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Abstract. In the history of the Missouri MAA Section, some of the more interesting people who influenced the growth and development of the Section through the years were and are women. In this paper, we will discuss the contributions of a few (certainly not all) of these women to the Missouri Section and mathematics as a whole, including Emily Kathryn Wyant (founder of KME), Margaret F. Willerding (who dealt with sexism in the 1940s), Maria Castellani (an official in Mussolini's Italy before coming to America), and T. Christine Stevens (mother of Project NExT). Without them, and others like them, both mathematics and the Missouri MAA Section would be poorer.

Introduction

Women associated with the Missouri Section of the Mathematical Association of America (MAA) have had, and continue to have, meaningful roles in the mathematics community. Some of them founded organizations and programs still thriving today, such as Kappa Mu Epsilon and Project NExT. Although some might not have thought so themselves, they all were feminists to some degree, if only for being examples of women pursuing careers in a field dominated by men. Sometimes, those careers were curtailed or even ended because of the prevailing societal norms at the time. And yes, one really was a fascist (when that word was not as pejorative as it is now), and held official positions in Mussolini's Italy, before coming to the US after World War II. We focus on a few (with apologies to all the deserving ones who were left out) of these women and their accomplishments, often achieved in spite of society's still-evolving ideas about what "a woman's place" should and should not be.

Margaret Murray [18] has introduced the idea of *the myth of the mathematical life course*, or briefly, *the myth*. According to the myth, an ideal mathematical career goes as follows. Extraordinary mathematical ability/potential appears early and is nurtured. A major in mathematics as an undergraduate is a foregone conclusion, and graduate school, the more elite the better, follows immediately after the bachelor's degree. Under the guidance of a respected mentor (who is further along in the myth), the doctoral dissertation makes significant contributions to an important area of mathematics. There follows a postdoctoral position and a tenure-track position at similarly elite institutions, and a productive research career while still relatively young gets well under way. At this stage, the person eats, sleeps, and breathes mathematics, and a spouse who effectively deals with the more mundane aspects of everyday life (i.e., everything not mathematics) is a great asset. With age, research slows some, but does not

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stop, and now being a mentor to those younger becomes more important. One is reminded of G.H. Hardy's prescription, "Young men should prove theorems and old men should write books." While the myth, or some of its main parts, has been around for a long time, Murray believes that the quarter-century immediately following World War II was a particularly fertile period for it to flourish. More pertinent to this paper, as Murray points out, the myth was applicable to and achievable by women only rarely, and always with difficulties not faced by men.

Indeed, few, if any, of the women discussed here had lives that even slightly conformed to the myth. For most, their mathematical life courses followed what we might describe in terms of a staircase with landings. (The Escher Staircase described by Jenny Harrison [9] is different way to use the staircase metaphor.) Academic ability, including but not necessarily restricted to mathematics, is recognized in high school or before, and a teaching career is envisioned. An early landing is teaching in a rural school, which was possible without a college degree in the first decades of the 20th century. There was no specialization in mathematics or anything else in rural schools – all subjects, and usually all grades, were taught by one teacher. The next flight of stairs leads to a bachelor's degree, which would allow access to the high school teaching landing. Now, specializing in mathematics begins to be possible. To enhance a high school career or allow access to the junior college landing, the master's degree flight may be climbed. If, during the bachelor's and master's work, sufficient mathematical aptitude is shown, a doctoral program might be pursued; however, a doctorate in mathematics only becomes a goal late in the process, unlike in the myth, where it is there from the beginning. After the doctorate, college and university landings are accessible, the person can return to the high school landing, and research positions also become possible. For women, though, there were additional obstacles. For instance, in at least the first half of the 20th century, one of the best ways for a woman to end her career was to get married - imagine the doors to all the landings slamming shut as the bride says, "I do."

Of course, we should be careful about applying metaphors to a particular career, realizing that both men and women mathematicians have achieved their career goals in a variety of ways, but the myth and its mindset are real, and the staircase is well worn.

Eula Weeks-King

Eula Adeline Weeks was from Rich Hill, a small town in western Missouri about halfway between Kansas City and Joplin. Her family had moved to Missouri from Georgia a little before 1900. In 1901, at age 19, she was a teacher in the Rich Hill high school. She entered the Teachers College at the University of Missouri soon after it was founded, and in 1908 received both a BA and a BS in education. Weeks was valedictorian of the Class of 1908 in the College of Arts and Sciences at Missouri. She continued at Missouri as a university fellow in mathematics and earned a master's degree in 1909. After spending three years at Bryn Mawr, she returned to Missouri and completed her mathematics Ph.D. in 1915. She was Earle R.

