

# NEEDHAM RESEARCH INSTITUTE NEWSLETTER

Newsletter No. 2

EAST ASIAN HISTORY OF SCIENCE TRUST

June 1987



## NEEDHAM RESEARCH INSTITUTE

Professor Ho Peng Yoke and Professor Nathan Sivin have accepted nomination as Visiting Associate Directors of the Institute.

Mr Steven Simmonite left the Institute in April 1987 at the close of his two-year appointment, taking with him the best wishes of his colleagues for his future career. Since March Mrs Hui-Hsiang Kirkpatrick has been assisting with the work of the library.

The Institute has been glad to welcome the following visitors during recent weeks: Mr Richard Bertschunger (Yeovil); Dr Francesca Bray CNRS (Paris); Dr Joel Brenier (University of Paris, VII); Dr Stephane Grumbach (Institut National de la Recherche Informatique et Automatique, Paris); Professor Jerome Heyndrickx CICM (Louvain University); Dr Catherine Jami (University of Paris, XIII); Dr Toshio Kusamitsu (Sophia University, Tokyo); Dr Anthony Michaelis (Editor, *Interdisciplinary Science Reviews*, London); Dr Elinor Shaffer (University of East Anglia, Norwich); Professor Song Sang-Yong (Hallym University, Korea); and Professor Bodo Wiethof (Bochum University, W. Germany).

The Institute extends its congratulations to Dr Bray on her appointment to a position in the University of California at Los Angeles.

## BENEFACTIONS

We owe a very great deal to many individuals and organisations too numerous to mention here, but the chief donors for both the building to house the Institute and for endowment and research are given below:

### The Building

The main benefactors were Tan Sri Tan Chin Tuan, formerly Chairman of the Oversea Chinese Banking Corporation; the East Asian History of Science Foundation in Hong Kong, the Council

of the Chinese Cultural Renaissance in Taiwan; and for the South Wing yet to be built, the East Asian History of Science Foundation in Hong Kong and the National Commission for Science and Technology Policy of the People's Republic of China.

### Endowments and Research Grants

Here the main benefactor was the Croucher Foundation of Hong Kong with a substantial endowment. For research we are deeply in debt to the Lee Foundation of Singapore; the Luce Foundation, the Mellon Foundation, The National Science Foundation, all mediated by East Asian History of Science Inc. and all in the United States of America; the National Institute of Research Advancement in Japan; and Gonville and Caius College in the United Kingdom.

We should also like to express our appreciation of the help and generosity received from the Cambridge University Press for nearly forty years past.

## TAN SRI TAN CHIN TUAN

Tan Sri Tan Chin Tuan's name is a household word in Singapore, where he has played a prominent



part both as business-man and philanthropist. During his long career he has contributed widely to public service and has taken considerable interest in academic research.

Born of a Fukien family in 1908, Tan Chin Tuan was educated at the Anglo-Chinese School of Singapore and started his career in banking at the age of 17. He became a member of the staff of the Oversea Chinese Banking Corporation from its foundation in 1932; ten years later he found himself responsible for management of the bank in its temporary headquarters at Bombay. At the end of hostilities he returned to Singapore to re-establish the bank's interests there and was appointed Chairman and Managing Director in 1966. While his main field of activities has been within the Oversea Chinese Banking Corporation, of which he is Life President, he has also maintained lively interests and connections in other business concerns which have likewise benefitted from his leadership; these have included Malayan Breweries Limited, Wearne Brothers Limited, Fraser and Neave Limited and the Eastern Realty Company.

In addition to devoted service to his professional interests, Tan Chin Tuan was soon making his mark in public service. At the early age of 31 he was nominated one of the Singapore Municipal Commissioners, and in 1940 he became a member of the Passive Defence Committee. He served also as a Justice of the Peace and as a member of the Legislative Council (1946) of which he acted as Deputy President (1951). In the meantime he had been appointed a member of the Executive Council (1948-55).

