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Widening the Poison Books Scope: Addressing Bibliotoxicology at a Medium-Sized Public University Library

This case study documents a project to research and identify arsenical bookcloth at a medium-sized public university. Use of arsenic as a color agent in nineteenth-century British and American bookcloth is summarized, and the librarian's timeline, including sabbatical-funded research, inter-institutional collaboration with a chemistry professor at an R2 university, and remediation of toxic books through grant funding is outlined. The essay addresses health and safety recommendations within the context of academic libraries.

Academic libraries face the challenge of what Drs. Melissa Tedone and Rosie Grayburn called "poison books," or bibliotoxicology.[1] Researchers at large institutions are conducting studies of library holdings, testing books for heavy metals, identifying health and safety guidelines, and sharing new knowledge via published case studies. Small- to mid-sized academic libraries, however, may lack equipment, expertise, funding, or time to investigate their holdings, or the space to safely segregate such items, and must develop their own strategies to address health and safety issues surrounding bibliotoxicology. This case study explores activities at a medium-sized public university.

Slippery Rock University (SRU), established in 1889, is a member of the Pennsylvania State System of Higher Education (PASSHE). With a student enrollment of 8,625 FTE, SRU is classified as a Professions-focused Undergraduate/Graduate-Doctorate Medium institution.[2] Each faculty librarian fulfils a number of roles; there are no book conservators. After attending a 2022 webinar,[3] Dr. Judy Silva, whose responsibilities include special collections, sought sabbatical funding to research bibliotoxicology and to pursue identification and remediation of poison

1. Rosie Grayburn and Melissa Tedone, "From Poison Books to "Bibliotoxicology": Highlighting Hazards in Paper-Based Library Collections," *Collections: A Journal for Museum and Archives Professionals* 21, no. 1 (2024): 152–156. https://doi.org/10.1177/15501906241255706

2. Carnegie Classification of Institutes of Higher Education, n.d., https://carnegieclassifications.acenet.edu/institutions/?inst=slippery+rock

3. Melissa Tedone and Rosie Grayburn, *The Poison Book Project: Arsenic in Mass-Produced 19th-Century Cloth Books* (2022), https://www.youtube.com/watch?v=OWY08Ye8rtM

books in any of Bailey Library's collections. Silva sought assistance from chemistry professor, Dr. Zachary Voras, at sister PASSHE institution West Chester University (WCU) to test books identified as potentially hazardous. Ultimately, Silva and a student co-authored a grant to fund removal of identified hazardous books.

While doing book restoration work in 2019 at the Winterthur Library in Wilmington, Delaware, conservator Tedone, aware of the Victorian-era use of arsenic as a color agent in wallpaper and other household items, considered whether that use included an emerald green book in hand.[4] Her colleague, Grayburn, tested the book's cloth binding, confirming Tedone's suspicion: the vivid green was a toxic, arsenic-based pigment (copper acetoarsenite). Spurred by safety implications for library patrons and staff, Tedone and Grayburn conducted "an analytical survey of the collections to better understand how many of the library's case bindings might be covered in potentially toxic bookcloth."[5] They established the Poison Book Project and subsequently the Bibliotoxicology Working Group, to alert colleagues and promote collaboration among professionals internationally including book conservators, librarians, archivists, and health and safety experts.[6] Since Tedone and Grayburn's initial publication, numerous researchers have added to the public record on bibliotoxicology, documenting the breadth and potential impact of arsenic and other toxic heavy metals in bookcloth, including in large academic libraries.

Literature Review

The focus of this review is arsenic as a color agent in nineteenth-century British and American bookcloth. The use of other heavy metals has also been discovered.[7] The history of arsenical hues and libraries' identification and remediation thereof are explored. While the use of toxic pigments in bookcloth was overlooked for much of the twentieth century, use in other household items was well-documented during the Victorian era (1837–1901), with dangers and associated illnesses identified as public health issues at the time.[8] Revival of interest in this topic in the late twentieth century, eventually spurred the rediscovery of arsenic's use in bookcloth.

4. Shirley Hibberd, *Rustic Adornments for Homes of Taste* (Groombridge & Sons, 1857).

5. Melissa Tedone and Rosie Grayburn, "Arsenic and Old Bookcloth: The Safe Handling, Treatment, and Storage of Victorian-Era Cloth Case Bindings," Book and Paper Group Annual 39 (2020): 108, https://cool.culturalheritage.org/coolaic/sg/bpg/annual/v39/bpga39-10.pdf

