the body alive while the head sublimed to relativity, rather than as the congenial occupation it probably was. From childhood Einstein must have heard talk about gadgets at the family table. His father and uncle ran a company for manufacturing electrical equipment, some of it advanced and clever, designed by the uncle. The classical theory of electromagnetic induction, which figures prominently in Einstein's first paper on relativity, was crucial to the design of the motors and power distribution systems of interest to the Einstein firm (*7*). This is not to say that Einstein took his central problems from the expanding electrotechnology of his day, but that he probably became acquainted with some of these problems in the framework of his father's engineering concerns.

Also one should probably not credit Einstein's memory that German militarism prompted his premature departure from the Munich Gymnasium. He was then a rebellious and lonely adolescent, wishing to join his family, who had moved to Italy, probably suffering from anti-Semitism, and certainly wanting to evade military service (Stern in Holton and Elkana, p. 327). His detestation of Germany arose from frustration over failure of the Weimar Republic, which he had publicly supported, and from an accurate evaluation of the Nazis, who had made him an early and special target (A. Kleinert in Nelkowski *et al.*, pp. 501–516).

The rise of the Nazis killed Einstein's pacifism. Among practical results of its demise was his signing the famous letter to Roosevelt recomending consideration of an atomic bomb. Here again Einstein is a poor guide to history. However important to him personally this signing might have become, it did not, as he supposed, have any practical importance in the construction or the timing of the atomic bomb (P. Doty in Holton and Elkana, p. 354). It did, however, lend drama to his continuing efforts to curb the postwar arms race (B. T. Feld in Holton and Elkana, pp. 369–383).

In closing the Berlin symposium, A. Hermann draws an analogy between Einstein's political and scientific development. At first, according to Hermann (Nelkowski *et al.*, p. 548), Einstein's politics, like his physics, displayed unerring insight; with the advent of the Nazis and quantum mechanics, both began to go awry. The pursuit of his will-o'-the-wisp, the unified field theory, had its parallel in his inability to consider the possibility that democracy might establish itself in Germany. In a speech at the opening of the centennial year, the president of the Bundesrepublik took up the challenge. To Einstein's declaration, "It is impossible to make good democrats of those people," he replied: "We have begun to prove the contrary."

Hermann comments: that is the best way to honor this great and good man Einstein, not taking his every word in politics or science as unalterable truths, but striving further along his path, "zu einer besseren Wissenschaft, zu einer besseren Gesellschaft." Other essayists put the same thoughts in virtually the same words: Einstein stands for "a more perfect society and for a deeper comprehension of the physical universe" (P. Bergmann in Holton and Elkana, p. 27), for "el camino del conocimiento, de la valorización del hombre, de la defensa de la verdad, de la construcción de un mundo nuevo" (C. Firmiani in Consejo Nacional, p. 78).

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References

1. C. Kirsten and H.-J. Treder, Eds., *Albert Einstein in Berlin, 1913–1933*; Teil I, *Darstellung und Dokumente*; Teil II, *Spezialinventar* (Akademie der Wissenschaften, Berlin, 1979).
2. J. L. Heilbron and B. R. Wheaton, *Literature on the History of Physics in the 20th Century* (Office for History of Science and Technology, University of California, Berkeley, 1981).
3. B. R. Wheaton and J. L. Heilbron, *An Inventory of Published Letters to and from Physicists* (Office for History of Science and Technology, University of California, Berkeley, in press).
4. Nobel Foundation, *Calendar* (Stockholm, 1977), p. 52.
5. T. S. Kuhn, *Black-Body Radiation and the Quantum Discontinuity* (Oxford University Press, New York, 1978).
6. A. I. Miller, *Albert Einstein's Special Theory of Relativity: Emergence (1905) and Early Interpretation (1905–1911)* (Addison-Wesley, Reading, Mass., 1981).
7. L. Pyenson, "Audacious enterprise: The Einsteins and electrotechnology in late nineteenth-century Munich," *Hist. Stud. Phys. Sci.* **12**, 373–400 (1982).

