of nuclear physics, as one populates the various allowed energy levels in nuclei which are themselves composed of protons and neutrons, and generate the potential in which they live, Pauli's principle dictates the structure of the nucleus. Since nature has so kindly provided a third relatively light and long-lived quark, namely the strange quark, one can create a cousin of the proton and neutron, which has a strange quark in place of one of the up or down quarks, leading to a strange baryon (hyperon). This can be used to then break the spell of Pauli's principle and probe energy levels of the nucleus as we now have a distinct particle which would otherwise have been forbidden. This has led to the development of the field of hyper-nuclei. One could then consider the possibility of having two strange quarks and create a doubly strange hyperon, and study the nuclei in an unprecedented manner. Hiyama and Nakazawa review the status of this fascinating field in 'Structure of S = –2 hypernuclei and hyperon–hyperon interactions'.

Despite the long history of nuclear physics in terrestrial experiments, the field of nuclear physics in the cosmos, which is now called nuclear astrophysics is a challenging one. While the abundance of light elements can be worked out in big bang nucleosynthesis, we know that heavy elements must be made of instellar interiors, and very heavy elements must have come from supernovae. Very old stars bear the imprint of the stellar cauldrons in which heavy elements must have been produced, and yet there are mysteries as regards some elements which require a neutron-rich environment. Today, with LIGO having definitely observed a neutron-star merger, some puzzles may get resolved. This fascinating subject has been reviewed in Frebel's 'From nuclei to the cosmos: tracing heavy-element production with the oldest stars'. Tatischeff and Gabici in 'Particle acceleration by supernova shocks and spallogenic nucleosynthesis of light elements' describe the puzzles facing the supernova remnant paradigm for the origin of galactic cosmic rays and describe the abundance of light elements in old stars. Thus, in these two articles one sees the delicate interplay between the fields of nuclear physics and astrophysics.

In conclusion, the present volume has a collection of attractive and accessible articles from leading experts on fields ranging from colliders to the cosmos, from particle physics to nuclear physics, and the interplay between these distinguished fields.

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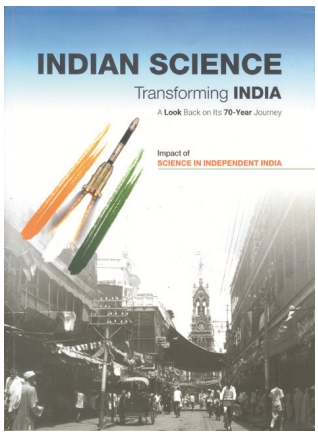


Indian Science: Transforming India – Impact of Science in Independent India. L. S. Shashidhara (ed.). Indian National Science Academy, Bahadur Shah Zafar Marg, New Delhi 110 002. 2018. viii + 177 pages. Price: Not mentioned.

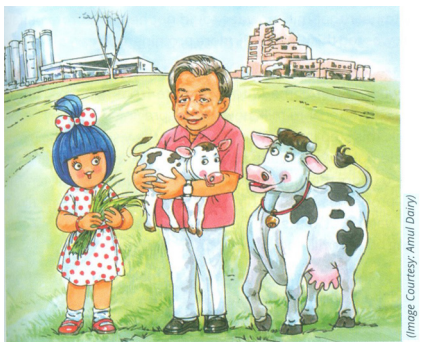
India achieved independence just over 70 years ago. Though the figure is not a specific anniversary, unlike, say, a golden jubilee or a platinum jubilee (which it will be in 2022), it is still a good time to learn about our successes in science. In April 2018, the Indian National Science Academy released a book with some of these success stories.

The selection of topics in this book, for areas that India has made progress in, is eclectic. Thus, we read about our achievements in the production of Samba Mahsuri and Basmati rice, in the shrimp industry, plant tissue culture, the diamond industry, etc. For instance, Basmati rice can be distinguished from adulterated rice using DNA fingerprinting, thus leading to identification of authentic rice, resulting in better exports. Mechanization in the diamond industry has led to over 12,000 laser units in Surat, with a resultant loss of 90% of the diamond-cutting jobs in Antwerp and 70% of those jobs in Israel, to Surat.

I must admit that I knew nothing at all about many of these areas and the book certainly achieves its first aim of showcasing the unsung areas that we have made progress in. Hopefully, it will achieve success in its other aim – that of inspiring more scientists to tell us their stories of research in science.

Not surprisingly, Amul, the Indian dairy company gets a chapter. (Perhaps there should have been a reference to the Amul advertisements too – after all, they are in a class of their own.). Medicine makes it appearance in more than one chapter, and there are essays on Shantha biotechnics and its vaccines as well as one on the blood bags manufactured by Penpol, and a separate chapter on generic drugs in India. I did wonder why atomic energy and space research have been left out – after all, they are easily India's biggest success stories, along with the green revolution. While it is commendable to highlight the lesser known areas, I think it would have been appropriate to have had something on the above topics too.

Any person with a science background who reads this book would no doubt be impressed to learn where the Indian researcher publishes – the rice research papers have been published in *PLOS ONE* (Samba Mahsuri rice) and in *Proceedings of the National Academy of Sciences (USA)* (Basmati). The tone is chatty, as it should be, in a book that is meant to popularize the science that is



One of the famous Amul cartoons in honour of Verghese Kurien.

being done in our country. The e-book can be downloaded for free at http://www.insaindia.res.in/pdf/ISTI.pdf.

However, tighter editing would certainly have helped in many areas. For instance, the references are mentioned in two places – as footnotes on each page, as well as at the end of the chapters on diamond industry and on generic drugs. I can think of no good reason for this duplication of information. In fact, on p. 27, reference 5 is repeated; we also discover that references 7 and 8 are absolutely the same. (By sheer coincidence, all three references are to the same journal – *Current Science*). Also, Wikipedia is quoted as a reference on at least one page (p. 86). While Wikipedia is often the go-to reference site for most laypeople now, scientists should abjure quoting it as a reference because it is a secondary and not a primary source of information. Indeed, some of the essays have too many web-based references, and with no reference to the last date accessed.

Likewise, while p. 12 mentions that indelible ink is exported to about 25 countries, p. 8 states that it is dispatched to over 15 countries. There is no ISBN number recorded in the book, nor is there an index (the latter, I accept, is probably not essential).

One final point. This may be pernickety but I think the title 'Science and Technology' would have been appropriate, rather than 'Science' alone. Strictly speaking, the book deals with more of technology rather than pure science.

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