6. Tedone and Grayburn, "Arsenic and Old Bookcloth,": 108–113.

7. Amy Baldwin, Paul Garside, and Nicole Monjeau. "Addressing the Presence of Arsenical Bindings in the British Library's Collections," *Collections* 21, no. 1 (2025): 125; Teresa Cecchi, Deborha Dorotei, and Maria Chiara Leonori, "Poison Books: First Comprehensive Analysis of 23 Elements in Suspected Old Books," *Science of the Total Environment* 981 (2025): 179583; Mitchel Gundrum, "Orpiment on Seventeenth-Century Blue-Coloured Textblock Edges," *Studies in Conservation* (2025): 1–8, https://doi.org/10.1080/00393630.2025.2450977

8. O. W. Doe and Charles E. Taft, "A Case of Paris-Green Poisoning," *The Boston Medical and Surgical Journal* 115, no. 13 (1886): 301–302; George S. Hale, "Arsenical Poisoning from Domestic Fabrics," Science 472 (1892): 104, http://www.jstor.org/stable/1767836; "The Manufacture of Mineral Pigments, *British Medical Journal,* 1 no. 1684 (1893), 753–754, https://doi.org/10.1136/bmj.1.1684.753

The Victorian era "cult" of domesticity was a world where "home and family life were regarded as 'sacred' . . . 'a private arena far removed from the unpleasantness of the outside world.'"[9] The discovery of vivid new shades of green fit perfectly into this era of domestic bliss in Europe and America. Carl Wilhelm Scheele first synthesized copper arsenite to create a brilliant green pigment in 1775.[10] *The Conservation and Art Materials Encyclopedia Online* dates "emerald" green—copper acetoarsenite—around 1800, adding that it was commercially produced beginning in 1814.[11] The new arsenic-based green pigments, including Mitis Green, became wildly popular and had various names depending on manufacturer.[12] While arsenical greens' toxicities were soon realized, they continued to be sold and used widely, appearing in a variety of household items, while simultaneously being used as rat poisoning.[13]

The dangers of using arsenic to create vivid greens were discussed broadly when their use peaked, with public debates and demands for legislation. Manufacturing these colors also came under scrutiny, with calls for protection of industry workers' health. Despite warnings in the popular press, trade publications, and medical journals about illness and death,[14] the general public appears to have been reluctant to accept that their home goods might be harmful, or to give them up.

The earliest documented reference to arsenic in the context of books is 1859, but only in terms of using the element as a pest-deterrent.[15] In 1872, *Scientific American*

9. By the 1860s, the question was not whether arsenic was present in such products as wallpaper, "but whether that arsenic could contaminate the atmosphere." Scheele's Green was eventually banned for use in foodstuffs; labelling of other products was compulsory. By 1878 reforms were well-established in England. Eventually a change in fashion trends was as much responsible as any legal restraint or public health awareness for the move away from the flashy greens. The dangers reappear in the *British Medical Journal*, with a special report on the still-prevalent issue of workplace safety for those engaged in the manufacture of green pigments. See P. W. J. Bartrip, "How Green Was My Valance? Environmental Arsenic Poisoning and the Victorian Domestic Ideal," *The English Historical Review* 109 no. 433 (1994): 891–913, http://www.jstor.org/stable/574537; James C. Whorton, *The Arsenic Century: How Victorian Britain Was Poisoned at Home, Work, and Play* (Oxford University Press, 2011): 189; and "The Manufacture of Mineral Pigments," 753.

10. Cecchi, Dorotei, Leonori, "Poison Books."

11. "Emerald Green," CAMEO (Conservation and Art Materials Encyclopedia Online), Museum of Fine Arts, Boston, accessed February 8, 2024, https://cameo.mfa.org/wiki/Emerald_green

12. Mitis Green is copper arsenate. Kim Bell and Robin Canham, "Pages of Poison: Identifying 19th Century Arsenical Green Books at Queen's University," *Canadian Journal of Academic Librarianship* 11 (2025): 1–28, https://doi. org/10.33137/cjal-rcbu.v11.43087; Cecchi, Dorotei, Leonori, "Poison Books"; "Dangers in the Manufacture of Paris Green and Scheele's Green," *Monthly Review of the U.S. Bureau of Labor Statistics* 5, no. 2 (1917): 78–83; Andy Meharg, "Killer Wallpaper," *Spectroscopy Europe* (2004), https://www.spectroscopyeurope.com/system/files/pdf/X-ray_16_5.pdf

13. Cecchi, Dorotei, Leonori, "Poison Books." 2.

14. John Leighton, "On the Library, Books, and Binding, Particularly with Regard to their Restoration and Preservation," *Journal of the Society of Arts* 7, no. 327 (1859), 209–219; "Beware of Green Colors," *Scientific American* 26, no. 15 (1872) https://www.jstor.org/stable/26042737; "Arsenic Colors," *Scientific American* 28, no. 7 (1873): 98, http://www.jstor.org/stable/26050365; "Dangers in the Manufacture," 78–83; William Michell Clarke, "On Arsenical Disease, or the Disorders Produced by Arsenical Papers and Colours," *The British Medical Journal* 1, no. 651 (1886): 698–701, http://www.jstor.org/stable/25234878; Doe and Taft, "A Case of Paris-Green Poisoning," 301–302.