Encapsulations of Scholarship

Concise Dictionary of Scientific Biography. Scribner, New York, 1981. x, 773 pp. $100; prepaid and library orders, $66.67.

Dictionary of the History of Science. W. F. BYNUM, E. J. BROWNE, and ROY PORTER, Eds. Princeton University Press, Princeton, N.J., 1982. xxxiv, 494 pp., illus. $40.

The success and standing of the 16-volume *Dictionary of Scientific Biography* are by now a matter of record. So alas is the price (originally $695 and now, in an eight-volume format, $595), which puts the *DSB* out of reach of all but the most determined scholar. It is therefore good news that Charles Scribner's Sons have brought out a one-volume abridgement where for a much lower price one may find "the essential facts from all the entries, set forth briefly and clearly and in significant proportion to the scope of the original articles."

Many questions come to mind. How faithful is the abridgement?—that is, can a scholar in his or her study use this condensation to determine whether a trip to the reference library to consult the original will be worthwhile? How valuable is the *Concise DSB* as a reference work, in itself? How well does it compare with other biographical dictionaries of scientists? Can the one-volume work serve as a guide to "the extant knowledge of the history of science," as the publisher claims? Or should one turn instead to the new *Dictionary of the History of Science*?

The first question is the easiest to answer. The 18 editorial staff listed on the title page of the *Concise DSB* have done their work well, though I doubt that I will be alone in feeling a sense of shock at the shrunken, "ghosted" versions of the essays I wrote long ago for the fuller work. Those versions are faithful to the tenor of their originals—thus the entries on John Dalton, Albert Einstein, and Sigmund Freud discuss their subjects' lives as well as their ideas, while Pierre Simon Laplace remains a disembodied mind. Only the proportions of the space allotted have undergone a change: in the *Concise DSB* Einstein has finally triumphed (two pages, to one each for Dalton and Laplace and half a page for Freud), whereas in the original Laplace ruled over all (130 pages, compared to 21 for Einstein and 10 each for Dalton and Freud).

The great strength of the full *DSB* lies in its lengthy, authoritative, and often compelling accounts of the genesis and growth of the scientific ideas of its subjects. The editor, Charles C. Gillispie, took great pains in his commissioning and shaping of this aspect of the work, and the results were of very considerable credit to him and of major value to scholarship. Gillispie was more tolerant of variations in the detailed information on family backgrounds, education, and career in the 5000 entries written by the hundreds of contributors from many countries. Unfortunately, accounts of scientific ideas do not condense easily, while variations in basic information become irritating when concentrated in a one-volume work intended for quick reference. By way of example, the six-line entry on Andrew Lapworth tells us that he "studied at Birmingham," but the eight lines devoted to his father, Charles Lapworth, give no hint of where, or if, he was educated. Laplace appears with-

out childhood, youth, or education, having been mysteriously incarnated at the age of 19; in contrast one is almost reassured to learn that Isaac Newton "was born prematurely and was a frail child. His father had died before his birth; within three years his mother remarried, leaving her son in the care of his maternal grandmother."

These variations in format no doubt spring from the interesting, indeed disturbing, fact that the *Concise DSB* has no editor: instead, it was somewhat mechanically derived from the parent volumes. It possesses neither the systematic, uniform treatment of its subjects apparent in the smaller *Biographical Dictionary of Scientists*, edited by Trevor I. Williams, nor the massive range of entries apparent in the *World Who's Who in Science: A Biographical Dictionary of Notable Scientists from Antiquity to the Present*, edited by Allen G. Debus (both reviewed in *Science* **167**, 363 [1970]). What it does provide is an interesting supplement to those works and a well-produced if expensive guide to the riches available in Charles Gillispie's 16 volumes. What it does not offer (despite its publisher's claim) is a useful entrée to the extant knowledge of the history of science. For that, one must turn to the work that Bynum, Browne, and Porter have edited.

