph Needham has taken steps to establish a new trust, known as the Lu Gwei-Djen Memorial Charitable Trust, the purpose of which is the continuation of her life's work. The principal objectives of the Trust will be to complete the *Science and Civilisation in China* project and to assist Chinese scholars of the history of science wishing to pursue research in Cambridge.

The future direction of the Institute has thus been spelt out by Dr. Joseph Needham. Of course, the other important aca-

demical activities of the Institute will continue, although they are not meant to be funded by the Lu Gwei-Djen Memorial Charitable Trust. Well-wishers intending to make donations to the Institute have a choice between this fund and the general fund of the East Asian History of Science Trust.

Prof. Ho Peng-Yoke

GIFTS

The Institute would like to express its appreciation to the following for contributions towards expenses: R. H. Bathgate, L. Ansberry, John C. Maxwell, Mansell Davies, Ian Dunn and Lee Seng Tee.

Books were also gratefully received from the International Cultural Association of Korea, the Daewoo Foundation, the Institute for Research in Humanities at Kyoto University, P. F. Lisowski, Jeon Sangwoon, Isaia Iannaccone, Wu Tianying, Lin Yourun, Marta Hanson, Li Jingwei, Shi Shiqiu, Ma Boying, Zhao Pushan, Chen Chuan, N. H. Nhan, Liu Huisun, William Brandon, Mansell Davies, Teresa Mitsopoulou, He Zudao, Robert Brill, S. Mahdihassan and Ishige Naomichi.

AWARD

The Institute is happy to record that Mr. Han Shangping, a long time supporter of the SCC project, has been given the award of Outstanding Journalist by the National Press Council of Taiwan.

SEMINARS ON WORK IN PROGRESS

A new initiative, in the form of seminars on work in progress, was intended to expand links between researchers based at the Institute and others elsewhere involved with the history of science. The seminars were well attended,

drawing scholars from a variety of related disciplines.

The presentations were as follows: 'The Introduction of Newtonianism in Japan: The Translation of J. Keill's *Introductio ad Verum Astronomia* (1712) into Japanese in 1784' delivered by Tsukahara Togo of Leiden University; 'The Magic Square in China and Japan: *Yang Hui Suan Fa* (1275) and *Hojin no Ho* by Seki Kowa (Takakazu, 1642?-1708)' delivered by Jochi Shigeru of the University of London; 'Tai House Gardens in Sipsongpanna: Plant Use and Implications for Archaeology' delivered by Charlotte Herxheimer of the University of London; 'Traditional Chinese Medicine: How Yin-Yang fits with Mao's Dialectics' delivered by Elisabeth Hsü of Cambridge University; 'Liu Hui and the Pyramid' delivered by Donald Wagner of the SCC project at Copenhagen; 'The Reconstruction of the History of Mathematics by Late Ming and Early Qing Scholars' delivered by Catherine Jami of the Centre Nationale de la Recherche Scientifique, Paris; 'The Regularization of Models: An Embodiment of the Constructive Property in Ancient Chinese Mathematics' delivered by Liu Dun of Academia Sinica and 'On the Principles of the Comparative History of Mathematics' delivered by Liu Jiemin of Beijing Normal University.

MEMORIAL SERVICE FOR PROFESSOR LU GWEI-DJEN

Over two hundred people attended a memorial service held at Robinson College on Saturday, May 2nd, to commemorate the life and work of Dr. Needham's chief collaborator, Prof. Lu Gwei-Djen. Readings were given in Chinese and English from both Taoist and Christian traditions, with addresses delivered by Prof. Ho Peng-Yoke and Dr. Joseph Needham.

