AARON IHDE'S CONTRIBUTIONS TO THE HISTORY OF CHEMISTRY

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Aaron Ihde's career at the University of Wisconsin spanned more than 60 years — first as a student, then as a faculty member, and, finally, as professor emeritus. The intellectual fruits of those six decades can be found in his collected papers, which occupy seven bound volumes in the stacks of the Memorial Library in Madison, Wisconsin. His complete bibliography lists more than 342 items, inclusive of the posthumous paper printed in this issue of the *Bulletin*. Of these, roughly 35 are actually the publications of his students and postdoctoral fellows; 64 deal with chemical research, education, and departmental matters, and 92 are book reviews. Roughly another 19 involve multiple editions of his books, reprintings of various papers, letters to newspaper editors, etc. The remaining 132 items represent his legacy to the history of the chemistry community and appear in the attached bibliography (1).

Textbooks

There is little doubt that Aaron's textbooks represent his most important contribution to the history of chemistry (2). The best known of these are, of course, his *The Development of Modern Chemistry*, first published by Harper and Row in 1964 and still available as a quality Dover paperback, and his volume of *Selected Readings in the History of Chemistry*, culled from the pages of the *Journal of Chemical Education* and coedited by the journal's editor, William Kieffer. Less well known outside the circle of his students and colleagues at the University of Wisconsin are his general science text, *The Physical Universe*, which was used for many years in the general science course that he taught for the Integrated Liberal Studies program, and his *The Dawn of Chemistry, A History of the Study of Matter Before Dalton*. This latter material was used in the form of photocopied handouts as the text for the first semester of his introductory history of chemistry course and was, in fact, the manuscript for a projected book designed to supplement *The Development of Modern Chemistry*, which, as its title implies, began its coverage of events starting in the late 18th century. Unfortunately, Aaron never got around to revising this material for final publication before his retirement. In 1992 I approached him on behalf of the new ACS history series with a proposal for its possible publication, but by then he felt that too much time had passed since he had done the original research for the manuscript and that he no longer had

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either the time nor the interest to do the necessary revisions and updates.

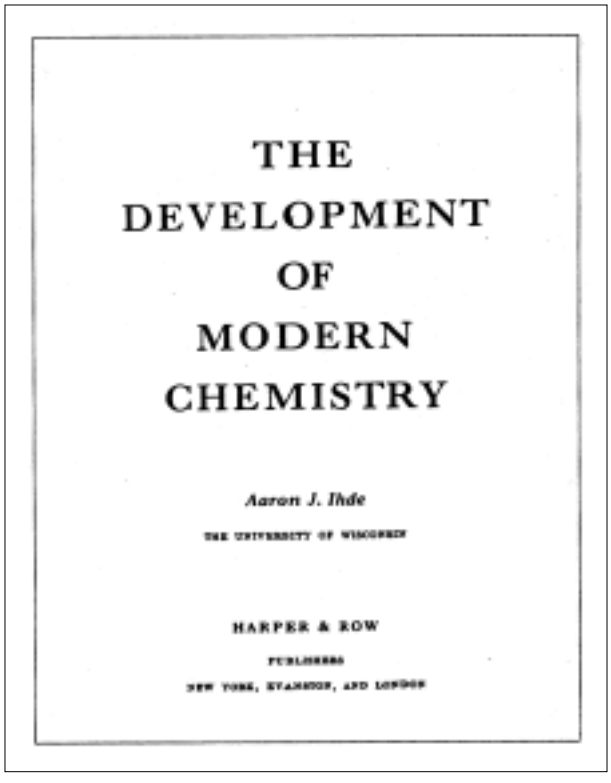
A number of excellent translated German (Ladenberg, 1905; von Meyer, 1906) and British (Pattison Muir, 1906; Hilditch, 1922; Marsh, 1929; Thorpe, 1930; Holmyard, 1931) history of chemistry texts had appeared during the first three decades of the 20th century, but by the early 1950s most of them were badly outdated. The only serious candidates available for use in a general history of chemistry course intended for chemistry majors were *A Short History of Chemistry*, by the British chemist and historian, James Partington (first published in 1937), the later revised editions of *A History of Chemistry* by the American chemist F. J. Moore (3rd edition 1939), and the more recently published 1952 and 1956 texts, *The Evolution of Chemistry* and *The Historical Background of Chemistry*, by Aaron's contemporaries, Edward Farber and Henry Leicester. But again none of these books provided any substantive coverage of events after about 1923. Consequently, the appearance of Aaron's *The Development of Modern Chemistry* in 1964 filled a well defined need. Not only did the book extend its coverage of events through the early 1950s, it was far more thorough than any of its predecessors, was impeccably documented, and contained an unprecedented number of high-quality illustrations and portraits.

