# Current Comments®

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## Science Historian I.B. Cohen Reviews *Social Studies of Science* by Sociologist Bernard Barber

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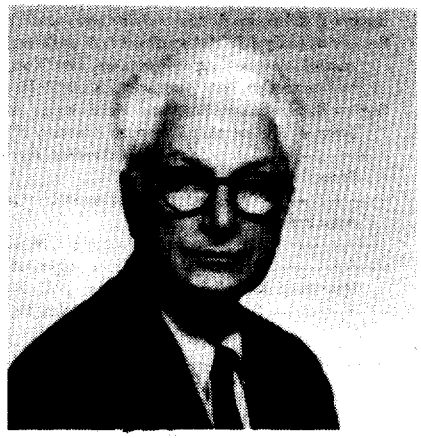
I can't recall exactly when I first met Bernard Barber. I do remember though that it was more than 25 years ago through a mutual colleague, sociologist Robert K. Merton. Over the years, our paths have crossed quite regularly, especially at the monthly meetings of the Science Policy Association of the New York Academy of Sciences.

Barber is a professor emeritus in the Department of Sociology at Columbia University. He earned his undergraduate, master's, and PhD degrees at Harvard, and has lectured throughout the world. In 1952, Barber published the pioneering book, *Science and the Social Order.*[1] In 1988, he wrote a commentary for *Current Contents®* (*CC®*) on this *Citation Classic®*, which by now has been cited in about 200 papers and countless books.[2] Table 1 below lists Barber's books—the most recent being *Social Studies of Science.*[3] This work documents many of the important phases in the development of the sociology of science—with emphasis on the emergence of scientific specialties. Table 2 shows the table of contents.

Through a fortunate coincidence, I met the eminent Harvard science historian I. Bernard Cohen at the home of Robert Merton. I used the occasion to ask Cohen to review Barber's book. The review appears below.

### Seminal Contributors to the Sociology of Science

In addition to explaining Merton's seminal influence on the study of the sociology



*Bernard Barber*

of science, Barber lists the contributions of many other scientists whose works have been discussed in *CC* over the years. Among them are J.D. Bernal,[4] Thomas S. Kuhn,[5] and Derek J. de Solla Price.[6] Indeed, the Institute for Scientific Information® (ISI®) has sponsored the J.D. Bernal Award[7] of the Society for Social Studies of Science (4S) for more than 10 years. Bernal's book, *The Social Function of Science,*[8] is a classic in the field.

Barber's new book also refers to ISI in the introduction. He asserts that many social scientists have been "enriched" by the *Science Citation Index®* (*SCI®*) and the *Social Sciences Citation Index®* (*SSCI®*). He is accurate in stating that the *SCI* was invented "as an aid to information retrieval for working scientists. Young sociologists of science...pioneered in using citation data

**Table 1:** Books published and edited by Bernard Barber.

**Barber B.** *Science and the social order.* New York: Free Press, 1952. 288 p. (Also published by Allen & Unwin, London, 1953; Collier, New York, 1962; Greenwood Press, Westport, CT, 1978. Japanese translation published by Ryokuen Shobo, Tokyo, Japan, 1955. Spanish translation published by Ediciones Ariel, Barcelona, Spain, 1957.)

----------. *Social stratification: a comparative analysis of structure and process.* New York: Harcourt, Brace & World, 1957. 540 p. (Spanish translation published by Fondo de Cultura Economica, Mexico City, Mexico, 1964.)

**Barber B & Hirsch W,** eds. *The sociology of science.* New York: Free Press, 1962. 662 p. (Also published by Greenwood Press, Westport, CT, 1978.)

**Barber B & Barber E G,** eds. *European social class: stability and change.* New York: Macmillan, 1965. 145 p. (Also published by Greenwood Press, Westport, CT, 1978.)

**Barber B.** *Drugs and society.* New York: Russell Sage Foundation, 1967. 212 p.

**Henderson L J.** *L. J. Henderson on the social system.* (Barber B, ed.) Chicago, IL: University of Chicago Press, 1970. 261 p.

