

NEEDHAM RESEARCH INSTITUTE NEWSLETTER

Newsletter No. 10

EAST ASIAN HISTORY OF SCIENCE TRUST

June 1991



THE SOUTH WING

The South Wing was officially opened by the Vice-Chancellor of Cambridge on 10 May, in the presence of a number of distinguished scholars and scientists from both Cambridge and overseas. In particular the Institute was glad to welcome Dr Shimokobe, President of the National Institute for Research Advancement, Tokyo; Professor Kuno Gotô, Momoyama University and Kansai Science City; Professor Motoko Kuwahara Gotô, Momoyama University; Mr R. Tai, Director of the Free China Centre; Dr Philip Mao, Chairman of the East Asian History of Science Foundation, Hong Kong; and Dr Ushiyama.

VISITORS

The Institute has been glad to welcome a number of scholars who have been engaged in research with the use of the library and its acquisitions, including Dr Agnes Chalier (Paris: working on Han dynasty rationalism); Professor Jeon Sang-woon (Seoul: scientific relations between Ming China and Korea); Professor Li Zhen (Peking: Chinese and Greek philosophical ideas); Ms Ma Li (Göteborg: Chinese mathematics); Dr Donald B. Wagner (Copenhagen: collaborator for SCC on ferrous metallurgy); Mr Wang Tingjun (Changchun and Perugia: cosmology and divination). Other visitors have in-



Dr Philip Mao, speaking at the opening ceremony.
Photo: Carmen Blacker



The Vice-Chancellor, Professor David Williams, presiding at the opening, with Dr Needham, Professor Lu Gwei-Djen and Dr H. T. Huang. Photo: Carmen Blacker



The South Wing, seen from the central block. Photo: Carmen Blacker

cluded Professor Jean Chesneaux (Paris); Mr Michael Rank (Reuter's News Agency); Ms Jean Sigler (New York).

JN'S ARTICLES: A FRENCH VERSION

Translations into French of a selection of ten articles written by Joseph Needham and Lu Gwei-Djen, or by the two authors in collaboration, have appeared in a recent publication entitled *Dialogue des civilisations Chine-Orient: pour une histoire oecuménique* (Paris: Éditions la Découverte, 1991). The articles range in date from 1925 to 1988, and the volume, which is part of the series *Histoire des sciences*, includes one preface by Joseph Needham and one by the editor Georges Métailié. The translations are by Francine Fèvre and Marie-Britte Foster.

GIFTS

The Institute is glad to acknowledge the contribution towards expenses that has been received from Mrs Ansberry, and two pairs of shoes for bound feet, now on display in the K. P. Tin Hall, from Mrs Engel, together with plaster models of feet for which such shoes were designed. The librarian expresses her thanks to Lady Sutherland, for the gift of books on Chinese art that had belonged to her late husband, Master of Emmanuel College; to Mrs May for conveyance of books left to the Institute by Dr Eric Aiton, formerly lecturer in Manchester Polytechnic; and to the following for individual gifts to the library: Jeremy Adler; Jean Chesneaux; Joyce Engel; Chung-liang Al Huang; Ch'eng-hsüeh Kuan; Ts'un-shan Li; Emily Lyle; J. F. Pérez; L. M. Wu; and the International Cultural Society of Korea.

GRANT FROM THE CHIANG CHING-KUO FOUNDATION

It is with great pleasure that the Institute has learnt that the Chiang Ching-kuo Foundation (Taipei) has approved applications made for two grants; one is to support research in the history of medicine; one is for the continuation of the series *The Shorter Science and Civilisation in China*. The Institute expresses its warm thanks for this generous help.

FELLOWSHIPS

Ms Elisabeth Lee Hsü has been nominated to hold the Research Fellowship supported by the National Science Foundation for the year 1991-92, and Dr Tsukahara Tôgo has been appointed to the Fellowship founded by the Daiwa Anglo-Japanese Foundation for the two years 1993 and 1994. Dr Tsukahara is working on aspects of scientific exchanges between Europe and Japan.