I can still recall being told as a junior in high school that the school library had just received a new history of chemistry written by none other than the father of our new high school chemistry teacher, John Ihde. I immediately checked it out during my first free period and spent the afternoon thumbing through its heavily illustrated pages, much to the irritation of my 5th-period physics teacher, who felt I should be taking class notes on Newton's laws of motion instead.

Though *The Development of Modern Chemistry* was well received when it was first published, Aaron later came in for his share of criticism by the newer generation of professional historians of science, who throughout the 1960s and 1970s indulged themselves in an immature orgy of repudiating the work of earlier historians, largely by the device of accusing them of the imaginary sin of historical whiggism (3). I once asked Aaron how he felt about this. Though he was obviously unhappy about this turn of events, he also felt that it was a fad that would eventually pass. "Their turn will come," he told me. Subsequent events have largely justified Aaron's equanimity. Roughly a dozen general histories of chemistry have been published since 1964, none of which has come close to supplanting Aaron's text. Only Partington's massive, four-volume *A History of Chemistry*, which was intended as a reference work, rather than as a textbook, has surpassed its level of scholarship, and only William Brock's recently published *Norton History of Chemistry* has equaled it for clarity of writing and mature judgment, though still falling short of its breadth of coverage.

General Writings on the History of Chemistry

Most chemists who become active in the history of chemistry are initially attracted to the field through their admiration for the work of some famous scientist. An unfortunate consequence of this motivation is that their historical efforts are frequently marred by an uncritical sense of hero worship. Conversely, professional historians tend to become narrowly focused on one particular era, such as the Renaissance, the Chemical Revolution, the rise of organic chemistry, etc., often to the exclusion of other periods — a fact which largely accounts for their failure to produce any general histories of chemistry. Aaron managed to avoid both of these pitfalls. Indeed, his general writings on the history of chemistry are best described as eclectic and range from the prehistory of spectrum analysis, antecedents of Boyle's famous


THE
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definition of a chemical element, and the importance of Faraday's laws of electrolysis through the history of isomerism, early research on the isolation of free radicals, and Boyle's speculations on the degradation of gold (4). This breadth of interest was no doubt due to the fact that his work in history of chemistry was always firmly rooted in his primary commitment to the teaching of a general history of chemistry course for chemistry majors.

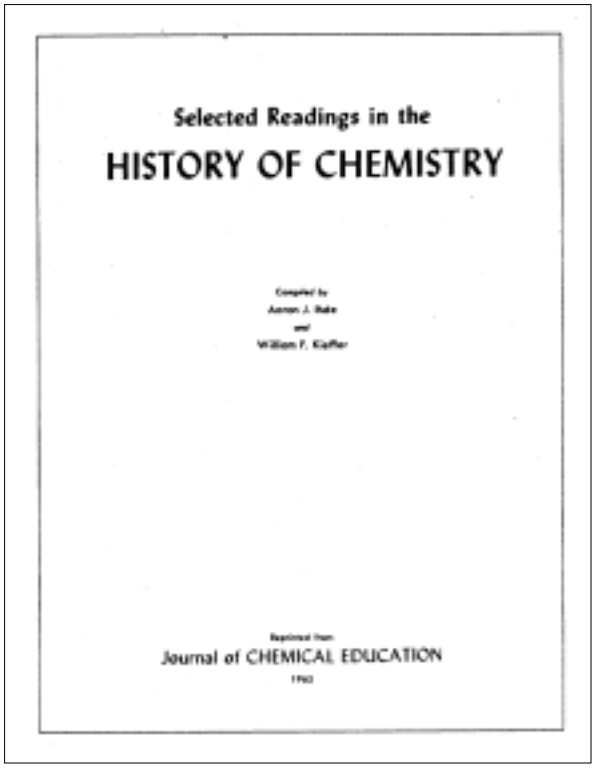
His attitude toward hero worship and the cult of the unique genius in science is most explicit in one of his earliest published papers, entitled "The Inevitability of Scientific Discovery," in which he argued that the interlocking nature or "consilience" — to use William Whewell's famous phrase — of scientific fact and theory makes the eventual discovery of new facts and theories almost certain (5). As scientific communication increases and more and more pieces of the overall picture are uncovered, the process of discovery becomes more and more inevitable, and examples of simultaneous discovery become more and more common. In other words, had there been no Linus Pauling, modern 20th-century chemistry would probably still include the concepts of bond hybridization, resonance, and the thermochemical electronegativity scale.

