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Women in the American Scientific Affiliation: Past, Present, and Future

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Roles of women in STEM fields, including social and natural sciences, have changed significantly since WWII. Studying the inclusion of women in the American Scientific Affiliation (ASA) provides a distinctive gender-based case study related to Christian mission and the evangelical Christian community. Analysis of fifty years of newsletters, leadership statistics, and membership numbers illuminates the story of women over time. The history of women in the ASA parallels the larger advancement of women, while also illuminating unique challenges within the evangelical Christian context.

Keywords: American Scientific Affiliation, women and science, scientific professional associations, intersectionality, gender equity, feminism, Christianity and science, religion and science

American Scientific Affiliation History and Mission

Established in 1941, the formal objectives of the American Scientific Affiliation (ASA) center on investigating the relationships between faith and science and disseminating these research results to both Christian and scientific communities.¹ The statement of the first national convention in 1946 called the ASA "a group of Christian scientific men" who advanced this mission.² Telling the story of how women advanced within the ASA offers a unique case study of the history of women in science in North America, with an emphasis on the United States, because of its ties to the Christian, and particularly evangelical, communities.

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A History of Intersectionality

The ASA and its members sit distinctively at the intersection of American culture, the professional scientific community, and the Christian community. Gender adds another element to this intersectionality as Janel Curry-Roper alluded to in her essay, "A Christian Woman in Academe" in 1996.3 Intersectionality is a framework that allows insight into the ways that multiple institutions and identities combine to shape people's experience of society and culture.⁴ Nuanced analysis and understanding is needed when bringing together American culture, professional scientific community, Christian community, and gender in order to illuminate how cultural change takes place.

Margaret Rossiter has written definitive works on the history of women in science in the United States.⁵ Recent work by Karen Foss, Sonja Foss, and Alena Amato Ruggerio has outlined the cultural history of feminism and its phases in the United States.⁶ Sally Gallagher traces the development of feminism and its relationship to the evangelical community.⁷ More broadly, Kristin Du Mez's recent book, Jesus and John Wayne, analyzes the intersection of evangelical culture and patriarchy associated with American nationalism.8 Research on the role of evangelical women within the larger social sphere is more limited, with the most research done on Christian higher education and why women involve themselves in institutions that restrict the use of their gifts.9 Brad Christerson, Elizabeth Hall, and Shelly Cunningham, in a study of job satisfaction among women in such institutions, found that inequalities were greater than at secular institutions. However, women also exhibited higher satisfaction at evangelical universities than their secular counterparts, citing close mentoring relationships with students, friendly noncompetitive relationships with colleagues, and an ability to integrate faith with work.¹⁰ These institutions, like the ASA, lie outside the church, while promoting professional and Christian mission and fellowship for those working within the organization. This article explores relationships among a distinctive set of institutions: American culture, professional scientific community, evangelical Christian community, and the women that live in all of them within the ASA.

The ASA was formed to promote community among scientists of faith who often faced tensions within evangelical church culture over issues of science. Simultaneously, shifts toward fundamentalism in the evangelical church that affected views of science also reflected theological shifts related to appropriate roles for women. Relevant questions include: Did men of the ASA understand the issues of women differently than men in the broader evangelical church? How did the ASA compare to the general trends in professional scientific societies across the country? How did these various lenses and institutions shape the story of women in the ASA?

Methodology

This research drew on multiple data sets from 1941 to 2020 to reveal the presence of women in various roles in the ASA, alongside discussions within the ASA related to gender climate. The goal of this project is to locate the advancement of women in the ASA within the intersecting contexts of historic waves of feminism across the country, within women's advancement in STEM fields more generally, and within theological discussions.

Data on women drawn from the ASA included membership data compiled by the percentage of women members from 1941 through 2020, as well as records of the number of ASA Fellows. The ASA newsletters from 1961-2008 provided data on the "lived" experience within the organization. Entries under the Personals section, with individual entries that were generally under the heading of "Personals" but evolved into headings such as "What ASAers Do" or "Doings of ASAers," were computed as a percentage of these entries for women as a measure of the visibility and engagement of women. In addition, all newsletter texts that referenced a woman in the ASA were compiled over the time period and content analysis was carried out, tracking changes over time for the following variables: discussions that exhibited a lack of self-awareness on the status of women; discussions that purposefully advocated for the advancement of women; use of labels for women that are not comparable to labels for men (such as "ladies," "wives," and the husband's name after the address of "Mrs."); and use of the terms such as teacher, wife, or housewife specifying women's vocational callings that reflect the balance of vocations at a particular time period.

The newsletter commonly recorded the meetings, leadership, and activities of regional chapters. From these records, the number of different women that were mentioned in regional leadership were computed for each year. National roles such as speaking at annual meetings, committee service, or annual meeting leadership were computed for each year. Finally, major articles on specific women that focused on their scientific work were noted over time. The analysis of these data sets and their overall pattern of alignment led to identification of six separate eras of the involvement of women in the ASA.