15. Leighton, "On the Library," 218.

warned of the dangers associated with use of arsenic in "certain shades of green."[16] While arsenical green household items are listed, books are not mentioned. A follow-up piece documented test results on specimens submitted by readers: fabric, wallpaper samples, and notably "toy books with green covers," deemed suspect the test found, as, in "all instances sufficient traces of arsenic," which proved the "dangerous character of the articles presented."[17] That single paragraph is the earliest identification of *arsenical books* in an American publication—in this case, children's books. Despite what we now know was decades of use, the late nineteenth-century literature seemingly fails to caution readers about the existence of arsenical green as a color agent in bookcloth, focusing instead on other household goods and manufacturing concerns.[18] Researchers at Queen's University Library in Kingston, Ontario, connect nineteenth-century technological changes leading to the mass production of books—"publishers' bindings"—with the arsenical green revolution. The new pigments, however, were "acutely toxic through ingestion and inhalation."[19] By 1900, these heavy metal colors had largely been replaced by coal tar dyes.

Despite arsenic's well-documented use in a wide variety of household items, until the early twenty-first century, its use as a color agent for bookcloth is scarcely mentioned.[20] A late twentieth-century revival of interest in Victorian bookbinding and, separately, use of arsenic in household items, again failed to mention use in bookcloth. Tomlinson's 1996 classic text describes one company's evolution in technology and machinery in great detail; however, very little is included about color and nothing about arsenic's use.[21] Similarly Krupp's 2008 *Bookcloth in England and America* focuses on patterns and their production methods, omitting the question of color agents altogether.[22] Beginning with Bartrip, researchers began to document the widespread use of poisonous colors during the Victorian era.[23] The use of arsenic in bookcloth, however, is still mentioned only tangentially. Hawksley's *Bitten by Witch Fever: Wallpaper and Arsenic in the Victorian Home* brought the topic into popular discourse but did not include bookcloth.[24] Solensky hinted at the arsenical books issue in descriptions of the dangers found in children's scrapbooks from the era.[25]

16. "Beware of Green Colors," 225.
17. "Arsenic Colors," 98.
18. "Dangers in the Manufacture," 78–83.
19. Bell and Canham, "Pages of Poison," 4.
20. Bartrip, "How Green."
21. William Tomlinson and Richard Masters, *Bookcloth 1823–1980: A Study of Early Use and the Rise of Manufacture, Winterbottom's Dominance of the Trade in Britain and America, Production Methods and Costs and the Identification of Qualities and Designs* (Dorothy Tomlinson: 1996).
22. Andrea Krupp, *Bookcloth in England and America,* 1823–1850 (Oak Knoll Press, 2008).
23. Bartrip, "How Green"; Lucinda Hawksley, *Bitten by Witch Fever: Wallpaper and Arsenic in the Victorian Home* (Thames and Hudson Ltd/The National Archives, 2016); José Ramón Bertomeu Sánchez, "Arsenic in France. The Cultures of Poison During the First Half of the Nineteenth Century," *Compound Histories: Materials, Governance and Production,* 1760–1840 (2018): 131–58; Whorton, "The Arsenic Century."
24. Hawksley, *Bitten*.
25. Jeanne Solensky, "Deconstructing a Scrapbook House," *The Ephemera Journal* 22 no. 3 (2020).

Grayburn used portable X-ray fluorescence spectroscopy (pXRF) and Raman spectroscopy to confirm Tedone's suspicions about arsenic in a nineteenth-century volume.[26] This led to an investigation of the entire Winterthur Library collection. Their survey focused on cloth-case English and American bindings published from the 1840s–1860s initially, and, later, the entire nineteenth century. They noted that most emerald-green bindings identified were "highly decorated, with gold titling, gold and blind blocking, and often gilt edges."[27] Identifying more arsenical bookcloth, Tedone and Grayburn set out to determine safe handling and storage procedures, and began to conduct outreach to others likely to encounter this issue.[28] Again, this was the beginning of the Poison Book Project and the broader Bibliotoxicology Working Group (BibTox). The work of Tedone and Grayburn is well-documented, and has served as a springboard for other researchers.[29] BibTox has become the research nexus for investigations at cultural heritage institutions internationally, including the British Library,[30] the National Library of Finland,[31] KB National Library of the Netherlands,[32] as well as academic libraries in Germany,[33] Canada,[34] and in the United States.[35] These academic libraries are of particular importance to this case study.

