

## Employment Issues

The first of the women in our study to receive a PhD did so in 1886, but the first instance of employment for this group was nearly 20 years earlier, when Christine Ladd taught in a high school in Utica, New York, in autumn 1867 before completing her undergraduate work at Vassar College in 1869. Employment for some continued into the 1990s, so we are considering an employment span of more than 125 years. While historical forces (especially the Great Depression and World War II) had an impact on these women's employment, social issues were more keenly felt.

Ruth Gentry, from a small town in central Indiana, was among the earliest to begin her career. Born in 1862, she began teaching school at age sixteen and later used her savings to pay for college. She graduated from the normal school in nearby Terre Haute at age eighteen, taught for several years in preparatory schools and college, and then graduated from the University of Michigan in 1890. This early work and schooling was a prelude to her holding fellowships, obtaining a doctorate from Bryn Mawr College, studying in Europe, and teaching at Vassar, all before 1900.

Indeed, it was rarely the case that the women went directly from high school to college to graduate school. About 17 percent worked full time one or more years before even beginning their undergraduate programs at the schools where they earned their bachelor's degrees. Almost all of these taught in elementary or high schools in the period between high school graduation and entrance into college. This was particularly common for the Catholic sisters, two-thirds of whom taught before beginning college work. A few women did clerical or other work, and about a dozen women first received some teacher training at a normal school before starting a regular bachelor's degree program.

The path from elementary school to graduate school taken by Nola Anderson Haynes, born in Missouri in 1897, was not unusual. She described the course of her entrance into the field of mathematics at the 1981 Smithsonian meeting.

I come from the Middle West and my grandfather had been a pioneer in Missouri ... and was a landowner... I went to a ... very small country school. My family were all good in mathematics, the men in the family particularly... My father would buy corn and ship cattle... He had me do a lot of the adding and figuring, and I learned how many bushels ... in a load and I liked it. I liked, of course, the arithmetic at school. Then I went to a very small town high school that was just a two-year high school when I started. But they added on the junior year and the senior year... Then ... you took examinations to get certificates and you could go out and teach in the rural schools. So I did that and taught for four years at a rural school. And I

was ambitious . . . so I went to the University of Missouri and got my bachelor's degree. I taught two years in high school then, but I had known a man at the university who at that time was the president of a junior college . . . [and] they needed a mathematics teacher there. . . . Since I had so much mathematics I was given permission to go there and teach in the junior college. Well, I liked it very much and I thought I will do junior college teaching now, but I better go back and get a master's degree. . . . One day . . . the chairman of the department asked, "Miss Anderson, what are you going to do next year?" I said, "I guess go out and get a job in junior college," thinking I could very easily, of course. And he said, "Would you be interested in going on towards a PhD if you got a fellowship?" Well, that was an easy thing; . . . I didn't have to think about getting a job, so I accepted it and went on and got my PhD.<sup>1</sup>

A few others taught while studying for their bachelor's degrees, so that nearly 20 percent had held full-time teaching positions before completing their undergraduate work. About half of the women began graduate studies immediately after graduating from college, although in several instances, they took courses during the summer or otherwise on a part-time basis while holding a full-time job. Furthermore, nearly two-thirds worked in the period between beginning and finishing graduate school, nearly all in full-time teaching positions.

Altogether, nearly 80 percent were employed full time at some point before receiving their doctorates.<sup>2</sup> Thus, it appears that because of financial considerations, opportunities available, or interest, most of these women who eventually earned PhD's in mathematics did so after some period of full-time employment. It is not easy to sort out to what extent employment before the doctorate was a means of financing education and to what extent it provided the motivation for obtaining the degree as a credential for college or university teaching. In any case, with few exceptions the jobs available after the doctorate were teaching jobs, usually in institutions that offered at most a bachelor's degree.

Some of the factors that would prove significant for women after receiving their doctorates were experienced even before those degrees were earned. For example, in 1931 Marjorie Heckel (Beaty) interrupted her graduate studies at Brown University to take a position as instructor at the University of South Dakota. Sally Krebs wrote in a 1987 paper about four professors emeriti at the university, that Heckel "came by train from New York and arrived at a university quite different from the way it is today. For one thing, she and . . . Harry Lane were the only instructors the mathematical sciences department had. Also, it was a year of drought in South Dakota when [she] arrived so the campus was very dry and dusty with only a few buildings compared to how many there are today."<sup>3</sup> In her second year there she met Donald W. Beaty, a cattle feeder and farmer who was teaching some courses at the university. They married in 1933, and according to Krebs, "her marriage forced [her] to resign her position at the university because during the depression only one member of a household was allowed to hold a job." Krebs reported that

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<sup>1</sup>Smithsonian meeting tapes.

<sup>2</sup>These numbers do not include the several who had assistantships or other part-time work.

<sup>3</sup>Sally Krebs, "A Century and a Half of Dedication," April 1987 (typescript).

the university needed another mathematics instructor during the year 1934–35, and Marjorie Beaty volunteered to teach one course for a semester without pay. After studying for two years at the University of Colorado she once again was given a regular faculty position at South Dakota. She received her PhD from Colorado in 1939 and in 1941 interrupted her career for fourteen years to rear two daughters. She returned, however, and eventually retired as professor after twenty more years as a faculty member.

