

Marvels of Indian Iron Through the Ages. R. Balasubramaniam. Rupa and Co, 7/16 Ansari Road, Daryaganj, New Delhi 110 002 in association with Infinity Foundation, 53 White Oak Drive, Princeton NJ 08540, USA. 2008. 283 pp. Price not mentioned.

The Infinity Foundation (IF), USA, has launched a gigantic project on the History of Indian Contributions to Science and Technology' (HIST), intending to cover three series of publications related to (i) materials and technologies, (ii) life sciences and (iii) theoretical sciences. D. P. Agrawal, an eminent archaeologist, is the Chief Editor for the first series, and intends to publish on behalf of the IF, about 25 books on metal technologies, architecture and engineering, hydraulics, textiles, agriculture, husbandry, navigation, mathematics, ceramics, lapidary crafts, glass and faience. About iron alone, three volumes were contemplated.

The spurt and prolificity of series publications on the ancient and pre-modern Indian S&T is most welcome. Evidently, it has been triggered by Joseph Needham's volumes on *Science and Civilization in China (SCC)*. Rajiv Malhotra, the President of the IF notes similar efforts on serial publications in Indian S&T undertaken by other organizations such as ICAR, INSA, PHISPC, etc. and promises to 'work with them to expand the discipline'. The same specialists are however writing for publications to be brought out by different organizations. If we wish to avoid repetition and overlapping, some collaboration at the national level is needed.

The book under review has four sections: Introduction, Pillars and beams, Cannons, and Wootz steel. The second section covers iron beams in the Orissa

temples and iron pillars at the Kodachadri Hill, Dhar, and most importantly, the Delhi Iron Pillar, an exclusively written book which has been reviewed earlier¹.

The author has deliberated on the history of the Delhi Iron Pillar, its structural features, manufacturing methodology and lastly on its resistance to corrosion. He has concluded that the side-way horizontal forge-welding methodology was used to manufacture such a pillar, heated iron lumps being successively placed on the side surface of the pillar and hammered onto the same. Handling was done by clamps and rotating pegs.

The author has also established that the corrosion resistance of the Delhi Iron Pillar is largely on account of the yellow layer of crystalline phosphate FePO_4 , H_3PO_4 , $4\text{H}_2\text{O}$. Did the phosphorus enter into the metal from the ore or from the charcoal ash? The present reviewer suggests that the corrosion resistance of the Delhi Iron Pillar is partly due to Delhi (low humidity) and partly due to iron (high phosphorus). There is a need for controlled experiments on some specially prepared phosphoric iron samples in a high humidity environment.

Reverting to the subject of forge welding, it is unfortunate that the author has barely hinted at the antiquity of the Indian technology (pp. 13–14), but *not* elaborately discussed the forge-welded laminated object technology in the Hallur area dated to 1200–1000 BC. O. P. Agrawal and his co-workers at the National Research Laboratory for Conservation of Cultural Property, Lucknow demonstrated that the cutting edge of the Tadakanhalli axe has a banded structure caused by forge-welding of *three* carburized and *four* uncarburized layers. Many such objects, found in the area, do not show any evidence of steeling. Pranab Chattopadhyaya may be credited to have shown the earliest evidence of steeling in the 3rd century BC Pandu Rajar Dhibi sickle, which reveals martensitic structure with adequate micro-hardness. These data obtained during 1989–90 have been described in detail elsewhere². Vibha Tripathi (2008) has also rendered justice to this subject.

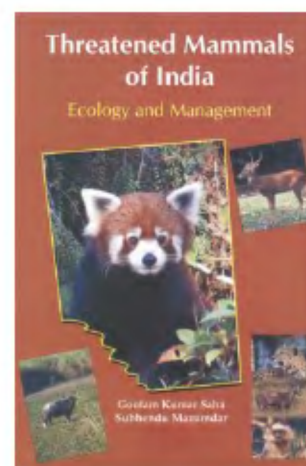
The author has also thoughtfully pursued his modern investigations on the ancient wootz steel in this book, with collaborators such as Sharada Srinivasan. An Indian counterpart of the *SCC* can certainly be collated and published by a dedicated team of science historians and

archaeological scientists. In conclusion, I recommend that this book be a part of all libraries in the world.

1. Biswas, A. K., *Indian J. Hist. Sci.*, 2008, **43**, 303–308.
2. Biswas, A. K., *Minerals and Metals in Ancient India*, D. K. Printworld, New Delhi, 1996, vol. I, chapter 12.

