

Maria Mitchell and the Advancement of Women in Science

ASTRONOMER Maria Mitchell (1818–89) was well known among her contemporaries as the first woman to win an international medal, the first American woman elected to the American Academy of Arts and Sciences, the first woman member of the American Association for the Advancement of Science, and the first woman professor of astronomy. Her successes serve to highlight the paucity of recognized women scientists in the nineteenth century. The barriers to women in science were high, limiting even those women who worked on the periphery of the scientific community as illustrators, textbook writers, and herbarium owners.¹ Thomas Henry Huxley, for example, argued that since women were ipso facto amateurs, they were not worthy of membership in learned societies devoted to serious discussion and debate.² Similarly, access to institutions offering advanced scientific education was negligible until the end of the century. Other more subtle factors also prevented women from realizing their scientific skills and promise. Most women internalized the gender stereotypes of Victorian society and thus lacked confidence levels and aspirations that reached as high as their potential. It is significant that Maria Mitchell, having to some extent surmounted these obstacles, chose to work directly with women rather than to defy male hegemony. This decision appears to be based on her perception that women's self-definition and experience contributed to their limited participation in science; that is, she believed that

women had a fundamental problem with personal self-confidence as well as public encouragement. Her initiatives regarding women in science, unanalyzed by her biographers, offer an illuminating perspective on a period typically viewed as quiescent on women's rights.³

Maria Mitchell became a symbol to her contemporaries, men and women alike, of the contributions women were able to make in science. Her discovery of a comet in 1847 and her calculations of its exact position at the time of discovery brought her a gold medal from the king of Denmark and led to her membership in the American Academy of Arts and Science, "in spite of being a woman."⁴ One result of these honors was Lucretia Mott's citation of Mitchell's achievement at the Seneca Falls Women's Rights Convention in 1848 as evidence of women's capability in all occupations.⁵ Thirty years old at the time, Mitchell was an independent, hard-working librarian and astronomical observer on Nantucket Island in Massachusetts and far removed from reform activism.⁶ Public recognition, however, gave her an opportunity to travel, not only to annual meetings of the American Association for the Advancement of Science, but also to Europe, where in 1857 she met leading astronomers, including the Herschel family and Mary Somerville, and visited their observatories.⁷ Shortly after her return, a group of women led by Elizabeth Peabody raised money for an Alvan Clark equatorial telescope to enable Mitchell to make more precise observations.⁸ Appointment as field researcher and computer for the *Nautical Almanac*—not coincidentally she was asked to compute the position of the planet Venus—permitted her more time for astronomical study. In short, Mitchell was perhaps the only American woman to have self-supporting scientific employment and international recognition in the 1850s.

Mitchell knew from experience that self-help was slow, tedious, and sometimes unrewarding. Her father, William Mitchell, was an active observer and calculator on Nantucket. Through her father's influence she won astronomical friends at Harvard. As the first woman in a number of male societies, she never felt the force of absolute exclusion; but she learned that nominal membership meant little in terms of collegiality. At some annual meetings of the American Association for the Advancement of Science, she attracted more curiosity than professional interaction.⁹ Such experience helps explain why she grew less attentive to the problems of discrimination and more concerned with the aspirations of young women.

Mitchell had two stated incentives for involving women in science. Like many contemporaries, she viewed science as a way of thinking. Concerned about the "half-educated, loose and inaccurate ways" in which women seemed to think and act, Mitchell hoped that science education would pro-

vide a systematic and rational way of problem solving. She also believed that science offered a unique intellectual challenge and could help women escape the narrowness typical of their lives. Her crusade to involve women in science thus embodied both a concern for social progress and a commitment to expand opportunities for individual women.

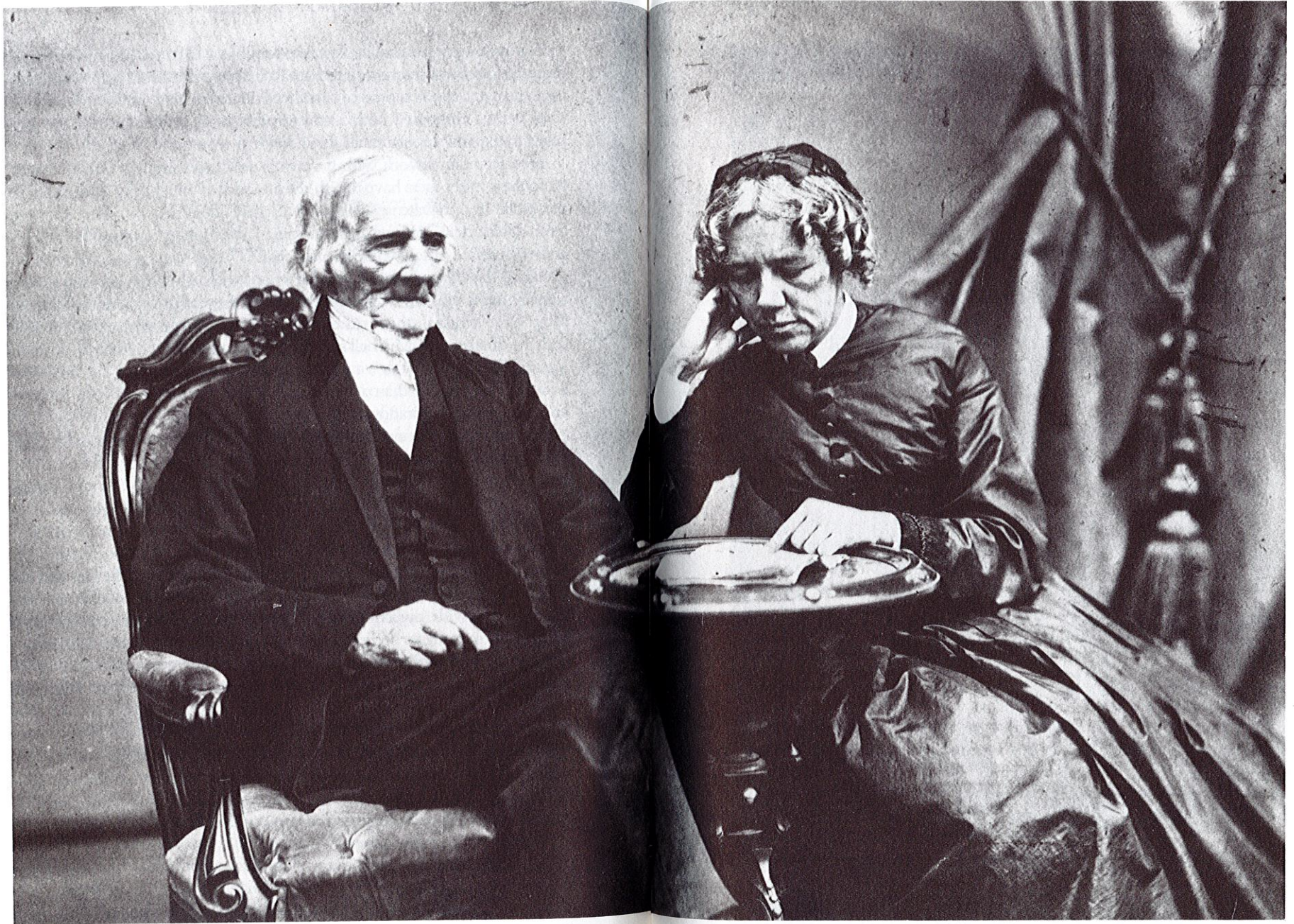
Her decision to work with women is not surprising. As Carroll Smith-Rosenberg and others have noted, the period was one during which spheres of public and private activity were largely identified by sex.¹⁰ Coming from Nantucket, where Quaker women were often responsible for civic and economic matters while their husbands were away at sea, Mitchell appreciated the effectiveness of women's networks. Although aspiring professionals might ultimately challenge the boundary of the sphere traditionally assigned to women, they had been shaped by its requirements and used its sources of strength. Mitchell's opportunity came with an offer to teach at Vassar. She agreed with a trustee who felt students should be "fed from living springs rather than a reservoir," and teachers should be a fount of knowledge and inspiration.¹¹