Fig. 1 Eula Weeks in 1908. (Reproduced from the University of Missouri Yearbook, *The Savitar*)

Hedrick's first and only doctoral student, the first woman to get a doctorate in mathematics at Missouri, and the second person overall to get a doctorate in mathematics there [23].

Following her doctorate, Weeks became a teacher at Grover Cleveland High School in St. Louis. Given her connection to Hedrick, a prime mover in the creation of the MAA and its first president, it is no surprise that she was a charter member of the MAA and the Missouri Section. However, her main professional activity was with the National Council of Teachers of Mathematics. Her principal nationwide service to mathematics was as a member of the National Committee on Mathematical Requirements. This five-person (initially) MAA committee was appointed by President Hedrick in 1916, with J.W. Young of Dartmouth as chairman and members A.R. Crathorne, Illinois, E.H. Moore, Chicago, D.E. Smith, Columbia, and Oswald Veblen, Princeton [10]. The committee formulated its own charge based on the following questions [11]:

I. What general educational values (utilitarian, disciplinary, cultural) can actually be secured by the study of mathematics?
II. What should be the primary purposes of mathematical instruction?

III.   What topics and what treatment of these topics will best serve to realize the values and purposes under I and II?

IV.   How much of the content included under III should be required (a) of all students in secondary schools; (b) for college entrance; (c) of all students in college?

V.   What should be the preparation of teachers in secondary schools and in colleges?

Because this list included considerations of secondary school mathematics, the committee requested that some of the regional mathematics teacher organizations appoint members to augment the committee. The committee also was authorized to add other members as it saw fit and the need arose. The committee operated for eight years, and its final report of more than 650 pages, *The Reorganization of Mathematics in Secondary Education* [19], was the most comprehensive work on the teaching of mathematics in the US up to that time. Also see Section 6 of [24].

Weeks was added to the committee in the fall of 1919. At the time, she was also a member of a special commission appointed by the College Entrance Examination Board to report on college entrance examination requirements, and this could have been a reason she was asked to join the committee. The two positions were a natural fit - one chapter of [19] dealt with college entrance requirements and another with standardized tests in mathematics. Weeks was a member of the subcommittee appointed to prepare a report on elective courses in mathematics for secondary schools, and was active in publicizing the work of the committee in the Midwest. She spoke on this topic at two Missouri (November, 1920 and November, 1921) and one Kansas (January, 1923) MAA Section Meetings, and at a summer mathematics club meeting at the University of Illinois in 1922. In addition, she was Vice President of the National Council of Teachers of Mathematics in 1922-23 and a member of the NCTM Board of Directors from 1923-26. Locally, she was a member of the Missouri Society of Teachers of Mathematics and Science, serving at least one term as secretary.

Eula Weeks married Harry Lane King, another teacher at Grover Cleveland High School, in 1924, essentially ending her professional career. At that time, it was frequently the custom, if not the rule, that married women were not employed as teachers, and so, after her marriage, Weeks-King resigned her teaching position. As we shall see, this issue faced other women in mathematics well into the mid-20th century. Following the myth was not even a dream if you couldn't have a job. She did maintain her MAA membership until at least 1938 and continued on the NCTM Board for two years after her marriage. She also attended the 20th Annual Meeting of the MAA, held in St. Louis in 1935.

Eula Weeks-King continued to live in St. Louis until 1967, when, now alone after her husband's death the year before, she moved to her son's home in California. She died that same year at age 84.

Emily Kathryn Wyant

The first woman officer in the Missouri MAA Section was Emily Kathryn Wyant; she was Chair in 1927. Wyant was an Instructor at Missouri from 1921 until 1930, and worked on her doctorate during this time, finishing in 1929. In 1930, Wyant left Missouri for Northeastern State Teachers College in Oklahoma, and in 1934, she became the mathematics department chair at Athens College in Alabama. While at Missouri, in addition to her involvement in the MAA, she was quite active in the mathematics honorary society Pi Mu Epsilon. At that time, Pi Mu Epsilon had become the national society for instructors and advanced students at universities with graduate programs. After moving to Oklahoma, Wyant, with the support of her department head, envisioned a national mathematics society for undergraduates, and in 1931 transformed the local mathematics club into the first chapter of Kappa Mu Epsilon, the mathematics honor society for schools that emphasize undergraduate education. Changing the name of a local club is one thing, but the creation of a national organization is something else altogether. Wyant wrote many letters to colleagues at other undergraduate institutions, and by the end of 1932, there were six chapters in five states. She was the first national president of KME. For more on the history of KME, see the "History of KME" link [4] on their website. The current KME national president, Rhonda McKee, University of Central Missouri, is an active member of the Missouri MAA Section.

