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# Neutrality Unbound: the Value of Rare Book Collections in STEMM Classrooms

*Though the book has a storied past as a container for scientific knowledge, a range of challenges exist for asserting its value to coursework in the fields of science, technology, engineering, mathematics, and medicine (STEMM). Much of the information that historical STEMM texts convey is widely available, dated, or peripheral to the curriculum of disciplinary instructors. These challenges are exacerbated by the ways in which prejudiced collecting has created special collections holdings that overrepresent and lionize the contributions of white, wealthy, Western men. To ascertain and assert the relevance of rare STEMM collections to contemporary scholarship, librarians must confront how these materials exist as enduring witnesses to bias in the development of the academic scientific community. In turn, this paper explores pathways for animating STEMM rare books through reimagined instructional practices. Rooted in a collection of rare mathematics and astronomical texts, its case study offers three frames for introducing the book into the classroom: questioning canonization, challenging materiality, and tracing loss. Through sharing results from use of these themes, the paper argues that rare book librarians can champion the value of their collections by committing to instruction on ethical scholarly communication as a core professional responsibility.*

## Introduction[1]

Of what value is print to science, technology, engineering, mathematics, and medicine (STEMM)? Though the monograph and physical periodical once towered as formats of choice for scientific communication, STEMM[2] research and publishing are now almost exclusively digitally mediated phenomena. This transition in communication history poses a challenge to the temporal breadth of rare book collections, many of which already struggle to assert their relevance to contemporary audiences beyond a sense of novelty. To mark this as a problem of the twenty-first

1. This paper builds on content included in a presentation by the author, "Repair for Whom? Confronting Loss in Two Collecting Histories," delivered as part of the RBMS 2024 conference, https://hdl.handle.net/11213/22771.
2. See Editor's Note, this issue.

century would obscure a longer legacy of concern in rare book librarianship, specifically regarding the overrepresentation and lionizing of white, wealthy, Western men. Any approach aimed at confronting and addressing these collection biases—whether through further development of the holdings or instruction—will require funding and people power, which institutions need incentive to prioritize. In this way, a core responsibility of rare book librarians is finding ways to ascertain and assert the relevance of their collections to contemporary scholarship.

For special collections housed in academic institutions, instruction persists as one of the most widespread practices for connecting researchers with the value of rare books. While increasing digital access to rare texts poses a broader challenge to the meaning of class visits, it is particularly pronounced with respect to STEMM collections. Beyond mismatches between the likely dated information of STEMM rare books and today's coursework, study of the book as an object or vessel for historical analysis often falls outside of the skills students are expected to use in the classroom and their careers. The lack of available perspectives on how rare books can support STEMM scholarship increases the barriers in conducting outreach with faculty. A possible pathway for finding value in STEMM collections emerges through presenting the rare book as an enduring witness to the development of the academic scientific community. Librarians have the unique position to offer historic print materials as evidence of the biases shaping the social history of STEMM disciplines—namely publishing, formatting, and financing research. Supporting students in thinking critically about the ethics of research and scholarly communication offers librarians the opportunity not only to connect their holdings with pre-professional training but also deepen their own reparative approaches to collections.

This paper argues that rare book collections are valuable tools for supporting STEMM curriculum. To do so, this piece analyzes efforts at the University of Louisville to make meaning of a collection of rare mathematics and astronomical texts. In reviewing the history of the collection, as well as subsequent attempts to bring such into the classroom, three instructional frames are proposed: questioning canonization, challenging materiality, and tracing loss. Together, these themes reveal how focusing on source analysis and the limits of neutrality connect librarians with the broader goal of preparing students to be leaders of justice-driven research and practice. Considerations for further scholarship trace the related need for rare book librarianship as a profession to commit to accountability and repair as core tenets of its culture and practices.

## Position Statement

The author's experiences as a white, masculine-presenting, early-career faculty librarian based in the borderlands between the South and Midwest of the United States inform this paper. Instructors may receive differential responses from students and

faculty partners alike based on how they look or are perceived. These dynamics may have informed the author-led discussions of bias and justice that are explored within the case study.

