

“THE POOR SISTER” COMING TO GRIPS WITH RECENT AND CONTEMPORARY CHEMISTRY (1)

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Abstract

In 2007 a reviewer wrote that “The history of 20th-century chemistry has been the poor sister of physics and biology.” Regrettably, that judgment is still valid. This paper argues for the necessity of elevating the profile of recent and contemporary chemistry (defined as chemistry of the last 60 and 30 years, respectively) in the historical literature and proposes a mechanism for doing so. It requires confronting a variety of challenges: the various audiences for history of chemistry that differ in technical and historical sophistication; the diversity of authors, among them chemists, chemist-historians and historians of science studying history of chemistry; and the necessity for adopting new research techniques and relinquishing some traditional ones. By far, most history of recent chemistry is written by chemists and chemist-historians and is only accessible to those with sophisticated technical training. However, that is not the only constraint preventing it from reaching a wider circle of readers. This body of literature lacks the essential contextual sophistication necessary for its inclusion in history of science publications. To overcome these barriers, HIST and the Science History Institute will collaborate on a workshop at the SHI connecting chemist-historians and historians of science in order to establish a shared background, to negotiate about the topic, structure, research agenda, and scope of proposed projects, and to plan for publication, when appropriate.

Introduction

“The history of 20th-century chemistry has been the poor sister of physics and biology;” such was the judgment of historian Ana Simões in 2007 (2). Examination of the annual volumes of the *Isis Current Bibliography* for the last dozen years indicates that Simões’ assertion still holds. This paper argues for the necessity of elevating the profile of recent and contemporary chemistry (defined as chemistry of the last 60 and 30 years, respectively) in the historical literature, lays out the obstacles impeding such an effort, and proposes a program for overcoming those obstacles.

Background

A convincing case for engaging with the history of recent science was articulated in 1997 by Thomas Söderqvist, who noted that “the bulk of scientific activity in world history has taken place since World War II,” and that “recent technoscience involves a significant portion of women ... and scientists from outside the traditional European-North-American core” (3). In Ref. 3 and in a successor volume published in 2006, chemistry received scant attention, substantiating Simões’ claim (4). Peter Morris’s 2007 assessment of whether “modern” chemistry would receive increased attention from historians of chemistry was not optimistic (5). Four years later, Morris was somewhat encouraged. Yet, after posing the ques-

tion, “Does the history of recent science have a future?” he found it “hard to say if the subject is on the rise” (6). Morris and Jeffrey Seeman express concerns about the pursuit of history of recent chemistry elsewhere in this issue (7). (I have adopted Morris’s definition of “Recent Chemistry” (60 years) and halved that to arrive at a definition of “Contemporary Chemistry.” I use “Recent Chemistry” as a catchall term unless specifically discussing contemporary chemistry. Furthermore, the term “historians of chemistry” denotes anyone who writes about the subject, regardless of professional affiliation. Further subdivisions of this denotation are discussed in a later section.)

Numerous impediments have been claimed to make writing the history of recent chemistry problematic. I have listed and assessed some major ones below. The first two have received abundant attention and will be considered only briefly; the remainder will be discussed in greater detail:

- The type of archival resources on which historians traditionally depend are mostly absent.
- The technical content is new and difficult and is accompanied by novel and unfamiliar terminology.
- History of recent science employs methodologies, such as oral histories and interviews, rarely used by most historians of chemistry.
- The boundaries of chemistry are becoming ever more blurred, as chemists increasingly find work in areas that lack the word “chemistry” in their title. Carston Reinhardt recently described chemistry as a “field of knowledge, a toolbox, an approach *delocalized over* the physical and life sciences, industries, and engineering” (8).
- Within this delocalized domain there are few, if any, headline-grabbing topics of the type found in neighboring sciences, such as physics and biology, that could provide an obvious starting point for anyone beginning to write about recent chemistry (9, 10).

Confronting Obstacles

Historians of science have long been admonished to treat science on its own terms, without the benefits of “retrospective insight.” That ideal is easily achieved with recent science because there are no later standards to apply. Yet some historians find recent science unfit for evaluation precisely because of the absence of such

standards (11). And while most commentators concede the difficulty of the contents and terminology of recent science, it has been argued that studies of the more distant past have not been free of that problem (12).

