

A SURVEY OF HISTORY OF CHEMISTRY BY CHEMISTS (1)

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Introduction

This article was presented at the 252nd national meeting of the American Chemical Society (ACS) held in Philadelphia in August 2016 under the title “History of Chemistry of Chemists, by Chemists, and for Chemists” (1). That title was a variation on the theme of the conference, “Chemistry of the People, by the People, for the People,” substituting for chemistry in general the focus of the ACS Division of the History of Chemistry (HIST), in whose program the presentation appeared. The “people” on whom this article concentrates are the people who do chemistry, that is, chemists. The article focuses on programs, institutions, resources, and works on the heritage of chemistry produced by chemists.

In writing about historical work by chemists, there is no intent to slight works of non-chemists. History of chemistry is a large tent, including individuals trained in and professionally practicing the disciplines of history, of chemistry, of philosophy and of sociology. Scholars of chemistry writing from outside the discipline possess professional distance and provide often salutary perspective valuable to chemists’ understanding of their past.

Moreover many of the programs and institutions treated below are interdisciplinary, involving both chemists and historians interacting with each other and pooling their expertise. An essay by Seymour Mauskopf published in this journal provides an excellent touchstone for the ongoing cooperative efforts of chemists

and historians. Provocatively titled “Do Historians or Chemists Write Better History of Chemistry?” the essay reviews some contributions of historians of chemistry (defined as scholars trained in history and employed as historians) and chemist-historians (chemists who research and write history of chemistry). Spoiler alert: Mauskopf does not give a definitive answer to the title question. In the process, he outlines a transition from a time when history of chemistry was written primarily by chemists to a time when history of science emerged and matured as a discipline in its own right. In that latter time, though, historians and chemists coexist in their interest in history of chemistry (2). Mauskopf, an historian of chemistry, embodies that cooperative coexistence, by his participation in several institutions and programs discussed below that have their roots in chemistry: he is a longtime member of the National Historic Chemical Landmarks subcommittee (a program of ACS), a recipient of the Dexter award presented by HIST, and an author in this journal.

Still it is appropriate in this venue—originally in a presentation in HIST programming and now in a journal published by HIST—to focus on contributions of chemists to history of chemistry. What follows is selective, based largely on what I have been exposed to and, at least in part for that reason, rather heavily tilted toward HIST and American contributions. Such a bias may be appropriate, given the venues of presentation and publication; however, pointing it out explicitly is also worthwhile.

The article begins with 19th-century historical efforts by chemists (with some mention of similar later works), moves to HIST and its programs and then to other institutions to which HIST can claim a relationship, and concludes with a selection of other current and recent historical resources by chemists.

19th-Century Historical Works

A Select Bibliography of Chemistry, 1492-1892 by Henry Carrington Bolton (3)

A Select Bibliography of Chemistry, 1492-1892 by the American chemist Henry Carrington Bolton (Figure 1) and its supplements provide an excellent entry point into early histories of chemistry. As we shall see, most of the early histories listed in the bibliography were written by chemists, as was the bibliography itself. Bolton had earned a doctorate in chemistry and worked as a professor of chemistry for several years (4).

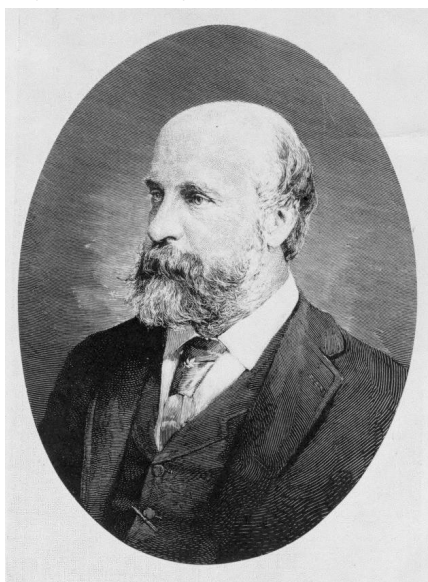


Figure 1. Henry Carrington Bolton (1843-1903), courtesy of the Edgar Fahs Smith Collection, Kislak Center for Special Collections, Rare Books and Manuscripts, University of Pennsylvania Libraries (5).

Bibliophiles of chemistry will recognize Bolton as the namesake of their society (6). His status as the patron saint of chemical bibliophiles is well warranted from his massive *Select Bibliography*, which filled over 1200 pages. The initial publication under the auspices of the Smithsonian in 1893 was supplemented in 1899 to bring the work's coverage up to 1897. A second volume published in 1901 was devoted to dissertations. And a

second supplement brought the coverage to 1902. The updates together amount to an additional 1000 pages.

Although only one section of the work is labeled "History of Chemistry," a bibliography covering 400 years must have been considered a resource for history even at the time, let alone over a century later. The authors of the works Bolton lists in the history section were mainly chemists or other scientists, some of them very prominent chemists.

Johann Friedrich Gmelin (1748-1804) wrote a three-volume history of chemistry at the very end of the 18th century, *Geschichte der Chemie seit dem Wiederaufleben der Wissenschaften bis an das Ende des achtzehnten Jahrhunderts* (7). Gmelin was a natural philosopher who taught medicine, chemistry, botany, and mineralogy at Tübingen and Göttingen (8). Bolton describes Gmelin's history as "an unwieldy work with a stupendous amount of detail, badly arranged. It excels in bibliographical references" (3a, p 114). Gmelin begins in the 12th century and ends with Lavoisier. In 1808 Johann Ritter (1776-1810) published a long paper on the history of chemical theories of the previous century (9), which Bolton characterizes as treating the phlogistic and antiphlogistic theories (3a, p 151). Ritter is known today for his work in electrochemistry and for the discovery of ultraviolet radiation (10).

These are two examples of chemists writing about the history of the rather new chemistry of Lavoisier within a generation of his research. Near the end of the century Marcellin Berthelot (1827-1907) also wrote about Lavoisier, having consulted his laboratory notebooks (11). Berthelot had previously written on the origins of alchemy (12). Berthelot reached the pinnacle of the establishment, both chemical and political, in nineteenth-century France. In chemistry he worked in areas as diverse as organic chemistry and thermochemistry. He served his nation as a senator, Minister for Instruction, and Foreign Minister (13).

In between the historical works of Ritter and Berthelot came books by Thomas Thomson (14) and Hermann Kopp (15), both practicing chemists. Thomson (1773-1852) was a professor of chemistry at Glasgow and an influential author (*A System of Chemistry*) and editor (*Annals of Philosophy*). He helped bring both Dalton's atomic theory and Prout's hypothesis to the light of day (16). Bolton notes that Thomson's was long the only history of chemistry in English (3a, pp 161-162). Kopp (1817-1892), professor of chemistry at Giessen and then at Heidelberg, wrote straightforward chemistry, as

well as its history and a fantasy of the molecular world (17). Bolton describes Kopp's volumes (Figure 2) as "a classical work, above praise" and wishes for an updated edition in Roman type (3a, p 127).

