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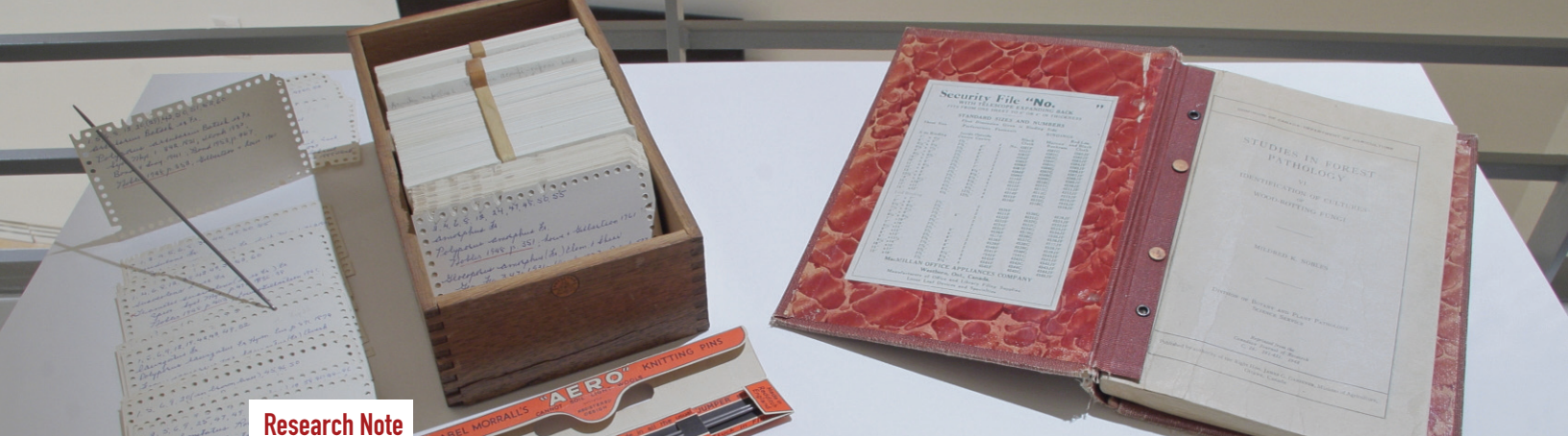
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Résumé de l'article

La recherche préparatoire et l'élaboration d'expositions peuvent être des moyens innovateurs pour cultiver de nouvelles connaissances dans les salles de cours des universités. Cet article décrit un séminaire offert à l'Université Carleton qui a porté sur la recherche effectuée sur des collections pour étudier des femmes scientifiques canadiennes. Intitulé « Représentation de la contribution scientifique des femmes » (Representations of Women's Scientific Contributions), le séminaire a donné aux étudiants l'occasion de considérer la culture scientifique matérielle d'une perspective critique féminine grâce à un exercice de rédaction de l'histoire culturelle d'objets scientifiques associés aux femmes étudiées. Le séminaire a culminé avec une visite d'Herbarium, une exposition fort bien reçue, présentée à la galerie d'art de l'Université Carleton, en 2017.



Research Note

Cultivating Knowledge about Canadian Women Scientists through Seminars, Objects, and Exhibitions

Cindy Stelmackowich

Abstract: *Exhibition research and development can be an innovative way to cultivate new knowledge in university classrooms. This article describes a Carleton University seminar that incorporated collections-based research to study Canadian women scientists. Entitled “Representations of Women’s Scientific Contributions,” the seminar gave students the opportunity to apply feminist critiques to the material cultures of science as they wrote the cultural histories of scientific objects related to the women they studied. The seminar culminated with students curating HERbarium, a well-received exhibition at the Carleton University Art Gallery in 2017.*