JOSEPH NEEDHAM LECTURE

The first Joseph Needham Lecture was delivered by Dr Christopher Cullen, Senior Fellow of the Institute, on 2 May, under the title *New Windows on Chinese Medicine: sickness and healing in a Ming Dynasty novel*. It is hoped that a summary of the lecture will be included in the next number of this Newsletter.



Dr Shimokobe, President of the National Institute for Research Advancement. Photo: Kate Grillet

A NEW CHINESE TRANSLATION OF *SCC*

Following the suggestion of Zhou Enlai, in 1964 the Institute of the History of Science, in the Chinese Academy of Sciences, started work on translating *SCC*, and abridged versions of Volumes I and III had appeared by 1975. A new start to the work was made in 1976, with the formation of a special committee to be responsible for the translation and publication of the work. The committee (chairman Dr Lu Jiaxi; vice-chairmen Professors Cao Tianqin, Ru Xin and Xi Zezong) was able to draw on the help of specialists from a number of government departments and ministries, and results were forthcoming shortly. On the occasion of the international conference which was held in Cambridge in August 1990, Professor Liu Zuwei, who has been responsible for planning the new translation, brought with him copies of the following volumes, for presentation to the Institute: Volume I, with prefaces by Lu Jiaxi and Joseph Needham, and a short essay by Professor Lu Gwei-Djen; Volume II, hitherto not translated into Chinese; and Volume V, Part 1, whose proofs had been corrected by the author, Professor Tsien Tsuen Hsuei. The next parts to be produced will be Volume III; Volume IV Parts 1 and 3; Volume IV Part 2; Volume V Parts 3 and 7. It is hoped that these translated versions will be available in about three years. Preliminary contacts, which have been most encouraging, have been made between scholars in Taiwan and the mainland with a view to close co-operation in the work of translation and revision that is envisaged.

THE MILLS PAPERS

As announced in Newsletter No. 3, the Institute has been holding the working papers of the late Dr J. V. G. Mills, which are the result of his life-long research in the geography of the Far East and the history of place names in East Asian waters. Thanks to the generosity of Dr Mills' heirs, it will now be possible to support a scholar to make a full examination of these papers, possibly with a view to publication. The Institute would be glad to learn of any research student or scholar who might be interested in undertaking the work.

RESEARCH ASSISTANTS

From time to time the Institute requires the help of research assistants who could take part for a short period in some of the work of editing, indexing or preparing manuscripts for the press. Such work, which may require a knowledge of Chinese or Japanese, and possibly a familiarity with word processing operations, might involve research in seeking sources for statements or for citations from rare publications, and it may well serve as valuable introductory experience to editorial method. Recently graduated students, or post-graduates, are encouraged to seek further information if they are interested.

THE CAST IRON LION OF TS'ANG-CHOU

Monumental iron castings – pagodas, bells, statues – were produced in China as early as the T'ang period and continued to be produced into modern times, but it seems to have been in the early Sung that they were especially popular. The largest iron casting on record in the world is the famous Ts'ang-chou Lion, cast in A.D. 953. It is 5.4 metres high, 5.3 metres long, and 3 metres broad; its weight is estimated at 50 tonnes. Figure 1 is a photograph of it taken by the American mining engineer Thomas T. Read about 1910. The other photographs on this page were taken by me on a visit to Ts'ang-chou in 1987.

Art historians believe that the lion was originally inside a Buddhist temple, now long gone, and that a bronze statue of the bodhisattva Mañjuśrī rode in the lotus flower on the lion's back. The bodhisattva was at some time removed for the value of its bronze; this may have happened as early as the reign of Shih-tsung (r. 954–958), Emperor of the minor dynasty of Later Chou, in his campaign against Buddhism.