The idea that only one member of a household should hold a job was not new at the time of the Depression. In an unsigned editorial in 1903 critical of a New York Board of Education by-law that a woman teacher who married had to resign, the writer noted, “Experience shows that, consciously or unconsciously, there lies behind all this opposition to married women as teachers some remnant of the spoils notion that a teaching post is a ‘place,’ and that a married woman ought to be ‘supported’ by her husband, while the ‘place’ goes to an unmarried girl dependent upon her own efforts.”<sup>4</sup> As was the case with Marjorie Beaty, the Great Depression, marriage, and children were significant factors affecting the employment of many of the women in the study, before, while, or after they earned their doctorates.

About 90 percent of the women in our study found employment in the year following their doctorate.<sup>5</sup> The number of positions per person after the PhD ranged from none to at least ten, with over a quarter of the women holding exactly one job during their entire career. After receiving their doctorates, the 228 women had about 600 different jobs with nearly 350 different employers, mostly academic, but some in government and business. All but two or three were employed full time at some point in their lives. The most notable exception is Emily Coddington Williams, whose attorney father died when she was young and whose mother’s family appears to have been very well-to-do. She attended private schools in New York, earned her undergraduate degree from the University of London and her master’s degree and doctorate from Columbia University, the latter in 1905. After she received her doctorate, she attended mathematics meetings in New York City and international mathematical congresses in Rome (1908) and in Cambridge, England (1912). However, there is no evidence that she ever held a formal position or published mathematical research. A few years after receiving her PhD, she earned a law degree and was admitted to the New York Bar but never practiced. She married when she was forty-three, was active in the life of New York City and Newport, Rhode Island, published a play, two novels, and a lengthy genealogical sketch, and died in Paris in 1952 at the age of seventy-eight leaving an estate estimated at \$12,000,000. Emily Coddington Williams is clearly not representative of the women in our study.

In general, the experiences of those who married and those who did not were quite different. Indeed, there are three distinct groups we can consider: those who remained single (or for whom marriage was irrelevant as far as employment was

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<sup>4</sup>“Notes and News: Married Women as Teachers,” *Educational Review* 25 (1903): 214.

<sup>5</sup>This number is comparable to the number given for persons with doctorates in mathematics who received the doctorate in 1934, at the height of the Great Depression, or who sought employment for 1934–35. See E. J. Moulton, “The Unemployment Situation for Ph.D.’s in Mathematics,” *American Mathematical Monthly* 42 (1935): 143–44. In comparison, the final unemployment rate for 2005–06 doctoral recipients was 3.3 percent. See Polly Phipps, James W. Maxwell, and Colleen A. Rose, “2006 Annual Survey of the Mathematical Sciences (Second Report),” *Notices of the American Mathematical Society* 54 (2007): 877.

concerned); women religious; and those who married. The group of women religious warrants independent examination since some employment limitations did not affect these women.

Eighteen Catholic sisters received PhD's in mathematics in the United States before 1940, the majority in the 1930s. It appears that these degrees were generally obtained as part of a movement to upgrade the level of instruction in Catholic women's colleges. Many of these colleges were just emerging as full four-year colleges from preexisting academies and were facing increasing pressure to meet requirements for accreditation.

Whereas the most daunting task facing most new PhD's, especially in the 1930s, was getting a job, that was not the case for the women religious. As Sister Helen Sullivan reported at the 1981 Smithsonian meeting, "One of the advantages of going into a religious community is you don't have to seek your jobs; I was assigned. I came home [to Mount St. Scholastica College] with my degree and started teaching everything in the program that I could handle. I taught fifteen hours my first year and believe you me it wasn't easy."

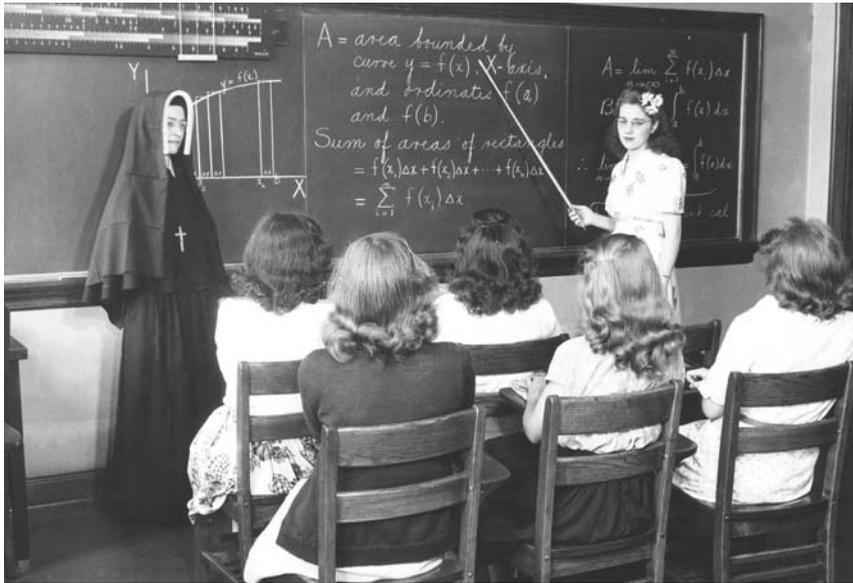


Figure 5.1: Sister Mary Cleophas Garvin's calculus class at Notre Dame College, 1945. Photograph courtesy of the Archives of the Sisters of Notre Dame, Chardon, Ohio.