A SHORT BIOGRAPHY OF DR. LU GWEI-DJEN BY JOSEPH NEEDHAM

Lu Gwei-Djen was born on the first of September, 1904, the only daughter of two remarkable people. Her father, Lu Mou-T'ing, was a pharmacist who knew both the pharmacopoeia of modern-Western medicine as also the herbal remedies of traditional-Chinese medicine. When I dedicated to him the first volume of my series entitled *Science and Civilisation in China*, I called him 'merchant-apothecary of the city of Nanking'. Her mother was a



'The people have gone but their influence remains'. (Dr. Lu Gwei-Djen standing beside her own calligraphy in Gonville and Caius College). Photograph courtesy of Dr. Joseph Needham.

We are sorry for the delay of this year's second issue of The Needham Research Institute newsletter due to a variety of reasons. We hope, however, that the January 1993 issue will not be unduly affected.

Ch'en, Ch'en Hsiu-Ying, and equally enlightened. Lu Mou-T'ing often used to say that he brought up his daughter with the firm conviction that however strange the proceedings of the old Chinese might be in the eyes of modern Europeans, they always knew what they were doing and some day the world would recognise this.

In due course Lu Gwei-Djen went on to Chinling College at Nanking, which was called the 'Girton of China'. After she graduated there, she went on to Peking Union Medical College where she was trained as a chemical pathologist, and afterwards she taught at St. John's University in Shanghai. But she left there before long, to take up a research post at the Henry Lester Institute in Shanghai, where she collaborated on vitamin research with the well-known authority on vitamins, Professor Benjamin Platt. In 1937 she got typhoid fever and since the war with Japan had just begun, the Japanese were bombing the harbour in Shanghai. She often told me subsequently how the spray from the falling bombs reached everybody in the boat, but they got through all right to a British destroyer which took them down the river to Wu-Sung where they boarded the vessel of the Blue Funnel line which was to take them to England.

It was in 1937 that Gwei-Djen first came to England, along with two other graduate students from China. Gwei-Djen worked with my first wife, Dr. Dorothy Needham, soon to be F.R.S., while Shen Shih-Chang worked with me, and Wang Ying-Lai worked with Professor David Keilin, the discoverer of cytochrome, at the Molteno Institute. Previous to that, I had been a biochemist, specialising in chemistry and embryology, but the more I got to know the three graduate students from China, the more exactly like my own their minds seemed to be, so it raised in very acute form the problem of why modern science had originated in Europe alone, in spite of the great successes of China in science and technology during ancient and mediaeval times (to instance only the discovery of gunpowder, printing and the magnetic compass). And therefore, as the years went by, I stopped being a regular research scientist and went over to being a historian of science in China. The dominant influence on me was Lu Gwei-Djen. She had learnt from a newspaper that I was treasurer of the Cornford-McLaurin Fund, a charity set up to help the relatives of those who had died in the International Brigade, fighting

against Franco in Spain. She thought, therefore, that the Cambridge Biochemical Laboratory would be a good place to work in and she arranged to come here.

We had worked out the subjects which a book on Chinese science was to cover before she left for America a week or two prior to the beginning of the Second World War. I used to write letters to my three Chinese friends in fledgling Chinese, and they were extremely kind in replying. All three of them had different fates. Shen Shih-Chang went to America too and spent the rest of his life at Yale University, while Wang Ying-Lai, returning to China, became the head of the National Biochemical Laboratory in Shanghai and eventually President of the Shanghai branch of Academia Sinica. As for me, I was greatly helped in learning Chinese by Gustav Haloun, the Professor of Chinese at the time. He said to me one day, 'Come to tea every Friday and I will go over with you the chapters which I have translated from the *Kuan Tzu* book'. He did indeed do this, and there could be no better way of learning classical Chinese.

Lu Gwei-Djen worked first of all in California, but she was driven away from there by the allergy which she developed to the flowering acacia trees, so she went to the Columbia Medical Center in New York city, spending the summers at the laboratory of Tom Spies in Birmingham, Alabama. In New York she became a great friend of Wu Chen-Hsiung, the famous physicist.

She did not return to Europe until 1945 when the War was almost over, and then she joined the British Council to continue the work of the Sino-British Science Cooperation Office which I had set up while Scientific Counsellor at the Embassy in Chungking. Her passport got lost, so she had to stay in India much longer than anticipated, but she reached Chungking eventually and was warmly welcomed by all of us there.

