
Extralaboratory Life: Gender Politics and Experimental Biology at Radcliffe College, 1894–1910

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One of the practical lessons which students are likely to learn at Radcliffe is that of adaptability to narrow and confined quarters.¹

To reach the Radcliffe Zoological Laboratory, Lucy Sprague trekked from Radcliffe's Fay House across Cambridge to Harvard's Museum of Comparative Zoology where she climbed the stairs to a small, women's only room on the fifth floor. She recorded her awareness of circumventing all-male spaces on Harvard's campus whenever she 'started off for college' or 'screwed up my courage to go to the laboratory' in her diary from March of 1900 (Figure 1).² The Dean of Radcliffe had even paid her a personal visit to enforce the college's strict codes of gender segregation: 'I was never to walk home through the Harvard Yard. For four years I walked down Massachusetts Avenue and up Quincy Street'.³ In her commutes to dissect specimens at the women's laboratory – Sprague recalls one that left her drenched from rain – she navigated around established masculine spaces on campus, a vivid window into how gendered thresholds limited women's access to sites of higher education in biology at the turn of the century.

Gender politics between Radcliffe and Harvard Colleges shaped Sprague's walks across campus. In 1894, Radcliffe incorporated as a women's administrative unit – not an academic college – associated with the all-male Harvard College.⁴ As a coordinate institution, Radcliffe did not have the ability to build its own faculty, hire the women it educated or create a professional academic community that reflected its social and political commitments to women in higher education. Instead, Harvard faculty taught courses to Harvard men and then walked to Fay House to repeat them for Radcliffe women.⁵ Surprisingly, access to scientific facilities proved to be an exception to these patterns, with Radcliffe women commuting in the other direction to take biology, geology and anthropology courses in Harvard's laboratories.⁶ Although unnoticed by scholars to date, the Radcliffe Zoological Laboratory, a space in the Museum of Comparative Zoology dedicated to the study of zoology (or animal biology), became an important site for training women in science.⁷ The history of Radcliffe's Zoological

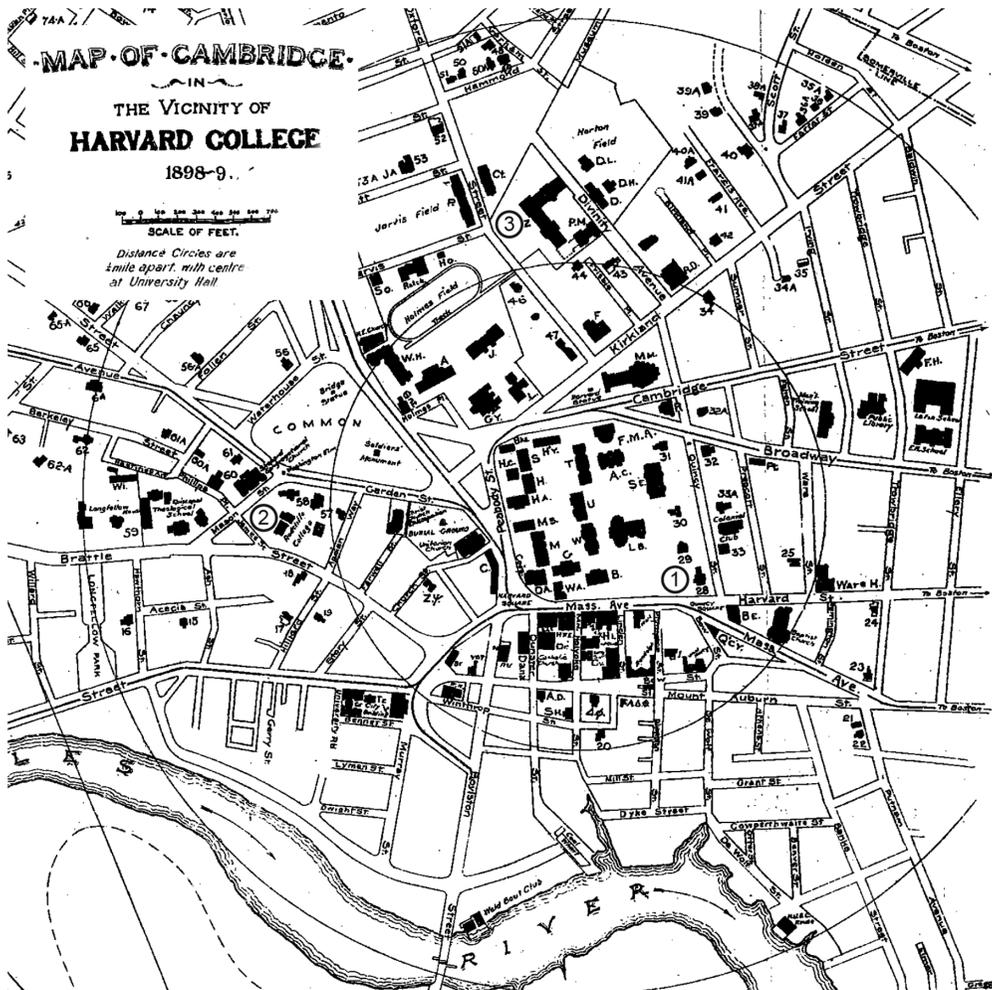


Figure 1: Lucy Sprague lived with Alice Freeman Palmer and George Herbert Palmer on Quincy Street (1). When walking to Radcliffe (2) or the Radcliffe Zoological Laboratory (3), she was required to avoid Harvard Yard (enclosed space around 'U'). Map adapted from *The Harvard Guide, 1898–99*, HUD 899.35 A, Courtesy of Harvard University Archives.

Laboratory reveals the benefits and shortcomings of coordinate instruction. While Radcliffe administrators celebrated their access to superior facilities and specialised training, Harvard faculty and students pushed back against women entering previously gender-segregated spaces and resisted what they considered to be the feminising spectre of coeducation.⁸

Radcliffe represented one of the more unusual forms of collegiate education during the late nineteenth century. Higher education for women expanded between 1860 and 1890 with the creation of women's colleges like Vassar, Wellesley, Smith and Bryn Mawr and the rise of coeducation, first in colleges like Oberlin and Antioch in the Midwest and later in public state schools including Iowa, Cornell, Wisconsin, Michigan and California. Against this backdrop, coordinate institutions like Radcliffe

made clear compromises, trading the lively collegiate life of women's colleges for access to academic facilities at established male institutions.⁹ In 1891, the former Wellesley President Alice Freeman Palmer warned that Radcliffe, known previously as the Harvard Annex, 'lives by favour, not by right, and it is impossible to predict what the extent of favour may at any time be'.¹⁰ Stanford's President David Starr Jordan agreed, puzzled as to why a woman 'should prefer the annex of one institution, when another equally good throws its doors wide open for her'.¹¹ Radcliffe's precarious relationship meant that its students shared similar academic and social experiences with women at coeducational schools, including hostility from adverse Harvard students, faculty and administrators.

As has been well reported, nineteenth-century ideologies of biological sex difference loomed over women's pursuit of higher education. Scientific and medical theories portended that excessive study would denature women's physiological fitness for reproduction, leaving American daughters unfit to pursue their natural occupations at home.¹² Women's education advocates responded with biological theories and data of their own that proved the opposite. Feminists argued for women's evolutionary superiority; coeducational colleges collected data on their students and found men more likely to suffer from ill health compared to women; and coordinate and women's institutions like the Harvard Annex testified regularly that 'the health of the students has generally been good'.¹³ At Harvard and Radcliffe, these debates about scientific expertise and biological vigour provided a ready vocabulary for articulating who was fit enough to make it in the laboratory.

Between 1870 and 1920, biology as discipline emerged at Harvard at the same time that Radcliffe women sought access to its all-male laboratory spaces. Directed by the physiologist Edward Laurens Mark, the Harvard Zoological Laboratory pioneered the 'new biology', an innovative, resource-intensive form of laboratory-based science and cultivated one of the most influential graduate programmes in American biology.¹⁴ While histories of biology during this period focus on novel methods of knowledge-production in the laboratory, they largely overlook how extralaboratory factors contributed to forging a new, communal and masculine culture of science. This article documents how the creation of the Radcliffe Zoological Laboratory suddenly made visible the ways that gender norms structured scientific spaces, challenged claims on the 'right' kind of biology and informed the experiences of women and men in the process of becoming biologists. Here I draw on recent work in gender studies of science that articulates how the coevolution of male scientific communities with 'shared male experiences' at home, on the athletic field, in school and in everyday life played a significant role in the historical discrimination against women in science.¹⁵ In early-twentieth-century biology in particular, cultures of male sociability allowed conversations, mentorship and competition to thrive outside of specialised scientific spaces. Striking examples are Thomas Barbour's 'eateria' at the Museum of Comparative Zoology and the rooftop canteen in the British Laboratory of Molecular Biology in Cambridge, both of which unexpectedly came to function as a crucial sites for the socialisation of young men in the field.¹⁶ More broadly, I use the example of the Radcliffe Zoological Laboratory to illustrate how extralaboratory life shaped modern science. Gendered social interactions outside of the laboratory – defined by masculine cultures of sociability and identity formation, the entrance of women into higher education and debates about

coeducation – structured biological disciplines and constructed standards for what it meant to be a scientist.

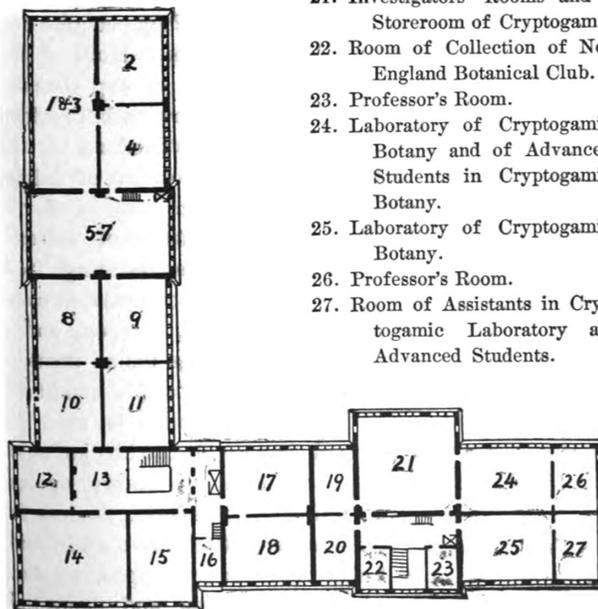
Using archival records detailing academic life in Cambridge, I begin by analysing how Radcliffe's history as a coordinate institution created the conditions for unequal access to laboratory facilities supporting biological training. I then turn to the politics of getting into the Radcliffe laboratory, where gender hierarchies structured both the institutional relationship between Harvard and Radcliffe Colleges and the different standards men and women were expected to meet to pursue graduate study. Next, I show how discourses of scientific masculinities created a ready vocabulary for justifying whose biology ought to be taught in the Harvard laboratories, either the strenuous field biology or the manly experimental zoology. As I demonstrate, scientific masculinities expanded into extralaboratory life as 'Mark's men' constructed fraternal cultures of sociability in boarding houses, weekend trekking groups and impromptu biology clubs. These cultures of sociability excluded Radcliffe undergraduates and graduate students differently. While Radcliffe undergraduates developed communal rituals for lampooning the closed world of zoological studies, postgraduate women often forged their academic paths in isolation. Finally, I examine the role that the pioneering comparative zoologist Julia Platt played in challenging anti-coeducational policies in the Harvard Zoological Club, an extralaboratory space crucial to the making of young scientists' careers. With these studies of extralaboratory life, I argue that the history of scientific training lies in part in the micropolitics of space. Gendered attitudes and behaviours were built into the construction of laboratory cultures during the workday and after hours. Only by attending to the lived experience of women and men navigating multiple institutions, social clubs and field sites can we make visible women as practitioners and understand the contours of an emergent system of scientific masculinities in biology.

The making of the Radcliffe Zoological Laboratory

In 1894, Radcliffe College rented a small workroom in the Museum of Comparative Zoology (MCZ) and converted it into a women's laboratory. Gender politics shaped the allocation of space as the Radcliffe Zoological Laboratory, flanked on all sides by overflowing invertebrate storage rooms, it occupied what was most likely a converted office or storage closet (Figure 2).¹⁷ Harvard's Department of Zoology maintained its gender-segregated borders as instructors taught college men in a 'light and airy' lecture room two doors away. Before widespread electrification, laboratory construction prioritised access to daylight for careful microscope observations. As a result, Harvard's laboratory rooms were purpose-built in a window-lined corner of the MCZ, leaving the Radcliffe laboratory with three western-facing windows with limited access to sunlight.¹⁸ Despite the cramped, poorly lit quarters, Radcliffe celebrated its access to an elite facility for training women in science.