## Literature Review

A central challenge for approaching bias in rare book collections arises from the divergence of perspectives on why they are valuable. Given the uniqueness of individual repositories, let alone curators and collections, it can be hard to surmise general principles across the field. Nevertheless, it is instructive to trace how scholars such as Oram and Cordes propose a split in practice between the twentieth and twenty-first centuries: from a model of "elitism"[3] to one of "proactive" connection building.[4] In the earlier era of collecting, the idea that certain materials had inherent worth deeply promoted and sustained a culture of self-importance in rare book librarianship. When value is seen as intrinsic to an object, it is easy to equate preservation with access and notability with utility. The epistemic harms resulting from the biased perspective are numerous, as this thinking shaped the rare collections of many libraries into enduring monuments to white, wealthy, Western men. When unchallenged, manifestations of this supremacist thinking narrow the utility of libraries to the forms of knowledge which can be garnered from biased holdings. While scholars such as Annan[5] and Traister[6] differ in their perspectives on the outcomes of failures in inclusion criteria, both associate such with the imagery of the stacks as a place of death or decay.

The challenge of librarians, since these foundations were laid in the field, is the development of a different politic of materiality. While Oram and Cordes both focus on increasing instruction, related philosophical shifts also emerge from challenges to print from a dawning digital age. In his 1996 revision of S. H. Steinberg's *Five Hundred Years of Printing*, Trevitt imagined that a fundamental role of print in the internet age would be to find meaning in the biases and successes of publishing's "enlightened selection and rejection" of voices.[7] That Trevitt would shift to a value of materiality as a process for researchers to gain from, rather than just an end product, reflects a larger disruption caused to the book by competing information technologies. Similarly, Pearson's 2008 *Books as History*[8] looks to context for meaning by highlighting how the

3. Richard W. Oram, "Special is as Special Does," *RBM: A Journal of Rare Books, Manuscripts, and Cultural Heritage* 1, no. 1 (March 1, 2000): 44, https://doi.org/10.5860/rbm.1.1.177.

4. Ellen R. Cordes, "A Response to Traister," *RBM: A Journal of Rare Books, Manuscripts, and Cultural Heritage* 7, no. 2 (September 1, 2006): 105–12, https://doi.org/10.5860/rbm.7.2.264.

5. Gertrude L. Annan, "The Rare Book and History of Medicine Department in the New York Academy of Medicine," *Bulletin of the Medical Library Association* 39, no. 1 (January 1951): 8.

6. Daniel Traister, "What Good Is an Old Book?," *Rare Books and Manuscripts Librarianship* 7, no. 1 (1992): 37, https://doi.org/10.5860/rbml.7.1.76.

7. S. H. Steinberg, *Five Hundred Years of Printing*, New ed. / revised by John Trevitt. (British Library, 1996), 249.

8. David Pearson, *Books as History: The Importance of Books beyond Their Texts* (Oak Knoll Press, 2008), 23, http://archive.org/details/booksashistoryim0000pear.

book, in comparison to "cybertexts," physically preserve markers of their own use.[9] Pearson and Trevitt both fundamentally assert a logic that the value of rare books comes from the people that shape them, whether through creating or animating them.

Though rare book collections can be expanded to encompass a larger range of perspectives, justice-driven practices are needed to avoid further othering of oppressed groups through this process. Kramer's work studying collection diversification efforts, warns how identity as a criteria in libraries can reinforce the idea of a group as a "monolith," particularly with regard to their continued positioning as marginal.[10] Championing diversity requires of rare book librarians the clarity with which to confront print's role in the committing of epistemic violence without foreclosing the possibility of more liberated relationships with the medium. To balance the past and the future requires discerning the intent of initiatives confronting canonical thinking in rare books. As part of this, Drake's insights on creating an anti-oppressive archival field are similarly relevant to rare book librarians in his desire to see collections drawn into "complete consciousness about the contours of their oppressions."[11]