Her course in astronomy proved challenging. No student was admitted who had not passed an examination in mathematics. Juniors were given extensive reading assignments, but each Monday Mitchell counterbalanced this work with lectures on the history and meaning of science reputed to be "racy and interesting" and which had a "more literary than mathematical" connection with astronomy.¹² Mitchell challenged but put no distance between herself and her students (their respect was evident in the fact that she was the only faculty member not given a nickname); she opened her advanced class with the comment "We are women studying together."¹³ Mitchell took students on trips to New York City and into the countryside to make astronomical observations. She also invited prominent friends, including Julia Ward Howe and Mary Livermore, to the campus. Although Livermore avoided the controversial topic of suffrage, a group discussion led to mutual agreement on the proposition that "every girl should have some aim and some means by which to support herself in time of need."¹⁴

Vassar was exhilarating, but there were also frustrations. Perhaps jealousy prompted one suggestion that relationships might be too close between the teacher and certain astronomy students.¹⁵ Although such rumors

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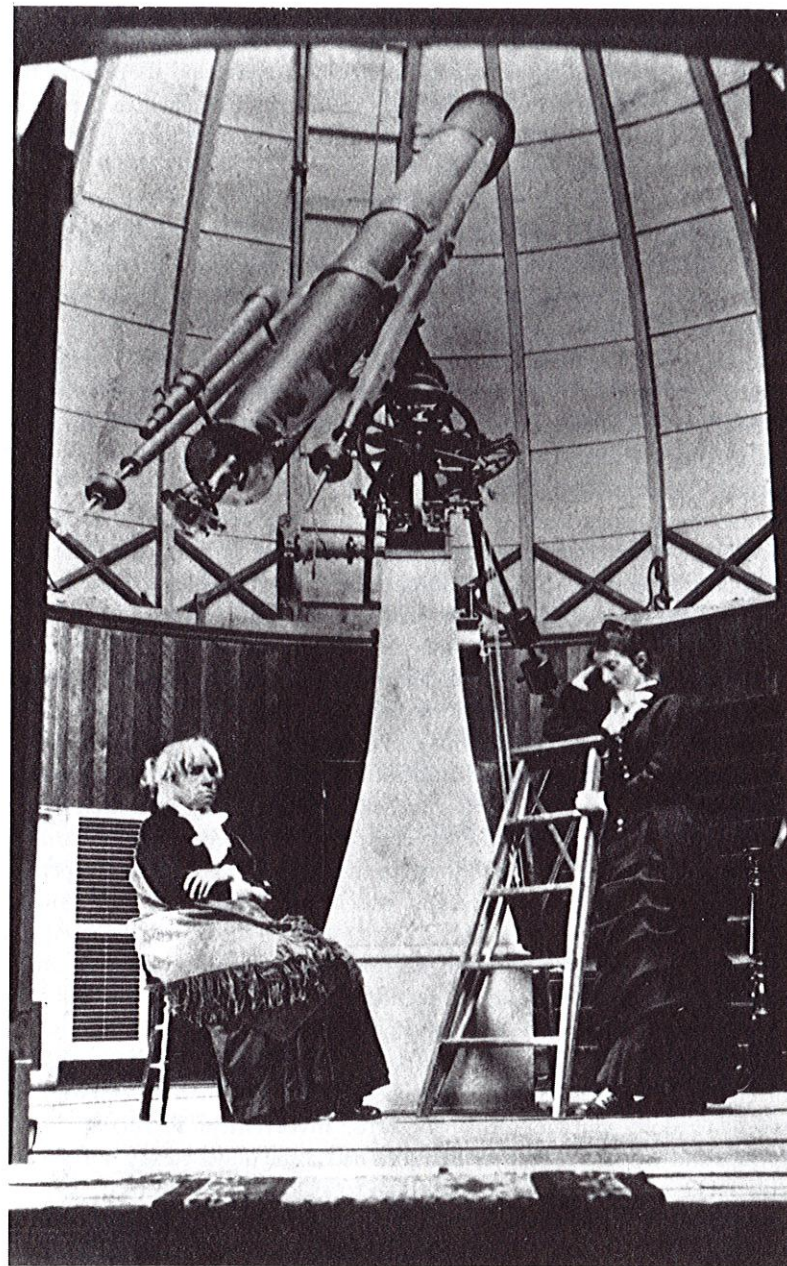
Maria Mitchell studied with her father, William, who taught her to use a telescope at their home on Nantucket Island and introduced her to his astronomer colleagues in Cambridge. Courtesy of Special Collections, Vassar College Library.



gained little attention, their existence indicates how easily suspicions arose about an unmarried woman scholar. Pressures were various, but student anxiety was a constant source of concern to Mitchell. Julia Pease, for example, whose early college letters frequently mentioned Mitchell's classes, was discouraged from selecting advanced courses in astronomy by disapproving parents.¹⁶ Even those who remained in the astronomy class were confronted with the question of what they would do after graduation. One student reflected: "I have Miss Mitchell and all these grand instruments, and nobody makes fun of it all here. But when I get home no one there will take any interest in astronomy. I shall have no telescope at first, and there will be no one there to help me on. Do you think I shall be brave enough then to hold on tight to what I have begun? When I think of it, I get discouraged."¹⁷

The college problems of her students reinforced Mitchell's conviction that offering women an opportunity to study was necessary but hardly sufficient to insure their participation in science. Within a year after coming to Vassar she resolved: "In case of my outliving father & being in good health, to give my effort to the intellectual culture of women without regard to salary."¹⁸ Women scientists needed to be recruited in greater numbers and society needed to be made ready for them.

Englishwoman Frances Bacon Cobbe observed; "As women grew older, if they had led independent lives, they tended to be women's rights women."¹⁹ This was certainly true for Mitchell. Maturity brought confidence in her own intellectual and leadership abilities. More significant, she became committed to women's rights. Once settled in Vassar, she went often to Boston, visiting friends and attending lectures on a wide range of social issues.²⁰ Her travel journals for 1857 and 1873 reveal a remarkable change in her concerns. On her second trip to Europe in 1873, she again visited scientific friends and astronomical observatories; but now her primary concern was women's higher education.²¹ She sought out persons working for women's education, and constantly discussed women's issues with fellow passengers.²² On her return from Europe Mitchell for the first time actively joined a national women's movement. Vassar had shown her the need to raise the aspirations of women, and she was ready to contribute her energy to a women's organization whose initial goals seemed broadly



Opposite: Maria Mitchell trained Mary Watson Whitney (*right*), later her assistant and successor, at the observatory at Vassar College. Courtesy of Special Collections, Vassar College Library.

defined to include professional advancement. She had chosen not to deal directly with the male scientific community, but to work with women. Her strategy was positive: to encourage public awareness and to prepare the coming generation psychologically and practically for acceptance as professional peers. It was to these ends that she directed her efforts in the Association for the Advancement of Women (AAW).