University Libraries

At Queen's University Library, researchers consulted the Poison Book Project identification bookmark and created a test set of 150 books published between 1820–1900. They also compared the Poison Book Project Arsenical Books Database[36] against

26. Tedone and Grayburn, "Arsenic and Old Bookcloth," 109.
27. Tedone and Grayburn, "Arsenic and Old Bookcloth," 5. They also mention that although arsenical book covers remain bright green despite their age, "spine cloth shows more variation in color, likely from exposure to oxidizing air pollution as the book sits on the shelf." Hence their recommendation that each green book in a collection under review be pulled to examine not just the spine, but also the cover.
28. Melissa Tedone and Rosie Grayburn, "Toxic Tomes: Understanding the Use and Risks of Heavy Metals in Nineteenth-century Bookcloth," *Collections* 19, no. 2 (2023): 189–201.
29. Rosie Grayburn and Melissa Tedone, "From Poison Books," 152–156. Also see other works by these authors cited in this article, and their "Editorial Introduction to the 'Bibliotoxicology' Special Issue," *Studies in Conservation* (2025): 1–2.
30. Baldwin, Garside, and Monjeau, *Addressing*.
31. Liisa Katariina Ruuska-Jauhijärvi et al., "Congress Review: Hazardous Heritage: Working with and Around Dangerous Materials in Cultural Heritage, 23 to 24.10, (2023), Antwerp, Belgium," *Collections* 21, no. 1 (2025): 170–181. https://doi.org/10.1177/15501906241289621
32. Foekje Boersma et al., "It's Not Easy Being Green: The Challenge of Having Poisonous Arsenic Containing Books in a National Library Collection," *Studies in Conservation* (2025): 1–12.
33. Juliana Wetten et al., "Arsenic Pigments in Libraries: Testing Methods, Contaminated Spaces, and Occupational Safety Measures," *Restaurator: International Journal for the Preservation of Library and Archival Material* 45, no. 4 (2024): 297–323.
34. Bell and Canham, "Pages of Poison."
35. Susan Russick et al., "Multi-Analytical Investigation of Arsenical Transfer and Remediation on Nineteenth-Century Green Books," *Studies in Conservation* (2025): 1–16; Susan Russick et al., "Toxic Tales: Arsenic's Legacy in Nineteenth-Century Green Book Bindings at Northwestern University Libraries," *Studies in Conservation* (2025): 1–17; Marc Vermeulen et al., "Identification, Transformations and Mobility of Hazardous Arsenic-Based Pigments on 19th Century Bookbindings in Accessible Library Collections," *Journal of Hazardous Materials* 454 (2023): 131453.
36. Poison Book Project, "Arsenical Books Database," n.d., https://sites.udel.edu/poisonbookproject/resources/arsenical-books-database/

their library's holdings. As at Winterthur, pXRF spectroscopy allowed researchers to bring equipment into the library rather than taking books to a lab. Bruker ARTAX software was used to examine the captured spectra to determine the presence of heavy metals.[37]

In keeping with the BibTox goal of interdisciplinary dialogue, Northwestern University Libraries researchers published extensively about their arsenical books investigation, disseminating their findings to book conservators and to health and safety experts.[38] They tested books published from 1802–1878, using XRF for positive identification. As XRF alone cannot confirm arsenic's use, its presence was confirmed for a small group of materials using Raman spectroscopy, X-ray diffraction (XRD), Fourier transform infrared spectroscopy (FTIR), and other analytical techniques.[39] Northwestern researchers were "particularly cognizant of circulating materials stored in the open stacks and the safety implications." They determined that arsenical books hold research value in part because of "the artifactual value of the physical object," deciding to retain them and identify safe handling and storage protocols.[40] They also conducted a thorough risk analysis. Rebinding was not considered a viable option as arsenic could have migrated into the books' pages.

Health Implications

Russick et al. "investigated potential hazards to users and caretakers, concluding that handling these materials presented possible health risks."[41] Noted in Baldwin et al., "The most common exposure route . . . is ingestion, which in a library context is most likely . . . handling a volume and then eating or touching their face."[42] In their conclusions, Russick et al. observed, "Library workers could be exposed to small, but frequent doses, which could result in difficult-to-diagnose chronic diseases."[43] Bell and Canham cited Tedone and Grayburn, and cautioned that there are, in fact, "no safe exposure limits for copper acetoarsenite," as "toxicity can be acute or cumulative, and exposure levels need to be calculated on an individual basis based on body weight, natural resistance to arsenic, and many other factors," therefore it is important to limit "direct contact, inhalation, and ingestion of bookcloth pigment insofar

37. Twenty-eight titles (18 percent) of Queen's University Library set were found to contain significant indications of copper and arsenic together. The arsenic was found not only in bookcloth, but also in "covering papers, painted surface decorations, endpapers, and fore-edges" (Bell and Canham, "Pages of Poison," 13).
38. Russick et al., "Multi-Analytical Investigation"; Russick et al., "Toxic Tales"; Vermeulen et al., "Identification, Transformations and Mobility of Hazardous Arsenic-based Pigments on 19th Century Bookbindings in Accessible Library Collections."
39. Russick et al., "Toxic Tales"; Vermeulen et al., "Identification, Transformations and Mobility."
40. Russick et al., "Toxic Tales."
41. Russick et al., "Toxic Tales"; Arsenical bookcloth may trigger serious, long-term health effects and should therefore be viewed as a public health concern. See Tedone and Grayburn, "Toxic Tomes."
42. Poison Book Project, *Handling and Safety Tips* in Baldwin et al., "Addressing the Presence."
43. Russick et al., "Toxic Tales," 3.

as possible."[44] Consequently, the potential buildup of arsenic over time is a concern, especially for those who frequently interact with toxic bookcloth.