Typically the Catholic sisters were the mainstays of small departments, and some taught a variety of courses in addition to mathematics. For example, during her more than thirty years on the faculty at Trinity College in Washington, D.C., Sister Marie Cecilia Mangold was either the only member, or one of two members, of the mathematics department. In another instance, after receiving the PhD, Sister Catharine Frances Galvin returned to Siena College in Memphis, Tennessee, where her teaching assignments included chemistry, physics, and statistics, in addition to mathematics. Furthermore, she was bursar at both St. Agnes Academy and at Siena College and served as the superior of her community for many years.

The situation of Sister Catharine Frances was not unusual. In addition to exceedingly demanding teaching assignments, women religious holding doctorates in mathematics often provided academic and administrative leadership for their colleges. For example, in addition to spending more than thirty years as professor and chairman of the mathematics department at Regis College near Boston, Sister Leonarda Burke was, for twenty-five years, director of the Regis College Research Center and principal investigator for contractual work for the Air Force Research Center, Hanscom Field. As another example, after serving as chairman of the mathematics department at Nazareth College in Louisville from her arrival in 1937, Sister Mary Charlotte Fowler was president of the college from 1961 to 1969.

For the women who were not nuns, the more common profile is of a woman who taught full time before receiving her doctorate in mathematics, probably also having had some kind of scholarship or assistantship during her graduate studies. Afterwards she found a position teaching mathematics in a college or university where the department's focus was on teaching rather than research. If she was among the 50 percent of the women who received their PhD's in the 1930s and was not a nun, she may have had additional trouble finding a suitable position because of the Great Depression. Furthermore, if a woman married, anti-nepotism practices probably drastically curtailed her already limited professional opportunities.

Those who did not get jobs immediately and those whose initial postdoctoral jobs did not fully utilize their education illustrate some of the difficulties encountered. First, of course, the Great Depression affected nearly everyone, men as well as women, throughout much of the 1930s. It appears that at least six women in our study were without jobs immediately after getting the PhD primarily because of the Depression. Others found that their opportunities were not what they had expected. Rosella Kanarik (PhD Pittsburgh 1934) wrote in 1985, "I graduated during the depression. It was almost impossible for anyone, let alone a woman, to find a position in industry, college, or university. I was lucky to get into a high school to teach mathematics."<sup>6</sup> The first position for Ruth Peters, who received her Radcliffe College PhD in 1933, was as a personnel assistant doing job analysis for the Pennsylvania Emergency Relief Board.

Even for those who had finished their graduate work before the 1930s, the Depression sometimes made a significant impact on their careers. A particularly vivid account is offered by Elsie McFarland Buck (PhD California 1920). She later reported, "I was teaching and semi-starving at a very small college in Spokane. . . . At any rate, we were not getting paid very much money. I [taught] my whole nine months there for \$360 and a box of apples and some kitchen cleanser donated by one of the students as part of his tuition. And I was sending out something like 300 or 400 letters of application all over the country. This was in 1932 . . . when jobs were very few and far between."<sup>7</sup>

As Kanarik suggested above, just being a woman greatly limited job opportunities. In some cases there were formal barriers or institutional practices. Sometimes individual discriminatory attitudes were the issue. In other instances, the limitations reflected expectations about the professional woman's proper role in academia.

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<sup>6</sup>Smithsonian questionnaire.

<sup>7</sup>Conversation between Mr. Don Haacke and Dr. Elsie Buck, November 21, 1980, OH-20, Special Collections Department, Albertsons Library, Boise State University.

Discrimination was prevalent enough to produce the following response on a 1926 questionnaire distributed by the Bureau of Vocation Information:

Nothing but the most earnest conviction that she could never be satisfied without a PhD in mathematics would justify a woman's setting herself that end. It is a long, hard road and when the degree is obtained, she finds that all the calls for mathematics teachers are for men, and that when a woman is employed in one of the large universities she is practically always given long hours and freshmen work for *years*, with less pay than a man would receive for the same service. If all the women could fare as well as I have fared, I'd say "Go ahead," but alas! Such unexpected good luck does not come to many in a generation.<sup>8</sup>

