Always the Exception: Women and Women of Color Scientists in Historical Perspective

By: Douglas M. Haynes

In March 2014, France Córdova, astrophysicist and former chancellor of Purdue University and the University of California–Riverside, became the first Latina to serve as director of the National Science Foundation (NSF) in its more than sixty years in existence (Morello 2013). This position is one of the most influential in American science. As director of the only federal agency tasked with supporting basic research and education in science and engineering disciplines, Córdova oversees a multibillion dollar budget to ensure continued US leadership in scientific discovery and the development of new technologies.

Despite the presence of a woman of color leading this prominent funding agency, women overall still remain underrepresented in other national organizations, including the National Academy of Sciences (NAS). Incorporated by Congress in 1863, NAS is a distinguished society of scientists and scholars that advises the country on all matters related to science, engineering, and technology. However, in its 150-year history, neither has there been a woman president nor are women well represented among its elected membership. On average, women account for 10 percent of its elected members annually, and in 2013, only 213 of its 2100 members were women (IAP 2014). Since the NAS does not share disaggregated membership data, it is impossible to know the actual number of US-born underrepresented minority (URM) women who are members. Physicist Shirley Ann Jackson, president of Rensselaer Polytechnic University, may be the only one.

One wonders who will be next, and when. Even the top fifty STEM (science, technology, engineering, and mathematics) departments (as determined by NSF), where many current and future scientists and engineers advance their careers, do not inspire much confidence. In a 2010 study, Nelson and Brammer noted that “URM women faculty, especially full professors, are almost nonexistent in physical sciences and engineering departments at research universities. Surprisingly, most of the few female minority professors in those disciplines were not born in the United States.” For those minority women scientists and engineers that are US born, the low number is especially stunning, particularly when considering that many of the structural barriers that impeded their full participation in higher education in the mid-1900s were removed decades ago with the passing of the Civil Rights Act (1964) and Title IX (1972).

Today, the underrepresentation of women of color in institutions of higher education approximates levels characteristic of the Jim Crow era (1876 to 1965), when society was structured to subordinate people of color. At that time, the very curiosity of women of color about the natural world and their desire to be experts challenged the institutions of American science and their unquestioned self-image as the privileged domain of white males. If anything, the current status of women of color in key STEM institutions reminds us not only how much the United States has changed, but also the glacial pace of change in academic science.

This is particularly evident in the historical data on PhD production. Although the data before 1960 is imperfect, the effects of racial and gender barriers in science are still quite obvious. The total number of white women earning PhDs grew from 25 before 1890 to 204 in 1900. While their absolute numbers continued to grow through late 1930s, the relative share of science doctorates earned by women declined from a high of 15.5 percent to a low of 11.5 percent. (Rossiter 1982).

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Data for African American women PhD recipients paint an even more dismal picture. Of the 381 known PhDs awarded to African Americans through 1943, only 48 were earned by women. Among these recipients were some of the earliest women to receive degrees in the natural and behavioral sciences (table 1).

