

## Biotechnology. Edited by Ulrich Kück and Nicole Frankenberg-Dinkel. De Gruyter, 2015. Pp. XV+443. Price 49.95 EUR/70.00 USD/37.99 GBP (Paperback). ISBN 978-3-11-034110-2.

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*Biotechnology* is a good companion for anyone working in the biotechnology field. While it does not delve very deeply into any one area, it provides a broad coverage of the subject, ranging from microbial to plant to animal biotechnology. In fact, the field known as biotechnology has become so broad that it is almost impossible for anyone to be knowledgeable in all areas. Hence, there is a need for the current book.

*Biotechnology* starts with an historical treatment and a big-picture view of food biotechnology. Of course, biotechnology has its roots in food preparation, with fermentation, pickling and cheese-making emerging long before scientific knowledge provided their underpinnings. The next section deals with enzymes and biocatalysis, an area that is currently expanding at a significant rate. While the treatment is basic and fundamental, there are a sufficient number of real-world examples to make the chapter engaging. The book then takes an organismal focus, first dealing with prokaryotes as expression systems in biotechnology. There is a significant focus on *Escherichia coli* as the workhorse organism for biotechnology, which is certainly warranted and well explained. The next chapter deals with fungal organisms. While the treatment is good overall, there could be more on *Saccharomyces cerevisiae*, the common yeast, as an expression organism for bioproducts. Given the toxicity of lipopolysaccharides, the expression system of choice for medicinals and other personal care products is often the common yeast. There is an interesting treatment of what is denoted, 'blue biotechnology'. Areas covered under this are rather disparate; for example, going from aquaculture to prospecting for natural product drugs in marine organisms. This leads naturally into a treatment of cyanobacteria. Cyanobacteria are, of course, crucial in global carbon capture and cycling. The prospect for fuels from cyanobacteria is perhaps a bit more rosy than the current commercial view, given the huge challenges in scaling up cyanobacterial cultures while providing sunlight and maintaining pure culture conditions. However, this is a subject worthy of coverage. There is a short chapter on strain design and -omic technologies. This would have been useful to have a more expanded coverage. The biotechnology industry leverages genomic and metagenomic information widely and so this is very important. The book does jump back onto this topic, to some degree, with a coverage of bioinformatics in the final chapter.

For those who conduct biotechnology research with organisms other than microbes, the book covers those areas, too. There is extensive coverage of higher plants, which is warranted given extensive developments in genetically modified crops that has greatly influenced agriculture in the last two decades. The chapter covers plant transformation methods as well as giving good examples of important genetically engineered crops. There is a chapter on transgenic animals and a more extensive chapter on stem-cell biology. The topic of optogenetics was somewhat surprising, but welcome. This covers the ability to influence neuronal firing *via* the implantation of optical proteins and light-driven control, and was a fascinating treatment. Another somewhat unusual, but interesting, chapter dealt with the drug approval process. The chapter started with a history of medicinal compounds and the growing pains of developing regulatory processes. It then goes on to discuss modern drug discovery and the process of getting drugs registered for market, a daunting but highly important process. The book concludes with a chapter on bioinformatics, with most examples dealing with animal genes and



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proteins. The methods apply to all sequences of course. The motif database is erroneously referred to as Rfam, which should be Pfam.

Overall the book *Biotechnology* is a very worthwhile addition to the library of scientists and non-scientists alike. Many of the chapters offer enough information in non-

technical terms to help educate non-scientists who might be in management or regulatory roles and wish to get up-to-speed on biotechnology. At the same time, most chapters offer sufficient details of methods and developments for scientists to find it informative. Biotechnology is growing rapidly, and the book *Biotechnology* can help us all keep up.