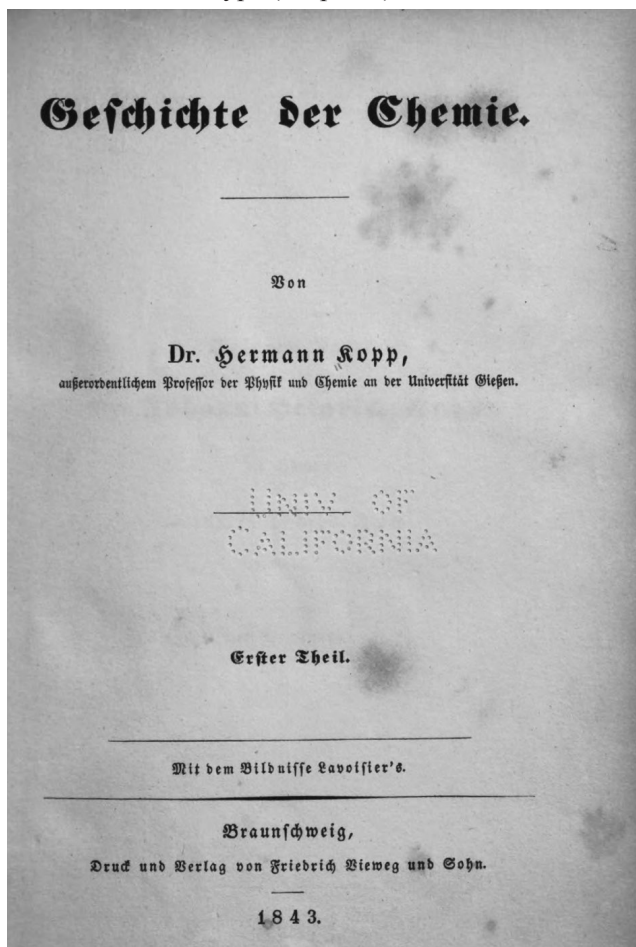


Figure 2. Volume 1 of Hermann Kopp's history of chemistry (15), which Bolton wished would be updated and printed in Roman type.

The practice of chemists writing history of chemistry did not stop in the 19th century. The magisterial four-volume *A History of Chemistry* (1961-1970) (18) was also written by a chemist. J. R. Partington (1886-1965) received degrees in chemistry from the University of Manchester, and he was professor of chemistry at Queen Mary College of the University of London for much of his career. He was a prolific author of textbooks in chemistry as well as of the five-volume *An Advanced Treatise on Physical Chemistry* (1945-1953) (19). His historical works were not limited to *A History of Chemistry*: they included works on applied chemistry and on Greek fire and gunpowder (20).

Returning to Bolton's bibliography, one finds a section devoted to biography. Most of the items listed in

that section are obituaries, éloges, and memorial lectures, published in chemistry journals. Many of the obituaries listed are unattributed, but the identified authors are mainly chemists—often prominent ones. August Wilhelm Hofmann (1818-1892) is the author most often listed in the section. Hoffman (Figure 3) was director of the Royal College of Chemistry in London and later professor of chemistry at Berlin and first president of the German chemical society (21). He later gathered a collection of such memorials along with correspondence and portraits, and had it published in book form (22). Chances are good that "unsigned" obituaries published in chemical journals were also written by chemists.



Figure 3. August Wilhelm Hofmann (1818-1892), courtesy of the Edgar Fahs Smith Collection, Kislak Center for Special Collections, Rare Books and Manuscripts, University of Pennsylvania Libraries (5).

Biographical works by chemists about chemists were not limited to articles. Robert Angus Smith (23) and Henry Roscoe (24) each published monographs on John Dalton in the second half of the 19th century. Smith (1817-1844), remembered today as a pioneer in

the study of air pollution and acid rain (25), also wrote a monograph on Thomas Graham (26) and a volume on 100 years of science in Manchester (27).

This practice of chemists memorializing the life and work of colleagues also continues, although not so much in chemistry journals. Dedicated publications of biographical articles such as *Biographical Memoirs of Fellows of the Royal Society* in Britain and *Biographical Memoirs of the National Academy of Science* in the US are examples of long-running series devoted to scientists eulogizing their distinguished scientific colleagues. The Royal Society began publishing obituaries in 1830. About 100 years later, it began putting such notices into a dedicated publication, which has been the annual *Biographical Memoirs* since 1955 (28). The American *Biographical Memoirs* began publication in 1877 (29).

Alembic Club Reprints and Ostwald's Klassiker

Some chemists of the late 19th-century were interested in making classics of the chemical literature more widely available to students and other chemists through reprints and translations. Physical chemist Wilhelm Ostwald (1853-1932), who would go on to win a Nobel prize for work in catalysis, kinetics, and thermodynamics, was the series editor of *Ostwalds Klassiker der Exakten Wissenschaften*, printed by Wilhelm Engelmann in Leipzig starting in 1889. The *Klassiker* were a set of reprints of classic works from the history of a range of sciences “from mathematics to physiology.” The first was Helmholtz’s 1847 paper on conservation of energy, “Über die Erhaltung der Kraft” (30). Over the next 25 years or so, 195 booklets were published. Another 49 came out in between the two world wars and a similar number in the postwar years (31).

In addition to serving as series editor, Ostwald edited some of the chemistry numbers. The first to carry his name as individual editor was number 3, *Die Grundlagen der Atomtheorie (The Foundations of the Atomic Theory*, 32), which may seem an odd choice for a skeptic of atoms. Another prominent chemist, Julius Lothar Meyer, edited the *Klassiker* edition (33) of the *Sunto* (“Sunto di un Corso di Filosofia Chimica fatto nel R. Università di Genova [Sketch of a Course of Chemical Philosophy]”) of Stanislao Cannizzaro (1826-1910). Meyer (1830-1895) was one of the independent discoverers of chemical periodicity in the 1860s, the one who, next to Dmitri Mendeleev, received the most credit for that discovery in the nineteenth century. In notes for this edition appears Meyer’s story of how the *Sunto*, distributed in pamphlet

form at the end of the 1860 Karlsruhe Congress, so clarified atomic weights for him that it was as though scales fell from his eyes. This well-known anecdote in the traditional reckoning of Cannizzaro’s important role in establishing a coherent system of atomic weights recognized throughout the chemistry community appears here 30 years after the Congress.

Another group of chemists interested in reprinting classics was the Alembic Club at the University of Edinburgh, founded by the assistants of the chemistry staff in 1889 (34). Under the series title Alembic Club reprints, they published 18 mostly slim booklets of classic chemical literature from 1893 through 1911; the series eventually totaled 22 titles through 1958 (35). The first booklet was *Experiments Upon Magnesia Alba, Quicklime, and Other Alkaline Substances* by Edinburgh’s own Joseph Black (36). Black (1728 - 1799) was professor of chemistry and medicine at the University of Edinburgh, best known for his discovery of “fixed air” (carbon dioxide) and his work on latent heat.