Allowing bias to be a meaningful frame for institutional rare book collections will ultimately require a new vision for their value: a conviction that the limits of collections are critical evidence of historical and ongoing forms of loss. In this, rare book librarians are accountable for creating and sustaining ethical practices that do not center the growth of collections and, in turn, institutions. Ghaddar offers an instructive approach to positioning loss as a teacher, documenting how the memory of violence by institutions contains the seeds for their dismantling. In particular, Ghaddar calls upon the "haunting" of records—that is, their perpetual connection to the violence they have enacted materially and epistemically—as an act of defiance by the "ghosts" of the people they aimed to disappear.[12] Though there is often an impossibility for print collections to carry the voices of oppressed peoples due to the medium's historical exclusivity, this too can be its own sort of challenge to the present. How rare book librarians and researchers alike will make meaning of this loss remains to be determined, though scholars like Hartman have begun imagining roles for the pursuit of ethical and care-driven connections with oppressed peoples across the shaky terrain of the stacks' silences.[13]

9. Pearson, *Books as History*, 23.
10. Ruth Kramer, "The Necessity of Embracing Collection Gaps: Moving Towards Diverse, Equitable, and Inclusive Collecting," *RBM: A Journal of Rare Books, Manuscripts, and Cultural Heritage* 25, no. 1 (June 5, 2024): 96, https://doi.org/10.5860/rbm.25.1.93.
11. Jarrett M. Drake, "Diversity's Discontents: In Search of an Archive of the Oppressed," *Archives and Manuscripts* 47, no. 2 (May 4, 2019): 278, https://doi.org/10.1080/01576895.2019.1570470.
12. J. J. Ghaddar, "The Spectre in the Archive: Truth, Reconciliation, and Indigenous Archival Memory." *Archivaria* 82 (2016): 26, muse.jhu.edu/article/687080.
13. Saidiya Hartman, "Venus in Two Acts." *Small Axe: A Caribbean Journal of Criticism* 12, no. 2 (June 1, 2008): 1–14 https://doi.org/10.1215/-12-2-1.

In the sparse literature that exists on the value of print materials to STEMM history, the book often appears as evidence of efforts to create or reflect a disciplinary canon—that is, a conception of the most important figures in a specific field. Though these canons are often composed of similar demographics to that found in peer collections in other research areas, the focus on attributing scientific achievements to individuals creates unique challenges. Brander's work analyzing the holdings of Becker Medical Library, surfaces how it may be a mischaracterization to view "the global West" as the collection's epistemic center.[14] Though the books are written largely by and for white men, Brander disturbs their authority by exploring how medical knowledge has been built much more fluidly and collaboratively across space and time than books may suggest. This challenge to the claim of men in particular over knowledge is similarly mirrored in astrophysicist Masters' surfacing the role of women in both the creation and readership of popular astronomy texts.[15] While there is a presumption that great scientific discoveries will speak for themselves, the cumulativeness of scientific knowledge poses a challenge to the book in scientific history, as the medium itself purports an idea of authorship and, in turn, ownership. Yale addresses this complexity by tracing how the book has not always been accepted within science as an authority, due to its inability to demonstrate intellectual provenance in the same way as handwriting.[16] This lack of authentication leaves the book vulnerable to being viewed as a secondary resource, rather than a unique or original means of communication. A possible response to this positioning emerges from Fleming's identified need at the 1960 Conference on Science Manuscripts for there to be record of "the transmission of ideas from scientists to laymen."[17] While book history can perform this function in a more general sense, the potential for rare materials to be accompanied by publicly-searchable donor information provides researchers with insight into collecting decisions that reveal how scientists become canonized.

When historical materials are brought into the STEMM classroom, an ongoing challenge is how to invite their lack of neutrality to shape learning outcomes. In the *Guidelines for Primary Source Literacy*, a core tool for rare book instruction, student self-development of "historical empathy" is a learning objective.[18] While this may feel incongruous with the curricular ambitions of STEMM courses, which frequently focus on domain knowledge, STEMM instructors already seek this type of classroom engagement. Kent and Lorenat's work connecting statistics and eugenics in

14. Elisabeth Brander, "Shaping the Past: How Donors Influenced Becker Library's Rare Book Collections," *Journal of the Medical Library Association: JMLA* 110, no. 4 (2022): 527, https://doi.org/10.5195/jmla.2022.1551.
15. Karen Masters, *The Astronomers' Library: The Books That Unlocked the Mysteries of the Universe* (Ivy Press, 2023) 128.
16. Elizabeth Yale, "The Book and the Archive in the History of Science," *Isis* 107, no. 1 (2016): 114.
17. Donald Fleming, "The Ends in View of the Preservation of the Private Papers of American Scientists," *Isis* 53, no. 1 (1962): 120.
18. Anne Bahde et al., "Guidelines for Primary Source Literacy," 2018, 5, http://hdl.handle.net/11213/17218.