By 1603 the tail was missing. The lion toppled over in a storm in 1803, with the result that the snout and belly were damaged. In 1886 the Department Magistrate Kung Yü sent masons to prop it up with bricks and stones. When Read saw it the casting was broken into four parts: the body, the lotus seat, the head, and the lower jaw, which lay on the ground and cannot be seen in the photograph. A photograph published in 1933 shows the lower jaw in place again, but it had

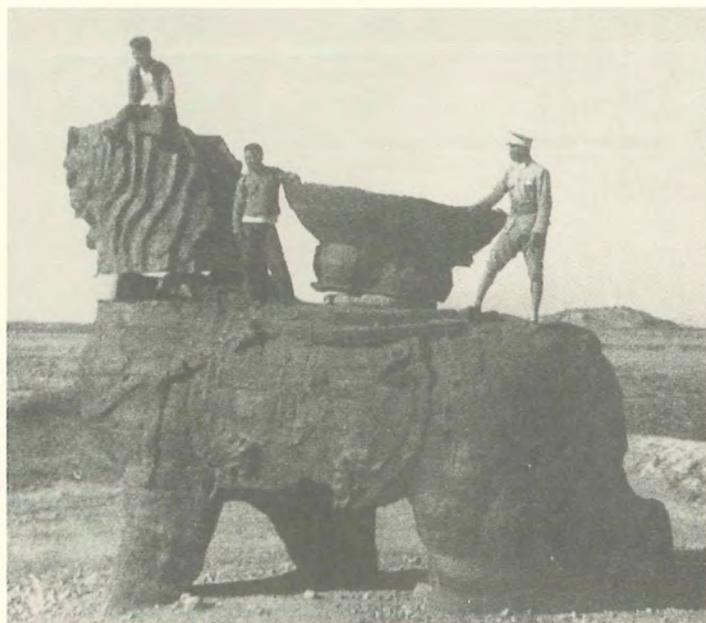


Figure 1. *The Ts'ang-chou Lion, photographed by Thomas T. Read at some time between 1907 and 1910. His caption reads, in part: "It . . . was cast in 953 A.D. in sections, like a concrete building. It was broken, in falling over, into four separate pieces, one of which, the lower jaw, is lying on the ground, not visible in the picture, while the head and the 'lotus seat' have been awkwardly propped in place with slabs of stone, so something of the original appearance has been lost...."* (Mining and metallurgy, 1937, 18: 383)

disappeared by 1963 and has not been seen again. In 1984 the lion was professionally restored and placed on a reinforced concrete pedestal two metres high.

The chemical analysis and metallographic examination of a sample taken by Read was summarily reported in 1938, and recently a team of Chinese archaeologists and metallurgists has published a more thorough study of the way in which the lion was cast. The following description is based almost solely on the published accounts.

The rectangular grid of casting seams on the surface of the Lion has led some art historians to believe that it was somehow pieced together from separately cast iron plates with dimensions about 25 × 45 cm. Actually the entire statue was cast, essentially in one piece, in one mould, using the traditional Chinese "piece-moulding" method. The seams show the joins between the individual pieces of the mould.

The piece-moulding method was used in bronze-casting in China as early as the Shang period, and to some extent it continues to be used in bronze- and iron-casting today. First an exact full-scale model is made of the intended casting. This is of clay, suitably reinforced with wooden or metal supports. When the model is dry it is plastered to a considerable thickness with wet clay; when this clay has dried to a leather-hard consistency it is cut into blocks which are carefully

removed, retaining the impression of the model. These separate blocks are dried and perhaps fired for greater durability. In order to form the mould-core the model is then carefully scraped down, removing a thickness of clay corresponding to the intended thickness of the casting. The previously formed blocks are re-assembled around the core to form the outer mould. This is reinforced with a wooden framework and buttressed with earth. One or more casting inlets are made, and the molten metal is poured into the mould thus formed. When the mould is removed the casting shows obvious seams at the joins between the individual blocks of the outer mould. In bronze castings these are usually removed by grinding and polishing, but in iron castings this is normally not possible and the seams are simply left as they are.

When, in the piece-moulding of the Ts'ang-chou Lion, the outer mould was built up around the core, numerous round-headed wrought-iron spikes were driven into the sides of the core to establish the correct spacing. On the back, cast-iron blocks (called "chaplets" by foundrymen) were used for the same purpose. When the iron was poured into the mould the spikes and chaplets were incorporated into the casting; their traces can be found by close examination of the outer and inner surfaces.

