

NEEDHAM RESEARCH INSTITUTE NEWSLETTER

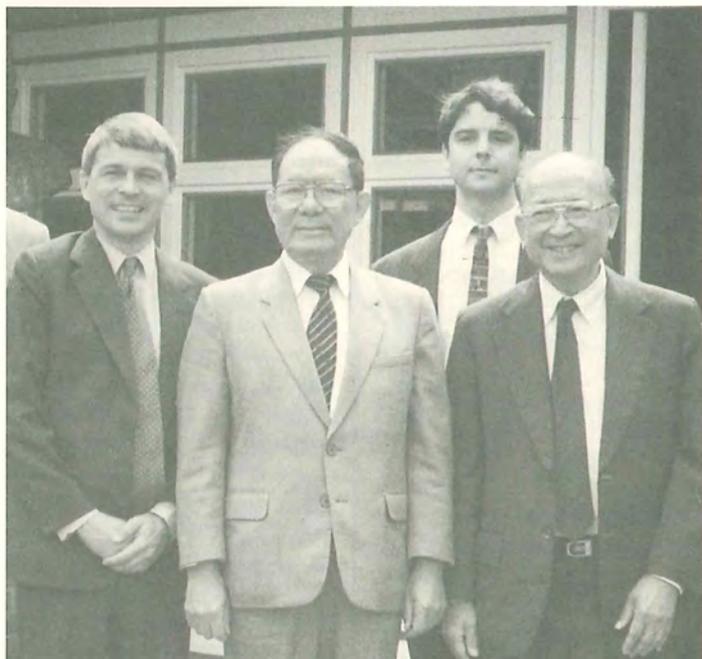
Newsletter No. 17

EAST ASIAN HISTORY OF SCIENCE TRUST

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Visit of Professor Song Jian

Professor Song Jian (centre), Vice-Chairman of the Chinese People's Political Consultative Conference and President of the Chinese Engineering Academy, visited the NRI in May. He is pictured here with our Director Professor Ho Peng-Yoke, Dr. Christopher Cullen, and Librarian John Moffett. Professor Song has recently been appointed Joint Honorary Chairman of the UK-China Forum.

THANKS TO OLD FRIENDS

Professor Sir Geoffrey Lloyd, the Chairman of the East Asian History of Science Trust, recently attended a meeting of the East Asian History of Science Foundation in Hong Kong and was able to express personally the gratitude of the Needham Research Institute for the substantial financial support received. The Institute depends heavily upon support from both the Hong Kong Foundation and its sister Trust, East Asian History of Science Inc. in New York.

Mr. S. T. Lee, FBA

It is with great pleasure that we inform our readers that Mr. S. T. Lee, Honorary Senior Fellow of the NRI, and a great benefactor of the Institute, has been elected as a Fellow of the British Academy.

Inside ...

- Early Taoist Printing by Tim Barrett
- Guo Shirong writes on Alexander Wylie
- Dr. Needham's War-time Diaries
- News from the Library and Archives

SCIENCE AND CIVILISATION IN CHINA

We are pleased to announce that another major volume in the series has now entered production. This is Volume VI:6 on Medicine, which we know has been eagerly awaited. The text of this book was written by Joseph Needham and Lu Gwei-Djen. It has been meticulously edited by Professor Nathan Sivin, who has also contributed an important introduction reviewing the current state of research. This is a monument of scholarship whose appearance in the second half of 1999 will mark a period in the development of the field.

Meanwhile, Volume V:13 on Mining (by Professor Peter Golas) will be formally published in January 1999. The announcement later in this newsletter gives a full description of this important work, which is appropriately enough the first instalment of metallurgical related topics planned for the series.

Volume VI:5, *Fermentations and Food Science* by Dr. H.T. Huang, is now also in press. Because of its rich and often complex illustrative material this volume will probably not be available until the first months of the next millennium. Such is the timescale of SCC!

Christopher Cullen
Chairman, NRI
Publications Board

The Needham Research Institute would like to thank all those who have recently made gifts of money to the Institute. These include Ms. Louise Ansberry, Mr. S. T. Lee, Dr. Raymond Lee, Prof. Paul Chao, and Prof. Peter Golas.