an undergraduate math course reveals some of the complications STEMM faculty face in preparing primary-source-based lessons. While Kent and Lorenat report their students' deep engagement with historical use of statistics as a means for promoting and enacting prejudice, the instructors themselves voice trepidation:

> Many of us trained in mathematics and experienced with mathematical pedagogy do not feel as though we have the expertise to handle discussions around racism and discrimination. However, these topics do impact the teaching and practice of mathematics.[19]

The lack of support Kent and Lorenat felt, as well as their cited struggles to meaningfully include historical books in the classroom due to concerns about the time needed to understand them, suggest meaningful collaboration points for rare book librarians. While faculty in STEMM disciplines may face uncertainties and barriers in fostering conversations on injustices in their professions, librarians have a mandate to generate meaningful connections in the classroom across time. In practice, this could look like utilizing historical materials to discern more ethical research practices,[20] or even supporting instructors in finding primary sources that offer students to see themselves in the plurality of scientists that are not just white, wealthy, Western men.[21] Critically, rare book librarians, too, can enrich their own knowledge of the value of their collections and practices from their instructional counterparts. This may include understanding how to better connect resources with students learning where core STEMM concepts come from,[22] or meaningfully surface how the cultural context of scientists shapes the broad applicability of their proposed theories.[23]

## The William Marshall Bullitt Collection of Rare Mathematics and Astronomy

What are the greatest works in mathematics history? This question, and its resulting biases, are at the heart of the collection of William Marshall Bullitt, a life-long mathe-

19. Deborah Kent and Jemma Lorenat, "Situating the Statistical Legacies of Galton and Fisher: Multi-Layered Discussions in the Mathematics Classroom," *The Mathematics Enthusiast* 22, no. 1-2 (June 1, 2025): 117–118, https://doi.org/10.54870/1551-3440.1654.

20. Julia R. S. Bursten and Matthew Strandmark, "Better Learning through History: Using Archival Resources to Teach Healthcare Ethics to Science Students," *European Journal for Philosophy of Science* 11, no. 3 (September 1, 2021): 10, https://doi.org/10.1007/s13194-021-00406-0.

21. Abe Edwards et al., "Inclusive Pedagogy in Mathematics via Primary Source Projects," *The Mathematics Enthusiast* 22, no. 1 (June 1, 2025): 104, https://doi.org/10.54870/1551-3440.1653.

22. Uffe Thomas Jankvist, "Students' Beliefs About the Evolution and Development of Mathematics," in *Recent Developments on Introducing a Historical Dimension in Mathematics Education*, eds. Costas Tzanakis and Victor J. Katz, vol. 00078, (Mathematical Association of America, 2011): 129, https://research.ebsco.com/linkprocessor/plink?id=a70873a7-f86a-3624-b9e5-d0fca93ded5c.

23. Costas Tzanakis et al., eds., "History in a Competence Based Mathematics Education: A Means for the Learning of Differential Equations," in *Recent Developments on Introducing a Historical Dimension in Mathematics Education*, vol. 00078, (Mathematical Association of America, 2011), 170, https://research.ebsco.com/linkprocessor/plink?id=a70873a7-f86a-3624-b9e5-d0fca93ded5c.

matics enthusiast and rare book collector. The idea for Bullitt's collection first emerged in the summer of 1936 when he hosted three scholars at his Massachusetts vacation home: astronomer Harlow Shapely and mathematicians G. H. Hardy and Oswald Veblen. Bullitt entered their orbit through his commitment to keeping tabs on emerging scholarship in mathematics. Over the course of the summer, discussions of the greatest mathematicians of all time fueled their time together. Bullitt found in this an opportunity for himself to serve as an adjudicator of his friends' differing perspectives. Excited by the challenge of building a canon, Bullitt began to solicit opinions from other scholars he respected. In October of 1936, Bullitt reached out for advice from mathematician E. T. Bell, author of *Men of Mathematics*. Bell suggested Bullitt use the parameter of "no living men" to assert a stronger sense of historical authority, a rule which compelled Bullitt to focus on crowdsourcing a list of the twenty-five greatest deceased mathematicians.[24] This effort had a specific, material imperative: construction of a collection of the first editions of mathematics' most notable works. The result grew well beyond these parameters during Bullitt's life and in its current state as an endowed collection of the University of Louisville's Archives and Special Collections (ASC). Beyond the library's ability to purchase materials, Bullitt's books were reunited with his correspondence and notes related to this mathematics history project.