Nonetheless, there were men who did support women in mathematics. In his positions as head of the mathematics department (1915–42), dean of the graduate school (1926–48), and secretary of the American Mathematical Society (1921–40), R. G. D. Richardson of Brown University was particularly influential in helping to place women looking for positions, especially those who had been students at Brown. In 1924, in a letter recommending Marian M. Torrey for a position at Smith College, he wrote, "The department feels that we have never had, among the twenty or more girls whom we have sent out to teach in colleges, any stronger candidate. . . . If Brown University would employ women, I would not hesitate to ask President Faunce to call her here at a good salary. She would do much better than many of the men whom we have at present on our staff."<sup>9</sup>

It is not surprising that Brown, a men's college, would not hire women. However, in a letter to Emily Chandler (Pixley) in 1927, Richardson writes that there is no opportunity for teaching at Brown's Women's College, because, "in general it is against the policy of our Women's College to employ women teachers."<sup>10</sup> Similarly, at some time no later than 1926, Frank Nelson Cole requested a recommendation from E. H. Moore at the University of Chicago for a man to fill a position at Columbia's coordinate college, Barnard.<sup>11</sup>

While most women's colleges did hire women faculty members, sometimes they preferred hiring men. Two years before Richardson recommended Marion Torrey for a job at Smith, Ruth Goulding Wood wrote to Richardson asking for recommendations for a young instructor in mathematics for the following year at Smith. She wrote that "the President is anxious to find a young man who has recently done his Doctors' thesis and who gives promise as a teacher."<sup>12</sup>

Men did not always think it was a wise idea for a women's college to hire only women faculty. For example, in 1947 C. R. Adams at Brown replied to Marion

<sup>8</sup>Hutchinson, *Women and the PhD*, 185–86. All we know of the respondent is that she had earned a PhD in mathematics between 1915 and 1924 and was an assistant professor at a college at the time of her response to the questionnaire.

<sup>9</sup>R. G. D. Richardson to Ruth G. Wood, February 13, 1924, Correspondence 1921–1925, R. G. D. Richardson Papers, Brown University Archives.

<sup>10</sup>R. G. D. Richardson to Emily Chandler, March 31, 1927, Richardson Correspondence 1926–1930.

<sup>11</sup>Undated letter, folder 2, box 1, E. H. Moore Papers, Special Collections Research Center, University of Chicago Archives.

<sup>12</sup>Ruth G. Wood to R. G. D. Richardson, November 24, 1921, Richardson Correspondence 1921–1925.

Stark at Wellesley College who had inquired about possible job candidates. He mentions a number of possibilities and then suggests they hire a man. “In any one of the group of fine women’s colleges to which Wellesley, Smith, Mount Holyoke, and Bryn Mawr belong the department of mathematics is bound to deteriorate if a policy of women only on the staff is adhered to.”<sup>13</sup> It should be noted that Rachel B. Adams (PhD Radcliffe 1921), the wife of C. R. Adams, had served as a tutor at Radcliffe for fifteen years but held no other formal position.

Other departments just did not want too many women on the faculty. After Louise Johnson (Rosenbaum) received her PhD from the University of Colorado in 1939 under the direction of the head of the department, Aubrey J. Kempner, “she knew that she had no future [at Colorado] since Kempner told her that there were enough women already in the department.”<sup>14</sup> At that time two of the five members of the department were women; they were Claribel Kendall (PhD Chicago 1921), an associate professor, and Frances C. Stribic, an assistant professor who had completed all her work for a PhD at the University of Nebraska except for her dissertation.

Some correspondence reflects views that were overtly hostile to women. In a letter of 1920, the long-time head of the mathematics department at Ohio State University wrote regarding the possible placement of two women there. “Our dean (Math is in Engineering College) does not like girls. We have two girl teachers. Don’t think we could get him to agree on another.”<sup>15</sup> At the time, one of the “girls” was the forty-four-year-old Grace Bareis, who had earned her doctorate there in 1909 and was an assistant professor until her retirement in the mid-1940s.

As has been amply demonstrated in other accounts, women were not the only targets of discrimination. Frederick W. Owens, department head at Pennsylvania State College, sought candidates in a letter to H. S. Everett at Chicago in 1931. “We have an opening for an instructor for next year to supply for a man on leave of absence. . . . For this position we would prefer a Gentile and a man. While we have both Jews and women on our staff, we can not have too large a proportion of them.”<sup>16</sup> Two years later in the midst of the Depression, Owens wrote to Richardson at Brown noting that they have an unexpected opening at Penn State and asking for suggestions. He writes that the salaries are reduced, probably about \$1500 and one year only. “For this place, if filled as a full time appointment, I would prefer a man and a non-Jew.”<sup>17</sup> It is noteworthy that Helen B. Owens, the wife of F. W. Owens, had earned a PhD in mathematics from Cornell in 1910 and was prohibited from taking a position at Penn State because of anti-nepotism practices.

Another frequently held prejudicial assumption was that women should teach only women or in women’s colleges. In 1922 Julia Dale applied for financial support at Cornell University after having received her master’s degree and having served as an instructor at the University of Missouri. A letter of recommendation contained

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<sup>13</sup>Clarence Raymond Adams to Marion Stark, December 9, 1947, Richardson Correspondence 1947–1949.