Marginal Involvement: Pre-1961

Post-WWII culture emphasized traditional gender roles which valorized the role of housewife for women. Women whose work mattered during WWII found themselves and their work marginalized afterward.¹¹ By the 1950s, women scientists who had standing during WWII lost ground.¹² The ASA was born in the midst of this era. Margaret Rossiter calls this the golden age of science that was generally a very dark age for women. At its beginning, the culture of the ASA had been one of families of (male)

Women in the American Scientific Affiliation: Past, Present, and Future

members coming together at its annual meetings. The culture and language of the organization was one of informality in spite of its professional goals. The ASA showed no women members until 1949 but grew to as high as 5.5% of the membership by 1956¹³ (fig. 1 and fig. 2). Women can be seen as early as 1946 in photos of conference attendees.¹⁴ In the 1950s, four women published a total of seven articles out of about 250 appearing in the *Journal of the American Scientific Affiliation (JASA*).¹⁵

The ASA newsletter used language such as "lady members" during this period. The use of "lady" called attention to these persons as being marked cases. Members who were men were "members," while members who were women were marked as "lady members." Identifying women as "marked" members and men as members leads into the next era, in which women took the status as "honorary men" who stand as exceptions to the rule.¹⁶

Honorary Men: 1961-1968

The 1960s were characterized by many of the same elements of the previous era. The ASA newsletter's language was one of a family, where the members and their wives came together. For example, a 1961 newsletter states:

In June they will hold their annual Ladies' Night banquet. More power to this group who have not only solved the monthly meeting problem, but also have advanced to the refined stage of involving the wives.¹⁷









Some initial signaling of the generational shift to come appears in a 1963 newsletter with the juxtaposition of wives, ladies, and the daughter of a member who desired to be a member.

Sights not easily forgotten: ... Helen Moberg and Eva Everest knitting and crocheting and plotting, like Madem LaFarge [sic] in *The Tale of Two Cities*; Dick Hendry's new blonde wife (nice going, Dick!); ... Dr. Howitt brings the nicest ladies to the conventions, this time his niece, Mrs. Barbara Ferguson; Ann Boardman, daughter of Donald Boardman of Wheaton College, submitting her application for membership – the FIRST second generation ASA member ...¹⁸

Gendered labels for women continued to dominate the newsletter during this era (table 1). When mentioned in the newsletter, most women were associated with gendered vocations. The text of the newsletter showed a high level of sexist language applied to female members and to male members' wives, showing a general lack of reflection on the role of women in the organization.

In the 1960s, 4 out of 53 elected Fellows were women (7.6%) (table 2). This percentage of Fellows mirrored the percentage of women members which remained between 4% and 5% overall.¹⁹ Two women served on national boards during this period, one on the

editorial board in 1960 and one on the membership committee in 1967.

Rossiter found that few scientific professional societies collected data on women prior to 1968. And even if women were present, they held lower positions (non-Fellows, associate members).²⁰ This makes it difficult to compare the ASA with other scientific societies, especially because of the ASA's interdisciplinary nature. Rossiter found data that showed women made up 12% of the American Association of Anatomists in 1960 and 13% of the Association of American Geographers in 1964. While the percentage of women in the ASA appears to be lower than in other organizations, women Fellows of the ASA reflected the same percentage as women members. This was in contrast to Rossiter's findings of great disparity between the percentage of women who were members and the percentage of women who were Fellows in this period.²¹

Analysis of Personals in the newsletter illustrates the minimal presence of women, falling far below their percentage level as members. Of the more than 778 Personals listed in the newsletter from 1961–1968, only 22 referred to women (2.8%) (fig. 3). Likewise, Joseph Spradley and Dorothy Chappell found only one paper out of 130 was given by a woman at the annual meeting (0.8%) and only three out of 350

	1961–1968	1969–1977	1978–1988	1989–1998	1999–2008
Gendered Labels	6	1	0	0	0
Gendered Vocation	14	21	34	11	0
Women in Regional Leadership	8	14	9	6	6
Women in National Leadership	1	2	8	21	39
Major Article on Woman Scientist	0	1	1	2	1
Self-Reflection on Role of Women	0	7	6	1	2
Lack of Self-Reflection on Women	2	3	0	0	0

 Table 1: Newsletter Content Analysis by Eras: Counts over Fifty Years

Table 2: Appointment of Fellows by Decade

	1960–1969	1970–1979	1980–1989	1990–1999	2000–2009	2010–2019
Men	49	59	50	20	20	49
Women	4	4	6	7	9	17
Total Fellows	53	63	56	27	29	66
% of Women Fellows	7.6%	6.4%	10.7%	26%	31%	26%

Women in the American Scientific Affiliation: Past, Present, and Future

JASA articles and communications during the 1960–1969 time period were authored by women (0.9%).²²

The 1960s brought about the second wave of feminism. One of the triggering events was the publication of The Feminine Mystique by Betty Friedan. She identified systematic sexism as that set of assumptions that left women unfulfilled because it was thought that women should aspire only to motherhood and homemaking. A protest at the Miss America pageant in 1968 increased the visibility of the movement in the public eye. Equal opportunities for women in education, economics, and employment were an emphasis in this second wave. Language was also emphasized which brought about the use of Ms. in place of Mrs. or Miss. Title IX also gave women equity in the area of education.²³ In June 1972, Title IX finally extended the Equal Pay Act of 1963 to higher education and banned sex discrimination.24 The effects of societal change began to be seen in the rise of the number of women in the sciences. Women in scientific fields rose to about five percent between 1960 and 1970, with the greatest rise in the biological sciences.²⁵

Incongruence: 1969-1977

The end of the 1960s through the 1970s saw change in the ASA. Incongruence characterized the organization as it tried to correct language and be sensitive to the presence of women members, while remaining embedded in a culture that assumed all members were male and had wives. In March 1969, the purpose statement of the ASA was changed to "an association of men and women."²⁶ This recognition of women scientists remained incongruent with the culture as illustrated by an article in the ASA newsletter in October 1970:

ASA Conventions are always more fun because of the ladies present. Besides many wives who come just for the fellowship and firecrackers, we're seeing a growing number of women scientists, too ... We also got to meet a wife or two who is a scientist in her own right ...