Bullitt's materials speak to his initial collaborative approach and reflect the complications of his collecting vision and practices. Beyond the biases of Bullitt and his contemporaries, the meaning of the collection is also complicated by its existence as a monetary asset. In July 1937, Bullitt remarked to Bell that his trusted antiquarian dealer, A. S. W. Rosenbach, shared with him the "rise in value of scientific books," leading Bullitt to want to "get in before they get too high."[25] Bullitt's financial imperative likely shaped his focus on discerning true first editions. Beyond the complication that Bullitt needed to navigate imprecise publishing chronologies, his fixation on using uniqueness to determine books' value promotes the fraught idea of them as the material afterlives of great thinkers. Though Bullitt saw the collection's value for students, his drive to assert his position as steward of these materials embodies a politic of epistemic ownership.

Control over the canon's material traces is further complicated by Bullitt's frugality, as he identified himself to booksellers as "not one of the rich American collectors."[26] Bullitt's desire to drive down prices sits uncomfortably with the reality of his class background. He was an heir to the estate of one of Kentucky's most prominent enslaving

24. Bullitt to E. T. Bell, 27 October 1936, William Marshall Bullitt correspondence collection [unprocessed], Archives & Special Collections, University of Louisville, Louisville, KY.
25. Bullitt to E. T. Bell, 7 July 1937, William Marshall Bullitt correspondence collection [unprocessed], Archives & Special Collections, University of Louisville, Louisville, KY.
26. Bullitt to J. M. Stonehouse, 27 August 1937, William Marshall Bullitt correspondence collection [unprocessed], Archives & Special Collections, University of Louisville, Louisville, KY.

families. The status and connections his family were afforded due to their wealth from enslaving shaped Bullitt's career and access to elite education. His prominent run as a lawyer accrued him an estimated "$200,000 per year from the mid-1930s onwards," a figure which belies any pretense of modesty.[27] Furthermore, Bullitt's attempt to quickly and economically invest in mathematical works directly connects to the fluctuating market in the leadup to World War II. The chronology of Bullitt's purchasing overlaps with a time of panicked selling of rare materials by Jewish people fundraising for their own escape from Central Europe.[28] Further work with Bullitt's provenance records is needed to determine if any formal links exist between the two phenomena, whether through the sellers Bullitt worked with or the materials themselves.

The idea for a justice-driven approach to Bullitt's materials stems from the desire to more directly name, confront, and learn through these tensions. As Bullitt's collection is ASC's most well-known and well-used, the logic of his attempt to create a canon of greatness is often obscured or entirely naturalized through the excitement of working with individual volumes. This is a testament to the enduring success of Bullitt's methods in gauging value-rich books. Students, faculty, and researchers alike continue to find wonder in the illustrations of Copernicus's 1543 *De Revolutionibus Orbium Coelestium* and errata left behind by Sir Isaac Newton on a first edition of his *Philosophiae Naturalis Principia Mathematica*. What remains a challenge is facilitating engagement with the materials that moves beyond novelty to their use as vital research tools, specifically with respect to how their development speaks to cultural biases shaping the history of STEMM research and publishing.

## Instruction with the Bullitt Collection: Context

Over two academic years, the author cultivated new instructional practices for working with the Bullitt collection through the annual Bullitt Lecture. This invited speaker engagement is presented by the University of Louisville (UofL) Department of Physics and Astronomy and campus chapter of the Society of Physics Students. A meaningful tradition is a visit, organized by students and Professor of Astronomy Benne Holwerda, to see the Bullitt collection with that year's event speaker. Student groups for both 2023 and 2024 were relatively heterogeneous in terms of age, race, ethnicity, and gender. In 2023, this session was a "show-and-tell" walkthrough of collection material before providing time for individual research. During the fall of 2024, the author partnered with Science Librarian Tessa Withorn and Holwerda to reimagine the session to center a discussion of citational justice and the constraints of canonization. Tessa

27. Kathleen McWhirter, *Bluegrass and Brahmin: The Marriage of Marshall & Nora Bullitt* (Cronin Creative, 2023), 138.

28. For more information on the forced and coerced forfeiture and sale of valuable assets of Jewish families during the Holocaust, please see: Scott M. Caravello, "The Role of the Doctrine of Laches in Undermining the Holocaust Expropriated Art Recovery Act," *Virginia Law Review* 106, no. 8 (2020): 1776–1777.