Fig. 2 Emily Kathryn Wyant in 1921. (Reproduced from the University of Missouri Yearbook, *The Savitar*)

Wyant's doctoral work at Missouri included one summer at the University of Chicago, and she did postdoctoral work there in 1933-34, between her positions in Oklahoma and Alabama. Unfortunately, not long after moving to Alabama her health began to fail, forcing early retirement in 1940 at the age of only 43.

Even as her physical condition deteriorated, Wyant made remarkable efforts to keep up with KME activities. According to her obituary [21] in *The Pentagon*, KME's official journal, "During the next few years, Dr. Wyant watched every step which Kappa Mu Epsilon took. She corresponded with the officers although her hand was too feeble for her to actually write the letters. Many remember her amazing trip with the aid of a nurse from Athens, Alabama, to Warrensburg, Missouri, in order that she might attend the last national convention." That convention was in April of 1941. Wyant died fifteen months later, in July 1942.

Nola Anderson Haynes

A contemporary of Wyant's (they were the same age) at Missouri was Nola Anderson (later Haynes), who also received her doctorate there in 1929. Like Wyant, she participated in the Missouri MAA Section while working on her PhD and left Missouri afterwards. Unlike Wyant, however, Anderson-Haynes came back to Missouri and had a long life and career. She is a good example of someone who climbed the academic staircase with stops at several landings. (Weeks and Wyant also followed this career trajectory.) Anderson taught at a rural school before receiving her BS degree from Missouri, and after her degree taught two years at the high school in St. Charles, MO plus one at Central College for Women, a two-year college in Lexington, MO. Aiming at a career teaching at a junior college, she went back to Missouri in 1925 to get a master's degree in mathematics and astronomy. As related in [6], after completing her master's, the department chair, W.D.A. Westfall, offered her a fellowship to continue towards a doctorate, an offer she accepted instead of seeking a junior college position.

After her doctorate, with now-widened career options, Anderson taught as an Instructor at Missouri for one year, and then in 1930 joined the faculty of H. Sophie Newcombe College, a degree-granting institution for women that was part of Tulane, in New Orleans, as mathematics department chair. While there, she was active in the Louisiana-Mississippi MAA Section, serving as both secretary and vice-chair. In 1938, she married E.S. Haynes (who was seventeen years older), chairman of the astronomy department at Missouri, and who had been a member of her doctoral committee. Haynes' wife of twenty-five-plus years had died in 1934 and he had two adult sons. Returning to Missouri, Anderson-Haynes fully expected her marriage to mean the end of her academic career due to the strict nepotism policy then in force at Missouri, much like Eula Weeks-King's case. Things were changing, though, and her timing was good. Because of the shortage of people to teach during World War II and the big influx of G.I. Bill students afterwards, she was hired by the Missouri mathematics department in the early 1940s. However,

Fig. 3 Nola Anderson in 1922, and Nola Haynes in 1996. (Reproduced from the University of Missouri Yearbook, *The Savitar,* and the UM Mathematics Department newsletter, *Critical Points*)

things had not changed completely. Her job titles always included the word "acting" before she was given a regular academic appointment as associate professor in 1951, the year after her husband retired. Apparently, after acting like a regular professor for nearly ten years, she finally actually got to be one. Back in Missouri, Haynes continued her involvement with the MAA, serving two terms, 1951-52 and 1960-61, as secretary-treasurer of the Missouri Section and one term, 1963-64, as chair. Nola Haynes died in December of 1996, less than three weeks before her 100th birthday. More details about her life and career can be found in [6], [17] and [23].