The idea of putting classic papers in chemistry into the hands of teachers and students has a particular resonance with me. As an undergraduate student in chemistry, I remember reading papers from David Knight’s collections of facsimiles (37), and then as a young professor I started transcribing classic papers in chemistry whose copyright had expired in order to make them freely available on the internet (38). Inspired by Project Gutenberg (39), I used Alembic Club reprints and Henry Leicester’s source books (40) as sources. A high school chemistry teacher in southern California named John Park had similar inclinations (41), and pretty soon we collaborated by linking to each other’s transcriptions. That was over 20 years ago. Now, page images of practically all of the Alembic Club reprints are freely available from Google Books and other sources—and many of the original publications are also available through Google Books, Hathi Trust Digital Library, the Internet Archive and other portals.

HIST and its Programs (42)

All of the activities mentioned so far began before the 20th century, most in Europe. Now the scene shifts to 20th-century America and an organization explicitly formed for chemists interested in their history, the ACS Division of the History of Chemistry (HIST).

The idea of forming an ACS section on history of chemistry grew out of a meeting between Edgar Fahs

Smith and Charles A. Browne (Figure 4) on the sidelines of the 1920 ACS meeting at Northwestern University. Smith, 66, was retiring as Provost of University of Pennsylvania. Browne, 50, was Chairman of the ACS Division of Sugar Chemistry and chief chemist of the New York Sugar Trade Laboratory. Smith wanted to meet Browne to talk about their interest in history and collections of historical materials. Smith said he later considered this meeting the first meeting of HIST (42).

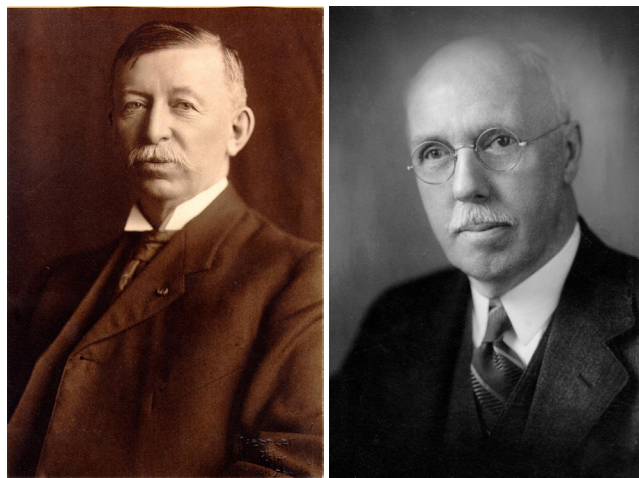


Figure 4. *Edgar Fahs Smith (1854-1928, l) and Charles Albert Browne (1870-1947, r, courtesy of the Edgar Fahs Smith Collection, Kislak Center for Special Collections, Rare Books and Manuscripts, University of Pennsylvania Libraries (5).*

At the next national meeting, in April 1921 in Rochester, New York, Smith and Browne held an informal “show and tell” session for fellow “cranks” (Smith’s term) involving some artifacts from their respective historical collections. It was not part of the official conference program. At the 1921 fall meeting, in New York City, Smith organized a meeting of “kindred spirits” to “discuss their hobbies.” The meeting was scheduled to follow the first meeting of the Section of Chemical Education (CHED), also organized by Smith. It was the start of a pattern of cooperation between CHED and HIST. At this session, a formal motion was made and carried to organize a probationary section on history of chemistry; a similar motion had occurred also at the education session; thus the two divisions were formally born on the same day, and Smith was chair of both—and also ACS president in 1921 and 1922 (42).

HIST went through the normal probationary period prescribed by ACS bylaws—no favoritism for or by the

ACS president. It earned divisional status in 1927. The programs of HIST meetings during the probationary years featured chemistry in America: Smith’s main interest was Priestley in America; Browne’s was alchemy in New England. At most of those early HIST meetings, there were historical exhibits open to the public. During those years, Browne and Smith encouraged the opening of a Priestley museum at the site of his house and they donated artifacts for display. The museum was dedicated in 1926 as part of the ACS golden anniversary celebration (42).

It is worth noting that other organizations devoted to history of science with a variety of constituencies were formed in the US at around the same time. Section L of the American Association for the Advancement of Science first met in 1920. By that time, the American Historical Association had sponsored some history of science sessions. And the History of Science Society was formed in 1924 (42).

HIST continues to be an organization of chemists interested in the history of our discipline. About 10 years ago, it adopted a mission statement that says, “The Division of the History of Chemistry (HIST) of the American Chemical Society (ACS) seeks to advance knowledge and appreciation of the history of the chemical sciences among chemists, students, historians of science, and the broader public ...” (43). Because HIST is a division of ACS, full membership in HIST requires membership in ACS, which is, essentially, open to professionals, teachers, and students in the chemical sciences; however, HIST also offers affiliation to non-chemists, which does not require membership in ACS.

Participation in HIST activities is not limited to members or even to members and affiliates, and in fact historians play important roles in HIST activities except governance. One of the principal activities of HIST is programming at ACS meetings, and that is an activity in which both chemists and historians regularly participate.

Dexter, Edelstein, and HIST Awards

In 1956, HIST Secretary Sidney Edelstein established The Dexter Chemical Corporation Award in the History of Chemistry. Edelstein was the founder of the corporation as well as of the award. The award could be given for important publications in history of chemistry, for advancing the teaching of history of chemistry, or for service to the field (42). The first recipient was Edelstein’s predecessor as Secretary of HIST, Ralph Oesper. The last recipient of the Dexter award was William Smeaton in 2001 (44).

The award's name and source of funding has changed twice since then. The Sidney M. Edelstein Award for Outstanding Achievement in the History of Chemistry was first awarded in 2002 to John Parascandola and last in 2009 to Trevor Levere (45). Now the award is called the HIST Award for Outstanding Achievement in the History of Chemistry. Its first recipient was William Newman in 2013, and its latest recipient, for 2019, is Otto Theodor (Ted) Benfey (46).

Both chemists and historians have received the award under all of its incarnations and both have served on the award selection committee.

Citation for Chemical Breakthrough

Citation for Chemical Breakthrough is a relatively new divisional award, originated under the leadership of then HIST chair Jeffrey Seeman, who remains its driving force. Its aim is to celebrate important chemical breakthroughs of the past. Plaques commemorating the breakthroughs (such as Figure 5, for example) are awarded to institutions where the breakthrough work was done. The intended audience consists primarily of chemistry professionals and students. Thus it is an award by chemists and for chemists. The program made its first set of awards in 2006. The award has celebrated achievements published over a span of about 200 years, from the chemical nomenclature of Guyton de Morveau and co-workers (1787) to buckminsterfullerene and polymerase chain reaction (1985) (47).

Publications

In the early days of HIST, Smith looked for a venue to publish historical papers, asking for pages in the *Journal of Industrial and Engineering Chemistry* and the *Journal of the American Chemical Society*. Then he had the idea for an *American Journal of Historical Chemistry* to publish six times annually, but it never came to pass.