Withorn and the author created a LibGuide to frame these themes into discussion questions and connect the session more closely with the work of that year's speaker, astrophysicist Karen Masters.[29] An ambition for this model is to utilize it as a part of an outreach strategy to work with other interested student groups and faculty.

Alongside the Bullitt lecture, 2023–2024 included conducting primary source research to consider new ways to tell stories about the collection. Attention was paid to Bullitt's 1936–1943 correspondence, as well as materials on the family's history, stewarded by the Filson Historical Society. The author also reached out to Shirley Harmon, Curator of Oxmoor Farm, to tour Bullitt's Louisville estate, formerly his ancestor's plantation. The experience was shaped greatly by Harmon's care in threading together stories of the Bullitt family and the people whom they enslaved. Though this trip occurred after the most recent instructional session with collection material, Harmon's work inspires and informs this paper's approach to justice.

## Three Narrative Frames for Justice-Driven Instruction

### *Questioning Canonization*

At the start of his crowdsourcing of a mathematics canon, Bullitt asked the opinion of George Sarton, editor of the science history journal *Isis*. Sarton directly refused to participate, citing that "mathematical genius is not a measurable quantity."[30] Though Sarton later used collection material, his initial aversion to the project is illustrative, especially with how little criticism of the project is documented in Bullitt's papers. Beyond the inclusion of two women whose contributions were added by ASC's Curator of Rare Books Delinda Buie, the canon that Bullitt created contains almost exclusively Western men, whether or not that was his conscious intention.

For the 2023 and 2024 Bullitt Lecture sessions, non-Western mathematical and astronomical perspectives were brought into the room from other collections to physically challenge the exclusionary depiction of history that lingers in Bullitt's list. The author explicitly approached this through guided group discussion with students on representational bias in the collection and the contemporary fields of astronomy and physics. In response, students asked for more materials documenting mathematical innovation outside of the Western canon, specifically from scientists in Southwest Asia and North Africa. A contributing factor to this sentiment was an interest voiced by students to locate and share data from public domain non-Western texts to diversify sources available to researchers. This idea arose from students considering how findings in print and manuscript materials may not have been preserved digitally and, in turn, left out

29. Tessa Withorn and Chad Kamen, "UofL Libraries: Bullitt Lecture Fall 2024: Home," updated January 15, 2025. https://library.louisville.edu/bullitt-24.

30. George Sarton to Bullitt, 9 June 1937, William Marshall Bullitt correspondence collection [unprocessed], Archives & Special Collections, University of Louisville, Louisville, KY.

of widely used aggregators of contemporary and historical scholarship, such as the Astrophysics Data System (ADS). The ADS itself was also tied to the students' hopefulness for the future of the field, as they saw the database's holistic approach to recording contemporary and historic astrophysics as inclusive and accessible.

An instructional challenge that remains unaddressed is the need to complicate canonization more broadly. During the 2024 session, the author invited students to imagine how continued investment in developing the collection could expand research opportunities. However, little of the discussion touched upon the fraught nature of deciding what constitutes a preservation-worthy important achievement in mathematics, astronomy, or physics. Sarton's larger challenge to the notion of greatness provides a potential pathway for confronting Bullitt's collecting criteria and, in turn, the ways similar thinking can still pervade well-intentioned efforts to diversify histories of the field.