In honor of women's long-suffrage in this country, we thought we'd publish a list of all the husbandwife scientist teams within ASA, but we hit a snag. The list Hazel sent us from Mankato came with the names listed only as 'Mr. and Mrs. So-and-so.' WOW! We wouldn't dare publish such a list these days without giving the wife's very own first name.

So, why don't more of you gals drop us a line now and then? Not your hem-line, please!²⁷

The newsletters of this era clearly supported an egalitarian position in the church and organization rather than the theological arguments for male headship that were pervasive within the evangelical church



Figure 3. Percentage of Personals about Women in the ASA Newsletter: 1961–2008

veved Old Testament passages ... He concluded from Gen. 1-2 that women have a special role of "helper-complement" but man has the collective leadership role, "captain of the family team." He argued that for Eve's sin in the Garden, God "expressly subordinates woman to her husband." He talked about O.T. culture and law and exposited Proverbs 31 about the virtues of a good wife. "She might even engage in business activities," he conceded, "but only with her husband's approval."

at the time. In June 1974, the newsletter included an

extensive article on an event that debated the role of

After dinner (roast chauvinist boar with its foot

in its mouth?), theologian Gleason Archer ... sur-

women:

... the final speaker was no "token female." She was Nancy Hardesty, who had taught at Trinity last year but is now at the U. of Chicago Divinity School working toward a Ph.D. in church history. She has written a book with Letha Scanzoni ... entitled All We're Meant to Be: A Biblical Approach to Women's Liberation. She also has a chapter on "Women and Evangelical Christianity" in Clouse, Linder, and Pierard's The Cross and the Flag ... Her "Biblical gynecology" didn't exactly coincide with Gleason Archer's. She said we must be willing to read the Bible with the possibility of discarding traditional interpretations. (After all, Galileo was right and traditional Biblical interpretations weren't.)

She reminded the audience that "he" is no more descriptive of God than "rock," "bread" or "vine," pointing out that "she" is actually used in such passages as Isa. 42:14; 46:3; 49:15; 66:13; and Luke 15. In the N.T., anthropos rather than aner is used in depicting the Incarnation; Christ became human, not specifically male. And He died for women, too. Genesis has both male and female made in God's image, receiving the same commission, and equally "blowing it" in the fall. In general, Hardesty disagreed with Archer on whether certain passages are descriptive or prescriptive. She pointed out that the Holy Spirit dealt directly with Mary, not through her father or Joseph. She concluded by suggesting that the church is hurting because we've denied and bound and stunted the growth of half the church's members, half the body.

Wow. That must have been some meeting. With the dominance of males in ASA and in particular in positions of leadership, this topic ought to be taken up by many local sections, and probably at a national meeting. Do scientists prefer female lab assistants because they're more submissive? Do we think of our own sons as potential doctors, our daughters as potential nurses? Would we welcome more women into our departments on an equal footing?28

In this article, Walt Hearn, newsletter editor, refers to parallels with the science-faith debates (reference Galileo), draws on professional credentials, summarizes Hardesty's description on inconsistent arguments among her opponents, and then asks questions of ASA members.

The first major article featuring a woman and her scientific contributions, Marie Berg, appeared in 1975.29 The newsletter also showed increased effort around language related to women and awareness of their presence or lack thereof at meetings of the organization.³⁰ This effort included news items about the Evangelical Women's Caucus which was a Christian feminist organization.³¹

Personals in the newsletter that were about women increased to a 5% level and stayed there throughout the time period (fig. 3). Much more sensitivity and awareness of gendered language emerged with gendered labels virtually disappearing by the end of 1977 (table 1). Women outside of more-gendered vocational positions were still rare but attention was being paid to women scientists. Women in leadership at the regional levels were much more recognized and present with fourteen individuals mentioned across the regions. This mirrored other professional societies across the USA.32 Women's involvement tended to settle at the local level.33

The number of women appointed as ASA Fellows grew by four from the previous decade while numbers of men appointed increased from 49 to 59, leaving the number of women elected as 6.4% over the previous 7.6% (table 2). Being a Fellow was a requirement for election to the Executive Council. The number of women Fellows elected continued to mirror the percentage of women members. Spradley and Chappell estimate women's ASA membership in 1972 to be 6.4% though the number of papers given at the annual meeting remained lower at eight out of 240 (3.3%) and only 16 out of 390 JASA articles and communications (4.1%).³⁴

The decade of the 1970s experienced the steepest increases in the number of women in STEM Women in the American Scientific Affiliation: Past, Present, and Future

occupations.³⁵ In spite of these increases, the number of women in the ASA did not see a comparable increase.