Dr. Lee Quo-Wei

The Chinese Civilisation Educational Trust has been set up in Hong Kong under the leading patronage of The Hon. Lee Quo-Wei, GBM JP, the recently retired chairman of Hang Seng Bank. The Trust is supporting the Dragon's Ascent project, a cooperative multimedia enterprise which aims to raise the world's understanding of Chinese culture and history through a major series of television films and other materials, including a book and CD-ROM. The Needham Research Institute has joined in a partnership with the Institute for the History of Natural Science in Beijing to provide the academic underpinning for this project. A distinguished creative team, led by award-winning director Francis Gérard, has been at work in China since the spring of this year. The project will be ready to make a major impact early in 2000, when the Year of the Dragon begins. We are most grateful to Dr. Lee and his fellow patrons for their generous support for this important work.

THE LIBRARY

This September, the second three-year agreement for book buying in China with the Institute for the History of Natural Science ended, and I am pleased to report that it will be continued for another three years. This has allowed us to keep up with new materials on the history of Chinese science published in China, and to continue to build our collection in certain special areas, such as Chinese archaeology and traditional Chinese medicine. Again, I should like to thank our friends in New York, East Asian History of Science Inc., for their financial support, and Mr. Hu Zesheng at the IHNS in Beijing for his efforts in purchasing materials for us. China is currently witnessing some of the most exciting archaeological developments in the world, and there has been a corresponding boom in monograph and serial publications on the subject from across China. Recent acquisitions here and at the University Library, some of them not easily available elsewhere, have helped to ensure that Cambridge collections have kept fully abreast of these developments, so vital for historians of China's technological culture.

In December 1997 I visited Beijing for two weeks in connection with the Dragon's Ascent Project, taking the opportunity to buy books, and to maintain contacts with scholars in Beijing. In August 1998 I also attended the 8th International Conference on the History of Chinese Science in Berlin. In September this year, the Library hosted the annual meeting of the European Association of Sinological Librarians. This was an excellent opportunity for me to talk with more than 30 colleagues from libraries with Chinese collections across Europe, to see the progress they have made in producing on-line databases of their Chinese collections, and, of course, to show off our own fine building and collection to them.

I realised recently that September was the 6th anniversary of my arrival here at the Institute. They have been six very enjoyable years, but time has flown by, and there is still so much to do!

DONATIONS: As always, we are very grateful indeed to all those foundations and individuals who have so generously made

donations of books to the Library. These include: The Korea Foundation, Int. Research Centre for Japanese Studies, Inst. for Research in Humanities, Kyoto, Mrs. F. H. Billings, Prof. M. Scarpari, Prof. Isaia Iannaccone, Dr. Roel Sterckx, Prof. Peter Lisowski, Prof. Yano Michio, Ms. Tao-Tao Huang, Dr. Vijaya Deshpande, and Dr. Fung Kam-wing.

VISITORS: Dr. Shin Dongwon returned to Korea in the summer, and we are also hosting Mr. Yao Licheng (IHNS, Beijing), who is on a Royal Society Fellowship researching the history of the Cavendish Laboratory. Other scholars who have visited during the year include: Prof. Wang Gungwu, Prof. Ye Zhemin, Dr. Geoffrey Chapman, Prof. Kushida Hisaharu, Dr. Benno van Dalen, Prof. Don Harper, Prof. Hans Ulrich Vogel, Dr. Catherine Jami, Rodo Pfister, Prof. Viviane Alleton, Dr. David Wright, Dr. Andrea Bréard, Prof. Don Wyatt, Prof. Zhao Feng, Prof. Margaret Pearson, Prof. Nakayama Shigeru, Prof. Goto Kunio, Prof. D. Leslie, Prof. Mark Elvin, Prof. Liao Boqin, Dr. Su Rongyu, Prof. Kiyoshi Takada, Dr. Angela Schottenhammer, Dr. Raymond Lee, Dr. Peter Engelfriet, and Dr. Robert Finlay.

LECTURES AND SEMINARS:

Four scholars have given lectures while visiting the Institute this year. Prof. Ye Zhemin (Beijing) on Blue and White ceramics, Prof. Viviane Alleton (EHESS, Paris) on scientific terminology, Prof. Donald Harper (U. of Arizona) on diagrams in early Chinese magico-religious thought, and Prof. Zhao Feng (China National Silk Museum) on the development of the drawloom. The Friday text-reading seminars, expertly organised and chaired by Dr. Elisabeth Hsu, have continued to be well-attended, with speakers from the NRI, Europe, Asia and the U.S., and with subjects ranging from salt wells (Hans Ulrich Vogel – Tübingen University), to self-immolating Buddhists (James Benn – UCLA), and word play in the *Zhuangzi* (Don Wyatt – Middlebury College). We are very grateful to East Asian History of Science Inc. of New York for providing funds to support the visit of scholars to give

presentations, and to all the scholars, both visiting and from Cambridge who have contributed.

