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Picture a Scientist: Insights into Gender and Racial Harassment of Women Scientists

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Abstract

Mankind's technological progress and transition into an industrialised society is intended for the welfare of society, including women. But due to patriarchy's construction of multiple gender binaries (men/women, reason/emotion), the field of science and technology has become male occupied and dominated. Therefore, in the present scenario, the underrepresentation of women in science, due to gender bias, discrimination, and harassment exists across science disciplines and research worldwide. Women scientists' work in the STEM field includes visiting and working in remote field sites that require extensive hiking and camping, late nights in observatories, working with male colleagues, etc. National Academies of Science, Medicine, and Engineering in STEM fields report (2018) states that "about 50% of women faculty and staff experience sexual harassment" (PAS1:20:06-19:59) in which sexual harassment as a form of gender harassment comprises "subtle exclusions, being left off an email, not being invited to collaborate, vulgar name-calling, obscene gestures, hostility, passed over for promotions, relentless pressure for dates" (PAS1:18:41-26), etc. The present paper attempts to study the various facets of gender and racial discrimination, and harassment experienced by both white women and women of colour scientists/researchers/faculty members in the science disciplines by analysing the *testimonios* of three women scientists in Cheney and Shattuck's documentary *Picture a Scientist* (2020). In *Picture a Scientist* biologist Nancy Hopkins, chemist Raychelle Burks, and geologist Jane Willenbring share their day-to-day life experiences of gender inequality and racial discrimination in their professional field. These women's narratives not only expose the bias of the patriarchal mindset in the male dominated field of science which drifts women scientists toward gender and racially biased unequal scientific society but also provide new perspectives on how to make science more diverse, equitable, and bias-free for women.

Keywords: women scientists, racial discrimination, sexual harassment, empowerment, space

Women's participation in science and their subsequent progress in scientific careers have been low in technologically advanced countries as women remained: "excluded from universities for over 700 years—since their [universities] founding in the 12th century until the nineteenth century" ("Women in Science" Schiebinger 16). Traditional gender roles ascribed to men and women in the past decades confined women to the domestic sphere whereas males were encouraged to pursue studies in sciences, making the field of science and technology male-centric/dominated:

Rather than being completely objective and value-free, the scientific method, as typically defined, reflects hegemonic masculinity and the subordination of femininity. The masculine bias in science is expressed in its sexist language, masculinist structure and methodologies, and androcentric epistemology (Letts 2001).

In STEM, women scientists' recruitment, upward mobility through promotions in the organization, winning awards and patents for innovation, etc., are blocked by multiple constraints and bias: "There is a correspondence between stereotypical masculine traits and the definition of the scientific method. Masculinity is associated with competitiveness, dominance hierarchies .., as opposed to emotionally driven, thought" (Beggan 2007). In the United States, feminist scholarship refers to it as the 'glass ceiling' that embodies "those artificial barriers based on attitudinal organizational bias that prevent qualified individuals from advancing upward in their organization into management-level positions" (Martin 1991). 'Glass ceiling effect' unearths the discrimination and unfairness against women, and women of colour based on the prejudice that emerged from the biological and genetic theories of 'cognitive ability' collectively known as 'biological determinism' which teaches that "something in the physical, psychological, and intellectual nature of women prohibits them from producing great science", thereby emphasizing women's inferior status in the male dominated field of science (15). This concept of women's social inferiority with respect to biological differences between men and women can be traced back to Aristotle. In ancient times, Aristotle, Hippocrates, and Galen constructed a biased picture of the nature of women, which provided

justification and propagation of women's inferior social status. In this regard, Aristotle put forth the argument that: "women are colder and weaker than men, and that women do not have sufficient heat to cook the blood and thus purify the soul" ("Skeltons in the Closet" Schiebinger 43). In another attempt to emphasize and scientifically prove the differences between sexes, social Darwinists studied the evolutionary biology of human beings to argue that "woman was a man whose evolution-both physical and mental had been arrested in a primitive stage" ("Women in Science" Schiebinger 16).