As a philanthropist Tan Chin Tuan has usually chosen to support causes anonymously, and these have often been concerned with the relief of personal suffering, e.g. of old people or underprivileged children. The honours

that he has received during the course of his life demonstrate the high regard in which he has been held. In addition to being a Commander of the British Empire he received the order of the Panglima Setia Mahkota, which carries with it the title of 'Tan Sri'. As a member of the Courts of the University of Malaya and Nanyang University he has been able to indulge his interest in the work of universities and research, as may also be seen in his election to the International Council of the Salk Institute for Biological Studies, in 1981.

As a Singaporean, Tan Sri Tan Chin Tuan has always taken a pride in the Chinese heritage in which he was reared. His love for the material products of Chinese culture may be seen in his collections of *objets d'art* and his library of books on Chinese history. In the course of three visits to China since 1985 he has been able to extend his familiarity with the homeland and products of Chinese civilisation. At the same time he has throughout his life been developing a deep appreciation of Western scholastic interest in China and in Europe's contribution to Chinese Studies. By the time that he first met Joseph Needham, in 1983, he had already been impressed by the progress made in research into China's cultural achievements and had realised the importance of such work in enhancing the reputation that China would enjoy in the community of nations. Being highly appreciative of devotion to learning and research for their own sake and of the scholastic motives that inspire such work, he has been glad to assist with the work of the Institute in a magnificent manner. His generous benefaction rests on his faith that a more extensive understanding of China's culture can lead only to closer relations between east and west. He believes that the library whose premises he has built has a distinct part to play in preserving the wealth of knowledge of the past for the benefit of present and future generations. Members of the Institute have Tan Sri Tan Chin Tuan to thank for the splendid surroundings in which they work.

## NOTE BY THE CHAIRMAN OF TRUSTEES

I had for a long time, indeed going back to before the war, heard of Joseph Needham's work. It was unique from the beginning in that here was a distinguished practising scientist who was devoting himself to an area in the history of science. Secondly, he had for this purpose chosen China, known to have been a wellspring of scientific and technological advance in very early phases of the world's history, but which was at the same time relatively unknown and unexplored.

My closer involvement with Joseph Needham's work came when I was invited to join a number of Trustees who had recently been brought together and to assume their Chairmanship. This was also the time when it was decided that the name of the Trust should be "The East Asian History of Science Trust" denoting an intention to enlarge the scope of the work to include in addition to China other areas of East Asia, which Joseph Needham and his collaborators felt offered the prospect of very important further discoveries.

I accepted the honour of this invitation readily and with gratitude for the opportunity it gave me to get to know Joseph Needham, his most important collaborator Lu Gwei-Djen and all the others working at the Needham Institute more closely. I have certainly never regretted this decision and I have watched with growing admiration the progress of the History, the volumes of which now cover a substantial area of shelf space. The work has achieved universal renown in scientific circles as well as in the wider circles of those who are interested in the history of ideas and of their practical implementation. The completion of the work that is now in hand, the consolidation of the large and precious material which is being collected in its course, the proper housing of it, the improvement of the facilities for the scholars from many parts of the world, who have already made use of it and will do so increasingly in the future, and eventually the exploration of the history of scientific and technological progress in other parts of East Asia, will require a great deal of effort as well as finance. Happily in the last two years much progress has been made; and the opening of the major part of the new building, which was described in the first



issue of this newsletter and which will be visited at about the time this present newsletter appears by the Chancellor of the University, the Duke of Edinburgh, is the most striking evidence of what has been achieved.

The implementation in the last two years of our plans has, of course, been dependent upon financial support, some of which is referred to in another place in this newsletter. But it would not have been possible without the enthusiastic co-operation of many voluntary workers in the United Kingdom, in the United States of America and in Hong Kong. Naturally a certain degree of organisation has been indispensable, such as the constitution of three bodies of Trustees in the United Kingdom, the United States and in Hong Kong, the setting up of a Committee of Management, as well as of an Academic Committee; but all this has been kept within modest bounds and the emphasis on the substance of the work as distinct from the administrative apparatus has been carefully observed. To finish the building will require further financial assistance but there is good prospect that this will be forthcoming. The completion of the series of volumes on China, which is of course the most immediate task, is within sight and financially secured. When accomplished, it will be both a monumental tribute to a great scholar as well as, we all hope, the foundation for further work in this important field of enquiry.