Increased Visibility: 1978-1998

The 1980s are often referred to as the post-feminist period.³⁶ At this point, many people believed feminism was no longer necessary and equality had been accomplished. Within the ASA newsletter, arguments continued to be made for the need to advance the cause of women. The newsletter article, "Now Let's Hear It for the Men," reported on an ASA member who was doing research on men to counteract male behaviors that were detrimental to women.³⁷ In 1980, the ASA publicly recognized its failures and tied that recognition to being a positive witness to the gospel:

Any organization in our culture dominated by white males is bound to look racist and sexist to outsiders. It may take us a long time to turn things around to a positive witness to the impartiality of the gospel, but the way to get there is to begin. For years women scientists were included in American Men of Science. Why didn't anybody think of changing it to Men and Women of Science long before that was done? ... As Christians we shouldn't shy away even from hard things when they're the right thing to do. We certainly don't want to overlook any simple, sensible actions that would show the world that in the Christian family brothers and sisters are valued equally.³⁸

In this newsletter, the editor committed to writing more stories about women and noted the increase of women in leadership in local sections.

The December 1979/January 1980 newsletter announced the first woman candidate for the ASA Executive Council, Marie Berg.³⁹ In spite of this advocacy, Berg failed to be elected to the Executive Council, and the February/March 1980 newsletter lamented the general lack of women in ASA leadership and other spheres, including the church.⁴⁰ A subsequent newsletter issue, in its response, made it clear that some members pushed back on the notion that being a woman was a characteristic to consider in voting. The response was quick in turning the issue around:

At least one reader misread our comment ... He thought we must be implying that "being female is the most important criterion for election" (to the ASA council). Our comment referred to past history in society as a whole, in the church, and in science—as well as in our Affiliations. The fact is that in all those realms "being female" has long been "the most important criterion" for underdevelopment of intellectual gifts and leadership capacity.⁴¹

The rhetorical argument in support for women then turned to the authority of one of the founders of the ASA, Alton Everest, and reported on how he and his wife Elva had sent the leadership a paper that pointed out that in 1976 less than 2 percent of U.S. engineers were women, although female enrollment in engineering schools was up to about 10 percent nationwide. The paper analyzed the historical structure of the discrimination against women as a more recent phenomenon, illustrated by data that showed that well into the Industrial Revolution, women had worked side by side with men in most areas of work.⁴² The end of the article then moves to the authority of scripture, drawing on Acts 2:

Well, it does say in Acts 2 that only "in the last days" will God pour out his Spirit lavishly and indiscriminately on both "your sons and your daughters." God says "on my menservants and my maidservants in those days I will pour out my Spirit; and they shall prophesy." Come to think of it, though, Peter said that those wonders were what was beginning to happen right then – and that was almost 2,000 years ago.⁴³

The argument for inclusive language continued in this era. The position of biblical feminism was assumed in the newsletter, with statements such as, "Even though the logic of "biblical feminism" seems clear, some sexist habits are deeply ingrained."⁴⁴ The article goes on to advocate for inclusive language, pointing to the professional standards in publishing as well. The article asks readers not to trivialize the issue and used humor to engage:

If you're giving a paper, don't assume that "man" or "men" obviously includes everybody—unless you think women shouldn't respect a door with "MEN" written on it. Feedback helps us develop linguistic sensitivity. Ask a local EWC (Evangelical Women's Caucus) member—or even a secular feminist—to read a draft of your paper, and follow her (or his) suggestions ...⁴⁵

The editor draws on research on the issue, giving members references such as linguist Robin Lakoff's *Language and Woman's Place*. The editor also quotes male members from the annual meeting who were asking why the organization could not make progress in its presenters using inclusive language.⁴⁶

Both theological and scientific arguments were used in this era to support the advancement of women, as well as using the authority of leaders within the ASA. More articles on women as scientists and scholars appeared as promised.⁴⁷ However, the structural barriers within the ASA were not clearly analyzed. For example, when lamenting the lack of women Fellows, the editor wonders whether the designation of Fellows should be changed rather than ask the question about the process by which they were chosen or the barriers to their identification.48 The ASA was not unique in its dearth of women Fellows. For example, in 1984 the American Psychological Association's membership was 43.8% women but only 16.2% of Fellows were women. And in 1994, women were 15% of the American Geophysical Union with only 3.1% of Fellows being women.49

The 1980s were characterized by the assumption of equality and a desire for it. From 1978 through 1988, Personals reached a stable level of around 7–8% for women (fig.3). Gendered vocational occupations still dominated in spite of the extensive self-reflection going on in the organization (table 1). Clearly the emphasis on inclusive language was operationalized because gendered labels disappeared entirely from the newsletter. Women were present in regional leadership; women in national leadership rose, in contrast to the previous decade.

Ann Hunt was the first woman elected to the Executive Council in 1983. The success of finally getting a woman on the Executive Council paralleled other professional scientific organizations in which women began to move into national offices.⁵⁰ Hunt moved into the presidency of the organization in 1986. The ASA followed a rotation so that once elected to council each member rotated up to the presidency, ensuring, in this case, that a woman would become president. The timing of the first woman president of the ASA was comparable to other such organizations.⁵¹

During the decade of the 1980s, the number of women elected to Fellow rose from 4 to 6 while the number of men dropped from 59 to 50 (table 2). The result was an increase in the percentage of women Fellows during the decade from 6.4% to 10.7%.

