

laying groundwork for potential future directions in dissecting pathogenesis and disease.

Metabolism and Bacterial Pathogenesis begins with chapters devoted to providing a review of metabolic pathways and pathogenesis itself. From there, readers are treated to a series of chapters that discuss metabolism and pathogenesis in a series of well-known pathogenic organisms, including *Borrelia burgdorferi*, *Escherichia coli*, *Pseudomonas aeruginosa* and, on a more general level, gram-positive as well as gram-negative bacteria. There is even an entire chapter devoted to oral pathogens and their metabolic needs. In truth, just about anyone with a more than casual interest in microbiology should be able to find a chapter-length treatment of their pathogen of interest with regard to the topics mentioned in the book's title. There should be almost no one who would not both learn something new and interesting in any given chapter, all of which were written by highly regarded researchers. The audience that is most accurately targeted would be a graduate-level course on pathogens. I can see a good number of these chapters becoming standard reading for many such courses.

That being said, there are a few issues with the book. First, and perhaps most strikingly, there is no chapter devoted to metabolomics. Surely, in a publication designed to help understand the connections between pathogenesis and metabolism, a chapter devoted to the *-omics* study of metabolism is warranted. Unfortunately, Conway and Cohen provide no explanation as to why they chose not to include one. This is, however, the only misstep attributable to the editors, with the remainder all squarely resting with the usually more than capable publisher, ASM Press. In fact, there are a number of publisher-based issues, none of which are catastrophic, but all that certainly should not appear in final print. These include misspelled chapter author names or incorrect order of author's names in chapter page headers. There are figures that are far too small to read without magnification or, in other cases, figures that are oversized. Additionally, there is an odd mix of color and black-and-white figures, sometimes even on adjoining pages. And perhaps most peevis: poor copyediting evidenced by numerous misspelled words and improper punctuation. In recommending *Metabolism and Bacterial Pathogenesis*, the suggestion is to focus on the content and not be overly concerned with the lower-than-expected fit and finish of the book itself. The content is worth the extra effort.

FABRIZIO SPAGNOLO, *Applied Biomathematics Inc., Setauket, New York*



BOTANY

PLANT BIOLOGY AND BIOTECHNOLOGY. *Volume I: Plant Diversity, Organization, Function and Improvement and Volume II: Plant Genomics and Biotechnology.*

Edited by Bir Bahadur, Manchikatta Venkat Rajam, Leela Sahijram, and K. V. Krishnamurthy. New Delhi (India) and New York: Springer. Volume I: \$299.00. xxvi + 827 p.; ill.; index. ISBN: 978-81-322-2285-9 (hc); 978-81-322-2286-6 (eb). 2015. Volume II: \$299.00. xxvi + 768 p.; ill.; index. ISBN: 978-81-322-2282-8 (hc); 978-81-322-2283-5 (eb). 2015.

This publication begins with the sentence, "Plants are essential to humanity for food, environmental intensification and personal fulfillment" (p. v). It seems to me that the writing of these books was a labor of love and personally fulfilling for the editors and authors. These volumes joyously capture the breadth and depth of research in the plant sciences over the past few millennia and they are also amazingly up to date. The solid foundations, breadth of vision, and detailed experimental observations in diverse areas of biology and biotechnology are seamlessly brought together; and neither volume could ever be considered "merely biology" nor "merely technology." Diligent readers will become familiar with all aspects of plant science and their integration that will allow the development of a meaningful, holistic, and multidisciplinary approach to think critically, as well as to solve problems in their own chosen field and/or in fields that are of national and global interest. *Plant Biology and Biotechnology* is not only a rich source of known information but also a rich source of fascinating biological problems in search of solutions that will be found by the right person. The two-volume set should be available in every library and read by any graduate student preparing for their qualifying exam or looking for a research project. If these books become widely read, they will serve as a rejuvenator as opposed to an obituary of a thoughtful, skillful, and meaningful study of plants for their own sake and to provide food, medicine, clothing, and shelter to the growing number of people in the world.

Most chapters are temporally inclusive and introduce its subject using the historical approach. This gives readers a chance to become a Leonardo, a Haberlandt, or a Bose as opposed to an expert who, according to Mahatma Gandhi, "knows more and more about less and less until he knows everything about nothing."

These volumes cover plants on almost every imaginable level of classification, from the atomic to the global, from the genetic to the epigenetic, from haploids to triploids, from the esoteric to the

commercial, from the oceans to the deserts, and in so doing, leave no plant untouched. There is a chapter on plant biodiversity and separate chapters on fungi, algae, lichens, bryophytes, cycads, angiosperms, and *Arabidopsis thaliana*.

