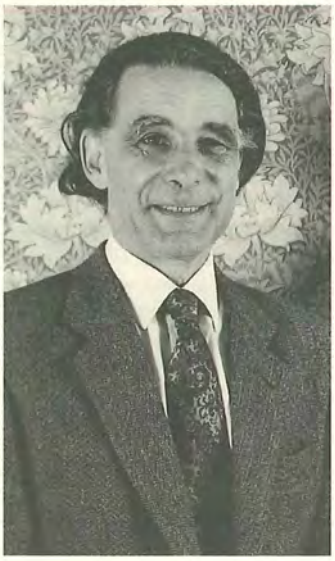
NEEDHAM RESEARCH INSTITUTE NEWSLETTER

Newsletter No. 16 — EAST ASIAN HISTORY OF SCIENCE TRUST — February 1998



Professor Sir Geoffrey Lloyd, Chairman of the East Asian History of Science Trust, was awarded a Knighthood in the Queen's Birthday Honours List of June 1997 for services to the History of Thought.

Inside...

MR. T. Y. LEE

Friends of the NRI will hear with regret that Mr. T. Y. Lee passed away recently in Vancouver. He was one of the inspirations behind the formation of the East Asian History of Science Foundation in Hong Kong, of which Dr. Philip W. C. Mao was chairman until he was recently succeeded by Mr. David Li. Mr. Lee served on the editorial board of the *Ta Kung Pao* in Hong Kong and was Editor-in-Chief of *Eastern Horizon*.

SCIENCE AND CIVILISATION IN CHINA

We are delighted to announce the appearance of the latest publication in the series – volume 7 part 1 "Language and Logic in Traditional China" by Professor Christoph Harbsmeier. This is undoubtedly a major event for sinological scholarship. In the words of the author's prefatory note "There is only one culture in the world which has developed systematic logical definitions and reflections on its own and on the basis of a non-Indo-European language. This is Chinese culture. The history of logical reflection in China is therefore of extraordinary interest for any global history of logic and hence for any global history of the foundations of science". Those who know the author will not be surprised to find that he treats his subject with much wit as well as with great learning. Further details of the book are given elsewhere in this newsletter. We hope readers will be pleased to see that Chinese characters appear in the running text of this book, rather than in separate footnotes as heretofore. Two further parts of the series are presently in press. Volume V.13: "Mining" by Professor Peter Golas will appear later this year. Following it after not too long an interval will be Volume VI.5: "Nutritional Science & Fermentation" by Dr. H.T. Huang. Several more manuscripts are nearing completion, and we hope to see an average of one part of *SCC* being published annually over the next few years.

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, Prof. Paul Chao, Dr. Alice Kehoe, and Prof. Peter Golas.

Mr. S. T. Lee, Honorary Senior Fellow of the NRI, is pictured here during a visit in September 1996. Mr. Lee has been a generous benefactor of the Institute for many years.

SSTC AWARD

In September 1997, Professor Ho Peng-Yoke, Director of the NRI, was pleased to accept, on behalf of Dr. Needham, the prestigious International Scientific and Technological Cooperation Prize, awarded to Dr. Needham in 1995 by the State Science and Technology Commission of the People's Republic of China. This prize is awarded to foreign scientists or organisations that have made important contributions to China's scientific and technological progress.

You are invited to visit the "Joseph Needham Home Page" at www.soas.ac.uk/Needham/ with 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

THE LIBRARY

The past year has seen the Library continue to grow. Thanks to continued and generous support from our sister trust in New York, East Asian History of Science Inc., we have been able to keep up the acquisition of new materials from China, and also of western publications. Our book-buying agreement with the Institute for the History of Natural Sciences (IHNS) in Beijing enables us to keep up with relevant materials published in China, and to acquire many items otherwise difficult to obtain. Our thanks go especially to Mr. Hu Zesheng for all his hard work and bicycling on our behalf in Beijing. We have turned our attention recently to collecting materials on archaeology from China, especially at the provincial level. Through the IHNS, and by writing letters from here to provincial institutes, we have been able to collect some runs of journals and other materials not commonly found in other libraries. We are very grateful to Mr. Mei Jianjun for his help in acquiring related journals on his field trip to China last summer. We are also grateful to Mrs. Gao Chuan, the Assistant Librarian, for her help in acquiring books during a visit home to Hangzhou in Summer 1997.

