

SCIENTIFIC BIOGRAPHY IN THE HISTORY OF CHEMISTRY: THE ROLE OF DEXTER AND EDELSTEIN AWARD WINNERS IN THE LAST FIFTY YEARS*

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The genre of biography maintains a great appeal among general readers as well as among scholars of the academic community. A 1994 poll on reading habits in Great Britain revealed biography to be the most popular category of non-fiction book and a genre considerably ahead of contemporary fiction (19% to 14% of readers) (1). Within the history of science profession, the June 2006 issue of *Isis* included a special section on scientific biography, with essays by Joan Richards, Mary Terrall, Theodore Porter, and this author (2). In my essay in this volume, I examined different genres of scientific biography: the inevitable process by which biography brings together the lives of the biographical subject, the author, and the reader; and the diversity of audiences for which biographies may aim. Peter Dizikes examines some of these same issues in his essay "Twilight of the Idols" in the November 5, 2006 issue of *The New York Times Book Review* (3).

By way of marking the fiftieth anniversary of the Dexter and Edelstein Awards for Outstanding Achievement in the History of Chemistry, it is instructive to emphasize the role that biography has played in the history of chemistry, especially as practiced by the chemists and historians who have received the Dexter and Edelstein prizes. These prizes extend from the first Dexter award to Ralph E. Oesper in 1956 until this year's Edelstein award to Peter J. T. Morris. A review of the names of past awardees shows that at least twenty of them have tackled the art of biography, including James R. Partington, whose four-volume *History of Chemistry* draws part

of its strength from its original and detailed biographical sketches, as does Aaron J. Ihde's *Development of Modern Chemistry* (4).

Partington's approach of short biographies was adopted by several Dexter award winners who crafted or edited volumes that tell the history of chemistry through sketches of the lives and works of important figures in the history of chemistry. Bernard Jaffe's *Crucibles: The Story of the Great Chemists* is exemplary of the genre. It was first published in 1930 and received the \$7,500 Francis Bacon Award sponsored by Forum Magazine and the Simon and Schuster publishing house. Jaffe's much beloved book went through numerous editions, the most recent of which is still available as a Dover paperback, first published in 1976 with the subtitle *The Story of Chemistry from Ancient Alchemy to Nuclear Fission*. Jaffe, who was born in 1896 and died in 1986, chaired the physical science department at James Madison High School in Brooklyn for many years and received the Dexter Award in 1973 (5).

Eduard Farber, Dexter winner in 1964, edited the biographical compendium *Great Chemists*, published in 1961, as well as a smaller volume on *Nobel Prize Winners in Chemistry, 1901-1950* (1953), which he updated a decade later in 1961. Farber, like Jaffe, was a man of the nineteenth century, born in 1892, and Farber found his way into the history of chemistry while reading Ernst Meyer's *Geschichte der Chemie* as a student in Leipzig. Farber later studied and wrote history of chemistry while

working in the chemical industry in Germany and the United States (6). The 1976 Dexter winner Trevor I. Williams edited an important biographical dictionary as the *Collins Biographical Dictionary of Scientists*. It went through four editions from 1969 to 1994.

On a grander scale than Farber or Williams's dictionaries, historians of chemistry, like other historians of science, embraced biography and entered its practice on an ambitious scale in the 1960s with the huge editorial project of the *Dictionary of Scientific Biography (DSB)*, now underway in its third phase in a *New DSB*, edited by Noretta Koertge. The first of the eighteen volumes of the *DSB* appeared in 1970 under the editorship of Charles Gillispie, followed by supplementary volumes edited by 1994 Dexter Award recipient Frederic L. Holmes (7).