<sup>14</sup>Jones and Thron, *A History of the Mathematics Departments of the University of Colorado*, 15.

<sup>15</sup>R. D. Bohannon to R. C. Archibald, 1920, Richardson Correspondence.

<sup>16</sup>F. W. Owens to H. S. Everett, July 16, 1931, folder 10, box 1, Mathematics Department Papers, Special Collections Research Center, University of Chicago Archives.

<sup>17</sup>F. W. Owens to R. G. D. Richardson, August 5, 1933, Richardson Correspondence 1931–1934.



Figure 5.2: Ohio State University Graduate Math Club and Faculty Club, April 15, 1929. Three of the five women who received PhD's from Ohio State are pictured here; Grace Shover (Quinn) and Grace Bareis, are seated on the left, and Mabel Schmeiser (Barnes), is partially hidden. Maude Hickey, younger sister of May Hickey Maria, is seated in front of Bareis and Schmeiser. Shover's advisor, C. C. MacDuffee, is standing on the right, and Schmeiser's advisor, Henry Blumberg, is seated on the left. Photograph courtesy of Grace Shover Quinn.

the following: "I consider Miss Dale to be a hardworking student with a good mind. Yet she is not an horrible example of what a female graduate student sometimes becomes. She unites a good scientific mind with sufficient youth and ordinary intelligence to make her influential with university women. I feel that in helping her in her education you will be not only advancing mathematics but furnishing some college with women students with a good teacher and an influential adviser."<sup>18</sup>

While many of the women were likely to face discrimination at some time in their careers, the experiences of those who married and those who did not were quite different. We will first consider issues relating to employment expectations and opportunities for those who married. These included finding employment for a two-person professional family, anti-nepotism practices (both formal and informal), child rearing, the perceived lack of a need to produce extra income, and societal and personal expectations.

Eighty-four of the 228 women in the study were married at some point in their life. Most were married once, seven were married twice, and one married three times.<sup>19</sup> All of the first and second marriages have ended, twenty of the first and two of the second by the death of the wife, fifty-three of the first and six of the

<sup>18</sup>W. D. A. Westfall to Professor J. H. Tanner, March 4, 1922, Julia Dale folder, box 61, Graduate School Records, Rare and Manuscript Collections, Cornell University.

<sup>19</sup>Six of the eight second marriages occurred after a divorce; the other second marriages and the third marriage occurred after the death of a husband.

second by the death of the husband, and eleven of the first by divorce. While 36 percent of the women who married had little or no employment while they were married, only about 4 percent of the single women, and none of the women religious, were never, or rarely, employed. Furthermore, the majority of those who were unemployed immediately after obtaining their doctorates were married. Initially the greatest difficulties were experienced by the approximately twenty women who married before or shortly after receiving the doctorate.

Of the women who married, 40 percent married men with PhD's in mathematics while another 21 percent married men with PhD's in other fields. Most of these husbands took academic positions; and the institutions in which they worked, their cultures, or their locations played a large role in whether the subsequent situation was favorable or not for the continued involvement of the woman in mathematics.

We can categorize roughly the nature of the careers of the women who married. Seven had continuous careers, without interruption, in which the role of the marriage seems to have been relatively insignificant. Ten had nearly continuous careers, although in some instances the marriage affected the professional situation adversely. Thirty-seven women had significant interruptions in their careers, frequently, but not always, because of family responsibilities. Finally, thirty of the women who married had little or no employment while they were married, even though almost all had professional positions at some point before the marriage.

For the seven who were both married and had continuous careers, the marriage and careers overlapped significantly for only three. They are Jewell Hughes Bushey, Evelyn Carroll Rusk, and Mary Kenny Landers. All three were married to fellow academics: Bushey and Landers to mathematicians, and Rusk to an art historian. Jewell Hughes married her Hunter College colleague of five years, Joseph Hobart Bushey, when she was thirty-nine years old and eleven years beyond her doctorate. Both were able to continue in their positions at Hunter. Mary Kenny and Aubrey Landers were fellow students at Brown when they first met. After receiving master's degrees they obtained teaching positions in New York City, she at Hunter and he first at Hunter and then at Brooklyn College. They married in 1933, and they both later resumed graduate work at the University of Chicago, in residence for a year and six summers to obtain their doctorates. They, too, were able to continue in their positions after marriage. Mary Landers, with three children, was the only mother among this group. Finally, Evelyn Carroll had just received her PhD and had been promoted to associate professor at Wells College, her alma mater, when she married William Sener Rusk, an art historian also on the faculty at Wells.

In the other instances of a continuous career it is obvious why the marriage was of little relevance. Mayme Logsdon married at nineteen and was widowed nine years later; her husband had two children, but they were largely in the care of other family members. Although she had taken a course for teachers and had taught during her marriage, her subsequent undergraduate work, graduate work, and mathematical career at the University of Chicago occurred long after she was widowed. In other cases, the marriage occurred relatively late in life, long after a career was established. Evelyn Wiggin Casner and Mina Rees were married in their fifties, both to non-academics, while Grace Murray Hopper was divorced relatively early in her career.