Roughly 29 of the items in Aaron's historical bibliography may be placed in this general history of chemistry category. Of these, one of the most important, in my opinion, is a 1969 paper done in collaboration with John Parascandola on the "History of the Pneumatic Trough," which is a model study of the important role of apparatus innovation in the history of chemistry — a topic sadly neglected by most textbook authors (6).

History of Chemistry and the Curriculum

Not only did Aaron do historical research, he was also a tireless advocate of the importance of teaching the history of science to science and nonscience majors alike. Roughly 16 of the items in his bibliography deal with this subject or with the description of the history of chemistry program and historical resources at the University of Wisconsin — the earliest appearing in 1951 and the most recent in 1990 (7). His vision of the role of history of chemistry in the training of professional chemists was well expressed in his 1971 paper, "Let's Teach History of Chemistry to Chemists!" in which he wrote (8):

> There is no question that we can train a chemical technologist without teaching him any history of chemistry and he may be a very good technologist indeed. I would argue with equal vehemence that we cannot *educate* a chemist without history of chemistry. I am interested, and I believe most of us are, in the *education* rather than the training of chemists. The person who is merely trained to carry out analyses or syntheses can do his job quite satisfactorily without much chemical theory or any history of chemistry. On the other hand, the chemist who is in a position of responsibility for the planning of investigations needs to know something about the past history of chemical investigation and the development of chemical thought. Without such knowledge he is merely a technologist.



History of Nutrition and Biochemistry

Though Aaron's work in history of chemistry was wide ranging, he did have a strong specialized interest in the history of nutrition and food chemistry, reflecting his own graduate training in this field under the direction of Professor Henry A. Schuette in the 1930s and early 1940s. This interest eventually widened to include aspects of the history of biochemistry, pharmacology, and environmentalism as well. Roughly 20 items in Aaron's bibliography fall into this category, including his very first contribution to the field — an historical study of maple sugar done in collaboration with Dr. Schuette (9).

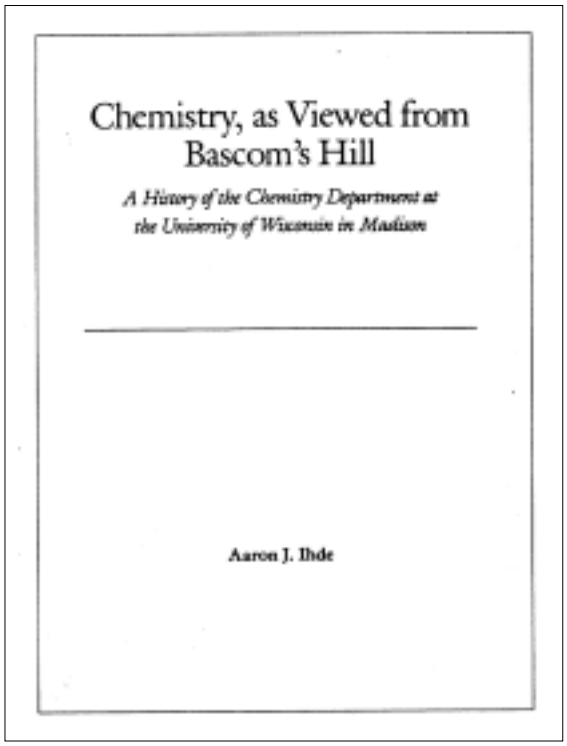
History of Chemistry at the University of Wisconsin

Aaron's entire academic career was spent at the University of Wisconsin, beginning with his undergraduate training in the late 1920s. Hence it is not surprising that about 11 items in his bibliography, excluding the biographical material discussed in the next section, deal either with the history of the chemistry department at Madison or with the history of chemical technology and education in Wisconsin and the Midwest in general (10).