Radcliffe's pursuit of a room of its own had a long history. Margaret Rossiter and Barbara Solomon have shown that women's colleges developed strengths in the natural sciences, with Mount Holyoke and Smith at the vanguard of zoological work.¹⁹ As a coordinate institution, however, Radcliffe struggled to maintain admittance to the laboratories increasingly required for a biological education. Radcliffe's history began in 1879 when the Woman's Education Association of Boston (later the Society

- 1 and 3. Fossil Vertebrates. — Mammals, Birds, Reptiles and Amphibia.
2. Fossil Vertebrates.—Assistant in Vertebrate Paleontology.
4. Fossil Vertebrates.—Fishes.
- 5-7. Mammals and Birds.—Storage.
- 8-10. Mammal Skeletons. — Storage.
- 9-11. Mammal and Bird Skins. — Storage.
12. Reptiles, Amphibia and Fishes. — Storage.
13. Hall.
14. Zoological Lecture Room and Laboratory.
15. Radiates.—Storage. Assistant.
16. Zoölogical Laboratory.
- 17-18. Mollusca and Crustacea. — Storage. Assistant.
19. Work Room of Assistant in Cryptogamic Herbarium.
20. Cryptogamic Herbarium.
21. Investigators' Rooms and Storeroom of Cryptogams.
22. Room of Collection of New England Botanical Club.
23. Professor's Room.
24. Laboratory of Cryptogamic Botany and of Advanced Students in Cryptogamic Botany.
25. Laboratory of Cryptogamic Botany.
26. Professor's Room.
27. Room of Assistants in Cryptogamic Laboratory and Advanced Students.



FIFTH FLOOR.

Figure 2: Specimen storage rooms bordered the Radcliffe Zoological Laboratory (room #16) in the Museum of Comparative Zoology. William Garrott Brown (ed.), *Official Guide to Harvard University* (Cambridge: Published by Harvard University, 1899), p. 75.

for the Collegiate Instruction of Women) arranged for students at what became known as ‘the Harvard Annex’ to pursue a Harvard education. Annex women studied separately under Harvard instructors and followed similar programmes of study to Harvard men without receiving a degree. Despite irregular course offerings, middle- and upper-middle-class Bostonian families with daughters made the Annex popular.²⁰ In the 1880s, while East Coast women’s colleges redesigned their campuses to encourage the intellectual and residential life of their students, Annex administrators worried that constructing a women’s campus would damage their hopes for coeducation. As a result, the Annex avoided investing in physical infrastructure, instead renting rooms in private Cambridge homes for lectures and recitations and

expecting students to commute to school from nearby boarding houses or the Boston suburbs.²¹

During this early period, inadequate facilities hampered the Annex's abilities to teach women science. One Annex supporter recalled that in the 1880s 'a room was taken in an old style house, for the establishment of a laboratory'.²² A guide for college-bound American women elaborated: 'The bathroom of the little wooden house was pressed into service as a laboratory for physics, students and instructors alike making the best of all inconveniences'.²³ Many of Harvard's scientific faculty either refused to teach in such haphazard accommodations or used the poorly equipped laboratory as an excuse to avoid educating women in the first place.²⁴ As Kimberly Hamlin has noted, Smith College's Lilly Hall of Science stood in contrast with the Annex's bathroom laboratory. After its completion in 1886, the Lilly Hall of Science became the foremost experimental biology laboratory for women in the United States. Smith students flocked to the study of evolution and animal biology in the new space, quickly outgrowing its already capacious rooms.²⁵ The Annex laboratory diverged from a more local example as well. Starting in 1876, Ellen Swallow Richards oversaw the gender-segregated Woman's Laboratory at the Massachusetts Institute of Technology, where over 500 women took courses in chemistry, mineralogy and botany. Also supported by the WEA, the Woman's Laboratory aimed to educate 'young girls that they may become more capable reasonable and logical women by reason of this science' and provide resources for teachers to learn about the new laboratory sciences. Although it closed in 1883, the Woman's Laboratory remained an important model for Boston philanthropists and women's education advocates interested in scientific training.²⁶

By 1890, Annex administrators, unsuccessful in their petitions for coeducation, decided to build a women's campus and secured the use of Fay House, a former private home that reflected the institution's commitment to respectable intellectual domesticity (Figure 3). Fay House became the centre of campus life, but it did not solve the Annex's problem of up-to-date facilities for instruction in animal biology.²⁷ In previous decades, women in Boston had a surprising amount of access to elite practices of natural history through Louis Agassiz and the MCZ. Founded in 1859, the MCZ was an influential nineteenth-century centre for natural history teaching, research, collecting and display.²⁸ Louis and his wife Elizabeth Cary Agassiz, who directed both the Annex and Radcliffe, promoted women's engagement with science. In the 1850s, Elizabeth ran a school for girls out of her home, enlisting Louis and his son Alexander as natural history instructors.²⁹ Both Elizabeth and Louis encouraged women to attend science lectures and summer nature study schools and to study at home or with museum curators.³⁰ An early WEA member attributed her interest in advocating for scientific education to 'studying at Professor Agassiz's School' where instruction was enlivened by '*original explorers, in special fields of learning or science*'. There she learned '*how to think* – how to investigate *any* subject within the range of my powers'.³¹ When Louis Agassiz died in 1873, the MCZ transferred to Alexander who formally affiliated the museum with Harvard three years later, binding its future to an all-male university education system (while also continuing its mission as a public museum and specimen repository). As a consequence, women had to be enrolled as Annex students to pursue scientific training in the museum, overcoming a whole host of barriers to entry from secondary school preparation and exams to tuition and substantial laboratory fees.



Figure 3: Radcliffe students inside of Fay House, c. 1899–1902. Radcliffe College Archives, SC 53-1-26, Harvard University.

In the 1880s, Elizabeth Cary Agassiz, as the Annex's director, negotiated with her stepson Alexander for the use of a museum room for her students. The Annex administrators viewed this space as very much Harvard's domain until 1888 when two postgraduate students, Florence Mayo and Julia B. Platt, published their original research in well-regarded scientific journals. The Annex quickly celebrated its claim over the room, renaming it the 'Zoölogical Laboratory of the Society for the Collegiate Instruction of Women' and referring to it as 'our own Laboratory', where women had courageously proved their fitness for scientific study.³² While the Annex touted its up-to-date 'Laboratory of Biology', behind the scenes Alexander protested the expense. He argued it was 'out of the question for me to supply the 'Annex' with either distilled or good alcohol' or to improve the conditions of the laboratory, which was plagued by drafts blowing 'on the heads of students'.³³

The growing demands of the Annex's 'own Laboratory' coincided with the wholesale reorganisation of biology instruction at Harvard. Led by the German-trained zoologist Edward Laurens Mark, biology pedagogy shifted from textbook recitation to laboratory-based instruction. Teaching laboratory science exerted new demands on the MCZ – with elementary and advanced laboratory courses rapidly overwhelming available space – and made it difficult to maintain gender segregation between Harvard men and Annex women. Thus, although women had been present in the MCZ for years, Radcliffe's incorporation in 1894 combined with the close quarters of an increasingly popular biological programme, sparked a surge of resistance, putting pressure on Harvard instructors to reinforce anti-coeducational policies. As a result, the Annex space, formally renamed the Radcliffe Zoological Laboratory,

came to signify the feminising threat of coeducation to the Harvard zoological community.

Gender and the politics of getting into the laboratory

The seemingly permanent physical presence of the 'Radcliffe Zoölogical Laboratory' obscured a much more precarious institutional reality. In its publicity materials, Radcliffe touted its access to specialist laboratories of physics, chemistry, botany and biology and singled out Edward Laurens Mark's Department of Zoology for delivering 'nearly the whole strength of Harvard College' to its students.³⁴ Reflecting trends at other women's colleges, a robust biology programme served to assuage concerns that women were overtaking their health by pursuing coursework designed for men.³⁵ Technical study in natural history had always required resources – a peek into the never-ending specimen collections in the MCZ confirms this point – but laboratory-based experimental biology became resource intensive in a different way. Mark's department specialised in painstaking investigations of cells and embryos, divining structures invisible to the human eye without the use of microscopes, microtomes and chemical reagents. This 'new biology' made zoology courses expensive. Radcliffe appropriated funds to rent its laboratory, pay instructors' and laboratory assistants' salaries, and purchase alcohol, reagents, specimens and instruments.³⁶ While economies of scale mediated the impact of the 'new biology' on Harvard's coffers, Radcliffe's limited resources and small student body meant that maintaining its zoology curriculum cost more than double that of running its botanical, chemical or physical courses of instruction.³⁷ Most importantly, Radcliffe students felt the burden of this institutional asymmetry individually by paying more in tuition and laboratory fees than their Harvard counterparts.³⁸

The burden of Radcliffe's laboratory benefited Mark's department in unanticipated ways. The 'one faculty, two student body' arrangement gave Mark leverage to negotiate for Radcliffe-funded teaching salaries for his male graduate students, important recruitment tools in battles with the University of Chicago and Johns Hopkins University for star students. Mark explained to a colleague that at Radcliffe: 'we can price out small scholarships to some extent, tho' we cannot do much in that [way] with the places in Harvard'.³⁹ Herbert Spencer Jennings, a graduate student working with Mark in the 1890s, learned, as he wrote to his future fiancé Jessica Burridge, that he should find ways to teach 'Radcliffe Girls' to augment his salary.⁴⁰ Radcliffe's proliferating elementary zoology courses created funding avenues for Harvard's zoological men, avenues which were closed to Radcliffe women. In 1899 Mark petitioned to hire Radcliffe students as laboratory assistants, but Harvard's President Charles W. Eliot vetoed the idea, noting 'the employment of a woman raises some questions which the employment of a man would not raise'.⁴¹ Thus, Mark's department educated Radcliffe students, but did not employ them.

As Harvard and Radcliffe relations grew more fraught, the wider American biological community remained somewhat confused about the Radcliffe Zoological Laboratory and its association with Harvard. In 1902, Maynard M. Metcalf, a zoologist from Goucher College, asked Mark:

May I ask you to what graduate work, if any, in Zoology and Botany at Harvard a woman is admitted? One of my students, who graduates this year and who received from the college a fellowship to support her in a year of graduate study, has asked my advice as to where she can best continue her work in Biology. I know that Miss [Margaret] Lewis and some others have done graduate work with you, but I do not know where others can have the same privilege. If you admit women at all may I ask if they can enter the regular graduate courses, work in your laboratories, and especially if they can come into contact with any of your instructors with whom they may wish to elect to work? I would greatly appreciate your kindness if you would inform me upon these points to guide me in advising this student and others also in the future.⁴²

As Metcalf suggested, knowledge about graduate training in the Radcliffe laboratory circulated through correspondence networks rather than in public printed forums. Women interested in advanced scientific training heard about Mark's laboratory second-hand from advisers at women's colleges like Goucher or from zoologists with personal ties to Mark.⁴³

When recommending students, Mark's colleagues drew on recognizable gender stereotypes to endorse men and women for graduate study in the Harvard and Radcliffe laboratories. When Herbert Spencer Jennings applied to Harvard, two factors determined his success: approval from Jacob Ellsworth Reighard, one of Mark's former students, and his reported manly intellect. Reighard, who received his PhD from the University of Michigan in 1882, moved to Massachusetts to teach secondary school and commuted to Cambridge on his days off to work in Mark's laboratory. Later, as a professor at Michigan, Reighard routinely sent his 'bright' students looking for 'new pastures' to Harvard. In 1894, he recommended Jennings, praising his painstaking research on rotifers. Jennings:

... would do first class work as candidate for the doctorate & indeed I think that he may be depended upon to something unusually creditable. He is very much such a fellow as [Charles B.] Davenport, shy, very nervous and a tremendous worker. He is very frail to look at but tough as a hickory switch.⁴⁴

Reighard aligned Jennings with Mark's most promising protégé and argued that his weak physical appearance belied his steely intellectual capabilities.⁴⁵