This publication provides the critical information and knowledge necessary to undergird the growing awareness of the importance of plants in the global cycling of life's basic ingredients and the awakened awareness of the role of each of us as stewards of the environment. These books also provide the accumulated botanical wisdom necessary to carry out our responsibility to understand and address global environmental issues such as conservation, resource management, human food security, carbon sequestration, climate change, and sustainability.

The two volumes, which include over 1500 pages, are encyclopedic and extremely well organized. They cover the unreduced complexity of the plant world as well as the isolated simplicity of plants. The day I got the books to review, my wife was waxing poetically about the properties of coconut oil that she was using to moisturize her skin. Wondering what it was in the coconut oil that she found miraculous, I consulted the chapter on vegetable oil-based nutraceuticals and found that unlike any other oil, coconut oil is extremely high in lauric acid (12:0). *Plant Biology and Biotechnology* will be the go-to resource for complete and accurate information on almost any plant-related question. However, readers should still be astute, for in a work this size, there are bound to be minor mistakes such as the bibliographic entry for J. R. Green's book, *A History of Botany 1860–1900* (1909. Oxford (U.K.): Clarendon Press).

The chapter titles provide clear and accurate descriptions of their contents. Volume I includes the following chapters: Plant Biology: Past, Present and Future; Organization at the Cellular Level; Development and Organization of Cell Types and Tissues; Meristems and Their Role in Primary and Secondary Organization of the Plant Body; Origin, Development and Differentiation of Leaves; Plant Biodiversity; Fungi; Arbuscular Mycorrhizal Fungi; Diversity and Applications of Mushrooms; Lichenology; Microbial Symbionts of Plants; Phosphate-Solubilizing Microorganisms; Reproductive Strategies in Bryophytes; Cycads; Angiosperms; Genetics of Flower Development; Pre-Fertilization: Reproductive Growth and Development; Post-Fertilization: Growth and Development; Seed Biology and Technology; Mineral Nutrition of Plants; General Overview of Plant Secondary Metabolism; Photosynthesis; Induced Mutations and Crop Improvement; Polyploidy in Crop Improvement and Evolution; Male Sterility Systems in Major Field Crops and Their Potential Role in Crop Improvement; Apomixis in Crop

Improvement; Plant Volatile Chemicals and Insect Responses; Management of Pollination Services to Enhance Crop Productivity; Applications of Remote Sensing in Plant Sciences; Impact of Climate Change on Agricultural Productivity; Alien Crop Resources and Underutilized Species for Food and Nutritional Security of India; Microalgal Rainbow Colours for Nutraceutical and Pharmaceutical Applications; and Vegetable Oil-Based Nutraceuticals. Volume II includes: *Arabidopsis thaliana*; Microalgae in Biotechnological Application; Application of Biotechnology and Bioinformatics Tools in Plant-Fungus Interactions; Genetic Markers, Trait Mapping and Marker-Assisted Selection in Plant Breeding; Doubled Haploid Platform; Plant Molecular Biology Applications in Horticulture; A History of Genomic Structures; Organellar Genomes of Flowering Plants; DNA Fingerprinting Techniques for Plant Identification; Functional Genomics; Translating the Genome for Translational Research: Proteomics in Agriculture; Epigenetic Mechanisms in Plants; Bioinformatics; Systems Biology; Somatic Embryogenesis; Micropropagation in Plants; Efficacy of Biotechnological Approaches to Raise Wide Sexual Hybrids; Hybrid Embryo Rescue in Crop Improvement; Application of Triploids in Agriculture; Improving Secondary Metabolite Production in Tissue Cultures; Somaclonal Variation in Micropropagated Plants; In Vitro Conservation of Plant Germplasm; Gene Banking for *Ex Situ* Conservation of Plant Genetic Resources; Conservation and Management of Endemic and Threatened Plant Species in India; Biotechnological Approaches in Improvement of Spices; Metabolic Engineering in Plants; Genetically Modified Crops; Engineering of Plants for the Production of Commercially Important Products; Genetic Engineering Strategies for Abiotic Stress Tolerance in Plants; Genetic Engineering Strategies for Biotic Stress Tolerance in Plants; RNAi for Crop Improvement; Plant MicroRNAs; Environmental Biotechnology; Phytoremediation; Marine Biotechnology; Desert Plant Biotechnology; and Rural Biotechnology in Transforming Agriculture and Rural Livelihood.

I bet that by just reading the chapter titles, you have already begun to think more deeply and broadly about the value of plants in the world. The editors "hope that these books will help our fellow teachers and a generation of students to enter the fascinating world of plant biology with confidence" (p. x). Bahadur et al. have prepared a wonderful feast. It will be good for the soul of the individual and the soul of plant biology and biotechnology.

RANDY WAYNE, *Integrative Plant Science*, Cornell University, Ithaca, New York