For a number of years there had been discussion about forming some umbrella organization to focus on women's club activities on a larger than local scale. The successful initiative came from Sorosis, a group in New York City. In 1869 several Boston women had visited the newly founded society to discuss a women's "parliament," without results.²³ Four years later, however, Sorosis decided to issue a publication called the *Messenger* to leading women involved in educational reform and in established women's clubs. Its stated intention was to unite women working in isolation from one another in order to undertake a "careful consideration [of] the more important questions that affect our women's lives."²⁴ Maria Mitchell was among the persons signing a "call" for a meeting in September 1873.²⁵ Specifically invited were women preachers, teachers, professors, artists, lawyers, businesswomen, editors, authors, and "practical philanthropists."²⁶

The AAW won approval from leading mid-century reformers. A wide range of women responded to the prearranged theme of education: Elizabeth Peabody discussed coeducation at Boston University; Catharine Beecher stressed the need for endowments of women's colleges; and Elizabeth Cady Stanton submitted thoughts on coeducation. Attendance by several hundred women revealed a measure of broad interest. Some papers were published, the participants were enthusiastic, and Sorosis itself gained more local members.²⁷ A midyear conference of officers resolved to hold the second annual meeting in Chicago, thus setting a precedent for peripatetic sessions. The western meeting was intended to attract new affiliates and serve as a stimulus to women in other parts of the country; subsequent meeting places included Syracuse, Philadelphia (in the year of the centennial celebration), Cleveland, and Providence.

Public opinion had changed only slowly about the acceptable leisure-time activities for women outside the home. Local groups organized for religious or charitable work were acceptable because they seemed an extension of women's domestic and moral concerns. Involvement in mixed reform groups and women's rights associations had come under steady public criticism. The opposition, however, began to erode as prominent upper- and middle-class community leaders spoke out. The new association, with its highly visible leadership, found the press supportive of "learned ladies," and

several newspapers went out of their way to explain that these women were practical and hardworking, "not mere talkers" or radicals. Having anticipated criticism, one AAW member recorded to her satisfaction that the "croakers and fogies handsomely acknowledged that the deliberations were hightoned."²⁸

The formation of the AAW gave women with Mitchell's vision a valuable public forum in which to explain and promote their ideas. The binding commitment was to education, formal and informal. In 1874 Mitchell's address "The Higher Education of Women" traced the initiatives of Emily Davies and others who had founded Girton College at Cambridge, England. While Mitchell deplored the unwillingness of Cambridge University to grant degrees to the graduates, she approved its intention to establish courses for women equal to the best male education. But where to start? Mitchell was practical, and her conclusion was a plea to every women's club to investigate its local situation and to work for the education of women by campaigning for positions on local school boards and by supporting women's colleges.²⁹

Mitchell had substantial hopes for the AAW as a vehicle for reaching a wide audience of women. She actively recruited new members and solicited papers from friends and former pupils for the annual meetings.³⁰ With Mitchell on the program committee, it is not surprising that several papers dealt with women and science. One was by former student Ellen Swallow (later Richards), whose attention had turned from astronomy to applied chemistry. In her paper, "What Practical Science Is Open to Women?," Swallow pointed toward her own initiative on the subject of nutrition. Another read a paper called "The Value of Natural Science for Women." Probably Mitchell's own address, her efforts to build an effective program, and her personal prestige led to her election as second president of the AAW for 1875 and her reelection in 1876.

As president Mitchell planned the annual meeting, she organized the AAW for more comprehensive action.³¹ Although surprised by the administrative effort required and reluctant at first to address large crowds, she proved to be a successful presiding officer.³² Her presidential address reviewed the association's origins and offered suggestions for the future. She praised the enthusiasm and dedication shown by women at the first two congresses, but she argued that it was essential to create more stability and to develop new programs. Her recommendations reflected her own approach to life in emphasizing that permanent changes in the condition of women could come only by "combined, continuous, and systematic action." Simply by virtue of annual meetings that brought together dedicated

women from around the country and awakened local women to "definite views, higher ambitions or braver efforts," the women's congresses made a difference. Nonetheless Mitchell wanted to produce more concrete results, calling for statistics on women in education, industry, and such special circumstances as prison, poverty, or chronic ill health. Accurate statistics would, she argued, enable activists to indicate the number of girls who suffered from "aimless lives" as well as those who had studied too hard, the number of working women at all levels of employment, and the success of asylums for the poor and criminal. Statistics, too, could be a "formidable opponent to the flourish of rhetoric" when bandied about with regard to women's presumed characteristics. Her presentation was tart, eloquent, and explicit when she demanded "fairness for the individual woman."³³

Mitchell's special concern remained that of aspiring professionals and she tried to make the audience, composed primarily of women whose work focused on the home and voluntary activities, understand the problems confronted by aspirants. On the one hand, she noted, society underestimated women and thus women rated themselves too low. At the same time, "with our ideas of women, we demand too much of a woman. We are generous toward the species but severe upon the specimen." She cited the example of the president of a coeducational school who indicated that he would hire a woman professor if he could find the equal of Mary Somerville. Mitchell argued that this demand was "enormous," and that if each male appointment had to be the equal of Pierre Laplace, then college chairs "must be vacant." Laplace was internationally famous for mathematical techniques he developed in celestial mechanics, a term he coined in his major work, *Mécanique Céleste* (Paris, 1795–1805). Mary Somerville became well known in Britain in 1848 as a translator and expositor of some of Laplace's work. While applauding contemporary pioneers, Mitchell expressed concern over the single-mindedness of the most dedicated and suggested, "There is something almost painful in the seriousness of the best girl graduates from our colleges." Witty and down-to-earth, Mitchell was quoted at length in newspapers, which commended her for her "sturdy common sense, her scientific knowledge, her ready talk, her abundant good nature, her prompt application of rules, and her steady presence."³⁴

At the centennial celebration in Philadelphia, Mitchell redirected her attention toward the "need for women in science." Earlier she had argued that women needed the discipline of effective science teaching to improve their natural facilities. The AAW address, written in response to a debate between Thomas Wentworth Higginson, Mary Livermore, and Louis Agassiz on the capability of women at a social science meeting in Boston,

approached the situation from a different perspective.³⁵ She argued that not only could women use scientific training, but that science also could benefit from women in the field. Childhood training developed in girls certain skills and characteristics that made women meticulous observers of natural phenomena. Moreover, she pointed out, the increasing need for science education in the primary schools could only be solved by better preparation of the women who taught at this level. While Mitchell preferred to deemphasize sex differences, she was pragmatic enough to mention women's socialized skills as an encouragement to women to engage in scientific studies.

