Keck, William Hiesey, Edgar Anderson, Carl Epling, E. B. Babcock, and George Ledyard Stebbins, who also grappled with the species problem in the plant world, but had greater success?

The only answer seems to be that the selection fits Wilkins's agenda, which is to rewrite the history of biology from his philosophical vantage point. Why else characterize the history of the evolutionary synthesis (or the modern synthesis of evolution) as taking place between 1930 and 1942, giving credit to R. A. Fisher (actually called "the founder of the modern synthesis" [p. 181]), largely ignoring the contributions of mathematical theorists Sewall Wright and J. B. S. Haldane, and then terminating it in 1942 instead of 1950 (the consensually determined end point)? Was it that including George Gaylord Simpson's paleontological contributions in his 1944 book, or G. Ledyard Stebbins's botanical contributions to the species problem in 1950, might muddy the waters, or was it simply because Wilkins wishes to elevate Mayr's importance so he can later knock him down?

Mayr's *Systematics and the Origin of Species,* published in 1942, is indeed one of the major works of the period, but it is wrong to refer to it as "the single most widely referred-to volume of the synthesis" (p. 188). That distinction should be given to Dobzhansky's 1937 *Genetics and the Origin of Species.* It was Dobzhansky who took the lead; Mayr's response (not just a reaction to the unpopular ideas of Richard Goldschmidt, as Wilkins seems to think) led to his own book, which was meant to supplement Dobzhansky's emphasis on "genetics" with an emphasis on "systematics."

The bugaboo of the Wilkins agenda seems to be Mayr, as systematist and historian (and, it seems, nearly everyone who took Mayr seriously). The fact that Mayr was responsible for much of the early philosophy of biology (along with philosopher Marjorie Grene) is neglected in *Species*, whereas the late philosopher David Hull is described worshipfully as "the leading philosopher of biology of his generation," who "made it a point to focus on the actual history and biology of his subjects" (p. 3). (Never mind that Hull didn't consult archives or do biology.) For the last two decades or so, Mayr's work has been the focus of detailed scholarly analysis, none of which was consulted before the writing of this book. That is too bad, because Wilkins might have learned something about what intellectual historians do, which is to historicize and contextualize concepts so as to give us more understanding about the past, about people and their ideas, ultimately with the hope of achieving a bit more humility about ourselves.

Contextualization (here, it would mean putting the concept of species in a historical or cultural context) would have allowed readers to appreciate that the word "species" is loaded with meaning because it inevitably brings values and politics into the picture. Concern with the meaning of race in humans, in all its ugly manifestations, has dominated discussions of taxonomy from Linnaeus onward, a fact that is given minimal or no attention in this book, as though it were not a critical feature of the history of classification. At one point, Wilkins cites a loaded entry from Dobzhansky's 1951 edition of *Genetics and the Origin of Species* about human races, but avoids substantive discussion of it, preferring instead to use it as an argument against Mayr's insertion of "typological" thinking into the synthesis. In fact, an emphasis on populations, and on individual differences, which characterized the synthesis and stressed the process of speciation, enabled a more dynamic view of races, species, and ultimately the wider evolutionary picture. That bigger picture really should have formed a critical part of the latter part of this book, especially because Wilkins laudably calls for a de-essentialized view of humans in the conclusion.

Clearly, Wilkins's project suffers from his philosophical agenda, a lack of knowledge of the history of biology and its sources, and a failure to apply the basic methodologies of historical scholarship. He repeats erroneous claims made by some philosophers that classification has not been of much interest, when in fact philosophers such as Michel Foucault and historians (and biologists) such as Stephen J. Gould and others have been drawing attention to the problems of classification for at least a generation. Classification does matter, and despite my criticisms, this book does have considerable value in drawing attention to it and to the problem of species. If Wilkins's work continues to broaden discussion of the complex history of species and its meaning, then *Species: A History of the Idea* will have served a good purpose. I recommend reading this book, but with more than a grain of salt.

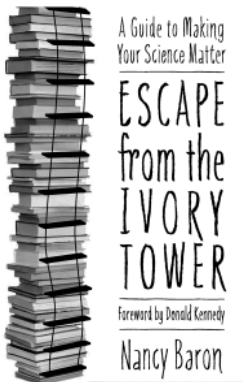
VASSILIKI BETTY SMOCOVITIS
Vassiliki Betty Smocovitis (bsmocovi@ufl.edu) is a professor in the Department of Biology and the Department of History at the University of Florida in Gainesville.

MAKE YOUR SCIENCE MATTER!

Escape from the Ivory Tower: A Guide to Making Your Science Matter. Nancy Baron. Island Press, 2010. 246 pp., illus. $27.50 (ISBN 9781597266642 paper).