In 1759, French anatomist Genevive-Charlotte Thiroux d'Arconville published the drawings of a female skeleton wherein: "she portrayed the female skull as smaller than the male skull, and the female pelvis as larger than the male pelvis" (qtd. in "Skeltons in the Closet" Schiebinger 43). The rationale of the study was to propagate the idea of 'natural' inferiority of intellectual capabilities of women over men, reinforce the 'natural' role of motherhood, and confine them to homely duties. It emerged in opposition to the eighteenth-century debates relating to women's participation in the public sphere of government, science, and commerce. These studies seek out scientific justifications for the unequal division of power and privilege between the sexes.

Consequently, the number of women scientists acquiring top positions as professors, deans, directors, and vice chancellors diminishes as they go up the organizational hierarchy. Women in science suffer from what Margaret Rossiter calls 'hierarchical discrimination', which clearly underlines a considerable gap between the number of women enrolling for graduate-level science and technology courses, and the women with Ph.D.'s and stable careers in sciences.

Another kind of discrimination women in the arena of science frequently face is "territorial discrimination or sex-typing of occupations" ("Women in Science" Schiebinger 15). The conventional age-old role of women in the private and domestic sphere, the biological role of being a birth giver and rearer of children, led to the validation of socio-cultural roles that propagate the idea of confining women to unpaid work in the domestic sphere. Slowly with the technological advances and changing socio-economic scenario,

women started working outside the home but were allowed to work in certain areas/territory marked as women's fields. Moreover, this prevalence of territorial discrimination even today continues in the sciences.

In the western countries during the 1920s, the key fields chosen by men were chemistry, medical sciences and engineering. In contrast, women were encouraged to study subjects like "botany, zoology, and psychology", where salaries were low leading women to "Gendered choice behaviors in adolescence when girls, despite gender equal performance levels in mathematics and science, report less motivation to learn, lower competence belief and higher levels of anxiety in regard to mathematics than boys," (Lazarides and Ittel 1). Therefore, lower proficiency belief in young girls with regard to sciences is not inherent but is a result of deep cultural roots: "The choice of toys — dolls for girls, building blocks and cars for boys —, for example, creates a major difference in building stereotypes..." (British Council 6) and the kind of education they receive to prepare them for homemaking roles and secondary work in the job market dominated by patriarchy.

Against this background, the present paper analyses Ian Cheney and Sharon Shattuck's documentary *Picture a Scientist* (2020), wherein biologist Nancy Hopkins, chemist Raychelle Burks, and geologist Jane Willenbring share their life experiences relating to gender inequality and racial discrimination in the professional arena of sciences, and their journey toward making science more diverse, equitable, bias-free and giving space to women to pursue careers in science. The underrepresentation of women in science, accompanied by gender bias, discrimination, and harassment, exists across all science disciplines. Women scientists' work in the STEM field includes visiting and working in remote field sites that require extensive hiking and camping, late nights in observatories, etc., which often expose them to different kinds of harassment, violence, and bias.

The report released in 2018 by the National Academics of Science, Medicine, and Engineering in STEM fields states that "about 50% of women faculty and staff experience sexual harassment" (1:20:07-00). Sexual harassment, as a form of gender harassment in

sciences, in most cases, comprises implicit biases against women and women of colour: “subtle exclusions, being left off an email, not being invited to collaborate, vulgar name-calling, obscene gestures, hostility, passed over for promotions, relentless pressure for dates, remarks about bodies, sabotaging of equipment” (PAS1:18:46-23).