Letters of recommendation for Radcliffe graduate students, however, focused less on their intellect and more on whether or not they were likable. Harris Hawthorne Wilder from Smith College's Zoological Laboratory in the Lilly Hall of Science sent a number of his students to Radcliffe. About Edith Helen Wheeler, who wanted to pursue a master's degree, Wilder wrote: 'I know that you will like her and that she will be *dead in earnest* from the start'.⁴⁶ Similarly, Reighard penned a note about a Mrs Schafer who had done research abroad and hoped to continue in Cambridge: 'I found her a *very nice* girl who seemed to have been meant for better things than studying zoölogy'.⁴⁷ She only did average work in his embryology course and '[a]s a woman she was quiet, lady like far beyond the measure of the average Ann Arbor girl, refined & cultured. My impression of her was wholly favorable, but I saw in her no evidence of great intellectual strength'.⁴⁸ More generally, while judgements levelled against male applicants turned on problematic track records or not having the right manly constitution for sustained study, evaluations against women centred on whether women ought to be studying science at all.⁴⁹

This notion was echoed in Radcliffe's reluctance to grant doctoral degrees, which remained one of the most contested aspects of scientific training at the Radcliffe Zoological Laboratory. Women did not receive Radcliffe PhDs until 1902.⁵⁰ Between 1894 and 1902, Radcliffe administrators hoped that Harvard would reassess its positions against both coeducation and granting degrees to women. Many women scientists like Margaret Lewis Nickerson found this transitional period frustrating. Nickerson received her undergraduate degree from Smith and started at Radcliffe in 1895. Mark supervised her investigations into the nervous system of marine invertebrates, which she published as a series of three substantial papers in well-regarded journals. Although Nickerson completed all doctoral degree requirements listed for Harvard's Department of Zoology, her thesis, 'Studies on the Central and Peripheral Nervous System of Two Polychaete Annelids' only qualified for a Radcliffe master's degree.⁵¹ Nickerson's *Michigan Alumnus* entry explained her status more fully:

She took all the minor courses required for a Ph.D. Degree and completed a thesis which was accepted by Prof. Mark and other members of the Department of Zoölogy as a thesis for the Ph.D. Degree, but in company with three other women who have earned the degree from Harvard, she is without the title.⁵²

While Radcliffe expected Harvard would soon capitulate to coeducation, it was to be disappointed for most of the twentieth century. In 1908, President Eliot clarified one of the underlying rationales for this policy: doctoral degrees prepared men for professional life, but the only 'natural' profession for women was marriage, 'the perfecting of family life, of home life, of household joy and good'.⁵³

Perhaps it is not surprising then that while Radcliffe's President Elizabeth Cary Agassiz worked to broadcast the scholarly achievements of her students, most notably those by women zoologists, the academic culture at Harvard overlooked them. In 1894 President Agassiz raised a small sum of money for the *Radcliffe Monograph* project to showcase original student research akin to Mark's long-running series, *Contributions from the Zoölogical Laboratory*. Mark's students Florence Mayo and Annie Henschman featured as the first and second monographs with President Agassiz celebrating that 'these papers showed very careful and thorough investigation'.⁵⁴ Mark's system of publication-driven supervision (which he had perfected in the Harvard Zoological Laboratory) guaranteed a steady stream of papers for the *Radcliffe Monograph* series. It also made visible the extent to which comparable work done in the Harvard and Radcliffe laboratories was evaluated differently. In 1902, Radcliffe's Dean reminded President Eliot that Harvard's refusal to confer the doctoral degrees was damaging graduate enrolment. While access to Harvard professors was Radcliffe's greatest asset as a coordinate institution, a growing number of women were looking elsewhere, sceptical of Radcliffe's ability to produce highly educated women.⁵⁵ In the zoological field, for instance, women increasingly chose to attend Columbia University, the University of Pennsylvania, the University of Chicago or Bryn Mawr.⁵⁶ While admission and accreditation policies revealed how gender discrimination limited women's access to scientific training, it is important to note that they stemmed from a culture of scientific masculinities in the laboratory and off campus.



Group of Dr. Mark's pupils 1893-94. Rear, standing: A. W. Weyssse, S. D. Judd, A. L. Reagh, E. T. Brewster, G. H. Parker, G. S. Miller, J. L. Frazier, W. E. Castle, J. H. Gerould, C. A. Kofoid.
Front, sitting, left to right: E. V. Wilcox, C. B. Davenport, E. L. Mark, W. McM. Woodworth, W. S. Nickerson, E. E. Cauthorne.

Figure 4: 'Mark's men' referred to the graduate students who studied at Harvard under E. L. Mark in the 1890s. Charles Davenport, 'Edward Laurens Mark', *Bios* 10 (1939), pp. 69–83, here p. 72.

Scientific masculinities and biology at Harvard

While the creation of the Radcliffe Zoological Laboratory at Harvard symbolised new opportunities for women scientists, feminine friendship had little place in the established masculine culture of science. Alice Freeman Palmer, in an address to Wellesley College students, situated scientific training in women's colleges within a larger project of promoting women's health. For Palmer, laboratories encouraged companionship among college women. There 'one of the friends may spend her days in the laboratory, eagerly chasing the shy facts that hide beyond the microscope's fine vision'.⁵⁷ Walking into the MCZ, however, Radcliffe women entered into a laboratory culture constructed around nineteenth-century notions of scientific masculinities.

In Mark's department, microscopes did not reveal coy facts about the natural world – which Palmer imagined would be coaxed patiently into being – instead they meticulously exposed the inner mechanisms of cellular structures. In the 1890s, 'Mark's laboratory', 'Mark's men', 'Mark's pupils', or the Harvard 'zoological men' referred to the male graduate students and instructors who pursued biological study as a profession (Figure 4).⁵⁸ The Graduate Students' Laboratory exhibited the starkest representation of the manly pursuit of scientific study at this time (Figure 5). There, as Mark described, '[f]rom half a dozen to a dozen men, each striving to gain new light on some zoological question, are working side by side in research courses, each a stimulating influence on his companions'.⁵⁹ Mark's fraternal community of zoologists relied on shared experiences of rigorous, technical study in the laboratory and a competitive sociability in all-male spaces and activities in greater Cambridge.

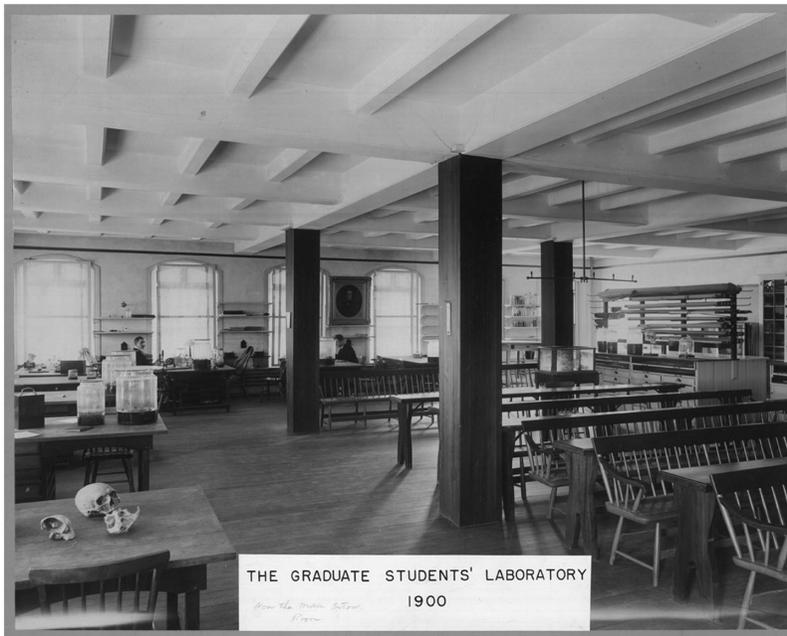


Figure 5: Harvard's 'Graduate Students' Laboratory', with a skull symbolically presented in the foreground, featured tables for male graduate students lining the light-filled windows. From the Archives of the Museum of Comparative Zoology, Ernst Mayr Library, Harvard University.

During this period, debates about what counted as the 'right' kind of biology to teach men at Harvard drew on discourses of American masculinity and further reinforced gendered boundaries in the laboratory. For many nineteenth-century Americans, Theodore Roosevelt's field biology most vibrantly represented biology as a science and set of practices. Roosevelt, a self-identified naturalist and big game hunter, performed a public, strenuous and experiential form of masculinity.⁶⁰ In 1893, Roosevelt (Harvard class of 1880) chaired the Visiting Committee tasked with evaluating Mark's department.⁶¹ That same year, Roosevelt published his book about hunting in the American West and marvelled at America on display at the Chicago World's Fair, both of which informed his opinions about how Mark taught zoology (Figure 6).

Roosevelt came away from his visit to the Zoological Laboratories deeply disappointed. He contended that the ideal form of collegiate training in zoology entailed recreating the manly conditions of the field.⁶² 'The highest type of zoölogist', Roosevelt wrote in his Visiting Committee report, 'is the naturalist, the man who loves outdoor work as well as the work of the laboratory, and who studies and delights in animals and plants, considered with reference to nature as a whole, and with regard to their own habits and interrelationship of structure'. Harvard, he continued, should fight against the priorities of the 'latter-day "biologist" – a mere histologist and embryologist' stooped over his ill-lit laboratory bench, unable 'to see the matter as a whole because of his very capacity to see the molecules of which it is composed'.⁶³



Figure 6: Theodore Roosevelt, here hunting in Africa, represented popular notions of scientific masculinity and its connections to field biology. Theodore Roosevelt Collection, Roosevelt 560.61-121, Houghton Library, Harvard University.

Mark, however, considered Roosevelt's natural history tradition to be outdated. Mark structured his curriculum around investigating biological mechanisms: '[T]he underlying motive in this new departure was largely physiological; it emphasised the fundamental nature of the biological processes, rather than the morphological aspects of organisms which point to their possible genetic relationships'.⁶⁴ When it came to the field sciences, Mark complained to Jacob Reighard that natural history was a 'farce', or 'a kind of "soft" recreation'. Students of taxonomy and systematics were 'simply "collectors"', instead of 'serious students of Morpho[logy] & Physiol[ogy]'. In the end, their approach looked like 'recreation' rather than serious 'work'.⁶⁵

Lecture notes from Mark's zoology courses revealed that he believed serious work in zoology began with mastering how 'animals exist both in space and time'. The zoologist ought to examine the 'facts' of animal 'form, function, place, or cause' using tools from morphology, physiology, comparative anatomy and embryology.⁶⁶ While Roosevelt saw the field as the site of scientific expertise, Mark viewed the laboratory as the most credible crucible of knowledge making. In principle, Mark agreed with the dissenting members of Roosevelt's Visiting Committee who argued that when it came to technical laboratory work, the men Roosevelt envisioned as hunched unhealthily over their microscopes were in fact in hot pursuit of scientific discoveries.⁶⁷ Thus, in the 1890s both Roosevelt and Mark deployed the language of masculinity – healthfulness and strenuous rigor versus physical and moral weakness in the field or the laboratory depending on the perspective – to justify their approaches to the natural world.⁶⁸

Mark grounded the production of knowledge in zoology in exacting laboratory methods emerging from his training in embryology. The masculine unveiling of