Examination also shows that a reinforcing framework of

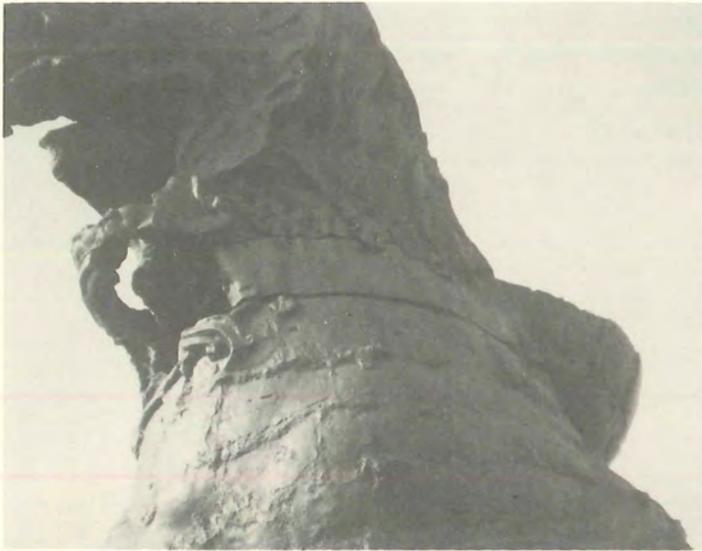


Figure 2. The lion photographed in 1987. Note the modern repair and the missing lower jaw.

wrought iron was cast into the neck and back of the lion. Presumably this was done because cast iron alone would not have been strong enough to carry the five-ton lotus and the bronze bodhisattva.

Horizontal lines of what foundrymen call "cold shuts" are found at regular intervals from about middle height upward. A cold shut is a fault in a casting caused by premature cooling in the mould before the mould is filled. These indicate that the lion was cast in several stages. First the outer mould was built up to about half of the total height and iron was cast into this. Hereafter the building of the rest of the mould and the casting into it proceeded upwards in alternating stages. Cold shuts severely weaken a casting. The founders were aware of this problem, and dealt with it by inserting pieces of wrought iron into the solidifying iron surface, after each partial

pour, to act as pegs holding the separately cast levels of the casting together. The operation was not entirely successful, and some of the pegs were displaced by the hot running metal from their intended positions. Some have since fallen out of the casting, leaving characteristic cavities or even holes behind.

Two chemical analyses are available for samples from the iron lion, one by Read and one by the Chinese team. These show, respectively: C 3.96, 4.3; Si 0.09, 0.04; P 0.231, 0.087; Mn 0, 0.02; S 0.022, 0.022. (Neither report indicates from what part of the casting the sample for chemical analysis was taken). The difference between the two analyses, especially with respect to phosphorous (P), is another clear indication that the casting was not the result of a single uninterrupted pour. The very low silicon content is typical of pre-modern Chinese cast iron: modern iron-

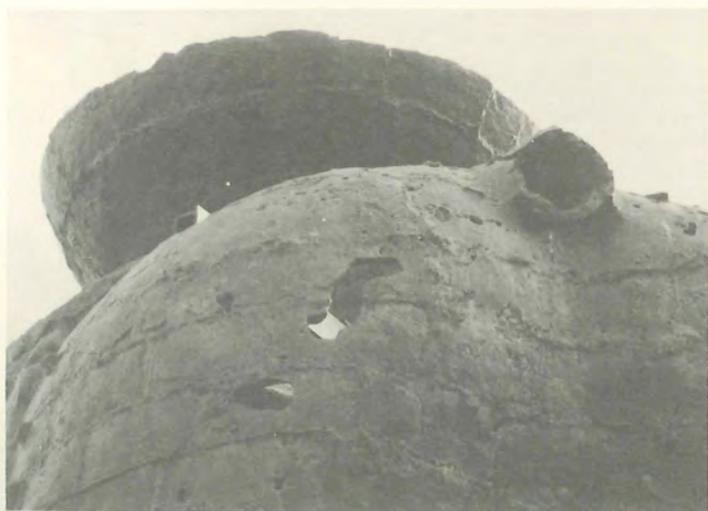


Figure 3. The rump. Note the cavities left by the loss of some of the wrought iron pegs.

founders would prefer an alloy with about 2 per cent silicon for such a casting. Metallographic examination of Read's sample indicates that it is white cast iron, with a streak of mottling. The Chinese team took three metallographic samples of the cast iron fabric of the casting, one from the right side of the lion's back and two from the lotus; two of these were pearlitic grey cast iron and one, from the upper rim of the lotus, was white cast iron with a small amount of mottling.