In some instances of a nearly continuous career the marriage affected the professional situation adversely. Emily Chandler and Henry Pixley were married in 1931,

a few months after each received a PhD from the University of Chicago. Unable to find employment in the same city, they resumed their former positions for the next five years, except for a year when both were on leave for work with the National Recovery Administration. She was professor and department head at Saint Xavier College for Women in Chicago, and he was an instructor at the College of the City of Detroit, which soon became part of the newly created Wayne University. Finally, in 1936, Emily Pixley obtained a position at Wayne University, where her husband was then an assistant professor. She was hired as a special instructor with an hourly salary and worked both part time and full time. During the next dozen years the Pixleys had three children. In September 1947, Emily Pixley's position was designated "regular substitute assistant professor," and she had a teaching load of sixteen hours per week. Less than a year after that, in April of 1948, in a memo concerning "the university policy relative to employment of man and wife," it was noted that "while the quality of teaching will be lowered somewhat by making Mrs. [X] and Mrs. Pixley the first to go, university policy demands that this be done, and I have already made clear to those affected that this will require the termination of their services in June 1949."<sup>20</sup> Emily Pixley did not wait for the university anti-nepotism policy to be satisfied but found employment at the University of Detroit, from which she retired as professor emeritus after twenty-five years on the faculty there. In this case, the so-called two-body problem was initially an issue, but formal anti-nepotism practices and the demands of parenthood also played a role.

As observed above, a number of those who were married were married to fellow academics, frequently mathematicians. In some cases the husband took a position at an institution where there were limited opportunities for his wife. Eleanor Pairman (PhD Radcliffe 1922) married Bancroft Brown (PhD Harvard 1922) shortly after they both received their degrees. He took a position at Dartmouth College, an isolated men's college in New Hampshire. Appropriate professional opportunities simply did not exist for her because of the isolation and absence of schools that would have hired a woman.

Not all dislocations occurred immediately after the doctorate. Annie MacKinnon earned her PhD at Cornell University in 1894 and spent the next two years studying mathematics in Göttingen before taking a position at Wells College, a college for women in Aurora, New York. Five years later the thirty-three-year-old MacKinnon gave up her position as professor and registrar to marry Edward Fitch, a professor of Greek at Hamilton College, a school for men in Clinton, New York, nearly a hundred miles from Aurora.

While in 1901 Annie MacKinnon Fitch ended her professional career when she married, we have seen that thirty years later Emily Pixley and her husband continued jobs they had in different cities. The year after the Pixleys found their temporary solution to the two-body problem, another couple found a similar solution. Rose Whelan earned her doctorate in 1929 from Brown University. She had taught at the University of Rochester the year before receiving her degree and returned to that position. In 1932 she and Charles H. W. Sedgewick were married. For the first year and a half of their marriage she continued her position at Rochester, while he finished his doctorate in mathematics at Brown and held a full-time position at the University of Connecticut. Soon after the first of their four children was born

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<sup>20</sup>Alfred L. Nelson, Mathematics Department, to Dean C. B. Hilberry, April 23, 1948, University Archives, Wayne State University.

the entire family lived full time in Connecticut. She was able to do some teaching as an instructor at the University of Connecticut and elsewhere, before the family moved to Washington, D.C. From age fifty-five to sixty-six she was instructor and then assistant professor at the University of Maryland.

In other instances, anti-nepotism practices were the primary factor affecting the woman's employment. Elizabeth Stafford (Hirschfelder) received her PhD in mathematics from the University of Wisconsin in 1930 and then taught for a year in Texas before marrying Ivan Sokolnikoff, who had just received his doctorate from Wisconsin. Both remained at Wisconsin in a variety of positions, he as instructor through professor and she in a number of irregular positions despite the fact that they had jointly published several significant mathematical papers and the classic text *Higher Mathematics for Engineers and Physicists*. It was clear that anti-nepotism sentiment at the university played a significant role in her options there. In 1932, Mark Ingraham wrote to the dean of his college that "although Mrs. Sokolnikoff is one of our best instructors and is better prepared than any other instructor to give advanced work, we have omitted her from the tentative budget for next year due to the fact that you do not feel it wise to retain the wife of a member of the Department on the staff."<sup>21</sup>

Anti-nepotism rules affected graduate students as well as faculty. In 1931, a year after going to the University of Illinois as a graduate student and teaching assistant, Gertrude Stith married Pierce W. Ketchum, a member of the mathematics faculty. Because of anti-nepotism practices, Gertrude Stith Ketchum was not permitted to continue as a teaching assistant after her marriage. However, some years later she was allowed to teach on a part-time basis because the department was in need of instructors.

Fifty-one of the eighty-four women who married had children. There were also stepchildren, adopted children, and a ward. Adopting children or having a ward was not limited to those who married. Ida Martha Metcalf (PhD Cornell 1893) advertised for and took a ward in 1915, while Mary E. Sinclair (PhD Chicago 1908) adopted two children as infants, one in 1914 and the other in 1915. In most cases, childrearing delayed the onset of a career, interrupted it, or made it seem impossible. Although several women established shortened careers later in their lives, for many the career effectively ended at marriage or after the birth of children.

