

Comprehensive Cyanobacteria Review for Both the Classroom and Laboratory

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Review of: *Cyanobacteria: An Economic Perspective*; Naveen K. Sharma, Ashwani K. Rai, and Lucas J. Stal (ed.); (2014). Wiley Blackwell; West Sussex, United Kingdom. 345 pages.

This book is quite readable and I had no trouble going through it from beginning to end. The chapters are organized into five well-written, themed sections. There is also a companion website, useful mostly for providing electronic versions of each table and figure, which can be used for presentations.

This book can, without a doubt, be used for graduate courses, reference, or research. I asked myself, therefore, how the book could be used in microbiology teaching and mentoring. After reading it, I decided that, as an instructor of an upper level environmental microbiology course, I could easily incorporate sections of this book in my teaching. While it would not be suitable as the sole textbook for an undergraduate microbiology course at any level due to its narrow scope, it is now common at most universities, fortunately, to have library services whereby segments of books can be made electronically available to students while still abiding by copyright regulations.

I appreciated the way chapters often weave together background information with current knowledge and research findings. Each extensively and exhaustively referenced chapter was co-authored by different topic area specialists. In this sense, each chapter stands alone as a mini-review article.

The text is packed with tables that are often long lists that can be somewhat tedious to look at, but which are loaded with valuable “at-a-glance” information. For example, one table in Chapter 14 (Cyanobacterial Polyhydroxylalkanoates) takes up more than a full page with columns headed: Application, Example, Property, Reference. There are many more like it in almost every chapter. The black and white diagrams are helpful, but I found that in chapters that are heavy on chemistry, I would have preferred more elucidation of chemical structures, reactions, and pathways. There is a color plate section with 22 full-color versions of black and white pictures or diagrams already embedded within the chapters.

I particularly liked the last section of the book, Part V: Tools, Techniques, and Patents. Sometimes in teaching microbiology, we discuss the natural ecological roles of

phototrophic microbes like cyanobacteria but neglect to point out applied environmental applications. Chapter 18 is devoted to large-scale industrial cultivation. While it overlaps quite a bit with the previous chapter, it helpfully focuses on a case study (commercially produced *Spirulina*) and provides some excellent diagrams with matching color plates that really help the reader understand these systems.

The chapter on bioengineering is highly illuminating, with lots of information about genetic engineering that was new to me, including some broad concepts related to strategies. For example, I was unaware of the fact that the use of antibiotic resistance and herbicide resistance cassettes was generally forbidden by regulators in industrial production. This chapter forced me to think deeply about the challenges in genetic engineering and utilizing cyanobacteria for production, prompting me to develop some cases and critical thinking questions to present to my students. Chapter 21, the final chapter of the book, is about patents. Here I learned that patent applications are open access and can be mined (by students?) to learn about current advances and references to the most recent pertinent literature. Links to easily searchable databases are provided and are most helpful for educators like myself.

In summary, I find this book to be an engaging and very informative look at an exceedingly important group of microbes. It is, in every sense, an economic perspective, as the title suggests—but the authors (and editors) take great care to include ecological relevance and perspectives. I definitely recommend it.

Ruth A. Gyure

Western Connecticut State University, Danbury, CT
E-mail: gyurer@wcsu.edu