Some years ago, an earthquake hit the northern Front Range of Colorado. Although the event was not impressive by California standards, four-drawer filing cabinets had danced little jigs, and my undergraduate assistant was convinced that the unusual silence among our research birds in the hours before the quake was evidence of their prescience. He mentioned this to some friends, and soon I was talking to the local radio folks, explaining—careful scientist that I am—that there is no evidence confirming or denying the ability of bobwhite quail to foretell earthquakes. Within a day, the radio credited me with declaring that bobwhites could predict earthquakes.

doi:10.1525/bio.2011.61.3.10



I wanted to hide; I prayed for sunspots to wreck the radio waves until the next news cycle; I vowed never to speak to a journalist again.

Years later, I was sitting on a county advisory board. We dealt with some controversy, and afterward, a reporter asked to contact me the following day. I agreed, and as I traveled home, I formulated my sound bites, sorting out my message. When he didn't call, I called him. What had changed my attitude toward the popular press?

I had met Nancy Baron, and I had experienced the communication training she has designed for scientists—in my case, through the Aldo Leopold Leadership Program (*http://leopoldleadership.stanford.edu*). I now have a clearer idea of how to get my message across to the public and I understand my mistakes when I make them.

Baron has taken her passion for communicating science one step further by writing *Escape from the Ivory Tower: A Guide to Making Your Science Matter.* I began reading her book with high expectations, knowing that if she had succeeded in distilling her ideas into print, then all scientists could learn to reach a wider audience—an audience that in many cases pays scientists' salaries and research expenses, but doesn't always understand (and may even distrust) what scientists do. I was not disappointed; Baron has more than met the challenge.

A superb communicator herself, Baron began her career as a national park biologist in Canada, started writing a newspaper column, and continued into journalism. She is a citizen of the media world as well as the scientific world, and she understands the complex wall of respect, bewilderment, and apprehension that can separate scientists and the media. More than that, she shares many scientists' passionate hope that their work can help show the way to a better future.

Baron makes no assumptions, but begins the book with an introductory section that includes a consideration of the costs and benefits of speaking out. How do scientists decide to speak out (or not)? She confronts some of the fears of scientists—the perceptions (and jealousy) of their peers, the worry that "advocacy" is somehow alien to science. Her thoughtful account of what it means to be a citizen scientist is worth the price of the book.

The second section ("A Clash of Cultures") is an introduction to the worlds of journalism, the changing media, and policymaking. In these chapters, Baron focuses on "cultural comparisons" and misperceptions on both sides. For instance, as scientists, we are careful (i.e., slow), evidence-based, in-depth thinkers who pay attention to details and are comfortable with uncertainty. Journalists are deadline-driven information gatherers who seek conclusions, certainty, and a quick overview with an emotional hook. This itself is a recipe for miscommunication. (Recall the amazing bobwhite quail.) In further contrast, policymakers ask a different set of questions about a given issue—what is the nature of their responsibility for the issue at hand, what is its effect on their constituents, and what are the costs and benefits of action or inaction? Clearly, a scientist who understands all of these perspectives will gain insight into the nature of successful communication with journalists and policymakers.

Two of my favorite parts of this section are a lively discussion of the importance of telling an engaging story, and a wonderful box (3.1) that addresses how to acknowledge scientific uncertainty "without completely undermining your authority and expertise." Baron also touches on the how and why of changing media (the blogosphere, social networks, and the like) but correctly notes that a comprehensive exploration would require a much longer book; this chapter will be useful to folks who are contemplating dipping a toe into this unsettled pool, but it can be skipped by the media savvy among us.

The heart of *Escape from the Ivory Tower,* in my opinion, is the third section: the "How-to Toolkit." Four pages into the toolkit, readers are introduced to the message box—a nonlinear way to prepare material so that the central issue or message can be approached from almost any angle. Preparing a message box is difficult only because it forces us to dig down and identify the core ideas that surround and support our message—and to express them all in no more than four to five sentences. Baron and the journalists she interviews are unanimous in their view that when it comes to communicating science, more—especially in the form of complexity, jargon, detail, and piles of numbers—is emphatically not better. As with the entire book, this section is enriched with examples, interviews, case studies, succinct summaries, and fine cartoons. These means of illustrating a point are especially useful with the message box; the before and after demonstrations of cluttered and clear communication bring home Baron's instruction.

Baron then moves on to chapters devoted to interviews, contacts, promoting a paper, and political activity. Here we learn about "block and bridge," that is, how to guide an interview toward the points we wish to make rather than the questions we do not wish to answer. We are warned that everything—yes, everything!—is on the record, and that journalists don't let us review their stories because their own professional tradition is rooted in independence and service to the public. Whether considering television, print, or radio, we repeatedly hear about the hazards of jargon and the magic of telling a story that comes alive with metaphors and personal touches. Scientists who spend time in

the classroom will recognize many of the elements of good teaching in the ways we are encouraged to approach outreach.

