Ajowain seed.

However, there is little evidence of any serious editorial intervention. The extent of repetition and overlap in the contents of multiple chapters indicates lack of any substantive editing. Tamarind, for instance, features in three successive chapters; 'bael' (*Aegle marmelos*) and a couple of others, in two of those three chapters; and jamun not only features in the two chapters, but also has a chapter to itself. The length, and presumably the depth, also vary considerably: camelina (*Camelina sativa*) has 25 pages, 'lasoda' (*Cordia myxa*) has only 2.5, and *Embelia ribes* has two chapters, the second devoted almost exclusively to propagation and cultivation techniques. Even in the chapters devoted to individual species, the treatment is not uniform across chapters: the chapter on castor has a section titled 'Draft genome sequence and annotation of *Ricinus communis*'; that on cactus pear devotes two pages to structural formulae of some chemicals found in the fruit; that on jujube has a section titled 'Current scenario and research needs' and jamun alone seems to have future prospects (going by the heading, that is).

By definition, many of the species described in the book are not widely known, and the inclusion of their photographs, in full colour, is a useful feature. Unfortunately, the total absence of scale makes the photographs far less useful. The close-up of ajowan (*Trachyspermum ammi*) seed (p. 107) and that of *Elaeocarpus floribundus* (p. 94) are good examples: the photographs are clear, but since there is no indication of scale, it is hard to know the true size of either.

If substantive editing is cursory, copy-editing is dismal: the text is marred by poor grammar, which at times obscures the meaning, as in 'For preparations of wine, the whole fruits are pressed without crushing' and 'Accession of fruit from NEH region indicated the fruiting season is midseason and dates July.'

All in all, although this book is useful as a compendium of information and an exhaustive survey of the literature on the chosen crops (the chapters are listed below), I wonder whether it offers value for money.

List of chapters: aquatic vegetables, aquatic weeds as potential future foods, underutilized fruits of Indian arid zone, underexploited and lesser known fruits of Mizoram, underutilized spices, cactus pear, camelina, castor bean, citron, delphiniums, *Embelia ribes*, propagation and cultivation techniques of *Embelia ribes*, jujube, jamun, lasoda, mappia, palmyrah, *Salacia oblonga*, *Saraca asoca*, and water chestnut.

1. http://landinstitute.org/
2. http://www.cropsforthefuture.org/
3. Underexploited tropical plants with promising economic value, National Academy of Sciences, New York, 1975.
4. www.theguardian.com/global-development-professionals-network/2014/may/16/food-crops-africa-plant-breeding-academy
5. www.cropsforthefuture.org/about-us/what-are-neglected-and-underutilised-species/

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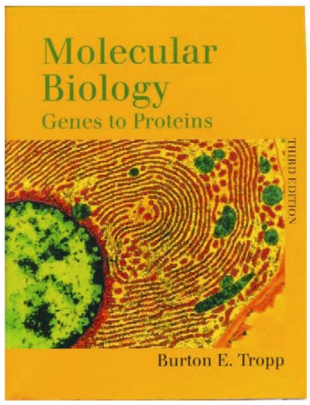

Molecular Biology: Genes to Proteins. Burton E. Tropp. Jones and Bartlett Publishers, Sudbury, Massachusetts, USA. 2008. 3rd edn. 1000 pp. Price: US$ 126.95, £34.99. ISBN 978-0-7637-0916-7.

This undergraduate textbook by Tropp is a comprehensive guide through the basic molecular processes and genetic phenomena of both prokaryotic and eukaryotic cells. Revised and developed from late David Freifelder's classic *Molecular Biology* (1st edn, 1983; 2nd edn, 1987) that stressed structure–function relations, this book has incorporated the important advances made since the second edition of Freifelder's classic. A tribute to the original author reads, 'David Freifelder taught biochemistry and molecular biology first at Brandeis University and later at the University of California, San Diego. His research interests and expertise were in a broad range of subjects. Therefore, he was qualified to write both general and specialized textbooks … From his teaching and writing experiences he developed a remarkable understanding of the ways in which students learn.' The task of maintaining lucidity despite incorporating increasing complexity is a daunting one, but Tropp has done that rather well in this book.

The term 'molecular biology' is appropriately shown to have first been used in 1938 by Warren Weaver to describe a research approach in which physics and chemistry would be used to address fundamental biological problems, though two studies in the 1860s by Gregor Mendel and Friedrich Miescher laid the intellectual foundation. Since little molecular biology is taught at the school level, the contents of this book represent the most fundamental/important topics in Tropp's view. A total of 247 scientists from Julie Ahringer to Joost Zomerdijk have been discussed in the book.

While the first chapter introduces molecular biology itself, the second and third chapters are on protein structure and function respectively; chapters 4–6 are about nucleic acids and nucleoproteins. These six chapters in 210 pages form the base for the rest of the text. An example of historical development of ideas is given at the start of chapter 6 about chromosome structure: 'Until the mid-1970s, biologists' view of chromatin was colored by the belief that all life on Earth belonged to one of two primary lineages, the **eukaryotes** (animals, plants, fungi that have a defined nucleus) and the **prokaryotes** (all remaining microscopic organisms that lack a defined cell nucleus). Based on this classification scheme and what was then known about chromatin structure, it seemed likely that prokaryotes would have one type of chromatin structure and eukaryotes

would have another. Then in 1977, Carl Woese proposed that the prokaryotes actually contain two types of organisms, the bacteria and the archaea. Despite the fact that bacteria and archaea both lack a defined nucleus, archaeal and bacterial metabolic machinery differ from one another as much as either differs from eukaryotic metabolic machinery. With the identification of the archaea, the living world was divided into three domains, the bacteria, the archaea and the eukaryote.'