Table 1. First African American Women PhD Recipients in STEM Fields

<table>
<thead>
<tr>
<th>Name</th>
<th>Undergraduate Institution</th>
<th>Graduate Institution (Year)</th>
<th>Discipline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ruth E. Moore</td>
<td>Ohio State University</td>
<td>Ohio University (1933)</td>
<td>Bacteriology</td>
</tr>
<tr>
<td>Ruth Howard Beckham</td>
<td>Simmons College</td>
<td>University of Minnesota (1934)</td>
<td>Psychology</td>
</tr>
<tr>
<td>Flemmie Kittrell</td>
<td>Hampton Institute</td>
<td>Cornell University (1935)</td>
<td>Nutrition</td>
</tr>
<tr>
<td>Jessie J. Mark</td>
<td>Prairie Valley College</td>
<td>Iowa State University (1935)</td>
<td>Botany</td>
</tr>
<tr>
<td>Roger Arliner Young</td>
<td>Howard University</td>
<td>The University of Pennsylvania (1940)</td>
<td>Zoology</td>
</tr>
<tr>
<td>Ruth Smith Lloyd</td>
<td>Mount Holyoke College</td>
<td>Case Western Reserve University (1941)</td>
<td>Anatomy</td>
</tr>
<tr>
<td>Marguerite Williams</td>
<td>Howard University</td>
<td>Catholic University (1942)</td>
<td>Geology</td>
</tr>
<tr>
<td>Marie Maynard Daly</td>
<td>Queens College</td>
<td>Columbia University (1948)</td>
<td>Chemistry</td>
</tr>
<tr>
<td>Phyllis Wallace</td>
<td>New York University</td>
<td>Yale University (1948)</td>
<td>Economics</td>
</tr>
<tr>
<td>Evelyn Boyd Granville</td>
<td>Smith College</td>
<td>Yale University (1949)</td>
<td>Mathematics</td>
</tr>
<tr>
<td>Dolores Cooper Shockley</td>
<td>Xavier University</td>
<td>Purdue University (1955)</td>
<td>Pharmacology</td>
</tr>
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Becoming a Scientist in the Age of Jim Crow

The promise of remaking the United States into an interracial democracy ended in 1876. A combination of state laws and local practices constructed a vast system of racial caste that subordinated African Americans to whites in all facets of public life. In 1896, this system was sanctioned by the US Supreme Court in the *Plessy vs. Ferguson* decision, which upheld “separate but equal” as constitutional.

Higher education was deeply affected by this culture of white supremacy. It shaped the origins of many of today's public land-grant universities. Although the landmark Morrill Act (1862) transferred federal lands to states to establish industrial colleges in southern states, they would enroll exclusively white men and women. Congress legitimized racial segregation in higher education in a second Morrill Act (1890) by providing funding for existing and new universities to serve African Americans (Roebuck and Marty 1993).

However, African American women who sought higher education faced the double bind of gender prescription and racial discrimination. As daughters, they were taught how to negotiate the often perilous racial norms. Whether raised in working- or middle-class families, education for them was highly valued as a means of community uplift. At the same time, these women were subjected both to powerful social expectations to care for their families and society as wives and mothers and institutional quotas that limited their participation in colleges and universities.

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The purpose of higher education for women was not to serve as a steppingstone to a career and life of independence but, rather, to equip them to fulfill traditional domestic roles. In fact, it was family responsibilities that delayed some from starting or completing graduate school. For instance, it took Roger Young fourteen years before she received her PhD in 1940 from the University of Pennsylvania after earning her master's degree at the University of Chicago. During that time, she taught classes and conducted experiments for her mentor, Ernest Everett Just, when his frequent research trips to Europe were necessary. The income supported her ailing mother, but the sense of exploitation, the burden of family responsibility, and the struggle to advance her work took a heavy toll on her own physical and mental health.

The image of the scientist as white and male was neither an accident nor the random distribution of interest, talent or merit, but, rather reflected structures and choices that differentially burdened, oppressed and devalued women in general and women of color in particular.

**Negotiating the Barriers of Race and Gender**

The academic choices of those women of color reflected the contemporary landscape of higher education then and mirrored those of all women in higher education today, particularly in the STEM disciplines. Scholarship support was crucial, but it is also likely that during their careers these pioneering women experienced the hyper visibility and social isolation that is often associated with being the only woman or one among a few in their classes or on campus. Further, the psychosocial load was made heavier by the pressure to perform not simply for a course grade or even to satisfy a degree requirement, but to refute the pervasive racist representations of the inferiority of African Americans in popular culture. On their shoulders rested an impossible burden: reconciling the myth of American meritocracy with the reality of racism and sexism in and outside of the academy.

Even with the distinction of an undergraduate degree, for these women of color the path to the doctorate was contingent on satisfying two conditions wholly unrelated to their preparation and promise: identification of universities that permitted them to enroll and access to faculty who were willing to work with them. Finding a supportive faculty advisor was essential. Then, as now, faculty advisors and mentors played a key role in the next stage of educational achievement. They formed part of a network that created pathways for women of color to enter and persist in research universities. As gatekeepers, they inspired these talented women to pursue graduate study while validating their competency and affirming their character. For established white male and female faculty, advising one African American graduate student did not threaten their reputations. On the contrary, it widened their protégée circle without significantly disrupting the social landscape of academic science. Still, the very institutions that awarded degrees to African Americans would not hire them in any field for several decades to come.