I have been lucky enough to have taken three trips abroad on behalf of the Library. In August and September 1996, I took a three-week trip to Korea and Japan. In Korea I attended the 8th International Conference on the History of Science in East Asia held in Seoul, and was able to confirm the arrangement by which the Library receives an annual donation of books from the Daewoo Foundation, via the Korean Society for the History of Science. In Japan I was able to visit several libraries and research institutions in Kyoto and Tokyo.

As part of an exchange with the Centre National de la Recherche Scientifique (CNRS) funded by the British Academy, I visited Paris for six days in January 1997. I met with scholars working on the history of Chinese science from the CNRS and elsewhere, giving a brief talk on the current situation of our Library at one of their seminars. I also visited the Bibliotheque Nationale, the Library of the Collège de France, and elsewhere.

In March, I visited the United States for two weeks. I attended the Assocation for Asian Studies annual conference in Chicago, and then went on to visit Professor Sivin at Philadelphia, and the Chinese collections at libraries at Princeton (Gest) and Harvard (Harvard-Yenching).

All three visits were extremely useful for establishing contacts with scholars working in our field, and for assessing libraries with large sinological collections, as well as for making acquisitions for the library. I should like to thank all those who made my visits so fruitful and enjoyable, though space does not allow me to name them individually here. I should especially like to thank the British Council and Prof. Song Sang-yong in Korea, Dr. Togo Tsukahara, Prof. Nakayama Shigeru, and all those scholars in Japan who contributed so generously to support my visit there, to Dr. Catherine Jami and Hubert Delahaye in Paris, and to Prof. Edward Shaughnessy and Elena Valussi in Chicago.

DONATIONS: Once again, the Library is very grateful to all those who have made donations of books and offprints to the Library. These include, The Korea Foundation, Mr. S. T. Lee, Dr. Tsuchiya Masaaki, Mrs. J. Stewart, Prof. R. Ptak, Prof. Shiba Yoshinobu, The Xu Xiake Association, China, Prof. M. Ceresa, Alison Harris, Dr. Philip Mao, Prof. Sir G. Lloyd, Dr. F. Pregadio, Prof. Osawa Masaaki, Prof. A. Mackay, Prof. Yamada Keiji, Prof. R. Cohen, Prof. Fan Dainian, Dr. G. Métailié, Zhang Jiayan, Prof. Y. C. Kong, Prof. Tasaki Tetsuro, Dr. G. Gild-Bohne, Prof. C. Daniels, Dr. E. Hsu, Dr. Fan Ka-wai, The Asiatic Society, Calcutta, Dr. U. Engelhardt, Dr. M. Esposito, Dr. D. Wagner, Dr. S. Alkin, Dr. B. Andrews, Dr. A. Cunningham, Dr. B. Führer, Tao-Tao Huang, Prof. J.T. Ramsey, Dr. J. Muir, Prof. E. Shaughnessy, Dr. C. Jami, Li Jianmin, Dr. M. Pearson, Prof. F. Bray, Dr. Alain Arrault, Prof. A. Cadonna, Prof. R. Yates, Prof. W. Jenner, Dr. Han Jianping, Prof. Ye Zhemin, Mu Xiangtong, Quanzhou Maritime Museum, Prof. J-C. Martzloff.

