Innovative Niche Scientists: Women’s Role in Reframing North American Museums, 1880–1930

SALLY GREGORY KOHLSTEDT*

Abstract. Women educators played an essential role in transforming public museums that had been focused on collections and research into effective educational and informational sites that engaged broad publics. Three significant innovators were Delia Griffin of St. Johnsbury Museum in Vermont who emphasized hands-on learning, Anna Billings Gallup who shaped a distinctive model museum for children in Brooklyn and Laura Bragg of the Charleston Museum who established strong collaboration with the local public schools. Joining museum curatorial staffs and professional associations that were largely male, these women educators and their peers typically provided pedagogical insights and teaching skills that enabled them to work effectively with school systems, teachers, pupils and parents. Genuinely interested in natural science, they shaped careers which included opportunities to engage with science, provided a considerable degree of autonomy and enabled them to experiment with hands-on learning. They built networks of museum educators and influenced the young American Association of Museums. Women museum educators created a bridge between semi-public natural history establishments for collection, preservation and scientific research and an active audience of teachers, pupils, visitors and patrons. Their efforts transformed museums into sites for education and broad public access to science in the early 20th century.

Keywords. Anna Billings Gallup, Delia Griffin, Laura Bragg, museum education, natural history museums, science education

In 1907 Delia I. Griffin described her educational work at the Fairbanks Museum, located in a small town in northern Vermont, to an attentive audience of professional peers at the second annual meeting of the American Association of Museums (AAM). Her detailed presentation, complete with lantern slides, led a well-established museum director from Dresden to comment, ‘I admire your work thoroughly. We have nothing like it in Germany’.1 Adolph B. Meyer was impressed but so were American attendees who passed a resolution to forge an official connection with the National Education Association (AAM, 1907). The fact that Griffin was one of just four women members at the Pittsburgh meeting, all of whom worked on educational programs, signaled both the opportunities and the gendered parameters limiting women in science and at museum sites. Their initiative, vision and personal ambitions helped to validate hands-on education and frame museum programs for children often in conjunction with

*History of Science, Technology, and Medicine Program, University of Minnesota, 108 Pillsbury Hall, 321 Pillsbury Drive, Minneapolis, Minnesota 55406, USA. E-mail: sgk@umn.edu

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local public schools; in the process they instantiated a component of museums that would become ever more dominant in the 20th century.2

Women science educators like Griffin brought innovative and up-to-date pedagogical thinking to natural history institutions. In the process they established a women’s niche in science, a site where they could develop and exchange ideas about quite specific projects while they established education as an essential component of museums at the turn of the century.3 Devising programs, integrating theories of pedagogy into science presentations and defining a distinct role for educators within established and new museums, early 20th-century women demonstrate the layered, intersecting ways that knowledge of nature was produced and used. Natural history museums, although increasingly open to the public, had initially been male establishments in terms of scientific staff and administrators. The few women who were volunteers or other staff have historically been shadowy figures remembered primarily by other experts for their detailed efforts in collections or their administrative service (Tonn, 2012). Leslie Marsden-Brooks argues persuasively that some used their positions to include other women and brought to their work a consciously gendered understanding of what should count as scientific knowledge. Perhaps for that reason, they chose not to be among the earliest members of the nearly all-male professional American Association of Museums in the early years of the 20th century.4 However, a few intrepid women did join, keen to show the possibilities of expanded museum activities in natural sciences. (Figure 1) They understood their work to be part of an emerging emphasis on extra-curricular learning experiences, and unabashedly claimed they would train youth in science (Pauly, 2000; Kohlstedt, 2009).5

In the past decade, historians have revisited the issue of careers of scientists, shifting from questions of professionalization toward the perceptions and self-perceptions of scientists’ lives and practice. Much of this work has focused primarily on the experiences of relatively well-positioned men.6 Often the limited analysis of women in science has been in comparison to the career patterns of such men.7 Women became more visible during the rapid institutionalization of science at the end of the 19th century when women had gained unprecedented access to higher education but remained essentially ‘locked out’ of scientific spaces (Rossiter, 1982; Jones, 2009, pp. 1–7).8 Family relationships could open laboratory doors or make field work acceptable for women, but studies of collaborative couples typically have themes of invisibility and distorted patterns of credit alongside discussions of scientific contribution. Another strategy of women scientists was the creation of special niches of women’s work, most notably home economics (Stage and Vincenti, 1999), as well as particular subfields such as lab analysis in geology and computing in astronomy in the late 19th century (Rossiter, 1980, Chapters 2–4). Once established, these gendered patterns persisted. They often implicitly but sometimes explicitly instantiated gender stereotypes about women and resulted in discrimination that pigeonholed even women in higher education and thus in subsequent careers (Knibb, 1994, pp. 352–369).
Fig. 1. The three standing women, Delia Griffin, Anna Billings Gallup, and Laura Bragg (the seated woman is apparently the wife of an attendee) pictured here at the entrance to the Lecture Hall of Science at the Pittsburgh Institute were active participants at the 2nd annual meeting of the American Association of Museums in 1907. Frontispiece, American Association of Museums *Proceedings* (1907).

While these niches can be viewed as a mark of exclusionary practices, they may also be taken as evidence of the creative initiatives of women who established themselves and their work as significant.\(^9\) Indeed, an occupational niche may provide a dynamic site that, in turn, affects the larger environment in which it is located. The women museum educators capitalized on changing school curriculum and the need of museum administrators to demonstrate their civic contributions. Starting with educational activities that were primarily directed toward teachers rather than pupils, they built a stronger niche when public enthusiasm threatened to overwhelm museum staff and traditional curators struggled to make public visits purposeful.