Aaron's office at the university was a veritable museum of departmental history. Here one could study the research notebooks of Villiers Meloche, handle chemical samples prepared by Farrington Daniels or by Victor Lenher, or examine the rotor to the prototype of the ultracentrifuge developed by The Svedberg in 1923 during his year as a Visiting Professor at Wisconsin. There were large ring binders containing hundreds of photographs of famous chemists and former faculty, many obtained from the files of deceased colleagues and later used in Aaron's books. And, of course, there was Aaron's wonderful personal library. Again, this included many chemical classics that Aaron had inherited from retired and/or deceased faculty, as well as the entire personal library of Charles Joy (1823-1891), who had been professor of chemistry at Columbia in the 1860s and 1870s. Joy's daughter had donated the library to Beloit College sometime in the early 20th century; and Beloit, in turn, had dumped it into a library discard sale sometime in the 1950s. Aaron had been lucky enough to attend the sale and was able to purchase the entire collection at 25¢ a volume. Many of the items in the Joy collection dated back to his student days at Göttingen in the late 1840s and early 1850s.

When, as a graduate student, I needed a break from the drudgery of laboratory research, I would spend it in the back room of Aaron's office complex poring through his accumulated treasures. Typical of his generous nature was the fact that, if any of these items — however valuable or rare — caught one's attention, it could be borrowed, almost indefinitely, by the simple act of scribbling a short note on an index card and dropping it into the small metal box kept on the shelf near the door in the outer office.

Aaron's interest in departmental history culminated in 1990 with the publication of his book, *Chemistry as Viewed from Bascom's Hill, A History of the Chemistry Department at the University of Wisconsin in Madison*

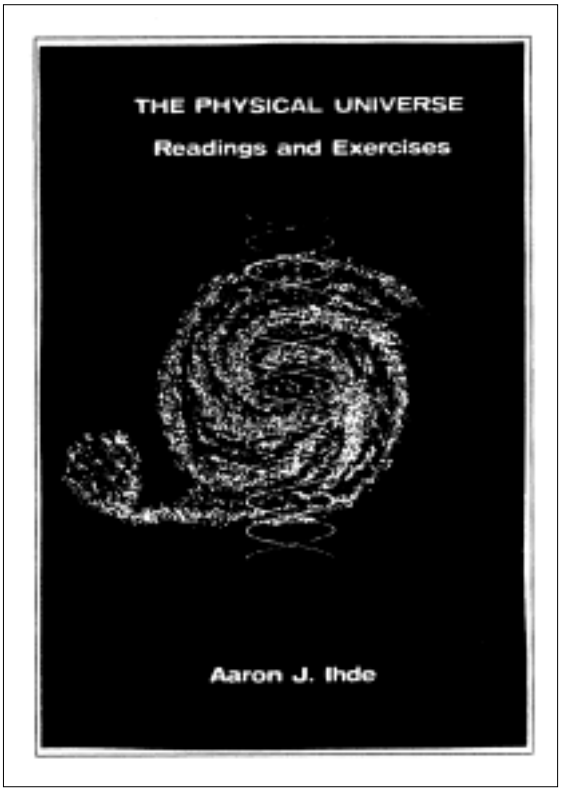


(11). Weighing in at 688 pages, it is probably the most thoroughly researched departmental history ever to appear in print.

