

THE PICTURE OF THE TAOIST GENII PRINTED ON THE COVER of this book is part of a painted temple scroll, recent but traditional, given to Mr Brian Harland in Szechuan province (1946). Concerning these four divinities, of respectable rank in the Taoist bureaucracy, the following particulars have been handed down. The title of the first of the four signifies 'Heavenly Prince', that of the other three 'Mysterious Commander'.

At the top, on the left, is Liu *Thien Chün*, Comptroller-General of Crops and Weather. Before his deification (so it was said) he was a rain-making magician and weather forecaster named Liu Chün, born in the Chin dynasty about +340. Among his attributes may be seen the sun and moon, and a measuring-rod or carpenter's square. The two great luminaries imply the making of the calendar, so important for a primarily agricultural society, the efforts, ever renewed, to reconcile celestial periodicities. The carpenter's square is no ordinary tool, but the gnomon for measuring the lengths of the sun's solstitial shadows. The Comptroller-General also carries a bell because in ancient and medieval times there was thought to be a close connection between calendrical calculations and the arithmetical acoustics of bells and pitch-pipes.

At the top, on the right, is Wên *Yuan Shuai*, Intendant of the Spiritual Officials of the Sacred Mountain, Thai Shan. He was taken to be an incarnation of one of the Hour-Presidents (*Chia Shen*), i.e. tutelary deities of the twelve cyclical characters (see p. 262). During his earthly pilgrimage his name was Huan Tzu-Yü and he was a scholar and astronomer in the Later Han (b. +142). He is seen holding an armillary ring.

Below, on the left, is Kou *Yuan Shuai*, Assistant Secretary of State in the Ministry of Thunder. He is therefore a late emanation of a very ancient god, Lei Kung. Before he became deified he was Hsin Hsing, a poor woodcutter, but no doubt an incarnation of the spirit of the constellation Kou-Chhen (the Angular Arranger), part of the group of stars which we know as Ursa Minor. He is equipped with hammer and chisel.

Below, on the right, is Pi *Yuan Shuai*, Commander of the Lightning, with his flashing sword, a deity with distinct alchemical and cosmological interests. According to tradition, in his earthly life he was a countryman whose name was Thien Hua. Together with the colleague on his right, he controlled the Spirits of the Five Directions.

Such is the legendary folklore of common men canonised by popular acclamation. An interesting scroll, of no great artistic merit, destined to decorate a temple wall, to be looked upon by humble people, it symbolises something which this book has to say. Chinese art and literature have been so profuse, Chinese mythological imagery so fertile, that the West has often missed other aspects, perhaps more important, of Chinese civilisation. Here the graduated scale of Liu Chün, at first sight unexpected in this setting, reminds us of the ever-present theme of quantitative measurement in Chinese culture; there were rain-gauges already in the Sung (+12th century) and sliding calipers in the Han (+1st). The armillary ring of Huan Tzu-Yü bears witness that Naburiannu and Hipparchus, al-Naqqās and Tycho, had worthy counterparts in China. The tools of Hsin Hsing symbolise that great empirical tradition which informed the work of Chinese artisans and technicians all through the ages.

SCIENCE AND CIVILISATION IN CHINA

“I THINK that if we are to feel at home in the world . . . we shall have to admit Asia to equality in our thoughts, not only politically but culturally. What changes this will bring about I do not know, but I am convinced that they will be profound and of the greatest importance.”

BERTRAND RUSSELL

History of Western Philosophy (1946), p. 420.

李約瑟著

中國科學技術史

莫朝鼎



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Joseph Needham

Frontmatter

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SCIENCE AND CIVILISATION IN CHINA

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*The second volume is dedicated to the memory of three scholars of the
University of Cambridge*

FRANCIS CRAWFORD BURKITT

FORMERLY PROFESSOR OF DIVINITY

EDWARD GRANVILLE BROWNE

FORMERLY PROFESSOR OF PERSIAN

who by their inspiring discourses on the Manichaeian Religion
and on Iranian Medicine, more than thirty years ago, demonstrated
to a young medical student the greatness of scholarship and the
epic aspect of the history of ideas

GUSTAV HALOUN

FORMERLY PROFESSOR OF CHINESE

whose friendship and instruction
honoured the author

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LIST OF ABBREVIATIONS

The following abbreviations are used in the text. For abbreviations used for journals and similar publications in the bibliographies, see p. 586.