**Barber B & Inkeles A,** eds. *Stability and social change.* Boston, MA: Little, Brown, 1971. 451 p.

**Barber B, Lally J J, Makarusha J L & Sullivan D.** *Research on human subjects: problems of social control in medical experimentation.* New York: Russell Sage Foundation, 1973. 263 p. (Also published by Transaction, New Brunswick, NJ, 1979.)

**Barber B,** ed. Medical ethics and social change. *Annals of the American Academy of Political and Social Science.* Philadelphia: American Academy of Political and Social Science, 1978. Vol. 437. 420 p.

----------. *Informed consent in medical therapy and research.* New Brunswick, NJ: Rutgers University Press, 1979. 214 p.

----------. *"Mass apathy" and voluntary social participation in the United States.* New York: Arno Press, 1980. 276 p.

----------. *The logic and limits of trust.* New Brunswick, NJ: Rutgers University Press, 1983. 189 p.

----------. *Effective social science: eight cases in economics, political science, and sociology.* New York: Russell Sage Foundation, 1987. 205 p.

----------. *Social studies of science.* New Brunswick, NJ: Transaction Publishers, 1990. 278 p.

as a useful, if not perfect, measure of the comparative scientific achievement and prestige of individuals, departments, and universities." (p. 12)

However, he is not entirely correct in saying I "did not foresee this use of the *Science Citation Index* when [I] invented it." (p. 12) Barber was not aware that in my first paper on the *SCI*[9] I did in fact refer to the potential use of citation data for evaluation. But I certainly did not imagine at that time the eventual extent of its use. Barber goes on to say "Garfield and the very successful organization he founded, the Institute for Scientific Information in Philadelphia, have been most encouraging of this unexpected benefit of their work. Thus, through the use of survey research, the *Science Citation Index,* and sophisticated statistical analysis, research methodology has played an important part in the development of the sociology of science as a specialty." (p. 12) In an upcoming essay, I will discuss the many types of citation indicators and analyses available directly through ISI's research contract department.

## Robert Merton, Founding Father of the Sociology of Science

Barber singles out Robert Merton as having made a monumental mark as a scholar in establishing and developing the sociology of science. In fact, Merton was Barber's tutor in sociology at Harvard in the late 1930s. Barber discusses Merton's landmark study of *Science, Technology and Society in Seventeenth-Century England*[10] in terms of extending Max Weber's argument about the influence of the Protestant work ethic on capitalism to the emergence of modern science and technology. Barber calls Merton's book a "prototype" in what became the sociology of science.

Merton is no stranger to *CC* readers. He and Harriet Zuckerman coauthored a *Citation Classic* commentary[11] in 1986 on their paper dealing with the beginnings of the referee system in science, and reporting

**Table 2:** The table of contents to *Social Studies of Science* by Bernard Barber.

their systematic analysis of refereeing in *The Physical Review*.[12] Six years before, Merton had also commented[13] on his classic book *Social Theory and Social Structure*.[14]

## Kuhn's and Price's Contributions

Two other scientists are described by Barber as major contributors to the discipline of the sociology of science—Thomas Kuhn and Derek Price, neither of them strictly sociologists. Kuhn's impact in the field stems from his enormously influential book, *The Structure of Scientific Revolutions*,[15] termed a "masterpiece" by Barber. The book remains today a "fundamental focus for the sociology of scientific discovery,"[3] (p. 13) and required reading for many students pursuing a science degree.

Derek de Solla Price was a dear friend and colleague of mine. I've often discussed his seminal work in the field of scientometrics in *CC*.[6] Indeed, Merton and I wrote the foreword to the second edition of *Little Science, Big Science...and Beyond*.[16,17] At the time of its second printing in 1986, the first edition had been cited in 725 publications. Even more striking is that these references were spread among 80 different disciplines and specialties.

Trained in England as a physicist, Price later became professor of the history of science at Yale. His main contribution came in the use of mathematics and statistics to *quantify* the social study of science. Barber points out that Price was "determined to make the social and historical study of science *scientific*" through the use of quantitative data. (p. 14)[3] He is inextricably linked with the field of scientometrics.

