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978-0-521-07060-7 - Science and Civilisation in China: Physics and Physical Technology: Part III:

Civil Engineering and Nautics

Joseph Needham, Wang Ling and Lu Gwei-Djen

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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 Vol. 4, pt. 2, p. 440). 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 early 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-Naqqāsh 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.

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In all the world there be no better workmen for buildings
than the inhabitants of China.

GALEOTE PEREIRA

c. 1577

The Chinese have their Contrivances for everything.

DOMINGO DE NAVARRETE

1676

C'est le pays le plus peuplé et le mieux cultivé qu'il y ait
au monde; il est arrosé de plusieurs grandes rivières, et
coupé d'une infinité de canaux que l'on y fait pour faciliter
le commerce. Le plus remarquable est celui que l'on
nomme le *canal royal*, qui traverse toute la Chine.

DENIS DIDEROT

1752

As regards the people who protect and manage the dykes
and channels of the nine rivers and the four lakes, they are
the same in all ages; they did not learn their business from
Yü the Great, they learnt it from the waters.

Shen Tzu

c. 4th century

Those who know how to manage ships learnt from boats
and not from Wo the Shipman. Those who can think
learnt from themselves, and not from the Sages.

Kuan Yin Tzu

8th century

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李約瑟著

中國科學技術史

莫朝鼎



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SCIENCE AND CIVILISATION IN CHINA

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VOLUME 4

PHYSICS AND PHYSICAL TECHNOLOGY

PART III: CIVIL ENGINEERING AND NAUTICS



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To the memory of

CHI CHHAO-TING

Historian of China's water ways and works

a friend beside the Chialing River
economic and financial leader in a resurgent land

and of

HERBERT CHATLEY

*Once Professor of Engineering at Thang-shan College
and*

Chief Engineer of the Huang-po Conservancy
an 'Old China Hand' who loved the Chinese people
historian of the engineers of Cathay and Manzi

this volume is
dedicated

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