## *Challenging Materiality*

One of the earliest challenges to Bullitt's exclusion of living mathematicians came through his desire to discern and acquire what scientists would consider the first published communication by Albert Einstein of his special and general relativity theories. While Bullitt decided he would consider collecting Einstein's works at the onset of his project, his ambition opposed the lack of precedent for defining what constitutes the most authoritative printings of a living scientist.[31] Knowing Veblen's collegial relationship with Einstein, Bullitt corresponded with Veblen regularly throughout 1938 to discern which book version of Einstein's theories constituted first editions. After checking with both Einstein and his assistant, Veblen reported to Bullitt that what he really sought were copies of the theories' publication in academic journals, as these were closest to the "first communication of [them] to the scientific world."[32] Veblen supported the acquisition of these periodicals over the next year and had Einstein inscribe copies to Bullitt. However, the value of print in this context is further complicated by Einstein's own lack of interest in the potential importance of his work's printed form, keeping a copy of neither article on hand.

In 2023 and 2024, students wrestled with the book's utility as evidence of scientific communication, specifically regarding its ability to offer divergent approaches to formatting. Holwerda and students alike gravitated both times toward a 1570 printing of Euclid's *Elementa* that includes pop-up illustrations. While assembling this interactive component with a bone folder provided a sense of novelty, it also enabled

31. Bullitt to Walter Goldwater, 3 June 1937, William Marshall Bullitt correspondence collection [unprocessed], Archives & Special Collections, University of Louisville, Louisville, KY

32. Oswald Veblen to Bullitt, 7 October 1938, William Marshall Bullitt correspondence collection [unprocessed], Archives & Special Collections, University of Louisville, Louisville, KY.

students to interrogate how accessibility of a text is shaped by its container, specifically when it is physically malleable. A related interest in style was spurred in students through interacting with one of the works from outside Bullitt's collection: Muhammad Tahir's handwritten reproduction of Musa B. Mahmud al-Rumi Qadizada's astronomical commentary *Sharh Chagmini,* or *Sharh al-Mulakhkhas*.[33] In comparison to the materials Bullitt collected, which are all printed in Latin script on straight horizontal lines, Tahir's copy employs an angled style of marginalia that bends how the reader navigates the page. The flexibility afforded by penmanship and unique stylization of *nasta'līq* calligraphy invite students to consider the potential for the presentation of scholarship to be aesthetically varied and culturally responsive. Given the relatively universal and rigid structural standards of contemporary STEMM research publications, historic print has the capacity to rupture the idea of what STEMM communication can look like. In doing so, rare books are ripe with opportunities for inviting students to consider how they may want to shift the style and materiality of their research outside of the contemporary formatting of a Western journal article. Expanding possible modes for sharing knowledge can not only broaden the accessibility of scholarship to various audiences but also destabilize assumptions about what forms of expression are possible in STEMM fields.

## *Tracing Loss*

Over 300 people are recorded as being enslaved by members of the Bullitt family.[34] The shadow of Bullitt's family's enslaving past intimately shaped his life, including his decision to take up residence in the plantation estate his family left during the Civil War. Bullitt, an ardent student of and advocate for his own heritage, solicited a reprint of his father's memoir from R. R. Donnelly & Sons Company, citing its relevance to scholarship on enslavement in Kentucky.[35] While it is clear that Bullitt was driven to have a holistic account of his family remembered, it is hard to read the intention of Bullitt's fascination. In the broader context of Bullitt's focus on defining the greats of history, his familial pride appears to minimize the harsh reality of what allowed them to amass their wealth and power: the brutality of a system of human ownership and exploitation. That the Bullitt family's class status influenced his access to elite institutions and the hobby of collecting rare materials is a foundational element of the collection. In this way, Bullitt's ability to physically unify his mathematical canon is inextricable from his family's legacy of valuing humans themselves as property.

33. *Sharh Chagmini, or Sharh al-Mulakhkhas. Commentary by Musa b. Mahmud al-Rumi Qadizada (d. 815/1412) on al Mulakhkhas Fi* (N.p., 1049 A.H./1683 A.D.). Qadizada's work is in response to Mahmud b. Muhammad b. 'Umar al-Chagmini al-Kwarizmi's *al-Mulakhkhas fil-Hay'a.*

34. Emma Johansen, "I Scream America: The History of Enslaved People at Oxmoor Plantation," Filson Historical Society, 2022, https://filsonhistorical.omeka.net/exhibits/show/sanders-oxmoor

35. Bullitt to R. R. Donnelly & Sons Co., 27 May 1941 William Marshall Bullitt correspondence collection [unprocessed], Archives & Special Collections, University of Louisville, Louisville, KY. The memoir in reference was originally published as Thomas W. Bullitt, *My Life at Oxmoor: Life on a Farm in Kentucky before the War* (John P. Morton and Co., 1911). A second run was printed privately in 1995.

