

BOOKS

Science/Technology: An Overview For a Thoughtful Audience

To Light Such a Candle: Chapters in the History of Science and Technology

Keith J. Laidler
Oxford U. P., New York, 1998.
384 pp. \$50.00 hc
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Reviewed by George Wise

Keith Laidler's *To Light Such a Candle* is a clearly written and generally accurate review of a large slice of modern science and technology. It should find an audience, but perhaps not the intended one. Laidler, a distinguished physical chemist and educator, recognizes the need for better communication between scientists and the general public. With this book, he hopes to cure what he views as public misunderstandings about science and technology and the links between them. However, the book's mixture of straightforward exposition and biographical anecdote will probably appeal more to reflective scientists than to curious nonscientists.

To Light Such a Candle narrates developments in seven major areas, ranging from photography to quantum theory and relativity, sandwiched between an opening chapter that poses questions and a final chapter that answers them. The engaging narrative is presented in plain English with very few equations and many diagrams. It covers a lot of ground and maintains the likable voice of an experienced scientist and teacher with interests ranging far beyond the laboratory. The title, for example, refers not to Faraday's famous lecture on candle chemistry or Edison's light bulb, but to the words of a 16th-century religious martyr.

The historical information is presented almost always with scrupulous accuracy. (Some exceptions: a dubious claim that recent discoveries of fractional charge may invalidate Robert A. Millikan's oil-drop experiment and the

confusion of the Dunkirk evacuation with the Normandy invasion in a discussion of World War II.) The author seldom draws on recent historical findings, however, a deficiency particularly evident in his superficial treatment of solid-state electronics, and in his echoing the mythical view of biochemist and Zionist Chaim Weizmann as a "pure" scientist whose work was scoffed at by colleagues, a view that has been seriously revised by recent Weizmann biographers. The important work Weizmann did on World War I munitions production, an achievement that advanced the Zionist cause, was actually closer to that of other scientists and motivated by a more complex mixture of science, ambition, and practicality than Laidler recognizes.

For one already familiar with the book's scientific content, Laidler's approach provides a useful perspective and much new detail. Physical chemistry gets a particularly effective treatment. For a reader less familiar with the science, the even, one-darn-thing-after-another pace of the technical presentation may raise a "Why are you telling me all this?" reaction. One longs for the more focused effect achieved by other books that address the nature of research and invention but tackle less of the total picture and make more provocative assertions—for example, Robert Root-Bernstein's *Discovering* (Harvard U. P., 1991) and George Basalla's *The Evolution of Technology* (Cambridge U. P., 1989). By contrast, it is hard to imagine that Laidler ever had the slightest uncertainty about his main conclusions: "1) Pure research should be judged entirely on the basis of its quality, not in terms of possible practical applications; 2) technology and engineering must be based on pure science; the time for empirical invention is long past; and 3) decisions about science and technology must be based on a careful consideration of all the factors involved."

The first of these is wrong. Pure research should be judged not entirely on the basis of its quality but also on the basis of ethical standards, as recent controversy over research (some of high scientific quality) performed on concentration camp inmates makes clear. Research that results in harm to, or death of, human subjects must be judged

totally unacceptable, regardless of the quality of the results or the "purity" of the research question. The second conclusion remains debatable; exaggerated reports of the death of empirical invention have been heard for nearly a century and hardly seem true for today's advances in computer and information technology. The third assertion is well-meaning but of little practical value. How would one possibly identify in advance all the factors, much less carefully consider them, when deciding to fund a new area of science or technology?

So this is not the book for educating the general public about what science and technology are, how they differ and where they are going. It is, instead, an admirable, often delightful aid to scientists beginning the process of putting some historical perspective on their technical knowledge.

A Modern Course in Statistical Physics

Linda E. Reichl
Wiley, New York, 1998. 2nd
edition. 822 pp. \$84.95 hc
ISBN 0-471-59520-9

The depth, subtlety and power of the concepts of statistical physics make it a fascinating subject, although one that can be intimidating to students. One sign of the subject's difficulty is the popularity of this quotation—I found it posted at 27 Web sites—from David L. Goodstein's book *States of Matter*, (Dover, 1985):

Ludwig Boltzmann, who spent much of his life studying statistical mechanics, died in 1906, by his own hand. Paul Ehrenfest, carrying on the same work, died similarly in 1933. Now it is our turn to study statistical mechanics.

Linda E. Reichl has designed the second edition of *A Modern Course in Statistical Physics* to help graduate students get a grip on this imposing subject. The feature that distinguishes this edition from the previous one, as well as from other texts on the subject, is its plenitude of problems, not only end-of-chapter homework exercises but also worked examples in the text. An instructor's solu-

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