The founding editor of the new *Journal of Chemical Education*, Neil Gordon, was committed to publishing historical papers, though. He appointed Lyman Newell (then secretary of HIST) as historical editor for the journal (42). Many years later, HIST published an index to historical articles in that journal, 1925 to 1990 (48).

The annual *Chymia* was partly a HIST publication for part of its life. It began as a publication of the Edgar Fahs Smith Collection at the University of Pennsylvania; at that point HIST had no official role in it, but HIST members edited it and contributed to it. University of

Pennsylvania funding lasted only three years, though, 1948-1950. A fourth volume was published with private donations in 1953. It was revived in 1959 as a joint venture of ACS and University of Pennsylvania, and its last volume was in 1967 (42).

In 1988, William Jensen (49), then secretary of HIST, began the *Bulletin for the History of Chemistry* with the support of HIST, the University of Cincinnati, and the Oesper Collections at that university. It grew out of the division's newsletter. Papers were originally contributed by invitation (42). All HIST members and affiliates receive the *Bulletin*. Paul Jones (1930-2019) served as editor of the *Bulletin* from 1995 through 2010, and Carmen Giunta has served in that

capacity starting in 2011.

Another venue of publication for HIST and other ACS divisions is through the ACS Symposium series. That series website lists 20 titles sponsored by HIST from 1975 to the present, more than half of them in the last 10 years. The first was a volume on the van't Hoff-Le Bel Centennial, edited by Bert Ramsay; that was number 12 in the overall ACS symposium series (50). The latest, Symposium series volume number 1311, *The Posthumous Nobel Prize in Chemistry, Volume 2: Ladies in Waiting for the Nobel Prize*, Vera V. Mainz and E. Thomas Strom, was published online in December 2018



Figure 5. Citation for Chemical Breakthrough plaque for the elucidation of the crystal structure of penicillin by Dorothy Crowfoot et al. (47).

(51). Strom has edited or co-edited five of these volumes, and HIST Councilor Mary Virginia Orna four.

Beyond HIST

Science History Institute: from CHoC via CHF

The home page of the Science History Institute (SHI) declares (52)

The Science History Institute collects and shares the stories of innovators and of discoveries that shape our lives. We preserve and interpret the history of chemistry, chemical engineering, and the life sciences.

The SHI logo includes the words “Chemistry · Engineering · Life Sciences,” reflecting the broadened mission of a newly expanded institution. In late 2015, the Chemical Heritage Foundation (CHF), based in Philadelphia, and the Life Sciences Foundation, located in Berkeley, California, merged. In 2018 the combined organization adopted its current name, and the Institute now has offices on both coasts of the United States and one in Europe as well. SHI continues the collections and mission of CHF in chemistry and chemical engineering.

The impetus to establish a Center for the History of Chemistry came from HIST. Chair William Wiswesser and Chair-elect John Wotiz approached ACS President Gardner Stacy in 1979 to fund a task force to study the proposal, look at potential sites, study other such centers, and draw up objectives. Work and discussions continued at various levels of ACS and beyond. In 1982, the ACS Board approved formation of a Center for the History of Chemistry (then known as CHoC) at the University of Pennsylvania under the direction of Arnold Thackray (42). In 1984 the American Institute of Chemical Engineers joined ACS and the University of Pennsylvania as major sponsors of the Center. In 1992, its name was changed to the Chemical Heritage Foundation (53).

During its gestation period CHF was an institution of and for chemists. It became an interdisciplinary institution in which professional historians and curators play important roles. For researchers into history of chemistry, SHI has several outstanding collections. The Othmer Library of Chemical History houses books from The Chemists’ Club, Donald Othmer’s personal library, the Roy G. Neville Historical Chemical Library, and other individual purchases, donations, and bequests. It has a collection of Oral Histories dating back to 1979. Its archives include papers of prominent chemists such as Carl Marvel and Richard Smalley; organizations such as

the International Union of Pure and Applied Chemistry, the Chemists’ Club, and several ACS divisions, including HIST; and corporations such as Dow, Aldrich, and Rohm & Haas. It has collections of images such as photographs and ephemera, and of fine arts, including many paintings of alchemy. Its collection of objects ranges from scientific instruments to chemistry sets. For those who can visit in person, SHI has a museum free and open to the public. It has educational outreach on its website including biographies of prominent chemists and video segments on women in chemistry. And it has multimedia outreach: magazine, podcast, video, and blog under the heading Distillations (54).

National Historical Chemical Landmarks

The National Historical Chemical Landmarks program began in 1992 as an effort of HIST and the ACS Office of Public Outreach (42). HIST is no longer a sponsor and its place in the ACS organizational chart has also changed: it is housed in the ACS Board Committee on Public Affairs and Public Relations. HIST members have continued to serve on the committee as do chemists from academia and industry, historians, and educators. The first landmark, dedicated in 1993 at the National Museum of American History, honored Leo Baekeland and the Invention of Bakelite. The latest dedication was in 2019 in honor of St. Elmo Brady (Figure 6), the first African-American to receive a Ph.D. in chemistry. His landmark career is being honored at the University of Illinois, from which he earned his degree, and at Fisk, Howard, and Tuskegee Universities and Tougaloo College, four historically black colleges or universities at which Brady served as an academic leader. Recent landmark designations also include the Keeling Curve (NOAA Mauna Loa Observatory in Hawaii and Scripps Institution of Oceanography, San Diego, California), Chlorofluorocarbons and Ozone Depletion (University of California, Irvine), Rachel Lloyd (University of Nebraska–Lincoln), and Rachel Carson (Rachel Carson Institute, Chatham University, Pittsburgh) (55).

The Landmarks program predates the Citation for Chemical Breakthrough award and it has a different and broader audience: it is of chemists and for “the people” (including students) more broadly defined. In fact, one of the criteria for landmark designation is that “The significance of Landmark subjects must be readily communicable to the general public” (56).



Figure 6. St. Elmo Brady. Courtesy of University of Illinois Archives

Selected other Programs and Resources

Diversity in Chemistry

Before concluding with something of a miscellany of projects, programs, or institutions involving history of chemistry of or by chemists, I wish to touch upon some history *for* chemists of the future if chemistry is to continue as a thriving enterprise. I write about the often hidden history of chemistry by individuals belonging to groups that remain underrepresented in chemistry. One shorthand term for this topic is diversity, that is human diversity in the chemical enterprise. I focus on two underrepresented groups, women and African Americans, even while recognizing that other ethnic groups such as Latinos and aboriginal peoples remain underrepresented in chemistry present and past and that east Asians and south Asians are also often missing from traditional European- and American-centered historical treatments.

Some of the programs and institutions already mentioned—ones that do outreach to the public and to

students—have produced very good materials on human diversity in chemistry. CHF, for instance, produced some excellent web resources on women in chemistry. A series of videos is still available at SHI under Women in Chemistry, and profiles of women and minority chemists are included among their Historical Biographies (54). But some excellent materials formerly on view at the CHF site are now only available in archived form at the Internet Archive. These include a web exhibit called “Stories from the Field” (57) and “Women in Chemistry: Her Lab in Your Life” (58). Likewise, the *Journal of Chemical Education* had a digital feature on the open internet called Biographical Snapshots of Famous Women and Minority Chemists. It was edited by Barbara A. Burke for JCE Internet, but it too is now only available at the Internet archive (59).