After several months of service with the British Council, she was elected Professor of Nutritional Science at Chinling College and therefore returned to Nanking. This situation did not last for very long, however, and she was soon called out to participate in the building up of UNESCO in Paris. There she stayed nine years, in charge of the Field Science Cooperation Offices which had been set up on the model of the Sino-British Science Cooperation Office in Chungking.

Eventually in 1957 she came to Cambridge which was to be her home for the rest of her life. She collaborated with me on many subjects, mostly medical, writing on, for example, the history of forensic medicine in China (centring on Sung Tz'u's *Hsi Yuan Lu*), the history of variolation and vaccination there, and many other subjects.

After my first wife died of Alzheimer's Disease in 1987, we got married in 1989. I had been very close to her since 1937, but we were granted barely two years of married life and she died on 28th November, 1991, of bronchopneumonia.

Her death is a terrible blow to all who knew her.

But to end on a lighter note, I hope that the volumes in the *Science and Civilisation in China* series, to which Lu Gwei-Djen contributed so much, will do a lot of good. I hope that an engineer building bridges in Africa somewhere will in the future say to a Chinese colleague, 'I know all about you people. You produced Li Ch'un, who in 610 A.D., or thereabouts, made the first segmental arch bridge in the world'. And so the work Gwei-Djen and I began together so long ago may prove to have been a bridge between peoples and cultures, as we always hoped it would be.

THE SCAPHE IN KOREA

I was in Korea, between the 8th and the 10th of February 1992, pursuing research into Chinese books republished there during the fifteenth century. I visited the Ch'angdök Palace, the greatest palace at that time, where I was able to inspect some scaphes. These were imitations whose originals had already been studied and documented, so it was not a completely novel experience for me. Nevertheless, my impression differed in at least one striking respect from the picture I had formed, through information in previous papers, of these scaphes: in fact, the scaphes were too small to be of any practical use.

Sometimes cultural artefacts which have already been lost in their land of origin are preserved in countries on the periphery of that main civilisation. During the Yuan dynasty, Chinese traditional astronomy was at its most sophisticated. Guo Shoujing (1231-1316) devised some important new observatory equipment with which he calculated the most complete calendar of traditional China, the *Calendar of Works and Days* (*Shoushi Li*). Guo

Shoujing's equipment was, however, lost from China.

The scaphe, an upward-facing, bronze bowl-sundial, was one of the pieces of observatory equipment which Guo Shoujing devised (see photograph below). Within the bowl, lines of coordinates were marked, with the tip of the gnomon occupying the centre of the opening. The ordinates were marked by 13 parallel lines between the two solstices and measuring the ordinate of the sun's shadow therefore indicated the season, through a series of 24 fortnightly periods. That is to say, the scaphe was not only a sundial but also a calendrical instrument.

It had been known in China, since at least the time of the Han dynasty, that the season could be ascertained by measuring the length of the sun's shadow from the gnomon. Astronomers set the gnomon perpendicular to a horizontal, graduated scale and the consequent ratios of various sun shadows were very complex. Moreover, measurements had to be taken at noon, so if the sun then happened to be clouded nothing could be done. The scaphe resolved these difficulties.

Because the calendar was one of the most important factors in agriculture and ritual, its distribution became an important symbol of the Emperor's power in Oriental countries. The diameter of the Korean scaphe was, however, only about one foot, so it would have been too small to indicate the correct ordinates. It was probably regarded as an exclusively ceremonial instrument, the gnomon and measuring-scale being set up in front of the palace in the Forbidden City only as a symbol of imperial majesty. And then the bowl-sundial disappeared from China.

When the Yi dynasty was established in Korea, King Sejon (r. 1456-68) introduced elements from Yuan dynasty culture, in order to develop and revitalise his country.