Jane Willenbring is a tenured faculty at the Scripps Institution of Oceanography at UC San Diego. As a graduate student in 1999 at Boston University she became a victim of biased conduct. She narrates traumatising sexual harassment at the hands of Professor David Marchant during a field trip to East Antarctica: “There were four people in the group. So there was Dave Marchant, his brother, and also a master’s student from the University of Maine, Adam Lewis” (1:25:14-1:25:04). The male dominant culture in sciences looked upon sexual discrimination, sexual harassment, and mistreatment of women to be normal. David Marchant with his privilege and authoritative power tried to break Jane’s spirit to pursue science (geology) through misogynistic verbal and physical abuse as they reached the site of the field trip at a secluded place in Antarctica: “Dave would start off from that sort of pop culture reference to just calling me a slut, and then slut went to whore, and then whore went to cunt. . . . and I just wanted to talk about science” (1:24:29-03). It includes negative damaging behaviour and verbal abuse by the person with power and authority. David Marchant bullied and harassed Jane by resorting to inhumane activities to make her feel unworthy and unwanted in the group: “every time I had to go to the bathroom just throw rocks at me” (1:23:52-47), which was “so embarrassing and demeaning and so I stopped, um... I stopped drinking water during the day. . . so I ended up getting a bladder infection” (1:23:37-18). She became the target of misogynistic attitude, inhumane actions, and verbal abuse of power exhibiting representative of a male-centred science. The negative impact was not only psychological but she also suffered from serious health issues for many years. These episodes of consistent sexual harassment at a remote field trip were intended to desist Jane from pursuing her career in sciences. Hegemonic masculinity influenced by socio-cultural values and sexism: “The message that’s given is that you somehow don’t belong here” (PAS1:33:47-38) impacted Jane adversely.

Jane Willenbring felt powerless. Her future and career were in David Marchant's hands, which restrained her from reporting the incidents of sexual harassment to the authorities for several years though she lived in the grip of traumatic memories. However, she continued her studies and promised herself to take action against David Marchant at an appropriate time. In the United States of America, Title IX of the Education Amendment of 1972 forbids discrimination based on sex in education programs and activities that receive federal financial assistance, it states: "No person in the United States shall, on the basis of sex, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any educational program or activity receiving federal financial assistance" (20 U.S. Code 1681) to help women achieve equal access to education. After securing a faculty position, Jane Willenbring wrote the first draft of the Title IX complaint against David Marchant: "It was a bit liberating, I have to say. It was 17 years after the fact. I definitely waited until after getting tenure." (1:05:05-55) with a vision to make sciences bias-free for future generations: "make the whole enterprise something that is welcoming to women" (PAS1:34:51-47).

Nancy Hopkins, a former professor of biology at Massachusetts Institute of Technology (1973-2014), shares her experiences of sexual harassment and unequal treatment throughout her professional career. She recalls an incident when she was sitting in the lab in Jim Watson's office when he pounced on her: "I was in the room alone and there's standing Francis Crick. He comes flying across the room, put his hands on my chest—breast, and says, 'what are you working on?'" (PAS 1:29:35-24). Nancy Hopkins shocked and startled at Francis Crick's inappropriate behaviour immediately composed herself and replied: "I am doing this experiment, I am trying to do this" (1:29:18-09). She behaved as if nothing had happened: "I didn't want Francis to be embarrassed. I didn't want Jim to be embarrassed. So, I just tried to pretend nothing had happened" (1:29:03-1:28:54).

Women's underrepresentation in the discipline of science is due to various barriers. When a woman enters into the science discipline as a faculty member, certain systemic factors collectively operate to keep her at the margins. Barbara Reskin explains that women are excluded from the communication networks crucial for their development of ideas even if they were allowed to work in a

laboratory. Women encounter “little lady syndrome” (1789), which assumes that “female staff members are support personnel or that they won’t be knowledgeable about complex science and political issues” (“Women in Science” Shiebinger1789). Later on, when Nancy Hopkins began her career as a junior faculty at MIT, the senior faculty members including males, treated her like a technician: “These postdocs, I think, saw you more as a technician than a faculty member” (1:11:20-15). As a part of gendered harassment in STEM, another major issue includes not giving credit for research innovations: “I started publishing papers and then I found you’d publish the papers and you would have trouble getting credit for the discovery” (PAS 1:10:36-30).