At the turn of the century, science entered school curricula as part of changing public attitudes toward nature, innovative educational psychology and new pedagogical practices. Perhaps not surprisingly, these progressive ideas found their way into urban museums through exhibition techniques and adaptive research agendas between 1880 and 1920 (Pandora and Rader, 2008; Cain, 2010). This essay argues that museum educators, predominantly women, were essential to this process as they brought innovative practices into specific sites within the museum and created positions where they enjoyed a degree of autonomy and authority as they framed natural history for a youthful audience. The distinctive educational practices they shared with museum educators elsewhere helped them navigate a largely masculine profession.
Prior to the early 20th century, well-to-do children who visited museums were expected to emulate adult visitors by merely observing displays. An amateur tradition of private individual collections had engaged children, but in ad hoc ways that provided ‘useful entertainment’ (Wonder, 1993; Rader and Cain, under contract). By the 1890s, school children and their educators began to be seriously considered as a core audience, especially as the number of publically supported museums in North America grew at an ‘astounding’ rate (New York Times, 1923). Even the attractive but static habitat groups seemed insufficient as child studies demonstrated that children learned best through active engagement appropriate for their age.

Museums responded to and then reinforced other cultural shifts. In the decades after the Civil War, school enrollment of a rapidly expanding population, more required years spent in school and better teacher preparation coincided with the growth of publicly sponsored museums. Not obvious or automatic, an active interface between education and museums was developed by a cadre of women who brought both scientific expertise and teaching experience. Initial resistance by male curators was overcome as museum administrators realized that public support required public access. Starting in the late 1870s, women (and a few men) introduced educational programs, first for teachers and then for youth as well. The process engaged women’s networks, community sponsors, active teachers and administrators and the emerging cohort of museum staff who specialized in education.

1. Women in Science and Education

Although women attained college degrees in science in the last third of the 19th century, finding careers was more challenging in what remained largely male disciplines. Some found success in occupations that operated in the interstices between male and female gendered occupations, borderland sites where personal aspirations linked to gendered prescriptions. Here women deliberately formulated career options that gave them some of the autonomy and responsibilities typically reserved for men. Historians of education and historians of science have tended to overlook these lives that negotiated between well-established career paths, in this case in the interstitial space between museum curators and teachers. But these are spaces where women might reflect but also enlarge gendered expectations and mentor others with shared enthusiasm for science and educational work. As teacher training schools taught pedagogical theory alongside academic content, the curriculum introduced teachers-to-be to the object orientation of Pestalozzi and Froebel as well as the new educational psychology, often in ‘practice’ or ‘laboratory’ schools. Collegiate education had few of the vocational elements but might, as in the case of Milicent Shinn, involve investigative research in child psychology (von Oertzen, 2013).

Colleges and normal schools thus enhanced the informal scientific activities girls had pursued earlier in the century, namely reading books on natural history, engaging in

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astronomical observation, attending public lectures, joining amateur groups, and finding supportive mentors. A few had found museums a receptive site for volunteers. But as women with degrees in science became more visible and numerous, their expectations changed and they used their skill to bring ideas of pedagogy into museums, to work there directly with pupils, and to promote their programs in professional venues.

Being on site in museums while working primarily with external populations meant educators and administrators had to solicit the financial and material resources required for educational exhibits and activities, identify the expectations of the teachers and pupils and coordinate programs that could address various ages, social classes and levels of expertise. The first cohort of women educators used their expertise to focus activities in new, genuinely public museums. In the process they created opportunities and indeed a distinctive niche in the dissemination of scientific knowledge for those who followed.

Among the most visible and persistent advocates for science education in the post Civil War period was the Boston Women’s Educational Association (WEA), providing resources for both the education of women and the advancement of education in the public schools. One of its leaders, Lucretia Crocker, had been among the first women elected to the Boston School Committee (school board) and actively promoted science education. In the late 1870s she collaborated with museum director Alpheus Hyatt to develop a Teachers’ School of Science at the Boston Society of Natural History (BSNH), which offered certification to local teachers who attended Saturday classes. These classes, offered intermittently over the next three decades, relied on philanthropic support and voluntary participation. The instruction consisted primarily of lectures by curators or visiting lecturers and visits to related exhibits in the museum, but there was limited discussion of specific methods for teaching science to younger pupils.

Crocker’s interest in science had been ignited during lectures by Harvard professor Louis Agassiz at the State Normal School in West Newton. The émigré zoologist was a tireless promoter of the natural sciences who directed a museum at Harvard and supported women’s education (Lurie, 1960). Crocker subsequently lectured on natural history topics at her alma mater, at Antioch College and then at the Newberry Street School in Boston. By the 1870s, she taught the teachers who attended classes at the museum of the BSNH. From 1881 to 1883, she and Ellen Swallow Richards, chemist and founder of home economics, gave a series of lessons on minerals in 12 local schools as demonstration, for example, and the WEA underwrote their subsequent publication. None of these activities persuaded the public school board to provide permanent support, and the mostly male membership of the BSNH deemed this educational work appropriate but not essential to their goals.

Crocker’s project of teaching teachers did provide a model and an inspiration to others who went on to establish embedded educational programs where the museum became a site-specific classroom to teach from objects as well as experts. Lectures and publications were effective with teachers, but providing effective science teaching required attention to pedagogy as well as the cooperation of teachers and school
administrators. In the decentralized educational system of the USA, each local community would have to make this a priority. As Crocker and her colleagues recruited teachers into their programs in hopes of introducing more science into the Boston schools, progressive reformers across the country worked to introduce a new curriculum of nature study in the 1890s. Museums were uniquely positioned to provide material and expertise for this new science education.

2. Delia I. Griffin, the Fairbanks Museum and Hands-on Education

Delia Griffin was in charge of nature study in the Newton public schools at the turn of the century when she was invited to direct the Fairbanks Museum in St. Johnsbury, Vermont. No records exist to explain Griffin’s appointment, but this small northern Vermont town probably did not have the location or salary to attract a more established male director, or perhaps the board recognized that an experienced educator could integrate the museum more fully into the life of the community. Griffin had taken classes at the Teachers’ School of Science and experienced how museum materials could be used for public education. She had been trained in the pedagogical ideas of ‘object lessons’ and in educational psychology that emphasized the importance of the learning environment. Her museum activities emphasized hands-on experiences and direct dialogue with pupils, open-ended techniques that could be challenging to the teachers. Such personal and iterative processes were frustrating for curators in traditional museums, but Griffin relished experimenting with techniques in her small-town institution.