Chemical Biography

Like his contemporary, Ralph Oesper of the University of Cincinnati, Aaron had a strong interest in chemical biography. Nearly 55 items in his bibliography fall into this category (12). These range from short entries in popular encyclopedias and dictionaries, such as *World Book Encyclopedia*, *Encyclopedia Britannica*, *Encyclopedia Americana*, *Harper's Encyclopedia of Science*, *Biographic Encyclopedia of Scientists and Inventors*, *Dictionary of Wisconsin Biography,* and the *Dictionary of American Biography*, to more scholarly entries in such works as Gillispie's famous *Dictionary of Scientific Biography*, Wyndham Miles' *American Chemists and Chemical Engineers*, and Edward Farber's book, *Great Chemists.* Many of these biographical entries involved chemists associated with the history of the department at Madison and so reflected Aaron's interest in departmental history, whereas others overlapped with his interest in the history of nutrition, food science, and biochemistry.

Aaron felt that contributing to dictionaries and encyclopedias was one of the social responsibilities of an



historian, not unlike a chemist contributing to published tables of chemical and physical data. Indeed, one of the tasks assigned to students in his advanced seminar on the history of chemistry was to learn the art of writing for dictionaries and encyclopedias by selecting the names of three chemists mentioned in *The Development of Modern Chemistry* and writing a concise biographical summary of not more than 750 words on each of them.

On more than one occasion, Aaron expressed his great admiration for Wyndham Miles' biographical dictionary of *American Chemists and Chemical Engineers*, for which Aaron wrote seven entries. This reflected his attitude that science was the accumulative result of the efforts of many scientists and not just the result of sporadic flashes of genius on the part of a privileged few. In keeping with this, he felt that the lives documented in Miles' compilation gave a far more accurate picture of a typical scientist and of the day to day practice of science than did the detailed biographies of the more famous.

Perspective

Aaron's legacy to history of chemistry is not only rich and diverse, it is also unique. Unlike most of his contemporaries in the Division of the History of Chemistry, who were able to pursue history only as a side line to their primary jobs, Aaron succeeded in molding his appointment at Wisconsin into a full-time position in the history of chemistry, complete with doctoral students and postdoctoral fellows (though not without some opposition, as he was fond of telling). In many ways his years at Wisconsin represent the apogee of constructive interaction between the humanities and science. They were a model for what the historical perspective could do for the training of professional chemists and what intimate day to day contact with practicing chemists could do for historians (13). Regrettably this particular confluence of events is unlikely to happen again. The chemistry department at Wisconsin has not seen fit to replace Aaron, and the rise of history of science as a separate profession has increasingly led to its isolation within history departments and to its progressive domination by the social sciences. To those of us who experienced the Ihde years at Wisconsin, these trends represent a great loss for chemistry and history alike.

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2. Items 41, 42, 47, and 53 in the bibliography.
3. See, for example, the condescending remarks in A. Thackray, "The Chemistry of History," *Hist. Sci.*, **1966**, *5*, 124-134.
4. Items 2-3, 8, 11-12, 15-17, 19, 21-22, 30-31, 43-45, 48, 50, 52, 56, 60-63, 96, 99, 122-123, 129 in the bibliography.
5. Item 2 in the bibliography.
6. Item 63 in the bibliography.
7. Items 4, 6, 10, 13, 20, 37, 49, 54-55, 59, 73-74, 120, 125, 127, 130 in the bibliography.
8. Item 73 in the bibliography
9 Items 1, 7, 35, 39-40, 51, 57-58, 61, 67, 69, 88-89, 91, 95, 97-98, 100, 113, 128 in the bibliography.
10. Items 5, 9, 14, 18, 46, 114-116, 126, 131-132 in the bibliography.
11. Item 131 in the bibliography
12. Items 7, 23-29, 32-34, 36, 38, 64-66, 68, 70-72, 75-87, 90, 92-94, 101-113, 117-119, 121, 124 in the bibliography.

13. It would be less then honest to claim that these interdisciplinary interactions always went smoothly. Aaron once told me that he was asked to write an inorganic cumulative examination for the second-year graduate students. It consisted of only one question, "Given an analytical balance, standard laboratory glassware and chemical reagents—but no mass spectrometer—outline how you would go about determining a table of self-consistent atomic weights." In light of the modern-day graduate student's well publicized ignorance of both descriptive and classical chemistry, it goes without saying that the results were a total disaster; not a single student passed the cume! "And you know," mused Aaron, "I was never asked to write another one."

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