It has been observed that in premier institutions like the Massachusetts Institute of Technology (MIT), the systemic and structural bias against women faculty and scientists is pervasive in the faculty of science. The male-centered/dominated educational institutes encompass organisational gender bias wherein women faculty members encounter institutional barriers such as unequal research space, disproportionate salaries, sexual harassment, inappropriate emails, problems related to getting credit for published research, etc. Nancy Hopkins, a senior faculty at MIT, required more research space (labs) for studying genetics in zebrafish: “I needed 200 square feet of space to put the fish tanks in, and I couldn’t” (1:06:30-24). She noticed her research space was smaller than her male counterparts working as junior faculty. The male-centred culture at MIT was not ready to listen to her demand for larger space instead their response was filled with phrases of ‘microinsult’ as one man in the department questioned her intellectual capabilities: “You don’t think you could really handle a bigger lab, do you” (1:06:23-15). To prove the fact that there is an unequal distribution of lab spaces for male and female faculty members, she collected data: “Men 2936 sq. ft., Women 1974 sq. ft. (1:07:45-40)”, by measuring the room spaces of all faculty members in the department and confronted the authorities with the evidence: “But when I got the measurements and showed them to the person in charge of space, he refused to look at them. And that’s when I became a radical activist, I guess. Um, against my wishes” (PAS 1:08:59-46). The preconceived notion of women being incompetent is deeply ingrained in the psyche of the male

stakeholders that the infrastructure is built in such a way as to exclude/slow down the intellectual 'space of progress' of women scientists. The denial of adequate physical space by male-centered scientific culture ignited in Nancy Hopkin a spark to speak and stand against the injustices done to women scientists in the discipline of sciences.

Raychelle Burks, an associate professor of analytical chemistry at St. Edward's University, shares her experiences of gendered racial discrimination in sciences as a tenured African-American professor. During her early years of college, she witnessed: "there were no black women chemistry professors that I had" (1:14:56-50). In sciences, it is observed that fewer than 1 in 4 speakers at chemistry conferences is a woman. Fewer than 1 in 25 is a woman of colour, as Raychelle Burks emphasises: "academia is especially historically marginalized" (*PAS* 1:01:54-51) which makes black women more vulnerable to discrimination and harassment in the white male-dominated discipline of Sciences. According to the National Center for Educational Statistics report, in 2015, the percentage of women of colour attending higher education who earned STEM degrees was 2.9.

Gender harassment sometimes includes uncivil and disrespectful behaviour called "Microaggressions" (Sue et al. 271), which refers to "the everyday verbal, nonverbal, and environmental slights, snubs, or insults, whether intentional or unintentional, which communicate hostile, derogatory, or negative messages to target persons based solely upon their marginalized group membership" (Sue). Raychelle Burks experienced discrimination, harassment, and the issue of invisibility from white male and female faculty. The kind of oppression black women face at the workplace is 'double bind' as the reason for biased treatment and discrimination has its roots in the historical treatment of black women as slaves ('racism') during slavery in the United States and persistent 'sexism' which refers to "an attitude and a behavior which is based on the presumed inferiority or difference of women as a group" (Weber and Wade 303). Being a black women scientist, Raychelle Burks faced the "effects of sexism and racism simultaneously throughout the STEM pathway" (Malcolm et al. 1975). She underwent oppression and marginalisation multiple times and admits that the environment of

white male-dominated conferences excludes women of colour: “like a lot of science spaces, there’s always a bit of discomfort” (1:04:12-08). She recounts how most of her work time was spent in dealing with the “oppressive systems” (1:10:14-11) like answering an inappropriate e-mail when other faculty members remained busy experimenting or demonstrating to students.