Her enthusiasm drew the attention of museum professionals at the American Association of Museums meeting where she explained the techniques that were part of the nature study school repertoire. She began with biweekly classes for teachers held after school hours. These provided the backdrop for class visits by their pupils to the museum:

One week out of each month, the museum class-room is the center of interest. The groups of children, each accompanied by its teacher, come from the public schools, and lessons are given them by the Director of the museum – lessons, not lectures. The pupils have as active a part as they would in any school exercise, asking and answering questions, and thinking out the problems which flower or bird may suggest. In general, also, they provide the material for their study – flowers or plants, seeds or fruits, or the common minerals of the region. Usually some preparation in the line of out-of-door study of the plant in its environment or its relation to insects is requested when subjects are assigned for the lessons, a week in advance (AAM, 1907, p. 140).

Griffin also met students before school to go on early morning bird walks – so popular that each child could participate no more than four times a year – and encouraged them to look at and even touch the taxidermy specimens in the museum itself. Conscious of conservation concerns, Griffin encouraged collection of wild flowers but maintained a watchful eye so that only one or two examples came from rare species.

After more than a decade in Vermont, where her efforts gained considerable visibility, she was invited to become the founding director of a new educational...
museum in Boston in 1914. The Children’s Museum of Boston, located near Jamaica Pond in a former mansion owned by the city’s Park Department, was sponsored privately through the Women’s Educational Association and by lectures provided through Lowell family funds. With natural history materials (many donated by the Boston Society of Natural History and Harvard’s Museum of Comparative Zoology) on the first floor, and ethnological materials (from the Salem Museum and from wealthy donors’ personal collections) the museum quickly filled its space (Sayles, 1937, pp. 8–9). These provided resources to schools even as Griffin encouraged school-age children to visit the museum and she thus translated nature study with its hands-on science curriculum into the Fairbanks and Boston museums. This work brought her the friendship of another museum director, Anna Billings Gallup of the Brooklyn Children’s Museum (Sayles, 1937, pp. 6–8).

3. Anna Billings Gallup (1872–1956) and the Dedicated Brooklyn Children’s Museum

Gallup was perhaps the most active and prolific advocate for science education in museums in the early 20th century. With certification from Connecticut State Normal School in New Britain in 1893, she taught at the Hampton Normal and Agricultural Institute in Virginia, which served African American and Indian students. Returning north, she took a B.S. degree in biology from Massachusetts Institute of Technology but turned again to education when offered an opportunity by the Brooklyn Institute of Arts and Sciences, a consortium of museums and voluntary organizations. The Institute had been temporarily housed in the Adams House mansion on Bedford Park after a fire, and the fine arts curator suggested leaving the natural history materials there and designing it as a museum specifically for children. (Figure 2) Within 2 years after joining the staff in 1902, Gallup was in charge (Johnson, 1962, pp. 119–122).

Following the policy already in place at the American Museum of Natural History in Manhattan, the city government provided salaries for staff members trained by Gallup to work with the local public schools. If the initial plan had been to create exhibits for children, Gallup quickly moved to make the genuinely new concept of a ‘children’s museum’ a dynamic and tactile counterpart to science curriculum in the schools. Her multifaceted program had a ‘please touch’ philosophy for children visiting the museum. She even allowed regular visitors to borrow objects; for example, a child who could recognize 25 species on sight could take home a mounted bird specimen for a week (Hein, 2006, p. 166). Her School of Pedagogy equipped teachers to instruct their pupils before each visit, echoing the Teachers’ School of Science in Boston (Alexander, 1979, pp. 169–170; Din, 1998). Collegial and supportive of teachers, having been one herself, Gallup worked well with those in the Brooklyn school system.

Like Griffin who was an avid birder, Gallup had a serious interest in zoology and spent the summer of 1902 in the Bahamas gathering marine specimens for exhibit.
Concerned with ecology, she created exhibits that discussed extinction and preservation as well as basic knowledge about the plants and animals in the vicinity of the museum. As she told a *New York Times* reporter, ‘...we are trying here to establish through the channel of a child’s curiosity an interest in the ethical meaning of the world around about it... not at the sacrifice, however, of accurately scientific information’ (New York Times, 1905, SM7). Her qualified comment revealed a tension between a pedagogy that encouraged open-ended investigation by children and a more didactic textbook approach. Gallup gave demonstration lectures at 4 pm every afternoon after school hours, and she soon introduced the idea of preparing materials for loans to teachers to use in their classrooms (New York Times, 1905, SM7).38

Expanding her program, in 1905 she hired Mary Day Lee, a graduate of both Teachers College at Columbia University and Barnard College, to incorporate physics and chemistry. The enterprising Lee created a wired telegraph system that connected to homes of young people who lived nearby and her radio room became one of the more popular sites at the Museum (New York Times, 1909, p. 18).39 By all accounts it was Gallup’s dynamic leadership that shaped this new phenomenon, a dedicated children’s museum, into an example of what collaboration among schools, teachers and museums might foster.

By 1911 Gallup reported that the well-stocked museum with entire rooms devoted to insects, shells, birds, physics and history was averaging an attendance of 13,760 visitors
City funding proved inadequate for her expanding programs, so she turned to a former president of the Brooklyn Woman’s Club. Gallup and Helen Butterfield Schoonhoven created an Auxiliary Club of ‘women of means,’ a progressive group which held special events to raise money for educational programs (Gallup, 1912). Gallup hired and trained young women in the museum, often taking them to meetings of the AAM where they could, in turn, expand their networks. At the same time, she collaborated with local directors, mostly men, in the New York City area and established ties to women running educational programs elsewhere. Thus, when a Boston group decided to create a children’s museum, it was Gallup who recommended her colleague from St. Johnsbury, Delia Griffin, as director. Collaboration among women was as important as close ties with powerful men in the creation of professional space for female museum educators and physical space for education in museums. Gallup quite deliberately shaped a fresh museum model, one designed for and around the education of children and where science was learned first-hand in demonstrations and practice.