Anticipating the question of why so few women had contributed to science in the past, she gave an exaggerated comparison to make her point. Danish astronomer Tycho Brahe had received a royal grant of an entire island, instruments, and assistants in order to pursue his research; this was the "ideal" intellectual life. In contrast, Mitchell cited excerpts from astronomer Caroline Herschel's diary; at fourteen Herschel attended church and school, but at home was so busy in the scullery that she could rarely join in family discussions; at twenty she was knitting socks for her famous astronomer brother; and only at thirty-seven did she gain an annual income of 30 pounds as assistant to her brother, which she said was "the first money I ever in all my life thought myself to be at liberty to spend to my own liking." Mitchell's conclusion, like that of Virginia Woolf's *A Room of One's Own* a half century later, was simple: "The laws of nature are not discovered by accidents; theories do not come by chance, even to the greatest minds; they are not born of the hurry and worry of daily toil; they are diligently sought, they are patiently waited for, they are received with cautious reserve, they are accepted with reverence and awe. And until able women have given their lives to investigation, it is idle to discuss their capacity for original work."³⁶

Mitchell was all too aware of the cost of multiple responsibilities. Two years as president of the AAW, with its tedious administrative details and distracting controversies over personality and presentations, were enough.³⁷ Skipping the Cleveland meeting in 1877, she returned the following year to present a scientific paper on the solar eclipse observed by her Vassar students. Public education, however, was only a first step for Mitchell.³⁸

In order to support women with talent and incentive for advanced work in science, Mitchell suggested that the AAW sponsor a scientific society for women. Although a growing number of "ordinary" scientific societies were open to women, she pointed out that "there is really little room for papers by women and we have so long been accustomed to listen in silence,

and not to speak, to receive views and not to advance them" that few women were yet ready to speak to mixed audiences as "equally unmixed as they are in science."³⁹ Her women's scientific society would be, in effect, a board of experienced researchers who could encourage younger women in laboratories and museums to present the results of their research. Mitchell envisioned a far-reaching society that would eventually establish courses, found schools, and develop local organizations. Women, once attracted to science, needed ongoing encouragement to offset the negative public response. Mitchell wanted to create an environment in which aspiring young women found concrete advice, encouragement, and the ways and means to pursue research. Dr. Mary Putnam Jacobi, already committed to the professional tendency toward specialization, responded skeptically to the idea: "I confess I do not see where you are to find enough women knowing enough about science to write about it, to form a committee, — and when you have, — who will be the audience to listen to them? or how would Prof. Mitchell and Mrs. Treat [a botanist] meet on common ground? — As for myself, I cannot more than any practicing physician, claim to be a 'scientist.'⁴⁰ Mitchell very shortly was forced to agree that there were not yet the critical numbers of women in the sciences required to form a workable organization.

No society was ever formed, but in 1876 the AAW created several committees, including one on science. Until her death in 1889 Mitchell served as its head. The purpose of the Committee on Science was to stimulate interest in science by annual reports "showing the fitness of women students to pursue investigations in different fields and their gradual assumption of responsibilities as professors and teachers."⁴¹ Mitchell solicited information on the status and opportunities for women in science and medicine through an open-ended questionnaire. Specifically, she asked:

1. Are there women in your community engaged in scientific research, or in original investigation?
2. Are there women who make a specialty of any branch of physical science, chemistry, or natural history, as teachers or as writers?
3. Are there women physicians, and have they a successful practice?
4. Are there scientific schools open to women?
5. Are there women who are giving pecuniary aid to such scientific schools?⁴²

In 1876 Mitchell sent the questionnaire to friends, former students, and institutions in various parts of the country, asking that the circulars be re-

turned even if every answer was negative. The exact number mailed is unrecorded, but by the time Mitchell made her report she had sixty-five replies, and fourteen arrived later.⁴³

There were more negative responses than positive, and the net results demonstrated Jacobi's prediction regarding the dearth of women engaging in scientific research. Mitchell tabulated the results, readily admitting that the numbers so casually acquired were only useful for general observations: seven questionnaires were totally affirmative, forty-seven were partially affirmative, and nineteen were totally negative.⁴⁴ The questions hinted at some relationship between scientific study and medical practice, but the two activities proved to be basically unrelated. In Albany, for example, the Dana Natural History Society (an amateur group of educated women) was reported as "large and reasonably prosperous," while the four women physicians in town had limited practices because, its reporter felt, "Albany is desperately conservative."⁴⁵ Even more common was no reported activity in science but a number of successful physicians. The early nineteenth-century nexus between physician and scientist was nearly over, with a few notable exceptions such as the enterprising Sarah R. M. Dolley of Rochester.⁴⁶

It proved easier to deal with the question of physicians, who formed a distinct occupational group, than to identify women scientists. Who should be included? The scientists were themselves in a process of distinguishing amateurs from professionals and provided no clear standards. Respondents showed understandable confusion, and their answers varied from an uninspired yes or no to discussion of the interests of specific local women. Question 1, with the requirement of "original investigation," elicited only seventeen positive replies out of seventy-nine; twenty-nine persons were identified in answer to the second question. Altogether fifty-one women were named, most of whom were local schoolteachers and members of natural history societies. The list was incomplete, lacking such names as Almira Phelps, who had written numerous textbooks in natural science; Emily Gregory, then studying at Cornell; and astronomy student Mary Whitney, who had graduated from Vassar and would eventually become Mitchell's successor there. Because Mitchell had relied on her own network of students and friends, there was a distinct regional bias; only Kentucky and Texas represented the South.

The questionnaire left no doubt that women were capable of scientific study. Women teachers in elementary and high schools, normal schools, and women's colleges taught every subject from natural history to chemistry and astronomy. Often, however, there was a note of apology. Emma Morrill, who belonged to an active botanical society in Wilmington, Dela-

ware, wrote somewhat defensively: "Women are not idle, they are good workers, many of them are efficient and capable, but their work is of a kind that cannot be put down in a schedule."⁴⁷ Women teachers had often "stumbled into the subject" of science, and many, like young Mary Reed of Philadelphia, were assigned to several areas with little opportunity to develop any special expertise. During the summer, however, Reed conscientiously read and attended summer school at Cornell in an effort to learn more about the subjects she taught.⁴⁸ The circulars also indicated efforts to secure opportunities for women seeking careers in science. Ellen Swallow Richards, who had become the first woman to study chemistry at the Massachusetts Institute of Technology, for example, wrote her former teacher about a proposal for women to study applied chemistry at MIT. A joint committee composed of MIT faculty and members of the Boston Women's Educational Association approved the proposal, and efforts by the latter were begun to raise financial support. Pleased with recent progress, Richards wrote confidently, if naively with regard to public opinion: "There is no longer any doubt as to the ability of women to carry out any work of this kind."⁴⁹

Indeed, the list of women from the Boston area was impressive, with twelve scientists and ten physicians.⁵⁰ Moreover, local women were gaining recognition. At the Boston Society of Natural History (BSNH), where women were still only "patrons," the question of membership had come under serious discussion. Lucretia Crocker, a former science teacher and member of the Boston school committee responsible for developing a Saturday program for teachers at the BSNH's museum, reported the sequence of events. Once women began studying science at the museum, the "inevitable" had happened: "At the close of a course of lectures or lessons by a Harvard Assistant Professor of Botany it was proposed to form a Botanical Section, when the dilemma arose—How can women join a section if they are not eligible as members of the Society?"⁵¹ In less than a year several women had gained at least partial recognition as members in the newly created category of associate members of the BSNH.⁵²

Mitchell found such news fascinating, although she never made use of the names she gathered to form a scientific club. The data became the basis for some annual reports, and in 1880 she circulated the same questionnaire but identified Henrietta Walcott and Antoinette Brown Blackwell as new committee members.⁵³ This survey was apparently smaller and more select; Mitchell's manuscripts reveal only nineteen replies. Her report for 1881 stressed the progress made in five years. The best results again related to women physicians, whose numbers appeared to be rapidly increasing.⁵⁴

Positive reports from Lucretia Crocker in Boston and Grace Anna Lewis from Philadelphia suggested to Mitchell that if in 1876 a scientific institution had been partly open to women, by 1881 it was wholly so.⁵⁵ Still she paused in her report to ask: "At what time did scientific associations close to women?" Princess Catherine of Russia had been chosen a member of the American Philosophical Society in 1789, and the American Academy of Arts and Sciences in Boston had elected fifteen members in 1780 without apparent regard to sex.⁵⁶ Yet both organizations had since basically closed their doors to women—with the exception of Mitchell's own election to the academy in 1848 (the last woman until the twentieth century). Mitchell's efforts led her to a more sophisticated understanding of history and the realization that progress could not be assumed.

