

BOOKS

A Life That Bridged the Old and the New In Physics, Chemistry, and Technology

Walther Nernst and the Transition to Modern Physical Science

▶ Diana Kormos Barkan
Cambridge U. P., New York, 1999.
288 pp. \$64.95 hc
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Reviewed by Helge Kragh

Walther Nernst (1864–1941) was a pioneer of physical chemistry who did important work in electrochemistry, thermodynamics, and low-temperature physics. Less successfully, in the 1920s, he entered astrophysics and suggested a steady state model of the universe. Although his earliest work was in the new physical chemistry, and he became a Nobel laureate in chemistry in 1920, Nernst was a physicist by training and mentality. His career is thus well suited to illustrate the relationship between physics and chemistry in the transition to modern physical science that occurred during the period from 1890 to 1920.

Diana Barkan, a historian of science with a background in chemistry, analyzes the relationship in considerable detail in her scholarly biographical study, *Walther Nernst and the Transition to Modern Physical Science*. Her biography of Nernst is a much needed improvement over such earlier studies as Kurt Mendelssohn's *The World of Walther Nernst* (Macmillan, 1973).

Barkan's picture of Nernst and his science includes many new and interesting interpretations, solidly documented and based on meticulous archival studies. For example, she shows that Nernst's route to his famous heat theorem (or the third law of thermodynamics) was not linked to the older tradition of thermochemistry but rather to problems of theoretical physics. Moreover, she argues that Nernst's work on low temperatures and specific heats grew out of a practically oriented, technological re-

search program that started many years before Albert Einstein's 1907 quantum theory of specific heats.

The technological context plays an important role in Barkan's book, as in her excellent chapter on Nernst's invention of the electrolytic glow lamp. For this reason, the book is not only a significant contribution to the history of physics and chemistry, but also to the history of technology.

Barkan also focuses on Nernst's interactions with such important physicists as Max Planck and Einstein. Her account of Nernst's role in the first phase of quantum theory, up to the 1911 physics Solvay congress, is a fine and innovative contribution to the history of quantum physics, and her chapter on the long drama that resulted in Nernst's Nobel Prize is a masterpiece. The book is primarily addressed to historians of science and technology, but it will also be of interest to many physicists and chemists.

I found it somewhat unsatisfactory that Barkan chose to end her book at about 1920, when, she claims, "Nernst's own scientific research virtually stopped." Yet, between 1921 and 1938, Nernst did much research in astrophysics and cosmology, a fact that Barkan notes but otherwise ignores. The book would have been even more valuable if it had included all of Nernst's major research areas and not just those that made an impact on mainstream science. It should also be noted that the book contains several unaccountable errors. For example, "the mathematician Ciamician" should probably be the Italian chemist Giacomo Ciamician; Barkan misdates the first chemistry Solvay congress to 1921 (it should be 1922); and she writes that the mother of the Danish chemist Niels Bjerrum was a professor at the University of Copenhagen, which she was not.

More seriously, at least to historians, the reference system is a mess. The bibliography refers to only some of the cited works, apparently arbitrarily, and many of the works referred to in the notes are impossible to locate in the book. For example, on page 208 there are references to "Shapin, 1994" and "Friedman (1981)," but neither of these—and there are

many other examples—is listed in the bibliography or elsewhere in the book. On page 155 there is a reference to "Mendelssohn, *Cryogenics*," whereas the bibliography lists Mendelssohn's book *Cryophysics* (New York, 1960); in a note the reader is referred to "the account of K. Mendelssohn," but the bibliography lists three works of Mendelssohn; and so on. It is a shame that this fine piece of scholarship is tainted by such elementary flaws.

Greenhouse: The 200-Year Story of Global Warming

▶ Gale E. Christianson
Walker and Co., New York, 1999.
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Greenhouse: The 200-Year Story of Global Warming is the biography of an idea. At least that's what Gale Christianson tells us in the preface to his new book. Christianson is a historian of science at Indiana State University. When he adheres to his stated mission, he writes energetic, informative, and engaging prose. But when Christianson begins to examine the scientific underpinnings of assessments of global warming, the book loses its focus—along with much of its appeal.

To be sure, Christianson sets himself on a hard path. Unlike a person, the normal subject of a biography, a scientific construct exists in many places and contexts simultaneously. It can last generations and can evolve into a theory (or several theories) very different from the form in which it first appeared. Even in a mature field like physics, portraying the growth of an idea is challenging. Imagine, for example, a biography of "the quantum." In the geosciences, where the understanding of global systems is in its infancy, the task is herculean.

Appropriately enough, the book begins with brief biographical sketches of Jean-Baptiste-Joseph Fourier, James Hutton, Charles Lyell, and many of the others who laid the groundwork for modern Earth-system science. The next section is essentially a history of the industrial revolu-

HELGE KRAGH is a historian of science at Aarhus University in Aarhus, Denmark, and the author of *Quantum Generations: A History of Physics in the Twentieth Century* (Princeton U. P., 1999).