Factors determining an arsenical book's potential toxicity may include "humidity, storage conditions, the aging process of the arsenic pigments as well as the binding agents."[45] One difficulty with assessing health hazards related to these materials is that no established limitations for intermittent contact have been assigned to libraries.[46] Whereas Tedone and Grayburn observed that, "within these environments, the type and frequency of interaction with arsenical materials is highly unpredictable," current permissible exposure thresholds are based on industry standards, difficult to translate to the library environment, particularly where emerald-green bookcloth may go undetected.[47]

The US Department of Health and Human Services Agency for Toxic Substances and Disease Registry warns that identified routes of exposure for copper acetoarsenite include:

> inhalation, ingestion, and transdermal exposure, although the latter is not considered a primary route. The degree of exposure is the cumulative exposure of all of these routes, with an acute, lethal threshold between 2 and 5 mg/kg of body weight.[48]

Health conditions arising from chronic exposure to arsenic may include various cancers as well as skin irritation and lesions, respiratory complications, peripheral neuropathy, and anemia.[49]

Safety Measures

Identifying potentially arsenical books is the essential first safety measure. Further library safety protocols include restricting access and circulation by moving arsenical bindings to an access-controlled area.[50] Contaminated books should be used only in this controlled environment under the supervision of trained staff, with the use of digital surrogates encouraged. Arsenical books should be sealed in polyethylene zip-top bags, labelled as hazardous, and shelved in a designated area with clear signage.[51] In addition to masks and nitrile gloves, one must avoid ingesting or inhaling pigment

44. Tedone and Grayburn, "Arsenic and Old Bookcloth," cited in Bell and Canham, "Pages of Poison."
45. Wetten et al., "Arsenic Pigments," 17–18.
46. Russick et al., "Toxic Tales," 3.
47. Tedone and Grayburn, "Toxic Tomes," 197.
48. K. Gehle, "ATSDR Case Studies in Environmental Medicine: Arsenic Toxicity," *Vol: GRA and I, issue: GRA and I* (2009): 1–124.
49. Gehle, "ATSDR Case Studies," 1.
50. Tedone and Grayburn, "Arsenic and Old Bookcloth," 1.
51. Tedone and Grayburn, "Arsenic and Old Bookcloth," 111.

dust, and avoid "touching the face, eating, or smoking until hands can be thoroughly washed, even if gloves have been worn to handle bindings."[52] Use of a nonpermeable "placemat" of polyethylene or polyester should be placed on tables, and over book wedges and cushions, during any use of arsenical books.[53] Tedone and Grayburn also recommend that stakeholders be identified and included in planning an institution's guidelines, and that safe handling of arsenical materials be included in an institutional disaster response plan.[54]

Northwestern worked with their Office of Environmental Health and Safety, the provost's office, and general counsel, to develop "a plan to isolate suspect materials, allow for their safe use and storage, train staff, update reader agreement, and other safety measures (such as limiting and controlling access)."[55] In addition to isolating the books, housing and labels were added. Toxic books from the stacks—including reference collections—were removed and stored in plastic bags housed within larger, labeled boxes. Library catalog records were updated to indicate which books were not available to be checked out, links to any digital copies were added, and a 583-field note was added to the MARC records to specify that items had been tested, and the result. Identified materials from the circulating collection went to off-site storage.[56]

Recommendations at Queen's University Library largely follow the Poison Book Project's, taking into account frequency and duration of handling identified books, with more stringent guidelines for conservators and staff. Digitization was considered, but not undertaken, due to insufficient staffing. Bell and Canham note, "By knowing the precise location of arsenical titles, library staff can effectively identify health hazards for emergency responders, thus enabling the use of appropriate personal protective equipment."[57] Thus, housing hazardous items together has the added benefit of enhancing disaster preparedness.