Thus success appeared to her to be dependent on women working cooperatively to advance the situation of women. On the negative side, she cited the paltry response to question 5, concerning women's financial support of other women, and gave explicit credit to five persons, including Elizabeth Thompson, who contributed to the cause of women in science.⁵⁷ More positively, she pointed out the research activity of faculty at such women's colleges as Wellesley, Mount Holyoke, and Vassar.⁵⁸ She stressed the expansion and vitality of women's groups in Syracuse, Chicago, and other cities where the AAW had held annual meetings. Privately, however, she subscribed as well to a "great woman" theory, recording in her diary: "Given one wide awake woman in town . . . you can rouse the whole."⁵⁹

Astronomer Mitchell was reluctantly forced by the questionnaire results to conclude that "those sciences which touch life and health" were most attractive to women. The defection of Mitchell's promising student Ellen Swallow to applied chemistry (analysis of purity of foods and water) served to underscore her observation that the "abstract sciences"—mathematics, astronomy, and physics—attracted only a small proportion of those women entering science. Social consciousness helped explain the emphasis—a significant challenge to women's expanding rights came from arguments regarding health.⁶⁰ Opportunity was the other side of the incentive. The life sciences led to medical schools, which were admitting more women to study, but graduate education was more difficult to obtain.⁶¹ Although most medical school graduates opened private practice, several respondents reported women working as superintendents in state and charitable institutions, medical directors in gymnasiums, members of city or county boards of physicians, medical missionaries, and delegates to medical conventions.⁶² Such facts seemed to indicate that women were being inte-

grated into regular medical circles, and in the 1880s most women expected the pattern to continue.

The emphasis of Mitchell's reports was not on those who enjoyed science as an avocation, but on those who took it up as a "serious and life-long occupation."⁶³ She described the work of women who presented their results at exhibitions, who published in *Popular Science Monthly* and other journals, who attended and presented papers at professional meetings, and who held paid positions in science. Employment was an evident problem and Mitchell's reports began to document the variety of possibilities, mentioning women as naturalists and assayists with mining companies and government surveys, as computers at observatories, as pharmacists, as assistants at the Smithsonian Institution and the Museum of Comparative Zoology in Cambridge, and as teachers on every level. Gains in science were less dramatic than those in medicine, and cautioning against her own impatience, Mitchell insisted: "Measured by a year's interval, the scientific study of women shows little change. If we take half a century, the growth is astonishing."⁶⁴

Mitchell allowed the science reports to dwindle in content throughout the 1880s.⁶⁵ A partial explanation may have been fatigue, since Mitchell was in her late sixties. In addition, she found the AAW less personally rewarding and professionally significant than she had hoped.⁶⁶ The tone and substance of annual meetings shifted as the leadership of the AAW became dominated by philanthropic leaders with leisure time. The Committee on Science, as conducted by Mitchell, seemed an anomaly representing professional aspirations in the midst of the voluntarism and moral philanthropy advocated by Julia Ward Howe, who served last and longest as AAW president from 1880 to 1900. In retrospect, the AAW met its stated purpose of disseminating information and inspiring local women at annual meeting places into literary or reform-minded groups.⁶⁷ Yet, ironically, the association's deliberate effort to be a stimulus meant that some of the very groups it helped initiate eventually joined the historically more visible General Federation of Women's Clubs, founded in 1889.

The AAW initially had stressed working activists. The *Sorosis Messenger* (1873) expressed the hope of uniting foremost writers and thinkers, women working in either traditional or nontraditional areas, and practical philanthropists.⁶⁸ Perhaps the needs of these various groups were too diverse to be united, although representatives of each undoubtedly joined the AAW in order to secure a national base. By the time the AAW had sufficient support for a regular publication in 1882, the group was beginning to lose its membership to alternative organizations. Mitchell's own former students, in-

cluding Christine Ladd-Franklin, Ellen Swallow Richards, and Martha Talbot—women who might have been expected to play a larger role in the AAW—instead helped to organize women college graduates into the Association of Collegiate Alumnae, directed particularly toward women who were career-minded or ready to support others who were.⁶⁹ Since Mitchell had expressed some dismay over the quality of mind of AAW leadership as early as 1875, it is not surprising that she gave full support to the new collegiate association.⁷⁰

Mitchell's own prodigious activity and the vigor of the early years of the AAW belie her assertion that feminism was quiescent in the 1870s. Although the General Federation of Women's Clubs and the reunited suffrage movement have made the 1890s appear to be a take-off period for women's activism, the 1870s and 1880s were critical for raising the consciousness of numerous women and laying the essential groundwork for later coordinated activism. The AAW took up many topics—the advancement of higher education for women, the expansion of women's interests outside the home, the strengthening of responsibility within the home, health, physical development, and sensible dressing—thus introducing significant discussion to groups of women not apt to subscribe to a feminist journal or to have much contact with women in other geographical regions. The leaders of the AAW were, as newspapers often observed, eminently practical. The AAW's low profile may well have helped obscure the group's considerable influence, as viewed by historians as well as many contemporaries.

The influence was indirect. Mitchell's "statistical investigations" were never applied to problems. The Committee on Science, like the AAW, simply supplied information to arouse women's awareness, but left to other groups any specific action. In the case of a science society, Mitchell's hopes were premature; the critical number of women involved in research did not yet exist. Without such groups, women had little leverage within professional circles. In 1879, for example, Mitchell recorded in her diary: "I wanted to nominate some women in some of the comm. of the Association [for the Advancement of Science] but my friends assured me that I should do more harm than good."⁷¹ The slow, persistent work of the Committee on Science and Mitchell could only lay groundwork for the later activism by encouraging segmented efforts of isolated women to enter scientific careers and to continue their private study.⁷²

The foundation laid by Mitchell and others has been hidden because it was built outside the scientific community and in conjunction with an organization that flourished only briefly. Mitchell helped invigorate the early years of the AAW. She lent her name and shared her vision from the presi-

dential podium and then stepped down to head the Committee on Science, whose questionnaire and annual reports became a model among the AAW committees. Her own work was presented in sufficiently popular form to win attention from local audiences, which frequently numbered over a hundred persons, and she actively solicited papers from others in science and medicine to demonstrate the quality of women's research. Her public posture was deliberate. On the one hand, she spoke out for women's education and represented a fulfilled single career woman. On the other hand, she avoided public statements about suffrage and opposed presentations that might offend.⁷³ It is evident that her own astronomical work suffered from her commitment to help other women overcome barriers.