VISITORS: The Institute has been pleased to receive visits from Lady Pamela Youde; Mr. William M. W. Mong, Chairman, Shun Hing Group (Hong Kong); Mr. Jin Yong; Fan Mingyi, newly appointed Counsellor of the Science and Technology Commission of the PRC; Sun Wanhu, Deputy Director-General of the Department of International Cooperation, State Science and Technology Commission; Prof. Mu Xi'nan, Director of the Nanjing Research Institute of Geology and Palaeontology; Prof. Ren Shi'nan, Director of the Institute of Archaeology, Chinese Academy of Social Sciences; Prof. Li Boqian, Chairman, Department of Archaeology, Beijing University; and Prof. Shirahata Yozaburo, International Research Center for Japanese Studies (Kyoto).

The following scholars have visited for research purposes: Prof. Nakayama Shigeru (Tokyo), Prof. Goto Kunio (Kansai), Prof. Takada Kiyoshi (Sendai), Dr. Yang Tsui-hua (Academia Sinica, Taiwan), Prof. Shiba Yoshinobu (Tokyo), Prof. Nathan Sivin (Univ. of Pennsylvania), Prof. Peter Golas (Univ. of Colorado), Prof. Hashimoto Keizo (Kansai), Dr. Lisa Raphals (Bard College), Dr. Morris Low (A.N.U.), Prof. E. Shaughnessy (Chicago), Dr. Ng Ganche (La Trobe, Aust.), Dr. Fabrizio Pregadio (Venice), Dr. Tsukaharu Togo (Tokai), Dr. Catherine Jami (CNRS), Dr. G. Blue (Victoria), Prof. Hou Jianxin, (Tianjin Normal University), Dr. Colette Diény (CNRS), Dr. Mieko Macé (CNRS), Prof. Osawa Masaaki (Tokyo), Prof. Li Bozhong (CASS, Beijing), Dr. Ch'en Kuo-tung (Academia Sinica, Taiwan), Dr. Zhang Baichun (China), Dr. Karine Chemla (Paris), Dr. Fan Ka-wai (Chinese U. of HK), Prof. Francesca Bray (UCSB), Prof. W. Jenner (A.N.U.), Dr. A. Arrault (Liège), Prof. J-C. Martzloff (CNRS), Dr. A. Bréard (Paris), and others.

SCHOLARS AT THE INSTITUTE: Since the publication of Newsletter No. 15, two collaborators, Professor Robin Yates, working on military technology, and Dr. Donald Wagner, working on ferrous metallurgy, have left the Institute after stays of six months and three years respectively. We have seen two Li Foundation scholars, Mr. Hu Weijia and Dr. Wang Qianjin, both from the Institute for the History of Natural Sciences, return to Beijing, and T. J. Hinrichs has also returned to Harvard, all completing one year scholarships here. We were also joined in 1997 by Dr. Sato Ken'ichi from Tokyo University on a six month Daiwa Anglo-Japanese Fellowship. More recently, the new Li Foundation scholar, Mr. Guo Shirong, from Inner Mongolia Normal University, has arrived. Mr. Guo is researching the influence of Western mathematics on China. We have also been joined for a year by Dr. Shin Dongwon from Seoul National University, who researches the introduction of Western medicine into Korea and its impact.

We were also very happy to provide a room for Dr. M. Loewe and Prof. E. Shaughnessy while they were completing the editing of the *Cambridge History of China* "Early China" volume.

John Moffett
Librarian

THE NEEDHAM ARCHIVES

Dr. Sally K. Church joined our staff part-time in August 1996 to work on the Needham archives housed here at the Institute. She holds a Ph.D. from Harvard in East Asian Languages and Civilisations. She has finished a draft transcription of Dr. Needham's wartime diaries, begun by our former assistant Tracey Humphries, and has taken on the task of attempting to identify over 1000 photographs in our collection from the same period. In addition she has organised the archives of Dr. Needham's journal articles and other published papers, and is working on a comprehensive bibliography of these. Since March 1997 she has been providing editorial and bibliographical assistance to some of the *SCC* authors. She plans to report on her archival work in detail in a future issue of the Newsletter.