- B** Bretschneider, E., *Botanicon Sinicum*.
- B & M** Brunet, P. & Mieli, A., *Histoire des Sciences (Antiquité)*.
- CIB** *China Institute Bulletin* (New York).
- CSHK** Yen Kho-Chün (ed.), *Chhüan Shang-Ku San-Tai Chhin Han San-Kuo Liu Chhao Wên* (complete collection of prose literature (including fragments) from remote antiquity through the Chhin and Han Dynasties, the Three Kingdoms, and the Six Dynasties, 1836).
- CTCS** Li Kuang-Ti (ed.), *Chu Tzu Chhiian Shu* (collected works of the philosopher Chu Hsi).
- CTYL** Li Ching-Tê (ed.), *Chu Tzu Yü Lei* (classified conversations of Chu Hsi).
- ECCS** Hsü Pi-Ta (ed.), *Erh Chhêng Chhüan Shu* (collected writings and conversations of the brothers Chhêng I and Chhêng Hao), containing *Honan Chhêng shih I Shu* and *Wai Shu, I-Chhuan I Chuan, Sui Yen*, etc.
- G** Giles, H. A., *Chinese Biographical Dictionary*.
- HCCC** Yen Chieh (ed.), *Huang Chhing Ching Chieh* (monographs by Chhing scholars on classical subjects).
- HWTS** Chhêng Jung (ed.), *Han Wei Tshung-Shu* (collection of works of the Han and Wei Dynasties); first completed in the Ming.
- K** Karlgren, B., *Grammata Serica* (dictionary giving the ancient forms and phonetic values of Chinese characters).
- KSP** Ku Chieh-Kang & Lo Ken-Tsê (ed.), *Ku Shih Pien* (discussions on ancient history and philosophy); a collective work.
- M** Mathews, R. H., *Chinese-English Dictionary*.
- N** Nanjio, B., *A Catalogue of the Chinese Translations of the Buddhist Tripitaka*, with index by Ross (3).

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LIST OF ABBREVIATIONS

- R** Read, Bernard E., Indexes, translations and précis of certain chapters of the *Pên Tshao Kang Mu* of Li Shih-Chen. If the reference is to a plant, see Read (1); if to a mammal see Read (2); if to a bird see Read (3); if to a reptile see Read (4); if to a mollusc see Read (5); if to a fish see Read (6); if to an insect see Read (7).
- RP** Read & Pak, Index, translation and précis of the mineralogical chapters in the *Pên Tshao Kang Mu*.
- SCTS** *Chhin-Ting Shu Ching Thu Shuo* (imperial illustrated edition of the Historical Classic, 1905).
- SPTK** Ssu Pu Tshung Khan edition.
- TH** Wieger, L., *Textes Historiques*.
- TP** Wieger, L. (2), *Textes Philosophiques*.
- TPYL** Li Fang (ed.), *Thai-Phing Yü Lan* (the Thai-Phing reign-period (Sung) Imperial Encyclopaedia, +983).
- TSCC** *Thu Shu Chi Chhêng* (the Imperial Encyclopaedia of 1726). Index by Giles, L. (2).
- TT** Wieger, L. (6), *Tao Tsang* (catalogue of the works contained in the Taoist Patrology).
- TTC** *Tao Té Ching* (Canon of the Virtue of the Tao).
- TW** Takakusu, J. & Watanabe, K., *Tables du Taishō Issaikyō (nouvelle édition (Japonaise) du Canon bouddhique chinoise)*, Index-catalogue of the Tripitaka.
- YHSF** Ma Kuo-Han (ed.), *Yü Han Shan Fang Chi I Shu* (Jade-Box Mountain Studio Collection of (reconstituted and sometimes fragmentary) Lost Books, 1853).

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LIST OF THOSE WHO HAVE KINDLY READ THROUGH SECTIONS IN DRAFT

This list, which applies to this volume only, brings up to date the list printed in Vol. I on pp. 15–16.

Mr S. Adler (Cambridge)	All sections.
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Dr Etienne Balazs (Paris)	Taoism, Confucianism, Natural Law.
Prof. Derk Bodde (Philadelphia)	Natural Law.
Mrs Margaret Braithwaite (Cambridge)	Mohists, Logicians, Neo-Confucians.
Mr Derek Bryan (Cambridge)	All sections.
Prof. K. Büniger (Tübingen)	Natural Law.
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Dr Arthur Waley (London)	Natural Law.
Prof. J. H. Woodger (London)	All sections.
Dr Wu Shih-Chhang (Oxford)	All sections.
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AUTHOR'S NOTE

WE are very conscious of the great range of territory surveyed in this volume, yet since Chinese cultural history is as complex as that of Europe, nothing less would have sufficed. The reader whose interests lie in the contrasting general development of thought at the two ends of the Old World will not consider superfluous one single note of this symphony. But we cannot but have in mind the reader who, perhaps himself a busy experimentalist, wishes to appreciate with minimum expenditure of time how far the scientific thought of ancient and medieval China differed from that of ancient Greece and medieval Europe. For such an enquirer the first necessity is to apprehend the deeply organic and non-mechanical quality of Chinese naturalism. This first appears in the –4th century with the Taoists (Section 10*c*), the Mohists (11) and the nature-philosophers of Yin and Yang (13*c*). Later it achieves formulation and stability in the Chinese medieval world-picture (Section 13*f*). The freshness of the original theme is reinforced by Buddhist contributions (15*e*), and reaches its definitive synthesis in +12th-century Neo-Confucianism (Section 16*d*, with which 18*f* (§10) should be read at the same time). Two other aspects particularly concern the natural scientist, the strong tradition of scepticism (14*b–i*), and the Chinese attitude to the juristic analogy regarding ‘Laws of Nature’ (18). For philosophical readers, too, this last will be of equal importance with the tradition of organic naturalism, of which indeed it constitutes one particular aspect, for it reveals how the Chinese concept of order could and did (in Granet’s felicitous phrase) positively exclude the concept of law. How far Chinese influences affected the thought of Leibniz and the development of organic naturalism in Europe is a question also raised (13*f* (§1), 16*f*). Lastly, one of the most important features of nearly all Chinese natural philosophy was its immunity from the perennial debate of Europe between the theistic world-view and that of mechanical materialism—an antithesis which the West has not yet fully resolved.