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Threatened Mammals of India. Ecology and Management. Goutam Kumar Saha and Subhendu Mazumdar. Daya Publishing House, 1123/74, Deva Ram Park, Tri Nagar, Delhi 110 035. 2008. 162 pp. Price: Rs 700/US\$ 35.

The science of conservation in India, many contend, is biased towards mammals to the neglect of other faunal groups. Reasons attributed to this bias include, at the very basic level, a grudging admiration for the aura and charisma that mammals exude. At a much different level is the fact that mammals have played a pivotal role in the development of large-scale conservation programmes that are seemingly species-specific, but pan across landscapes and political boundaries. Project Tiger and Project Elephant are two such well-known examples.

Paradoxically, there is a general paucity of reference material on mammals in

India. And contrary to popular notion, this lack affects a cross-section of people and organizations. While students continue to be the most affected, other interest groups such as the media, legal experts and community-based organizations also bear the brunt.

It is in this context that books such as the one under review can play a critical role. For instance, a simple question on the number of organisms under various categories of threat in India is often the most difficult to answer. Worse is the case when the Red List and its categories are interchangeably or loosely used. Saha and Mazumdar attempt to fill this lacuna in the current book. Sadly though, the book falls short of expectation. The book, spanning about 160-odd pages, is divided into sections that provide an overview of conservation in India, followed by a detail on the IUCN Red List and its categories, descriptive accounts on each of the mammals listed for India and a conclusion on the various legal provisions in existence for the conservation of mammals.

The first step that one would have to take in such an effort is to identify the target group/readership. Assuming that when this question is not asked, the book would naturally be fit for general reading is rather erroneous. This is amply reflected by the patchy writing in this book, with certain portions being basic, while others suddenly prop up on a completely different plane. Also illustrating our point further is the absence of a glossary and a key, a gross blunder for a book that is replete with technical terms.



The ambit of the book is vast, not only covering a number of threatened mammals but also attempting to highlight their ecology and management. And herein lies the second problem – the book fails to accord equal attention to all aspects. The best section in the book is the Introduction, despite the prosaic admiration for the glorious Indian tradition. Species

accounts dominate the book, while the focus on management is the least. Mammals being described in a nutshell is not only scant, but also rather terse and confounding. Extracts of the existing international and national legal provisions on conservation, under the guise of management of threatened mammals are disappointing. A saving grace of this section is the narrative on the 'Save Barasinga' campaign.

The importance of peer review or the lack of it in this case is illustrated by the numerous errors in the book. For instance, the scientific name of the gaur (*Bos gaurus*) is wrongly mentioned, and so is the endemic status of the Lion Tailed Macaque. That the authors did not accord importance to the numerous scientific studies is exemplified in the species accounts of which we detail the case of the Asian elephant to illustrate our point. It is well known that the Asian elephant is distributed in four major pockets of India, and not two as specified. Musth is a mating signal, more aptly described as a phase that is usually recorded in males over 25 years of age, and is not an indicator of the animal attaining maturity. Further, elephant herds are organized as bond groups and not as a family, each bond group in turn has a number of families. Studies state that the home range of the Asian elephant varies between 150 and over 600 km² – and it is rather perplexing to note that the literature referred to for the book does not contain even a single paper on the elephant. Given the rich experience of the authors on the Red Panda, it is but inevitable that it is this species that is dealt with great confidence in the book.

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CO₂ Rising: The World's Greatest Environmental Challenge. Tyler Volk. The MIT Press, 55 Hayward Street, Cambridge, Massachusetts, 02142, USA. 2008. 223 pp. Price not mentioned.

All authors – from science writers to Indian authors writing in English – face a dilemma on the choice of the audience they write for. Write primarily for an audience unfamiliar with the nuances of one's (sub-) culture, and by explaining too much, risk losing the interest of those who would understand (and may be profit) the most. Write primarily for those like oneself, and risk being incomprehensible to a wider audience.

This book aims to set forth the essential facts about the dynamics of fossil-fuel-derived carbon dioxide, its participation in the global carbon cycle, and its ties to humanity's material well-being. Unfortunately, by trying too hard to write in a style that does not scare readers who are not technically inclined, the author makes it tedious for those who may be so inclined.

As a literary device, the author personifies five different molecules of carbon dioxide, based on how they recently entered the atmosphere: from coal, oil, natural gas, an Antarctic ice core or a glass of beer. He gives them names and follows their movements though different parts of the carbon cycle in and out of the biosphere. But ultimately the choice of the places that each of the five moves through is arbitrary and the path followed by any one of them could be just as easily exchanged for another. It is unimportant to the story where each molecule ends up, where it has been, or if its travels have made it any different from the others.