In chapter 7 on genetic analysis, the author enumerates the advantages of using budding yeast, as *Escherichia coli* is not an effective model system for answering questions unique to eukaryotic cells. Further, unicellular yeasts are easy to grow in liquid suspensions or solid surfaces and have a doubling time only twice that of *E. coli*. The intracellular organization of a yeast cell is typical of a eukaryotic cell. However, the problem with yeast is: 'The yeast cell membrane is surrounded by a tough thick cell wall made of polysaccharides and polypeptides, making it very difficult to disrupt the cell without causing major damage to the cell organelles. This problem was solved when a snail gut enzyme was shown to degrade the yeast cell wall, allowing yeast cells to be gently disrupted.'

In chapter 8 on viruses in molecular biology, Tropp writes, 'The first clue to the existence of bacterial viruses came in 1896 when the British bacteriologist Ernest Hankin observed that the sewage-ridden Ganges and Jumna Rivers in India contained an unidentified substance that passed through a fine porcelain filter and had the ability to kill *Vibrio cholerae*, the bacterial species that causes the often fatal disease, cholera. Hankin recognized that the filterable agent helped to control the level of the pathogenic bacteria in the river by killing the bacteria but did not attempt to determine the nature of the agent.' Frederick Twort encountered a similar agent in 1915 and suggested it might be a virus; in 1917, French physician Felix d'Herelle prepared a filtrate from the stools of patients who had recovered from dysentery and named it bacteriophage, a term that still continues.

Tropp integrates life experiences leading to discoveries, e.g. 'Bruce Ames started to think about this safety issue in 1964 while reading the ingredients on a box of potato chips. He wondered how he could tell whether preservatives and other additives might be carcinogenic. His curiosity eventually led to his discovering a test, which, after undergoing several modifications and improvements, is still used today to determine whether a chemical substance has a high probability of being a carcinogen.'

The Human Genome Project has been summarized in chapter 17, the last among three consecutive chapters on RNA polymerase II, in the context of co-transcriptional and post-transcriptional processes. Here the size distribution of introns in three eukaryotic genomes, i.e. human, worm and fly, has been compared. Human introns tend to be larger than either the worm or the fly introns, though the size distributions are broad. Exons tend to be more uniform in size among human, worm and fly, mostly between 50 and 200 base pairs long.

Only four principal investigators of Indian origin are among the 247 scientists included in the main text and index of this book. They are: late H. Govind Khorana (USA), Venkatraman Ramakrishnan (USA, UK), Jamshed R. Tata (UK) and Rajagopal Chattopadhyaya (India).

Out of a total of 1660 references in the book there are 59 original papers listed has co-authored by one or more Indian origin. Arranged alphabetically by the last names, including Indian origin names only, these coauthors (year of publication) are: Sankar Adhya (1981), Aneel K. Aggarwal (1995), Rajendra K. Agrawal (2000), Rajagopal Chattopadhyaya, Kaushik Ghosh, Veriketta M. Haridasan Namboodiri (2000), Rajagopal Chattopadhyaya, Atasi Pal (2004), Jayanta Chaudhuri (2004, 2004), Rita Das (2000), Chanchal Das Gupta (1982, 1983), Santanu Dasgupta (2000, 2004), Alok Dhar (2005), Anjali Dhiman (2000), Anindya Dutta (2002), H. Govind Khorana (1968), Subramanian Sri Krishna, Indraneel Majumdar (2003), Anuj Kumar (2004), Sohail Malik (2005), Rupak Mitra (2004), Arun Malhotra (1996), Maumita Mandal (2004), N. Manjunath … Premlatha Shanker (2006), Jayanta Mukhopadhyay (2002), Sashidhar Mulugu ... Shamsuzzaman … Deepak Bastia (2001), K. Muniyappa (1984), Subbaratnam Muthukrishnan (1975), S. K. Nair (2003), Geeta J. Narlikar (2002), Krishnamurthy Natarajan (2001, 2002), Shilpa Pandit (1999), S. S. Patel (2000), Satya Prakash (2005), Madaiah Puttaraju (2000), Sathees C. Raghavan (2006), Srinivasan Raghunathan (2000), Seesandra V. Rajagopala (2004), Uttam L. Rajbhandary (he is Nepali; 1994, 1995, 1997, 1998), B. Ramakrishnan and M. Sundaralingam (1995), Venkatraman Ramakrishnan (1997, 2001, 2002, 2003, 2003), Urmila B. S. Rawat … Jayati Sengupta (2003), Anjanabha Saha (2005), Nilima Sarkar (1996), Jayati Sengupta (2002, 2003), Girish C. Shukla (2002), Sachdev S. Sidhu (2001), Devanjan Sikder (2005), Gayathri Srinivasan (2002), Hosahalli S. Subramanya (1998) and Siva Ramesh Wigneshweraraj (2002). Again, except for the 2 papers from Chattopadhyaya and coworkers, the studies for the remaining 57 papers were carried out in the USA or Europe.

Among the 1,660 references in Tropp's book, other than research papers, are a DNA isolation and sequencing protocol book by A. Khan (1996), a book on human chromosomes by R. S. Verma and A. Babu (1995), a book chapter by S. Adhya (1996), three entries in the *Encyclopedia of Life Sciences* (John Wiley, 2001) authored by Rajendra K. Agrawal, S. Chandrasegaran, J. Kohli on ribosome structure, restriction enzymes and meiosis respectively.

The front cover is an attractive and colourful presentation of a transmission electron micrograph of a mammalian cell nucleus (green), rough endoplasmic reticulum (red) and mitochondria (turquoise). Though the back cover mentions that it is a continuation of Freifelder's classic, it will help to do so on the title page as well in future editions. This is a splendid textbook that is clear, lively and written in an engaging style.

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