Margaret Willerding

Margaret F. Willerding was quite active in the Missouri Section from 1948 through 1956, attending every meeting in those years. She received her Ph.D., with Arnold Ross, in 1947 from St. Louis University, and accepted a position as Instructor at Washington University that fall. During 1946-47, Ross had moved to Notre Dame, and Willerding spent much of that year commuting, most likely by train, between St. Louis and South Bend while finishing her dissertation. In South Bend, she became acquainted with Eugene Guth, a Hungarian theoretical physicist who was a friend of Ross. She and Guth were briefly engaged to be married, but Willerding did not go through with it. The fact that Guth was 14 years older than she was could have played a role. Also, although she was trained as a research mathematician and probably could have been a good one, Ross and Guth were the only research mathematicians she knew much about, and as she recalls in an interview with Murray [18], "All they did was eat, drink, and sleep mathematics, and I said, 'There's more to life than this.'" Ross was department chair at Notre Dame, and was interested in hiring Willerding to create a research group of himself, her, and Guth, but it was not to be. Had she married Guth and gone to Notre Dame, Willerding, who did make a stop on the public school teaching landing of the staircase, might have been able to realize something fairly close to the myth. On the other hand, she might have found herself expected to play the supportive spouse role for Guth's pursuit of the physics version of the myth (which he came close to achieving – see [7]). Anyway, especially given her remark above, the

Fig. 4 Margaret Willerding in 1949. (Reproduced courtesy of Harris-Stowe State University Archives)
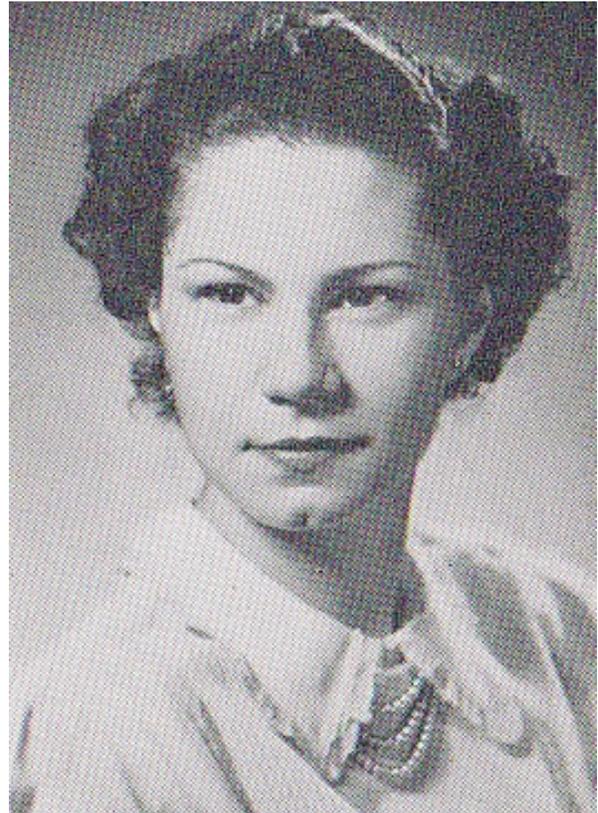
myth didn't seem to be something Willerding saw as all that desirable, and she sure wasn't about to conform to someone else's myth.

This experience did not turn her away from a research career, though; her position at Washington University carried research expectations with it, and she got her dissertation published in the *Bulletin of the AMS*, a good start. However, as she related in [18], she began to feel that Washington University was not a place where she could prosper. For one thing, the department head told her when she was hired that she should not expect to be promoted as fast as a man, even if she did as much or more work than her male colleagues. Another incident was connected with the AMS Regional Meeting held at Washington University in the fall of 1947. There was a tea for the participants on Friday afternoon of the meeting, and one of the faculty wives called Willerding to ask if she would pour at this event. Her answer was, "I don't intend to pour at one of the teas you're having. I'm one of the *faculty*." After just one semester, she had had enough and resigned her position at Washington University.

Because Willerding had previously taught for the St. Louis school district, she was able to request reactivation, and be assigned to the faculty at Harris Teachers College, her undergraduate alma mater. This marked the beginning of her transition from a pure mathematics research career to one in mathematics education, where she was very successful. She was the author of

over 20 elementary textbooks.   She was the second woman (after Wyant over 20 years before) to hold an office in the Missouri Section when she became Secretary-Treasurer in 1949-50, and from 1952 until 1956, she served as the Association Secretary. Beginning in 1952-1953 there were two secretaries for the section, a Local Secretary who presumably handled correspondence and other details pertaining to the section meetings, and an Associate (or Association) Secretary, who was the person who dealt with the national MAA. Willerding was elected Associate/Association Secretary in 1952, and in 1956 she was re-elected Association Secretary for a period of another five years [22]. When she left Harris Teachers College and Missouri for a position at San Diego State in the fall of 1956, the position of Association Secretary was not re-filled.