The literature suggests that libraries are retaining arsenical items and separating them from other holdings. None indicated items would be removed altogether, but Queen's and Northwestern University authors note that, if withdrawn, books containing arsenic would necessarily be disposed of as hazardous chemical waste to protect library workers, patrons, and the environment.[58]

52. Tedone and Grayburn, "Arsenic and Old Bookcloth," 110.
53. Tedone and Grayburn, "Arsenic and Old Bookcloth," 110.
54. Tedone and Grayburn, "Arsenic and Old Bookcloth," 10.
55. Russick et al., "Toxic Tales," 12.
56. Russick et al., "Toxic Tales," 13. Special collections already had controlled access. Suspected materials in Archives and Special Collections were "housed, labeled, and stored in situ."
57. Bell and Canham, "Pages of Poison," 19–20.
58. Russick et al., "Toxic Tales," 12.

Slippery Rock University Case Study

Bell and Canham acknowledge that reviewing a library collection for green-covered nineteenth-century books is time-consuming and particularly challenging in understaffed libraries. Such a review may be an ongoing task, as materials, old and new, are continually added or moved, and as new revelations about pigments emerge. This case study documents the inter-university collaboration of a librarian and a chemistry professor at two medium-sized public universities in addressing the question of bibliotoxicology and the remediation of toxic books. The project's three phases are outlined, from preliminary research through identification, testing, and, ultimately, removal of hazardous books from the library's circulating collection, and the creation of a new "Poison Books Collection" in Special Collections. Phase one, conducted during the author's sabbatical leave, included a literature review, a preliminary survey of mid-nineteenth-century books throughout the library's collections, and testing selected volumes at West Chester University. During phase two, parameters were broadened to the entire nineteenth-century, while narrowed to the circulating collection, which was deemed more urgent due to unmediated patron access. The scope was simultaneously narrowed from *all* green books to only emerald-green volumes. Phase three widened the survey's scope, in light of Cecchi et al.'s discussion of other colors containing heavy metals,[59] with the project reframed to consider all nineteenth-century publishers' bindings in the circulating collection, regardless of color. This case study is of particular importance, as SRU is a public Primarily Undergraduate Institution (PUI), having fewer resources available for the testing and management of potentially hazardous books compared to larger and/or private institutions.

Phase One: 2024

Inspired by Tedone and Grayburn's work,[60] but lacking adequate time for research or collection review, Silva sought and was awarded a two-summer sabbatical. She read extensively on the topic, identifying the scope and challenges associated with bibliotoxicology. SRU's Special Collections[61] seemed the more likely location of any poisonous books, and yet, given the institution's age, and a circulating collection still holding many nineteenth-century volumes, the latter was deemed more urgent. Circulation staff generated a holdings report of books published between 1840–1869 in any collection, including Special Collections, circulating, reference, and children's

59. Cecchi, Dorotei, Leonori, "Poison Books."
60. Tedone and Grayburn, *The Poison Book Project.*
61. Bailey Library's Special Collections consists of fourteen subcollections, including rare books, three geographic collections, four eponymous collections, historical children's and historical music education books, local authors, artists' books, autographed books, and a critical literacy collection (https://www.sru.edu/academics/bailey-library/archives-and-special-collections/special-collections). The access-controlled patron space is 840 square feet, plus the author's 133-square-foot office and a 133-square-foot adjacent workroom. The author is the sole librarian in special collections; her other responsibilities include university archives, and liaison to the art, dance, history, philosophy, and theatre departments, as well as instruction in all these areas.

books, and Silva pulled every green book from the stacks, out of an abundance of caution—a total of forty-one books. She housed these in clean, nonarchival boxes, in a separate cabinet pending testing. Technical services staff created a new sub-collection, The Poison Books Collection, in the library catalog. The books' records were changed to this new location, then suppressed pending further investigation. The author drafted local health and safety guidelines for the handling and storage of potentially hazardous holdings, drawing upon those at other institutions (see Appendix). The guidelines were discussed with SRU's Office of Environmental Health and Safety and shared with library coworkers and administration.

During this initial phase, Silva contacted West Chester University (WCU) Chemistry Department faculty member Dr. Voras, who had worked with a librarian there testing archival materials. Voras offered to test Slippery Rock's books at WCU using an Intax ArtTAX micro X-ray fluorescence spectrometer (μXRF) equipped with a tungsten x-ray source and an XFlash detector. Nine books were tested, five from Special Collections, and four from the circulating collection. While no arsenic (copper acetoarsenite) was detected, lead and iron were found in eight books, chromium in five, and gold in two. Lead and chromium are highly toxic.[62] Technical services staff added 583-field notes to bibliographic records indicating these findings, and the books were housed in Special Collections.