Spradley and Chappell recorded twenty papers out of a total of 400 given by women at the annual meeting (5%) and 13 out of 340 *JASA* articles and communications (3.8%).⁵² These numbers do not indicate significant change during the decade. The lack of progress is especially evident when measured against the national trends of women in STEM fields. By 1990, women held 42% of the positions in the biological sciences on the high end, and 9% of the positions in engineering on the low end.⁵³ In contrast, the percentage of women members of the ASA essentially remained flat between 1972 and 1990 at around eight percent.

Rossiter describes this time period as one of intense legal confrontation, in which women undergraduate and graduate students in the sciences increased, while the number of women science faculty members did not change significantly. Women were also discovering that they were often paid less than men in comparable positions.⁵⁴

In 1993, Kenneth J. Dormer, President of the ASA Executive Council, called upon the ASA to recruit and appoint women to leadership roles in the ASA.⁵⁵ He stated:

We need to increase our membership with an emphasis on young scientists and women ... [W]omen need special encouragement since they often experience discrimination in science in subtle ways. I would like for the following to occur: Appoint more women to the commissions, panels and nominating committee, have at least one woman on the Council, and have female members write to female prospects to encourage them to join the organization.⁵⁶

These efforts in the decade that followed began to bear fruit and coincided with the third wave of feminism that arose in the early 1990s. The third wave emphasized analysis of power dynamics, valorized individual responsibility, and celebrated difference, recognizing women's multiple identities.⁵⁷

Women's gains in the ASA were mixed from 1989 to 1998. Personals in the newsletter remained stable from the previous decade (fig. 3). References to gendered vocational occupations declined dramatically (table 1). Likewise, women who were referenced in national leadership rose while women in leadership at the regional level remained stable. Several major articles on women scientists were published

Women in the American Scientific Affiliation: Past, Present, and Future

while commentary on the issue of women was minimal, particularly in contrast to the previous decades. Women scientists continued to be highlighted in the ASA/CSCA newsletter.⁵⁸

In spite of increased visibility, numbers of women did not significantly change. Between 1990 and 1999, seven women were elected as Fellows out of 27 – an increase of one woman from the previous decade (table 2). The ASA leadership was intent on electing more women to the ASA Executive Council during this period. Ann Hunt was the first elected in 1983. The next several women elected were run against other women to ensure the representation of women. This appears to be an intentional strategy to get women on the Executive Council, given the greater number of men running for office. The percentage of women members declined between 1990 and 2000 at a higher rate than the overall general decline in ASA membership (fig. 1 and fig. 2).⁵⁹

During the 1990s, women in STEM fields continued to rise except for women in math/computer science.⁶⁰ Between 1970 and 2000 the number of women completing doctoral degrees in science and engineering had quintupled to almost 10,000 with psychology and biology dominating.⁶¹ The question remains as to why the ASA did not significantly benefit from this increase of women in STEM fields across the United States.

The roots of change in the ASA began in the late 1990s through the efforts of Sara Miles, Dorothy Chappell, and Mary Stewart Van Leeuwen, who organized a conference for women in science at the Center for Christian Women in Leadership, at Eastern College in June 1997.⁶² Several women who later became leaders in the ASA and other faith-based and secular organizations point to the importance of this conference in their professional development.⁶³ This movement had parallels within the professional scientific community.

Starting around 1997, new voices began to emerge to articulate the need for institutional transformation.⁶⁴ MIT issues related to gender equity gained national press after MIT women worked together to produce a report in 1999, and soon gender equity of women in science became a national issue that resulted in a new atmosphere that called for concrete goals and accountability.⁶⁵ The number of women appointed to

the National Academy of Sciences has dramatically risen since that time.⁶⁶

Reaching: 1999-2010

A second conference for Christian women in science was held in 2000.⁶⁷ The conference addressed a variety of issues that ranged from workplace challenges, to balancing work and home, to difficult biblical passages, to research and grant-writing. The 2000 ASA Annual Meeting included a session addressing the challenges of women.⁶⁸ The importance of the professional work of women scientists in the ASA gained visibility.⁶⁹

The change in the status of women in the ASA was evident across the organization. In the newsletter, the number of references to women in Personals between 1999 and 2008 doubled from the previous 20 years (fig. 3). The number of women elected as Fellows steadily increased to 31% elected between 2000 and 2009 (table 2). The number of men elected remained at a relatively low number, leading to an increase in the representation of women. The number of women members began to rise significantly at the end of this decade (fig. 1 and fig. 2). This increase was represented in absolute numbers with 117 women in 2000 and 166 by 2010. Women were also more consistently being elected to the Executive Council and eventually women began to run successfully against men.