4. Laura Bragg (1881–1978), the Charleston Museum and Public Education Outreach

While Griffin and Gallup both had teaching experience, Laura Bragg followed a newly opened path through library science. A recently opened women’s college along the Fenway in Boston, Simmons College led in establishing credentials in fields where a few women were already working and where college degrees would help to expand opportunities for employment, namely in social work, librarianship, retail management, home economics and health education (Kohlstedt, 1980). Laura Bragg entered with the first class, took elective courses in the sciences and graduated with a library degree in 1906. Her interest in biology had led the slightly deaf undergraduate to do her practicum at the museum of the BSNH, where she encountered its programs for teachers involved in nature study. Her first job took her to the remote public library at Orr’s Island, Maine, where she quickly introduced nature classes and clubs as a way to draw youth to her small facility. Local children and residents displayed their findings of local flora and fauna, and she invited her former museum supervisor, Charles Johnson, to visit and confirm their identifications and point out specimens that might be unknown or of value to his collection.

The location, however, did not suit Bragg’s energy and ambition, so after just 1 year she took a temporary position with the New York Public Library. At the 115th Street Branch Library, she initiated a story hour and outreach programs but continued to seek a more intellectually challenging position. When the head of the library program at Simmons College recommended her for a post as librarian at the Charleston Museum in South Carolina, Bragg wrote a detailed letter about her background and hopes of finding creative work to arouse her enthusiasm. Initially too late in her response, Bragg had
a sufficiently impressive application that when the woman who had been hired caught malaria and returned to New York, the director, Paul M. Rea, offered the position to Bragg. Once there, she organized the museum’s small library, coordinated a local natural history society, expanded a program for children to pursue natural history interests and began to investigate the botany of South Carolina.

Director Paul Rea, appointed in 1903, reinvigorated the faltering Charleston Museum into a significant cultural center. His wife, Carolyn Morse Rea, who had a degree in biology from Wellesley College, had spent a summer at Woods Hole, taught biology at Western College for Women in Oxford, Ohio, taken charge of biology at the Massachusetts State Normal School in Lowell, and supervised nature education at its Bartlett Model School before getting married (Leonard, 1914). Paul Rea, who taught several summers at Wood Hole, was thus well aware of nature study and the educational role museums could play in conjunction with the public schools.

In the early years, Bragg also maintained her scientific interests. She surveyed native and non-native trees in South Carolina, part of Rea’s efforts to have the museum contribute to a biological survey of the state. Primarily interested in botany, Bragg enjoyed field work as a counterpart to some of the more routine tasks of the library and museum. She also traced the scattered collection of one of the pre-Civil War South’s important botanists, Lewis R. Gibbes, by visiting regional collections and making contact with botanists at well-established herbaria across the country. Locally she organized field trips and published a list of fern in South Carolina.

As her biographer notes, Bragg never really saw herself in gendered terms even though she understood how gender and, indeed, gentility positioned her for her work (Allen, 2001). In Charleston, her growing personal relationship with Belle Heyward linked her into well-established families, whose connections in turn facilitated her projects in the schools and provided invitations to stay at rural retreats while doing field work. Encouraged by Rea, she regularly attended meetings of the AAM. Like much of the professional class in Charleston, she escaped the heat and humidity most summers by going north. Bragg visited her family in New Hampshire and took advantage of the journey to visit museums along her route to observe their exhibits and programs. These activities strengthened her relationship with colleagues like Griffin, Gallup and Ellen Eddy Shaw, curator of elementary instruction at the Brooklyn Botanic Garden.

Bragg was also deeply engaged in the educational aspects of museum work. She conducted courses for teachers, adult members of the Museum, youth clubs and school children; and she produced nature study curriculum for the primary grades in the Charleston schools. Nature study had been introduced in northern schools but with regionally specific references to flora and fauna. As Bragg wrote to the director of nearby Winthrop College, ‘The public schools are at present using my nature study course for the first grade. I am at work now adapting Holtz’s ‘Nature Study’ to southern conditions’ (Kohlstedt, 2009). In the summer of 1915 she visited the New York Botanical Society’s collections and noted, ‘I am accustomed to teaching nature study classes in much the way
that Miss Shaw conducted her classes’. She contacted the Nature-Study Society offices in an effort to purchase Anna Botsford Comstock’s *Field and School Bird Note Book* and, in response to an invitation, joined the society. En route back to Charleston that year she again visited the Brooklyn Children’s Museum and other museums in Philadelphia, Washington and Richmond. By this time she had introduced exhibit cases to circulate in the schools, which became locally known as ‘Bragg boxes’. These might contain several stuffed birds, a well-identified rock and mineral collection, mounted moths and butterflies, ethnological artifacts from Africa or other materials to be used in individual classrooms for a week or two. Bragg distributed natural history and ethnological boxes to both black and white classrooms in segregated Charleston, although the museum charter established segregation and designated just one evening a week for black residents.

When Paul Rea resigned in 1920, Bragg was named director, a position that elevated her status without much improvement in salary. She then forged strong connections to the AAM’s executive director, Laurence Coleman, and hosted the society’s annual meeting in Charleston in 1923. Bragg took visiting members to local plantations and showed them a Charleston that was redefining itself as a tourist site. The network of women museum educators was evident as colleagues made housing arrangements through Bragg and were advised about clothes appropriate for the climate. Their professional connections had evolved into social trust among the women who forged ahead so independently in their museums. Bragg also coordinated a conference of southern museums, which positioned her well for material and staff exchanges. Recognizing the trend toward systematic training for museum staff, Bragg built an informal internship in Charleston and placed experienced young women (and some young men) in museum positions, often in educational programming.

In the late 1920s, she taught a small summer school program at Columbia’s Teachers College for post-graduates who sought museum training in education or exhibition (New York Times, 1927, E22). Anna Gallup invited Bragg to use her museum as demonstration of practice. The systematic training allowed Bragg to place promising young women, such as Mildred Babcock, who became curator of the Winthrop College Museum in Rock Hill, South Carolina. By this time most larger museums had educational activities on site, some with specialized children’s rooms and outreach programs, and smaller museums struggled to follow this trend as these activities extended the feminized educational niche in the museum world. Bragg herself had become increasingly interested in cultural and historical topics, and in 1930 left to direct the Pittsfield Museum in Massachusetts. Her legacy of collaboration with the public schools and the local community, however, reflected how intimately those bonds could be built.

