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0521329957 - The Shorter Science and Civilisation in China: An Abridgement of Joseph Needham's Original Text, Volume 4

Colin A. Ronan

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This fourth volume of Colin Ronan's abridgement of Joseph Needham's monumental work is concerned with the immense advances made in early and medieval China in mechanical engineering. It covers the main sections of volume IV part 2 of the original treatise.

It discusses in simple but eminently readable terms the status of engineers, their tools and materials, then basic mechanical principles, followed by machinery powered by animals, man and even by steam, vehicles for land transport, six centuries of hidden clockwork, windmills and aeronautics. Since China was far ahead of the West in ancient and medieval times, this volume helps make clear the immense debt owed by Western civilisation to China. Such debt included the important mechanical principles of transforming rotary motion to a to-and-fro motion of a crank and vice versa. The Chinese invented the first efficient harness for horses, and the first mechanical clocks the world had ever seen.

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COLIN A. RONAN

Lately of the Needham Research Institute

The Shorter Science and Civilisation in China

AN ABRIDGEMENT OF

JOSEPH NEEDHAM'S ORIGINAL TEXT

Volume 4

THE MAIN SECTIONS OF VOLUME IV, PART 2
OF THE MAJOR SERIES

ENGINEERS: THEIR STATUS, TOOLS
& MATERIALS

BASIC MECHANICAL PRINCIPLES &
TYPES OF MACHINES

LAND TRANSPORT

CLOCKWORK

WINDMILLS & AERONAUTICS



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Published by the Press Syndicate of the University of Cambridge
The Pitt Building, Trumpington Street, Cambridge CB2 1RP
40 West 20th Street, New York, NY 10011-4211, USA
10 Stamford Road, Oakleigh, Melbourne 3166, Australia

© Cambridge University Press 1994

First published 1994

A catalogue record for this book is available from the British Library

Library of Congress cataloguing in publication data applied for

ISBN 0 521 32995 7 hardback

ISBN 0 521 33873 5 paperback

Transferred to digital printing 2003

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PREFACE

In this, the fourth volume of the abridgement of Dr Joseph Needham's *Science and Civilisation in China*, we look at the astounding development of mechanical engineering in ancient and medieval China. We cover most of volume IV, part 2 of Dr Needham's original work. However, it is now desirable to keep each volume of this abridgement of approximately the same size; in consequence, and with Dr Needham's agreement, the description of hydraulic machinery has been held over until the next volume. There it will appear together with that part of hydraulic engineering concerned with control, construction and maintenance of waterways.

As in previous volumes in the abridgement, I am indebted to Joseph Needham for his encouragement and help; his advice has been invaluable. As in the previous volumes, this is no new edition. However, in the text the Pinyin romanisation of Chinese is given, but its use has now become so widespread that it is given first, with the modified Wade-Giles system in square brackets where desirable. The modified system has been continued in order to make it easy for readers to refer to Joseph Needham's original *Science and Civilisation in China*, should the need arise. Pinyin alone is given in the captions to and lists of illustrations.

My warmest thanks are due to Dr Simon Mitton and to Ms Fiona Thomson of Cambridge University Press for their ever ready help, and to Ms Helen Spillett not only for her careful checking of the Pinyin transliterations, but also to her and to Ms Sheila Champney for their admirable work as copy-editors, and to Ms Liz Granger for her excellent index.

The preparation of this volume has only been possible due to a grant generously provided by the Chiang Ching-kuo Foundation for International Scholarly Exchange in Taiwan. For this I am most grateful.

Hastings, East Sussex
September 1992

Colin A. Ronan