From the beginning of the *DSB* project in the 1960s, some scholars expressed objections to perpetuating the writing of the history of science as the biographies of great men and great ideas. Feminist scholars pointed to the absence of women scientists in older big-history narratives and called attention to historical prejudices that excluded women from the company of male heroes, with the notable exception of the glorious but tragic story of Marie Curie (8). Social historians and sociologists challenged historians to write about ordinary scientists as well as heroic figures and to study the technicians and instrument makers who do most of the work of science. A leader among these social historians has been 1983 Dexter awardee Arnold Thackray. One of his early books, *John Dalton: Critical Assessments of His Life and Science* (1972), focused on the traditional figure of Dalton, but other work has described chemical inventors and entrepreneurs, most recently in Thackray's volume (2000) co-authored with Minor Meyers, Jr. on twentieth-century chemical instrument-maker, manufacturer, and philanthropist Arnold Beckman. Thackray notably joined with Lewis Pyenson, Steven Shapin, and others in the 1970s who argued for the importance of prosopography, or group and institutional biographies in the history of science, as in Thackray's 1981 book with Jack Morrell on *Gentlemen of Science: Early Years of the British Association for the Advancement of Science* (9).

Some scientists, like historians, counseled a different approach to the history of science than the heroic genre. Among these was the physical chemist Michael Polanyi, who turned from doing chemical research to writing about the nature of science. In 1962, he advised historians to pay attention to ordinary workers in the scientific community, modestly saying that, while (10):

The example of great scientists [like Einstein] is the light which guides all workers in science, . . . we must guard against being blinded by it. There has been too much talk about the flash of discovery and this has tended to obscure the fact that discoveries, however great, can only give effect to some intrinsic potentiality of the intellectual situation in which scientists find themselves. It is easier to see this for the kind of work that I have done than it is for major discoveries.

Scientific biographies of the last few decades show the influence of discussions provoked by the *DSB* project and by points of view like Polanyi's. Of course, biographies of superhero celebrities continued to appear. Galileo, Newton, Darwin, and Einstein fall into this category, as does Marie Curie. Among chemists, in addition to Curie, Lavoisier has been the most popular subject of biography. Six Dexter scholars have written one or more books about Lavoisier. Douglas McKie was one of these biographers. Born in 1896, McKie completed his Ph.D. in chemistry in 1927 under F. G. Donnan at University College London. McKie resigned an appointment in the UCL chemistry department in 1934 in order to join a unit that became the Department of History and Philosophy of Science (11). His first biography *Antoine Lavoisier: The Father of Modern Chemistry*, which appeared in 1936, has a title that carried into the twentieth century the nineteenth-century feud about the origins of modern chemistry as a "French science." McKie's 1952 biography *Antoine Lavoisier: Scientist, Economist, Social Reformer* goes on to portray the complexity of Lavoisier's life and activities in Enlightenment and revolutionary France.

The 1980 Dexter winner Maurice Daumas was an expert on scientific instruments, and he emphasized the innovation and superior quality of Lavoisier's laboratory equipment in the book *Lavoisier, théoricien et expérimentateur* in 1955. The 1972 Dexter Award winner Henry Guerlac examined the continuities or roots of Lavoisier's so-called chemical revolution in the continental mineralogical and pharmacy tradition, on the one hand, and in British pneumatic chemistry, on the other hand. Guerlac did this in *Lavoisier—The Crucial Year* (1961) and in *Antoine-Laurent Lavoisier: Chemist and Revolutionary* (1975). The latter was written specifically for the *DSB* project. Ferenc Szabadvary, who received the Dexter Award in 1970, wrote a biography of Lavoisier for a German-language readership in 1987.

Taking a different tack, 1997 Dexter Award winner Bernadette Bensaude-Vincent, in her biography *Lavoisier: Mémoires d'une révolution* (1993), critically examines earlier interpretations of the role of Lavoisier

in chemistry. She treats Lavoisier as the last great figure of an eighteenth-century chemical tradition and a consummate insider in the scientific elite, rather than as a maverick breaking with his peers.