In June of 1954, Willerding became editor of the Mathematics Problems Department of the journal *School Science and Mathematics*, succeeding another Missouri MAA Section member, Prof. G. H. Jamison from Northeast Missouri State, in this post. Jamison had been editor of the Mathematics Problems Department since 1931, and Willerding did the job until 1976. The following story [14] sheds light on Willerding's personality, which, by all indications, was pleasant, but far from bland.   George Mallinson was the editor of *School Science and Mathematics* during most of Willerding's time as problems editor there. He was Dean of the School of Graduate Studies at Western Michigan and became editor in 1957. He and Willerding had never met, but he was pleased with her handling of the Problems Department. Then in the early 1960s, at a meeting of NSF Institute Directors, Mallinson met someone from San Diego State and asked about Willerding. The person said that he didn't know her well, but thought she was a nice person, a good teacher, and "of rather advanced age." At the time, Willerding was in her 40s, which even then could hardly be considered "of advanced age," but that remark worried Mallinson a little because he didn't want to break in a new problems editor in the near future. So on a trip to California a couple of months later he arranged to meet Willerding. She was to pick him up at his motel and they would have a dinner conference. As Mallinson recalls in [12], "At about 6:00 PM on the meeting date, a rap was heard at the door and [I] opened it and was very astonished. Before [me] was a very svelte, well-constructed young lady in a perfectly fitting dress, dark hair drawn back, standing in front of a robin's egg blue Thunderbird. [My] first thought was that the young lady had not come to the right room. That thought was dispelled when she laughed and said, 'So that's what in h___ a dean looks like!'" They had a pleasant dinner, Mallinson's concerns evaporated, and Willerding continued editing the *School Science and Mathematics* Problems Department for many more years.

Murray interviewed Willerding in person for [18], and that reference contains more details and insights about her life and career.

Maria Castellani

Maria Castellani was at the University of Kansas City from 1946-1961, serving as the mathematics department chair from 1951-1961, and holding the Lena Haag Chair in Mathematics beginning in 1957. She was active in the Missouri MAA Section and was section chair in 1955, the second woman to hold that office. Castellani received the Doctorate in Mathematics at the University of Rome in 1923, and spent 1923-24 at Bryn Mawr, as the Italian Scholar in Mathematics.

Castellani's life does not fit either the myth or the staircase model. She had an interesting and varied career in Italy before moving to Kansas City, where the academic mathematics phase of her life began in middle age. After returning from her year at Bryn Mawr, she became head of the League of Nations' Accounting Office in Geneva. This post, along with her many contacts abroad (relative to Italy), made her a natural choice to be named president of the Mussolini regime's *Associazione Nationale Fascista Artiste e Laureate*, or ANFAL (which translates as National Fascist Association for Women Artists and Graduates). One of the organization's founders, Castellani led ANFAL throughout the 1930s. It was not an easy job, and to be an effective advocate for women in Mussolini's Italy must have required a high degree of political astuteness. Problems she faced ranged from how to prevent mass movement of women workers from rural areas to the cities (an effort that was never very successful) to providing women for traditionally male occupations in order to free the men for frontline military duty. A rival women's association to ANFAL in Italy was FIDLIS, the organization of Italian women degree holders, which had strong ties to the international women's movement. Castellani and ANFAL insisted that the International Federation of University Women (IFUW) withdraw its recognition of FIDLIS so that only ANFAL would represent Italian professional women. However, the IFUW was based in London, and in the mid-1930s, Italy's relations with England were getting worse, so the IFUW showed no signs of agreeing. The problem went away when, in 1935, at the request of the government, FIDLIS "dissolved itself spontaneously" [1].

Fig. 5 Maria Castellani circa 1930, and at the University of Kansas City in 1947. (Reproduced from (http://www.fondazionefidapaonlus.it/wp-content/uploads/2013/05/ANNULLO-X-I-25-ANNI.jpg), and the University of Kansas City Yearbook, *Kangaroo*)

During this time Castellani was also actively involved with the International Federation of Business and Professional Women, and was the prime mover in founding the Italian branch, *Federazione Italiana Donne Arti Professioni e Affari*, or FIDAPA. She spoke at the July 1933 International Federation of Business and Professional Women Congress, held at the Palmer House in Chicago. In the press release for this event, carried by many U.S. newspapers, she was described [20] by: "The Fascist viewpoint will be presented by Dr. Maria Castellani, manager of the statistical bureau of the largest insurance institute in Italy, first woman to become a bureau chief under the Mussolini regime." Through her International BPW activities and her involvement in broadcasting, she became internationally known. In 1936, she hosted a radio broadcast from Italy, which was heard nationwide in the U.S. on NBC [15], featuring Maria Cristina Marconi, second wife of Guglielmo Marconi, the Italian inventor and Nobel Prize recipient. Considering Castellani's background in broadcasting, it should be no surprise that when she was Chair of the Missouri MAA Section, the invited speaker that year, Philip S. Jones from the University of Michigan, spoke on "The Use of Television in Mathematics Education." One wonders whether Jones realized that his hostess probably knew more about his topic than he did.