## About the Reviewer, I.B. Cohen

I.B. Cohen is Victor S. Thomas Professor Emeritus of the History of Science at Harvard. An authority of world fame on Isaac Newton and Benjamin Franklin, his *Franklin and Newton*,[18] published in 1956, was named the best book on early American history for that year by the Institute of Early American History and Culture. Most recently he has published *Puritanism and the Rise of Modern Science: The Merton Thesis*.[19] Later this year, Princeton University Press will publish his *The Natural and the Social Sciences: A Critical and Historical Perspective*.[20]

Cohen arrived at Harvard in 1933 and has never left, except for periods of research. He received his BS in mathematics in 1937 and was the first US citizen to receive a degree in the history of science (1947).

He has been president of the History of Science Society (1961-1962), chairman of the US National Committee of the International Union of the History and Philosophy of Science, and president of the Union Internationale d'Histoire et de Philosophe des Sciences (1968-1971). He is widely recognized as the doyen of the history of science.

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*My thanks to Paul R. Ryan and Eric Thurschwell for their help in the preparation of this introduction.*



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## Bernard Barber. *Social Studies of Science* New Brunswick, NJ/London: Transaction Publishers, 1990. 278 p.

Bernard Barber, professor emeritus of sociology at Columbia University, is a pioneer in the disciplinary specialty of sociology of science. His pioneering book, *Science and the Social Order* (1952) was the first general work on the sociology of science to be written by a trained or professional sociologist. At the time when it was written, there was little interest in this general area as an academic specialty. There were then no undergraduate courses given in this subject. In a foreword to Barber's book, Robert K. Merton cited a recent diagnosis of "the present state of sociology" by the Chicago sociologist Edward Shils, in which the study "of science and scientific institutions" was characterized as one of "the major underdeveloped areas of sociological inquiry." Some of the chapters of Bernard Barber's new book on *Social*

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*Studies of Science* recount the origins and growth of this new specialty, others explore some major stages of development of the sociology of science, while yet others are landmark studies that document Barber's own role in the development of this subject (see Table 2).

Barber agrees with other observers concerning the important contribution made to the development of this field by a group of British scientists of the 1930s. Their numbers include J.D. Bernal, Lancelot Hogben, Julian Huxley (who, unaccountably, is not mentioned by Barber), and Frederick Soddy—all of whom were deeply concerned by the anti-rationalist movements of those days as well as the plight of society in the grips of the Great Depression. To varying degrees, a number of members of this group believed that a better model for science as a progressive social force might be found in the Soviet Union and their views about science in relation to social forces were somewhat conditioned by a celebrated paper by Boris Hessen, a member of the Soviet delegation to the International Congress of the History of Science held in London in 1931. Hessen's goal was to show that the "pure" abstract science of Isaac Newton had "social roots," which Hessen attempted to identify by the application of a crude Marxism.

### Merton's Thesis

A seminal work of even more far-reaching influence on a nascent sociology of science was Robert K. Merton's *Science, Technology and Society in Seventeenth-Century England*, published in 1938, a revision of Merton's doctoral thesis at Harvard. On the fiftieth anniversary of the publication of this work, celebrations in its honor were held throughout the world, producing the well deserved praise, new criticism, and important new scholarship related to the main themes. I myself edited a volume of selections from the critical scholarship spawned by this seminal work over 50 years, together with a historical introduction displaying the history of its creation and its influence. Merton's work was directly "concerned with the sociological factors involved in the rise of modern science and technology," but the application of his findings toward the creation of a new scholarly discipline were not obvious. A primary reason for the failure of Merton's early work to influence a new discipline of sociology may have been that in a larger sense Merton's monograph was primarily centered on problems relating to the social validation of an emerging science. By contrast, the larger view of sociology of science, such as obtains today, is concerned with science as an established institution—a society, so to speak, of its own. Later in his career, Merton returned again to the main themes of sociology of science, stimulating a whole school of younger colleagues and providing a host of major new insights that mark the new discipline of sociology of science.