Consequently, with their doctorates in hand, these women joined the faculties at minority-serving institutions, which primarily focused on undergraduate education in the liberal arts or vocational subjects. By the turn to the twentieth century only a handful offered master's degrees and only in a limited number of science fields. None awarded PhDs until 1958, when Howard University bestowed the first PhDs in chemistry and zoology. The life of a faculty member at these institutions involved considerable teaching, little time for research, and the challenge of sexual double standards. For example, Moore and Shockley rose to head the departments of bacteriology and microbiology at Howard University and Meharry Medical College, respectively. Even though they led important and large units, neither was ever promoted to full professor. Similarly, Ruth Lloyd joined Howard’s medical school as an assistant in physiology and anatomy and was promoted to instructor. Sixteen years passed before she became an assistant professor.
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For others, a research career involved a circuitous path in and out of institutions of higher education. Ruth Howard, a specialist in childhood development, began her independent research career at the Illinois Institute of Juvenile Research and later the National Youth Administration in Chicago. She and her husband, Sidney Beckham, established their own consulting practice. Marie Daly began her faculty career as an instructor at Howard in 1949 and ended as a professor at Yeshiva University's Albert Einstein College of Medicine in 1986. Between these milestones she was an instructor at Howard, a research assistant at Rockefeller Institute, a research associate at Columbia University Research Service, and a professor of biochemistry at the College of Physicians and Surgeons of Columbia University. Her research explored the biochemical effects of cholesterol, sugars, and smoking on the human body.

Regardless of their varied trajectories, these women scientists applied their training and research to improve the condition of society. At a time when the vast majority of medical schools refused or limited the admission of African Americans, Ruth Moore and Dolores Shockley played an integral role in the production of health science professionals. A specialist in nutrition, Flemmie Kittrell raised awareness about malnutrition in the United States and campaigned for improved farming practices throughout the world. She also was an architect of the Head Start program. Early in her tenure as a faculty member, Evelyn Granville noticed the inadequate preparation for college-level mathematics among students. She not only coauthored *Theory and Application of Mathematics for Teachers* (1975), but also participated in NSF-funded math-enrichment initiatives for school children and professional development programs for teachers. At MIT, Phyllis Wallace's ongoing activist research on race and gender discrimination gathered momentum and included some of the earliest studies of salary equity in corporate America.

**Conclusion**

By the time the careers of these women of color began to wind down, the landscape of academic science had changed. In response to World War II and the subsequent Cold War, the flood of federal dollars to universities enabled research universities to expand their capacity for innovation and research. However, the impact of the revenue associated with overhead and subsidized tuition for returning male veterans did more than contribute to research. It also reinforced the structures of race and gender exclusion and discrimination that had historically characterized science. Even in the wake of the civil rights movement, universities and their faculty either resisted change outright, or changed slowly as a result of the fear of losing federal support that funded post-war academic science.

Despite stunted career horizons that arose for no other reason than their gender and race, these pioneers pursued with tenacity their curiosity about the earth, nature, and society and challenged an entire social system—including the institution of academic science—that was organized to marginalize them at best and subordinate them at worst. Today, many of their achievements have been widely recognized. In 1989, Smith College awarded Evelyn Boyd Granville an honorary degree. The American Home Economics Association also established a scholarship in the name of Flemmie Kittrell, the American Society for Microbiology now features Ruth Moore on its history webpage, and the American Chemical Heritage Foundation celebrates the career of Marie Daly.

However, if given the choice between equity and equality or deferred recognition in the twilight of their careers, I suspect all of these trailblazing women would have preferred the unfettered opportunity to advance knowledge as full members of society and the US scientific enterprise.
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References


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