5. Extended Museum Practices

Griffin, Gallup and Bragg all had initiated permanent educational programs in their museums, and others soon followed. After the St. Louis Louisiana Purchase Exposition...
in 1904, which had education as its theme, the St. Louis school system established an Educational Museum, built with materials collected as the fair closed. (Figure 3) The so-called museum was essentially a storehouse for the kinds of materials loaned by established museums elsewhere (Saettler, 1990, pp. 128–131). Amelia Meissner, a local teacher hired to take photographs at the fair, was appointed the first curator to organize and add to the natural history and ethnic collection (Provenzo, 1979; Allen, 2005). Acquisitions from St. Louis also led to a project centered in Reading, Pennsylvania (Smith, 1931, pp. 111–115), organized under the auspices of a new state Division of Educational and Social Economy. Alicia M. Zierden, who had been in charge of the Pennsylvania exhibit in St. Louis, oversaw the materials and created sets of lantern slides sent to schools throughout the state (Lambert, 1905, pp. 69–70; Leonard, 1914–1915, p. 915). Other programs, which ranged from dedicated museum rooms in schools to more systematic collections maintained in teachers colleges like that of Theodosia Hadley at Michigan’s Western State Normal School, demonstrated the possibilities for enterprising teachers and museum administrators.

Women who took up museum-based educational programs did not inevitably have backgrounds in teaching; some came to the work through simply personal interest in science. In the late 19th century, a gifted amateur like Elizabeth (Jennie) Jane Letson could still move into a position of responsibility. Fascinated by conchology, she visited the museum of the Buffalo Society of Natural History in the early 1890s and volunteered to clean its shell collection; she also arranged its library. Becoming an expert on mollusks, she received the Jessup fellowship of the Academy of Natural Sciences in Philadelphia where she spent 2 years working with Henry Pilsby. In 1900, she became director of the Buffalo Museum and developed programs for teachers and

Fig. 3. The St. Louis Board of Education, following a rapidly developing museum model already familiar at the American Museum of Natural History, delivered specimens on loan to schools throughout its district starting in 1905. Photo courtesy of Eugene Provenzo.
pupils, organized an active Conchological Society, and increased its publication activity (Vinal, 1937, pp.1109 and 1111). The way in which women’s educational activities have been obscured, however, is evident in the historical summary of lectures, school visits and other activities by the Society’s male secretary. In conclusion, almost as an aside, he thanked ‘Dr. Elizabeth J. Letson, the efficient Director of the Museum on whose shoulders the greater part of the routine in arranging the work has fallen’ (Cummings, 1906, pp. 5–11).73 While day-to-day activities may have been routine, the initiative, planning and implementation were also to her credit. After a decade as director, Letson married a zoologist William A. Bryan and moved with him to Hawaii where she continued natural history work until her death in 1919.74

Letson undoubtedly met Griffin and Gallup at the Pittsburgh meeting of the AAM where museum education was a significant topic (see again Figure 1). By then education in museums was both changing and expanding, as reflected in the career of Delia Griffin when she moved from St. Johnsbury to head the new Boston Children’s Museum. In Vermont much of the education was centered in the museum while in Boston she concentrated on outreach. Connecting to well-established Boston institutions, she provided lectures and monthly bulletins for teachers, created exhibits for school classes to visit, organized nature walks in the park across from the museum, housed nature clubs for students and prepared specimen boxes to be loaned to teachers for their classrooms (Sayles, 1937, pp. 27–60).75 In the winter of 1918 when coal supplies ran short during the war so that homes were cold and schools were shut, the museum managed to keep its doors open and served as a daytime refuge for children (Sayles, 1937, pp. 27–28). By the 1920s the museum staff reached out to the Girl Scouts, Camp Fire Girls, Boy Scouts, Rangers, school science clubs, bird clubs, settlement house classes and the YMCA and YWCA.76 In 1926 Griffin left to direct the Children’s Museum in Hartford, Connecticut (Sayles, 1937, p. 62).77

6. Conclusion

Delia Griffin, Anna Billings Gallup and Laura Bragg and several others established careers in museum education that followed no well-marked path. Griffin relied on her normal school training while Gallup pursued an MIT degree in biology before being named curator and Bragg was among the first women to take a degree in librarianship. Each demonstrated remarkable versatility, administrative capacity and an independent style as she responded to rapidly changing museum programs and practices. Their individual successes depended on balancing local expectations and engaging a national movement to make museums places of systematic education. As visible leaders in this movement, each managed to stake out a place for expanding educational projects even as she acquired professional visibility and stature. Most of the early AAM women members started their careers in educational settings but an interest in science led
them to museums where they could engage science content and build collaborations, often with other women in education and philanthropy (AAM, 1906, pp. 12–13). The Proceedings of the Association reveal their active participation, but none of them was elected to office until after Laura Bragg hosted the AAM meeting in Charleston and became a member of its Council in 1924. Curiously, although there were women educators at the large American Museum of Natural History in New York, their work remains largely invisible and most did not join the AAM in its early years, perhaps evidence that in very large male-dominated institutions, their opportunities for initiative and mobility were already constrained. Annual museum reports of major museums claim cooperation with school systems in Philadelphia, Pittsburgh and Chicago, among others, but their institutional histories stress their dramatic, if static habitat groups and their research agendas from this period with only passing comment on education and education staff. More work remains to be done.

The founders of museum education actively created their own networks, neither exclusively female nor strikingly feminist. They did pay serious attention to each other as well as to women teachers and to the community women who supported their projects. Inevitably, as the examples here demonstrate, men could play an essential role as well, and their support was probably made easier by gendered assumptions about women as teachers. Social norms constraining the employment of married women perhaps explain why most of these women remained single. Indeed, singleness meant that they could easily travel, attend regional and national meetings, do field work and find other collaborations and partnerships. More research should be done on this topic to complement the historical research on couples in the sciences (Lykknes, et al., 2012). Gender operated positively as local women supported these directors and encouraged them to train a cadre of younger women who also pursued museum careers.

