

The Moon in the Nautilus Shell: Discordant Harmonies Reconsidered

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Source: BioScience, 63(8) : 686-687

Published By: American Institute of Biological Sciences

URL: <https://doi.org/10.1525/bio.2013.63.8.13>

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for his clear passion for his subjects, their homes, and their ways.

Tibet Wild differs from Schaller's other books, most notably in two ways: His focus is directed more on his journeys—some treks lasted more than 50 days—which results in the absence of his typically rich descriptions of biology and behavioral nuances of the large mammals that he observed. A more pleasant diversion away from his previous titles is Schaller's choice to pepper this book with glimpses of his personal life—from childhood through raising two sons with his wife and early field companion, Kay, to his ambitions, fears, and hopes for a positive future at the Roof of the World. An insightful subsection in a chapter entitled "A gift to the spirit" articulates the author's perception of his own accomplishments and perceived inadequacies: "My inner voice points to failure. I have not built anything, no conservation organization, no university department" (p. 99). "Feral naturalist" is a chapter focused on his early life as young boy in Europe before and during World War II and his move to the United States as a 14-year-old.

Many personal reflections and philosophies are scattered throughout *Tibet Wild*, often at the end of a paragraph, almost as if they are afterthoughts and less important than his detailed chronicles, which they are not. He ends a rather clinical description of the birth of a chiru from his field notes with "the scene transcends science and reaches the emotions, touching the heart" (p. 103). Schaller sees his legacy mostly in the young nationals he has trained in Tibet "who will continue to fight to protect nature's beauty" permitting "my legacy... [to] flow onward long after I have ceased to be even a memory" (p. 100). I know that many memories will live on.

Of Schaller's many writings—he has written 16 previous books and numerous scientific and popular papers—*Tibet Wild* is not the place for the uninitiated to start. It is tedious in

parts, perhaps reflecting the author's eagerness to simply document the details of the places he has traveled and the people with whom he has worked. The text also jumps around chronologically, and even geographically, chapter by chapter, which is a bit distracting. As the primer on Schaller's works, I recommend *A Naturalist and Other Beasts* (Schaller 2007, Leslie 2008).

A life lived as Schaller's is rare. Adventures of spirit and mind abound in all of us, but those who have left so many footsteps in truly wild, often foreboding landscapes are exceptional indeed. Schaller's work in the wilds of the Tibetan Plateau will enlighten future generations, just as the chronicles of early adventurers—Moorcroft, Rockhill, Przewalski, and Hedin, among others—have done for over a century. Schaller defines his perspective of a lifelong pursuit in few words: "Conservation is a long journey, not a destination" (p. 6) and "conservation is my life, and I must believe in success or I have nothing" (p. 309).

After finishing this book, I was left with the uneasy feeling that few such volumes by Schaller are left to come, and a sense that he is starting to close a chapter on his journeys to the deepest and coldest parts of Tibet. I hope I am wrong, but his readers can be thankful that throughout his rich career, Schaller has taken the time to share in words the status of these wild places and their beasts as a permanent benchmark to what they may become. *Tibet Wild* sings with Schaller's tenacity, patience, and passion, which I can only hope will contribute to his own call for "a century of environmental enlightenment, one that expresses its loyalty to the earth and all its wonder and variety, the only home we shall ever have" (p. 356).

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PERSONAL REFLECTIONS ON ENVIRONMENTAL SCIENCE

The Moon in the Nautilus Shell: Discordant Harmonies Reconsidered.

Daniel B. Botkin. Oxford University Press, 2012. 448 pp., illus. \$29.95 (ISBN 9780199913916 cloth).

Daniel B. Botkin, a professor emeritus of environmental studies at the University of California, Santa Barbara, and a well-known global ecologist, has written a personal account of the current environmental issues of climate change, population dynamics, species extinction, and natural resource management. *The Moon in the Nautilus Shell: Discordant Harmonies Reconsidered* is a follow-up to his pivotal publication *Discordant Harmonies: A New Ecology for the Twenty-First*

doi:10.1525/bio.2013.63.8.12

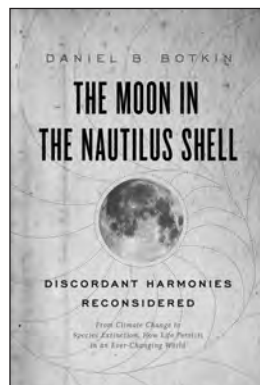
Century (1990) and takes on similar themes over two decades later.

Botkin is a respected biologist, known for his contributions to ecology and environmental science. In his seminal early work, he used computer simulation models to understand the complex structure and dynamics of forest ecosystems. Subsequently, he has worked mostly on applied environmental science problems—the conservation of African elephants, bowhead whales, and salmon; the use of satellite imagery to monitor changes in rainforests and sea ice; the role of humans in global climate change. His writings are extensive—scientific papers, books, technical reports, popular articles, and opinion pieces.