NRI TEXT READING SEMINARS

The text reading seminars on Friday afternoons have now become well-established. With the departure of Dr. Donald Wagner, T. J. Hinrichs organised the seminars until December 1996. We are very grateful to both of them for all their efforts in making these seminars such a success. Researchers from further afield are now regularly invited, and the scope of topics and texts discussed has broadened, ranging from stele inscriptions to detailed instructions on meditation practices, from Han legal documents to Qing poetry, and from military to religious texts. The speakers included Christine Bodenschatz, David Wright, Mark Lewis, Jennifer Liu, Christopher Cullen, Hu Weijia, Angela Leung, Michael Loewe, Marnix Wells, Robin Yates, Sally Church, Fabrizio Pregadio, Roel Sterckx, Grace Fong, Elisabeth Hsu, John Moffett, Vivienne Lo, Ken Brashier, David Lattimer, Frank Dikötter, Fan Ka-wei, Francesca Bray, Vijaya Deshpande, Donald Harper, Ho Peng-Yoke, Tim Barrett, and Bill Jenner. Among the most entertaining texts belonged Li Yu's (late Ming)

account of windows and Ji Xian's (early Qing) "heart transplant", and among the most difficult ones were the *Huangdi yinfujing* (from the *Daozang*) on *dunjia* calculations and the recently unearthed "rhapsody on the spirit crow" (Eastern Han). Unusual was the understanding of *xiantian* ("genetic" constitution) in a communiqué on PRC eugenics, and illuminating the suggestion to translate *ni* as "molten metal" in a text passage that concerned the technology of making imprints in a 5th century Buddhist treatise.

Visitors to the Institute are encouraged to give a text reading seminar. Please contact John Moffett, jm10019@cam.ac.uk, or myself, elh25@cam.ac.uk, in advance so that we can make the necessary preparations.

Elisabeth Hsu

THE DEVELOPMENT OF SOME EARLY CHINESE WEAPONS

With generous assistance from the Chiang Ching-Kuo Foundation for International Scholarly Exchange and Canada's Social Sciences and Humanities Research Council, I am engaged in research for a book which will be the third of the military science and technology section of *Science and Civilisation in China*. This book will include many aspects of the fascinating and understudied topic of warfare in the Chinese culture sphere, including the history of the use of shock weapons, chariots, cavalry and infantry tactics, systems of communications, armour, camps and formations, military medicine, and law and organisation. In addition, I will be proposing some more general conclusions about the role of warfare in the development of Chinese society and civilisation, and its relation to religious beliefs and practices, and will consider some comparisons between the Chinese and the Western experience of the cycles of peace and war. Here I will give a brief review of hand weapons in early China and consider some of their uses in ritual and social contexts.

According to literary sources, there were five different types of weapon in ancient China, varying as to whether they were for use on the chariot or were to be wielded by infantrymen, although different texts list different weapons. One of these weapons was the axe, which was often decorated in the Shang with a grinning demon mask. However, axes were more commonly used for ritual executions than in actual warfare. In later Chou times and in the Han, they were given to generals by the ruler in a rite conducted in his ancestral temple to symbolise the general's authority to execute rebels who rejected the ruler's commands. Once the ruler had given the general the axe, he could not countermand orders issued by the latter in the field: he could only reassert his authority when the general gave up the axe.

Archaeologists have demonstrated that by far the most common weapon in the early and middle bronze age was the dagger-axe (ko), and huge numbers of these have been retrieved. Emura Haruki has shown that there were basically three different regions where the shapes of these weapons varied: the north-central plains, the southwest, where the culture of the Pa and Shu peoples was dominant; and the south and southeastern region. But it is not clear as yet whether the different shapes indicate that the warriors in the different regions used the weapons in different ways. A number of types of dagger-axes unrecorded in the traditional literature have been discovered, including triple-headed dagger-axes from the tomb of Marquis I of Tseng (buried ca. -433). His inner coffin was decorated in red and black lacquer depicting demons holding such weapons on guard at the symbolic entrance. Quite possibly, the weapons were deposited in the tomb for the use of these spirit protectors.