In the Ch'ing period a local poet, Chi Jui-ch'i, wrote:

Thinking of ancient flourishing glory,

I sigh for the changes of our times

But the Iron Lion still stands,
While halls and palaces have
turned to thorns and
brambles.

The Iron Lion is still Ts'ang-chou's greatest glory, and even the local beer (which is excellent) is called Ts'ang-chou Lion Beer.

Donald B. Wagner
University of Copenhagen

Bibliography: *Wan-li Ts'ang-chou chih*, (1603) 1: 9b-10a, 12b; 8: 12a, 19a-b, 21b, 22b, 43a-45a. *Ts'ang hsien chih* (T'ien-chin 1933) frontispiece; 13: 1b-2a; text appendix 1: 26b-27a; 2: 1a-2a, 17a. T. T. Read, in *The iron age*, 30 April 1936, 18-20; *Mining and metallurgy*, 1937, 18: 383. M. L. Pinel, T. T. Read, & T. A. Wright, American Institute of Mining and Metallurgical Engineers, Technical publication no. 882, 1938. Joseph Needham, *The development of iron and steel technology in China*, London 1958, pp. 20-21, 72, plate 24. Lo Che-wen, in *Wen-wu* 1963.2: 38, back cover. Wu K'un-i, Li Ching-hua, & Wang Min-chih, in *Wen-wu* 1984.6: 81-85. Wang Min-chih, in *Wen-wu P'ien-ti*, 1985.2: 37. *Chung-kuo mei-shu ch'üan-chi: Tiao-su pien*, 5: *Wu-tai Sung tiao-su* (Peking, 1988) p. 19.

REPORT ON RESEARCH

I have been in contact with the Institute for several years now. My main interest concerns modes of reasoning in Chinese medicine, and this has been the focus of my studies in my M.Phil. dissertation for General Linguistics as well as in my Ph.D. thesis for Medical Anthropology.

In the M.Phil. dissertation I used linguistic methods of lexical semantics for analysing medical concepts in one of the earliest texts on Chinese medicine i.e. the 25 case histories of Chun-yu Yi which are recorded in the 105th chapter of the *Shiji*.

For Ph.D. research, I have focused on the way in which the form of transmission affects the contents of knowledge and practice. Chinese medicine has been legitimised and promoted by the government since the 1950s, and its transmission in government units is modelled on that of Western biomedicine. By analysing textbooks, I show ways in which, over the past thirty years, an attempt has been made to standardise the different strands of Chinese medical knowledge, and I refer to it as 'standardised knowledge'. This textbook knowledge conforms to Western biomedical systematisation, a materialist and static view of processes, and the ideology of Marxist dialectics, but the medical practice of government trained doctors is not always as distinct as the theory presented in the textbooks.

In settings outside the government work units, Chinese therapeutic knowledge and practice has also been modified by Western thought and medicine, but not as systematically. Here, one still finds ways of learning which build on the notion of experience (*jingyan*) and flexibility in applying book knowledge to the particularities of medical practice (*linghuo zhangwo*) and which depend on the personal qualities in the relationship between master and disciple. And here, the transmission of Chinese therapeutic knowledge is often veiled in secrecy.

While engaged in fieldwork in Kunming from August 1988 to December 1989, I lived at the Yunnan Chinese Medical College, a government work unit, where knowledge and practice was standardised and taught in classroom and clinic. A *laozhongyi* ('honorable doctor') with whom I read excerpts from the *Yellow Emperor's Inner Canon* and the *Book of Changes* emphasised the characteristics of what I call 'personalised knowledge', and from a *qigong* healer who accepted me as an apprentice I learnt the implications of secret knowledge. ('*Qigong*' designates modern versions of age old self-cultivation practices.)

The comparison between these three forms of transmission highlights the limitations of the current standardisation of knowledge in Chinese medicine.

Elisabeth Lec Hsü: graduate student, Department of Social Anthropology, Cambridge.

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

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