Résumé : *La recherche préparatoire et l’élaboration d’expositions peuvent être des moyens innovateurs pour cultiver de nouvelles connaissances dans les salles de cours des universités. Cet article décrit un séminaire offert à l’Université Carleton qui a porté sur la recherche effectuée sur des collections pour étudier des femmes scientifiques canadiennes. Intitulé « Représentation de la contribution scientifique des femmes » (Representations of Women’s Scientific Contributions), le séminaire a donné aux étudiants l’occasion de considérer la culture scientifique matérielle d’une perspective critique féminine grâce à un exercice de rédaction de l’histoire culturelle d’objets scientifiques associés aux femmes étudiées. Le séminaire a culminé en HERbarium, une exposition fort bien reçue, présentée par les étudiantes à la galerie d’art de l’Université Carleton, en 2017.*

Keywords: Canadian women scientists, feminist critiques of science, science exhibitions, art galleries

GENERATING KNOWLEDGE ABOUT THE NORMS and practices of science and scientific discourse does not need to be restricted to only reading publications and writing texts. Rather, a variety of approaches including analysing the material cultures of science and developing innovative exhibitions that address the cultural histories of scientific objects and practices can be an innovative form of cultivating new knowledge. A combined undergraduate and graduate university seminar I developed in the winter term of 2017 at Carleton University for the

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Figure 1. A.R. Timothy, *Photographer, Science '35 Queen's University, 1935*. Sepia photograph on paper 89 x 22.86 cm. Private collection. Photo credit David Barbour.

Pauline Jewett Institute of Women's and Gender Studies brought collections-based research to bear on the histories and contributions of Canadian women scientists; it gave students the opportunity to take an active role in applying feminist critiques to the material cultures of science.

Entitled "Representations of Women's Scientific Contributions," the seminar focused on researching the lives, contributions, and stories of Canadian female scientists. Course readings were drawn from history, science studies, museum and curatorial studies, material culture studies, feminist philosophy of science, and feminist/gender cultural theory.¹ The materials we researched and developed were to be incorporated into two planned exhibitions. The first was for a fall 2017 exhibition at Carleton University Art Gallery's exploratory space called the Carleton Curatorial Laboratory (CCL). The second was for a 2018 national exhibition on Canadian women in the natural sciences planned for the Canadian Museum of Nature.²

Instead of focusing exclusively on lectures and in-class discussions based on assigned readings, the seminar included numerous off-campus sessions to specialized archives and libraries, scientific laboratories, and collections facilities located across the National Capital Region. These included field-trips to the Natural Heritage Campus of the Canadian Museum of Nature; the storage facilities of the Canada Science and Technology Museum; the herbariums and archives of the Central Experimental Farm, Agriculture/Agri-Food Canada; as well as the special collections at Natural Resources Canada (NRCan) Library. This opportunity to conduct archival and artefact research where many rich primary sources and material cultures related to the histories of Canadian scientists reside allowed us to perform object-based research as a mode of generating knowledge. Equally important, these field trips provided opportunities for students to meet with science curators, collections managers of scientific materials, librarians of science collections and resources, and of course, scientists. Alongside these experts, we engaged in discussions about the expectations of the exhibition as a work in-progress and how scientific artifacts and objects could ask new questions of both science and its histories.³



Figure 2. Detail of A.R. Timothy, Photographer, Science '35 Queen's University, 1935. Sepia photograph on paper 89 x 22.86 cm. Private collection. Photo credit David Barbour.

Where to begin a seminar that focuses on unknown Canadian women scientists? Especially when the story of women in science is an ongoing account of discrimination, barriers, hostility, and invisibility. Perhaps with an archival record that has always stood as a statement about professional identity—in this case, the professional group portrait. [Figures 1 & 2] This group photograph taken of the ‘Science ‘35 class at Queen’s University’ was an artifact I brought into the seminar on the first day to allow us to ruminate on women’s specific marginalized position within science and the rules that govern science’s disciplinary formations. It is an 89-cm long black-and-white sepia-toned panorama photograph attributed to a Kingston commercial photographer who specialized in shooting large group portraits and graduation photographs for Queen’s University and the Kingston General Hospital. My intentions of starting off the seminar with a group portrait that did not include a single female was to try and make visible the otherwise invisible relations, shapes, and meanings that were already there.