“Racial Microaggressions”, a term coined by Pierce in 1970, refers to “subtle, stunning, often automatic, and non-verbal exchanges which are ‘put downs’” (Pierce, Carew, Pierce Gonzalez, & Willis 66). It can be further described as “subtle insults (verbal, nonverbal, and/or visual) directed toward people of color, often automatically or unconsciously” (Solo’rzano et al. 19). Racial microaggressions manifest themselves in the form of ‘microassault’, ‘microinsult’, and ‘microinvalidation’. The intention behind this kind of treatment of black women with hidden messages is to demean them on a personal or group level, convey that they are lesser human beings, children of lesser god to threaten and relegate them to inferior status and treatment. Raychelle Burks describes how she has been constantly ignored in the meetings: “I’ve been in meetings where you’ve made a suggestion or said, ‘Well, what about this?’ And it was like you’d never spoken at all, but if a white guy says it, you’re like, and now it’ll magically be heard, everybody watches this” (1:13:49-37). This ‘microinvalidation’ wherein the message communicated is that black women’s contribution in their respective fields is unimportant and they are unworthy of attention. She narrates another incident when despite having a faculty nameplate outside her room, she was considered a caretaker of the room and deliberately reminded of her marginalised status through ‘microinsult’: “...once sitting at my desk, at my computer, like I’ve got, you know, papers spread out. Someone comes into my office, and for some reason assumes I am janitor” (1:13:60-53) to reinforce the idea that a black woman cannot be a professor in academia but only suitable for lower jobs like keepers, watchmen, and sweepers, which demand low or no intellectual expertise in science.

The physical space in which Raychelle Burks worked with other colleagues was not inclusive and professional. Instead, the space became the metaphor of oppression for her and every African-American faculty: “People can insult us on our face with

inappropriate language and derogatory terminology, but we're the ones that are supposed to be respectful and civil, it's not that you take it personally . . . you just don't expect any different" (1:01:40-27). The issue of invisibility and biased treatment from white male and female faculty members become an indispensable part of their (black women scientist's) daily routine as women of colour "get used to be underestimated. You get used to being treated bit shabbily" (*PAS* 1:01:48-41).

Despite being the victims of gendered and/or racial harassment, these three women scientists remained firm and determined to put efforts into making science inclusive and bias-free for young women students and scientists. Due to the persistent and strenuous efforts of Geologist Jane Willenbring, in 2019, Bob Brown, the president of Boston University, terminated the services of Professor David Merchant, who was found guilty of sexual harassment. For the first time at MIT, Nancy Hopkins, along with other female faculty members from different disciplines, addressed and communicated to higher authorities the issue of systemic and invisible prejudice against women faculty members in STEM along with a detailed study report regarding the unequal distribution of spaces for men and women. Raychelle Burks, who represents black marginalised women scientists, became a role model for young female students/researchers. She often appears on various TV shows, encouraging women to take up science disciplines, and apprises them on the advantages of becoming a scientist. These three women scientists have become public figures in their own ways, contributing to encouraging children (especially females) to establish careers in sciences by working toward slowly eradicating the age-old biases and stereotypes.

The implicit and persistent gender and racial harassment against women faculty members and students ensures women's negligible or lower participation in higher positions and leadership roles. It prevents women from reaching out and accessing the power to establish inclusivity and diversity among faculty members in STEM. These three prominent women scientists: Jane Willenbring, Nancy Hopkins, and Raychelle Burks by articulating, resisting, and exposing gendered and racial harassment that exists within the male-centered field of science, not only liberated themselves but also acted as a

voice for the oppressed silent class of women scientists and students who encountered biased behaviour and discrimination for years. By sharing their journey from being victims of gender and racial harassment to becoming empowered women scientists and radical activists, role models by providing an image/picture of a scientist who can be a woman (in opposition to the conventional image of male scientists only), making way for inclusive and bias-free science fields for future generations of women scientists as Sally Ride, the first American women in space puts forth: “Young girls need to see role models in whatever careers they may choose, just so they can picture themselves doing those jobs someday. You can’t be what you can’t see” (Interviewed by Alison Beard).

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