Some materials are easier to find. “ACS Honors African Americans in the Chemical Sciences” is an exhibit about 11 African American chemists on the current ACS site (60). The Royal Society of Chemistry has prepared a large online exhibit, “175 Faces in Chemistry: Celebrating Diversity in Science” (61). Most of the featured chemists are contemporary, but a good many are historical.

In the interest of promoting diversity *of* chemists, I wish to point out two websites not produced *by* chemists. Part of The HistoryMakers website, which claims the nation’s largest African American video oral history collection, the ScienceMakers portion has received NSF support (62). Based on video interviews, ScienceMakers necessarily focuses on recent and contemporary scientists. A bit more historical and less high tech is Mitchell Brown’s website “The Faces of Science: African Americans in the Sciences” (63). Brown is a librarian, so naturally his site points to other sources for researching African Americans in the sciences.

Excellent print sources also exist in this area, some written by chemists. Jeannette Brown, a pharmaceutical chemist long active in chemistry education (and interviewed for the ScienceMakers), wrote a book on and titled *African American Women Chemists* (64). Marelene and Geoffrey Rayner-Canham have published extensively on women and girls in chemistry; of their many books and articles (some in this journal), *Women in Chemistry from Alchemy to the Mid-Twentieth Century*, published by CHF in 2001 (65), has the broadest coverage and appeal.

History in Pedagogy

Another future-oriented application of history of chemistry is in chemical education. As noted previously, the *Journal of Chemical Education* once published historical papers by chemists.

From time to time, chemists have produced educational materials explicitly based on past developments in chemistry in order to teach chemistry as currently understood or science as currently practiced. Perhaps the most prominent of these efforts was the set of Harvard Case Histories in Experimental Science, under the direction of James Bryant Conant, President of Harvard University. There were eight case histories in all, each issued individually and then collected in two volumes (66). As the title suggests, the series was not limited to chemistry; however, chemistry was at the center or at least on the border of six of the eight cases: Boyle's experiments in pneumatics, the overthrow of the phlogiston theory, the rise and fall of the caloric theory, the atomic-molecular theory, plants and the atmosphere, and Pasteur's work on fermentation. Conant wrote four of the eight cases, and another chemist, Leonard K. Nash, wrote two of the others. The cases are primarily works of pedagogy rather than of history, but they draw extensively from classic papers on their title topics.

Journals

A new entry into the history of chemistry field is *Substantia*, an open-access international journal on history of chemistry published by Firenze University Press (67). Its editor in chief, Prof. Pierandrea Lo Nostro is a member of the Department of Chemistry "Ugo Schiff" of the University of Florence, Italy. The associate editors are also academic scientists and mathematicians. The journal is quite wide ranging. Although history of chemistry is on the journal's masthead, the first two bullet points in listing its scope are (67)

- original contributions offering novel experimental or theoretical insights in Chemistry and related disciplines
- fundamentals implications of chemical theories and related sciences

The oldest journal devoted to history of chemistry is *Ambix*, published by the Society for the History of Alchemy and Chemistry (SHAC). *Ambix* is generally regarded as a history journal, i.e., more oriented toward historians of chemistry than chemist-historians to use Mauskopf's terms (2). But as former editor Peter Morris

observed, many of the founders of *Ambix* were chemists, including J. R. Partington and Frank Sherwood Taylor (68).

Finally, chemists occasionally publish articles on history of chemistry in journals primarily devoted to research in chemistry. To name just one such journal and two such chemists, Jeffrey Seeman and David Lewis have published historical papers in *Angewandte Chemie International Edition*. Seeman (69) and Lewis (70), recipients of the HIST award for 2017 and 2018 respectively, are both organic chemists by training and in practice, and both have published well-received historical articles in this journal, thereby reaching chemists whose main focus is not historical.

Book Series

Chemists continue to produce books and even series of books on historical topics. *Profiles, Pathways, and Dreams* was the title of a series of autobiographies of prominent chemists, mostly organic chemists, published by ACS during the 1990s. Jeffrey Seeman was series editor. He had proposed a single-volume collection of autobiographical essays, but the project vastly outgrew the proposal, weighing in at 20 volumes in all. The authors were chemists and the audience chemists, so the books are quite detailed chemically (71). Carl Djerassi, who was then near the end of his accomplished career in synthetic organic chemistry, was among the autobiographers in the series (72). Djerassi had recently begun a remarkable literary career, which would see him publish several novels, plays, and three more volumes of autobiography or memoir.

Springer Briefs in the History of Chemistry is an ongoing series of slim volumes on topics in the history and philosophy of chemistry. The series editor is Seth Rasmussen, whose research includes both the chemistry and the history of conducting polymers. At 21 volumes and counting through 2019 (73), the series has treated chemists from Scheele to Sanger and materials from alcohol to aspirin (74).

Collections

As mentioned earlier, the founders of HIST, Edgar Fahs Smith and Charles Browne, collected historical books, photos, and the like. Smith's collection was left to the University of Pennsylvania by his widow, and it can be visited actually or virtually. The physical collection is listed as one of the collections at the University's Kislak Center for Special Collections, Rare Books and

Manuscripts (75). The virtual collection has long been digitized as part of the Schoenberg Center for Electronic Text & Image (5). It is a treasure trove primarily of portraits of chemists, from which this article has drawn several illustrations, but also of images of laboratories and apparatus.

The Oesper Collection at the University of Cincinnati is another historical collection full of associations with HIST. Ralph Oesper was born in Cincinnati in 1886 and he earned bachelor, master, and doctoral degrees from the University of Cincinnati. After teaching at NYU and Smith College, he returned to the University of Cincinnati in 1918. His chemical specialty was analytical chemistry, and his area within history of chemistry was biography. He published many biographical sketches in the *Journal of Chemical Education* in the 1940s. Upon his death in 1977, he left his collection and an endowment to the University. In 1986, William Jensen was appointed Oesper Professor of Chemical Education and History of Chemistry. He greatly expanded the collection of published materials and portraits and initiated an apparatus collection. Compared to the Smith collection, relatively little of the material is available online, but interestingly the physical apparatus collection is available online in a virtual tour (76).

Travel and Geography

For chemists interested in traveling to sites of chemical history, other chemists have gone before and prepared guides. Jim Marshall and his late wife Jenny collected photos, directions, and maps from extensive travels in Europe and to a lesser extent the Americas into a package they call *Rediscovery of the Elements*, initially released as a DVD but now freely available online. The material comes from visits to places associated with the discovery of elements: laboratories, universities, mines, museums, and the like (77). Mary Virginia Orna drew on her own extensive experience in leading study tours in the history of chemistry and that of colleagues in producing a chemistry-heavy travel guide to science history (78).