Structural Change: 2011-2020

The fourth wave of feminism began around 2008. The emphasis in this era was on addressing the structures that had failed to advance or protect women.⁷⁰ Karen Longman and Patricia Anderson, in their review of the literature on barriers facing women in leadership, provide insight into the general range of structural barriers facing women in organizations like the ASA.⁷¹ Among the list of environmental or organizational barriers, they cite studies revealing the often male-normed organizational cultures can be unappealing to women: the difficulties faced by women in maintaining work-life balance due to lack of flexible structures; the challenges of tokenism; the exclusion that women still face from professional networking opportunities and access to mentors or role models.⁷² Robin J. Ely and Deborah L. Rhode noted in a comprehensive encyclopedia article defining the challenges facing women in leadership that

"the problem of exclusion is compounded by organizational structures and practices that tend to reflect and support men's experiences."⁷³

Barbara Kellerman and Deborah L. Rhode describe the assumptions built into the pipeline theory that assumes that the number of women will increase as they increase at the bottom of the pipeline:

This [theory] presumes, first, that women and men have similar qualifications, once women are in the system, they will ascend to the top at a rate similar to that of men. It presumes, second, an absence of gender bias—namely, that no gender stereotypes will impede women's progress. The pipeline presumes, third, that in spite of the differences in gender, organizational systems and structures work as well for women as they do for men. Finally, it presumes patience—that women's equal representation at the top is simply a matter of time.⁷⁴

In addition to these structural or environmental barriers for women, they also face internal barriers. Studies suggest that women may be less likely to act in self-promoting ways and to take the kinds of risks that lead to visibility.⁷⁵

In addition to these environmental and internal barriers, Longman and Anderson noted "the influence of deeply held theological convictions about gender roles that overtly or subtly can deter women from considering or aspiring to leadership."76 They suggest that role congruity theory can shed light on the nature of the challenges faced by women in the Christian organizational context. Role congruity theory attempts to explain how deeply embedded social patterns and assumptions about the roles of men and women can influence perceptions of individual performance and shape expectations that people have of themselves and others.77 According to Longman and Anderson, this theory helps to explain the challenges faced by women attempting to navigate possibly conflicting role expectations, whether those be expectations stemming from their theological worldview or from the male-normed workplaces which they are trying to enter.⁷⁸ Thus women have to do double work to manage all the challenging internal and external barriers while progressing professionally.

Women need models whom they can identify with; and women need organizational programming that can let them bear the weight of family pressures,

which fall disproportionately on women.79 Barbara Reinhold says that, in her experience, "women inconvenienced by a company's rigidity of insensitivity to family-life issues are more likely to quit a job than to speak up and ask for what they need to make that job manageable."80 The same is true for organizational membership, involvement, and service. For example, the Ecological Society of America found that when women organized sessions, the percentage of women presenting correlated with the percentage of women members and also led to the representative rate of publication in their journal.⁸¹ The lack of childcare at their scientific meetings made it difficult for young mothers.⁸² The challenge is reaching the critical mass needed to begin to change the culture of the organization. The consensus is that the percentage of members who have been marginalized needs to reach 25-30 percent in order for change to begin.83

The first major structural change in the ASA, the establishment of the Christian Women in Science (CWiS) affiliate, took place in 2013. CWiS invites women to join, and encourages women in their careers in STEM. This move was part of an overall directional change in the ASA that led to the re-emphasis on affiliate groups and regional chapter development. Lynn Billman was the pioneer whose visionary efforts led to the establishment of CWiS. One of her goals included being certain that at least one woman was elected to serve on the Executive Council of ASA making it "more diverse and more effective for twenty-first century leadership."⁸⁴ She also was diligent to establish links in CWiS between early and later career women in the ASA.

CWiS provides recruitment efforts, especially of graduate students and early career females, as well as supportive programs and mentors for women to consult as they undertake successful STEM careers.⁸⁵ The CWiS Board's vision included establishing special programs at the ASA annual meetings and initiating a CWiS blog and Facebook page for the ASA that became a reality with the founding of CWiS. The move to the online environment was a fundamental shift in accommodating the lives of women. The mission of CWiS, as restated in the 2022 strategic planning process, is to support Christian women who are interested in the integration of Christian faith and science, and to encourage them in their professional development and spiritual growth.⁸⁶

Women in the American Scientific Affiliation: Past, Present, and Future

The impact of CWiS on the number of women in the ASA was dramatic. Women members of the ASA made up 10.9 percent of the membership in 2010 with 166 individual women (fig. 1 and fig. 2). In 2013, the percentage grew to 39 percent, partially as a result of a decrease in the number of men as well as an increase of the number of women to 464. By 2020, the number of women in the ASA rose to 650, or 30 percent of the membership. While the percentage of women Fellows elected from 2010 to 2019 dropped from 31% to 26% from the previous decade, the absolute number of women increased from 9 to 17, or almost 100% (table 2).

The second structural change within the ASA related to the process for selection of individuals for the ASA Executive Council. Members of the executive council had traditionally been through an election process of two candidates running against each other, a practice not required by the bylaws. A change in practice was made starting in 2017 through an election process without multiple candidates. The decision was made to build a council based on the range of experiences that individual would bring to the council. This strength-based approach involves seeking a range of gifts that best serve the whole. An additional change, which did involve a change in the Constitution, was to increase the number of members on the council and to allow non-Fellows to serve on the executive council. The majority of council members are required to be Fellows. This change was adopted April 18, 2019. In 2020, after these changes, with multiple openings on the executive council, three women were elected to the executive council, making that executive council the most diverse in its history. It was in this same period that the ASA had its first female executive director, Leslie Wickman, who served in that role from 2016-2020.

