Reviews and Resources

BOOKS

**Life’s Engines: How Microbes Made Earth Habitable**  

This short book, less than 200 pages of text, is a delight. It’s not clear for whom it is written. Falkowsky says it’s an outreach beyond that of a textbook. I doubt if most of its contents aren’t familiar in broad outline to most professional microbiologists, but I’m sure all of them would be rewarded by reading it. I was. It’s sprinkled with intriguing historical vignettes: when 22, Darwin, collected fossils with Adam Sedgwick in north Wales; Darwin took a copy of Charles Lyell’s *Principles of Geology* along with the King James Bible on the *HMS Beagle*; Robert Hooke learned Dutch to read Van Leeuwenhoek, and wonderful sentences like, “In 1859, the same year that Big Ben chimed for the first time and the London publisher John Murray and Sons sent the first edition of *The Origin of Species* to press, on the other side of the Atlantic an American train conductor, Edwin Drake, drilled the first major oil well near Titusville, Pennsylvania.”

Falkowsky has intriguing ideas about a variety of microbiological happenings. He pays considerable attention to the delay between the emergence of oxygenic photosynthesis and the great oxygenation event, discounting the impact of iron’s being the major oxygen sump (as he used to believe), emphasizing instead that of sulfur and nitrogen. The topics are eclectic. He discusses, among others, the age of Earth, origin of life, panspermia, lateral gene transfer, climate change, and the consequences of our burgeoning human population. He’s intrigued by the origins and impact of biology’s “nanomachines;” particularly photosynthetic reaction centers and membrane-bound ATP synthases. Perhaps the book ought better to be titled *A Chat with Paul Falkowsky*; that, too, undoubtedly a delight.

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**Metabolism and Bacterial Pathogenesis**  

I recently had the pleasure of reading this wonderful book. *Metabolism and Bacterial Pathogenesis* came at the right time, because I work on a human-exclusive pathogen for which some strains collected from patients are auxotrophic, making me wonder: how is it that a pathogen that is very effective at surviving in humans requires one of the very amino acids that is limiting in humans? Every chapter in this book, directly or indirectly, suggested to me that the answer I am looking for may be very near, and what I have to do is to dig through some of the numerous references listed. These references are so limited that it made me recall the frequent editorial restrictions on references—clearly, the contributors were encouraged to freely discuss the details in depth. The contributors also suggest provocative and challenging new concepts, e.g. “pathometabolism.” This term encompasses the complex metabolic interactions between host and bacterial pathogen, concepts that could lead to novel antimicrobial therapeutics.

Every chapter is well written and entertaining (in contrast to what a reader might expect from description of metabolic pathways). Rather than simply a review of biochemical details, the metabolic pathways explain how a pathogen energetically or nutritionally overcomes the challenge of invasion and survival within mammalian cells. For instance, how *Mycobacterium tuberculosis* survives within a granuloma and why it can be called an “essential pathogen,” a concept that helps explain the epidemiology of tuberculosis. This pathogen must cause symptomatic disease (cough) in order to be transmitted, but its persistence in the community is favored by a long-term latent state until a susceptible population becomes available.

In short, this book provides an insightful collection of reviews that describe how basic metabolic processes play critical roles in virulence, unveiling fundamental (although often ignored) molecular mechanisms of infectious disease.

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