The AAW questionnaire indicated a substantial number of women interested in science and hinted at their rising aspirations. Although other women, including such friends of Mitchell as Grace Anna Lewis, Antoinette Brown Blackwell, and Lucretia Crocker, were influential in this movement, one cannot exaggerate Mitchell's key role in the 1870s. Influence cannot be measured in quantitative terms, but after the 1876 meeting Phoebe Hanaford placed Mitchell at the "head of the list of scientific women in America."⁷⁴ Mitchell held a vision and pursued strategies that coincided with changing but cautious views of women's clubs; that is, she sought and utilized the psychological and practical reinforcement found in the sphere of a female world. Mitchell, in her later years at least, found homosocial society congenial and a more useful vehicle for change than any direct challenge to male bastions. She believed that the integration of women into professional circles could come only after women had gained, within a supportive environment, both confidence and expertise. Her own strategies were to teach women at Vassar, encourage any woman engaged in science, and publicize successes. The remarkable increase of women in science by the turn of the century suggests that indeed her students and younger friends had begun to realize the results of her long-term strategies involving women's collective action and professional participation.

38. *Ibid.*, 154.
39. *Ibid.*, 129.
40. *Ibid.*, 132; Hertha Ayrton, "On the Relations between Arc Curves and Crater Ratios with Cored Positive Carbons," *Report of the British Association for the Advancement of Science* [held at Toronto in August 1897] (London, 1898), 575–577.
41. Hertha Ayrton, "The Drop of Potential at the Carbons of the Electric Arc," *Report of the British Association for the Advancement of Science* [held at Bristol in September 1898] (London, 1899), 805–807.
42. Sharp, *Hertha Ayrton*, 138–139.
43. *Ibid.*
44. *Ibid.*
45. Ayrton, *The Electric Arc*, 1902.
46. R. Appleyard, *The History of the Institution of Electrical Engineers (1871–1931)* (London, 1939), 167.
47. Ayrton, "The Mechanism of the Electric Arc," *Philosophical Transactions of the Royal Society of London*, ser. A, 199 (1901–1902):299–336.
48. Carpenter, H.C.H., "Mrs. Hertha Ayrton," *Nature* 112 (December 1, 1923):800–801.
49. *Ibid.*, "The Origin and Growth of Ripple-Marks," *Proceedings of the Royal Society of London*, ser. A, Containing Papers of a Mathematical and Physical Character, 84 (October 21, 1910):285–310.
50. *Ibid.*
51. Sharp, *Hertha Ayrton*, 177.
52. *Ibid.*, 254.
53. *Ibid.*, 225–235.
54. *Ibid.*, 233.
55. Sharp, *Hertha Ayrton*, 183.
56. Carpenter, "Mrs. Hertha Ayrton," 800.
57. *Ibid.*, 801.
58. *Ibid.*

Chapter 7: Maria Mitchell and the Advancement of Women in Science

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1. This activity is discussed in Sally Gregory Kohlstedt, "In from the Periphery: American Women in Science, 1830–1880," *Signs* 4 (1978):39–63. A comprehensive study of women in science is in Margaret Rossiter, *Women Scientists in America:*

Struggles and Strategies to 1940 (Baltimore, Md., 1982). The few books previous to Rossiter that dealt with women and science recount often heroic efforts without much attention to the mutual support networks; among the best are Edna Yost, *American Women of Science* (Philadelphia, 1943); Madeline B. Stern, *We the Women* (New York, 1962); and Phoebe Kendall, *Maria Mitchell: Her Life, Letters and Journals* (Boston, 1896).

2. Quoted in Joan N. Burstyn, "Sex and Education: The Medical Case against Higher Education for Women in England, 1870–1900," *Proceedings of the American Philosophical Society* 17 (April 10, 1973):79–89. Contemporary John Zahn (under pseudonym H. J. Mozans) in *Women in Science* (New York, 1913) wrote: "Perhaps the greatest change is that woman now does thoroughly what before she did only as amateur" (p. 105). Standard accounts of the process of professionalization tend to ignore the subgroups excluded for reasons other than ability: George Daniels, "The Process of Professionalization in American Science: The Emergent Period, 1820–1860," *Isis* 58 (1967):151–166; and Daniel H. Calhoun, *The American Civil Engineer: Origins and Conflict* (Cambridge, 1960).

3. Mitchell's biographers, especially her sister Phoebe Kendall, tend to deemphasize her women's rights activism. An important exception is Dorothy J. Keller, "Maria Mitchell: An Early Woman Academician" (Ph.D. diss., University of Rochester, 1974). Only a few scholars—Ellen Du Bois, for example—have begun to explore the reform activities of women between the Civil War and the emergence of a second suffrage movement and a rise in socialist feminism.

4. The academy's *Report* for 1848 is quoted in Keller, "Maria Mitchell," 3.

5. Eleanor Flexner, *Century of Struggle: The Woman's Rights Movement in the United States* (Cambridge, 1959), 71–77.

6. Mitchell's diary has no comments about the role and status of women until about 1855. Most of the Mitchell manuscripts are at the Maria Mitchell Science Library on Nantucket Island (hereafter MMM) and available on microfilm at the American Philosophical Society in Philadelphia; some correspondence is preserved in the Vassar College Archives (hereafter VCA).

7. The trip and the meetings with the Herschels and Somerville seemed to redirect her attention toward the role of women in science. Throughout her career, Mitchell would use Caroline Herschel, in particular, as an example of women's underutilized potential. See her "Reminiscences of the Herschels," *Century Magazine* 38 (1889):903–909.

8. Helen Wright, *Sweeper in the Sky: The Life of Maria Mitchell, First Woman Astronomer in America* (New York, 1949), 104, 120. A late notebook entry (undated, item 35, MMM) by Mitchell acknowledges three crucial aids to her success as a scientist: the first woman teacher who taught her to love learning, the man who loaned her \$100, and the woman who gave her the telescope.

9. *Ibid.*, 69.

10. "The Female World of Love and Ritual: Relations between Women in Nineteenth-Century America," *Signs* 1 (1975):1–30.

11. Mitchell to Rufus Babcock, March 18, 1964, vCA.
12. "Maria Mitchell at Vassar," unidentified clipping, item 35, MMM. Students considered Mitchell "sternly just yet marvelously kind." See comments in Catherine Weed Barnes and Ella Dietz Clymer, "Report to the Delegates from Sorosis," in *Association for the Advancement of Women, Report of the Fifteenth Women's Congress held in New York City, October, 1887* (Fall River, Mass., 1890), 26; news clipping from the *Toronto Mail* (October 16, 1890); and an undated *Toronto Globe* in the Julia Ward Howe Scrapbooks, 2:5, 52, Schlesinger Library on the History of Women in America, Radcliffe College (hereafter SLR).
13. Kendall, *Maria Mitchell*, 31.
14. Julia M. Pease to "Momma," May 2, 1875, Student Letter File, vCA. The series of letters from January 1872 to May 1875 suggest the importance a concerned faculty member might have in the life of her students. Also see David F. Allmendinger, Jr., "Mount Holyoke Students Encounter the Need for Life-Planning, 1837-1857," *History of Education Quarterly* 19 (1979):27-46.
15. Martha Leb. Goddard to [Sarah J.] Spaulding, Boston, September 24, 1875, Mitchell MSS, vCA. Goddard was incensed at some "libel" by a "coarse, disloyal, treacherous" Vassar student who "told the secrets of her sex, and told them in so false a way that she lied—even if her facts were true." Goddard expressed none of the fears of homosexuality that emerged in Victorian America when she wrote: "Almost every girl has, for her first love, an older girl or some young woman, often her school-teacher, to whom she gives a pure and adoring affection, and to whom she offers gifts as she dares—Haven't you many a time saved your sweetest flowers, and done your finest handwork for some woman whom you loved?" This period may well have been a turning point away from the acceptance of the close woman-to-woman relationships discussed in Smith-Rosenberg's "Female World of Love and Ritual."
16. Julia Pease to Carrie [Pease], Vassar, January 17, 1875, Student Letter File, vCA; and John H. Raymond to Mitchell, Vassar, Monday [1875], Mitchell MSS, vCA.
17. Gertrude Mead to Mary Whitney, Vassar, September 29, 1870, *Astronomical Observatory Notebooks*, vCA. A letter to Miss Hopson dated only November 25 indicates that Mead might be willing to sell her Clark telescope, thus indicating that she did drop her astronomical study. Mitchell MSS, vCA. The number of unsuccessful aspirants to science careers can never be tabulated, but various evidence exists about thwarted hopes; see, e.g., the letters from Alice Bache Gould to Elizabeth Agassiz, Agassiz MSS, SLR.
18. Miscellaneous notes, October 18, 1868, item 35, MMM.
19. European notes, item 49, MMM. Mitchell interviewed Cobbe and discussed the role of women, concluding: "The world would never know how much it had lost by Mrs. Somerville's not having been educated."
20. June 3, 1878, item 29, MMM. She attended meetings of the New England