Towards the middle and end of the Warring States period, dagger-axes were replaced by halberds (chi) which are basically dagger-axes with the addition of a spear at the top of the shaft, a change which probably reflected new tactics in warfare. Armies, composed mainly of infantry, grew much larger in size and were directed on the field of battle by professional soldiers, who controlled them by means of different types of specialised formations. Gone were the days in which individual aristocrats showed their mastery of ritual behaviour by driving chariots and wielding their own personal dagger-axes.

Others of the five weapons were not nearly as common as the dagger-axe and the halberd: only a few examples of maces (shu) have been discovered: two examples in the tomb of Marquis I of Tseng, and others in the pits of the pottery warriors and horses of the First Emperor. More common were spears and some unusual types have been discovered at Shih-Chai-Shan belonging to the Tien culture which occupied parts of Yunnan in Han times. One example has the spear head decorated with two captives hanging suspended by their hands tied behind their backs. This same site contained a similarly unusual representation of a model battle scene decorating the top of a bronze box for storing cowry shells. Cowries were items of great value for the Tien people and might have been used as a form of currency, as well as being a symbol of fertility and good fortune.

Swords started to become military equipment in early Chou, possibly originating with indigenous tribesmen in the northeast. The development of the double-edged sword has been clarified with the excavations in Loyang of the cemetery along Chung-Chou Road in the late 1950's. The most magnificent examples of the swordsmith's craft come, however, from the southeast, where the kings of Wu and Yueh, who probably did not speak a language related to Chinese, commissioned swords of remarkable beauty and exquisite workmanship. These swords, about 55 cm in length, are usually inscribed in bird-script and inlaid with gold or blue-tinted glass. The surface was painted with rhomboid and other patterns and treated with sulfides as an anti-corrosive. The swords still retain their design and sharpness to this day. The swords usually narrow at the tip to a sharp point, suggesting that they were used primarily for stabbing rather than slashing. The handle with two knobs was wound with silk thread to make it easier to wield.

Towards the end of the Warring States period, iron swords began to appear more frequently and they began to increase in size, eventually reaching more than a meter in length. The length of these swords may be connected to the introduction of cavalry, where a longer sword could be effective when swung down by a man on horseback onto the heads and shoulders of enemy infantry. The increasing popularity of single bladed, slightly curved sabres probably reflects this trend even more clearly.

Swords came to hold a special place in the social life of Chinese at this time, for the ceremony of initiation into adulthood, or capping, of a young man consisted of his donning a cap and a sword for the first time. According to recently excavated Chhin almanac texts from Shui-Hu-Ti, this ceremony had to take place on an auspicious day, otherwise it was thought that the recipient would suffer bad fortune. Surprisingly enough, through the Han dynasty, officials in the government bureaucracy, who were educated in civil Confucian learning, were also expected to wear ceremonial swords. The importance of these weapons can be judged from the fact that many individuals chose to have themselves buried with their swords at their side inside their coffins, keeping other weapons and grave goods in the outer coffins.

Projectile weapons, in the form of crossbows, also increased quite dramatically the firepower of soldiers in late Eastern Chou, These weapons were intermingled with hand weapons in different ways in different formations, depending on the terrain and the numbers of the opposing force. It may be that the stress laid by military texts of the period on intensive training reflects the need for contemporary armies to learn how to resist the temptation of fleeing in the face of the showers of vicious bolts unleashed by this powerful weapon. Every soldier was required to learn how to shoot accurately and was tested on a regular basis. Officers in charge who failed to hit the target a certain number of times could be punished with a fine. The casting of the crossbow trigger mechanism required precision engineering skills to ensure that all the moving parts worked together perfectly and the bronzesmiths must have been highly valued members of the artisan community.