Roll of Ipsden

## VISIT TO CHINA AND JAPAN 1986

Early in November last year, Dr Lu Gwei-Djen and I flew to Hong Kong where we stayed about ten days. During this time, we met many old friends and succeeded in persuading the East Asian His-

tory of Science Foundation (Hong Kong) to bestow a further magnificent donation towards the building of the South Wing. Among other functions, a notable reception was given by Professor Ho Peng-Yoke at Robert Black College, of which he has been Master. He recently accepted an invitation to be a Visiting Associate Director of the Needham Research Institute of Cambridge, together with Professor Nathan Sivin of Philadelphia.

Then, in the middle of the month, we flew on to Beijing, where we were put up at the Friendship Hotel. One of the most remarkable events of that period was the official inauguration of the Chinese translation of a collection of my papers and essays, entitled *Li Jo-Sé Wên Chi*. The work has been edited by Dr Phan Chi-Hsing of the Academia Sinica History of Science Institute. The function took place in the Great Hall of the People, and many speeches marked the occasion. I was also presented with a large oil painting of myself with some of the triumphs of ancient and mediaeval Chinese science and technology in the background. This painting has now arrived in Cambridge and we plan to hang it in the new Library.

Another time, we had an interview with Dr Sung Chien, the Minister in Charge of the National Council for Science and Technology Policy. He told us of the gift voted by the People's Republic towards the building of the South Wing, and this was a very happy occasion.

Soon afterwards, we flew to Chungking in Szechuan (the war-time capital where I had lived for four years) and then took a car 250 kilometres north-west to re-visit the Buddhist cave-temples of Ta-tsu. There, in cave no. 149 of the Pei-shan complex, we were able to verify that the object represented in high relief is really a bombard (the earliest form of cannon), while it was Dr Lu who noted that the parallel figure on the opposite wall was carrying a bomb – so that gunpowder was clearly in the picture. The big surprise here, however, was the date, about 1128 A.D., as opposed to the expected 1260. We have now written an account of this remarkable finding, in which we speculate on the relatively slow development of the bombard, caused perhaps by lack of enough saltpetre to make a gunpowder formula with sufficiently high percentage of nitrate to allow the mixture to exert its full propellant power.

Returning to Chungking, we flew to Wuhan, where we were entertained to lunch by professors of Hupei University. Then we set out for the home and tomb of Li Shih-Chen, the great pharmaceutical naturalist who died in A.D. 1593. This was again about 250 kilometres to the south-east and on arrival at Chhichow (Chhichhun), we were able to see the tomb of Li Shih-Chen and a museum alongside it which has been set up in his memory. One of the most interesting features here is the scenery of Hupei province, which as one approaches the place, changes from a rather



The statue in high relief of the figure carrying the bombard from cave no. 149 at the Pei Shan complex of Buddhist cave-temples at Ta-tsu, N.W. Szechuan. Its date, from the dedication inscription, must be in the close neighbourhood of +1128, rather than the middle of the +13th century as would have been expected.

Photograph by Robert Temple

mournful plain to a land of hills and wonderful lakes, fed from the Yangtze. The Taoist temple where he and his father practised medicine is now being restored.

Then on again to Shanghai where there were many old friends to meet, such as Professor Tshao Thien-Chhin and his wife, Professor Wang Ying-Lai and Dr Hu Tao-Ching, the editor of Shen Kua's wonderful book *Mêng Chhi Pi Than*. During this time, Dr Lu paid a visit to her brother and his wife, now both over 80, in Nanching.

Eventually, as December came round, we flew to Osaka, where we were met by many old friends, as well as representatives from Tenrikyō. Our first objective was to take a short vacation on the southernmost island of Japan, Kyushu, with Dr Ushiyama Teruyo. Here the high points were perhaps the steaming hot water vents of Beppu, the still active volcano of Mt. Aso, and that wonderfully interesting place, Hirado, where the first English factory was set up in the 17th century. The Hirado Museum also possesses a painted scroll of the Chinese ships which came in those days to Nagasaki; it is painted and drawn to scale and gives a wonderful representation of the shipping of those times.