He set the new instrument in front of some of the Ch'angdök Palace buildings and thereby preserved the invention in Korea. He perhaps even hoped to become 'Emperor' of Korea, this ambition implied in the directional position of his palace. The main gates of the Ch'angdök open towards the south, just like those of the Chinese emperor's palace, whereas the gates of the Korean Koryö dynasty palace open eastwards. Sejon's scaphe (or *angbu* in Korean) was lost, but one from the seventeenth century has been retained and replicas of it are displayed in the Ch'angdök Palace Museum.



Replica of a scaphe in front of the main building of the Ch'angdök Palace, Seoul. Photograph: Jochi Shigeru.

The diameter of the scaphe is 35.2 cm while the gnomon in the bowl is tipped 37.20 degrees (36.67 standard degrees). This angle is taken from the polar height at Seoul, though it is

immaterial to the scaphe's function; the essential feature is that the tip of the gnomon be located in the very centre of the bowl.

Jochi Shigeru

REPORT ON A LECTURE TOUR OF CHINA

This trip came about as a response to invitations from the Foundation of Chinese Dietary Culture (FCDC), Taipei, and the National Natural Science Foundation of China (NSFC), Beijing, to visit Taipei, Beijing and Shanghai in the fall of 1991. I welcomed it as an opportunity to fulfil a wish I have had for a long time, that is, to see for myself a number of critical archaeological finds related to food science and technology that have been uncovered in China in recent years. I left Washington, D.C. on September 3 and returned on October 10, 1991. The cities visited include Taipei, Hong Kong, Beijing, Nanchang, Changsha, Zhengzhou and Shanghai.

Taipei, Sept. 4-8. The purpose of my visit was to participate in the Second Symposium on Chinese Dietary Culture sponsored by the FCDC. The Chairman of the Symposium was Mr. George C. S. Wong, chief executive officer of the Mercuries Group Ltd. which financed the meeting. The Honorary Chairman was Prof. Chen Chi-Lu, who was the moving spirit behind the committee that hosted Joseph and Gwei-djen's visit to Taiwan in 1984. The theme of the Symposium may be rendered as 'Chinese Dietary Culture Looks Towards the 21st Century'. The specific topics discussed were: 1. Nutrition and Food Cures; 2. Wine and Tea in the Dietary System; 3. The Changing Scene in Food Techno-

logy; 4. Dietary Culture and Aesthetics and 5. Dietary Culture and Economics. My paper entitled, *The Origin of Fermented Foods in the Orient* was presented in Session 3. The Symposium concluded with a Round Table Discussion on International Exchange of Dietary Cultures. Attendance at the Symposium was by invitation only. The audience appeared to be very knowledgeable in many aspects of dietary culture as was shown by the lively discussions that followed each presentation. For me, the Symposium will also be remembered fondly for the opportunity it gave me to meet other researchers involved in the history of food science and nutrition in China.

On the last day of the Symposium the organisers took us on a tour of the Food Research Institute at Hsinchu and the Tea Experiment Station at Yangmei. Much interesting applied research is in progress at both locations, and the tea tasting and demonstration of the Chinese tea ceremony in the afternoon were most enjoyable.

Hong Kong, Sept. 8-15. The stay in Hong Kong was a welcome respite from the hectic days in Taipei. I was able to catch up with my jet lag, see many old friends and prepare the lectures I was going to give in Beijing.

On the 14th I spent the day at the Chinese University of Hong Kong at Shatin with my old friend, Prof. D. C. Lau. He and Dr. C. F. Chen, Director of the Institute of Chinese Studies, have been supervising a project to establish a computerized database of the entire body of extant Han and pre-Han traditional

Chinese texts (103 individual texts). The database is expected to be completed in 1992. The next stage is the compilation and publication of a series of concordances to the individual texts under the general title *The Ancient Chinese Texts Concordance Series*. The first publication on *Chan Kuo Ts'e* is now in press, to be followed by the *Li Chi*, *Chou Li* etc. Eventually the whole series will be available on floppy discs.