In late Warring States times, despite the evident strength of the Chhin armies, the state of Yen, in northeast China, near modern Peking, seems to have been more technically advanced than the Chhin in the production of iron, for iron weapons and iron scale armour, as well as an iron helmet have been discovered at the remains of its capital, Yen-Hsia-tu. On the other hand, only one out of the thousands of weapons found at the First Emperor of Chhin's mausoleum was made of iron. Nevertheless, despite Chhin's relative technical backwardness, it was successful in conquering all its rivals and founding the Chinese imperial system in -221. Its success may have been based on the discipline and order that it was able to instil in its people and its soldiers and on its application of new battle formations to break enemy armies.

The history of the development of weapons in post-Han times to the middle of the nineteenth century is far more obscure than that for the early period, for virtually no actual weapons have been preserved from this long stretch of time. In contrast to the pre-imperial and early imperial period,

weapons were usually not included in grave furnishings, which suggests a significant change in burial practices, perhaps initially the result of the introduction of Buddhism and the fracturing of the economy in the period of disunion. I will have to examine the representations of weapons in wall-paintings and in sculpture and compare them to notices in historical and literary texts to reconstruct the later history of hand weapons.

Robin D. S. Yates

BRONZE METALLURGY IN XINJIANG

I am pleased to write a few lines on my current research for the Newsletter of the Needham Research Institute (NRI), to whom I am deeply indebted for their kind support over the past three years. I first came to the NRI in February 1994 as a one-year Li Foundation fellow. Prior to coming to Cambridge, I worked as a lecturer at the Institute of Historical Metallurgy, University of Science and Technology in Beijing, doing research on the history of non-ferrous metals in China. I owe special gratitude to my supervisors, Professors Tsun Ko and Han Rubin. Without their guidance and concern over a period of many years, I would never have bcome a student, and then a researcher, in the history of science and technology.

In September 1994 the East Asian History of Science Foundation, Hong Kong (EAHSFHK) informed me that their Board of Trustees had decided to award me a fellowship to support my Ph.D. course in the Department of Archaeology, University of Cambridge. I was excited and most grateful for this generous provision as I now had a rare opportunity to work in one of the world's foremost academic institutions.

I commenced my Ph.D. course in January 1995. My proposed research topic was "Copper and Bronze Metallurgy in Late Prehistoric Xinjiang and Comparisons with Neighbouring Bronze Cultures". I have been paying attention for many years to the issue of the origins and evolution of early bronze metallurgy in China, which has aroused much scholarly interest and contention over the past fifty years. There is, to date, no consensus among scholars about whether bronze metallurgy arose independently in China or was introduced to China by cultural diffusion. I was aware that the Xinjiang region had been virtually ignored in previous studies of early metallurgy and thus merited special attention in the light of recent archaeological finds. But I only had a sketchy knowledge of Xinjiang archaeology. So the first thing I did was to familiarise myself with the important archaeological finds relevant to the early use of metals in Xinjiang. I systematically examined those finds and gradually built up the confidence that further studies of them from a scientific perspective could contribute a new dimension to knowledge about the archaeology of Xinjiang, which has developed rapidly in only the last twenty years.

It soon became clear to me that I should not limit my attention to early metals. It is impossible to discuss the development of metal technologies without understanding their archaeological context. Therefore, under the guidance of my supervisor, Dr. Colin Shell and my academic advisors, Professor Colin Renfrew and Dr. Gina Barnes, I have undertaken a preliminary survey of the late prehistoric remains in Xinjiang in terms of chronology, regional distribution, material assemblage, and cultural features on the basis of original archaeological reports and relevant research work. This survey has provided me with a broad view from which to observe the beginning and early use of metals in Xinjiang.

