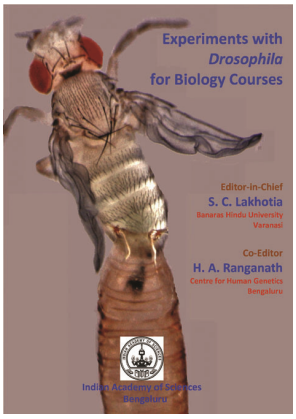
compounds from the surface bound bacteria influence the metamorphosis of the larvae. The diet dependent changes in gut microflora are of huge interest. Could one design live sensors to sense disease biomarkers? Interestingly, inspired by the chemosensory properties of microbes, synthetic biologists have indeed made progress in this direction to design genetic networks to sense and emit visual signals. In response to poor nutrients or other stress signals in the environment, the endospore forming Firmicutes begin the process of sporulation. This is an ancient topic of study, but continues to offer important knowledge to developmental/differential gene regulation and finds important space in this volume of *ARM*. Metagenomics is adding to our better understanding of the microbial world; but there is dire need of better bioinformatics/analytical tools to make full use of the data. The articles also make a case for single-cell genomics and metabolomics data to study the microbial networks. It is a war out there and microbes use multiple strategies to survive and thrive. So while bacteria (archaea too) developed the CRISPR-Cas systems to immunize them against viruses (or foreign genetic elements), the invading entities ('the genetic parasites') developed anti-CRISPRs (Acrs)-mediated immune suppression. The volumes of *ARM* have usually covered the aspects of malaria, which continues to be a huge burden for humankind with over 400,000 deaths in 2018. Interestingly, the articles in this volume discuss the origin of human malarial parasite, development of drug resistance in *Plasmodium*, and the gene drive and microbial manipulations to incapacitate the mosquito vector. Given the human interventions with nature, and the increasing risks of zoonoses, these are important topics to be covered. The topics of archaeal DNA replication, and the evolution of the centromeric regions in fungi are also covered in this volume. Another article discusses the class of bacterial and archaeal nitrogenases which use vanadium (V) and iron (Fe) only as transition metals (V/Fe or Fe/Fe cofactors in place of Mo/Fe cofactor), and these may well be important for the microbes in the molybdenum-limited environments. Other important articles that do not directly fall into the prominent themes of chemical ecology or malarial biology, cover advances made (by cryoEM) in membrane functions of phototrophic bacteria; mechanisms of phase variation as an epigenetic regulatory mechanism of virulence and immune evasion; structure and function of Ro60 ribonucleoprotein and the noncoding Y RNA present in all domains of life; role of functional amyloids in signalling pathways; structure-based understanding of catalysis of methanogenesis; reproductive isolation of *Saccharomyces* species; and the capability of the bacterial world in developing a tremendous diversity despite their smaller genomes.

I enjoyed reading through this volume of *ARM* and got to learn a whole lot of new things. Clearly this volume like the earlier ones in this series, would serve as an excellent resource for preparing lectures or a ready reference for research. All articles are extremely well written to provide a lasting impact of the topic. The editors have all done a tremendous job in bringing out this volume of *ARM*. I congratulate them, and highly recommend this book to the students and researchers alike.

UMESH VARSHNEY

Department of Microbiology and Cell Biology,
Indian Institute of Science,
Bengaluru 560 012, India
e-mal: varshney@iisc.ac.in



Experiments with *Drosophila* for Biology Courses. S. C. Lakhotia and H. A. Ranganath. Indian Academy of Sciences, Bengaluru 560 080. 2021. x + 618 pages; e-Book.

The 'Cinderella of genetics', *Drosophila*, is one of the most popular model organisms in the field of research. Researchers have a long association with this multicellular organism employing it to study diverse aspects of biology for over a century. The book under review is an open-access book whose editors are well known in the field of *Drosophila* research. S. C. Lakhotia (Banaras Hindu University, Varanasi) has more than five decades of experience in *Drosophila* research. He has made notable contributions in the fields of chromosome biology, non-coding RNAs and stress response. He is the recipient of numerous prestigious accolades including the Shanti Swarup Bhatnagar award, one of the highest Indian science awards in India. H. A. Ranganath (University of Mysore, Mysuru) has been working on the *Drosophila* model for more than five decades and has carried out pioneering studies on the genetics of speciation and evolution. He also has several awards to his name and is the Founder Vice-President of the Indian Society of Evolutionary Biologists. It is noteworthy to mention that the academic lineage of the pioneering Indian *Drosophila* researchers, including Lakhotia and Ranganath goes back to Thomas Hunt Morgan.

Hands-on-training with model organisms gives a better appreciation of science and bridges the gap between the virtual world of reading and the life in motion. This book takes note of the lack of experimental studies with model organisms at the undergraduate and postgraduate levels in science. The editors and fly researchers across India have compiled this volume to cater to the needs of researchers, teachers as well as students. They do so by offering experiments with fruit flies to provide a practical understanding of diverse life processes. In the words of the editors, it is an effort to 'bring life to life science courses'.

Experiments with fruit flies are advantageous in terms of time and economic requirements. This book is a compendium of extensive fly-based laboratory protocols. Many experiments require minimal basic set-up and are devoid of any ethical constraints. The protocols have been prepared in the laboratory manual format providing a background, stepwise description of the procedures followed by analytical questions to refine the understanding of the subject matter. These laboratory exercises cover diverse aspects of biology and are written by the relevant experts. The experimental procedures should inculcate a good understanding of developmental biology, genetics, molecular biology, immunology, behavioural biology, neurobiology and a host of other topics covered in the protocols. With a generous fly community and the simple set-up, majority of the experimental procedures should not be a difficult task to carry out in most institutions.

The *Drosophila* genome bears a striking similarity with the human genome with

nearly three quarter of human disease genes having related sequences in flies. This makes *Drosophila* an ideal organism to study basic life processes and model human diseases. The complex architecture and the anatomical differences between humans and flies may seem too divergent at a first glance. However, at the fundamental level they share a great functional similarity. This has evinced in the wealth of knowledge that *Drosophila* research has contributed to the different fields of biology. It is further reiterated by the fact that fruit flies were integral to the work of six Nobel Prizes.

The book opens by giving a brief history of *Drosophila* research and introduces us to the fly husbandry. It makes us familiar with the basics of fly genetics like nomenclature, phenotypes and other subtle nuances of fly pushing. It illustrates the fly anatomy and gives a pictorial representation of some mutant and wild-type alleles. The introductory segment is aimed to accustom the reader to the world of fly genetics. It gives us the requisite amount of basic knowledge and information about the publicly available platforms to procure the set-up for a fly room. The dedicated chapters on the protocols for experimental procedures follow this to provide a practical understanding of various life processes. They cover diverse topics and are useful for teaching and demonstrating a plethora of subjects. This potent model system will enable us to demonstrate subjects from classical genetics to the advanced CRISPR-Cas9-based genome editing. Furthermore, this dynamic book will continue to convey the advances in research by offering us the relevant fly-based protocols.

In summary, the book provides us the basic knowledge about fly husbandry and offers elegant protocols to study diverse life processes. This is a useful resource, a highly recommended book for professionals and students who wish to understand and utilize this model organism for research.

SAJAD AHMAD BHAT

Department of Biotechnology,
University of Kashmir, Hazratbal,
Srinagar 190 006, India
e-mail: sajadbhatk@gmail.com