Beijing, Sept. 15-26. My principal duty was to give a series of lectures and discussions on *Federal Support of Science and Technology in the United States and Grant Administration at the United States National Science Foundation* to the staff of the NSFC.

Most of September 23rd was spent at the Institute of the History of Natural Science. The IHNS is now housed in the Fu-wang-fu, the old residence of a Manchu prince. I gave a talk in the morning on two topics that I am currently working on: the origin of Chinese wine fermentations and the origin of *tou-fu*. At their request, I prefaced my remarks with a fifteen minute summary on the status of NRI and SCC. After lunch I toured the library and had discussions with various members of the IHNS staff, including He Shaogeng who briefed me on the status of the SCC translation project. Several volumes are now in press. I also received some details of an IHNS plan to publish a new series on the history of science and technology in China. It will consist of 30 individual volumes divided into three categories: general history, specialised topics and reference works. The series is to be completed in 5-7 years. Also planned is an *Encyclopaedia of the History of Chinese Astronomy*, which will be published in 16 volumes.

Nanchang, Changsha and Zhengzhou, Sept. 26 - Oct. 2. In Changsha I spent a morning visiting the extraordinary exhibit of cultural relics (including the body of Lady Da which is over 2000 years old) found in the Western Han tombs at Ma-wang-dui and now housed in a specially constructed museum. It was an unforgettable experience. Particularly memorable to me are the rich displays of food materials, cooking utensils and serving vessels that define the culinary environment in an aristocratic family in the early years of the Han dynasty. In Zhengzhou, my main mission was to see the stone mural that is said to depict the making of *tou-fu*, found in Eastern Han tomb no. 1 at the village of Da-hu-ting, Mixian county, about 40 km south of Zhengzhou.

When I finally stood in front of the stone mural that I had contemplated for years it was as if a dream had come true, and I reached the emotional highpoint of my entire trip.

Shanghai, Oct. 2-10. It was a rude return to the twentieth century when I landed at Shanghai after a turbulent flight from Zhengzhou. My only chores were to give a lecture on the status of NRI and SCC at the Shanghai Science and Technology Publishers and a talk on *Current Issues in the Funding of Science and Technology in the United States* at Fudan University. Thus, although I had quite a busy schedule, I managed to put aside some time to browse among several bookstores and bought quite a number of books both for my own use and for the NRI library.

One event that I enjoyed greatly was the mini-reunion that Chen Wenhua, Wu Deduo, Ma Changyuan and I had at the Shanghai Museum on October 4th. In our honour, Dr. Ma, Director of the Museum, gave us a private showing of his priceless Han dynasty bronze still, and allowed us to photograph, touch and examine it in detail. For comparison he also showed us a recent acquisition, a Han dynasty steamer of about the same size, with a domed cover. One sees immediately that the 'still' is simply a modified 'steamer'. It is really designed for steam distillation (rather than for distillation *per se*), which is the actual process used in the preparation of Chinese distilled liquor from the semi-solid fermented mash. He then gave us a personally guided tour of the Museum, which is divided into three sections; bronzes, ceramics and painting-and-calligraphy. The display of Chinese bronzes at the Shanghai Museum is the best I have seen anywhere.

One diversion that my hosts kindly arranged for us was an afternoon outing to the Shanghai Botanical Garden. Although the cassia and chrysanthemums were in full bloom, what impressed us most was the timeless beauty of the *penjing* collection where each display is a masterpiece of Chinese landscape architecture in miniature. The peacefulness of the *Penjing* Garden was a welcome respite from the hustle and bustle of busy Shanghai. My impression of the scene was one of the images of China uppermost in my mind as I boarded the plane on the morning of October 10th to start my return flight to the United States.

Dr. Huang Hsing-Tsung

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It must be emphasised that the subject-matter of some of the parts given above is subject to alteration as research proceeds. Further information about these titles will be included in future editions of the Needham Research Institute Newsletter.

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