Carmen Giunta made an interactive online map of places associated with the periodic table and its elements, based largely on the locations collected by the Marshalls. The map, *Places of the Periodic Table*, was assembled for the 2019 observation of the International Year of the Periodic Table. It contains additional locations (visited virtually through Google Maps and Google Earth) as well as links to further information. It is not intended as a travel guide (79).

Chemical Genealogy

Another project by chemists and for chemists is the chemical genealogy database compiled by Vera Mainz and Greg Girolami. The database consists of brief biographical records, with references, of a large number of academic chemists, including (most importantly for the purposes of tracing genealogy) that person's advisor for his or her highest earned degree. Who is in the database? The faculty of 10 large US chemistry departments at the time of the project (which now is about 20 years in the past), and their educational ancestors. There is also a methodological introduction and suggestions on how to go about constructing a genealogy of one's own (80).

Chemistry Tree, a branch of The Academic Family Tree, is another chemical genealogy database (81). Presumably it is assembled primarily by chemists: it is a crowd-sourced project along the lines of a wiki. Compared to the Mainz and Girolami database, the Chemistry Tree has many more records but with less information and documentation per record.

Conclusion

At least some chemists have long been interested in their history. And at least some chemists continue to be active in collecting, documenting, and presenting that history for themselves, their colleagues, their students, other scholars, and the interested public.

What draws these chemists to history of chemistry? Surely some motives are shared with historians, such as the desire to piece together an interesting story of an important event—to figure out and to explain how it really happened. For many chemists who write the history of their discipline, some sort of commitment to that discipline must also play a part. The intellectual curiosity that draws researchers to figure out novel synthetic methodologies in the lab, for example, is surely not that far from a curiosity about how the older methodologies they learned about during their education came to be. After having seen the development of a particular topic from the inside for many years, after having contributed to that development, it is not surprising to wish to tell the story of that development. After all, the peer-reviewed literature that documents new scientific knowledge typically does not include personalities, inspirations, contingencies, blind allies, and other elements of engaging stories of human activity.

The commitment to and knowledge of their discipline gives chemists both advantages and disadvantages

compared to non-chemists seeking to construct a history of a chemical topic. Historians are trained in historical methodologies and they bring a detached perspective; chemists are trained in chemical methodologies and can sometimes provide an insider's perspective.

Some of the projects described here are rooted in motivations outside what one might expect of a professional historian. These include the hobby-like collecting activity of HIST founders Smith and Browne and today's member of the Bolton Society as well as other collectors of chemical books and other artifacts. They also include the pursuit of history as a means towards other chemistry-related ends, whether that be to teach, to recruit, to build public appreciation, or to celebrate past accomplishments.

Dedication

Much of the foregoing material was touched on in greater or lesser detail at a HIST symposium organized by James Bohning and Jeffrey Seeman titled "HIST at 85: Looking Back and Looking Ahead" presented at the Spring 2007 ACS meeting in Chicago (82). The single most valuable reference for me in compiling this article was Bohning's leadoff paper from that symposium, later published in this journal, "Looking Back: Eighty-Five Years of Chemists and Their History" (42). Bohning was a dedicated member and contributor to HIST for many years and in many ways, including as the Division's historian and archivist (83). This article is dedicated to his memory.

References and Notes

All URLs accessed Apr. 19-24, 2019.

- Presented at the 252nd National Meeting of the American Chemical Society [henceforth ACS], Philadelphia, PA, Aug. 21, 2016, HIST 1. Revised and updated Jan. 2018 and April 2019.
- S. Mauskopf, "Do Historians or Chemists Write Better History of Chemistry?" *Bull. Hist. Chem.*, **2011**, 36(2), 61-67. Available online at http://acshist.scs.illinois.edu/bulletin_open_access/v36-2/v36-2%20p61-67.pdf.
- a) H. C. Bolton, *A Select Bibliography of Chemistry, 1492-1892*, Smithsonian Institution, Washington, DC, 1893; b) *A Select Bibliography of Chemistry, 1492-1897, First Supplement*, 1899; c) *A Select Bibliography of Chemistry, 1492-1897: Section VIII, Academic Dissertations*, 1901; d) *A Select Bibliography of Chemistry, 1492-1902, Second Supplement*, 1904. All four volumes are available online via <https://catalog.hathitrust.org/Record/007556107>.
- H. T. Pratt, "Henry Carrington Bolton: A Truly Renaissance Man," *Boltonia*, **2004**, No. 6, 2-5. Available online at https://web.archive.org/web/20120320054658/http://www.chemheritage.org/Downloads/Library/Boltonia-06_2004.pdf.
- Schoenberg Center for Electronic Text & Image, The Edgar Fahs Smith Memorial Collection, <http://sceti.library.upenn.edu/sceti/smith/>
- The Bolton Society, <https://www.sciencehistory.org/bolton-society>.
- J. F. Gmelin, *Geschichte der Chemie seit dem Wiederaufleben der Wissenschaften bis an das Ende des achtzehnten Jahrhunderts*, Rosenbusch, Göttingen, 1797-1799. Available online via <https://catalog.hathitrust.org/Record/006724497>.
- P. Walden, "The Gmelin Chemical Dynasty," *J. Chem. Educ.*, **1954**, 31(10), 534-541; DOI: 10.1021/ed031p534. The Gmelin of *Handbook of Inorganic Chemistry* fame was Johann Friedrich's son Leopold.
- J. W. Ritter, "Versuch einer Geschichte der Schicksale der chemischen Theorie in den letzten Jahrhunderten," *J. Chem. Phys. Mineral.*, **1808**, 7, 1-66. Available online at <https://books.google.com/books?id=AENPAAAACAAJ&pg=PA1>.
- H. Berg, "Johann Wilhelm Ritter – The Founder of Scientific Electrochemistry," *Rev. Polarography*, **2008**, 54(2), 99-103; <https://doi.org/10.5189/revpolarography.54.99>.
- M. Berthelot, *La Révolution chimique*, Alcan, Paris, 1890. Available online at <http://gallica.bnf.fr/ark:/12148/bpt6k67962x.r>.
- a) M. Berthelot, *Les Origines de l'alchimie*, Steinheil, Paris, 1885. Available online at <http://gallica.bnf.fr/ark:/12148/bpt6k5447840h?rk=21459;2>. b) *Collection des anciens alchimistes grecs*, Steinheil, Paris, 1887. Available online at <https://archive.org/details/collection-desanc01bert>. c) *Introduction à l'étude de la chimie des anciens et du moyen âge*, Steinheil, Paris, 1889 (in which alchemy plays a large part). Available online at <https://archive.org/details/introductionl00bert>.
- C. G. Doremus, "Pierre Eugène Marcellin Berthelot," *Science*, **1907**, 25, 592-595; DOI: 10.1126/science.25.641.592.
- T. Thomson, *The History of Chemistry*, 2 vol, Colburn and Bentley, London, 1830. Available online at <https://books.google.com/books?id=fXkJAAAAIAAJ>.
- H. Kopp, *Geschichte der Chemie*, 4 vol., Vieweg, Braunschweig, 1843-1847. Available online via <https://catalog.hathitrust.org/Record/001495236>.
- H. S. Klickstein, "Thomas Thomson: Pioneer Historian of Chemistry," *Chymia*, **1948**, 1, 37-53.