John Moffett

DR. NEEDHAM'S WAR-TIME DIARIES

Between 1943 and 1945, while serving as head of the Sino-British Scientific Co-operation Office (SBSCO) in Chongqing, Dr. Needham made four major forays into other parts of China to investigate the conditions under which science was being carried out in outlying areas. During this time he kept – as was his habit – a daily record of where he went, what he did, whom he met, and what he saw. This record takes the form of four handwritten diaries that are currently held in the archives of the NRI.

A few years ago, Tracey Humphries began the project of transcribing these diaries. Now we have rough drafts of all four, awaiting further editorial work in preparation for their possible publication. There is also a fifth diary, the 'special notes' from Dr. Needham's visit to Dunhuang, which so far has resisted transcription as it consists largely of his pencil drawings of the paintings and sculptures he saw at Qianfodong in 1943.

Dr. Needham's titles for the four diaries are as follows: the 'Northwest Tour' (Aug.-Dec. 1943), the 'Southeast Tour' (Apr.-July 1944), the 'Southwest Tour' (Aug.-Oct. 1944), and the 'Last Tour' (Aug.-Nov. 1945).

Apart from including much mundane material, such as what time Dr. Needham got up in the morning, what he ate for breakfast, and the cost of nearly everything from rickshaws to Russian cigarettes, the diaries contain information of significant historical value. We can learn, for example, about the projects on which scientists were working, the nature of their research, and the hardships under which they lived and worked. We can also learn much about the political situation that shaped their experiences and about the infrastructure (or lack of it) that existed in war-time China.

We can read Dr Needham's early musings about the project that would eventually consume the energies of a lifetime, and see the preparations he was making for it even at this early stage: reading, book-buying, lecturing, making contacts, amassing information, and writing. The diaries show the vital interest he had in almost everything about China, from history to modern politics, from art to food, from geology to butterflies.

His inquisitive, questioning mind is in evidence on nearly every page, as is his thirst for knowledge and passion to make sense of and find an explanation for everything. There is a certain impatience that permeates his writings, yet he has the resourcefulness to make the most of even the most tedious moments. One can see his zest not only for intellectual pursuits but also life's joys of many other kinds.

The diaries capture the general mood of the times, especially the difficulties experienced by Chinese scientists living in exile in their own country. They show the resilience, dedication, and unbelievable accomplishments of these professionals in spite of their lack of facilities, basic equipment, and contact with the outside world. They also show Dr. Needham's commitment to help these scientists procure what they needed in order to carry out their research and teaching.

Also included in the diaries are many of his hand-drawn maps of the countryside, sketches of people in local dress, and various unusual sights. There are even diagrams of seating arrangements at dinner parties. He provides schematic outlines and summaries of complex issues and subjects, such as the geological history of a region he was passing through, and the complex political situation in China during the Three Kingdoms period. The latter is followed a few pages later by an outline of the complex politics of China in the 1940s – the various political factions and subfactions, and their leaders. This outline was part of Dr. Needham's efforts to make sense of the bureaucratic



tangles in which he found himself. Other interludes that are also interspersed between day-to-day accounts include lists of equipment he found wanting in China's scientific outposts, and notes (sometimes with drawings) of flora and fauna he observed.

Dr. Needham's lively and idiosyncratic personality pervades the diaries. Sprinkled among dreary accounts of disabled trucks and marooned expeditions, are such gems as an encounter with two Mongolian travellers, one of whom had an inflamed eye that Rewi Alley treated, and an account of performing Morris dancing to save his party from a tribe of horsemen.

Along with the diaries, we also have a collection of the photographs that Dr. Needham took on his journeys through China. This collection complements the diaries very well. For instance, where he mentions taking a photo of a "Tang abbot in his tomb" (9 Oct., 1943), that very photo can be found.

During the course of my work with the collection, some photos that initially appeared uninteresting later turned out to be rather significant. For example, what originally seemed an unidentified river bank turned out to be the Yangtze River landing point for the Chinese Academy of Sciences. A photo that I had first labelled 'Four men, one in a hat' was later found to include Dr. Fu Sse-Nien (in the hat) and Dr. Tao Meng-Ho, then Directors of the Academia Sinica's Institutes of History and Sociology respectively. This was a truly humbling experience!