Biographies of Lavoisier highlight a perennial problem facing the scientific biographer. As I noted in *Isis*, we may very well wonder whether the best scientific biographies, as a rule, are books about the scientist or books about the science (12). For instance, consider the recent biographical interest in the chemist Fritz Haber. An article in the *New York Times* in late 2005 notes the debut of Daniel Charles's biography *Master Mind: The Rise and Fall of Fritz Haber, the Nobel Laureate Who Launched the Age of Chemical Warfare* (13). There is the play "Einstein's Gift," written by Vern Thiessen, about Haber and Einstein; the short German film "Haber" by Daniel Ragussis; and the opera "Zyklon" by jazz musician Peter King. "I learned nothing about science [while] working on the project," remarked Thiessen, "but I learned a tremendous amount about *scientists*." His aim, Thiessen added, was to enable the audience to "understand the passion behind the work (14)." Thiessen's comment might have pleased Polanyi, who argued in essays and in his book *Personal Knowledge* that historians should not only portray the reason and logic of a scientist's work, but the passion that undergirds scientists' commitment and quest for scientific knowledge (15).

In this vein, some biographies are framed as a *Bildungsroman*, or a narrative of self-development in which the biographer and the reader are obliged to seek the coherent self within the diverse themes of the subject's life. In reflecting on the writing of biography in general and in his own book on the immunologist Niels Jerne, Thomas Söderqvist writes that an aim of biography is a study of life as an achievement or a deed, of how one lives and crafts a life (16). In my biography of Patrick Blackett, I found myself asking how this gifted experimental physicist came to make choices of how he would live his life: what scientific problems he would study, how he would organize his laboratory, what administrative responsibilities he would take on, what political issues he would address publicly, how he would serve his country during the Second World War, and how much open controversy he was willing to endure in science and in politics. The biography came to be one that asked questions about the nature of leadership in a scientific community and the moral courage of a scientific life, as well as about Blackett's scientific experiments and theories. Ethical questions are at the core of Vern Thiessen's play and of Daniel Charles's book about Haber: the story they tell,

says Thiessen, is one of a man "who wants to do good and fails miserably (17)."

The technical science that is the daily pastime of a large part of the scientist's life and passion has to play a large role in scientific biography, as in 1978 Dexter awardee George Kauffman's biography *Alfred Werner, Founder of Coordination Chemistry* (1966) and Trevor William's *Robert Robinson: Chemist Extraordinary* (1990) (18). No historian studied more carefully than did Frederic L. Holmes, the Dexter winner for 1994, the detailed technical work of scientists. Holmes's dense narratives of scientists' laboratory work and their investigative pathways appealed mainly to a narrow audience, however, rather than to a broader public or college readership—unlike, say, Bernard Jaffe's *Crucibles*.

In fact, Holmes's study of Lavoisier, *Lavoisier and the Chemistry of Life: An Exploration of Scientific Creativity* (1985), had a very different goal from that of an inspirational biography of a great chemist or a chapter in the history of chemistry or the probing study of individual development typical of a *Bildungsroman*. As in his two-volume study of Hans Krebs (1991, 1993) and in his very first book, *Claude Bernard and Animal Chemistry: The Emergence of a Scientist* (1974), Holmes aimed to use Lavoisier's work to explore the nature of scientific creativity in general, as well as the tortuous, interwoven, and unpredictable pathways by which scientific experimentation and reasoning really work. Laboratory notebooks were the essence of Holmes's story, not the political, administrative, philosophical, or psychological hours of Lavoisier's life.

The biographical focus can also be an effective means for exploring and analyzing the politics of scientific practice and the cultural formation of natural knowledge. The tried-and-true "Life and Times" approach often has had this goal, as do newer approaches in history and sociology of science that emphasize the social construction of scientific knowledge. Among biographies written by Dexter Award winners, a good number achieve these ends, while also explaining the details of the technical scientific work that was the passion of the biographical subject. These biographies include [2003] David M. Knight's *Humphry Davy: Science and Power* (1992), [1995] William Brock's *Justus von Liebig: the Chemical Gatekeeper* (1997), [1990] Colin Russell's *Edward Frankland: Chemistry, Controversy and Conspiracy in Victorian England* (1996), [1984] Maurice Crosland's *Gay-Lussac: Scientist and Bourgeois* (1978, 2002), and [2001] William Smeaton's 1962 *Fourcroy: Chemist and Revolutionary* (1962).

