

The Rustless Wonder: A Study of the Iron Pillar at Delhi. T. R. Anantharaman. Vigyan Prasar, C-24, Institutional Area, New Delhi 110 016. 1996.

While it is generally conceded that ancient India had made seminal contributions to mathematics, astronomy, medicine and metallurgy, definitive studies are lacking. The grand sweep of Joseph Needham's magnum opus of *Science and Civilization of China* is yet to be experienced by Science and Civilization in India. However, it is encouraging to note that of late there is increasing interest in such studies in India. A recent initiative is the Study Group on Ancient Metallurgical Heritage of India set up by the Indian National Academy of Engineering.

The metallurgical heritage of India is indeed spectacular. Of the eight metals – gold, copper, silver, iron, zinc, lead, tin and mercury – known since antiquity, Indian contributions are striking for at least three of them. Zinc was extracted for the first time in the history of mankind in the Zawar area of Rajasthan nearly 2500 years ago. The Iron Pillar at Delhi stands as a remarkable achievement of the mastery of Indians over the production of iron. Wootz steel, an anglicized version of the Kannada term *ukku* for steels, was the most advanced material of the first millennium. Produced by the craftsmen of the Deccan plateau, it defied the ingenious experiments of Michael Faraday, reputed to be the greatest experimentalist of all times, to replicate it. Additional areas of metallurgical interest are the lure and lore of gold in Indian mythology and history, the cast bronze figurine of the dancing girl of Mohenja Daro, the Chola bronze idols made by the lost wax process and the

bronze mirrors of Kerala. Recent studies of these subjects are throwing further light on these developments. The monumental volume by A. K. Biswas and Sulekha Biswas, *Minerals and Metals in Ancient India*, was recently reviewed in these columns.

The present book under review deals with one of the major objects of Indian metallurgical heritage, namely the Delhi Iron Pillar. This massive pillar weighs over 6.5 tons and stands tall over 7.16 meters. Located near the Qutab tower in Delhi, it has towered over India in a geographic sense from the capital and in a historic sense over a millennium and more. As Robert Hadfield had observed, 'it is one of the finest specimens of ironwork produced until modern times; indeed it is only within the last century or so that any European ironmaster could have undertaken to produce such a forging'. There are several questions about this ancient marvel – almost amounting to a whodunnit. When was it erected? Who commissioned it? How was it made? Why does it resist corrosion?

No one is more suited to address these questions than T. R. Anantharaman, an eminent physical metallurgist and a renowned Sanskrit scholar. Few will be as qualified as the author to quote the poet, Bhartrhari and the metallurgist Sir Robert Hadfield, almost in the same breath. This elegantly produced book is just over 100 pages long. But in a gripping narrative, Anantharaman traces the origin of the pillar, its mode of fabrication and its unusual corrosion resistance. The book is in the form of an annotated commentary citing both literary and metallurgical sources. The conclusions are that Emperor Samudra Gupta had it erected in *circa* AD 370–375 as a flagstaff for a temple of Vishnu. The eulogy was inscribed in

the pillar *circa* AD 380–385 by his son King Chandra. The iron pillar was made by forge welding lumps of iron. Its corrosion resistance can be traced mainly to its composition.

The book gives a brief and lucid description of the evolution of iron technology. While one chapter traces the growth of iron technology in India, it would have been helpful to have placed it in a global context in terms of its evolution in China and the Middle East. In fact a serious question to be addressed is whether a given metallurgical technology was first developed at one place and then spread to other regions via cultural diffusion and trade routes or multicentric origins occurred. The author favours the latter possibility with respect to iron technology in India. Additional archaeological and scientific studies in India and elsewhere are necessary before really definitive answers can be given to many of the questions addressed in this book.

It is intriguing to note that the references have been given at the end in both chronological and alphabetical order. The duplication could have been avoided. A more serious flaw is the absence of links in the text to the references.

This book is the first of a series promised by Vigyan Prasar. It has set the tone for the subsequent volume on the bronze icons of South India. Alluringly titled *When Gods came Alive* and edited by Baldev Raj, C. Rajagopalan and C. V. Sundaram, its issue will be eagerly awaited.

S. RANGANATHAN

*Department of Metallurgy,
Indian Institute of Science,
Bangalore 560 012, India*