

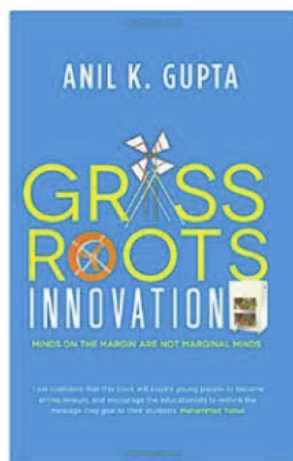
Kopp was not the first to indulge in imagination to explain his science, and the history of science is a testament to the fact that he was not the last. Think Max Planck, Niels Bohr and Albert Einstein.

Science and imagination. Seemingly unlikely bedfellows at first thought, but a closer look reveals otherwise. How does one explain the role of imagination in science, given that the hallmark of science as we know it is empiricism? In essence, this is the question that Rocke, and ultimately Kopp seem to be grappling with. Do we have answers? Yes and no.

In Rocke's translation, Kopp at places appears somewhat obscure as he moves easily from a Mozart reference to a sonnet of Shakespeare as his molecules go about enjoying these finer things in life. (Kopp initially trained to be a philologist, but turned to chemistry, inspired by Leopold Gmelin.) Rocke on his part makes these analogies understandable for the reader with his extensive footnotes. This fantasy world of Kopp is ultimately not for the general reader, but will make an interesting read for someone with interest in the history of chemistry in general, and the workings of scientific imagination in particular. In looking up certain biographical sketches of Kopp on-line, I found that some authors consider him the first historian of chemistry. Though there were other histories of chemistry before Kopp's, none was as accurate and comprehensive as the *Geschichte der Chemie*. For this reason, and for Kopp's seminal contributions to chemistry, his anthropomorphic molecules will find takers. In the final analysis, this stroll through Kopp's aerarium is an invitation to dream.

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**Grassroots Innovation: Minds on the Margin are not Marginal Minds.** Anil K. Gupta. Penguin Books India Pvt Ltd, 7th Floor, Infinity Tower C, DLF Cyber City, Gurgaon 122 002. 2016. 381 pages. Price: Rs 599.

Innovation, a buzzword in the globalized world economy, predominantly refers to technological changes within the formal sector, although the genealogy of the word shows its use in ancient and medieval times with a negative connotation. This was not an important concept until the 'Schumpeter Mark I&II' that has changed its understanding and revolutionized the field of innovation studies. Also, the agents of change in Mark I, i.e. individual innovators were replaced by firms in Mark II. However, at the turn of the 21st century, scholars and policymakers once again focused on individual innovators, especially in the informal sector in India. This book is a timely intervention in terms of highlighting the contribution of these 'unsung heroes' or the 'grassroots innovators', as termed by the author Anil Gupta.

The author, a renowned name in the field of grassroots innovation, describes such innovators as a rich source of knowledge and inspiration for millions in the country. He has been the brain behind institutions and networks like Honey Bee Network (HBN), Society for Research and Initiatives for Sustainable Technologies and Institutions, Grassroots Innovation Augmentation Network, National Innovation Foundation and many more such initiatives to support the grassroots innovations movement. This book is an elaborate narrative of the author's journey, and the associated experiences and experiments with the

grassroots innovations over two and half decades in and outside India.

The book contains eight chapters; the introductory chapter rightly sets the tone by introducing the philosophy behind the grassroots innovations movement in India. It also unlocks many hidden tales and anecdotes from the author's college days, tracing the genesis of this movement. The author attributes his ideas to this fairy-tale journey and how it fed into his thought process to help him reach the present position in his life. The second chapter, in continuation with the first, explains in detail the context of setting up HBN in India. However, one has to note that the Network's roots can be traced in the philosophies of Gandhi and Tagore, and their discussion on *Charkha* and *Shantiniketan* respectively<sup>1</sup>. The author too has acknowledged Gandhi as the source of ideas on several occasions. Further, the author has provided a detailed account of individuals, institutions and organizations engaged in the process and problems faced by the movement. Such an experiment of creating networks of organizations in itself was an excellent example of organizational innovation in the context of informal sector innovations. The narratives are relevant and useful, especially for the young generation when it is looking for start-ups in the formal sector, and this experience may encourage youngsters to think about informal sectors too.