Since 2024, every instructional session with Bullitt materials has begun with this history. This involves tracing how the university's ability to provide access to a substantial set of rare mathematical works embodies an afterlife of capital accrued through the reduction of human life to its monetary value. Working this into a lesson plan with care has been an iterative process, as its heaviness can quickly sink engagement with the materials. Addressing the wonder of the collection head-on emerged as a promising approach. Students often feel excitement and enjoyment working with these materials, specifically in experiencing a physical connection with scientists they may have studied. Explicitly recognizing the validity of this form of encounter from the start facilitates students in beginning to reflect on how they will engage with the materials themselves. As the joy of being able to experience the works side by side was a core part of Bullitt's project, addressing the meaningfulness of this unification also provides an on-ramp for materializing the impact of the Bullitt family's enslaving on research. Further work is required to channel this aspect of instruction toward justice-driven skill-building. For STEMM students, many of whom may pursue careers in academia, there exists a need for sharpened and liberatory approaches to historical and contemporary forms of violence and dispossession that shape the wealth of research institutions and their donors.

## Looking Ahead (by Looking Backward)

Amid his efforts to develop his collection, Bullitt was pointed by Shapley and Veblen toward a cause needing his support. With the disbarring of Jewish scholars in Central Europe in the late 1930s, Veblen secured the refuge of his colleagues at American institutions. Bullitt's prominence, wealth, and commitment to mathematical scholarship made him a potential ally in championing a refugee's placement at UofL. Veblen noted this and planted seeds with Bullitt of the dire situation facing scholars in summer 1938. Through continued efforts by Veblen, on March 2, 1939, Bullitt corresponded with Raymond Kent, then-president of UofL, about offering monetary backing if the university were to invite a refugee Jewish scholar to join the faculty. This proposal came to fruition through Veblen's facilitation and Bullitt's financial commitment: by the end of the year, Charles Loewener escaped then-Czechoslovakia to the United States.

The story of Veblen, Bullitt, and Loewener brings forth a question for rare book librarians and their instructional partners: how can the classroom prepare students to imagine functional and actionable communities of care in academia? This case study explored a few frames for considering how rare book collections can reveal for students the biases in shaping the intellectual, communicative, and financial aspects of their fields of inquiry. However, much remains to be seen of building justice-driven engagements with STEMM students that support them in seeing their agency

through their professions to combat injustices. The fight to provide refuge to Jewish scholars in the late 1930s mirrors many challenges that continue to face students today. Refugees, undocumented migrants, and immigrants increasingly face dehumanization, surveillance, and incarceration at the hands of the United States government. While Bullitt's books and correspondence show little of the practices used by him and others to safeguard vulnerable academics, they speak to the relational infrastructure needed to secure safety for people fleeing persecution.

While each repository carrying rare STEMM books will have their own stories to thread into instruction, librarians share a responsibility to assert the relevance of their collections to the building of more equitable and just communities of knowledge production. By utilizing STEMM materials as evidence of the humanness of knowledge production, rare book librarians gain a new approach for asserting their utility to the classroom. Further scholarship is needed to develop, test, and analyze learning objectives that measurably connect rare book instruction with student growth, specifically with respect to identifying and confronting biased practices. Relatedly, much remains to be explored in terms of how rare book librarianship as a field can be reshaped to address the forms of loss threaded into its history. It will not be enough to reframe or redevelop collections once designed to venerate white, wealthy, Western men. Without confronting the material forces that enable such prejudices, there can be no true accountability.

Although the findings of this paper emerge from a specific instructional context, they suggest that rare books have potential to sharpen research toward the pursuit of justice through serving as evidence of neutrality's non-existence in a still prejudicial world. The power of the book will not come from its witness alone. The stacks must further open themselves to new meanings and values that are durable to the challenges facing print in the twenty-first century and the critical fight ahead for a more inclusive and repair-oriented society.

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