

Arnold O. Beckman: One Hundred Years of Excellence. *By Arnold Thackray and Minor Myers Jr.* Philadelphia: Chemical Heritage Foundation, 2000. xvii + 379 pp. Photographs, notes, index. Cloth, \$65.00. ISBN 0-941-90123-8.

Reviewed by David B. Sicilia

The centenarian smiling on the front dust jacket of this lavishly produced biography has good reason to be cheery. Arnold O. Beckman, born in 1900, has enjoyed an exceptionally long and rewarding life as a chemical engineer, entrepreneur, and philanthropist. Through most of career he was one of America's premier designers and manufacturers of scientific instruments. The authors are Arnold Thackray, a former history of science professor and for many years president of the Chemical Heritage Foundation, which copublished the book, and Minor Myers Jr., also a former academic and now president of Illinois Wesleyan University. Although the authors don't discuss the terms under which this book was (apparently) commissioned, it is celebratory in form and content. But it is not hagiography and thus should not be dismissed easily. In the process of bringing its subject to life, *Arnold O. Beckman: One Hundred Years of Excellence* also tells an intriguing and much-needed story about the development of chemical scientific instrumentation in twentieth-century America.

Beckman was born in Cullom, a modest Illinois farming community, and by the time he graduated from high school as class valedictorian he had read classics in chemistry, substituted for his chemistry teacher, erected a home laboratory, and consulted for the local gas company. After graduation Beckman joined the marines and served in World War I, where he met his future wife, Mabel Meinzer, then a Red Cross volunteer. After some postwar wandering, Beckman completed a bachelor of science degree in chemical engineering and, in 1923, a masters degree in physical chemistry at the University of Illinois. He then entered the Ph.D. program at the California Institute of Technology (Cal Tech), dropped out after a year, but—encouraged by Arthur A. Noyes—returned and completed a dissertation on photochemical research in 1928.

Remaining at Cal Tech to teach, Beckman began to link quantum theory and chemistry through his work on thermocoupling. By the early 1930s he had focused on

chemical instrumentation, and (among other things) had developed an instrument for measuring citrus-fruit acidity—a process in high demand in Southern California—utilizing hydrogen ions. It was, according to Thackray and Myers, “the first chemical instrument with electronics at its very heart” (p. 129). Beckman launched several enterprises, notably National Technical Laboratories (later Beckman Instruments, Inc.) in this period, to produce his trademark devices, which were portable, well-crafted, self-contained, and convenient to use. Such commercial pursuits were deemed incompatible with the academy, so Beckman quit Cal Tech in 1939.

A successful line of pH meters was followed by DU spectrophotometers that determined the composition of materials through light absorption, which found ready application in making vitamins, petrochemicals, and penicillin. Beckman’s opportunities grew with his reputation (and wealth). In 1942, the federal government asked him to develop an infrared spectrophotometer for its synthetic rubber program, and later in the war he worked on radar components and a recording micromicroammeter for the Manhattan Project. By the mid 1950s, Beckman was becoming increasingly involved in electronics and data handling. The authors claim that he played a key role in the emergence of Stanford Industrial Park, and thus Silicon Valley. He bought Berkeley Scientific in 1952 and entered the chromatography field via acquisition four years later. Beckman retired as president of Beckman Instruments in 1965, and the company merged with SmithKline in 1982. Two closing chapters chronicle Beckman’s high-level university positions, conservative politics, and philanthropy, including his endowment of five major research institutes.

This biography is well contextualized and accessible to the nonchemist, without being simplistic, achieved through informative sidebar essays that, for example, lucidly explain the workings of chemical instruments, review the careers of great scientists at Cal Tech in Beckman’s day, and offer concise histories of key institutions. But many historians of business and technology will be frustrated by the analytical limitations of this book. We rarely gain an inside perspective on Beckman’s business enterprises. And although we learn how his key chemical instruments worked, we are told very little about the mental processes that led to their creation. In this regard, the story of the DU spectrophotometer’s problematic creation is one of several missed opportunities.

Thackray and Myers mention several early failed designs but do not delve into the particulars that would have revealed the innovation process. Similarly, many of the book's beautifully reproduced engineering diagrams go undiscussed. And while the authors draw some connections between early Beckman instruments and later designs, too often they lapse into an uninformative refrain about Beckman's ability to identify the "sweet spot" in emerging technological trends. This is symptomatic of a prose style that, while usually clear and straightforward, occasionally suffers from clumsy attempts at verve. "Nothing would stop Arnold now" (p. 10), the authors gush. "Effort paid!" (p. 12) they exclaim.

Beckman and his family cooperated fully in this project, which afforded the authors a rare opportunity to query their subject about events as far back as the early reaches of the twentieth century. Helped by their researchers, they consulted a range of archival sources and interviewed scores of associates. If there were major missteps or controversies in Beckman's career, we don't learn about them here. The book was written to inform the public about a key figure in the development of twentieth century applied chemical science and, in the process, to highlight the importance of chemical instrumentation. In those terms it succeeds. It's an engaging story to boot, aided not only by the bountiful illustrations but also by a CD-ROM that features Arnold Beckman himself reflecting on his past. By all appearances he is, indeed, a happy man.

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