Phase Two: 2025

Over the 2024–2025 academic year, several new articles informed the project, including case studies at large universities.[63] These followed Tedone and Grayburn's recommendation to consider entire nineteenth-century holdings.[64]Accordingly, SRU technical services staff ran a report of titles published from 1800–1899. This new list, 892 titles, was first compared against the BibTox Arsenical Books database, with no exact matches. Next, Silva reviewed each title on the shelf in the circulating collection, this time pulling 113 emerald-green titles. For books with electronic facsimiles available, the cataloging librarian added new bibliographic records to the library catalog with this hyperlinked information. Silva shared her findings with library colleagues and administrators, hosted two informal sessions for library student employees, and presented at the university's faculty research symposium.[65]

62. Poison Book Project, "IDing Arsenic Bookbindings," https://sites.udel.edu/poisonbookproject/arsenic-bookbindings/

63. Bell and Canham, "Pages of Poison"; Boersma et al., "It's Not Easy"; Cecchi, Dorotei, Leonori, "Poison Books"; Ella Creamer, "Tool to Identify Poisonous Books Developed by University of St. Andrews," *The Guardian,* https://www.theguardian.com/books/2025/jun/06/tool-to-identify-poisonous-books-developed-by-university-of-st-andrews?CMP=share_btn_url; Russick et al., "Toxic Tales"; Wetten et al., "Arsenic Pigments."

64. Tedone and Grayburn, "Arsenic and Old Bookcloth," 109.

65. Slippery Rock University Faculty Research Symposium, September 25, 2025. Proceedings forthcoming.

Phase Three: Widening the Scope

Cecchi et al. note, "While Arsenic stimulated a flurry of research activity, the hazards related to all the other toxic metals in old book pigments still have to be globally investigated."[66] With this, and the Phase One test results in mind, Silva determined to reframe the project through a broader lens: a review of all nineteenth-century holdings, regardless of color. Resuming normal responsibilities post-sabbatical in Fall 2025 limited the time available to continue the project. Space was also a concern: with little room in Special Collections, all identified books remained on carts in Silva's office for much of the academic year.[67]

To address these challenges and move the project forward, Silva reframed the issue, assessing the potentially hazardous books through a more traditional lens: weeding. Weeding is an ongoing library responsibility, yet nineteenth-century titles in Slippery Rock's circulating collection were long overdue for review. This prompted the broader focus, reinforced by the number of books flagged as weeding candidates during Phase Two. Returning to the spreadsheet of nineteenth-century titles, circulation staff added usage statistics. Silva again reviewed titles in situ. Those with extremely low usage, in poor condition, having newer editions, and/or no longer relevant to the curriculum were pulled and tagged for withdrawal or possible relocation to Special Collections. These included potentially hazardous books in a variety of colors, which would be tested with the emerald green books. An additional 153 titles were pulled and housed in the Special Collections workroom, their catalog records updated and suppressed. Thirty-nine rebound books were separated and deaccessioned via normal procedures: offered to another institution or, if in poor condition, recycled.

The 114 remaining books, plus 113 from Phase Two, were tested March 2026 by Dr. Voras, this time at Slippery Rock, using WCU's portable equipment: a Bruker Tracer 5 pXRF for preliminary elemental identification and a handheld Bruker BRAVO Raman spectrometer.[68] As of May 2026, one volume suspected of having arsenic in its endpapers is at WCU awaiting further testing. [69] Test results also included thirteen books with mercury (twelve from surface cover art suspected to be vermillion, and one from an added binding tape), and 193 with lead and/or chromium. Twenty-seven items with lead and/or chromium were selected for retention in the Poison Books Collection, their bibliographic records unsuppressed to facilitate discovery and mediated access. One hundred ninety-nine books with

66. Cecchi, Dorotei, Leonori, "Poison Books," 8.
67. See above note for relevant square footage.
68. This portable instrumentation is provided in collaboration with the WCU Department of Anthropology and Sociology, again highlighting the importance of cross-departmental and cross-institutional collaboration.
69. Siegfried Bing. *Artistic Japan: Illustrations and Essays.* Vol. 1. London: Sampson Low, Marston, Searle & Rivington, 1888.

mercury, lead, and/or chromium will be disposed of as hazardous waste, as required by law, following Environmental Health and Safety (E&HS) procedures.[70] Silva and student Leah Harris were awarded an internal grant to fund the books' removal by an EH&S-identified contractor.

Conclusion

Conducting a bibliotoxicology review in an academic library is a substantial undertaking, requiring research time and time on task. Of importance to this case study is the necessary collaboration between sister institutions for medium-sized public universities: testing equipment may only be available at one institution within a public state system, and there may be limited budget for the safe handling, storage, and disposal of the books. Books selected for retention must be segregated and flagged, with health and safety guidelines established and implemented.

Librarians might face a lack of buy-in from stakeholders, who may either view such a project as a niche concern, or simply be wary of handling potentially toxic materials. Administrators might focus on liability and shy away from projects dealing with potentially hazardous materials. Educating stakeholders about health risks "requires translating complex scientific information into accessible terms."[71] Training student employees to handle potentially hazardous materials was deemed ethically unacceptable in this case study. At SRU, Silva handles the physical processing of any potentially poison books, rather than delegating this responsibility to staff or student employees. Library lingo and practices—for example, those surrounding cataloging procedures—may further the communication chasm among stakeholders. The potential for transferability of arsenic to neighboring books is anoth-er challenging factor, and remediation efforts are just beginning to be explored.

