

WOMEN IN ASTRONOMY IN THE US AND CANADA

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1. Introduction

This paper is divided into three sections. In the first, we highlight the results of statistical investigations into the status of women in astronomy in the US. In the second section, we discuss some of the likely reasons for the lack of equal representation by women in astronomy and in the final section, we discuss some the suggestions for how to improve things. Much of the information presented here was taken from the proceedings of the **Women in Astronomy** meeting held in Baltimore in 1992. Recommendations from that meeting, have been formalized in the **Baltimore Charter**. The Baltimore Charter has been endorsed by a number of universities and institutions in America, including the NSF, NASA, and the AAS.

2. Statistics

Combining the statistical information presented in Billard (1992), Boyce (1992), Skidmore (1992), Wilson (private communication 1994), Oey and Fleischman (1992), and Schreier (1992), we arrive at the following 'snap shot in time'.

- Any way you look at it, women make up a small percentage of the astronomy/physics PhD work pool in America (12 %).
- This percentage decreases (dramatically) with seniority (22 % at the bottom, 5 % at the 'top').
- Women are paid less than men at the same level (10 - 20 % less).
- Women's science productivity and grant awards are comparable to men at the same levels.

If we try to trace the careers of women in astronomy to answer the question ‘where have all the women gone?’, we find the following.

- Women comprise only 33% of those interested in pursuing careers in physical sciences in the first year of university, and attrit at a higher rate throughout the PhD/postdoc process, with women comprising 25% less of the pool at each stage.

- Once they have obtained a PhD and a PostDoc, the transition to Assistant Professor occurs at roughly the same rate for men and women in astronomy. (this appears to be real progress!).

- Senior positions are severely underoccupied by women. We cannot yet tell if this is the proverbial ‘glass ceiling’, or whether this is an historical remnant of the days when women were an even smaller fraction of the astronomy pool.

3. Why So Few Women?

In this section we point out some things which can *potentially* steer women (preferentially) away from astronomy.

Science is not a traditional female role in America. This can have many ramifications.

- There are few role models for women astronomers and girls and young women are sometimes not guided into science by traditional educators.

- Since we don’t commonly ‘see’ women doing good science, we may internalize that to mean ‘women aren’t as good at science’. Statistical test conducted by Paludi and Bauer (1983) showed that (both men and women) reviewers rating a paper they believed was written by a man (John T. McKay), rated the quality of the paper a 1.9 (out of 5, where 1 is highest) and but when they thought the *same* paper was written by a women (Joan T. McKay), they gave the paper a 2.7.

- American culture tells girls that ‘looks are better than books’ (Roald Dahl, “Matilda”) and that ‘Math is hard’ (Barbie).

Traditionally, women have had primary responsibility for family and children in American culture (and men for bringing home the paycheck). Women (and men) who are ‘family minded’ may choose not to pursue a career in astronomy, if they feel that it is not possible both to be an astronomer and raise a family. They may be encouraged in this direction by the following:

- Professors sometimes back away from encouraging women with families from going on.

- Lack of childcare facilities, sensible family leave plans, and no possibility of cessation of career pursuit during the child raising years can exacerbate the difficulty.

- Astronomy careers traditionally demand that you relocate frequently - this is often not possible for two career families.

Concern about personal safety from crime, for example when working late in deserted buildings, also preferentially can affect women working in the sciences (since crimes such as rape are typically directed at women).

Since most astronomers are currently men, women can experience difficulty in establishing good relationships with colleagues and mentors, in cases where *either* individual finds cross-sex interactions difficult. This may include 'uncomfortableness' establishing professional relationships (e.g., mentoring relationships or work study groups), 'uncomfortableness' at male dominated environment and language, and in the worst cases outright sexual harassment.

The common practice of choosing the people you know and feel comfortable with means women (and men who've taken non-standard routes) sometimes can't get their foot in the door when they apply for jobs (i.e., they may not make short lists or may be disproportionately absent from invited speaker lists).

4. THE GOAL - and Our Progress Towards It...

'If as some longitudinal studies of gifted children show, six percent of the top one percent of math-achieving boys attain the Ph.D. in math, science, and engineering, then we want to see six percent of the top one percent of math-achieving girls do the same' (Tobias 1992) and we might add, progress through to populate the senior ranks in a 1:1 ratio. We are a long way from that goal! But, we are moving in the right direction.

Some steps which can be taken to improve the climate for women in astronomy are listed below. While some of these have direct benefit only for women, many would in fact benefit both male and female astronomers.

- Improving the work environment to make women feel more wanted and at ease - use of inclusive ('gender neutral') language, removal of offensive posters, holding sexual harassment seminars and support for claims.

- Affirmative action efforts - special attention to women applicants, special attention to selection of women for committees and speaking opportunities, examination of the hiring record vis a vis women and minorities.

- Improved family awareness and acceptance in the workplace; benefits packages, near/on-site daycare, pausing of tenure/promotion clock, parental leave programs, flextime arrangements, consideration of spouse in hiring.

- Women's science support groups. Email networks, women meeting together any important reminder that you are not really alone.

- Special grants supporting women (e.g., visiting professorships, Canadian Faculty awards for women, graduate student fellowships).

- Increased attention to mentoring.
- Improvement of science education for children and college students, with emphasis on making it more inclusive and interesting to those (including females) with less confidence and a different style than the traditional male math/science achiever.
 - Legislation for affirmative action and sexual harassment claims.
 - Attaining 'critical numbers' - more women beget more women...

Of course, the most important thing is that people (astronomers) have to acknowledge the problem and be willing to work to solve it. Or as the old joke says (e.g. Kinney 1992) 'How many psychologists does it take to change a lightbulb? Only one, but the lightbulb really has to want to change.'

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