Some historians are troubled by the centrality of interviews and oral histories in the history of recent science. They emphasize the variable reliability of interviewees’ memories and their inevitable tendency to put themselves in the best possible light. Advocates of oral testimony respond that cross-checking interviews with written documents and the testimonies of other interviewees provide checks on these shortcomings. They further aver that it is naïve to believe written documents are free of self-aggrandizement. Furthermore, the spontaneity of interviews permits the expression of unmediated observations often absent from written documents (13). Fortunately for historians of chemistry, the Science History Institute (SHI) in Philadelphia has a large collection of oral histories from interviewees in numerous fields falling under the “chemistry” umbrella and conducts oral history workshops (14).

The quotation that begins this paper requires qualification; problems that seem uniquely characteristic of the history of chemistry may be more widespread. Angela Creager has pointed out that “The history of biology is often presented especially in classrooms as either the history of evolution or that of genetics—or both ... Rarely do the non-hereditary, non-transmutational aspects of the life sciences, whether endocrinology or ecology, take centre stage” (15). A similar complaint has come from historians of solid-state physics: “Solid state physics is ... a large, heterogenous, messy field ... [l]acking the unifying features beloved of historians ... [and having] neither a single hypothesis or set of basic equations ... nor a single spectacular and fundamental discovery” (16). These remarks demonstrate that writing recent history of science without relying on “Block Buster” topics is not a problem unique to chemistry.

Different Audiences, Divergent Histories. Can They Be Reconciled?

Historians of chemistry fall into distinct groups having different professional backgrounds and often engaging separate audiences. The primary professional allegiance of chemist-historians is to organizations where chemistry is taught and/or practiced, while professional historians of chemistry have been characterized as “‘historian[s] of science’ doing the history of chemistry.”

I use “historians of science” to designate historians of chemistry who are not chemist-historians (17).

The existence of several audiences for history of chemistry, defined by their degree of technical competence, is characteristic of our field. As Morris pointed out a decade ago, chemists produce the majority of publications in history of chemistry. Indeed, chemists have long written book-length histories of chemistry for a variety of readers, many of which have covered aspects of recent chemistry (18). At present, essentially all coverage of history of contemporary chemistry and much writing about history of recent chemistry has been authored by chemists (including chemist-historians), and usually appears in technical journals. Those publications serve to celebrate chemistry as a discipline, showcasing exemplary investigations and valorizing those who achieve them. While appreciated within chemical circles, these works assume sophisticated technical knowledge and are thus opaque to readers outside those circles (19).

However, chemist-historians often can and do write for a wider audience that includes readers with only modest chemistry backgrounds. A great many of these authors, regardless of location, write for publications connected to the American Chemical Society, particularly the ACS Symposium Series and the *Bulletin for the History of Chemistry* (20, 21). The technical content on these varies considerably, especially in the *Bulletin*, and a sizeable portion of its articles are accessible at least in part to historians of science. Yet even when achieving a desirable balance of technical and non-technical content, these articles only occasionally incorporate the degree of contextual detail expected of publications in history of science journals (22). Yet if the history of recent chemistry is to become known beyond the chemistry community, publication in these journals will be indispensable.

While only a minority of chemist-historians have written for history of science journals, they are the preferred outlet for historians of science. These historians typically seek out the political, social, economic, and personal contexts that significantly shape the history of chemistry. Unfortunately, the limited technical expertise of most historians of science constrains them from working on recent chemistry (23).

Thus, we have two parallel tracks of scholarship separated by disciplinary constraints and cultural differences that limit communication, much less cooperation. For history of recent chemistry to approach something like parity with history of both recent biology and recent physics, it will need advocates who have a secure grasp

of both the science and its setting. Individuals with both capabilities are rare, and there is an almost unimaginably large terrain to be covered. An alternative is facilitating collaboration between chemists and chemist-historians on one side and historians of science on the other. This path has its own difficulties (24). Nonetheless, it holds out the hope of drawing more participants into this urgent but seemingly overwhelming task.

A Proposal for Raising the Visibility of Recent History of Chemistry

Chemists and historians are socialized into professional cultures that differ sharply in their canons of evidence, argument, and presentation. It follows that merely bringing members of the two groups together with little shared background and guidance is unlikely to lead to fruitful collaboration. In fact, it can easily produce the opposite effect. Söderqvist points out that “When it comes to recent and contemporary science ... scientists often find it difficult to acknowledge the need for specific historical skills,” while “Historians have so little understanding of recent science and may exhibit such insensitivity to scientists’ way of thinking and understanding science that they cannot achieve the necessary rapport” (25). Thus, collaboration between chemists and historians of science is a process that, in large part, must be *cultivated*. It will involve recruitment of participants; establishment of some shared background; negotiations about the topic, structure, research agenda, and scope of proposed projects, and plans for publication, if appropriate.