Silva was fortunate to be eligible for sabbatical leave to research the issue and begin the project. Collaborating with Voras provided the opportunity to test potentially hazardous books, as the library budget did not support conducting an occupational exposure assessment like that described by Sotek Makos, and Hawks.[72] Voras's testing of the initial set of books found no arsenic but identified other harmful heavy metals, a concern affirmed by the research of Cecchi et al.[73] Widening the scope of this proj-ect beyond arsenic to include other toxic heavy metals allowed the researchers to safe-guard library employee and patron health, while creating mediated access to selected books in Special Collections' new Poison Books Collection as important historical

70. Adebowale Adeniji, "Bioremediation of Arsenic, Chromium, Lead, and Mercury," U.S. Environmental Protection Agency (2004).
71. Bell and Canham, "Pages of Poison," 21.
72. Jeffrey Sotek et al., "Occupational Exposure Risk Assessment of Library Collections Work Tasks and Storage Areas," *Studies in Conservation* (2025): 730–39, doi:10.1080/00393630.2025.2460407
73. Cecchi, Dorotei, Leonori, "Poison Books."

objects of material culture. Weeding provided this broader framework for a collection in need of review due to age, condition, and usage considerations, removing toxic heavy metals from circulation in the process. Next steps include a more robust review of Special Collections' fourteen other sub-collections and adding procedures for safer handling of the items in the Poison Books Collection to the library's disaster preparedness plan.

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Appendix: Bibliotoxicology Plan for Bailey Library (Draft)

Bibliotoxicology is an emerging area of concern for academic libraries. This plan for the identification and safer handling of potentially toxic books at Bailey Library is informed by, and adopted from, current best practices identified in the literature. It should be reviewed periodically, consulting The Poison Book Project for relevant new literature.

Stakeholders (potentially library faculty, staff, students, and administrators; the Office of Health and Safety; the Office of the Provost; and/or university legal counsel).

1. Craft and communicate policies & procedures for the identification and safer handling of potentially hazardous books in any of the library's collections (e.g., the circulating collection, the Instructional Materials Center (IMC), Reference, Special Collections, Archives, and bound journals).
2. Create and implement training materials for library employees (faculty, staff, and students).
3. Create and disseminate educational resources for patrons regarding safer handling of potentially hazardous books. See Winterthur Library and Northwestern University Libraries materials (cited below) as prototypes.

Library Personnel Activities

1. Run a report of library holdings from 1800–1899.
2. Compare library holdings against the Arsenical Books Dataset. Following the protocols for safer handling included in *Staff Guidelines for Hazardous Materials Collection* (below), pull any direct matches.
3. Using the Poison Book Project bookmark for reference, review physical holdings for green covers. Attention may be focused outward from 1850 in both chronological directions.
4. Pull green books. Have tested, working with WCU Chemistry Department faculty member Dr. Zachary Voras. Follow *Staff Guidelines for Hazardous Materials Collection* (below) for suspicious books and any books testing positive for heavy metals.
5. Create a new Poison Books sub-collection location in Special Collections in the library catalog. Change locations and call number prefixes for books relocated to the new sub-collection. Add 583 notes to bibliographic holdings records for these titles (see Resources_Warning Labels_MARC notes).
6. Move suspicious and positively tested books into Poison Books sub-collection, placing any arsenical books in 100% polyethylene zipper bags, and flagging all heavy metal books with hazard labels Resources_Warning Labels_MARC notes.

7. Consider testing adjacent books for transferred arsenic as appropriate.
8. Add the location of potentially toxic materials and procedures for safer handling to the library's disaster preparedness plan. (Note: These materials must not be allowed to get wet. In the event of a water disaster, appropriate PPE must be worn).
9. Consider weeding titles based on their circulation statistics and/or availability of digital surrogates. Consult with Environmental Health and Safety about disposal of hazardous materials for any deaccessioned books.
10. Research availability of digital surrogates of potentially hazardous books; add any pertinent links to bibliographic records.
11. Update Special Collections website and brochure, adding new sub-collection.
12. Consider repeating entire process for other colors that were produced using other heavy metals.

Staff Guidelines for Potentially Hazardous Materials Collection

1. All books containing arsenic or suspected of containing arsenic should be handled with nitrile gloves. Hands should be thoroughly washed after handling, even if gloves are worn.
2. Tables and supports used during the examination of arsenical books should be wiped down to protect others who might use the space.
3. All books positively identified as containing arsenic and newly suspected items should be placed in appropriately labelled 100% polyethylene zipper bags with hazard labels Resources_Warning Labels_MARC notes and stored separately.

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