- Women's Club and on one occasion sat impatiently through a lecture by Harvard mathematician Benjamin Pierce, who argued "that women were the educators of men and should be satisfied with that" (notebook, item 29, MMM).
21. Journal, item 48, MMM. The journal for the second trip is filled with detailed notes of Mitchell's interviews with educators in Edinburgh, Cambridge, and London.
 22. Wright, *Maria Mitchell*, 197-204.
 23. These included Mrs. Horace Mann, Elizabeth Peabody, and Mrs. Charles Pierce (J. J. Croly, *Sorosis: Its Origins and History* [New York, 1886]).
 24. *Papers [of the AAW] . . . 1876* (Washington, D.C., 1877), 121-122.
 25. Mitchell was simply listed as an honorary member in Marguerite Dawson Winant's, *A Century of Sorosis, 1868-1968* (Uniondale, N.Y., 1968), 113.
 26. *Papers . . . 1876*, 123. Altogether the planning committee estimated that 1,620 letters and notices had been mailed to women in the United States and Europe.
 27. Lita Barney Sayles, *History and Results of the Past Ten Congresses of the Association for the Advancement of Women*, published separately and as part of the *Papers Read before the Association for the Advancement of Women at Its Tenth Annual Congress* (1882), 6-7. There is only a chapter on the AAW, whose history has been eclipsed by the more long-lived, activist General Federation of Women's Clubs, in Karen J. Blair, *The Clubwoman as Feminist: True Womanhood Redefined, 1868-1914* (New York, 1980). Also see Julia Ward Howe, *Reminiscences*; Laura E. Richards and Maude Howe Elliott, *Julia Ward Howe, 1819-1910* (Boston, 1916); and Howe, *Historical Account of the Association for the Advancement of Women, 1873-1893, World's Columbian Exposition, Chicago, 1893* (Dedham, 1893), although this last introduces some inaccuracies repeated in subsequent accounts. The AAW published reports from 1873 to 1893, although those to 1881 are only lists of papers and some summary of business items. Detailed reports of committees and state vice-presidents began in 1882. Selected papers, although numbered in sequence from 1873 to 1891, were apparently published from 1873 to 1876 and from 1881 to 1891. The most complete series found by this author are housed in the Vassar College Archives. There is apparently no manuscript record of the AAW, although the Howe papers at the Schlesinger Library have considerable material relating to the late 1880s and 1890s. A series of letters from Howe to Emily Howland between 1888 and 1894 indicate Howe's unsuccessful efforts to find younger members, a more efficient governing system, and money for the organization; see Sophia Smith Collection, Smith College, Northampton, Massachusetts.
 28. *Ibid.*, 9. Local AAW officers themselves printed disclaimers in local newspapers to allay fears of the potential audience. "It has been announced that women's right to suffrage, marriage, divorce, free love, and Bloomerism will not [be] considered in the deliberations of the Congress" (*Fayetteville Recorder*, October 14, 1875); and "It will be seen from the list of topics printed above, that the Congress will have nothing to do with the discussion of women's suffrage, or other topics connected

with what is popularly termed the 'women's rights' movement" (*Syracuse Journal*, September 18, 1875). Clippings file of the Onondaga Historical Society, Syracuse, New York.

29. *Papers and Letters Presented at the First Woman's Congress of the Association for the Advancement of Women* (New York, 1974), 89-98.

30. Note to Miss Lapham, undated, attached to a reprint of "Notes on the Satellites of Jupiter," Mitchell MSS, VCA; also see Mitchell to Antoinette Brown Blackwell, January 19, 1878, Blackwell Family MSS, SLR.

31. "Address of the President," *Papers . . . 1875*, 3. Commonplace Book, November 2, 1873, item 50, MMM. Mitchell wrote: "I am amazed that they considered me a good presiding officer. I made my little speech boldly and fearlessly," and she emerged from the meeting feeling "fifteen years younger" (Howe, *Reminiscences*, 387).

32. Confronted with an almost immediate controversy about whether to have an opening prayer, the pragmatic Mitchell compromised on the spot with a minute of silent prayer; it was over, according to one reporter, "in half that time" (*Woman's Journal*, October 23, 1875).

33. "Address of the President," *Papers . . . 1875*, 3.

34. *Syracuse Journal*, October 18, 1875.

35. Journal for 1873, item 48, MMM. Higginson gave an address on the higher education of women and Agassiz took exception to critical comments about Harvard's treatment of women, insisting that he made no distinction among his assistants. Mary Livermore asked why her daughter could not get a regular college education in Boston or Cambridge. A bemused Mitchell recorded the debate in detail and concluded optimistically in her journal: "It is clear that learning is to be made possible for women; that they shall accept it and value it as the duty for them, and that they shall use it wisely. For myself it seems to me my duty is to prepare a Lecture on 'Science for Women' and in the claim to their consideration which I think it has."

36. *Papers . . . 1876* (Washington, D.C., 1877), 9-10.

37. The meeting in Philadelphia was not pleasant, the assigned hall had problems, and the Philadelphia women threatened to cancel their sponsorship if suffrage was mentioned. When Howe was nominated for president, the western representatives shouted out the names of western women, including controversial temperance leader Frances Willard, and ultimately Mitchell was accused of "carrying things with a high hand" (Copybook, November 15, 1876, item 50, MMM). Mitchell confessed privately: "I admire the courage of people who can work with all kinds of people, but I cannot do good work in inharmonious relations & must keep free of them." (Mitchell to Alice Stone Blackwell, January 19, 1878, Blackwell Family MSS, SLR).

38. Participants reported on summer school sessions on Penikese Island under Agassiz and at Harvard's Botanic Garden in which women were given unprecedented opportunity to study ("Our Museums and Our Investigators," *Papers . . . 1876*, 26-28).

39. "Lectures on Women," undated, item 17, MMM.

40. To Antoinette Brown Blackwell, March 22, [1879], Blackwell Family MSS, SLR.

41. When too busy to work on the committee reports, Mitchell solicited papers on education and science (Mitchell to Blackwell, January 19, 1878, Blackwell Family MSS, SLR). Upon leaving the presidency, she resolved "to push the Scientific Dept. going a little. It is all very uphill work—mainly because women have so little money or control" (Copybook, item 50, MMM).