What if media mavens and policymakers do not come calling? Where can you meet journalists? How do you pitch your story? What makes a successful op-ed piece? Baron has some answers. She shares her knowledge about how to get media traction for scientific discoveries and, for that matter, how to judge for yourself whether those discoveries are strong candidates for media attention. Baron drills down to the details: Are you ready with compelling photographs? Can you write a press release? She dissects and presents "Anatomy of an Outreach Effort" (box 12.3). Finally, she guides us through the foreign terrain surrounding political outreach. From dress codes to one-pagers, she covers the admittedly nerve-racking process of congressional testimony. (Scale it down, and you are ready for your county commissioners!)

Outreach is not cheap and is not without some surprises. In the final section, Baron devotes a chapter to dealing with backlash, be it from special interest groups, peers, or the media. In a summary chapter, she offers comments on what she sees as "Ten Steps to Success." This chapter is perhaps most notable for its (and the book's) final sentence. Baron shares a question from the poet Mary Oliver: "Tell me, what is it you plan to do with your one wild and precious life?"

To my knowledge, no other book attempts to assist scientists in doing the critical task of outreach to media, politicians, and the wider community. Because Baron understands scientists, journalists, and policymakers—and because she cares passionately about how science is translated into care for our planet—she can write an accessible book that nonetheless delivers the detail and hands-on instruction scientists need for success.

Escape from the Ivory Tower is well organized with short, to-the-point chapters that are punctuated by examples, interviews, and gentle humor. In the world of science we sometimes forget that a book can be an easy, pleasant read and still teach us quite a bit. Nancy Baron knows that, and she has delivered that book. The result is unlike anything you've read before—and it is something you need to begin reading now. This is not a book for your bookshelf. It is a book for your backpack, your briefcase, your graduate students, and the trunk of your car, in case you need a refresher on the message box or simple inspiration before a chat with a newsperson or a visit to your elected officials. This is a book to be read, enjoyed, and dog-eared—assuming, of course, you want your science to matter.

JANICE MOORE
Janice Moore (Janice.Moore@ColoState.Edu) is a professor at Colorado State University in the Department of Biology, at Fort Collins.

SMALL, WARM, AND FUZZY

Unsimple Truths: Science, Complexity, and Policy. Sandra D. Mitchell. University of Chicago Press, 2009. 160 pp., illus. $27.50 (ISBN 9780226532622 cloth).

In *Unsimple Truths: Science, Complexity, and Policy*, Sandra D. Mitchell accomplishes an enormous amount in very short compass. Starting from the actual practice of (mainly) biological and (some) social sciences, she presents a workable and effective philosophy of science focused particularly on sciences dealing with complex subject matters. Drawing on nicely handled examples from psychiatry (e.g., major depressive disorder), biology (e.g., recent genetics and genomics, drug discovery, the study of insect societies), and the policy world (e.g., climate change and economic problems), Mitchell develops and illustrates a philosophy of science suited to the complexities scientists face. The result is a compact and elegant presentation of a philosophy she calls "integrative pluralism," challenging many orthodox positions in the philosophy of science. While keeping her examples in the foreground, Mitchell provides a philosophical basis for rethinking the methods for analyzing complex systems in situations involving considerable uncertainty. She also demonstrates by example the value and reach of her philosophical approach in contrast with more conventional philosophies of science, from Popperian falsification and standard forms of inductive reasoning to sophisticated forms of theory and model testing.

Mitchell argues that many traditional philosophies of science handle Newton's laws or those of electrodynamics, for example, by using the concept of supposedly exceptionless, necessary scientific laws pertaining to all physical systems. These philosophies, she maintains, do not provide appropriate guidance for biologists and other scientists dealing with complex situations and systems. Although her philosophy is built to provide ways of coping with considerable uncertainty about the underlying laws, the causal structure of the systems under investigation, the outcomes of particular situations, and the consequences of particular interventions, her aim is not just epistemological. Rather, she builds on the very character of complex systems and the issues addressed in dealing with them. Mitchell argues, in effect, that law-likeness and the extent to which laws determine outcomes are matters of degree.

All substantive laws (unlike laws of logic) are context limited—even the constants pertinent to quantum mechanics depend on the quantity of mass-energy in the universe at the time of the Big Bang. The laws of chemistry depend on those of physics, but they apply only after the universe had cooled sufficiently to allow the formation of atoms and molecules. Some of them depend on relative availabilities of various compounds or even of various isotopes and relevant

doi:10.1525/bio.2011.61.3.11