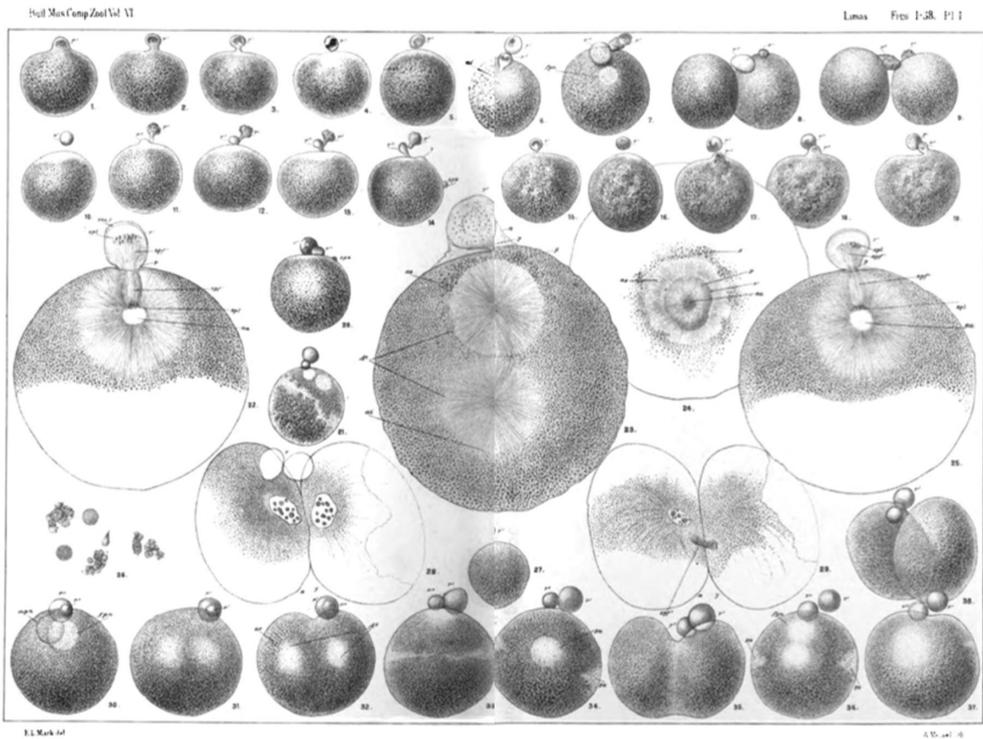


Figure 7: E. L. Mark's work on slug eggs entailed rigorous, detail-oriented work at the microscope. E. L. Mark, 'Maturation, Fecundation, and Segmentation of *Limax Campestris*, Binney', *Bulletin of the Museum of Comparative Zoölogy at Harvard College* 6, part 2, no. 12 (1881), Plate I.

feminised nature is a common discursive trope in modern science, and the practice of embryology is no exception. Embryology aims to study sex cells, fertilisation and development – and requires that practitioners manually control reproduction in glass dishes, halt egg development at various stages using chemicals and cut specimens into sections to better visualise their components.⁶⁹ Mark's first major embryological research article, 'Maturation, Fecundation, and Segmentation of *Limax Campestris*, Binney', tracked the development of fertilised slug eggs from the moment of extrusion to the first cleavage (or division).⁷⁰ To understand this process, Mark had to fix each cellular transformation in time and document by hand changes in the eggs' internal structures (Figures 7 and 8). Mark's biological training programme, therefore, emphasised high levels of microscopy expertise and required demanding standards for visualising the results. Almost across the board, Mark's men agreed that the consequence was a particular form of scientific self-fashioning grounded in the celebration of technical expertise and in the expectation that nature was eminently malleable.⁷¹

Questions about scientific masculinities at Harvard scaled up from cell lineage studies to the gendered arrangement and use of laboratory spaces in the MCZ. The physical presence of the Radcliffe Zoological Laboratory created expectations that men and women would remain apart in the museum. On this point in 1908, Alexander Agassiz, the primary patron of the museum, launched an investigation into 'disputed questions

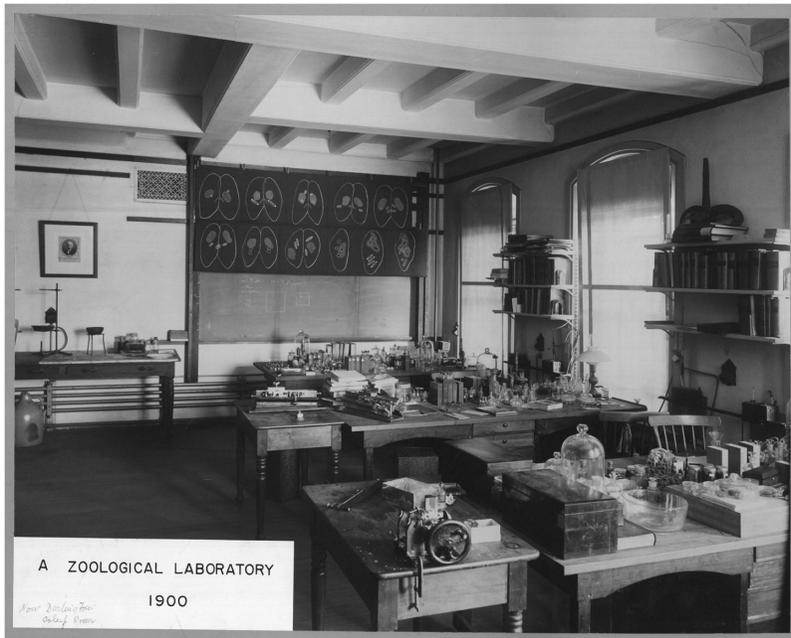


Figure 8: Embryological investigations required microscopes, microtomes, chemicals, and reference texts – materials that taxed Radcliffe’s limited resources. From the Archives of the Museum of Comparative Zoology, Ernst Mayr Library, Harvard University.

of occupancy’ in the zoological laboratories. Writing to Mark, Agassiz wanted to know which rooms Radcliffe women were rightfully or wrongfully occupying.⁷² Mark responded that Harvard men had the use of fourteen rooms (plus an additional four private offices). Radcliffe women, on the other hand, technically had only ‘the exclusive use of one room’, the designated women’s laboratory, but shared ‘in the use of three of these [Harvard rooms] (and occasionally a fourth)’. Necessity required shared use since Radcliffe’s laboratory proved too cramped for undergraduates taking elementary courses and too poorly equipped for graduate students requiring access to the instruments, chemicals and specimens located conveniently nearby in Harvard’s rooms.⁷³

Agassiz had initiated his fact-finding mission after Radcliffe administrators proposed a new women’s restroom to accommodate its students. The closest men’s lavatory was on the fourth floor by Harvard’s laboratories, and the nearest women’s restroom seems to have been located in the public museum galleries two floors away. Agassiz firmly believed that the museum’s resources, which had been used for over thirty years to support natural history collections and research, should not be wasted on Radcliffe, arguing that it ‘cannot expect us to sacrifice [the] M.C.Z. for their needs in anyway’. Constructing a women’s restroom would block the hallway windows, rendering the ‘light of that hall to be unavailable’ for the rest of the laboratory rooms on the floor. It would also mean ceding additional square footage to Radcliffe, which already had a room of its own.⁷⁴ To Agassiz, and many similarly minded administrators, the existence of the women’s laboratory justified all subsequent refusals for future compromises.

Despite fraught institutional politics, gender segregation was renegotiated on a daily basis in the face of spatial constraints and the material demands of zoological teaching. Harvard instructors dealt with overcrowding in the Radcliffe laboratory by informally moving their courses to other rooms in the museum. In 1895, Mark reported that the Radcliffe zoological lectures had been given in their designated room, but ‘for want of necessary room the laboratory work in one of the courses, Zoölogy 3, was conducted elsewhere’.⁷⁵ Herbert Spencer Jennings provided a clearer account of the impossible task of segregating instruction:

Now, a lecturer delivers a lecture to say twenty men in a room that would hold fifty, then turns them out and delivers the same lecture to ten girls. Sometimes no room is vacant for the Radcliffe lecture, and [Professor George Howard] Parker takes one of his classes of girls into a room where there are a number of men doing laboratory work, and gives the lectures there. The idea that it won’t do for women to take lectures in the same room where men are taking the same lectures, but will do to take lectures in a room where men are doing laboratory work, is a little too fine spun to last, it seems to me, – especially as it costs a great deal of money.⁷⁶

Principled anti-coeducational practices blurred given the everyday use of space. Jennings revealed that women were regularly taught in Harvard’s lecture rooms alongside men doing laboratory research, suggesting that instructors created mixed gender classrooms as an unintended consequence of Radcliffe’s unequal resources. In this case, Parker justified the unsanctioned use of space in two ways: first, by ensuring that distinctions in scientific labour within the room upheld separatist policies; and second, by guaranteeing that the room itself remained gender segregated. As Marsha Richmond has noted, women pursuing biology at Cambridge University followed ‘an unwritten rule’ of gender segregation, sitting separately during coeducational lectures and laboratory practicums. These patterns held more widely in colleges and medical schools, where women often sat on one side of the classroom or dissecting hall.⁷⁷

For Jennings, these spatial gymnastics made navigating the Harvard laboratories unpredictable. One spring afternoon in 1895, Jennings opened George Howard Parker’s laboratory door: ‘and I said “Are there any Nereis up here?” and he said yes, – so I marched boldly in – and found myself walking in front of about thirty girls – between them and their lecturer. There was nothing to do but keep straight ahead and get the Nereis and march out again – and apologise to Dr. Parker afterward’.⁷⁸ Used to a fraternal academic space, encountering women among the *Nereis* (segmented worms) suddenly made a tacit gender boundary visible. Jennings, regretting his ‘foolish’ appearance, provides an example of how many college men during this period recorded the experience of being suddenly overrun by women. In the early 1900s, a number of coeducational schools responded by reversing course. Wesleyan, Stanford, the University of Chicago, Tufts University and the University of Rochester, among others, banned women, imposed quotas or created separate coordinate colleges to mediate threats of feminisation in the classroom and in campus life.⁷⁹

Fraternal cultures of science in Cambridge

Enrolling at Harvard meant entering into a lively social and intellectual community of zoologists. Herbert Spencer Jennings serves as a useful example for understanding how graduate careers in science functioned in extralaboratory settings. In the

1890s, Jennings boarded in the Norton's Wood neighbourhood at Gertrude and Charles Davenport's house. Both Davenports studied under Mark (with Charles Davenport working as a Harvard instructor) and Jennings shared a floor with a fellow zoology doctoral student, Alfred Goldsborough Mayor. Quite regularly, Jennings and 'all the zoological men' walked across the Charles River to Boston for evening lectures. In February of 1895, for instance, they went to the Boston Society of Natural History to hear Edmund Wilson talk. Wilson had just published a well-received paper about embryology.⁸⁰ During the walk, Jennings learned that this was 'an important article' because Wilson 'came to conclusions different from those previously arrived at'. In addition, Jennings, Parker, Mark and Mayor agreed that Wilson was "'top of the heap"' at present in American biology – at least as far as original work is concerned – and of course that [sic] the thing'.⁸¹ In his extralaboratory commute, Jennings learned about his biological community's shared standards for what made a successful scientific career.

Walking turned out to be a favourite recreational activity for Mark's men. Jennings went on weekly Sunday strolls with Davenport and Mayor. As he recalled, they would 'talk about heredity and natural selection and the mechanics of development – and Dr. Davenport has done and is doing much along that line – and Mr. Mayor is very sensible and sharp – [and] well read on such things'.⁸² These Sunday strolls transformed into an informal weekend biology club that became an important site of knowledge-making for Jennings.⁸³ While convalescing from the mumps and quarantined upstairs in the Davenport's house, he read Alfred Russel Wallace's *Darwinism* and concluded: '[it] is a very interesting book, and it was much more interesting than it would have been a year ago, on account of the talk I have had with Dr. Davenport and Mr. Mayor on such questions. Those Sunday morning walks of ours have really been of great value to me'.⁸⁴ In this way, one can see clear connections between the culture of masculine sociability in greater Cambridge and the development of Jennings's feeling for scientific expertise.⁸⁵

Radcliffe students attempted to enter into this established manly culture of academic inquiry and to navigate its contours in different ways. As Mary Caroline Crawford's guide for American college girls explained, Radcliffe was a place where 'the girls live their life in a town swarming with men students'.⁸⁶ One important resource for accessing Radcliffe women's social and intellectual experiences is the campus-wide time capsule project. In 1900 Harvard's librarian William Coolidge Lane solicited diaries, essays, and photographs recording everyday life in Cambridge for the month of March and stored them in a wooden chest not to be opened until 1960. Radcliffe undergraduate Lucy Paton recorded that 'the longer I live the more sure I feel that essentially one of the best lessons that a woman can learn is how to adapt herself to circumstances'.⁸⁷ Similarly, Katherine Fullerton described the fraught relationship between academic and social experiences at Radcliffe during a time when campus life started to come into its own:

It is so hard to realise that lectures and recitations, the serious academic side of college, are anything but the most commonplace and universally understood of experiences. We Radcliffe girls – thanks chiefly to our brothers who have learned at Harvard to be intolerant of us – are all bent, consciously or unconsciously, upon proving to the world that we are something besides 'grinds', that we know

how to enjoy ourselves, *vous aussi*; and the result is that the social side of our college life seems to us to have a certain importance other than the mere pleasure of it.⁸⁸

As Fullerton suggested, and as Lucy Sprague's experiences commuting across campus to avoid Harvard Yard confirms, many women navigated contradictory expectations of respectable femininity, intellectual independence and social pleasure. Sprague's time capsule diary revealed that making it through her biological studies was a badge of honour. At the beginning of the month, she 'had great fun dissecting and drawing my star-fish' and 'worked on a tubellaria all morning and, on the whole, enjoyed myself'. When she came down with an illness, she 'decided not to go to my morning lectures but gather my strength together for an afternoon in the laboratory'. By the end of March, Sprague was dissecting higher organisms, speeding 'to the laboratory where I worked on the organs of a crayfish until half-past three'.⁸⁹

During the early twentieth century, Radcliffe undergraduates came to consider elementary zoology courses to be a rite of passage for every college girl. Exploits in the laboratory refracted through the gendered social expectations of a women's college, highlighting divergent interests of sociable femininity and careful dissection practices. Kay Livermore, for example, took to *The Radcliffe Magazine* to lampoon the mechanics of zoology courses and their grotesque application to dining in polite company.

