BOOK REVIEW

A Matter of Wonder: What Biology Reveals About Us, Our World, and Our Dreams

By Gottfried Schatz
2011 Karger 190 pages

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Try to imagine a book about mitochondria, pain, hearing, circadian rhythms, aging, hair and skin color, protein structure, retroviruses, iron deficiency, thermophiles, vitamin B_{12}, intestinal bacteria, synthesized biological organisms, controversies about genetic determinism, the historical origins of medical research, and a few other topics, all in 170 pages (plus acknowledgments and index). Oh, and the pages are small, with only about 150 words per page. That is what we have here. As you might expect, the book does not provide great detail. It does, however, focus on interesting, thought-provoking highlights.

This collection of short essays was originally a series of articles published in a highly regarded Swiss newspaper from 2006 to 2008. Gottfried Schatz, the author, who died in 2015, was a biochemist and professional violinist with broad interests in science and the arts. His most notable research accomplishment was being co-discoverer of mitochondrial DNA.

Because the 20 essays in this book were written for a newspaper, they are brief, nontechnical, and intended mostly for the curious, intelligent nonprofessional. Because each essay is independent and self-contained, a reader could take them in any order, and could pause at any point without losing the thread. For example, you might enjoy reading this book while waiting for an appointment, ready to quit whenever you are called. You might also read it while riding a plane or train.

Although the essays are brief, they have much to recommend them. For example, Schatz makes mitochondria much more interesting than I had realized. A woman with overactive mitochondria was constantly hot and sweating, even on cold days, and she burned through her food as fast as she could eat it. Mutations that accumulate in mitochondria are an easily overlooked cause of many infirmities of old age. On another topic, I had never thought about the oddity that iron deficiency is a common human problem despite the abundance of iron on earth. Although iron is abundant, animals cannot extract it from minerals, but must rely on eating plants that absorbed it.

To me, the most interesting chapter dealt with vitamin B_{12} (cobalamin). In the early, oxygen-poor oceans, the earliest microorganisms evolved proteins bound to cobalt, nickel, iron, and manganese. Later, when the oxygen levels increased, the oxygen caused sulfur to erode from rocks, and the sulfur made most of the cobalt, nickel, iron, and manganese precipitate. Microorganisms then evolved new proteins bound to zinc and copper. Today, only a limited number of bacteria retain the ability to synthesize cobalamin, which includes cobalt, but all animals still need that enzyme for two reactions critical for brain function. We have to get that enzyme from the bacteria in our gut, or by eating animals that got it from bacteria in their own gut. So, in our dietary needs we retain a remnant from the earliest history of ocean chemistry.

Because this book derived from a series of newspaper articles, it cites no references. It doesn't even have a list of readings at the end. I am sure that many of the likely readers of a book like this consider reference citations as either irrelevant or intrusive, and admittedly no one would expect as many citations as in a journal article or an academic textbook. Nevertheless, in certain places I found the lack of references to be a serious limitation. Citations serve two functions: They enable a reader to check the original source, and they discipline the writer to check something possibly misremembered or misunderstood.

For example, Schatz states that some women have a fourth color receptor and therefore "can distinguish up to a hundred million colors" (p. 61). He also asserts that about half of their sons will be color-blind. From what I can find, the first statement appears to be probably misleading and the second statement wrong. Some women do have a fourth color receptor. The reason is that the gene for the long wavelength ("red") receptor, on the X chromosome, has two common forms, differing in one amino acid, which therefore produce receptors that differ by about 4 to 7 nm in their preferred wavelength. Because women have two X chromosomes, some women—almost half of Caucasian women and about 30% of African and Asian women—are heterozygous for the genes producing long wavelength receptors (Deeb, 2005). According to the very few studies published on this topic, women heterozygous for the long wavelength receptor perceive finer than average distinctions among colors, if tested in certain ways. For example, they describe a rainbow as having about ten bands of distinguishable colors, rather than the usual seven (Jameson et al., 2001), and they respond differently from average on certain other color-vision tests (Dees and Baraas, 2014). However, this result is different from saying that such women distinguish "up to a hundred million colors"—whatever that means.

A more serious question is why Schatz asserts that half of such women's sons will be color-blind. I can find no evidence for that idea, and it does not make sense in terms of what I have been able to find about the genetics. So here is where the lack of reference citations is critical. If he is right and if he had cited a reference, I could check it out and correct my misunderstanding. If he is wrong, then when he tried to support his statement with a reference, he would have discovered his own error. I apologize for belaboring this point, but I am trying to underscore the importance of citing one's sources.

Overall, I find more to like than to dislike in this book, but I recommend it more for the interested layman than for academics or advanced students.

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