### Kuhn and Price

Barber calls attention to the great stimulus to this new field by the seminal "and landmark" publication by Thomas S. Kuhn on *The Structure of Scientific Revolutions.* Barber was one of the first analysts to take note that Kuhn had done more than provide new insights into the history and philosophy of science; Kuhn himself had recognized that "many of my generalizations are about the sociology or social psychology of scientists."

Barber takes note of another non-sociologist, Derek J. Price, like Kuhn a historian of science, who made an important contribution to a developing field of sociology of science. Barber calls our attention—among other things—to Price's recognition of the "informal networks of communication and collaboration" that are central in all scientific work (which he characterized by using the seventeenth-century name of "invisible college"). Another important step made by Price was his extreme use of quantitative information, noting the exponential growth of scientific publications, among other things, meriting the appellation by Robert Merton and Eugene Garfield of "the father of scientometrics."

Although quantitative studies of science can be traced back to the nineteenth-century endeavors of de Candolle and Galton and others, a major new effort in such quan-

titative analysis was done laboriously by hand by Merton for his study of the seventeenth century. When the sociology of science became a major subject (in the late 1950s and the 1960s) quantitative methods in sociology were given a greatly enlarged scope by the introduction of survey research (as developed by Paul F. Lazarsfeld and others). Later—as Barber points out—this quantitative approach was "very much enriched by the invention in the 1960s, by Eugene Garfield, of the *Science Citation Index®*."

Barber's own work in the sociology of science has illuminated "that perennial phenomenon in science, the emergence and development of new scientific specialities." An important set of selections in the present volume deals with the "social process of scientific discovery," including a very original and insightful study of the "resistance by scientists to scientific discovery," a topic often ignored by those who imagine that scientists welcome rather than resist every novelty. There is also the landmark paper, produced in collaboration with Renée C. Fox on the "case of the floppy-eared rabbits," presented as "an instance of serendipity gained and serendipity lost," which is based on extensive oral-history interviews with the two principal investigators, Lewis Thomas and Aaron Kellner. Documented case histories, as Merton once observed, especially those which would be based on direct observations "in the laboratories and field stations of physical and biological scientists," perhaps might teach us more "in a comparatively few years about the psychology and sociology of science" than has been learned "in all the years that have gone before."

For many readers, the most interesting section of this volume deals with various sociological aspects of the medical profession. These range from perceptive analyses of the problems of ethics in experimenting with human subjects to general aspects of medical ethics in relation to medical technology and social change. A final group of papers discusses the relation between the philosophy of science and sociology of science and scientists and the attitude of scientists in relation to the social study of science. Here Barber explores the curious phenomenon, one which he has personally experienced during 40 years of research, concerning general ignorance among natural scientists concerning the social study of science.

**A Feeling of Anger**

One of the most interesting chapters in Barber's book is on "Scientists and the Social Study of Science." Here Barber records his feeling of anger at the "arrogant assertion" by scientists of "all kinds of sociological, political, and psychological generalizations about science without any awareness of the limitations of their impressions, their prejudices, and their common sense knowledge." Barber quotes a statement of Freeman Dyson, that "I am not able to make use of the wisdom of the sociologists because I do not speak their language." But, in fact, he has never tried, confessing that "for insight into human affairs, I turn to stories and poems rather than to sociology." In analyzing why Dyson and other scientists refuse to take account of the findings of sociologists of science, Barber stresses a "strong individualist cast" to their "view of the world." Calling attention to Dyson's statement that "Science and technology, like all original creations of the human spirit, are unpredictable," Barber remarks that this assumption is one "that the social study of science cannot accept." Many readers will wish, as I did, that Barber would have expanded this sentence into a wholly new essay, bringing to bear his knowledge of work done in this field and his own personal insights.

Many readers of this insightful and useful volume will share the reviewer's regret that no indication is given of the date of publication of each essay. Since their dates of composition and publication cover a span of several decades, without such a date it is not always easy to grasp the full relevance of Barber's comments.

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