The third structural change within the ASA that benefited women came with the pandemic. Traditionally, the ASA Annual Meeting had dominated programming. The move to multiple events and online programming created more opportunities for women to participate. This flexibility has been reinforced with the increased vibrancy of regional chapters.

Early in the history of the ASA, women were referred to as "lady members." The underlying database for membership continued to reflect this linguistic "marking" of women. In 2010, only women were marked in the database: they were listed as F for female. The column was blank for men. By 2013 and 2014, it appears that new members of both genders were being marked as either M or F. Only in 2015 did both get marked consistently, removing the final practice related to gender-marked cases.⁸⁷

The dramatic increase of women in all aspects of the ASA between 2010 and 2020, primarily since 2013, is late in terms of the overall presence of women in STEM fields. Most of the growth nationally occurred in earlier decades. In fact, of all the science and engineering (S&E) degrees awarded in 2016, women earned about half of the bachelor's degrees, 44% of master's degrees, and 41% of doctorate degrees, about the same as in 2006.⁸⁸ Women in the ASA made up 30% of its membership by 2013.

Findings

This article explored the intersectionality of American culture related to women, the professional scientific community, the evangelical Christian community, and the history of women in the American Scientific Affiliation. This research explored how the ASA and its leaders saw and understood the challenges of women in the ASA and its parallels to issues of theology around women in the evangelical church. The research also compared the timing and data related to women in the ASA with general trends across the country and in professional scientific societies.

The history of women in the American Scientific Affiliation tracks very closely with the larger societal movement of feminism. The trends in the ASA around the status of women paralleled the larger societal trends, for example, in the use of inclusive language (table 3).

Rossiter's work on the growth of women in professional scientific societies also shows the parallels of the ASA with these institutions. The ASA appointed the first woman to its executive council, and then as its president, within the similar time period of many of these organizations. In contrast to these organizations, however, the ASA lagged behind by more than a decade in its attempts to increase women members, not making significant gains until after 2010. Structural barriers were also addressed much later than in other professional societies. ASA newsletters illustrated arguments for the advancement of women that reflected the unique nature of the ASA, which sits at the intersection of faith and science. These arguments drew on empirical evidence, the professional credentials of individual scholars, historical evidence, and theology, showing parallels to the science-faith dialogue. In a few cases, the historic debates over science and faith were referenced when addressing the issue of women in the church and society, illustrating the parallel framing of the argumentation of the two issues.

The question remains as to why the late date for the increase in women members and the removal of structural barriers. What was there about the nature of the ASA that led to this? Several possibilities, unique to evangelical religious lenses, present themselves.

One explanation for underrepresentation of women so late in the history of the ASA is that the incongruence between the profession of science and the evangelical subculture was greater than that of the general society. We have virtually no research on the intersection of employment of women in science and the evangelical community over time. Could possible incongruence between scientific careers and the evangelical community have led to fewer women from within the evangelical sector of society going into science, or into the science-related workforce after higher education? If trained scientists, might these women have found little support for pursuing a profession? Likewise, might those who did pursue science, given this subculture, have been hesitant to associate with an organization that was confessionally Christian, choosing higher status societies, given their experiences as a professional woman in the church in general? Such incongruence could have

been further exacerbated by the topical dominance of some issues—origins, for example—that might be of less interest to women. Some research shows that women tend to focus on topics with more direct impact on lives and communities.⁸⁹

In comparison to secular professional science societies, the ASA was late in addressing structural issues that were barriers to the advancement of women. Research on evangelical culture finds that those in this tradition tend to be individualistic in perspective and worldview. The result is that evangelicals tend to see imperfections in society as the result of individual sin rather than structural in nature. Solutions to these imperfections are then also viewed through the lens of individual change, as opposed to institutional change.⁹⁰ This theological lens may have contributed to the late assessment of structural barriers within the ASA.

One unique aspect of the ASA, in comparison to other professional societies, is the element of "fellowship." The ASA Constitution includes the objective, "to provide a community of fellowship for Christians involved in science and related fields."⁹¹ The ASA, along with the evangelical community, often ties this to the concept of "family." For example, in 1986 an article in the ASA newsletter reported:

... many people of both sexes turned out for the showing of slides from last year's Oxford meeting and the two ASA tours of Europe. Taking that trip together introduced wives and families to other ASA members and perhaps gave them a greater sense of participation in ASA ... It's one thing to arrange "something for the wives" as many groups do while husbands are busy at a meeting; it's another to think of ways to draw the whole "ASA family" together. But the latter seems a more ap-

Marginal Involvement Pre-1961	Honorary Men 1961–1968	Incongruence 1969–1977	Increased Visibility 1978–1998	Reaching 1999–2010	Structural Change 2011–2020
No women members until 1949	Gendered labels	Number of women members doubles,	Advocacy in the ASA newsletter	Women find each other	Fellows increased in absolute
5.5% women in 1956 Photos show early involvement of women Language of women members as exceptions	Pirst Fellows, 4/53 Personals, 22/778 Pubs/Papers under 1%	50 to 100 Gendered labels disappear Regional leaders Personals up to 5% Pubs/Papers to 3-4% Fellows flat	Rise in national leadership Lack of progress in membership and Fellows	Personals double Fellows and membership steadily increase Consistent presence on executive council	numbers Membership rose to 650 or 30% of membership First woman executive director Executive council with three women