42. Item 47, MMM.

43. *Ibid.* Although the circulars themselves are missing, a final total of seventy-nine responses are recorded in a copybook apparently complete and organized by state.

44. *Ibid.* Mitchell's own tabulations are at the end of the copybook.

45. The Dana Society, composed largely of social leaders concentrated on self-help and on local park projects; there seemed to be little interest in careers for women in science. The society's manuscripts are deposited at the Albany Institute and Historical and Arts Society, Albany, New York.

46. Dolley apparently wrote to every woman about whom she had heard in up-state New York, but none felt she was a contributor to science. Within three years, however, Dolley again wrote to Mitchell, describing the newly founded Rochester Society of Natural History, which was composed chiefly of women (item 46, MMM). Also see the society's manuscripts and annual reports for 1880 and 1882 at the Rush Rhees Library, University of Rochester, Rochester, New York.

47. Delaware similarly reported an active study group, but no women physicians.

48. Item 46, MMM. A note from J. J. Burleigh to Grace Anna Lewis pointed out that Reed had applied unsuccessfully to the summer school under the Agassiz family on Penikese Island, but had subsequently enrolled at Cornell.

49. *Ibid.* Richards wrote a long note to her former teacher, explaining the situation in Boston.

50. *Ibid.* F. E. Foote also noted the variety of educational opportunities in the greater Boston area, including the special courses at Harvard, the scientific course at the Lowell Institute, the summer course in Salem, and the students at the Technical Institute.

51. *Ibid.*

52. Sally Gregory Kohlstedt, "The Nineteenth-Century Amateur Tradition: The Case of the Boston Society of Natural History," in *Science and Its Public: The Changing Relationship*, ed. G. Holton and W. A. Blanpied (Dordrecht, Holland, 1976), 185-186.

53. Annotations in her copybook for 1876 indicate that the second mailing in 1880 was much smaller. Mitchell had only nineteen replies by the time of her report. A list dated August 20, 1880, contains the names of twenty-one women in various states (most of whom had sent replies in 1876) and five high schools; responses out-

side this initial group indicate that Mitchell must have sent additional letters and that not all inquiries were answered.

Walcott was a close friend of Howe and active in the AAS, sometimes making the report in Mitchell's absence. Blackwell, whose book of essays *The Sexes Through-out Nature: An Inquiry into the Dogma of Woman's Inferiority to Man* (New York, 1875) contained a "new scientific estimate of feminine nature," had relinquished her ministerial work in favor of scientific and philosophical study.

54. Mitchell suggested that "when any town has a [woman] physician in 1876, it has several in 1881." Draft copy of Mitchell's report for 1881 is in item 24; the published reports began in 1882.

55. Crocker had described the associate status of members in the Boston Society of Natural History and expressed her hope that women would soon be made regular members as well. Lewis submitted a list of women admitted to the Academy of Natural Sciences since 1876. Although there was a movement toward specialized societies in the 1870s, these women were of the generation that still relied on local acceptance.

56. Item 46, MMM. Endowment was a major theme of her address "The Collegiate Education of Girls," read in 1880 before the AAW and published separately in Boston in 1881.

57. Item 21, MMM. On April 26, 1882, Mitchell recorded a visit from Thompson in her diary during which Thompson offered to pay Mitchell's expenses as a summer travel companion in Europe. Although Mitchell declined the offer, she was taken with the cheerful, unconventional woman who was not "weak-minded." For a discussion of Thompson's scientific philanthropy, see Howard S. Miller, *Dollars for Research: Science and Its Patrons in Nineteenth-Century America* (Seattle, Wash., 1970), 127-129.

58. See Rossiter, *Women Scientists*, chap. 1.

59. Notes and diary, August 20, 1881, item 24, MMM.

60. The debate was taken up with vigor in the pages of Edward Youman's *Popular Science Monthly* in the 1870s. Also see Rosalind Rosenberg, "In Search of Woman's Nature, 1850-1920," *Feminist Studies* 3 (Fall 1975):141-154.

61. Diary for 1883, item 21, MMM. Mitchell quoted E. B. [sic] Stanton as stating there were "470 women physicians with university diplomas in the United States."

62. *Report . . . 1887*, 34-35. For discussion of this optimism and subsequent disillusionment in the twentieth century, see Mary Roth Walsh, "Doctors Wanted: No Women Need Apply," *Sexual Barriers in the Medical Profession, 1835-1975* (New Haven, Conn., 1977).

63. *Report . . . 1884*, 25.

64. *Report . . . 1883*, 23. Mitchell recorded privately, "How slowly women work into science," but her public comments were always encouraging: "If we cannot show rapid advancement of the culture of science among women, we can claim that there is slow and steady advancement" (*Report . . . 1882*, 25).

65. Mitchell apparently did not write the reports for 1878 and 1886, in the latter year because she was working hard to find financial support for the observatory at Vassar College (Mitchell to Antoinette Brown Blackwell, August 22, 1886, Blackwell Family MSS, SLR).

66. Her personal concern with women in science did not diminish and her notebooks contain numerous clippings and anecdotes on the subject (item 21 and others, MMM).

67. According to Alice Stone Blackwell, "Wherever it met, it left behind a trail of new women's clubs and other organizations then considered novel and dangerous" (quoted in Inez Irwin, *Angels and Amazons: A Hundred Years of American Women* [New York, 1934], 229). In her *Reminiscences*, Howe wrote: "Talk of the man with the hoe! We were the women of the plough. To us it was given to draw the furrow and drop the seed from which have sprung up clubs and federations scarcely to be numbered."

The General Federation of Women's Clubs was created as an alternative to the AAW and reflected an ongoing competition between the Boston area women involved with New England Women's Club (which did not join the federation when it was founded in 1889) and the New York Sorosis. The AAW persisted under Howe until she "laid it to rest" in 1900. Howe's correspondence with Ednah Dow Cheney is particularly useful on these later years. Jane Cunningham (Jennie June) Croly's *The History of the Woman's Club Movement in America* (New York, 1898) dismisses the AAW's two decades of work in one paragraph, calling it the "John the Baptist" of women's clubs.

68. Winant, *A History of Sorosis, 1868-1968*, 20.

69. Robert Clark, *Ellen Swallow: The Woman Who Founded Ecology* (Chicago, 1973), 86-90.

70. Mitchell conducted an officer's meeting of the AAW at the home of Phoebe Hanaford and recorded with disappointment that most of the executive committee were women "of business" rather than learning (Commonplace notebook, June 20, 1875, item 50, MMM). Mitchell gave a paper to the collegiate group in Boston; see her copybook, January 1880, item 50, MMM.

71. Copybook, August 27, 1879, item 50, MMM.

72. Her eye was always on the women who would succeed her, and she wrote in her diary that "the continuance of scientific study seems to be on the increase," with women more involved in serious study and "less apt to take up science as a pastime" (August 14, 1883, item 21, MMM).

73. She apparently had successfully opposed, for example, a presentation by Mary Livermore on writer Harriet Martineau (Livermore to Antoinette Brown Blackwell, June 27, 1877, Blackwell Family MSS, SLR).

74. Phoebe Ann (Coffin) Hanaford, *Daughters of America: Or Women of the Century* (Augusta, Maine, 1882), 252.