Who might participate and how might they be identified? On the chemistry side, one cannot expect chemists with active research programs to be available. However, retired chemists and academic chemists at institutions lacking facilities for laboratory-based research yet requiring faculty research activity are potential candidates. They could be reached by an advertisement in the *Bulletin* (26), by announcement in the SHI online publication, *Distillations* (27), and by a notice posted to the CHEM-HIST list (28). It would be very desirable to have a story on this initiative in *Chemical & Engineering News*. Those resources collectively might well be sufficient to capture the attention of most historians of science interested in the history of recent chemistry but daunted by the technical barrier (29).

The principal activity would be a workshop, several days in length, which would concern itself with research techniques—doing oral history, conducting archival

research—and historiographic issues—the varieties of history of chemistry, the criteria for judging them. The Executive Committee of HIST has agreed to support such an initiative by promoting it and seeking out potential participants (30).

However, the proposed program must be hosted by an institution capable of supplying the ancillary services essential for its success. The SHI is an ideal venue, given its facilities and its mission, and it has agreed to assume that role (31). The process envisioned would have the workshop led by one or two historians of science, possibly with the assistance of a chemist-historian who had published in several types of journal. A list of topics might be circulated during the call for participants in part to encourage work on recent chemistry. And if we take seriously Reinhardt's characterization of chemistry as "an approach *delocalized* over the physical and life sciences, industries, and engineering," then we should contemplate increasing the number of collaborating investigators and their disciplinary backgrounds."

Afterword

In recognizing the reality of modern chemical practice, most chemists have abandoned the image of the lone investigator at the bench. Perhaps historians of chemistry should reconsider the image of the lone investigator in the archives (32).

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References and Notes

1. Based on a talk given at the Cain Conference on "Historiographies of Modern Chemistry and the Life Sciences," Science History Institute, Philadelphia, PA, 30 October 2018.
2. A. Simões, "*Shifting and Rearranging: Physical Methods and the Transformation of Modern Chemistry* by Carsten Reinhardt" [book review], *Centaurus*, **2007**, *49*, 247-248 on 247. See also H. Kragh, "Carsten Reinhardt, *Shifting and Rearranging: Physical Methods and the Transformation of Modern Chemistry*" [book review], in *Isis*, **2007**, *98*, 413-414. The book was published by Science History Publications, Sagamore Beach, MA, 2006.
3. T. Söderqvist, Ed., *The Historiography of Contemporary Science and Technology*, Harwood, Amsterdam, 1997, p 2.
4. R. E. Doel and T. Söderqvist, Eds., *The Historiography of Contemporary Science, Technology, and Medicine: Writing Recent Science*, Routledge, London, 2006.
5. P. J. T. Morris, "Writing the History of Modern Chemistry," *Bull. Hist. Chem.*, **2007**, *32*, 2-9.
6. P. J. T. Morris, "The Fall and Rise of Recent Chemistry," *Ambix*, **2011**, *58*, 238-256 on 254. See also H. Kragh, *An Introduction to the Historiography of Science*, Cambridge University Press, Cambridge, UK, 1989, pp 29-31, 156-158.
7. P. J. T. Morris and J. I. Seeman, "The Importance of Plurality and Mutual Respect in the Practice of the History of Chemistry," *Bull. Hist. Chem.*, **2022**, *47*(1), 124-137.
8. C. Reinhardt, "'What's in a Name?' Chemistry as a Non-classical Approach to the World," *Isis*, **2018**, *109*, 559-564 on 564; italics in the original. See also B. Bensaude-Vincent, "Chemists Without Borders," *Ibid.*, 597-607.
9. A perusal of the Tuesday "Science Times" section of the *New York Times* will be adequate to establish the point.
10. Drawing on Harry Collins, Steve Fuller has asserted that "the contemporary period is the *only* one about which the historian can reliably write, mainly because the scientists have not yet had an opportunity to forge canonical accounts of their exploits, which then function as myths obscuring any hope of getting at [what] really happened," S. Fuller, "Who's Afraid of the History of Contemporary Science?" in Ref. 3, pp 245-259 on 246 (italics in the original).
11. F. L. Holmes, "Writing about Scientists of the Near Past," in Ref. 3, pp 165-177 on 165-166.
12. Ref. 11, pp 168-170.
13. S. de Chadarevian, "Using Interviews to Write the History of Science," Ref. 3, pp 51-70. L. Hoddeson, "The Conflicts of Memories and Documents: Dilemmas and Pragmatics of Oral History," Ref. 4, pp 187-200.
14. Science History Institute, Center for Oral History, <https://www.sciencehistory.org/center-for-oral-history> (accessed 21 Sep 2021).
15. A. N. H. Creager, "A Chemical Reaction to the Historiography of Biology," *Ambix*, **2017**, *57*, 343-359 on 343.
16. J. D. Martin and M. Janssen, "Beyond the Crystal Maze: Twentieth-Century Physics from the Vantage Point of