Table 3: Summary of Women's Involvement in the American Scientific Affiliation

Article *Women in the American Scientific Affiliation: Past, Present, and Future*

propriate goal for members of the Lord's family. We'll probably even learn something from each other. $^{\rm 92}$

David Horn, in his book Soulmates: Friendship, Fellowship & the Making of Christian Community, makes the argument that evangelicals have not been careful about the use of language around different types of relationships. He says that relationships are different in the specialized language that characterizes them, in the conventions that define distinct patterns of behavior, and in their physical settings and contexts.93 For example, Horn argues that the synonymous use of friendship and fellowship leads to misunderstandings and a failure to understand the true nature of fellowship. While friendship is exclusive, preferential, reciprocal, and involves a deep knowing of the other, Christian fellowship is nonexclusive, nonpreferential, and not necessarily mutual but, rather, self-giving.⁹⁴ The language and contexts in which friendship is lived out are different from that of fellowship. Someone may be part of your fellowship and become a friend, but to be in Christian fellowship with another does not require that they are a friend.

The synonymous use of the terms "family" and "fellowship" has some of the same problems, as described by Horn. The language of family implies a certain informality, obligation, and preferential status as friend. Likewise, in the evangelical community, especially since the 1970s, its use has been tied to an increased focus on the nuclear family and traditional gender roles. Thus, the use of family as synonymous with fellowship may have different emotional meaning for men and women.

Beth Barr traces the emphasis on family as a spiritual unit to the Reformation, when monasteries were dissolved. Within these pre-Reformational communities, women found agency; afterward, the family unit became paramount, and women were limited in their agency through their need to be under the protection of a family.⁹⁵ Thus, there are many ways in which the use of "family" is tied to the loss of agency for women, and a growth in the assumption that they must be married to be a whole person. Gallagher states that ordinary evangelicals place a high value on autocratic decision making, and resist careerism in an effort to prioritize family over work.⁹⁶ This connotation of family with restrictions in professional advancement has not been confined to evangelicals. Rossiter reported how, in the 1950s and 1960s, record numbers of women obtained doctorates but were caught in anti-nepotism rules that restricted them to lesser positions.⁹⁷ Rossiter states, "One such woman described the scientific laboratory and its resident staff as a 'patriarchal household.""⁹⁸

The words "family" and "friendship" both present challenges to women as they try to construct professional relationships that are appropriate across gender lines. Research has shown that women thrive in contexts where a professional culture is evident because of the lack of ambiguity in trying to navigate relationships.99 This professional culture helps construct clear boundaries around language and expectations, clarifying the context in which everyone is operating. The use of the term "fellowship" does not have the same challenges as family and friendship, according to Horn. Thus, the use of "family" language in the ASA may represent an incongruence with the lives of professional women, who already struggle to manage expectations within the evangelical subculture.

The use of "family" language also implies a highly relational institution. Organizations that are highly relational have been shown to inhibit the growth of diversity because they are organized by whom individuals know, as opposed to having clear institutional pathways to engagement. In other words, relationships are of value, but if they supplant policies and procedures, they impede engagement by those outside the known network; typically, those "outside" would be women if the network is male dominated historically. Thus, women thrive where there are high levels of professionalism, clear policies and procedures, and the intentional recognition of the diversity of their needs.¹⁰⁰ Reflection and a clear and renewed understanding that the members of the American Scientific Affiliation are a "fellowship of Christians involved in science," might be helpful for the development of a culture of radical hospitality.

Conclusions and Implications

This research explored the experience of women in the ASA who live at the intersection of American culture, the professional scientific community, and the Christian community. This history illustrates how their experiences reflected the larger patterns of women in both American culture and the scientific community, while also uniquely exhibiting features that may be elements of North American evangelical Christian culture. Whether women are thriving or not in any organization or sphere, has been described as serving as the "canary in the coal mine," telling us whether the climate is safe and comfortable for all. If women are thriving, then a diverse group of individuals are usually thriving—men with spouses who are professionals, underrepresented groups, single parents, and others.

An essential element to all groups being able to enter and thrive in an organization is that the organization has clear policies and procedures and thinks about how to make structures inviting to everyone.¹⁰¹ The ASA is an organization that desires to engage a broad range of perspectives. This research illustrates how the variety of demographic backgrounds and experiences needs to be incorporated into the organizational strategy to achieve its mission, a mission to create a fellowship of those curious about the natural world and amazed at God's creation; a fellowship of people who are courageous about asking hard questions about faith and science; and a fellowship that embodies intellectual humility, in which individuals stand in their beliefs with an attitude of willingness to reconsider opinions and evidence.

Notes

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- ¹⁴Everest, The American Scientific Affiliation: Its Growth and Early Development, 39, 170, 43, 45, 179, 49, 52.
- ¹⁵Ibid.
- ¹⁶Anne Curzan, *Gender Shifts in the History of English* (Cambridge, UK: Cambridge University Press, 2003). This book is an extensive work on the history of language; it includes a discussion of the culturally or ideologically biased ways in which people treat supposedly "neutral" language.
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Women in the American Scientific Affiliation: Past, Present, and Future

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- ³⁵Hill, Corbett, and St. Rose, "Why So Few?," 15, Figure 11: Women in Selected STEM Occupations, 1960–2000.
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