

STATUS

A REPORT ON WOMEN IN ASTRONOMY

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Women in Canadian Astronomy: Fifteen Years of Hard Data

By Michael A. Reid
and Brenda C. Matthews

Achieving diversity within the Canadian astronomical community is of interest to individual scientists, academic departments, funding agencies, and society as a whole. However, until recently, there had been no coordinated effort to study the gender demographics of the Canadian astronomical community. In 2001, we gathered and presented such demographic information for the period from 1991–2000. The present work reports the results of our follow-up survey, conducted in 2006, which covers the period from 2000–2005. We find that the representation of women in Canadian astronomy has improved markedly over the last five years. We also find that the size of the Canadian astronomical community has grown substantially over the same period. The improving representation of women remains



strongest at the lowest levels of academia, with smaller gains achieved at each stage of advancement. We find that women are being hired into faculty positions at a rate approximately consistent with their representation in the applicant pool.

Background

Five years ago, we presented the results from the first survey (Survey 1 hereafter) of gender demographics within the Canadian astronomical community, tracing the relative representations of men and women through different academic levels during the years 1991–2000¹. We found that women were significantly underrepresented at all levels of Canadian astronomy during the period studied, but that the trend was toward greater equality. As in other countries, we found

¹ Reid, M. A., & Matthews, B. C. in the January 2005 edition of STATUS

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Center for Astrophysics Gender Equity Report



In February 2007 the gender equity committee at the Center for Astrophysics released their report of a 5-year

study. While many institutions across the nation have carried out similar studies, this study of the CfA is particularly important for the astronomy profession since the CfA is one of the largest and most prestigious institutions of our field. Below we present the executive summary of the report.

For the full report go to <http://www.cfa.harvard.edu/do/geneq/>

This report summarizes the final findings and recommendations of the Center for Astrophysics (CfA) Gender Equity Committee (CGEC). The CGEC was appointed by former CfA Director Irwin Shapiro in 2002, to assess gender equity in all of the categories of CfA employment. Since 2004, CGEC activities have been supported by Director Charles Alcock (see box). The CfA, based in Cambridge, Massachusetts, is a combined institution composed of the Smithsonian Astrophysical Observatory (SAO), the Harvard College

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Canadian Astronomy *continued from page 1*

that the ratio of women to men is highest at the lowest levels of academia we studied (i.e., among graduate students) and declines steadily, reaching its minimum at the level of full professor. The responses to Survey 1 represented only approximately half the astronomy population in Canadian academia (by number), being most acutely affected by the lack of participation of three of the largest departments in the country.

Introduction

This follow-up survey (Survey 2 hereafter) has been conducted to trace the representation of women in the five-year period 2001–2005. Data were requested for a period of six years (2000–2005) to ensure continuity. Our goal was to achieve more complete statistics by increasing the degree of participation in the community. This is of greater importance as these data are among those requested of members of the Coalition for Canadian Astronomy by government officers in relation to the Long Range Plan (LRP). In addition to the data requested as part of Survey 1, we have requested the numbers of incoming graduate students in MSc and PhD programs each year. Over time, these data, when compared with the number of graduates, can be used to assess the overall level of attrition from graduate programs.

Description of the 2006 Survey**Participation**

For Survey 2, we broadened our scope to include smaller departments in community colleges where physics programs exist. We invited a total of 57 institutions to participate in the survey and received responses from 30. The full list of institutions polled in both iterations of the survey is shown in Table 1. In the table, asterisks indicate incomplete or otherwise problematic responses. In most cases, after contacting institutions which had submitted problematic or no responses, we were able to obtain accurate data. However, there were a few exceptions. The Survey 2 data provided by Université de Montréal were largely incomplete and were therefore excluded entirely from our analysis. The University of Alberta did not submit demographic information about their postdoctoral fellows, but we have used the rest of their submission. The University of Waterloo submitted only the changes in the number of people in each category for each year, from which we cannot reconstruct the absolute numbers of people in each category, so we have excluded their submission from the analysis. Two major centers of astronomical research did not participate meaningfully in either iteration of the survey: Queen's University and York University.

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However, we are happy to be able to add to the list of respondents several major institutions which did not participate in the first iteration of the survey.

The great majority of the institutions which did not respond to Survey 2 were small universities and colleges. It is likely that most of these did not respond because they employ no personnel whose primary activity is astronomy.

Methodology of Survey 2

Survey submissions were gathered using a web-based form. Because it allowed for automated, real-time validation of survey data, this format ensured greater uniformity and accuracy in the survey responses than the paper version used in the previous iteration of the survey. We also hope that the development of an online version of the survey will make it easier to administer annually. This will address the primary complaint of non-respondents to Survey 1, which was the necessity of compiling information covering long time intervals. Participating institutions were first asked to indicate whether they employed anyone in the following categories between 1 Jan 2000 and 31 Dec 2005: full professors, associate professors, assistant professors, postdoctoral fellows, and other staff, such as sessional lecturers, instrumentationalists, observatory staff, etc. Among the professors, there were separate categories for full-time and part-time positions. The data on part-time faculty are excluded from our results because there were only 2 data points (1 male and 1 female part-time associate professor). For each year, participating institutions were also questioned about the number of students entering MSc or PhD programs and about the number of degrees awarded to graduates of these programs.