Alan Rocke's biographies of Kolbe and Wurtz are among the exemplars of the kind of biography that was demanded by skeptics of the *DSB* in the 1960s who objected to the *DSB* project as a perpetuation of great-man history. The biographical subject is the subtitle, rather than the main title, of Rocke's book *The Quiet Revolution: Hermann Kolbe and the Science of Organic Chemistry* (1993). The main title, like the biographical study as a whole, interrogates the traditional trope of schismatic revolution and introduces the idea of a "quiet revolution" that took place in organic chemistry in the 19th century, with a focus on the organization and conduct of the German scientific community and on the meaning and role of research schools and traditions. Rocke's 2001 book *Nationalizing Science: Adolphe Wurtz and the Battle for French Chemistry* extends this approach to chemistry in France, in an examination of the general question of how scientific change comes about and what roles are played in scientific development by failed revolutions, as well as by successful ones.

More typically, the 1969 Dexter Award winner Walter Pagel highlighted the biographical subject *first* in his titles for books on *Paracelsus: An Introduction to Philosophical Medicine in the Era of the Renaissance* (1958, 1982) and *Joan Baptista van Helmont: Reform of Science and Medicine* (1982). Pagel's books were novel and important at the time in Pagel's general interpretations of the relationship between Renaissance medicine and chemistry and in his argument for the importance of religion and magic in early science.

Michael Polanyi wanted portrayals of scientists and of their science that were painful, as well as pretty. He thought that the most penetrating and moving representations of the "young scientist's struggles" come from novelists, such as Sinclair Lewis, C. P. Snow, and Neville Shute. Polanyi wanted accounts from historians, philosophers, and scientists that would render the scientist's life, including the darkest moments, with feeling and imagination (19):

We want to know . . . about the kind of research team which 'is a death-trap for young scientist[s] and a slough of despond for the older ones.'

Polanyi's own biographers William T. Scott and Martin X. Moleski have written precisely this kind of biography in *Michael Polanyi: Scientist and Philosopher* (2006), self-consciously following Polanyi's triumphs and anguishes as he moved, day after day, from his laboratory to meetings with colleagues and friends, and to evenings at home with his family where, as his biographers describe,

Polanyi turned his thoughts to poetry, art, literature, philosophy, politics, or prayer.

The biographer's choice of the means for effecting a biographical interpretation reflects the author's own beliefs not only about the nature of scientific work, but about chance, fate, character, or cunning in the lives we all live. Richard S. Westfall arrived at the insight that the Puritan ethic that informed his own life furnished the set of categories that he used to construct his picture of Isaac Newton, even while Westfall began increasingly to feel that the real Newton was eluding him (20). Thomas Hager, who spent much time with Linus Pauling before Pauling's death in 1994, and who published his biography in 1995, wrote that he began the project as a Pauling enthusiast and remains one, but came to realize that "below the surface charm. . . was a fiercely competitive and emotionally constricted man (21)."

Chemists themselves have written some of the most lively and informative accounts of themselves and their work in autobiographies. Exemplary in this genre are the twenty autobiographies published since 1990 in Jeffrey Seeman's series "Profiles, Pathways, and Dreams," which documents the development of modern organic chemistry. Some chemists have written both autobiography and fictionalized biography, as in Carl Djerassi's *The Pill, Pygmy Chimps, and Degas' Horse: The Autobiography of Carl Djerassi* and *Cantor's Dilemma: A Novel* (22).

In coming to a conclusion, it is striking that many of the historians of chemistry who have been recognized with the Dexter and Edelstein Awards have used biography as a means of writing the history of chemistry and in working out new methodological approaches that have been social or prosopographical or psychological or entrepreneurial or intellectual in character, rather than heroic or hagiographical. As a genre of historical writing and analysis, scientific biography is an effective means for engaging readers in the struggles, successes, and failures of scientists crafting their own lives as they explore and construct knowledge of the natural world. Scientific biographies that are rich in science and that are engaging as lives can have great appeal to audiences that are literate and even illiterate in the sciences. For historians of chemistry, the writing of such biographies has illuminated the changing character of chemical practices and chemical theories, as well as explored the lives and character of individual chemists of the first and all ranks.

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Appendix: Dexter biographers

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