The Moon in the Nautilus Shell presents Botkin's unique views on a wide variety of topics. Some are very general and topical, such as the successes and failures in managing parks and reserves to maintain viable populations of endangered species and the evidence for and against anthropogenic carbon dioxide (CO₂) emissions as the primary cause of recent global warming. Other topics are narrow and idiosyncratic, such as the role of intestinal bacteria in the digestion of vegetation by moose and Henry David Thoreau's reflections on nature from the summit of Mount Katahdin.

At the heart of the book lies Botkin's special perspective on the nature of nature and its relationship to humans, which is couched in the more specific contexts of ecological science, environmental policy and management, and religious and philosophical value systems. He presents an eclectic mix of hard ecological science and softer spiritual views on nature and suggests how these two vantage points can be used in tandem to address pressing problems, such as climate change and species extinction. Within the preface, a small section called "Why be a scientist?" offers the following quotation from the author, which will resonate with many ecologists: "I loved nature, and was surrounded by it and had to

understand how it worked. There was no other choice for me.... I thought everyone who became a scientist was driven by curiosity."



Perhaps the most important (and controversial) contribution in the book is Botkin's analysis of climate change—it is a critical examination of the current consensus that recent warming is anthropogenic and caused primarily by CO₂ released by burning fossil fuels. The author presents some of the complications inherent in compiling, analyzing, and interpreting the historic data on fluctuations in CO₂ concentrations, solar irradiance, global temperatures, and the extent of sea ice; he then uses his experience as a complex system modeler to critically assess the problems of predicting future changes on the basis of the outputs of simulation models. Botkin is hardly a denier of climate change—more of a cautious skeptic. He ends his discussion with some thoughtful comments on the uncomfortable intersection of science, politics, and popular belief that remains at the core of debates about what should be done about climate change.

Mostly, however, the book reviews classical ecology—topics such as the drivers of population fluctuations and the extent to which an ecosystem functions as an integrated whole. Botkin rightly criticizes the idea that such systems are stable and self-regulated and therefore reflect an underlying balance of nature. Regrettably, in much of his treatment, he addresses the state of these topics as they were decades

ago, as if he does not realize how much ecology has progressed in the interim. The last section, titled "Postscript: A guide to action" is indeed a postscript. It reads as if it were cobbled together to make the material in *Discordant Harmonies* more current, and therefore, more relevant.

Botkin severely criticizes what he considers to be the perpetuation of flawed, unsubstantiated science, citing as one example Caughley's (1970) reappraisal of Rasmussen (1941) and Leopold and colleagues (1947) on the magnitude and cause of the explosion and subsequent crash of the deer population along the North Rim of the Grand Canyon (the Kaibab Plateau) in the early 1900s. But Botkin seems not to have done his own homework. The title *The Moon in the Nautilus Shell* refers to a purported lunar rhythm in the growth of the chambered nautilus, a relative of squid and octopuses that has been extensively harvested for its beautiful shell. Botkin uncritically repeats the findings of Kahn and Pompea (1978). In a recent review, however, Landman and Cochran (2010) explained that "Kahn and Pompea (1978) assumed that chambers are formed every lunar month and that growth lines are deposited daily.... However, these assumptions were false, and this approach has been widely discounted (Hughes 1979, 1985, Jones and Thompson 1979, Runcorn 1979, Saunders and Ward 1979)."

Unfortunately, it is not clear who the intended readers of *The Moon in the Nautilus Shell* are and why they should want to invest their time. The book is marketed as "poised to be a core text of the twenty-first century environmental movement," but instead of the text unfolding to a new landmark position, we notice the author backtracking to his earlier work in order to find a resolution. (To be fair, the subtitle makes this clear.) Botkin refers to *Discordant Harmonies* in his introduction and expresses disappointment that "much that I hoped it would achieve remains undone." A repeated theme is that we humans interact with our environment in two

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ways: rationally and spiritually. Botkin suggests that we confuse the two and hopes that “this new book helps to clarify this dilemma.” After reading the book, I am still confused. Science provides a widely accepted—and admittedly imperfect—but time-tested method to discover how nature works. Neither organized religions nor personal value systems, neither Leopold’s environmental ethics nor Botkin’s reconsiderations, can provide a universally accepted system of belief to guide our relationships to nature. What is good and should be preserved and what is bad and should be changed will always be subjective and debated. Isn’t this a good thing?

The style of writing and the book’s equal treatment of the scientific and humanistic sides of environmental issues remind me of *A Sand County Almanac* (Leopold 1949). Like Leopold, Botkin introduces topics by presenting vignettes from personal experience. He writes of flying over Venice and thinking about large-scale environmental engineering schemes, of revisiting Isle Royale in Michigan and gaining new insights into predator–prey interactions, and of exploring a water mill in New Hampshire and reflecting on how nature is different from a machine. Unlike Leopold, whose account of the dimming “fierce green fire” in the eyes of a dying wolf is etched into every reader’s mind, most of Botkin’s examples seem strained and ineffective. *A Sand County Almanac* provided both scientific and ethical inspiration for an entire conservation movement in the twentieth century. I doubt that *The Moon in the Nautilus Shell* will have a similar impact on the environmental movement of the twenty-first century.

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doi:10.1525/bio.2013.63.8.14