But now it was time to establish ourselves at Tenri, where the interesting conference on "Cosmos, Life and Religion" was to be held. Acceptance of the invitation to give a lecture at this had been one of the reasons for our going to East Asia at this time of year. It also meant, however, that my 86th birthday was celebrated in Kyoto with a wonderful evening party and dinner. I was the only Westerner present, the majority being eminent Japanese historians of science. One of them, Mr Inoue Akio, had provided a *maiko* (apprentice *geisha*) who did several beautiful dances for us and poured out wine for the top table. It was an extremely Japanese evening and very delightful.

Eventually, after a short stay in Tokyo, we flew home by way of Anchorage, Alaska, to arrive just in time for Christmas. The excursion had been extremely worth while.

J.N.

## THE SSU K'U CH'ÜAN SHU

As reported in Newsletter No. 1, the Institute is receiving as a gift from the National Palace Museum, Taipei, a copy of the

reprint of the *Ssu k'u ch'üan shu*, amounting to 1500 volumes. This generous gift forms a notable acquisition for the library where it will serve the needs of scholars researching in many aspects of Chinese Studies.

The *Ssu k'u ch'üan shu*, or 'Complete collection of the Four Treasuries of Literature' is one of China's monumental literary achievements. Its compilation was ordered by imperial edict in 1773, with the object of assembling copies of rare books from all possible sources in the empire; transcribing their texts in uniform style and in a way that would take account of the textual differences of various copies; and providing critical bibliographical notes regarding authorship and problems to which the works might give rise. Being entitled 'Ch'üan shu', or 'Complete writings', the collection was designed to include not only works which were brought to light from obscurity as a result of the empire-wide search, but also well known texts that had long formed part of the staple literary diet of Chinese scholars.

This was by no means the first project of its sort to be undertaken by the imperial governments of China, whose interest in building up libraries and sponsoring the production of catalogues can be traced to the beginning of the Christian era. The first bibliographical list to be made, of which we possess a summary, was drawn up as a result of the work of Liu Hsiang (79–8 BC) and his son Liu Hsin (died AD 23) and formed a precedent that was followed throughout the imperial age and by China's present government.

Throughout the centuries imperial governments and their successors were sponsoring literary projects, and the production of the *Ssu k'u ch'üan shu* was to be the most ambitious attempt ever launched. Leading scholars of the day, including Chi Yün (1724–1805), Tai Chen (1724–1777) and Shao Chin-han (1743–1796) to name but a few, took part in the work of selecting material for inclusion in the collection. It was thanks to their meticulous collation of copies of texts and their critical assessment that the production of the *Ssu k'u ch'üan shu* reached such a high professional standard. It is however also possible that a less noble and somewhat sinister motive lay behind the project. This was the desire of the imperial Ch'ing government to search out all literature that might be regarded as subversive or critical of the current régime, founded as this had been in 1644

by the Manchus; the project provided opportunity to suppress texts of this type that existed in small numbers of copies only.

Whatever the motives may have been – and great credit must be accorded to the imperial government for a disinterested desire to perpetuate the long-standing tradition of support for learning – the work was soon started. Copies of the texts were produced by hand in faultless calligraphy, and by 1782 the first set was ready. Altogether seven manuscript sets were eventually made, being stored in the imperial palace at Peking, the old Summer Palace of Peking, Mukden, Jehol, Yang-chiu, Chin-chiang and Hang-chou. Each set comprised 36,000 uniform volumes, which included the 79,000 chapters (*chüan*) of over 3,400 works. These were arranged in the four traditional categories (or 'Treasuries') of classical writings (*ching*), historical works (*shih*), philosophical texts (*tzu*) and literature (*chi*). A further section of the work included the bibliographical notes to the whole collection, and the five component sections were bound up in distinctive colouring – green for classics, red for histories, blue for philosophies, grey for literature and yellow for the catalogue.

