



**Story of the Delhi Iron Pillar.** R. Balasubramaniam. Foundation Books Pvt Ltd, Cambridge House, 4381/4 Ansari Road, Daryaganj, New Delhi 110 002. 2005. 99 pp. Price: Rs 195.

Anybody who has been to see the Qutab Minar in Delhi would have been awestruck by an iron pillar standing in the complex. The person would have wondered what this iron pillar was doing here, who built it and when, and how come it has not rusted all these years. The chances are he/she would have seen people trying to hug it and see if their hands could meet. For most of the visitors, the matter ends there. But not for R. Balasubramaniam (Department of Materials and Metallurgical Engineering, IIT Kanpur).

He decided to find out the answers to all the questions raised above and share them with the layman. The result is a nicely written thin book, *Story of the Delhi Iron Pillar*, of about 100 pages and 40 illustrations, with a photograph of the pillar donning the cover. It is based on extensive research by the author and the journal publications are listed at the end of the book. As a matter of fact, the present book is a sequel to a research monograph published by the same author a few years ago, this time written specifically to educate the lay reader of the rich Indian metallurgical heritage.

The author has approached the problem with scientific zeal and informs the reader that the iron pillar was constructed during the time of Chandragupta II Vikramaditya (AD 375–414) and was located at Vishnupadagiri, present-day Udayagiri in the vicinity of Vidisha and Sanchi in Madhya Pradesh. He comes to this conclusion on the basis of the Brahmi inscription on the iron pillar and other archaeological evidence. With an illustrative diagram of Udayagiri, the author argues how the iron pillar played an important astronomical function in a Surya

(sun) temple complex. On the basis of available records, the author concludes that the iron pillar was moved by Illutmish (AD 1210–1236) to its present location in Delhi and even goes on to surmise how the actual movement must have taken place.

What makes the Delhi iron pillar truly fascinating is its length (23'6"), diameter (ranging from 24.59" at the bottom to 11.85" at the top) and the fact that it has not withered all these years. In addition, it has a lustre that baffles the onlooker. Interestingly, the portion that was buried underground shows signs of damage and so does the hollow slot in the decorative bell capital at the top. The latter has been protected from further damage by filling the cavity with wax.

On the basis of careful examination of the tell-tale signs on the pillar and his own knowledge of metallurgy, the author makes the reader understand that the pillar was made by forging iron lumps produced by direct reduction of iron ore using charcoal in a bloomery furnace. If the reader was brought up in a village (like the reviewer was) and had watched the local blacksmith heat up lumps of iron to red-hot stage and forge them, he/she would understand what the author is saying. But putting together lumps of iron to such magnificent proportions is no mean achievement! It must have required all the ingenuity and technical skill the artisans had 16 centuries ago. The author then outlines how this must have been accomplished.

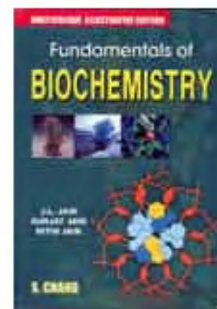
The author goes on to unravel the mystery of the iron pillar not having corroded to the core all these years. He traces it to the high phosphorus content in the iron that went into the making of the pillar and the formation of a protective layer of crystalline iron phosphate just below the thin cover of rust on the surface. What makes the crystalline phosphate layer protective is a mystery that remains to be solved. But the author goes about describing spectral and X-ray diffraction results that support his explanation.

Nicely written at a level that non-experts can understand, the book becomes slightly technical towards the end. The author could have easily avoided some of the typos. Perhaps most unforgivable is the incorrect spelling for phosphorus in some places. But these minor imperfections in the book about the nearly perfect iron pillar should not dis-

tract the enthusiastic reader from completing it in one go!

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**Fundamentals of Biochemistry.** J. L. Jain, S. Jain and N. Jain. S. Chand & Co Ltd, New Delhi 110 055. 2005. 6th edn, 1230 pp. Price: Rs 525.

The senior author, J. L. Jain had been teaching biochemistry for several years. Using his rich experience as only a teacher can, Jain has organized the contents of this textbook to include all the necessary information, limiting it to about 1200 pages. Classical topics such as vitamins, hormones and nutrition have been treated well adding newer developments, in contrast to the neglect they received in some textbooks. A welcome addition is the chapter on biochemical techniques. Protein targeting and degradation is dealt in a full chapter. Information on fast-growing molecular and cell biology are added at appropriate places as is necessary for a biochemistry textbook. Sections on free radicals and antioxidants are rather poor. Information provided on p. 1012 appears to be from an obscure chemical source on the formation of radicals by ionizing radiation rather than biological. Oxygen radicals, reactive oxygen species and antioxidants could have given added value to this book, as they are current active fields. In fact, some misleading statements and presentations are allowed: 'free radicals are very reactive. In fact many of them react with  $H_2O_2$ ' (p. 1012, box); box on p. 274 is a poor representation of the radical species, as carbon or oxygen atoms do not have the customary dot.

Illustrations, photographs (including three-dimensional ones of many proteins), figures, tables and formulae are done with care. The colour, circles and boxing have added easy expression, e.g. coordinated control of glycolysis and Krebs cycle by effectors (p. 501). Boxes at many places regarding personal anecdotes of scientists are a good feature. It is often said their science is used but scientists are forgotten.

Not many know about the loss of a hand of Sumner, but he carried on to prove that enzymes are proteins despite strong opposition from his peers. At the same time I cannot understand omission in this list of Y. Subba Row (of Indian origin), who is credited with the discoveries of ATP, creatine phosphate and folate.

It is most pleasing to see a good quality textbook produced in India. This is by

far the best I have seen coming out of Indian authors and the Indian press. Both have to be congratulated for bringing out this book at an affordable price.

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