17. A. J. Roche, *From the Molecular World: A Nineteenth-Century Science Fantasy*, Springer, 2012. This volume contains Roche's translation of Kopp's *Aus der Molecular-Welt* (1882) as well as a biographical note on Kopp.
18. J. R. Partington, *A History of Chemistry*, 4 vol., Macmillan, London, 1961-1970.
19. W. H. Brock, "J. R. Partington (1886-1965): Physical Chemistry in Deed and Word," *Bull. Hist. Chem.*, **2009**, *34*(1), 11-20. Available online at http://acshist.scs.illinois.edu/bulletin_open_access/v34-1/v34-1%20p11-20.pdf.
20. James Riddick Partington (1886-1965), <http://acshist.scs.illinois.edu/awards/Dexter%20Papers/PartingtonDexter-BioJJB.pdf>.
21. C. Meinel, "August Wilhelm Hofmann—"Reigning Chemist-in-Chief," *Angew. Chem. Int. Ed.*, **1992**, *31*(10), 1265-1282; <https://doi.org/10.1002/anie.199212653>.
22. A. W. von Hofmann, *Zur Erinnerung an vorangegangene Freunde: gesammelte Gedächtnissreden*, 3 vol., Vieweg, Braunschweig, 1888. Available online via <https://catalog.hathitrust.org/Record/001495250>.
23. R. A. Smith, *Memoir of John Dalton: And History of the Atomic Theory Up to His Time*, Bailliere, London, 1856. Available online at <https://books.google.com/books?id=qwJBAAAcAAJ>.
24. H. E. Roscoe, *John Dalton and the Rise of Modern Chemistry*, Cassell, London and Macmillan, New York, 1895. Available online via <https://catalog.hathitrust.org/Record/008638078>.
25. Royal Society of Chemistry, 175 Faces of Chemistry, Robert Angus Smith, <http://www.rsc.org/diversity/175-faces/all-faces/robert-angus-smith>.
26. R. A. Smith, *The Life and Works of Thomas Graham, D.C.L., F.R.S.*, Smith & Sons, Glasgow, 1884. Available online at <https://books.google.com/books?id=eFA0AQAAMAAJ>.
27. R. A. Smith, *A Centenary of Science in Manchester*, Taylor and Francis, London, 1883. Available online at <https://books.google.com/books?id=CdeBAAAIAAJ>.
28. Royal Society Publishing, Biographical Memoirs of Fellows of the Royal Society, <https://royalsocietypublishing.org/rsbm/about>.
29. National Academy of Sciences, Biographical Memoirs, <http://www.nasonline.org/publications/biographical-memoirs/>.
30. H. Helmholtz, Über die Erhaltung der Kraft, Ostwalds Klassiker der Exakten Wissenschaften Nr. 1, Engelmann, Leipzig, 1889. Available online at <https://books.google.com/books?id=qu44AAAAMAAJ>.
31. I pored over library catalogs and other sources to obtain the count of Klassiker titles. Many are available online via Hathi Trust catalog pages <https://catalog.hathitrust.org/Record/010851333> and <https://catalog.hathitrust.org/Record/008616187>.
32. J. Dalton and W. H. Wollaston, *Die Grundlagen der Atomtheorie*, Ostwalds Klassiker der Exakten Wissenschaften Nr. 3, Engelmann, Leipzig, 1889. Available online at <https://books.google.com/books?id=mKQ6AAAAMAAJ>.
33. L. Meyer, "Anmerkung," in S. Cannizzaro, A. Miolati, Trans., L. Meyer, Ed. *Abriss eines Lehrganges der theoretischen Chemie vorgetragen an der K. Universität Genua*, Ostwalds Klassiker der Exakten Wissenschaften Nr. 30, Engelmann, Leipzig, 1891. Available online at <https://books.google.com/books?id=tS9PAAAAYAAJ>.
34. L. Dobbin, "The Alembic Club and the History of Chemistry," *J. Chem. Educ.*, **1929**, *6*, 1225-1229.
35. Most are available online via <https://catalog.hathitrust.org/Record/010389559>.
36. J. Black, *Experiments Upon Magnesia Alba, Quick-lime, and Other Alkaline Substances*, Alembic Club Reprints No. 1, Clay, Edinburgh (1893). <https://archive.org/details/experimentsuponm00blac>.
37. D. M. Knight, Ed., *Classical Scientific Papers: Chemistry*, American Elsevier, New York, 1968. D. M. Knight, Ed., *Classical Scientific Papers: Chemistry, Second Series*, American Elsevier, New York, 1970.
38. C. Giunta, Ed., *Classic Chemistry* <http://web.lemoyne.edu/giunta/>.
39. Project Gutenberg, <http://www.gutenberg.org>.
40. H. M. Leicester and H. S. Klickstein, *A Source Book in Chemistry, 1500-1900*, McGraw-Hill, New York, 1952. H. M. Leicester, *A Source Book in Chemistry, 1900-1950*, Harvard University Press, Cambridge, MA, 1968.
41. J. Park, *Classic Papers from the History of Chemistry (and Some Physics too)*, <https://www.chemteam.info/Chem-History/Classic-Papers-Menu.html>.
42. This section and the next rely heavily on the work of James J. Bohning, to whose memory this article is dedicated. J. J. Bohning, "Looking Back: Eighty-Five Years of Chemists and Their History," *Bull. Hist. Chem.*, **2007**, *32*(2), 66-81. Available online at http://acshist.scs.illinois.edu/bulletin_open_access/v32-2/v32-2%20p66-81.pdf.
43. "HIST Mission Statement (2007)," *Bull. Hist. Chem.*, **2007**, *32*(2), 81. Available online at http://acshist.scs.illinois.edu/bulletin_open_access/v32-2/v32-2%20p81.pdf.
44. ACS Division of the History of Chemistry, Dexter Award for Outstanding Achievement in the History of Chemistry, <http://acshist.scs.illinois.edu/awards/dexter.php>.
45. ACS Division of the History of Chemistry, Edelstein Award for Outstanding Achievement in the History of