Professional group portraits such as this one carry important narratives related to the goals of the group and its transmission of knowledge. Large assemblies gathered around their Masters demonstrate the desires of the students to join a professional fraternity based on principles and methods. Quintessentially these types of group photographs are a statement about identity. In this image, long rows of well-dressed students and science-faculty members positioned in the center fill the spaces. Male subjects holding onto their books and fedoras take up all of the shapes and spaces of meaning within this photograph recorded in front of the stately historic stone science building on Queen’s campus.

The focus for the seminar class was to discuss how this particular object opens onto a discussion about the invisible relations that governed science and scientific discourse in the 1930s. In other words, how could new sets of



Figure 3. Installation detail of HERbarium exhibit, Carleton University Art Gallery, Ottawa.
Photo credit Patrick Lacasse.

questions that highlight difference/marginalization relations unfold onto rules of exclusion, prohibition, division, and rejection that governed science in Canada? In many respects, this group photograph illustrated what was at stake socially and culturally at the time when scientific disciplines were established and professionalizing. With no females in sight, the seminar students puzzled over the rules related to who was allowed to be there on the steps at Queen's university that day? How did the separation of spheres (private versus public) affect women entering into scientific fields? When were women formally allowed entry into universities in Canada, and then permitted to practice as professionals within the discipline of science? How did these masculinising effects related to professionalization redefine women's relationship to science and scientific discourse in ways that reverberate today?

The exercise with the 'Science '35 class at Queen's University' portrait made the students reflect on the enormous barriers facing women as they sought entry into science; they also recognized that telling the stories of women scientists would involve repositioning science to be seen anew, and that representing female scientists would likely entail making them visible for the first time. Armed then with the exciting prospects of developing a distinctive exhibition that would communicate the outcomes of research conducted during class field-trips, we set out to analyse the cultural and gendered backgrounds of the scientific objects we came across (whether that be the research notes connected to a scientist, her photographs of her laboratory experiments, or her herbarium specimens of flora, fauna or fungi). To these ends, the rich primary sources related to Canadian women scientists became epistemic things, presenting for us specific sources open to be viewed, read, analyzed and discussed, especially



Figure 4. Installation detail of HERbarium exhibit, Carleton University Art Gallery, Ottawa. Photo credit Patrick Lacasse.

as it related to the topic of gender.

As research progressed, it became apparent that we needed to communicate in the exhibition a relation between objects and context. How could our chosen objects pose questions that related to the history of being a women scientist? Interested in developing evocative displays and small tableaux, we contemplated the ways that scholarly arguments could be based on objects and extended into the spatial arrangements of the exhibition space. Extended further, how can the stories connected to scientific objects unfold or reveal their historical meanings and gendered content? For instance, how could the unique and effective sewing-needle solution that mycologist Dr. Mildred Nobles adopted for her taxonomical studies on mycological subjects be presented for what it was — an interface, where her ways of thinking and acting materialized to have a transformative effect?

It was not uncommon for women scientists to invent and adopt unique material forms and solutions while performing their research. As shown in **Figure 3**, Nobles used a sewing needle to poke through the holes of her taxonomy-research cards: similar codes signaled similar features and the cards would remain on the needle; while dissimilar cards meant different features (or species groups) and the cards would fall off the needle.⁴ Serving as a perfect solution for the early management of large amounts of scientific data, Nobles created this system in her laboratory at the Canadian Department of Agriculture to identify 126 species of wood-rotting fungi that eventually led to Dr. Nobles' 1948 prized manual, known internationally today as the "Nobles Species Code."⁵ For our display, the surprising yet extremely effective working actions and methods that played themselves out in a number of female

scientists' work were prioritized. The display we assembled of Nobles' hand-written punched cards brought into focus where, when, and how science and a tool more associated with traditional feminine handicrafts came together and materialized.

