

will help educate people about the role of a snake in the environment. One way to help snakes is to educate people.

Another great point: “Snakes do not ‘dislocate’ their jaws, a process that would render them useless, they articulate them on the ball and socket joint where the jaw is hinged on the skull.” So many people believe otherwise. Anyone who has seen a snake consume prey would deduce that they dislocate.

I have been working with snakes since the mid-1990s, but this book has taught me some new things, for example that snakes shed (slough) their tongues. This book has tons of great information for experts or for new snake enthusiasts.

There are a couple of changes that I would make, like placing the Global Distribution of Venomous Snakes map in the beginning of the book instead of the back, which would make it more user friendly. In addition, there should be pictures with labels of a snake’s jaw and skeleton in the book’s anatomy section. This would make the text more understandable.

This book could be used by professors who take their students on field studies or to teach the biology of snakes.



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MICROBIAL LIFE

March of the Microbes: Sighting the Unseen. By John L. Ingraham. 2010. The Belknap Press of Harvard University Press. (ISBN 9780674035829). 326 pages. Hardcover. \$28.95.

Life on Earth as humans know it would not be possible without the variety and vast numbers of microorganisms that are frequently overlooked by most people. Some of these microbes are responsible for converting nitrogen, sulfur, and carbon-containing compounds into forms that benefit other organisms. A few are used in making foods and beverages. Others cause diseases. Visible evidence of these microbes abounds, from the holes left in Swiss cheese by *Propionibacterium shermanii* to the toxic black mold *Stachybotrys chartarum*, which threatens the health of residents of flood-damaged homes, to younger-looking faces

thanks to a dilute solution of the toxin produced by *Clostridium botulinum*, to the fresh snow on the ski slope made by machines utilizing the corpses of *Pseudomonas syringae*.

Ingraham takes the reader on a series of “microbe sightings,” using detailed examples to give the reader an appreciation for how humans’ lives and environment are affected and shaped by bacteria, archaea, protozoa, fungi, and viruses. Within each themed chapter, he tells the story and history of several specific microbes, including a brief aside whenever the organism in question has a notable relative. For example, chapter 4, “Living Together,” includes a section called “A Belching Cow.” Here the reader learns the term *eructate*; that “a twenty-two gallon cow’s rumen would be home to about a quadrillion microbes, about 200,000 times as many microbes as there are humans on Earth”; that the microorganisms produced in the rumen are “the ruminant’s major source of protein”; that all five major types of microbes are present in the rumen; that dry dog food is treated so it has an odor similar to that of a rumen, but diluted in strength; and that certain Eskimo tribes that eat reindeer get sufficient vitamins by eating not just the meat, but also the contents of the reindeer rumens. Before the section is complete, cecal digestion of cellulose in organisms such as rodents, cellulose digestion in termites, and the possible use of some cellulose-digesting microbes in the production of biofuels are also discussed. This chapter has additional sections entitled “Spanish Moss,” “A Fat Man and a Thin One,” “A Gall on a Grapevine,” “Small Points of Light on a Dead Fish,” and “An Aphid Feasting on a Tender Rose Leaf.” It also includes literary references from Jules Verne and Mark Twain; illustrations of how *Agrobacterium tumefaciens* transfers genes into a plant, and of an aphid eating while also giving birth; and stories of scientists from Carolus Linnaeus to Elie Metchnikoff to Jeff Gordon.

With a plethora of fascinating examples and engaging, engrossing writing, *March of the Microbes* is an excellent survey of microbial life that could even act as the text to accompany a high school elective on microbiology. Several AP Biology Readers who were coaxed into reading part or all of chapter 5, “Cycling Nitrogen,” and learned of the anammox process were convinced of the merits of this book. (This process, discovered in the 1990s, may “account for as much as two-thirds of the flow of fixed nitrogen back to the atmosphere” in marine sediments and other environments.) The detailed lives of many organisms with various levels of

impact on us and our world are presented with just enough detail to satisfy, even fascinate, but not overwhelm the reader.

Unfortunately, there are a few notable errors in the text, such as an indication that sperm do not contain mitochondria and one reversed arrow in a food chain diagram, thus showing methanogenic archaea using rather than producing methane. Hopefully such errors will be corrected before a paperback version of the book is issued. While there is a helpful glossary in which one can be reminded of what PM means (precursor metabolite), there is no bibliography. Thus, the reader must resort to an online search engine to find further information about a particular microbe. Nevertheless, when nearly every page presents nuggets to share with students and colleagues, and when the reader does not want to stop in the middle of a chapter, *March of the Microbes* must receive a high recommendation.



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SCIENCE EXPERIMENTS

Theo Gray’s Mad Science: Experiments You Can Do at Home – But Probably Shouldn’t. By Theo Gray. 2009. Black Dog & Leventhal Publishers. (ISBN 9781579128753). 239 pages. Paperback. \$19.95.

This is a cookbook of science demonstrations guaranteed to make a big impression. Author Theo Gray says “I’ve tried to capture the fun and sense of adventure that comes with science, as well as its truth and beauty.” He starts out with an introduction that includes a warning about the potential danger that some of these experiments can pose. He explains that with any chemistry there are potential risks, and that within this book there are experiments he would let his kids do but others that it would be crazy to try at home. One very prominent warning says “If you never read any warnings, please read this: Wear Safety Glasses!” The book includes experiments in chapters entitled “Experimental Cuisine,” “Doomsday DIY,” “Raw Power,” “Playing with Fire,” “Heavy Metal,” “Natural Wonders,” and “Twisted Shop Class.” In the “Experimental Cuisine” chapter, Gray starts with an experiment that