The combination of photographs and diaries in this collection provides a remarkably complete and vivid record of Dr. Needham's activities in war-time China. Links can also be made to the biographical card-file he kept during this period, which is also part of our archives. We thus have a vivid picture of war-time China and the conditions under which scientists and educators lived and worked during the era of China's administrative and cultural displacement to Chongqing.

Sally K. Church

Below are some excerpts from the diaries. Most are from the "Northwest Tour" in 1943, but some are taken from other diaries. We quote them here to show the richness and variety of materials they contain.



Dr. Needham in Chinese uniform, 1945-1946.

There are many accounts of trucks breaking down; we offer just one as an example. This was the breakdown that marooned Dr. Needham and his party at Dunhuang for 26 days:

1ST OCT. 1943. For the first couple of km the truck went quite well over the sandy riverbed track, but then a bad noise developed and it turned out that the brass pipe conveying oil to the valve rocker shaft had broken. This was repaired, but something was still badly wrong with no. 3 cylinder. There we were in the desert all day. Soon it transpired that the MAIN BEARINGS – GONE from 1, 2, 3, and 4 cylinders!!! (At the furthest point of the whole journey!)

Apart from studying the caves at Dunhuang, which he did each day,



The British Council Cultural Scientific Office truck, on its way from Kunming to Anshun, Guizhou, swerved to avoid another vehicle and slid over a bank. ("Calamity Day", 9 Sept. 1944).

there was little else to do during this time. The following two accounts show how Dr. Needham kept himself occupied and vented his frustrations:

12TH OCT. (First day of repairs at oilfield.) Sunny again. Got down to the Nature article on the Northwest. Did it by teatime. Afterwards walk with RA (Rewi Alley) among the stupa tombs.

21ST OCT. Windy with poor sun. Sat most of the day by a log fire in the Lama's kitchen, while the boys' had a bath, and basked by it, writing to Dophi and reading Lattimore. In the evening to the caves with RA. Found a lovely wooden head of a flute player, presumably once part of a balcony. The Mongols back again, to fetch eye medicine for their mother, and stayed to supper. Songs and dances afterwards. The eldest one's name [was] Lobsun-Jaartsan. [He] could write Tibetan, that being now the written language of all the Kokonor Banner. The boys slept on the kang.

23RD OCT. RA typed; I finished Lattimore's book. Both days fine. At a quarter to 4:00, when I was teaching the boys Fieldtown jigs, KW (the driver, Kwang Wei) turned up on horseback from Tunhuang. The engine in the city, and coming. Great jubilation, nice evening. But money running very low.

24TH OCT. Mem: Song and Dance to be made. Advisers sent me off quite insufficiently prepared. Should have had desert equipment, much more canned stuff, more spare parts, a servant to cook, a mechanic, and a gun (a revolver [for] wolves, and sporting gun [for] partridges, ovispoli argali), and someone familiar with Kansu dialect. [Also,] boards, lamp and camping equipment.

(Here follows a long list of items he wished he'd had, including many lorry parts.)

At the Dunhuang guest house Dr. Needham made the following entries:

29TH OCT. Telegraph office interesting – radio transmitter, intelligent chaps; all Central Asia now linked by radio [Mem. mention in Nature Article]. Looked round city, drum tower, etc....

At 1:00 horses were brought and we all went for a beautiful ride through the oasis – autumn colours in the bright sunshine – to Yue Ya Chuan, the famous Crescent Moon Lake, and Singing Sands. It is just where the dessicating oasis verges on the huge sandhills, which for centuries have surrounded the lake without filling it. Temple, Lamaist-Taoist, like Chien-fotung, but very nice. Water crystal-clear, said to be a special fish in it....

The Hasars [are] a tribe allied to the cossacks which were turned out of Sinkiang in the civil wars. Said to be 800 rifles of them within one day's ride of Chienfotung. But the magistrate said to be paying them danegeld....

30TH OCT. Mem: tell Fu Sse-Nien² that Chienfotung ought to [be] better looked after now that the road passes so close. Also, the plaster fallen off [in] bits ought to be collected and saved.

1ST NOV. 1943. At 11 pm when Wu [Tso-Rjeng]³ and I were sleeping, RA and the others burst in, KW having removed the broken piston and come in to town, travelling 60 km at 40 mph on five cylinders! (They'd cooked on a fire, eaten Soviet fish, p'd in the radiator because no water, [and heard] frightful wolf howling.)