Since the study, collection, preservation, and representations of scientific specimens were preoccupations for a number of women, we decided to highlight the “her” within herbarium and selected *HERbarium* as the title for the Carleton Curatorial Laboratory exhibition.⁶ Using the term herbarium made us aware of the underlying scientific, visual, and epistemological structures that governed the practices that shaped Canada's early natural heritage. A wall case displaying a large assortment of wood decay fungi specimens that were collected between 1925 and 1932 by Dr. Irene Mounce for the National Mycological Herbarium (DAOM) were carefully presented as veritable herbarium specimens; catalogue numbered fungi were isolated and placed in Pyrex glassware; original typed herbarium labels were either laid-out in the case or left thumb-tacked into the fungi itself; smaller specimens were shown in their original plastic specimen bags [Figure 4]. The reason for these choices was recognizing that it was important to put forward the case that Canadian women were actively and professionally involved in presenting specimens as a concept and a historical practice: a concept that understood that ‘nature’ could be contained and organized into fixed schemes, and a practice that has entailed scientists' naming, labeling, organizing, and theorizing.

HERbarium displayed the broad range of illustrative techniques — from original drawings and watercolour paintings to photographs — that Faith Fyles, assistant botanist at the Department of Agriculture, created for the Dominion Horticulturist's experiments with apple cultivation at the Central Experimental Farm in Ottawa, as well as for her 1920 publication on the poisonous plants of Canada.⁷ [Figure 5] The display of these items showed that Fyles was instrumental in defining both the scientific and representational systems related to plants and food crops during this early period. Clearly, developing representations and generating objects structured perceptions, communications, and further scientific pursuits. In the case of Faith Fyles, scientific objects were also visual agents. For her, the continued transformation of natural objects into stylized and artistic forms was both an intellectual and artistic/aesthetic exercise. *HERbarium* was an opportunity to present a number of nineteenth- and early-twentieth century natural-history practices as engagements that represented wider colonial narratives and practices.

Posing questions related to the specific ideologies attached to being a scientist led us to better understand the ways that the personal and the professional, and the private and the scientific, are intertwined in the stories related to women scientists. Dr. Mildred Nobles never married and remained employed with the Canadian Department of Agriculture until her retirement. However the career of her predecessor, Dr. Irene Mounce, ended when she married. As noted in her obituary, “Dr. Mounce's career in mycology-plant pathology ended when she



Figure 5. Installation detail of HERbarium exhibit, Carleton University Art Gallery, Ottawa.
Photo credit Patrick Lacasse.

married...in 1945, and was required to resign because of her marital status.”⁸ The phrase “required to resign” caused both the class as well as the staff at the Department of Agriculture to pause. Our initial research on the personal lives of female scientists working at the Geological Survey of Canada during the same period disclosed similar results — only unmarried women were allowed to hold full-time employment; women who got married were “required to resign.” Intent on finding evidence of gender biases within employment records and policies, we poured ourselves into researching archived federal government employment policies in documents housed at Library and Archives Canada.

The ‘smoking gun’ was found! It came in a standard memo issued from the Privy Council Office of the Public Service Commission of Canada [**Figure 6**]. Dated June 18, 1920, the document stated that the Civil Service Act of 1919 was “pleased to” amend the existing Act to bar married women, whose husbands were living and able to work, from permanent positions in the public service. Sadly, this discriminatory measure remained in effect across Canada until 1955.

We all felt compelled to treat the Privy Council memo as a museological artefact even though it is atypical for a government policy document to be included in an art-gallery exhibition. Endowed with the ability to speak on its own, and needing little contextualization or preamble, the message in the letter points to the reasons why the female scientists were not allowed to fully mature and professionalize. Additionally, it points to how the private lives and careers of many Canadian women, including scientists, were affected by these discriminatory marriage policies between 1920 and 1955.