When you're taking Zoology I
 You find that your meals are such fun!
 This is how you begin conversation at dinner when taking Zoology I:
 'Oysters', you say with thoughtful nods.
 'Do you eat raw Pelecypods?
 Let's see, what was it the instructor
 Said of the anterior adductor?
 They've lots more parts than I suspected
 Till I'd got one of them dissected;
 For instance, I never should have guessed inside
 this part there's a coiled intestine
 Which —'
 Here the horror-stricken waitress quickly carries off your plate.⁹⁰

As the poem continues, Livermore digs enthusiastically into her fish and poultry dishes, wielding a dull fruit knife — 'O for my scalpel here!' — to pry apart bones and muscle tissues and to use her newfound knowledge of parasites to confirm that 'Nemathelminthes' (nematode worms) are in the salad dressing. The meal abruptly ends with calls of 'We demand an apology; / of appetite now we've not got any'.⁹¹ Here Livermore captures the social and cultural space zoology inhabited on Radcliffe's campus: zoology revealed the hidden dimensions of biological organisms, yet this was unladylike, turning a dinner among friends into a macabre dissection session.

Compared to Livermore and her fellow undergraduates, Radcliffe women pursuing graduate studies had much more solitary experiences in an academic culture known, at least among Mark's men, for its communal scientific environment. Radcliffe's reliance on Harvard and its refusal to grant doctoral degrees resulted in very little financial or institutional support for women's long-term studies. Jacob Reighard, along with advising Jennings, also supervised Fanny Langdon, who had arrived at the University

of Michigan in 1892 to study botany and soon transitioned to zoology. Reighard readily recommended Langdon for graduate work noting that he had ‘never seen so good a woman nor one so likely to do satisfactory research’. Langdon was fully prepared: ‘She has had enough instruction, has made her first research, has command of French, German and Italian, knows a good deal of technique and of the literature’.⁹² Yet, like Jennings, Langdon needed funding to pursue her studies.⁹³ Mark was ‘glad to do all I can to make it possible for her to come [here] next yr’, but ‘fear[ed] it would be difficult to get for her aid for more than her college tuition (\$200.00) and I should not feel confident of that’.⁹⁴ To avoid funding Langdon’s room and board, Mark and Reighard encouraged her to move in with her relatives in Jamaica Plain even though they lived five miles away from the laboratory in Cambridge. While Langdon could write to the Radcliffe Dean to see if ‘it may be possible that a scholarship from the few that Radcliffe has could be had for her’, Mark did not want to appear involved. ‘It would be better not to say that the suggestion came from me’.⁹⁵ Thus, Mark used his power at Harvard to advocate for his male graduate students but refused to do so at Radcliffe, where financial resources for supporting graduate study were severely underdeveloped.⁹⁶

Compared to Jennings who arrived at Harvard prepared to rent a room from the Davenports, Langdon navigated a far more isolating living situation. She moved from Michigan into her family’s home in Jamaica Plain, endured long commutes over the Charles River to Cambridge, and found it difficult to work given her domestic responsibilities. Langdon wrote to Reighard: ‘I know it is foolish but the real influence of the climate, the constant anxiety of my people, and having nothing to think about except myself are the hardest things to work against’. Close quarters with her family left Langdon ruminating about her role as a woman zoologist:

I have really wished several times that I was more like the other women I know. When I was a girl I tried to get interested in the things other girls cared for – music, art, fancy-work, etc. but the results never paid for the immense labor put on them so I gave up in disgust. Now I am utterly without the average womans [*sic*] means of passing away time. I have no friends here except my mother and brother, and the only gossip that interests me is U. of M. gossip! I have not before realised how completely my work has cut me off from other things. If I had mountains or water to look at, I could be contented in idleness but my best scenery consists of the neighbours backyards, and my amusements are confined to watching the shaking of rugs and hanging up of clothes, and my wildest excitement is an occasional quarrel between tiny youngsters.⁹⁷

As Margaret Rossiter has pointed out, women like Langdon were ‘caught between two almost mutually exclusive stereotypes: as scientists they were atypical women; as women they were unusual scientists’.⁹⁸ In the case of Langdon, she was as a woman also subject to academic policies designed to support male heads of household. Cut off from the zoological community on campus and its largess, Langdon interpreted these structural obstacles as challenges to her womanhood and her ability to pursue science.

Coeducational conflict in the Harvard Zoological Club

Campus life blossomed in colleges around the country at the turn of the century. Coeducational schools often tolerated integrated classrooms but insisted on gender segregated social spheres, with male students excluding women from extracurricular clubs and activities. Although Harvard and Radcliffe generally fit this pattern, there were a few

quasi-extracurricular spaces indispensable to scientific life on campus where policies of gender segregation remained unclear. In particular, the Harvard Zoological Club emerged as one of the most significant extralaboratory sites during this period and one rife with coeducational conflict. Organised in 1887 as a series of bi-weekly conversations with advanced students and instructors, the Harvard Zoological Club modelled itself after the Harvard Natural History Society, a long-running student organisation waning in popularity due to the rise of experimental biology.⁹⁹ The Zoological Club transformed into a site of professionalisation in the 1890s, as young zoologists practiced performing their authority by presenting their research findings. The creation of the Radcliffe Zoological Laboratory, not coincidentally, marked the Zoological Club's shift from an extracurricular space to what Mark called 'a permanent and valuable adjunct to the department'.¹⁰⁰

Jennings's correspondence reveals the club's gender politics and his own personal opinions about the relationship between zoological expertise, higher education and womanhood. Writing to Jessica Burrige, Jennings described Gertrude Davenport as intellectual, ambitious, and someone who did 'excellent work in zoology' but did not 'report papers' in the Zoological Club 'because the Club, like all the rest of the University, is non-coeducational – so she doesn't even attend'.¹⁰¹ It was at the Davenport's house where Jennings first met Julia Platt, who he recorded as being very deep into science and who wanted to show 'what a woman can do in spite of men'.¹⁰² And in 1895, Jennings reported that Platt, 'true to her reputation, she has managed to stir up a row'. She 'made application to be admitted to the Zoological Club'.¹⁰³

Julia Platt had returned to Radcliffe after a long academic journey familiar to the first generations of women scientists. She received her undergraduate degree from the University of Vermont and then moved to Cambridge to do research at the Harvard Annex in 1887. In 1889, Platt left and over a period of nine years took courses and conducted investigations at Woods Hole, Clark University, the University of Chicago, Bryn Mawr, the University of Freiburg, the Naples Zoological Station and the University of Munich. Platt published actively in embryology and has since been considered one of the most accomplished American woman zoologists of her time. Most notably, Platt's research on *Necturus maculosus* (mudpuppy embryos) showed that cells from the ectoderm produced cartilage, a task usually thought to be reserved for cells from the mesoderm and one that ran contrary to commonly held assumptions about germ layer theory.

Platt's findings sparked controversy among American and European biologists, many of whom questioned her evidence that cells were not all pre-programmed to develop into specific adult structures. Experimental work in the 1920s confirmed Platt's conclusions and contributed to rethinking how germ layers developed.¹⁰⁴ To Jennings, Platt's pursuit of such serious study had resulted in a character that:

... has been warped and made unpleasant by a struggle to do what men do and most women do not – one cannot help realising why it is that so many men hate to see women press into this kind of work, leaving behind what is more peculiar to woman as woman.¹⁰⁵

Platt's clear talent and ambitions provoked instances of hazing perhaps designed to keep her at the margins of the scientific community. As the biologist Edwin G. Conklin recalled, while Platt worked on a floating platform at Woods Hole, Hermon Bumpus

and a group of men ‘all advanced on the platform, saying “Miss Platt, what are you getting?”’ and ‘their combined weight sank the platform and Miss Platt got thoroughly soaked’.¹⁰⁶

Platt had returned to Cambridge in 1895 in the hopes of finally receiving her doctoral degree from Radcliffe. Mark, who had interacted with Platt during her early years at Harvard, attributed her challenging path to her ‘peculiarities’ and ‘her reputation for not getting on well with those under whom she worked’. Like Jennings and Conklin, who saw Platt as ‘very independent and outspoken’, Mark reacted to what he considered to be her unwomanly behaviours. Mark’s evaluation of Platt’s unlikeability was based on her refusal to submit her working manuscript to him for publication and accept his supervision. Platt wanted to ‘publish it when and where she chose without consulting Radcliffe College or making any statement as to its being done in the Radcliffe Laboratory’.¹⁰⁷ Her savvy decision meant that she did not have to acknowledge Radcliffe or Harvard in her scientific work, institutions that she felt did not fully support her scholarship.

Separate social organisations developed in coeducational colleges, where faculty wives and women’s deans created women’s communities and extracurricular activities based on ideologies of complementarity. Yet, these remained subordinate to male organisations in power and prestige.¹⁰⁸ In 1895 Platt had the option of joining Radcliffe’s Science Club, which was modelled after Harvard’s, but she found that it was neither a site of professionalisation nor closely connected to the zoological community. The undergraduate-managed club met three to four times each semester in Fay House, hosting general interest meetings as well as closed members-only sessions for talking about the latest scientific findings.¹⁰⁹ Members regularly invited Harvard instructors to give lectures, and an eclectic range of topics fell under the club’s purview: natural history in the broadest sense (desert flowers of California, nature study), original investigations conducted on specialised questions (research on trichomes, Jacques Loeb’s nerve theory, the future of geology), technical lectures related to physics (properties of radium, wireless telegraphy) and speculations about civilisation and anthropology (man in the tropics, Navajo ethnology, brain size and mental capacity). Primary and secondary school science education dominated many of the meetings, with fashionable topics related to teacher education, domestic science and scientific housekeeping.¹¹⁰ Reportedly, Platt did not find the Radcliffe Science Club equal to Mark’s organisation.

Many of Boston’s biological science meetings already took place in mixed company, offering a precedent for opening up the Harvard Zoological Club to women. Jennings and the rest of Mark’s male graduate students walked to lectures at the Boston Society of Natural History – which started admitting women in 1876 – and to zoological club meetings at Tufts College in Medford, which was coeducational at the time. Jennings recounted at spring meeting at Tufts where ‘there were some girls at the meeting and after it was over, they made some coffee in laboratory beakers and gave us each a beaker-full, with glass tubes to drink it with – strictly laboratory style’.¹¹¹ This act, and Jennings’ description of it, at its heart expressed the ideal role of scientific women – as supportive helpmeets, and ultimately, as wives.¹¹²

While at Tufts, Jennings stopped to peruse a copy of John Henry and Anna B. Comstock’s co-authored *A Manual for the Study of Insects*, approving heartily of their collaborative work. Inspired to write to Burrige, he clarified that ‘of course you know, I don’t mean that I think the wife ought to be the husband’s assistant – I just mean that it’s

pleasant that so many do work together in one way or another'.¹¹³ Burridge identified as an artist even though she had taken biology courses at Michigan, and Jennings considered her creative sensibility and scientific training compelling background for their future together. 'And you – why my dear, you are now very much better prepared to understand and take an interest in scientific work – even if you took no more of it in the University – than – why – almost any woman I know of – much more than Mrs. [Charles] Kofoid was'.¹¹⁴ For Jennings, making sense of the mixed gender space of the Tufts Zoological Club required drawing on his only other framework for men and women interacting with one another: the institution of marriage.¹¹⁵ In practice, marriage resolved issues with gender segregation in nineteenth-century science. At Harvard, scientific marriages began in the laboratories in Cambridge or in the summer research stations in Newport, Rhode Island or Woods Hole. In the 1890s, the Davenports provided the most visible example after the Annex's Gertrude Crotty married her instructor soon after arriving in Cambridge from Kansas. It is quite possible that traditional gender roles within marriage also informed Jennings's response to Platt and her efforts to lobby for a coeducational club at Harvard.¹¹⁶

When Platt first petitioned to join Harvard's Zoological Club, Mark and his men disagreed as to whether or not to accept her application. Mark and the other instructors originally 'denied the request, without referring it to the Club' as a whole.¹¹⁷ Some of Mark's graduate students heard about Platt's intentions:

Miss Platt has a friend or two in the Club, – who of course were supposed not to know that she had made any request of Dr. Mark, and she got these stirred up to take some action in the matter. Most of us younger men were in favor of admitting women in general and Miss Platt in particular, into the Club anyhow, so a scheme was arranged, and one night at the Club it was moved and seconded that she be invited to become a member of the Club. This forced Dr. Mark to explain the condition of affairs, though he said that he was entirely willing that the Club should make its own decision. The motion was withdrawn, with some decided expressions of opinion from various sides, – so that the matter got an airing, which was what was desired.¹¹⁸

Mark ruled by fiat, first in private and later during the closed-door meeting, when the terms of debate were framed by his power and seniority. Since the club was not listed as an official course of record in the *Harvard University Catalogue*, it did not technically have to adhere to strict policies of gender segregation. Yet, as Mark's decision suggests, he actively worked to maintain the club as an all-male extralaboratory preserve at the centre of the masculine culture of zoology in Cambridge.