4TH NOV. (At Suzhou, Gansu) Photographed paper pulp making. Visited Ho Hsi Middle School, supported by British Indemnity money. Met Dean Ho Ling-Teh, previously met at Lanchow, and an English master Kao Ho. Science teaching very poor – no visible apparatus.

6TH NOV. Then in the night, I on my camp-bed, and the others all on the k'ang, it went and caught fire, burning the mats, filling the room with smoke, and destroying Lao Wang's clothes, seal of wood, etc. Refitted him in the morning with other people's spares.

9TH NOV. Got some news bulletins ..., but not enough occupation for the mind. Last night the chiming clock next door resembled the one in the hall at home when I was a boy, hence [an] elaborate remembrance of my father's library and all that



Dr. Needham and Wu Zuoren at left, with Sun Kuang-Chiun and Wang Wan-Sheng (students of Rewi Alley at the Baillie School) at right. (1943).

was in it. At other times I visit Owlstone Road in the spirit, examining everything....

His busy schedule is clear from these entries made in Lanzhou:

17TH NOV. At 4:00 to the Provincial Government where lectured on Science and Civilisation to 200 officials. Gov. Ku himself was present. Very cold, and the handze [metal bowls filled with boiling water] didn't warm the hall!

18TH NOV. Lunch at the Rotary Club, and spoke on Scientific and Technological Cooperation in relation to the Northwest.

19TH NOV. By car to the Northwest Epidemic Prevention Bureau, and lectured to a big, interested audience on organisers. Lunch with Yang Yung-nien and pretty Japanese wife, Li Wen-ming and Charlie Chang. Asked to do another [lecture] tomorrow. A hot bath in the [op] theatre (!) at the Hoyts⁴.

20TH NOV. Then with Chang Cha-li to the Hsi-Bei Fang I Chu (Northwest Epidemic Prevention Bureau), where I lectured the second time. Then took the British Consul Bryan out to lunch. Then to the CIC (China Industrial Cooperatives) Federation and gave another lecture. Dinner with Chang Kuan-lien and his family, HT (Huang Hsing-Tsung, HY (Liao Hung-Ying), Bryan and Rice.⁵

22ND NOV. Notes on Granet. After lunch called on Lo Djia-Lun at the Lichihshi (expedition back from Chinghai), but talked only with Wu Wen-Tsao spkplug anthropologist and sociologist; Ting Hsiao, an CYYDJY [Chung-yang yen-chiu yuan, Academia Sinica] geologist; and Yao Hsün-Yuen, a public health specialist. Had previously seen Ku Chien-Chi, animal husbandry. All want me to go [to] Sinkiang by air next year. All speak very well of Sheng Shih-Tsai.

23RD NOV. Finished notes on Granet. Truck still not ready. In aft. to Hsi-Bei Fang I Chu for 3rd lecture, then dined with Yang Yung-Nien & med. men.

24TH NOV. To Shihliedien ... with HT; out by rickshaw back by raft down the rapids...

27TH NOV. Dr. Hoyt reported that at his meeting with Yang Yung-nien, at which he enquired re Govt. policy re Mission Hospitals, Yang said certainly stay and keep going, as after the war civil strife anticipated and the Govt Service might fail to function temporarily.

3RD DEC. Proofs of HOOS (History is on Our Side). Lunch with HT and Frank Liu, the Veterinary Vaccine man. The oil gotten ... Sent a telegram ... re the World Sci Coop Serv. in the UNR&RB (United Nations Refugee & Relief Board). Saw Veterinary Vaccine Institute.

The war in Europe was never very far out of mind:

5TH DEC. At 4:30 am, a nasty dream - Dophi⁶ sleeping alone at Clements End. [She] said afterwards: a new rocket-bomb had hit the air-raid shelter, she fortunately not being in it. But whole house rocked - frightened.

7TH JUNE 1944, Hengyang, Hunan. News of the second front, invasion on five points of the coast of northern France in the Chinese papers - but WD (William

Dickie) says couldn't confirm - on European radio last night. (Slightly later:) Second Front confirmed

Dr. Dorothy Needham also kept a full professional schedule when she accompanied her husband on his tours. The following entry describes a visit to the Army Medical College in Anhsun, Shapingba (emphasis his):

13 AUG. 1944. I to main college at 9 am, where gave speech to parade ground of medical students. Hospital Chief Col. Chen translating, mamahuhu. Played on and off the stand by brass band (!). From 10:30 to 12:30 visiting Nutrition Institute of Wan Hsing with Dophi. Lunch at Gen. Li's and his nice obstetrical wife. After, Dophi rested, and I to visit Li's Vaccine Institute (very good) and Chang's (another) Pharm. Institute (not so hot, mainly production). At 4:30 Dophi lectured on 'Biochemistry of Muscle'. Tea on Nutrition Institute lawn under peach trees. Dinner very formal in Nutrition Institute with brass band playing outside and speeches inside. Got a cold.