Actions and practices that previously went unnoticed came into view as our attention focused on material dimensions and personal histories. In the end it was through analyzing the social and cultural background of objects that we made visible the otherwise invisible meanings that regulated women’s involvement in science. Yet, objects such as crafting tools also became agents of change that gave women the ability to shape their knowledge and contributions. With *HERbarium*, the careful placements of objects and specimens in mini-displays and sub-stories allowed us to highlight specific discourses and power relations.

Outcomes

As we look for ways to advance gender awareness, inclusion, and equality in STEM, there is value in focused seminars, exhibitions, and conducting object-based research that includes gender analysis. In addition to generating a unique exhibition, the outcomes of the seminar ranged from students learning about hidden science-collections facilities where they later secured internships and placements while advanced graduate students were introduced to untapped collections where they could pursue original research. All of the students felt they either met or researched and found historical female figures or mentors that gave them renewed hope to pursue careers in, or connected to, science. In the months following the seminar, students were invited to present in Montreal

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7. 18. 19

(C O P Y)

P. C. 1393

PRIVY COUNCIL
CANADA

AT THE GOVERNMENT HOUSE AT OTTAWA
Friday the 18th day of June, 1920.

PRESENT

HIS EXCELLENCY
THE GOVERNOR GENERAL IN COUNCIL:

His Excellency the Governor General in Council, pursuant to the provisions of Section 37 of the Civil Service Act of 1919, as amended, is pleased to approve the following regulations to govern the employment of married women in the Public Service, made by the Civil Service Commission, under the authority of the said Section 37, and the same are hereby approved and established accordingly,-

REGULATIONS.

" Hereafter no married woman, whose husband is living, shall be eligible for appointment in the Public Service.

Provided that, when the Commission reports that the supply of experienced help for any particular kind of work is not sufficient to meet the demands of the Public Service, a married woman may be certified for temporary employment.

Provided further, that where it can be established by a married woman that her husband is unable, through illness or other cause, to contribute to her support, such married woman may be certified for permanent or temporary employment.

Provided further, that where, in the opinion of the Commission, it would be desirable or necessary, and in the best interests of the Public Service to employ a married woman or to employ husband and wife together, such married woman may be certified to by the Commission for permanent or temporary employment."

(Sgd.) Rodolphe Boudreau.
Clerk of the Privy Council.

Figure 6. Memo from the Privy Council Office of the Public Service Commission of Canada, June 18, 1920. Ink on paper. Collection: Library and Archives Canada – Collection on Politics and Government, e008440398-v8.

a well-received poster on HERbarium at the North America 2017 Gender Summit. This international event allowed connections and exchanges with others active in current gender and science research and ‘women and girls in science’ initiatives from across the world. It gave a number of participants in the seminar the confidence to become leaders in Canadian science societies, specifically, the Committee to Encourage Women in Physics (CEWIP) and Carleton University’s undergraduate and graduate student Women in Science and Engineering Society (CU-WISE).

But it was not only the students that were impacted. Science institutions and federal-government departments that normally do not lend artefacts to galleries or museums due to a lack of interest or awareness about their collections were now keen to participate and partner in our curated exhibitions. This novel type of outreach caught the attention of Director Generals and Science Directors of federal-government departments. Furthermore, our research group with its unique focus on cultivating knowledge on women and science were profiled in a variety of local and federal-government newsletters, blogs, and university radio programs.

Researching and celebrating the lives and contributions of the largely unknown women scientists who often work away from the spotlight also became a critically important objective of the exhibition team when planning “Courage and Passion: Canadian Women in Natural Sciences” at the Canadian Museum of Nature. Simply put, role models matter and can make a difference for the next generation of girls and young women. Through hundreds of carefully selected artefacts, specimens, photographs, and field notes ranging from fossils, wet specimens and a 16-foot-tall giraffe skeleton, the layered and gendered stories of culturally diverse trailblazing Canadian women scientists were vividly and proudly presented. The interest in this national exhibition that I curated has been strong and far-reaching, garnering national-media attention and inspiring all ages.⁹ Like any good text, experiment, or experience will do, a rich thematic exhibition has the potential to stimulate new scholarship and can contain the seeds for ongoing research, that is: pose ever more inspiring questions.