Platt organised 'a sort of rival Club' in response. She had heard about Jennings's informal Sunday biology meetings, which had become so central to his own scientific identity. 'Miss Platt', as Jennings explained, 'says there are about an equal number of women similarly interested, so she has invited us, with one or two others, to meet at her rooms, sometime next week, to discuss the Cell Theory'. He admitted, 'I am rather in sympathy with her movements though her personality seems not to be a very pleasant one. I am inclined to think it will result in the Zoological Club being thrown up to graduate students in Radcliffe College, in a year or so'.¹¹⁹ Jennings regretted the invasion of his Sunday mornings and considered them an extension of his work in the classroom. Radcliffe women did not think that they needed men, but they did not know 'how much or how little they really do know – and men rather set the standard now, in these things – and the girls want to compare'. Platt's 'rival Club' was not a

meeting of equals from his perspective, but an informal continuation of Radcliffe's subordinate relationship to Harvard men.¹²⁰ While Platt successfully negotiated for an alternative site for high-level scientific conversations between women and men, that site carried with it residue from gender politics that had grown up within and around the laboratory.

Jennings was prescient about the Zoological Club's changing gender dynamics. A year later Mark changed the meeting time from the evening to the afternoon and invited Radcliffe graduate students to attend. Opening up the organisation to women provided them crucial access to a professional site that had long dominated extralaboratory life. Yet the ease of Mark's decision made Harvard's steadfast refusal to integrate its classrooms even more frustrating.¹²¹

It is an open question whether or not Mark's invitation changed the culture of Harvard's Zoological Club. Evidence from Edith Nason Buckingham's correspondence suggests the beginning of an answer. Buckingham graduated from Radcliffe in 1902 and became the first woman to receive a Radcliffe PhD in Zoology in 1910. In 1906, she described an early spring meeting to her mother:

Poor Julia [M. Heyl] had to talk at the Zoölogical Club last week and was considerably scared, but self possessed. She said the final stroke was that Dr. Parker asked the club to move forward so as to better see some drawings she had hung over the blackboard, and she lost me in the crowd, as I moved up. She said the men gave her the impression of doing hurdle jumping over the benches.¹²²

It is striking that Heyl interpreted her experience as one of being advanced upon by an army of men, with her fellow woman scientist lost in the confusion. Buckingham admitted, however, that from her vantage point actually 'they walked very moderately and rather hesitatingly and only a few at a time'.¹²³ In many ways, Buckingham represents a generational difference in the history of women pursuing scientific careers. Platt's solitary pioneering of informal Sunday conversations with Jennings and his cohort contrasts with Buckingham's experiences of navigating the masculine zoological culture alongside at least one other woman. Here the issue is not fighting for access into the Zoological Club but figuring out how to navigate its politics from the inside.

Conclusion

During the nineteenth century, American universities began to forge systems of scientific education that persist today. Concurrent constructions of biology as an academic discipline, the laboratory as a site of knowledge making, and the trained scientist as a figure of authority and expertise emerged in the years around 1900. While most histories of biology focus on the intellectual transformations central to this 'new biology', I have shown that attending to how gender operated in the biological sciences challenges the narrative that scientific knowledge produced within the laboratory can be separated from the lived experiences of men and women doing scientific work. Complementing recent scholarship in laboratory studies that focuses on the practice of biology, my work alerts us to the important role that 'after hours' cultures of sociability played in patterning both formal training in the laboratory and informal conversations in the wider world. Most significantly, access to these informal extralaboratory worlds at Harvard and Radcliffe Colleges, and in many other

American and European institutions, was defined by traditional gender ideologies that excluded women from full participation in the scientific community.

Gendered notions informed the practice and content of biology as a science intent on understanding the origins of human behaviour and evolution, explaining sex and reproduction in the animal and human worlds and arguing for right living on the basis of science. As seen in the case of E. L. Mark and Theodore Roosevelt, the turn-of-the-century discourse of American manhood and masculinity provided a ready set of coded language used to argue for the relevance of each of their scientific practices to a professionalising academic community. Within this stabilising biological culture, as the experiences of Radcliffe women suggest, the movement of women across thresholds of privileged scientific sites troubled established gender norms and revealed deeply held normative values about who ought to be considered a scientist. The example of the Harvard and Radcliffe Zoological Laboratories demonstrates that educational categories – from admission standards, to letters of recommendation, to structures of graduate funding, to laboratory mentorship – emerged in close conversation with dominant strains of American masculinity. It also illuminates the ways in which universities functioned as laboratories for higher education during this period more broadly, experimenting both with methods of teaching and research and with opening their doors to a more diverse student body.

Notes

1. Editorial, *The Radcliffe Magazine*, December 1899, p. 40, Radcliffe Archives, Harvard University, USA.
2. "'Chest of 1900", 1899–1900', Diary of Lucy Sprague, 1 March 1900, HUA 900.11, Harvard University Archives, USA. [Hereafter 1900-HUA]
3. Lucy Sprague Mitchell, *Two Lives: The Story of Wesley Clair Mitchell and Myself* (New York: Simon and Schuster, 1953), p. 118.
4. Drew Gilpin Faust, 'Mingling Promiscuously: A History of Women and Men at Harvard', in Laurel Thatcher Ulrich (ed.), *Yards and Gates: Gender in Harvard and Radcliffe History* (New York: Palgrave MacMillan, 2004), pp. 317–27, here p. 320.
5. On the history of women at Harvard see: Sally Schwager, "'Harvard Women": A History of the Founding of Radcliffe College' (Ed. D. diss., Harvard University, USA, 1982); Helen Lefkowitz Horowitz, *Alma Mater: Design and Experience in the Women's Colleges from their Nineteenth-Century Beginnings to the 1930s* (Amherst: University of Massachusetts Press, 1993), esp. pp. 95–104, 237–61; Lawrence T. Nichols, 'Sociology in the Women's Annex: Inequality and Integration at Harvard and Radcliffe, 1879–1947', *The American Sociologist* 28 (1997), pp. 5–28.
6. Anon., *The American College Girl, Her College and Her Ideals* (Boston: L. C. Page, 1930), p. 103.
7. Throughout the text, I refer to the women's laboratory in the MCZ by the many names it had beginning in the 1880s. After 1894, it was most often referred to as the Radcliffe Zoological Laboratory or the Radcliffe laboratory.
8. Lynn D. Gordon, *Gender and Higher Education in the Progressive Era* (New Haven: Yale University Press, 1990), p. 11.
9. Gordon, *Gender and Higher Education*, see esp. pp. 25, 43–6. See also: Barbara Miller Solomon, *In the Company of Educated Women: A History of Women and Higher Education in America* (New Haven: Yale University Press, 1985).
10. Alice Freeman Palmer, 'Three Types of Women's Colleges', in George Herbert Palmer and Alice Freeman Palmer (eds), *The Teacher: Essays and Addresses on Education* (Boston: Houghton Mifflin, 1908), pp. 313–36, here p. 332.
11. David Starr Jordan, *The Care and Culture of Men: A Series of Addresses on the Higher Education* (San Francisco: Whitaker & Ray Company, 1896), p. 130.
12. For histories of biological theories about sex difference see: Kimberly A. Hamlin, *From Eve to Evolution: Darwin, Science, and Women's Rights in Gilded Age America* (Chicago: University of Chicago Press, 2014); Sarah S. Richardson, *Sex Itself: The Search for Male and Female in the Human Genome* (Chicago:

- University of Chicago Press, 2013); Erika Lorraine Milam, *Looking for a Few Good Males: Female Choice in Evolutionary Biology* (Baltimore: Johns Hopkins University Press, 2010); Londa L. Schiebinger, *Nature's Body: Gender in the Making of Modern Science* (New Brunswick: Rutgers University Press, 2004); Anne Fausto-Sterling, *Myths of Gender: Biological Theories about Women and Men* (New York: Basic Books, 1992); Cynthia Eagle Russett, *Sexual Science: The Victorian Construction of Womanhood* (Cambridge: Harvard University Press, 1989); Carroll Smith-Rosenberg and Charles Rosenberg, 'The Female Animal: Medical and Biological Views of Woman and Her Role in Nineteenth-Century America', *Journal of American History* 60 (1973), pp. 332–56.
13. Eliza Burt Gamble, *The Evolution of Woman: An Inquiry into the Dogma of Her Inferiority to Man* (New York: G. P. Putnam's Sons, 1894); Helen R. Olin, *The Women of a State University: An Illustration of the Working of Coeducation in the Middle West* (New York: G. P. Putnam's Sons, 1909), p. 95; Anon., *Private Collegiate Instruction for Women in Cambridge, Mass. Second Year. Reports of the Treasurer and Secretary, 1880–81* (Cambridge: William H. Wheeler, 1881), pp. 8–9.
 14. Jenna Tonn, 'Museum, Laboratory, and Field Site: Graduate Training in Zoology at Harvard and Radcliffe Colleges, 1873–1934' (PhD diss., Harvard University, USA, 2015). On the 'new biology' and the 'new natural history' see: Robert E. Kohler, *Landscapes and Labscapes: Exploring the Lab-Field Border in Biology* (Chicago: University of Chicago Press, 2002), esp. pp. 23–59; Philip J. Pauly, *Biologists and the Promise of American Life: From Meriwether Lewis to Alfred Kinsey* (Princeton: Princeton University Press, 2002), esp. pp. 126–44; Lynn K. Nyhart, 'Natural History and the "New" Biology', in N. Jardine, J. A. Secord and E. C. Spary (eds), *Cultures of Natural History* (Cambridge: Cambridge University Press, 1996), pp. 426–43.
 15. Erika Lorraine Milam and Robert A. Nye, 'An Introduction to Scientific Masculinities', *Osiris* 30 (2015), pp. 1–14, here p. 11. On the history of women in science, particularly biology, see: Margaret W. Rossiter, *Women Scientists in America: Struggles and Strategies to 1940* (Baltimore: Johns Hopkins University Press, 1982); Sally Gregory Kohlstedt, 'Innovative Niche Scientists: Women's Role in Reframing North American Museums, 1880–1930', *Centaurus* 55 (2013), pp. 153–74; Leslie Madsen-Brooks, 'A Synthesis of Expertise and Expectations: Women Museum Scientists, Club Women and Populist Natural Science in the United States, 1890–1950', *Gender & History* 25 (2013), pp. 27–46; Paula Gould, 'Women and the Culture of University Physics in Late Nineteenth-Century Cambridge', *British Journal for the History of Science* 30 (1997), pp. 127–49; Marsha L. Richmond, "'A Lab of One's Own": The Balfour Biological Laboratory for Women at Cambridge University, 1884–1914', *Isis* 88 (1997), pp. 422–55.
 16. Thomas Barbour, *Naturalist at Large* (Boston: Little, Brown and Co., 1943), pp. 162–3; Soraya de Chadarevian, *Designs for Life: Molecular Biology after World War II* (Cambridge: Cambridge University Press, 2002), pp. 266–7. See also: Robert E. Kohler, *Lords of the Fly: Drosophila Genetics and the Experimental Life* (Chicago: University of Chicago Press, 1994); Lily E. Kay, *The Molecular Vision of Life: Caltech, the Rockefeller Foundation, and the Rise of the New Biology* (New York: Oxford University Press, 1993). On scientific masculinities in fields outside of biology see: Andrew Warwick, *Masters of Theory: Cambridge and the Rise of Mathematical Physics* (Chicago: University of Chicago Press, 2003); Nathan Ensmenger, "'Beards, Sandals, and Other Signs of Rugged Individualism": Masculine Culture within the Computing Professions', *Osiris* 30 (2015), pp. 38–65.
 17. William Garrott Brown (ed.), *Official Guide to Harvard University* (Cambridge: Harvard University, 1899), pp. 81–3.
 18. As E. L. Mark wrote to Charles Davenport: 'I don't know of a pleasanter lecture room in all Cambridge. Of course, there are many others that are more pretentious and better fitted up; but it is so light and airy, & the outlook is so fair'. Papers of Charles Davenport, E. L. Mark to Charles Davenport, 23 December 1900, American Philosophical Society, Philadelphia, PA, Edward Laurens Mark - Folder 1. [Hereafter CBD-APS] See also: Anon., *Annual Report of the Assistant in Charge of the Museum of Comparative Zoölogy at Harvard College to the President and Fellows of Harvard College for 1899–1900* (Cambridge USA: University Press, John Wilson and Son, 1901), p. 16. [Hereafter MCZ Annual Report].
 19. Rossiter, *Women Scientists in America*, pp. 1–28; Solomon, *In the Company of Educated Women*, p. 82. For a list of women affiliated with Harvard's laboratories, see: Mary R. S. Creese, *Ladies in the Laboratory?: American and British Women in Science, 1800–1900: A Survey of Their Contributions to Research* (Lanham: Scarecrow Press, 1998), pp. 100–03.
 20. Schwager, 'Harvard Women', pp. 234–43.
 21. Horowitz, *Alma Mater*, p. 102; Schwager, 'Harvard Women', pp. 309–10.
 22. Arthur Gilman, 'In the Beginning', *The Radcliffe Magazine*, June 1905, pp. 75–84, here pp. 79–80, Radcliffe Archives: Harvard University, USA. [Hereafter Radcliffe Archives].