In at least one instance, having a child brought an unwanted and abrupt end to a job. Jessie Jacobs (Offermann) earned her PhD from the University of Illinois in 1919. In 1920 she moved to a position as instructor in pure mathematics at the University of Texas, where she met Hermann Joseph Muller, who arrived the same year as associate professor of biology. Jacobs and Muller were married in June 1923, and she remained an instructor through the academic year 1923–24. Their son was born in November 1924 in Austin. According to Muller's biographer, "The birth ... led to a bitter blow for Jessie. The mathematics department terminated her appointment because her colleagues felt that a mother could not give full attention to classroom duties and remain a good mother. For Jessie it meant a permanent loss of her career as a teacher."<sup>22</sup>

<sup>21</sup>Mark Ingraham to Dean Sellery, May 19, 1932, folder Budget 1931–33, box 1: 1924–1937, Budget Files, Department of Mathematics, College of Letters and Science, University of Wisconsin-Madison Archives.

<sup>22</sup>Elof Axel Carlson, *Genes, Radiation, and Society: The Life and Work of H. J. Muller* (Ithaca: Cornell University Press, 1981), 133–34.

About 60 percent of the married women who had children had significant, although shortened, careers with the most common employment pattern being one in which there was an interruption during the childbearing and early childrearing years and then resumption of the mathematical career later. Mabel Schmeiser Barnes provides one such example. She received her PhD from Ohio State University in 1931. After spending the next four years, in the midst of the Depression, at a teachers college in Nebraska, at the Institute for Advanced Study at Princeton, and as a substitute mathematics teacher in New York City, she married John Landes Barnes, a recent mathematics PhD from Princeton. They moved to Massachusetts, where J. L. Barnes had a position as assistant professor at what was then Tufts College. Mabel Barnes “kept [her] hand in somewhat by marking papers and substituting for him when he was away, and by helping him edit the mathematics section of *Eshbach’s Handbook of Engineering Fundamentals*, second edition.”<sup>23</sup> Their two children were born before John Barnes took a leave from Tufts to do war work with Bell Labs. After World War II ended, Mabel Barnes was hired as an assistant professor at Tufts for 1946–47, partly because of the influx of veterans. She later noted that “nepotism and [her] being a woman were overlooked. Desperation again overcame prejudice.”<sup>24</sup> Although she was rehired for the next year, they moved to California where her husband had taken a position as professor in engineering at UCLA. In 1950 Mabel Barnes resumed her career at Occidental College in Los Angeles, where she was hired as instructor and was promoted through the ranks before retiring as professor emeritus in 1971.

Audrey Wishard McMillan’s career took a different turn after her years at home with her children. She earned a doctorate in 1938 from Radcliffe, after which she spent four years as an instructor at Vassar College. In 1942 she married Brockway McMillan, who had earned a PhD in mathematics from MIT. From 1942 to 1945 the McMillans were in Dahlgren, Virginia, where Brockway McMillan was with the US Naval Reserve. Audrey McMillan was an assistant to Hermann Weyl at the Institute for Advanced Study in Princeton in 1942–43 and worked for the US Navy’s Bureau of Ordnance in Dahlgren during 1943–45. In 1946 Brockway McMillan began a long association with Bell Telephone Laboratories, where he spent most of the next thirty years. The McMillans had three children during the 1940s and early 1950s. Audrey McMillan wrote in 1997, “I do not think it possible to care for 3 small children and do mathematical research. I tried. Unfortunately, I did not realize that, at age 50, I might have been able to.”<sup>25</sup> Instead, she turned her attention to elementary school teaching and consulting, which interested her because of the “new math.” She later was an instructor at a day school, taught a course for elementary teachers at New York University, and served for a decade as a consultant to the Summit, New Jersey, board of education.

Without a doubt, World War II affected many of the women in the study. In several instances, women were called back into the academic workforce because of the demand for instructors during and after the war. These were often the same women who had been unable to hold academic jobs earlier because of anti-nepotism practices. We noted earlier the experience of Mabel S. Barnes who was hired at Tufts in 1946 because the college was willing to overlook its previous discriminatory

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<sup>23</sup>Barnes, in “Centennial Reflections on Women in American Mathematics,” 7.

<sup>24</sup>Ibid.

<sup>25</sup>Authors’ questionnaire.

practices when it desperately needed more faculty members. Nola Haynes (PhD Missouri 1929) is another example of a women for whom World War II and the subsequent influx of veterans to college campuses was a positive influence. Haynes married in 1938 after having spent 1930 through 1938 as a faculty member at H. Sophie Newcomb College in New Orleans. At the 1981 Smithsonian meeting, she recounted the following:

I left Newcomb College . . . to get married to the chairman of the astronomy department of the University of Missouri. There was a very strict nepotism law and I was giving up my career for marriage, thinking I would never teach again. Then when the Second World War came along and they were bringing in all these various companies. . . , I was the first person called back into teaching. But at that time they didn't set any salaries, and they gave me an acting instructor's name or something like that; it was because of the nepotism law. . . . I thought it was a temporary sort of thing and then it went on and after the war the boys came back . . . I was still an acting associate professor . . . because of my husband. It was not until my husband retired that I became associate professor.