The third chapter discusses *Shodhyatra*, one of the important institutions related to grassroots innovations, organized twice a year by HBN mostly in remote locations of the country. The idea is to seek, recognize and reward the knowledge of grassroots communities at their doorsteps. So far, HBN has organized 38 such yatras, which have proved instrumental in building trust with the local communities across India. The chapter is further enriched by many experiences from the field that are shared by the author to highlight the institutional innovation by the network.

The fourth and fifth chapters are dedicated to knowledge of grassroots communities. The author argues that we are largely ignorant of the developments happening at the grassroots level. However, he strongly puts forth the need to pay special attention to such innovations happening at the grassroots level; also people can be trained to cater to the specific needs of their local settings. The

## BOOK REVIEWS

activities of HBN provide such training to observe innovative practices in one's own surroundings. Stories discussed in these chapters also highlight the problems and challenges at the grassroots level. While the responses to the problems are innovations at the grassroots level, these are generally ignored by the formal sector due to apathy or realization of lack of market opportunities. The author suggests that we need to give extra care to the local-level problems and be empathetic to the works done by the local communities to solve them, along with attention to the unexplored creativity of the young minds. Thus, knowing, feeling and doing for the grassroots communities would be a new mantra for the sector.

The sixth chapter looks into concepts like 'grassroots innovations', 'frugal' and 'Jugaad' innovations. Despite differences, these concepts are often used interchangeably<sup>2,3</sup>. The author also highlights the differences by looking into the formal and informal sectors, and acknowledges that grassroots innovations are more environment-friendly than the others. Further, he has problematized the comparison of grassroots innovations with the word jugaad as the latter has negative connotations too. Moreover, he explores several dimensions of frugality for grassroots innovations such as material, multifunctionality, repurposing and rejuvenation, flexibility and location-specific adaptability, availability, affordability and accessibility. He argues for a frugal lifestyle, which is not per se a new phenomenon, and many societies are practising it in one or the other way.

Chapter 7 reflects on various modes of resource mobilization, for instance, natu-

ral, social, ethical and intellectual capital for supporting the cause of grassroots innovations. The last chapter sums up the learning one can derive out of grassroots innovations. According to the author, these seem so insignificant or trivial that we tend to be ignorant about them in our routine life. However, if one pays a little attention, these minuscule and largely overlooked phenomena can be a great source of learning. This is the crucial message that the author echoes for his readers.

The book is a comprehensive yet lucid narrative of the knowledge and experiments by HBN with the marginalized people. Further, it highlights the interaction between the formal and informal sector entities, and its outcomes. However, from an academic perspective, drawing a connect between theory and practice could have made this narrative more interesting given the author's sound background in this field. Perhaps, the activist in the author played an influential role while documenting his journey. A theoretical model is all the more needed to capture the nuances of informal sector innovations, as the existing theories in the field of innovation studies are more relevant to the formal sector. In this context, the author could have surely made a noteworthy contribution. While he has highlighted the positive aspect of such innovations and experiments done by HBN, there are several cases of neglected and 'failed technologies' among grassroots innovations which should have also been discussed by him. Moreover, the book could have given more space to the works of female innovators. However, the author has explained his reasons for not doing so, and mentions one of HBN's new initiatives – the

'Ignite Award', to invite more entries from female innovators.

The book succeeds in substantiating the author's ideas and arguments by drawing support from real-life examples. He has also given some meaning to various ancient tales and sayings from the past by putting them in today's context, especially in the informal settings. The writing style is captive and readers will enjoy these narratives. In fact, many a time the reader feels like a fellow traveller with the innovators and having a face-to-face interaction with them. This book certainly deserves to be published in other regional languages to have a cross-sectional reach and spread the message of grassroots communities. The book will give more insights to researchers, policy-makers and individuals interested in this field of knowledge for understanding the informal sector innovations from a different perspective.

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2. Kumar, H. and Bhaduri, S., *Afr. J. Sci., Technol. Innov. Dev.*, 2014, **6**(1), 13–22.
3. Sheikh, F. A., *Afr. J. Sci., Technol. Innov. Dev.*, 2012, **4**(4), 2012.

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## Corrigendum

### **Indian Journal of History of Science. Thematic issue: Knowledge Production in Pre-Colonial India – Methodological Aspects**

**C. C. Kartha**

[*Curr. Sci.*, 2017, **112**, 1760–1762]

Page 1762, 1st column, line 49, read as 'c 3000 BC' instead of 'c 300 BC'.

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