23. Mary Caroline Crawford, *The College Girl of America and the Institutions Which Make Her What She Is* (Boston: L. C. Page, 1905), p. 100.
24. Schwager, 'Harvard Women', p. 214.
25. Hamlin, *From Eve to Evolution*, pp. 63–4.
26. Collection on the Massachusetts Institute of Technology Women's Laboratory, 1867–1922, Report for the April 1882 Meeting of the Woman's Educational Association, Institute Archives and Special Collections, Massachusetts Institute of Technology, Cambridge, Massachusetts, AC 298.
27. Joseph B. Warner, 'The Early Days of Radcliffe College', *The Radcliffe Magazine*, April 1909, pp. 107–14, here p. 111, Radcliffe Archives.
28. On the Museum of Comparative Zoology's history see: Christoph Irmischer, *Louis Agassiz: Creator of American Science* (Boston: Houghton Mifflin Harcourt, 2013); Mary P. Winsor, *Reading the Shape of Nature: Comparative Zoology at the Agassiz Museum* (Chicago: University of Chicago Press, 1991); Edward Lurie, *Louis Agassiz: A Life in Science* (1960; repr., Baltimore: Johns Hopkins University Press, 1988).
29. Lucy Allen Paton, *Elizabeth Cary Agassiz: A Biography* (Boston: Houghton Mifflin Company, 1919), pp. 46–58.
30. Sally Gregory Kohlstedt, 'In from the Periphery: American Women in Science, 1830–1880', *Signs* 4 (1978), pp. 81–96, here pp. 94–5.
31. History of the Woman's Education Association, 'An account of the early formation of the Woman's Education Association', [undated and unsigned], Woman's Education Association Records, 1871–1935, Massachusetts Historical Society, Boston, MA, Box 1, Folder 3 (emphasis in original).
32. Anon., *Society for the Collegiate Instruction of Women, Reports of the Treasurer and Secretary, 1887–1888* (Cambridge: William H. Wheeler, 1888), pp. 11–12. [Hereafter *SCIW Report*].
33. Agassiz Letter Books, 1859–1910, Alexander Agassiz to E. L. Mark, 8 October 1887, by permission of the Ernst Mayr Library, Museum of Comparative Zoology Archives, Harvard University, Cambridge, MA, USA, MCZ F890, vol. 10; Archives of the Museum of Comparative Zoology, E. L. Mark to Alexander Agassiz, 6 October 1891, by permission of the Ernst Mayr Library, Harvard University, Cambridge, MA, bAg 602.10.1. [Hereafter *MCZ Archives*].
34. *Annual Reports of the President and Treasurer of Radcliffe College, 1903–1904*. Radcliffe Archives, Harvard University, USA p. 13. [Hereafter *Radcliffe Annual Report*] See also: *Radcliffe Annual Report 1896–97*, [Back cover].
35. Mabel Newcomer, *A Century of Higher Education for American Women* (New York: Harper, 1959), pp. 82–3.
36. *Radcliffe Annual Report 1895–96*, p. 23.
37. Radcliffe was asked to purchase its own set of microscopes, which it shared between zoological and botanical students. Papers of E. L. Mark, Agnes Irwin to E. L. Mark, 15 February 1902, Harvard University Archives, Cambridge, MA, HUG 4557.2, Correspondence, 1900–1905, Box 4, Folder, HY-I. [Hereafter *ELM-HUA*].
38. Schwager explains: 'Tuition at the Annex was expensive: \$200 for the full course, compared with \$150 at Harvard, \$100 at Smith and Vassar Colleges, and \$60 at Wellesley. Meeting the expenses of room and board required at least another \$200 per year'. In addition, data from 1885 shows that zoology at the Annex had the highest cost per student ratio compared to any other department. Schwager, 'Harvard Women', p. 244; *SCIW Report for 1885*, p. 13.
39. Papers of J. E. Reighard, E. L. Mark to J. E. Reighard, 18 March 1896, Bentley Historical Library, University of Michigan, Ann Arbor, MI, USA, Box 1, Correspondence Mar. 1896. [Hereafter *JER-BHL*]
40. Herbert Spencer Jennings addressed his letters to Jessica Burrridge, whose given name was Mary Louise Burrridge. In the text, I refer to her as Jessica. See: Papers of Herbert Spencer Jennings, H. S. Jennings to Mary Louise Burrridge Jennings, 10 February 1895, American Philosophical Society, Philadelphia, PA, USA, Folder: Feb.-April 1895. [Hereafter *HSJ-APS*]
41. Charles W. Eliot to E. L. Mark, 13 July 1899, HUG 4557.2, Box 3, Folder EL, *ELM-HUA*.
42. Maynard M. Metcalf to E. L. Mark, 14 April 1902, HUG 4557.2, Box 6, Folder Mer-Mi, *ELM-HUA*.
43. On women zoologists from Goucher College see: Steven J. Zottoli and Ernst-August Seyfarth, 'The Marine Biological Laboratory (Woods Hole) and the Scientific Advancement of Women in the Early Twentieth Century: The Example of Mary Jane Hogue (1883–1962)', *Journal of the History of Biology* 48 (2014), pp. 137–67.
44. J. E. Reighard to E. L. Mark, 4 February 1894, Box 1, Folder: Correspondence Feb. 1894, *JER-BHL*.
45. Charles Davenport played a central role in the twentieth-century American eugenics movement. In 1904, the Carnegie Institution funded his Station for Experimental Evolution at Cold Spring Harbor, which later

- became the home of the Eugenics Record Office. Gertrude Davenport continued her scientific research there, co-authoring studies on human heredity beginning in 1907. The Davenports recruited at least one Radcliffe zoology graduate, Annie Parker Henchmen, to work with them. On eugenics see: Jan Anthony Witkowski and John R. Inglis (eds), *Davenport's Dream: 21st Century Reflections on Heredity and Eugenics* (Cold Spring Harbor: Cold Spring Harbor Laboratory Press, 2008); Garland E. Allen, 'The Eugenics Record Office at Cold Spring Harbor, 1910–1940: An Essay in Institutional History', *Osiris* 2 (1986), pp. 225–64; Charles E. Rosenberg, 'Charles Benedict Davenport and the Beginning of Human Genetics', *Bulletin of the History of Medicine* 35 (1961), pp. 266–76; E. Carleton MacDowell, 'Charles Benedict Davenport, 1866–1944: A Study of Conflicting Influences', *Bios* 17 (1946), pp. 2–50.
46. Harris H. Wilder to E. L. Mark, 14 September 1901, HUG 4557.2, Box 8, Folder WIL, ELM-HUA (emphasis in original).
 47. Jacob Reighard to E. L. Mark, 13 January 1899, HUG 4557.2, Box 7, Folder REI-RI, ELM-HUA (emphasis in original).
 48. Reighard to Mark, 13 January 1899, ELM-HUA.
 49. These sentiments echoed commonly held scientific understandings of male genius and female mediocrity. Victorian sexual selection theory suggested that men were more likely to be highly variable in the context of intelligence (more male geniuses, but also more men with lower intellectual abilities), while women were more likely to be of average intelligence. See: Russett, *Sexual Science*, pp. 92–7; Fausto-Sterling, *Myths of Gender*, pp. 13–60.
 50. Agnes Irwin to Charles W. Eliot, Radcliffe College Report, 1901–1902, UAI 5.150, General Correspondence Group 2, Box 48, Folder: Agnes Irwin, 1894–1903, CWE-HUA.
 51. *Radcliffe Annual Report 1896–97*, p. 11.
 52. Margaret Lewis Nickerson married her fellow graduate student Winfield Scott Nickerson, and they both took up positions at the University of Minnesota. Margaret taught as an instructor and Winfield as an Assistant Professor of Histology and Embryology. Margaret received her MD in 1904 and worked as a physician until retiring in 1936. Margaret and her husband separated in 1911 but never divorced. See: Bessie Bradwell Helmer, 'Report of the Committee on Fellowships', *The Michigan Alumnus* 4 (1897), p. 24; Winfield Scott Nickerson, in Joseph W. Lund (ed.), *Harvard College, Class of 1890, Secretary's Report 4* (Cambridge: The University Press, 1903), pp. 71–2; Creese, *Ladies in the Laboratory?*, p. 100.
 53. Charles W. Eliot, 'Woman's Education – A Forecast', *Association of Collegiate Alumnae Magazine*, February 1908, pp. 103–05.
 54. *Radcliffe Annual Report 1895–96*, p. 9.
 55. Agnes Irwin to Charles W. Eliot, Radcliffe College Report, 1901–1902, General Correspondence Group 2, Box 48, Folder: Agnes Irwin, 1894–1903, CWE-HUA.
 56. Margaret W. Rossiter, 'Women Scientists in America before 1920: Career Patterns of over Five Hundred Women Scientists of the Period Reveal That, While Discrimination Was Widespread, Many Women Were Working Hard to Overcome It', *American Scientist* 62 (1974), pp. 312–23, see esp. Table 4 on p. 315.
 57. Alice Freeman Palmer, *Why Go to College* (New York: Thomas Y. Crowell & Company, 1897), p. 14.
 58. *MCZ Annual Report 1895–96*, p. 3; Charles B. Davenport, 'Edward Laurens Mark', *Bios* 10 (1939), pp. 69–83, here p. 72; H. S. Jennings to Jessica Burrigge, 24 February 1895, HSI-APS; Letters to Edward Laurens Mark, 30 May 1937, HUG 4557.8, ELM-HUA.
 59. E. L. Mark, 'The Museum of Comparative Zoölogy, and the Zoölogical Department', *The Harvard Graduates' Magazine* 1 (1893), pp. 295–6.
 60. Gail Bederman, *Manliness and Civilization: A Cultural History of Gender and Race in the United States, 1880–1917* (Chicago: University of Chicago Press, 1995), pp. 170–216.
 61. Board of Overseers, Report of the Committee of Zoölogy, 15 November 1893, UAI 10.7.3, Reports of the Visiting Committees, 1890–1970, vol. 1, Harvard University Archives. See also: Winsor, *Reading the Shape of Nature*, esp. pp. 187–97.
 62. Theodore Roosevelt, *The Wilderness Hunter: An Account of the Big Game of the United States and Its Chase with Horse, Hound, and Rifle* (New York: G. P. Putnam's Sons, 1893). See also: Michael R. Canfield, *Theodore Roosevelt in the Field* (Chicago: University of Chicago Press, 2015).
 63. Board of Overseers, Report of the Committee of Zoölogy, 15 November 1893, HUA.
 64. E. L. Mark, 'Zoölogy', in Samuel Eliot Morison (ed.), *Development of Harvard University Since the Inauguration of President Eliot, 1869–1929* (Cambridge: Harvard University Press, 1930), pp. 378–93, here p. 386.
 65. E. L. Mark to J. E. Reighard, 8 March 1897, Box 1, Folder: Correspondence, Mar. 1897, JER-BHL. See also: Walter Faxon to Alexander Agassiz, 15 July 1895, bAg 319.10.1, MCZ Archives.