As we saw earlier in this chapter, marriage did not always hinder a woman's ability to pursue a career in mathematics. Several married women had continuous or nearly continuous careers, and many more had satisfying careers after significant interruptions. Whereas marriage often presented women with difficulties in finding or keeping a job, we know of no instance of a close female friendship having had a negative professional consequence. Moreover, we find that such friendships apparently contributed to the fulfillment of personal and professional lives of a number of women in our study. In at least two cases, a pair of these women mathematicians worked and lived together for much of their careers. Suzan Benedict and Susan Rambo were both graduates of Smith College, and both taught there for the major part of their careers. Benedict was ten years older than Rambo and joined the Smith faculty in 1906, two years before Rambo. Benedict earned a PhD from Michigan in 1914, as did Rambo in 1920. By 1918 they were sharing a house, and they continued to do so until Benedict's death in 1942. Similarly, Clara E. Smith and Lennie P. Copeland were colleagues at Wellesley College, traveled together, and were sharing a home in Wellesley at the time of Smith's death. Another pair, Wealthy Babcock and Florence Black, were close companions and colleagues for about fifty years. They both received their doctorates from the University of Kansas in 1926 and shared many interests including sports, camping, and riding. At least three other women in our study shared their lives with female mathematicians who were not in our study. For example, Harriet Montague and Mabel Montgomery were colleagues at the University of Buffalo, where Montgomery earned her PhD in 1953. They coauthored a textbook and shared a home in Buffalo until Montague's death, when Montgomery was listed as Montague's only survivor. Others lived with colleagues who were not mathematicians. Pauline Sperry and her friend Alice Tabor, who was in the German department at the University of California in Berkeley, were instrumental in establishing the Women's Faculty Club at Berkeley. Cleota Fry joined her Reed College classmate Vivian Johnson at Purdue University, completed her doctorate there, and remained on the mathematics faculty, while Johnson taught

in the physics department. They traveled together and shared a house until Johnson's death, several years after they both had retired. These are just some of well over a dozen instances in which women in the study found close, sustaining female companionship as well as uninterrupted and successful professional lives.

Table 6.1: Leading academic employers

	Total number of women	Number who held primary job	Average number of years worked by women*	Total number of years worked by women†
Hunter College	20	9	16.8	335
Wellesley College	14	7	17.9	250
University of Illinois	15	6	12.0	180
Vassar College	14	7	12.9	180
Goucher College	5	4	26.0	130
Randolph-Macon Woman's College	6	3	20.9	125
Smith College	9	3	13.3	120
Bryn Mawr College‡	8	3	14.4	115
Pennsylvania State College (Univ.)	7	5	15.7	110
Mount Holyoke College	13	2	7.3	95

\*These averages are based on data that has been rounded.

†These numbers are rounded to the nearest five years.

‡These numbers include Isabel Maddison who was employed at Bryn Mawr for thirty-one years, mainly in administrative positions, the last of which was recording dean and assistant to the president of the college. For the first fourteen years she also held faculty rank.

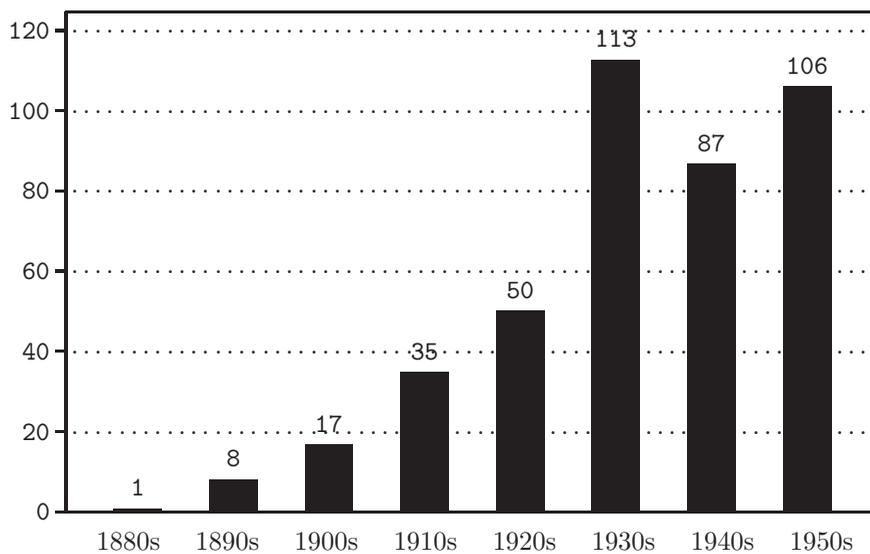


Figure 8.1: Mathematics PhD's to women in the United States by decade, 1886–1959