In certain ways these women who worked – sometimes visibly and sometimes behind the scenes – in museum education adapted and enlarged the gendered profile of school teachers into creative leadership that included post-graduate training for teachers. While male curatorial staff acquired advanced degrees and sometimes taught at neighboring universities in the sciences, these women museum educators provided a state-of-the-art set of skills to communicate science across a perceptively growing divide between experts and the public. Paradoxically, even as education became more bureaucratized and embedded in civic life, work in education remained only marginally viewed as a profession (MacDonald, 1999). Nonetheless, this new niche of educational work was integrated and complementary to other museum activity, and it provided some degree of autonomy and opportunities for intellectual and pedagogical leadership that reflected, for women museum educators, the status of scientific work.

Initially constrained to the prescribed educational domain within the male stronghold of natural history museum work, these women moderated their scientific ambitions. Having scientific skills had, however, enlarged their possibilities at a time when young men were finding multiple openings in academe, government agencies and industry.
to advance their careers and seemed to look less often to museum work. Scientific experience also made them credible to their curatorial peers. Brought up in aspiring middle-class households, the women studied here needed to work, were ready to try somewhat risky educational experiments and typically shared a progressive outlook about disseminating knowledge to lower classes and the underprivileged. They brought pedagogical ideas and practices into museum sites, transforming the public face and internal dynamics of their institutions.

Systematic public education in museums grew steadily and by the mid 1910s the enterprising Louise Connelly of the Newark Museum had toured 60 museums even ‘as far West as Chicago’. She found that educational projects were becoming as pervasive in art as in natural history museums, and she praised accessible exhibits that displaced the ‘hoarding’ practices of older museums (Connolly, 1914). The progressive ideas of hands-on education often associated with John Dewey had thus found expression in and beyond school classrooms through innovative programs that shared museum resources and brought pupils into museums. The women who led educational innovations in museums promoted their programs, and indeed themselves, as important to social and intellectual progress in their communities. Working in parallel and sometimes collaboratively, the cohort of museum educators developed pedagogical tools, fresh techniques and age-specific materials that gained them support from patrons and school boards as well as the pupils, teachers and parents whom they served. In this process they reshaped the institutions that they served at the same time as they established an important site for other women to engage in the wide-ranging practices of sciences in public life.

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NOTES

1. A. B. Meyer, then on a tour of North American museums, congratulated Griffin and his comments are recorded in a newspaper clipping, 17 November 1908, in scrapbook, Fairbanks Museum and Planetarium. St. Johnsbury, Vermont.
2. The total registration was 59 members. The other three women were Anna Billings Gallup of the Brooklyn Children’s Museum, Elizabeth Letson of the Buffalo Society of Natural History’s Museum, and Alicia M. Zierden of Pennsylvania State Museum in Harrisburg.
3. The term niche has migrated from ecology to the social sciences while remaining an important biological tool (Griffiths, 2005). On the use of the term in the social sciences, see Popielarz, P. A. and Neal, Z. P. (2007). Margaret Rossiter (1982) applied it to women in home economics and other
fields in *Women Scientists in America: Struggles and Strategies to 1940* (Baltimore: Johns Hopkins University Press).


5. Extra-curricular learning experiences in art and literature as well as in science were philanthropic, voluntary or private programs and often took advantage of other growing public institutions such as libraries and museums. The literature is extensive but see, for example, Van Slyke, A. A. (1995).

6. See, for example, the sociological project of Steven Shapin (2010).


8. Such exclusion was not only in elite (and not so elite) academic institutions but also in learned and professional societies as well as government and corporate laboratories.

9. Early historical research on women concentrated on activists and ignored or dismissed those who stayed with ‘traditional careers’ (including teaching, nursing, library science and home economics), failing to note that such fields were relatively new for women and just gaining professional status. For a challenge to that perspective see Brumberg, J. J. and Tomes, N. (1982).

10. Charles Peale allowed children to visit his Philadelphia Museum if accompanied by adults (Sellers, 1980).

11. The children’s book *Rollo’s Museum* by Jacob Abbott served as a model and was frequently referenced by those encouraging children to get involved with nature study, as in Griffin, D. (1907).

12. In the USA, women comprised two-thirds of the teaching force in 1880 and over three-quarters by 1900, with the highest percentage in rural schools (Wyman, 2000). For a contemporary profile of teachers including data on age, sex and other demographic features see Coffman, L. D. (1911). Civic leaders in small towns followed this trend (Ramsey, 1938, pp. 44–52; Cain, 2009).


18. Scholars are often ill at ease describing the role of persistently interested participants who through informal training or self-education communicated with expert scientists because historians have now largely abandoned the term amateur, but see the special issue of *Science in Context*, 24, introduced by Jeremy Vetter’s (2011) essay, Lay Participation in the History of Scientific Observation, pp. 127–141.

22. An obituary notice by Alpheus Hyatt (1886) in the *Proceedings of the Boston Society of Natural History* outlined Crocker’s effective search for private sponsorship and noted that for more than a decade she had participated in nearly every Saturday afternoon class in order to work with attending teachers.

23. His wife, Elizabeth Agassiz, cooperated with others to found Radcliffe College.

24. Crocker left no manuscript collection but see the obituary in *Proceedings of the Boston Society of Natural History*, 23. Also see Edward, J. T. (1971). She headed the science division of the Society to Encourage Studies at Home, a network of women who taught other women by mail for those who had no other access to education.

25. Local philanthropist Thaddeus Fairbanks, wealthy inventor of the platform level scale, established the museum in 1889 (Ullery, 1984, pp. 129–133).

26. Griffin was apparently born in Maine and attended Bailey School and Kent’s Female College (in Kents Hill) before moving to North Attleboro, Massachusetts, and then to Newton, Massachusetts, where as nature study teacher she promoted school gardens and bird walks. See notice of her later appointment in Boston in (1913) *Journal of Education*, 77–78, p. 738.