I also realised that this research should be undertaken in a comparative light. I needed to extend my perception to the far west, beyond Xinjiang. For this purpose, following Professor Tsun Ko's advice, I began to learn Russian from June 1995, because many important archaeological references to western Central Asia are published in Russian.

In September 1995, I participated in the conference on the Prehistory of Mining and Metallurgy held at the British Museum, and reported my preliminary research on early metallurgy in Xinjiang, especially the smelting technology of arsenical copper at the Nulasai site. At this conference, a number of distinguished scholars in the field of archaeometallurgy showed serious interest in my work, and that gave me considerable encouragement for my future research.

I subsequently investigated the metal resources potentially available to the Bronze Age inhabitants in Xinjiang. The distribution of copper, tin and other relevant metallic ores was mapped on the basis of studies that have been done on ancient mining activities as well as modern mineralogical surveys. These maps provide a general background for a better understanding of early bronze metallurgy in Xinjiang. I also studied the chronology and typology of prehistoric metal artefacts. This work made it possible for me to outline roughly the development of copper and bronze working in prehistoric Xinjiang, and to map the distribution of the copper-yielding sites.

In April 1996, I was invited by Professor Victor Mair to visit the University of Pennsylvania to participate in the International Conference on the Bronze Age Peoples of the Tarim Basin and Surrounding Areas. This was an excellent opportunity for me to meet other scholars of prehistoric Central Asia. I benefited a great deal from the presentations and discussions, which provided me with up-to-date information concerning recent archaeological finds in Xinjiang and the Eurasian steppes.

Thanks to financial aid from the Great Britain-China Trust and Darwin College, I was able to return to China to undertake three months of fieldwork from June to August 1996, which included visits to archaeological sites, and collections in museums and other academic institutions. I visited the mining and smelting site at Nulasai, Nileke County, westernmost Xinjiang, which is of great importance for the study of prehistoric metallurgy in Northwest China, to collect copper ore and ancient smelting slag samples for further scientific examination. I also made very productive visits to local museums and archaeological institutions in Yining, Urumqi, Lanzhou, Xining, Ledu, Yinchuan, and Huhehot, not only examining their excellent collections of metal, pottery and other artefacts on exhibition and in storage, but also holding discussions with local scholars. It was an important experience for me and a way to gain first-hand familiarity with recent archaeological finds.

From the very beginning, I intended to carry out metallurgical analyses of the Xinjiang materials. During my fieldwork in Xinjiang, I was fortunate to obtain samples from 20 copper/bronze objects through the kind collaboration of colleagues at the Museum of Xinjiang and the Institute of Archaeology in Xinjiang. A full metallurgical analysis of these samples is being undertaken in order to reveal their microstructure and composition, from which will be gained a direct insight into their manufacturing techniques.

Recently, I have been focusing on the studies of archaeological materials from western Central Asia and Southern Siberia, which may have had certain relations with Xinjiang in prehistory. In order to study some archaeological finds made in western Central Asia, I conducted a two-week research visit to the collections in Paris during January to February 1997, with a grant from the British Academy.

It is worth noting that as more and more archaeological finds are coming to light in Central Asia, there is a strongly growing international interest among scholars in the early Eurasian cultural interaction. With this interest, the new material from Xinjiang has become increasingly important. My ongoing study of early metallurgy is actually the first attempt to explore an important technological aspect of prehistoric Xinjiang from a wider comparative perspective. Preliminary results of my research have indicated a diversity of metallurgical traditions in prehistoric Xinjiang, some of which can be traced back to cultures documented far to the north, east and west. The use and spread of metals in Xinjiang during the Bronze and Iron ages were associated with significant changes in economy and culture of the society, such as the transition to horse nomadism. I am sure that by means of further typological observation and technical comparison, the interaction between Xinjiang and its neighbours with respect to metallurgy will be better understood, and this study will help to evaluate the role that foreign influences played in the early history of metal in China.