- Chemistry, <http://acshist.scs.illinois.edu/awards/dexter.php>.
46. ACS Division of the History of Chemistry, HIST Award for Outstanding Achievement in the History of Chemistry, http://acshist.scs.illinois.edu/awards/hist_award.php.
47. ACS Division of the History of Chemistry, Citation for Chemical Breakthrough Awards, http://acshist.scs.illinois.edu/awards/citations_chem-breakthroughs.php.
48. M. D. Saltzman, *Index to the History of Chemistry in the Journal of Chemical Education, 1925-1990*, HIST, 1995.
49. William B. Jensen (1948–), <http://acshist.scs.illinois.edu/awards/Edelstein%20Papers/JensenEdelsteinBioJJB2.pdf>
50. O. B. Ramsay, *van't Hoff-Le Bel Centennial*, ACS Symposium Series 12, ACS, Washington, DC, 1975.
51. V. V. Mainz and E. T. Strom, Eds., *The Posthumous Nobel Prize in Chemistry, Volume 2: Ladies in Waiting for the Nobel Prize*, ACS Symposium Series 1311, ACS, Washington, DC, 2018. As the title suggests, there was an earlier volume as well: E. T. Strom and V. V. Mainz, Eds., *The Posthumous Nobel Prize in Chemistry. Volume 1: Correcting the Errors and Oversights of the Nobel Prize Committee*, ACS Symposium Series 1262, ACS, Washington, DC, 2017.
52. Science History Institute [henceforth SHI] home page, <https://www.sciencehistory.org>.
53. SHI, History, <https://www.sciencehistory.org/history>.
54. SHI website, <https://www.sciencehistory.org>. Specific pages include Othmer Library (/othmer-library), Oral History Collections (/oral-history-collections), Archives (/archives), Collections (/collections), Museum at CHF (/museum), Historical Biographies (/historical-biographies), Women in Chemistry (/learn/women-in-chemistry), and Distillations (/distillations).
55. ACS, National Historic Chemical Landmarks, <https://www.acs.org/content/acs/en/education/whatischemistry/landmarks.html> and links therefrom.
56. ACS, Landmark Nomination Process, <https://www.acs.org/content/acs/en/education/whatischemistry/landmarks/takeaction.html>.
57. CHF, Stories from the Field, <https://web.archive.org/web/20130514020428/http://www.chemheritage.org/discover/online-resources/stories-from-the-field/index.aspx>.
58. CHF, Women in Chemistry: Her Lab in Your Life, https://web.archive.org/web/20070714193149/http://www.chemheritage.org/women_chemistry/.
59. B. A. Burke, Biographical Snapshots of Famous Women and Minority Chemists: List of Snapshots, <https://web.archive.org/web/20130204145329/http://jchemed.chem.wisc.edu/JCEWWW/Features/eChemists/bios.php>.
60. ACS, ACS Honors African Americans in the Chemical Sciences, <https://www.acs.org/content/acs/en/education/whatischemistry/african-americans-in-sciences.html>.
61. Royal Society of Chemistry, 175 Faces in Chemistry: Celebrating Diversity in Science, <http://www.rsc.org/diversity/175-faces>.
62. The HistoryMakers, ScienceMakers, <https://www.thehistorymakers.org/biographies/sciencemakers>.
63. M. Brown, The Faces of Science: African Americans in the Sciences, <https://webfiles.uci.edu/mcbrown/display/faces.html>.
64. J. Brown, *African American Women Chemists*, Oxford, New York, 2011.
65. M. Rayner-Canham and G. Rayner-Canham, *Women in Chemistry: Their Changing Roles from Alchemical Times to the Mid-Twentieth Century*, CHF, Philadelphia, 2001.
66. J. B. Conant, Ed., *Harvard Case Histories in Experimental Science*, 2 vols., Harvard University Press, Cambridge, MA, 1957.
67. *Substantia*. An International Journal in the History of Chemistry. <https://riviste.fupress.net/index.php/subs/about>
68. P. J. T. Morris, "Musings from a Departing Editor on the 75th Anniversary of *Ambix*," *Ambix*, **2012**, 59(3), 189-196; DOI 10.1179/174582312X13484746071949.
69. Jeffrey I. Seeman (1946-), <http://acshist.scs.illinois.edu/awards/HIST%20Award%20Papers/SeemanHISTBioFinal.pdf>.
70. HIST Award Biography for David E. Lewis, <http://acshist.scs.illinois.edu/awards/HIST%20Award%20Papers/LewisHISTBio.pdf>.
71. J. I. Seeman, "Profiles, Pathways and Dreams: from Naïveté to the HIST Award," *Bull. Hist. Chem.*, **2018**, 43(2), 45-60.
72. C. Djerassi, *Steroids Made it Possible*, Profiles, Pathways, and Dreams, ACS, Washington, DC, 1990.
73. SpringerBriefs in History of Chemistry, <http://www.springer.com/series/10127>.
74. A. Lennartson, *The Chemical Works of Carl Wilhelm Scheele*, 2017. J. S. Jeffers, *Frederick Sanger*, 2017. S. M. Rooney and J. N. Campbell, *How Aspirin Entered Our Medicine Cabinet*, 2017. S. C. Rasmussen, *The Quest for Aqua Vitae: The History and Chemistry of Alcohol from Antiquity to the Middle Ages*, 2014. All published by Springer in series SpringerBriefs in History of Chemistry.
75. Penn Libraries, Edgar Fahs Smith Memorial Collection, <http://sites.library.upenn.edu/collections/special/groups/edgar-fahs-smith-memorial-collection>.
76. Digital Collections, University of Cincinnati Libraries, The Oesper Collections in the History of Chemistry, <http://digital.libraries.uc.edu/oesper/history/>.

77. J. L. Marshall and V. R. Marshall, Rediscovery of the Elements, <http://www.chem.unt.edu/~jimm/REDISCOVERY%207-09-2018/>.
78. M. V. Orna, *Science History: A Traveler's Guide*, ACS Symposium Series 1179, ACS, Washington, DC, 2014.
79. Places of the Periodic Table, <https://t.co/5rli5ROMcl>.
80. V. V. Mainz and G. S. Girolami, Chemical Genealogy, <http://web-genealogy.scs.illinois.edu>
81. Welcome to Chemistry Tree - The Academic Genealogy of Chemistry Researchers, <https://academictree.org/chemistry/>
82. HIST at 85: Looking Back and Looking Ahead, 233rd National Meeting of the ACS, Chicago, IL, Mar. 27, 2007. The titles and abstracts of the presentations can be found in the ACS Meetings Archive at <http://oasys2.confex.com/acs/233nm/techprogram/S20912.HTM>.
83. N. D. Heindel, "HIST Remembers James J. Bohning," <http://acshist.scs.illinois.edu/roster/officerbios/Bohning-JamesJ.pdf>.

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2019 Conferences in History and Philosophy of Chemistry

- International Society for the Philosophy of Chemistry: 23rd annual meeting. July 15-17 in Torino, Italy (www.ispc2019.unito.it).
- Fourth International Conference on the Periodic Table, Mendeleev 150, is scheduled for July 26-28 in St. Petersburg, Russia (mendelev150.ifmo.ru/).
- 12th International Conference on the History of Chemistry (12ICHC). July 29-August 2 in Maastricht (sites.google.com/view/ichc2019/).
- ACS Division of the History of Chemistry at the Fall 2019 National Meeting of ACS, San Diego, California, August 25-29 (www.acs.org/content/acs/en/meetings/national-meeting.html).
- XXI Mendeleev Congress on General and Applied Chemistry, St. Petersburg, Russia, September 9-13 (mendelev2019.ru/index.php/en/).