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***Beyond Sputnik: U.S. Science Policy in the Twenty-First Century.* Homer A. Neal, Tobin L. Smith, and Jennifer B. McCormick. University of Michigan Press.**

The launching of Sputnik was a revolution in technological achievement, a focal moment in Cold War politics, and a push for American policy makers to vastly increase support for science funding. *Beyond Sputnik* is a textbook that introduces the key elements of science policy in the United States. It begins with a brief history of science policy in the U.S., and proceeds to describe the various players in federal science policy, complete with the labyrinth of D.C. acronyms, and focuses on science policy as developed in the years since the launching of the Russian satellite.

The book is not about policy *based on* science, but is rather about policy *made for* science. The authors draw on Harvey Brooks' distinction between "policy for science" and "science for policy"; this book is about the former. In other words, the book is primarily concerned with the role that policies have in directing scientific funding, research, and application, rather than with the way in which policies are constructed based on the results of science.

Beyond Sputnik is intended to be an introductory textbook, and it achieves this end: concepts are introduced clearly and kept simple, much ground is covered, and the authors direct readers to more sources for further detail. The text is split into two columns on the large pages. Hundreds of minute details populate the presentation of the science policy process, which gives the reader a rich understanding of the entities and relations that comprise the complex web of science policy. The book is divided into four sections, each with five chapters. Section 1 has chapters that define science policy, give a brief history of U.S. science policy, describe the major players in science policy, describe the science policy process, and defend the rationale for federal science funding. Section 2 gives a detailed overview of federal science partners, including universities, federal laboratories, industry, and the public. The final two sections discuss key science policy issues: examples include military science, big science, scientific ethics, globalization, and education.

Throughout the book "policy discussion boxes" highlight a particular question, tension, or conflict that invites further discussion. Should the federal government support research in the social sciences, as the New Deal Democrat Harley Kilgore argued, or should the social sciences be excluded from federal support, as Vannevar Bush argued? Should the Office of Technology Assessment be revived to provide more technical advice to Congress? What should be taught as science in the classroom? How should the effectiveness of policies be evaluated? The intention of these discussion boxes is to stimulate undergraduate discussion. At the end of each chapter is a section called "Policy Challenges and Questions" which summarizes the key points of the chapter and raises further questions for discussion. Chapter 12, for example, is on big science, and with the examples of the failed superconducting super collider, the international space station, the

human genome project, and the planned international thermonuclear experimental reactor, this chapter discusses the purported advantages and drawbacks of such large-scale projects.

For a book on science policy, there are many simplistic claims about the general nature of science. For example, the authors suggest that scientific knowledge is deductive, whereas policy formation is inductive (13). Such a stark contrast is reiterated when the authors write “unlike natural science, policy analysis does not identify a true or false answer, but rather identifies better and worse policy solutions” (68) – these claims about science strike one who has studied the vicissitudes of science in some detail as naïve. Specific claims about science are also simple, or inaccurate, or both; for example, the authors write “genes, in combination with environment, determine many of our characteristics and traits,” or “almost invariably, any given disease is caused by malfunction of a protein” (202). This may be what one reads in the local paper, but such claims will be a pain to read for anyone with a more sophisticated understanding of genes and diseases. They are not merely scientific claims that have been simplified for purposes of undergraduate pedagogy, but rather are scientific claims that are very likely false. To be fair, the book is not intended as a contribution to understanding either the general nature of science or specific aspects of scientific knowledge; however, one might reasonably expect a book on science policy to have a more accurate and sophisticated understanding of the variegated nature of science and scientific knowledge.

An important and challenging problem currently facing policy makers is the construction of policies based on scientific evidence, especially when the evidence is discordant and so the science itself is uncertain. What should policy makers do when forced to make policy based on uncertain evidence? As suggested above, this book does not address such questions, since they are the purview of “science for policy”. But the problem of constructing policy based on scientific uncertainty is ubiquitous, and poorly understood, and thus including some discussion of it in an introductory textbook might encourage further thought on this important problem.

This book is full of interesting details. Chapter 6, for example, gives a brief history of universities, starting with Plato’s Academy, and then describes how modern universities are categorized. Ever wonder what the requirements are to be designated by the Carnegie Foundation as a Research University with very high research activity? This book will tell you (95). Ever wonder what all the Department of Energy National Laboratories are, and who are their associated contractors? This book will tell you (122). Some sections are too full of details that any educated person should already know – the basic structure of the U.S. government, or the role of various actors in a university – but, then, the book *is* intended for undergraduates. The plethora of fascinating details in *Beyond Sputnik* makes up for its occasional pedestrian pace.

Given the volume of material covered, the simplicity of the presentation, and features such as discussion boxes and references for further information, *Beyond Sputnik* provides a fine introduction for someone unfamiliar with the broad range of topics associated with U.S. science policy. This is not a research manuscript; it would be a good book for

undergraduate science policy courses, for new policy makers engaged with science, for scientists interested in the policy process that influences their research, and for others interested in science policy.

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