But the subsequent history of the project makes melancholy reading. Large portions of the seven sets were destroyed during the course of the T'ai-p'ing rebellion (1851 to 1864) and the burning of the summer palace in 1860, and only three sets survived in entirety. One of these is the set that had been kept in the *Wen-Yüan-Ko* that formed part of the former imperial palace in Peking. These premises included a special room to be used by the emperor when studying the collection.

Of the works that had preceded the *Ssu k'u ch'üan shu*, mention must be made of the *Yung-lo la-tien*, which had been ordered by the Ming emperors and completed in 1403–24. Here again the record was sad. Despite the production of another manuscript copy, this great work was completely lost except for a few parts that lie scattered in various libraries, and it is hardly surprising that considerable anxiety arose regarding the preservation of the remaining copies of the *Ssu k'u ch'üan shu*. As a result, from early in the Republican period until 1929 no less than four proposals were put forward to reproduce the work in facsimile. Regrettably these were never brought to fruition, owing to a shortage of funds, the rivalries and jealousies of those who were

concerned, or the incidence of war. However a somewhat more modest scheme, to reproduce select parts of the collection, was successfully undertaken from 1935. In that year there appeared an edition of 231 of the rare books that had been included in the *Ssu k'u ch'üan shu*; this initial venture was followed on no less than twelve further occasions, so that the total number of works reproduced in this way exceeded 1872 titles, amounting to 15,000 chapters. These reprints were all made from the original copy that had been deposited in the *Wen-Yüan-Ko*, Peking.

The final stage has now been reached by the decision taken by the Commercial Press, Taiwan, in 1982, to reproduce the work in its entirety. It had been realised that publication of selections of particular items from the mammoth collection had become unwieldy and difficult to manage; indeed some items had actually been reproduced in duplicate, and the next logical step would be to make the whole collection available. This work is now nearing completion. It is based on the same copy, held originally in the *Wen-Yüan-Ko*, and for the ease of reference a continuous pagination has been added. Each page of the new print will accommodate two complete folios of the original work. In all the set will comprise 1500 volumes.

The *Ssu k'u ch'üan shu* stands as a monumental product of Chinese traditional scholarship. Its compilation engaged some of the finest intellects of the eighteenth century and drew on the long heritage of bibliographical research that stretches back for two thousand years. The technical information about works of literature contained in the collection and the critical notes of the scholars who were responsible for drawing up the catalogue form an indispensable tool for the study of all aspects of Chinese learning.

Earlier in the eighteenth century the *Ssu k'u ch'üan shu* had been preceded by another gigantic product of Chinese scholars, paper-makers and printers, the *Ku chin t'u-shu chi-ch'eng* or 'Collection of texts and illustrations old and new'. The 10,000 chapters of this work, completed in 1728, include long passages of Chinese literature, arranged according to subject. Thanks to its most recent gift, the Institute's library now houses a worthy companion to the encyclopaedia of 1728, in the form of another famous example of Chinese bookmanship.

M.L.

# SCIENCE AND CIVILISATION IN CHINA

published by Cambridge University Press

The Gunpowder Epic, Volume V, Part 7 of *Science and Civilisation in China*, was published in January 1987. The following extract from a review in *Nature* demonstrates the esteem in which the work of Joseph Needham and the Needham Research Institute is held.

'No work of scholarship in the twentieth century has done as much to alter received ideas about the past as Joseph Needham's *Science and Civilisation in China*. This latest volume, *The Gunpowder Epic*, is indeed an epic. ... Needham shows more fully than ever before, and with a richness and range of scholarship that others have never attained, that Chinese Taoist alchemists were the first to explore the incendiary and explosive properties of gun-

powder; and that Chinese military men pioneered a variety of uses for the mixture, up to and including guns and rockets, long before gunpowder reached western Asia and Europe ... Needham's talents are extraordinary - a combination of linguistic ability, chemical and technical competence, and a cast of mind that has put endless details together into a clear and convincing picture of world-wide development that ran across some 1,500 years ... This is a truly great and mind-enlarging book.' William H. McNeill, *Nature* (23 April, 1987)