The following is an early reference to the preparations Dr. Needham was already making for his magnum opus:

25TH OCT. 1944. First day of Science Society of China (Meitan branch). Meetings. Dophi stayed at home. LP (Lawrence Picken) and JN attended (corrected English of papers), made short speeches on International Scientific Cooperation Service. Lunch at home. In afternoon JN worked at home, prepared schedule and layout of S&CiC (Science and Civilisation in China) book. Dophi lectured at meetings on Machinery of



Chengdu boiler makers with cupola furnace behind, Sichuan Engineering Works (Central Machine Works, MRC).



The entry for 9th Oct., 1943, has: "...Caves with RA 11:00-2:30, Irish Stew for lunch, went over around 4:30 to photograph Tang abbot in his tomb across river, walk on desert, supper with Lo's". Dr. Needham's caption for this photo is: "The Tang Abbot".

Muscle. Dinner at Wen miao. Combination room meeting afterwards. Decided to stay another day.

The following entries were written at Mienyang, Sichuan.

6TH. SEPT. 1945. Over to the school bearing gift of BC (British Council) pub. books, but no one there so left them. Started writing my Report to the Gissimo. Out to lunch at the bus station, had fish...

7TH. SEPT. 1945. N.B. the low whistling noises constantly present, caused by the pigeons to whose tails whistles have been attached for fun. In Peiping each family used to have their own sort.

¹ "The boys" were two students from the Baillie school where Rewi Alley taught.

² Historian and philologist of Academia Sinica, and later President of Taiwan University.

³ Wu Zuoren, artist and professor of oil painting at Zhongyang daxue.

⁴ Dr. S. Hoyt of the China Inland Mission was in charge of the hospital and leper colony at Lanzhou.

⁵ E. E. Rice, US Consul.

⁶ Dr. Needham's nickname for his wife Dorothy.

The Lo's in the caption on this page are the family of Lo Chi-mei, head of the photo department, Central Press Agency.

EVIDENCE FOR 7th CENTURY TAOIST PRINTING

In a recent research note which carries forward the exploitation of Taoist materials for the study of the origins of printing, I have shown firm evidence for the printing of images on paper by Taoists before the end of the seventh century AD.¹ The source concerned does not, however, mention the printing of text. But in another paper to be published shortly I note a different Taoist author of the seventh century who speaks (albeit metaphorically) of using written textual talismans (Chinese *fu*) as matrices from which to print copies.² Presumably what this author has in mind are talismans inscribed on wood printing onto paper, but this is not explicitly made clear, and the research of the late Michel Strickmann on what he terms 'insigillation' or the use of seals printed directly onto human bodies as a therapeutic technique – plus the earlier use of magic seals on mud – means that in isolation this source might be understood in a number of ways.³

But in a third text to which I drew attention several years ago, which dates for its part to the early tenth century, we find reference to textual talismans of the type known as 'registers' being "manufactured on paper" for distribution, to quote my deliberate translation, since any word for printing is not explicitly used.⁴ When read in conjunction with my second text, however, the likelihood of this referring to *printing onto paper for distribution* seems very much higher. The only problem concerns establishing the date attributed to this innovation, since it is ascribed to the time of the thirteenth in the line of so-called 'Taoist Popes', stretching back to the middle of the second century AD.

To judge from later hagiography concerning the 'Taoist Popes', the thirteenth in the line must have lived at the latest circa 700 AD, since number fifteen is assigned to the middle of the eighth century.⁵ My own research on these 'Popes' suggests that slight adjustments may have been made over time to produce a standardised chronology, but at any rate our source for these talismans distributed on paper, backed up by epigraphic evidence, would place number nineteen in 868 and number twenty-one in the early to mid-tenth century. To fill in the space between this period and the start of the line might on some reckonings put number thirteen even a bit further back than the seventh century, but on the reasonable assumption that our early tenth century text, where it mentions specific details, contains genuine historical recollections of actual individuals whose lives were spaced across real human generations, a rough calculation puts us once more in the late seventh century.