I feel very fortunate to be able to conduct my research at the NRI. Not only has its rich and unique collection of Chinese books and journals been of benefit to me in many ways, but also the people working here have always been kind and helpful. I would like to take this opportunity to express my sincere thanks to all who have given me their kind help.

Mei Jianjun

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CAMBRIDGE

Science and Civilisation in China

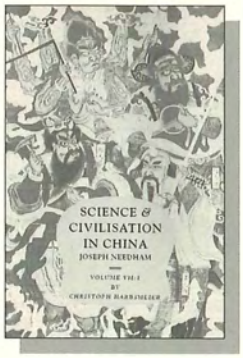
Volume VII: The Social Background
Part 1: Language and Logic in Traditional China

Christoph Harbsmeier

Foreword by Joseph Needham

NEW

- Part of the authoritative and unique *Science and Civilisation in China* series
- Detailed analysis of the role the ancient Chinese language played in forming the foundations of Chinese science
- Insights into the parallels with ancient Greek and Buddhist logic



Science and Civilisation in China Volume VII Part 1 is the final volume of this unique resource. Chinese culture is the only culture in the world which has developed systematic logical definitions and reflections on its own and on the basis of a non-Indo-European language. Christoph Harbsmeier discusses the basic features of the classical Chinese language which made it a suitable medium for science in ancient China, and he discusses in detail a wide range of abstract concepts which are crucial for the development of scientific discourse. There is special emphasis on the conceptual history of logical terminology in ancient China, and on traditional Chinese views on their own language. Finally the book provides an overview of the development of logical reflection in ancient China, first in terms of the forms of arguments that were deployed in ancient Chinese texts, and then in terms of ancient Chinese theoretical concerns with logical matters.

c. **£70.00** HB 0 521 57143 X 544 pp. 1998
Publication February 1998

Science and Civilisation in China

Volume VI: Biology and Biological Technology
Part 3: Agro-Industries and Forestry

Christian Daniels and Nicholas K. Menzies

Series Editor: the late Joseph Needham

Dr. Daniels traces the history of all aspects of Chinese sugarcane technology from ancient times until the early 20th century, showing how the Han Chinese by their own ingenuity and with some influence from the indigenous people of South China, Indian culture, and possibly Islamic culture as well, developed distinctive techniques for sugarcane agriculture and sugar manufacture.

Dr. Menzies examines the evolution of forestry and forest management in China from the earliest records until the introduction of Western paradigms of 'Scientific forestry' during the 19th century. He identifies a consistent and coherent tradition of intensive management of trees in agricultural systems, contrasted with a climate of regulation and officially sponsored clearance in extensive areas of natural forest. Both of these are major contributions to the series as a whole.

£95.00 HB 0 521 41999 9 770 pp. 1996

Science and Civilisation in China

Volume V: Chemistry and Chemical Technology
Part 13: Mining

Peter Golas

- The only history of Chinese mining in English
- Profusely illustrated with line drawings and photographs, as well as abundant tables and maps
- Makes many comparisons with mining traditions in other parts of the world

The fifth volume of Dr Needham's immense undertaking covers the subjects of chemistry and chemical technology. This, the thirteenth part of the volume, is the first history of Chinese mining to appear in a Western language. Covering from the Neolithic period to the present day it deals with the full range of Chinese mining from copper to mercury, arsenic to coal and a large number of other minerals and materials.

The author draws extensively not only on written sources but also on archaeological remains, and observation of traditional techniques still in use. The interrelationship between Chinese mining and the social, economic and political conditions in which it took place is examined, and leads the author to conclude that these extraneous factors were probably more important in determining how mining was carried out than technological progress.

c. **£95.00** HB 0 521 58000 5 850 pp. 1998
Science and Civilisation in China
Publication October 1998

Science and Civilisation in China

Volume V: Chemistry and Chemical Technology
Part 6: Military Technology: Missiles and Sieges

Edited by the late Joseph Needham and Robin D. S. Yates

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