In 1961, Castellani was hired as Mathematics Department Chair at Fairleigh Dickinson University in New Jersey, where she spent the rest of her career. Richard Delaware of the University of Missouri Kansas City has a nice web page [2] devoted to Castellani.

Distinguished Service Award Recipients

The MAA's national Award for Distinguished Service to Mathematics was first presented in 1962, and the Gung and Hu Award for Distinguished Service has been its endowed successor since 1990. This is the most prestigious award for service offered by the MAA. Three members of the Missouri MAA Section, all of them women, have received this award. We close with brief overviews of their accomplishments.

Shirley Hill, University of Missouri Kansas City, was recognized in 1991 for her valuable leadership nationally in elementary and secondary school curriculum development and for her work on policy boards dealing with the teaching and learning of mathematics. Hill climbed the mathematical staircase; she taught in Kansas City schools before getting her doctorate from Stanford in 1961. She focused her career on teacher education and curriculum development. For more details, see [3] and [5].

Deborah Tepper Haimo, University of Missouri St. Louis, received this award in 1997. She was quite active in the MAA at the national level, culminating with a term as MAA President in 1991-92. During her term as president, she led in the reorganization and streamlining of the

MAA committee structure, and established what we now know as the Deborah and Franklin Tepper Haimo Awards for Distinguished College or University Teaching of Mathematics. See the citation for the award [12] for more details.

Haimo and her husband, Franklin, created their own life course for couples who are both mathematicians. She was not interested in a high school teaching career because she knew that in Boston, where she lived during her teenage years, married women were not allowed to teach in the public schools. This was around 1940. She had fallen in love with mathematics early, and did her undergraduate work at Radcliffe, where she met Franklin while she was an undergraduate and he a graduate student in a Harvard class taught by Saunders Mac Lane. They were married and moved to St. Louis when Franklin finished his Ph.D. in 1947 [13], and began a large family, something they both wanted, and for which Deborah willingly delayed her mathematical research career. Five children and two advisors later, she finished her Ph.D. at Harvard in 1964, while mainly living in St. Louis. The Haimos did quite a good job of supporting each other and sharing the chores of everyday life. They both had respectable research careers; with Deborah publishing more than Franklin, despite her delayed start. Franklin also had seven Ph.D. students at Washington University, but Deborah did not teach at schools with doctoral programs (although she was instrumental in getting one started at the University of Missouri St. Louis, where she served two terms as department chair). One of their daughters, Varda, received a Ph.D. in mathematics from Harvard in 1984.

T. Christine Stevens, St. Louis University, was the 2004 recipient. Stevens can be considered the mother of Project NExT (New Experiences in Teaching), widely accepted as being one of the most successful programs in the history of the MAA. She and Jim Leitzel created Project NExT in 1992, and since Leitzel's death in 1998, Stevens has been sole director of the project. In addition, she has been an AMS/MAA/SIAM Congressional Science Fellow, an NSF Program Director, and active on several MAA and SIAM national committees. Still active, Stevens is currently an Associate Executive Director of the American Mathematical Society and Head of the Meetings and Professional Services Division. Again, see the citation [16] for details.

Conclusion

While working on this project, my biggest regret is that although I have met in person two of the women (Haimo and Stevens), I *could* have met all the others (except Wyant, who died before I was born) if I had known then what I know now and sought them out. I am envious of Murray's experiences interviewing the women for her book [18]. That's another problem with the myth – if you eat, sleep, and breathe mathematics, you can miss out on knowing some people who might have enriched your life. Go ahead and prove your theorems and write your books, but get out and meet others along the way, too.

According to Euclid, "There is no royal road to geometry." There still isn't, even if the myth can be achieved, which might be as close as we can come to the modern equivalent. Each of these women followed her own road to a mathematics career, and each can serve as an example of success in mathematics for any aspiring mathematician, man or woman.

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