Cindy Stelmackowich, PhD, is an Ottawa-based artist, curator and academic. She was a post-doctoral Fellow with the New York Academy of Medicine, the SSHRC Strategic Knowledge Cluster “Situating Science,” and the Lichtenberg-Kolleg Institute in Germany. Her curatorials projects have been exhibited at The Canadian Museum of Nature, Carleton University Art Gallery, Dalhousie University Art Gallery, and the Canadian Consulate (New York City).

Endnotes

- 1 Readings included scholarship on science and gender by historians Marianne Ainley, Julie Des Jardins and Ruby Heap, as well as writings on the “material turn” in the cultural and social sciences by Martha Fleming and others. See Marianne Ainley, ed., *Despite the Odds: Essays on Canadian Women and Science* (Montreal: Vehicule Press, 1990); Julie Des Jardins, *The Madame Curie Complex: The Hidden History of Women in Science*, (CUNY: The Feminist Press, 2010); Ruby Heap, “Writing them into History: Canadian Women in Science and Engineering since the 1980s”, in *Out of the Ivory Tower: Feminist Research for Social Change*, eds. A. Martinez et al (Toronto: Sumach Press, 2003): 49-67; and Martha Fleming, “Thinking through Objects,” *PrePrint* 399, (Berlin: Max Planck Institute for the History of Science, 2010): 33-48.
- 2 In Fall 2016 I was invited to be the Curator for a special exhibition on Canadian women in the natural sciences for the Canadian Museum of Nature. Entitled *Courage and Passion: Canadian Women in Natural Sciences*, the exhibition revealed the contributions of innovative trailblazers in science from the 17th century up to the present times. It also addressed the social and gender barriers that women faced, with contemporary insights to inspire girls and young women with an interest in science. The exhibition opened July 28, 2018 and ran for seven months until March 31, 2019. The launch marked 100 years since women won the right to vote in federal elections, a milestone passed in the museum when it served as the temporary home for Parliament following the fire that destroyed the Centre Block in 1916. A link to the exhibition: <https://www.nature.ca/en/plan-your-visit/what-see-do/our-exhibitions/courage-passion-canadian-women-natural-sciences>
- 3 I am grateful for the many interesting discussions I had with the students enrolled in the Winter 2017 Carleton University seminar: Josie Arruejo, Chelsea Black, James Botte, Brigid Christison, Michelle Jackson, and Sharon Odell.
- 4 Special thank you to Dr. Scott Redhead, Curator of the National Mycological Herbarium (DAOM), for sharing his knowledge and enthusiasm about the contributions of Dr. Mildred Nobles and Dr. Irene Mounce.
- 5 Mildred K. Nobles, “Studies in Forest Pathology. VI. Identification of Cultures of Wood-rotting Fungi,” *Canadian Journal of Research*, 26c, 3 (1948): 281-431.
- 6 *HERbarium* was displayed at Carleton University Art Gallery in the Carleton Curatorial Laboratory (CCL) between September 11 and December 3, 2017. Thank you to Director Sandra Dyck and Curator Heather Anderson for this special invitation and their interest in our seminar research. <http://www.cuag.ca/index.php/exhibitions/404>
- 7 Faith Fyles, *Principal Poisonous Plants of Canada*, (Ottawa: Department of Agriculture, Dominion Experimental Farms, 1920) Ser. 2, Bull. 39.
- 8 “Obituary: Irene Mounce, 1894-1987,” *Mycologia*, 80, 5 (Sept.-Oct., 1988): 607-608.
- 9 Extensive national media interest was generated from the exhibition *Courage and Passion: Canadian Women and the Natural Sciences*. These included radio and television interviews with *Global News*, *CBC: All in a Day* and *CBC: Our Ottawa*. A couple of interviews published on-line include: <http://blog.cdnsiencepub.com/celebrating-canadian-women-in-science-at-the-museum-of-nature/>