Taken together, then, the evidence suggests that Taoists were printing text at least for

talismanic use at about the same period that they were certainly printing images. These documents may not have been intended to be read – any more than the Buddhist spells which form our earliest surviving printed materials in East Asia – but they were designed, it would seem, for distribution, and so in my view come under a reasonable definition of printed text. The impact that Taoist practice seems to have had on Buddhist understandings of printing I have started to explore in a further paper.⁶ Now that the chronology of the adoption of printing in religious circles is somewhat clearer, it is possible to discern much more of the complex religious and ideological background that prompted this momentous technological change. I hope to be able to secure funding to study this in depth at book length as soon as possible.

T. H. Barrett

¹ "The *Feng-tao k'o* and printing on paper in seventh-century China", *Bulletin of the School of Oriental and African Studies* 60.3 (1997), pp. 538-549.

² "Images of Printing in Seventh Century Chinese Religious Literature", in *Chinese Science* 15 (1998), pp. 81-93. The relevant reference is in n.29 of this piece.

³ "The seal of the law: a ritual implement and the origins of printing", *Asia Major*, Third series, 6.2 (1998), pp. 1-83.

⁴ "The Emergence of the Taoist Papacy in the T'ang Dynasty", *Asia Major*, Third series, 7.1 (1994), pp. 89-106: see pp. 98-99. The source in question is the topic of an earlier study by F. Verellen, "Evidential Miracles in Support of Taoism": the inversion of a Buddhist apologetic tradition in late Tang China", *T'oung Pao* 78.4, 5 (1992), pp. 217-263.

⁵ Russell Kirkland, 'Chang Kao: Noteworthy T'ang Taoist?' *T'ang Studies* 2 (1984), pp. 31-35.

⁶ "Did I-ching go to India?," forthcoming in *Buddhist Studies Review* 15.2 (1998).

The "Joseph Needham Home Page" (www.soas.ac.uk/Needham/) has links to:

- Joseph Needham, 1900-1995 (a biographical sketch)
- The Needham Research Institute
- The Science and Civilisation Project
- Needham Research Institute Newsletter
- East Asian History of Science Library

A few copies of *Lu Gwei-Djen: A Commemoration* (Durham: Pentland, 1993) are still for sale from the NRI at £5.50 including postage & packing.

ALEXANDER WYLIE'S INTRODUCTION OF CHINESE SCIENCE TO EUROPE

I am grateful for the opportunity to write about Alexander Wylie's contribution to the transmission of science for the Newsletter. I am deeply indebted to the Li Foundation in New York, and to the NRI, for their kind support for my research work on this subject. When I applied for the Li Foundation fellowship one and a half years ago, I decided to study the history of the Anglo-Chinese transmission of science and to make use of the libraries in the U.K. for this purpose. I arrived at the NRI last November, and began my term as a one-year Li Foundation fellow. Thanks to the rich collection of books and journals both in the NRI's East Asian History of Science Library and in the Cambridge University Library, and to the kind people who have so generously offered their help, I have made substantial progress in my research.

The life of Alexander Wylie (1815-1887) was closely intertwined with China. From early on he seems to have cherished the hope of going to China, and began to teach himself Chinese. In 1846 he was engaged by The London Missionary Society. He was sent to Shanghai the following year. From then on, he spent nearly thirty years in China, returning to Britain once from 1860 to 1863, and again in 1877 because of an eye illness. He was superintendent of the London Missionary Society's printing establishment in Shanghai from 1847 to 1860, and took charge of the British and Foreign Bible Society at Shanghai from 1863 to 1877. Wylie had married Miss Mary Hanson in Shanghai in 1848, but unfortunately she passed away in China the following year.

One of his most significant accomplishments was his contribution to the study of Chinese culture and civilisation, and to the transmission of scientific knowledge between China and the Western world. From his arrival in China in 1847, Wylie

spent many hours in the study not only of Chinese, but also of the Manchu and Mongolian languages. He also read voluminously in the history, geography, religion, philosophy, arts and sciences of East Asia. His contemporaries all deemed his acquaintance with Chinese literature wider than that of any other scholar. He published several books as well as many papers and articles in journals, periodicals and newspapers on such diverse fields as literature, religion, history, philology, mathematics and science. His research was valued highly by sinologists both during his lifetime and after his death. His Chinese translations of Western texts concerning mathematics, astronomy, botany, physics and the steam-engine are all classics among translations of Western scientific materials into Chinese done in the 19th century.