The *Dictionary of the History of Science* deserves admiration for its boldness. Its aim is to cover all the (Western) sciences, in all their tangled evolution and present complexity, inside one volume. This is a daunting task, and to accomplish it the editors have opted for an active stance, and *edited*. They eschew biography, saying, "We have judged it more useful to have articles on the Atom, the Unconscious, or Mendelism, than on Dalton, Freud or Mendel." Even the foundation ideas of science (light, evolution) are given only a highly compressed treatment in articles of 1000 to 2000 words, while most central topics receive a mere 500 to 700 words (galaxy, Galenism, generation-reproduction, geometry, gravity) and some are relegated to 250 to 400 words (genetics, God's relation to nature, geophysics, groups). Some items are barely even defined (gamete, germ, geology). What is lacking in substance is made up for by the verve of the entries, and by an exhaustive series of cross-references (golden numbers, *see* calendars; Golgi bodies, *see* protoplasm; goniometer, *see* crystals; gonorrhoea, *see* syphilis; Goodman's paradox, *see* new riddle of induction).

Reflecting its editors' interests, the *Dictionary* is strong on biological and medical matters, on geology, on certain classic areas of the history of science (Copernican revolution, corpuscular philosophy, and Kepler's laws all receive major entries), and on the philosophy of science (classification, conjecture/refutation, consilience, conventionalism, correspondence rules, counterfactuals, counter-induction). Almost entirely ignored are technologies of all kinds, scientific societies and institutions, and most areas of social science. Just as the *DSB*, while claiming universal coverage, is a recognizably American work, so too the *Dictionary of the History of Science* is obviously British in its quirks (Macmillans of London were its original publishers, and two-thirds of its 95 contributors are from the United Kingdom). Thus the "grid-group analysis" of Mary Douglas receives extended attention, while the long articles on "sociology" and "sociology of (scientific) knowledge" manage to avoid all mention of Robert K. Merton. No simple national chauvinism is at work here, as may be seen from the fact that the fashionable "ethnomethodology" of the American Harold Garfinkel is treated at length.

It is a pity that the English publisher chose to economize on production costs. The minute print and the absence of any illustrations give a cheap effect, which is reinforced by poor typography and clumsy layout. Under this malign influence, Princeton University Press also seems to have abandoned its usual standards, settling on shoddy covers and narrow margins for the American edition. However, if one looks beyond these dispiriting circumstances, and also makes allowance for the editors' particular angle of vision, then the real achievement comes alive: in the hackneyed cliché, "The *Dictionary of the History of Science* will prove an invaluable work of reference, that deserves a place on every scientist's bookshelf."

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Science Establishing Itself

Science in America. A Documentary History, 1900–1939. NATHAN REINGOLD and IDA H. REINGOLD, Eds. University of Chicago Press, Chicago, 1982. xii, 490 pp. $37.50. The Chicago History of Science and Medicine.

"In a democracy today," wrote Jacques Loeb to a colleague in 1915, "there is as yet no room in a state university for pure research. It may be done on the sly, but public pressure is against it." The German-born, American biologist added that "a research man is really safe only at present in a privately endowed institution, while he can not feel safe in a teaching institution." As detailed by Nathan and Ida H. Reingold in *Science in America*, Loeb's remarks touch on a problem and response that animated the scientific community in the United States during the opening four decades of the 20th century.

The problem was the inadequate recognition and support in American society for researchers and their work. As Loeb implied, this lack of deference to science was particularly acute in state universities where public pressure to provide mass education was keenly felt. The solution for Loeb and many others lay in privately funded institutions for basic research. These "sheltered enclaves," as the Reingolds label them, would provide talented researchers with recognition and support in an environment free from outside distraction and governmental interference. Loeb himself in 1910 had abandoned a university career in favor of a research position in the recently organized Rockefeller Institute; other American scientists had affiliated with the equally new Carnegie Institution. This trend culminated in the early 1930's with the founding of the prestigious Institute for Advanced Study.

The Reingolds see an ironic outcome to this strategy of establishing enclaves. Contrary to scientists' expectations, private institutions did not in later years come to dominate the pattern of research in the United States. Indeed, during and after World War II the emergence of federally funded, large-scale, project-oriented research reversed the previous trend. A further irony is that with the federal science of mid-century came the national deference that scientists had previously sought through private institutes. And, to the scientists' dismay, increased public involvement soon led to increased public skepticism toward science.