28. Although academic and museum scientists had initially welcomed nature study, the open-ended methods of the new pedagogy did not directly provide the sequential and didactic schooling they had anticipated (Kohlstedt, 2005, pp. 324–352).

29. She encouraged adults to join amateur groups and hosted the Vermont Bird Club’s annual winter meeting in 1906 at the Fairbanks Museum. See the (1907) Vermont Bird Club, *Bulletin*, 2, p. 30.

30. Apparently over 150 such lessons were presented each year.

31. She regularly spoke at national meetings of the AAM, the Nature-Study Society and the New England Federation of Natural History Societies. See (1907, 18 October) *Science*, 26, p. 526.

32. Her successor at the Fairbanks Museum was Alice Wilson Wilcox, a graduate of Brown University (1913) *Journal of Education*, 77–78, p. 738.

33. Sayles, who served as treasurer, explained the hard work involved in maintaining private funds in her book (Sayles, 1937, pp. 16–26).

34. Griffin’s career finished as director of the Children’s Museum in Hartford, Connecticut. A similar but apparently shorter-lived Cambridge Children’s Museum was established by ‘the City of Cambridge in cooperation with Harvard University, with a Committee of Cambridge Ladies and with the Teachers’ School of Science’ [through George H. Barton], (1920).

35. Little is known about her early life, although the Gallup Hill Cemetery headstones suggest her parents died in 1874, just 2 years after her birth, Gallup Family Association [online] http://www.gallupfamilyassociation.com/photos/?page=cemetery (accessed 18 July 2011).


37. Laura Bragg was critical of the Field Museum’s ‘quite elaborate school exhibits’ that were ‘mere show exhibits with nothing the child could touch’. Bragg to Mildred Babcock, 17 November 1927, Bragg Papers, CM.

38. Gallup claimed her precedent for these circulating materials, ‘hampers of specimens’, in some (unnamed) European museums.

39. With her wireless radio station, Lee taught Morse code to those who were interested in listening in on commercial and naval communication around the New York City ports. See www.rwonline.com/article/mary-day-lee-radio-pioneer/3196 (accessed 29 June 2011).

40. Gallup’s report for 1911 indicated that 245 lectures had been given to 23,309 pupils, 797 teachers had participated in programs, and 839 loans to schools had been issued (MBIAS, 1912).
41. The women's clubs created a cadre of women united in their goal to elevate their minds and to become a 'social and intellectual force' in their communities (Croly, 1898, preface).
42. Simmons College was among the first to offer a college credential in library science and to open up this professional option for women (Garrison, 1979).
43. Charles Johnson to Paul Rea, n.d., January 1909, and Mary E. Robbins to Rea, 5 January 1909, both in Correspondence Files, Charleston Museum (hereafter CM), Charleston, South Carolina.
44. Bragg also used the museum at the Tufts College Biological Laboratory on the mainland across from Orr's Island. Bragg to Clifton Gray Normal, 25 January 1926, Laura Bragg Papers, CM.
45. Johnson to Rea, January 1909 noted in his recommendation that Bragg 'seems to thoroughly enjoy the broader side of library work, and its relation to the Museum and in showing the boys and girls how to study for themselves' Correspondence Files, CM.
46. Bragg to Paul Rea, 21 January 1909, Correspondence Files, CM.
47. Carolyn Morse Rea (1908) published 'The Museum in Relation to the Schools' in the Bulletin of the Charleston Museum, 4, p. 13. It is curious that she did not take on any educational responsibilities, but she had a child and may have been responsive to the social norm that married women with children should not work. Leonard (1914)
48. Rea to Bragg, 12 August 1910 and 14 July 1911, Bragg Papers, CM.
49. Bragg to father [Lyman D. Bragg], 9 November 1909 and 13 May 1912, Laura Bragg Papers, South Carolina Historical Society (hereafter SCHS), Charleston, South Carolina.
50. Charles Bessey to Bragg, 28 January 1914, Bragg Papers, CM.
51. The fern list was published in the American Fern Journal; see Bragg to R. C. Benedict, 7 January 1912. Louise Follin, Supervisor of the Charleston Primary Schools and also instructor at Charleston's Memminger Normal School, joined Bragg on collecting trips; see Bragg to Follin, 18 February 1914, Bragg Papers, CM.
52. Biographer Allen (2001) suggests this 'new woman' cultivated women's networks and supported women's suffrage but without seeing herself as so much female as an independent person.
53. In 1911, for example, she observed that the Brooklyn Museum was 'way ahead' of the American Museum in terms of its educational programs. Bragg to Rea, 16 July 1911, Correspondence Files, CM.
54. By 1911 they had both attended 5 AAM meetings and had intervening correspondence. Gallup to Bragg, 11 March 1911, Bragg Papers, CM. Also see Bragg to Anna Gallop [sic], 15 September 1922, as she sent Anne Porcher to the Brooklyn Museum to learn how to adapt library work to museum conditions and noting 'I did so enjoy my day at the Children's Museum; I was very sorry not to see you but you may certainly trust your staff in your absence . . .'.
55. Bragg to Curator of Public Instruction, 18 February 1914, Bragg Papers, CM.
56. Bragg to D. B. Johnson, 10 January 1914, Bragg Papers, CM.
57. Bragg to D. B. Johnson, 10 January 1914, Bragg Papers, CM. Shaw had a B.S. degree and taught in normal school before being hired to direct the educational program, including a children's garden, at Brooklyn Botanic Garden.
58. Eliot P. Downing to Bragg, 27 January 1914 and Bragg to Downing, 9 February 1914, Bragg Papers, CM.
59. Bragg’s father, a minister, had taught for 2 years at a school founded by the Freedman's Aid Society in Holly Spring, Mississippi. Bragg took a cautious but progressive stance on race issues and gradually made the museum more accessible to adults and children of color. In 1919 Charleston hired its first black teachers (Allen, 2002, pp. 179–181).
60. Rea and Bragg had both, separately, been offered positions in Brooklyn Institute but declined. Bragg commented to Rea that ‘I’d rather be second with you for head than have Miss Griffin’s position or that of any other head [sic] museum woman I know’. Bragg to Rea, 28 July 1914 and Rea to Bragg, 1 August 1914, Bragg Papers, CM; also Bragg to Lyman Bragg, 2 June 1914, SCHS.
61. Griffin to Bragg, 1 March 1923 and 10 March 2914, Bragg Papers, CM. Gallup to Bragg, 10 March 1924, Bragg Papers, CM.