Wylie's achievements have not received the attention they deserve. Although his works are referred to again and again, very little research has been carried out on his contribution to the exchange of knowledge between East and West. Relatively speaking, another British national, John Fryer (1839-1928), who also played a leading role in the introduction of Western scientific knowledge to China, has received more attention. There is thus an obvious need to correct this imbalance. This was the reason why I chose Wylie as my research subject one and half years ago. The following is a summary of one of the papers I have written recently on the subject, which I presented at the 8th International Conference on the History of Science in China, held in Berlin in August 1998.

With the help of Chinese mathematician Li Shanlan (1811-1882), Wylie studied traditional Chinese mathematics extensively, concentrating especially on China's mathematical knowledge in the Song and Yuan periods. In his famous paper on Chinese mathematics, entitled "Jottings on the Science of Chinese Arithmetic" (1852), he outlined the history of Chinese mathematics for the first time either in China or in the Western world. This paper was welcomed by Western scholars and became popular in his time. It was

therefore reprinted several times, and translated into German and French.

Wylie's introduction to Chinese astronomy concerned astronomical instruments and records, and the names of fixed stars. Three of his papers in particular, "Eclipses Recorded in Chinese Works" (1867), "List of the Fixed Stars" (1874), and "The Mongol Astronomical Instruments at Peking" (1876), are all well known. He was interested in other scientific subjects as well, and published papers to introduce the Chinese discoveries of asbestos and the magnetic needle, among others. He translated into English some parts of the *Dilizhi* (geographical treatises) of the *Qian Han Shu* and the *Hou Han Shu*.

Many Chinese works in the fields of agriculture, medicine, astronomy, mathematics, botany, zoology, mineralogy, geography and topography, and so on, are introduced in Wylie's famous book *Notes on Chinese Literature* published in 1867. He also communicated some of this knowledge to others via his correspondence. To any request for help in the study of Chinese civilisation and science, Wylie willingly lent a hand. Among others, James Legge, E. Tennent, H. Yule, H. Cordier, and H. Howorth all acknowledged his help in their important works.

Wylie not only played an important role in bringing a knowledge of Chinese science to the attention of Western audiences but also contributed to the study of Western science in China. Since the 1850s he has been well-known in China for his translations and writings on Western mathematics and science. For instance, with Li Shanlan he translated the following important Western works into Chinese: Loomis's *Elements of Analytical Geometry and Differential and Integral Calculus*, De Morgan's *Elements of Algebra*, Herschell's *Outlines of Astronomy*, and the last nine chapters of Euclid's *Elements*.

In European countries Wylie has been regarded as an accomplished sinologist who introduced Chinese literature, mathematical and scientific knowledge to the West. His achievements, especially in the study of the history of mathematics

and science in China, have been highly influential, and for a long time after his works first appeared, almost every study of the history of mathematics and science written in a European language and concerning China referred to him as an authority. Dr. Joseph Needham referred to Wylie's works again and again in his massive work *Science and Civilisation in China*.

Wylie's studies convinced him that China had developed both science and civilisation in ancient times. He had an ineradicable conviction that in the depths of Chinese recorded history a mass of important facts are hidden. Thus he devoted himself to the study of historical texts, among his other studies. However, this kind of research was difficult in his day. The largest obstacle was the general suspicion of Chinese civilisation in the West. Even though some scholars made great progress in uncovering China's knowledge of science, many people still thought that "the Chinese possess no real science of their own", and the results obtained by researchers were often disbelieved or questioned. Wylie himself encountered this problem.

What is significant is that in spite of the underdeveloped nature of this field, he still endeavoured to convey information about Chinese science to Europeans. When many Westerners thought that the astronomical instruments in Beijing were all made by missionaries, he revealed that some were made by the Chinese scientist Guo Shoujing at a much earlier time. When many thought it was wrong to consider "the suggestion of any degree of eminence in abstract science" in China, he wrote his "Jottings" on mathematics to show "that a little investigation might establish juster views" and stated his intention "to draw attention to the state of arithmetical science in China". In Joseph Edkins' words, "Wylie showed that they (the Chinese) possess the necessary power to become senior wranglers in a competition for the highest mathematical prizes with the gifted youth of Europe".

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Science and Civilisation in China

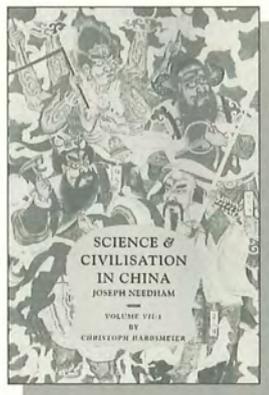
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