- Solid State Physics,” *Hist. Stud. Nat. Sci.*, **2015**, *45*, 631–640 on 632–633.
17. S. H. Mauskopf, “Do Historians or Chemists Write Better History of Chemistry?” *Bull. Hist. Chem.*, **2011**, *36*, 61–67 on 61. Ref. 6 (Morris), pp 249–255.
 18. Ref. 6 (Morris), pp 239–248. N. Hirota, *A History of Modern Chemistry*, Kyoto University Press, Kyoto, 2016.
 19. Although written for an audience of chemists, the two dozen or so autobiographies of distinguished chemists in Jeffrey Seeman’s *Profiles, Pathways, and Dreams* series, published by the ACS in the 1990s, contains much material of interest and is accessible to historians.
 20. In 2017 the University of Florence began publishing *Substantia. An International Journal of the History of Chemistry*, <https://riviste.fupress.net/index.php/subs/about> (accessed 21 Sep 2021), which is open access. Although focused on chemistry, it accepts articles from a wide variety of disciplines that range from the highly technical to the historical and philosophical. Among technical journals, *Angewandte Chemie* (English version, *Angewandte Chemie International Edition*), is notable for its receptivity to historical submissions.
 21. Also noteworthy is *Distillations*, the online successor to *Chemical Heritage* magazine, published by the SHI, which also provides podcasts. The intended audience is less sophisticated than and orders of magnitude larger than those for all the above-mentioned history of chemistry/science journals. Writing for a lay audience requires skills additional to those encompassed by this paper, an activity to which we pay less attention than it deserves.
 22. P. J. T. Morris, “Musings from a Departing Editor on the 75th Anniversary of *Ambix*,” *Ambix*, **2012**, *59*(3), 189–196 on 194–195.
 23. Recent chemistry accessible to historians has occasionally appeared in monographs. Examples include the one referred to in Ref. 2 (Reinhardt) as well as C. Reinhardt, Ed., *Chemical Sciences in the 20th Century: Bridging Boundaries*, Wiley-VCH, Weinheim, Germany, 2001 and P. J. T. Morris, Ed., *From Classical to Modern Chemistry: The Instrumental Revolution*, Royal Society of Chemistry, London, 2002. The last two derive from conferences sponsored by the Commission on the History of Modern Chemistry (now the Commission on the History of Chemistry and Molecular Sciences).
 24. When historians of science professionalized the field in the 1950s and ‘60s, scientists and scientist-historians were effectively banished from their ranks. The last few decades have seen calls for reversing that stance: S. J. Weininger, “Letting the Scientists Back In,” in K. Gavroglu and J. Renn, Eds., *Positioning the History of Science*, Springer, Dordrecht, Netherlands, 2007, pp 173–176.
 25. Ref. 3, p 10; Ref. 6 (Kragh), pp 115–119.
 26. The editor of the *Bulletin* has offered to publish announcements of the initiative: Carmen Giunta, private communication, 21 February 2021.
 27. Science History Institute, *Distillations* (accessed 21 Sep 2021).
 28. CHEM-HIST, <https://www-mailman.uni-regensburg.de/mailman/listinfo/chem-hist> (accessed 21 Sep 2021).
 29. Alan Rocke, private communication, 4 June 2021.
 30. Seth Rasmussen, private communication, 17 May 2021.
 31. Daniel Jon Mitchell, private communication, 21 May 2021; David Caruso, private communication, 16 June 2021.
 32. B. Ashrafi, “Big History?” in K. Gavroglu and J. Renn, Eds., *Positioning the History of Science*, Springer, Dordrecht, Netherlands, 2007, pp 7–11.

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