62. The Laura Spellman Rockefeller Foundation grant enabled Bragg to tour small southern museums, covering Richmond, Charlottesville, Lexington, Blacksburg, Atlanta, Birmingham, Tuscaloosa, Montgomery, Augusta, and Savannah. See Bragg to Coleman 21 September and 3 October, 1924; also see Bragg to John J. Coss, 2 May 1929, Bragg Papers, CM. Also see Coleman, L. V. (1927).

63. The Bragg papers have numerous letters to potential applicants, most of them from women. In 1929 Mrs. Barrington, Curator of Public Instruction at the Charleston Museum, took over the New York summer school while Bragg continued ‘apprentice classes’ in Charleston. Bragg to John J. Coss, 8 June 1929, Bragg Papers, CM.

64. Gallup to Bragg, 7 July 1928, Bragg papers, CM.

65. Her protégé Babcock became discouraged by the expectation that she teach at the college, collect for the museum, hold museum classes for teachers and their students, and help the local schools organize their own small exhibits. All this was for low wages, leading her to tell Bragg, ‘I have not lost my perspective, but I can’t eat it’. Winthrop to Bragg, 29 November 1929, Bragg Papers, CM.

66. Nearly a quarter of the attendees at the AAM annual meeting in Washington, D. C. in 1924 were women, and eleven of them indicated affiliation with a children’s museum or program. An AAM Attendance List is in Bragg Papers, CM.

67. In the 1910s, art museums and historical sites added educational programs. Agnes Laidlaw Vaughn, for example, moved from her educational work at the AMNH to the Metropolitan Museum of Art as liaison to the public schools. See obituary in the (1919) Metropolitan Museum of New York, Bulletin, 14, p. 118. See Murtagh, W. J. (2006).

68. Meissner, a teacher and daughter of a local horticulturalist, organized delivery first by horse and buggy and later by delivery truck. In the first year of operation, 5,000 deliveries were made, providing art and natural history objects, photographs, maps, and lantern slides.

69. Bragg visited when the AAM met in St. Louis; see Bragg to director Carl Rathmann, 10 June, 1927, Bragg Papers, CM.

70. Zierden attended Bucknell University and taught before concentrating on exposition exhibits on education.

71. Theodosia Hadley, with a B.S. from Vassar (1902) and an M.S. from the University of Chicago (1904), wrote books and pamphlets, led local field trips, and initiated the distribution program in Kalamazoo, Michigan. She knew Bragg and Gallup through a network of former interns at the Brooklyn Museum. See (1947) Miss Hadley Dies, Western Michigan College News Magazine, 4, pp. 8–9 and 5, pp. 8–9.

72. Relatively little has been written about Letson (1874–1919) aside from an obituary by Pilsby, H. (1918–1919) Nautilus, 32, pp. 142–143, and one in (1919) Science, 49, p. 305. She produced an important (1905) Check List of the Mollusca of New York, Bulletin, 341, New York State Education Department. Also active in a Buffalo women’s writing group known as the Scribblers, she had an honorary doctorate from Alfred University.

73. By 1906 the attendance of school children (26,983) outnumbered those of adult visitors (20,000), evidence which helped secure city funding for the museum.

74. Bryan directed the Bishop Museum in Honolulu and his new wife became librarian at the university. When she died, he left to head the Los Angeles Natural History Museum. MacKenzie, G. N. (1917); also Bryan’s papers at the University of Hawaii at Manoa Archives.

75. Sayle’s account is based on annual reports apparently no longer extant and suggests layers of activity and promotion, including a Hyatt fund intended to give ‘car money’ to poor children who might not otherwise be able to visit the museum.

76. Griffin also encouraged summer camp ‘museums’. (Griffin, 1922, p. 158).

77. Griffin was given 4 months severance salary to allow her to rest and travel.
78. Annie [sic] B. Gallup, Elizabeth Letson, and C. M. Perine attended the first meeting, and Delia Griffin had indicated her intention to join before that meeting and did attend the following year. In 1906 and again in 1907 resolutions to join with the NEA were put forward; W. J. McGee of the St. Louis suggested ‘some of us regard museums as the coming type of educational institutions’. (AAM, 1907, p. 34).

79. Among the educators at the AMNH were Agnes Vaughn (who worked particularly on a program for the blind), Ann E. Thompson, and Flarida A. Wiley (known to some as the ‘bird woman of Central Park’) (Vaughn, 1914, pp. 39–42).

80. The term docent became increasingly popular, a mechanism for mentoring and hiring women; in Charleston, at least, young men were encouraged to study the collections. Bragg to Mildred Babcock, 22 September 1927, Bragg Papers, CM. Gallup led internship programs and by the 1910s there were always several women, some sponsors and some staff, representing the Brooklyn Museum at the AAS meetings. Bragg regularly commented, as for example, ‘I have a delightful little girl with me who is an apprentice at the Museum. She is going to be a grand museum worker…’ Bragg to Mildred Babcock, 28 February 1929, Bragg Papers, CM. Among her most successful were Helen McCormack (Valentine Museum, Richmond, Virginia), Anna Rutledge (Valentine Museum), Margaret Hightower (Berkshire Museum), and Mildred Babcock (Winthrop College).

81. A normal school graduate (Washington, D.C.), Connolly had a B.S. and M.S. at George Washington University and eventually became superintendent of the Newark public schools. At the Newark Museum, she collaborated with John Cotton Dana and established a highly regarded on-site training program for museum staff (Mulryan, 2001).

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