Volume V, Part 9, **Textile Technology: Spinning and Reeling**, by Dieter Kuhn is the next title to be published in Autumn 1987. This is the first of

two parts to cover Chinese textiles and textile technology. It deals with the evolution of bast-fibre spinning and silk-reeling in the history of China, two basic techniques in the production of yarn and thread. For the first time in a publication outside

China the raw materials, such as hemp, ramie, jute, cotton, and silk, and the processing techniques applied, are documented and explained in their context of historic evolution, geographic distribution and economic significance.



Silk-reeling frame, on a handscroll attributed to Liang Khai, first decade of the +13th century. (Oriental Department, Cleveland Museum of Art, Cleveland, Ohio, USA.)

Titles published to date (1954-1987):

Volume I:	INTRODUCTION ORIENTATIONS	£37.50 net
Volume II:	HISTORY OF SCIENTIFIC THOUGHT	£65.00 net
Volume III:	MATHEMATICS AND THE SCIENCES OF THE HEAVENS AND THE EARTH	£80.00 net
Volume IV:	PHYSICS AND PHYSICAL TECHNOLOGY	
Part 1:	Physics	£42.50 net
Part 2:	Mechanical Engineering	£75.00 net
Part 3:	Civil Engineering and Nautics	£85.00 net
Volume V:	CHEMISTRY AND CHEMICAL TECHNOLOGY	
Part 1:	Paper and Printing	£50.00 net
Part 2:	Spagyric Discovery and Invention: Magisteries of Gold and Immortality	£50.00 net
Part 3:	Spagyric Discovery and Invention: Historical survey from Cinnabar Elixirs to Synthetic Insulin	£42.50 net
Part 4:	Spagyric Discovery and Invention: Apparatus, Theories and Gifts	£75.00 net
Part 5:	Spagyric Discovery and Invention: Physiological Alchemy	£65.00 net
Part 7:	The Gunpowder Epic	£50.00 net
<i>Forthcoming:</i>		
Part 9:	Textile Technology: Spinning and Reeling	About £50.00
Volume VI:	BIOLOGY AND BIOLOGICAL TECHNOLOGY	
Part 1:	Botany	£50.00 net
Part 2:	Agriculture	£60.00 net

For further details of these titles please write to Lorna Williams at Cambridge University Press, The Edinburgh Building, Shaftesbury Road, Cambridge CB2 2RU

The following titles will be published over the next ten years:

Volume V	CHEMISTRY AND CHEMICAL TECHNOLOGY
Part 6:	<i>Military Technology: Missiles and Sieges</i>
Part 8:	<i>Military Technology: Shock Weapons and Cavalry</i>
Part 9:	<i>Textiles: Spinning and Reeling</i>
Part 10:	<i>Textiles: Weaving and Looms</i>
Part 11:	<i>Non-ferrous metallurgy</i>
Part 12:	<i>Ferrous metallurgy and mining</i>
Part 13:	<i>Ceramic Technology</i>
Part 14:	<i>The Salt Industry, Ink, Lacquer, Pigments, Dyes and Adhesives</i>
Volume VI	BIOLOGY AND BIOLOGICAL TECHNOLOGY
Part 3:	<i>Agro-Industries: animal husbandry, fisheries, agricultural industries and forestry</i>
Part 4:	<i>Horticulture and Botanical Technology</i> (A continuation of the volume on botany already published.)
Part 5:	<i>Zoology</i>
Part 6:	<i>Nutritional Science and Fermentation Technology</i>
Parts 7 to 10:	<i>Institutes of Medicine</i> (Anatomy and Physiology), <i>Medicine, Pharmaceutics</i>
Volume VII	THE SOCIAL BACKGROUND
Part 1:	<i>Introductory Considerations</i>
Part 2:	<i>Economic Contexts</i>
Part 3:	<i>Language, Logic and Science</i>
Part 4:	<i>Political and Ideological Dimensions. General Conclusions</i>

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*.