66. Charles B. Davenport, Harvard Lecture Notes, Notebook: NH 2, 4, & 5, 1887–1889, CBD-APS. (emphasis in original)
67. Board of Overseers, Report of the Committee of Zoölogy, 15 November 1893, HUA. On the methodological and generational divide among scientific practitioners: Garland E. Allen, 'Naturalists and Experimentalists: The Genotype and the Phenotype', *Studies in the History of Biology* 3 (1979), pp. 179–209.
68. Dude culture permeated conversations about masculinity in elite colleges: Kristin L. Hoganson, *Fighting for American Manhood: How Gender Politics Provoked the Spanish-American and Philippine-American Wars* (New Haven: Yale University Press, 1998), pp. 118–23; Kim Townsend, *Manhood at Harvard: William James and Others* (New York: W. W. Norton, 1996).
69. Pioneering work in gender studies of science includes: Evelyn Fox Keller, *Secrets of Life, Secrets of Death: Essays on Language, Gender, and Science* (New York: Routledge, 1992); Ludmilla Jordanova, *Sexual Visions: Images of Gender in Science and Medicine between the Eighteenth and Twentieth Centuries* (Madison: University of Wisconsin Press, 1989); Carolyn Merchant, *The Death of Nature: Women, Ecology, and the Scientific Revolution* (San Francisco: Harper & Row, 1989).
70. E. L. Mark, 'Maturation, Fecundation, and Segmentation of *Limax Campestris*, Binney', *Bulletin of the Museum of Comparative Zoölogy* vol. VI, part 2, no. 12 (Cambridge: Printed for the Museum of Comparative Zoölogy, 1881).
71. Mark's cultivation of technical expertise in zoology added up to more than the sum of its parts. Jacob E. Reighard recalled: '[Y]ou taught me to cut serial sections, to interpret them, to make drawings, to look up literature. These are routinely simple matters & we did not talk of deeper ones. Yet the result was a mental awakening, I cannot explain it, yet there it was. I had learned to think!' Jacob Reighard to E. L. Mark, 14 April 1937, HUG 4557.8, Letters to E. L. Mark, ELM-HUA.
72. Alexander Agassiz to Samuel Henshaw, 31 May 1908, bAg 10.10.24, MCZ Archives.
73. E. L. Mark to Alexander Agassiz, 31 May 1908, bAg 602.10.1, MCZ Archives (emphasis in original).
74. Alexander Agassiz to Samuel Henshaw, 3 June 1908, bAg 10.10.24, MCZ Archives.
75. *MCZ Annual Report 1894–1895*, p. 45.
76. H. S. Jennings to J. E. Reighard, 29 December 1895, JER-BHL. (emphasis in original)
77. Richmond, 'A Lab of One's Own', pp. 447–8. For gender segregation and hazing in lectures and medical school see Rosalind Rosenberg, 'The Limits of Access: The History of Coeducation in America', in John Mack Faragher and Florence Howe (eds), *Women and Higher Education in American History* (New York: Norton, 1988), p. 112; Regina Morantz-Sanchez, *Sympathy and Science: Women Physicians in American Medicine* (New York: Oxford University Press, 1985), pp. 113–19.
78. H. S. Jennings to Mary Louise Burridge Jennings, 12 April 1895, HSJ-APS.
79. Ruth Bordin, *Women at Michigan: The 'Dangerous Experiment', 1870s to the Present* (Ann Arbor: University of Michigan Press, 1999), p. 20.
80. The Boston Society of Natural History included women in its membership roles. Women attended public lectures and participated in the society's extensive Teacher's School of Science, a laboratory-oriented training programme for local educators. See: Sally Gregory Kohlstedt, 'From Learned Society to Public Museum: The Boston Society of Natural History', in Alexandra Olseon and John Voss (eds), *The Organization of Knowledge in Modern America, 1860–1920* (Baltimore: Johns Hopkins University Press, 1979), pp. 386–406. On cutting-edge biology in the 1890s see: Edmund B. Wilson and Albert P. Mathews, 'Maturation, Fertilization, and Polarity in the Echinoderm Egg: New Light on the 'Quadrille of the Centers'', *Journal of Morphology* 11 (1895), pp. 319–42.
81. H. S. Jennings to Mary Louise Burridge Jennings, 24 February 1895, HSJ-APS.
82. H. S. Jennings to Mary Louise Burridge Jennings, 4 May 1895, HSJ-APS.
83. H. S. Jennings to Mary Louise Burridge Jennings, 27 October 1895, HSJ-APS.
84. H. S. Jennings to Mary Louise Burridge Jennings, 27 May 1895, HSJ-APS.
85. Philip Pauly has suggested that nineteenth-century naturalists in Washington, DC developed a tightly knit scientific community because of geographical proximity and 'a second evening world of clubs and societies'. See: Pauly, *Biologists and the Promise of American Life*, pp. 51–4.
86. Crawford, *The College Girl of America*, p. 114. See also: Deirdre Clemente, "'Prettier Than They Used to Be": Femininity, Fashion, and the Recasting of Radcliffe's Reputation, 1900–1950', *The New England Quarterly* 82 (2009), pp. 637–66.
87. Diary of Lucy Allen Paton, 11 March 1900, 1900-HUA.
88. Diary of Katharine Fullerton, 31 March 1900, 1900-HUA.
89. Diary of Lucy Sprague, Compilation of entries during March 1900, 1900-HUA.

90. K. Livermore, 'Zoology I', *The Radcliffe Magazine*, February 1916, pp. 93–4, Radcliffe Archives.
91. Livermore, 'Zoology I', pp. 93–4.
92. J. E. Reighard to E. L. Mark, 8 March 1896, Box 1, Correspondence Mar. 1896, JER-BHL.
93. Reighard also wrote to Chicago's C. O. Whitman recommending Langdon: 'I think that she is by all odds the most likely of all the women that I have known to continue to do high class work'. See: J. E. Reighard to E. L. Mark, 8 March 1896 and to C. O. Whitman, 1 March 1896, Box 1, Correspondence Mar. 1896, JER-BHL.
94. E. L. Mark to J. E. Reighard, 18 March 1896, Box 1, Correspondence Mar. 1896, JER-BHL.
95. Mark to Reighard, 18 March 1896, JER-BHL (emphasis in original).
96. Many women recognised the financial burdens of graduate school and pointed out their unequal access to money, fellowships, and leisure time for advanced study. See: Olin, *The Women of a State University*, pp. 264–67.
97. Fanny E. Langdon to J. E. Reighard, 19 October 1897, Box 1, Correspondence Oct. 1897, JER-BHL.
98. Rossiter, *Women Scientists in America*, p. xv.
99. Records of the Harvard Natural History Society, Secretary's Records, 1865–1890, Harvard University Archives, HUD 3599.505.
100. *MCZ Annual Report 1894–95*, p. 35.
101. H. S. Jennings to Mary Louise Burrige Jennings, 7 April 1895, HSJ-APS.
102. Jennings's correspondence is one of the few records of Platt's time at Radcliffe. H. S. Jennings to Mary Louise Burrige Jennings, 15 December 1895, HSJ-APS. (emphasis in original)
103. H. S. Jennings to J. E. Reighard, 29 December 1895, Box 1, Correspondence Dec. 1895, JER-BHL.
104. Steven J. Zottoli and Ernst-August Seyfarth, 'Julia B. Platt (1857–1935): Pioneer Comparative Embryologist and Neuroscientist', *Journal of Brain, Behavior and Evolution* 43 (1994), pp. 92–106. For Platt's later civic career see: Stephen R. Palumbi and Carolyn Sotka, *The Death and Life of Monterey Bay: A Story of Revival* (Washington, DC: Island Press, 2011).
105. H. S. Jennings to Mary Louise Burrige Jennings, 15 December 1895, HSJ-APS.
106. Platt was unable to find a teaching position in science after receiving her PhD from the University of Freiburg in 1898. See: Creese, *Ladies in the Laboratory?*, 100–03; Edwin Grant Conklin, 'Early Days at Woods Hole', *American Scientist* 56 (1968), pp. 112–20, here p. 120.
107. E. L. Mark to Charles W. Eliot, 10 July 1898, Box 53, Folder: E. L. Mark, 1894–1903, CWE-HUA; Conklin, 'Early Days at Woods Hole', p. 120.
108. Gordon, *Gender and Higher Education*, pp. 41–43, 120, 190–92; Bordin, *Women at Michigan*, pp. 20, 29–31.
109. Marsha Richmond describes how women science students created 'a scientific culture that mirrored the one enjoyed by the male undergraduates'. Richmond, "'A Lab of One's Own'", p. 440.
110. Source material aggregated from *The Radcliffe Magazine* between 1899–1905, Radcliffe Archives, Harvard University, USA.
111. H. S. Jennings to Mary Louise Burrige Jennings, 12 May 1895, HSJ-APS.
112. Similarly at Tufts, at Cambridge's Cavendish Laboratory women scientists took on the role of the 'humble tea lady' during coeducational meetings. See: Gould, 'Women and the Culture of Physics', pp. 140, 144–5. On the phenomenon of scientific marriages: Annette Lykknes, Donald L. Opatz, and Brigitte van Tiggelen (eds), *For Better or for Worse?: Collaborative Couples in the Sciences* (Basel: Birkhäuser, 2012); Pnina G. Abir-Am, Helena M. Pycior, and Nancy G. Slack (eds), *Creative Couples in the Sciences* (New Brunswick: Rutgers University Press, 1996); Pnina Abir-Am and Dorinda Outram, *Uneasy Careers and Intimate Lives: Women in Science, 1789–1979* (New Brunswick: Rutgers University Press, 1987).
113. H. S. Jennings to Mary Louise Burrige Jennings, 5 May 1895, HSJ-APS. (emphasis in original)
114. H. S. Jennings to Mary Louise Burrige Jennings, 12 May 1895, HSJ-APS. Charles Atwood Kofoid received his PhD from Harvard in 1894, the same year he married his former Oberlin classmate Carrie Prudence Winter. For biographical information Richard B. Goldschmidt, *Biographical Memoir of Charles Atwood Kofoid, 1865–1947* (Washington DC: National Academy of Sciences, 1951), pp. 121–51, here pp. 121–2. (emphasis in original)
115. Jessica Burrige illustrated Jennings's scientific work after their marriage, see Jacob Reighard and H. S. Jennings, *Anatomy of the Cat - with One Hundred and Seventy-Three Original Figures Drawn by Louise Burrige Jennings* (New York: H. Holt and Company, 1901).
116. Linda Gordon has suggested that coeducation confused the social roles of men and women, leading to romantic miscommunications in and outside of class during a time when men and women lived in separate social worlds. Gordon, *Gender and Higher Education*, see esp. pp. 74, 109–11).
117. H. S. Jennings to J. E. Reighard, 29 December 1895, Box 1, Correspondence Dec. 1895, JER-BHL.

118. Jennings to Reighard, 29 December 1895, JER-BHL.
119. Jennings to Reighard, 29 December 1895, JER-BHL.
120. H. S. Jennings to Mary Louise Burr ridge Jennings, 29 December 1895, HSJ-APS.
121. *MCZ Annual Report 1895-96*, p. 30.
122. Gulick Family Papers, Edith Nason Buckingham to Alice Buckingham, 27 March 1906, Massachusetts Historical Society, Boston, MA, Box 2.
123. Edith Nason Buckingham to Alice Buckingham, 27 March 1906, Massachusetts Historical Society.