After selecting the categories relevant to their institution, participants were asked to indicate the number of men and women in each position for each year. To address a failing of Survey 1, Survey 2 forced participants to distinguish between an entry of '0' in any category and a non-response. Only one complaint was received about the format of the survey (from the University of Waterloo, whose data were not included in the survey for the reason discussed in the previous section), and that complaint can be addressed with revisions to the explanatory text. In order to make it easier for institutions to participate, we hope to administer the survey in this online format annually from now on.

Results: Representation of Women Improving

The essential and most encouraging finding from this survey is that the proportional representation of women in Canadian astronomy has risen in all categories but one (postdoctoral

Institution	Survey 1 (1991-2000)		Survey 2 (2000-2005)	
	Inv.	Rep.	Inv.	Rep.
Acadia University	N	-	Y	Y
Algoma University College	N	-	Y	N
Augustana University College	N	-	Y	Y
Bishop's University	N	-	Y	N
Brandon University	N	-	Y	Y
Brock University	N	-	Y	N
Canadian Institute of Theoretical Astrophysics	Y	Y	Y	Y
Capilano College	N	-	Y	N
Carleton University	N	-	Y	N
Concordia University	N	-	Y	Y
Dalhousie University	N	-	Y	N
École Polytechnique de Montréal	N	-	Y	N
Herzberg Institute of Astrophysics (Victoria)	Y	Y	Y	Y
Herzberg Institute of Astrophysics (Penticton)	N	-	Y	N
The King's University College	N	-	Y	N
Lakehead University	N	-	Y	N
Laurentian University	N	-	Y	N
McGill University	Y	Y	Y	Y
McMaster University	Y	Y	Y	Y
Memorial University of Newfoundland	Y	Y	Y	N
Mount Allison University	N	-	Y	Y
Queen's University	Y	N	Y	N
Redeemer University College	N	-	Y	N
Royal Military College of Canada	N	-	Y	Y
Ryerson Polytechnic University	N	-	Y	N
Simon Fraser University	N	-	Y	N
St. Francis Xavier University	N	-	Y	N
St. Mary's University	Y	Y	Y	N
Trent University	Y	Y	Y	Y
Trinity Western University	N	-	Y	N
Wilfrid Laurier University	N	-	Y	N
University of Alberta	Y	N	Y	Y*
University of British Columbia	Y	Y	Y	Y
University of Calgary	Y	Y	Y	Y
University College of Cape Breton	N	-	Y	Y
University College of the Fraser Valley	N	-	Y	Y
University of Guelph	Y	Y	Y	Y
Université Laval	Y	Y	Y	Y
University of Lethbridge	N	-	Y	Y
University of Manitoba	Y	Y	Y	Y
Université de Moncton	Y	N	Y	N
Université de Montréal	Y	Y	Y	Y*
University of New Brunswick	N	-	Y	Y
University of Northern British Columbia	N	-	Y	Y
University of Ottawa	N	-	Y	Y
University of Prince Edward Island	N	-	Y	Y
University of Regina	Y	Y	Y	N
Université Sainte-Anne	N	-	Y	N
University of Saskatchewan	Y	Y	Y	N
University of Sherbrooke	N	-	Y	Y
University of Toronto	Y	N	Y	Y
University of Victoria	Y	N	Y	Y
University of Waterloo	Y	Y	Y	Y
University of Western Ontario	Y	Y	Y	Y
University of Windsor	N	-	Y	N
University of Winnipeg	N	-	Y	N
York University	Y	N	Y	N

Table 1: Institutions surveyed. "Inv" means invited, "Rep" means replied. The asterisks correspond to responses that were incomplete.

*Canadian Astronomy continued from page 3***Table 2:** Mean Percentage of Women in Canadian Astronomy.

Category	1991–1995	1996–2000	2001–2005 ¹	(2001–2005) (1991–1995)
Full Professor	0	0	4 (6)	NaN
Associate Professor	10	13	18 (16)	1.8
Assistant Professor	12	23	31 (30)	2.6
Postdoctoral Fellow	7	17	14 (14)	2
Other	n/a	n/a	13 (13)	–
PhD's Granted	9	14	28 (39)	3.1
Entering PhD Students	n/a	n/a	34 (34)	–
MSc's Granted	14	20	44 (48)	3.1

¹ Figures in parentheses were calculated using only those institutions which participated in both Surveys 1 and 2.

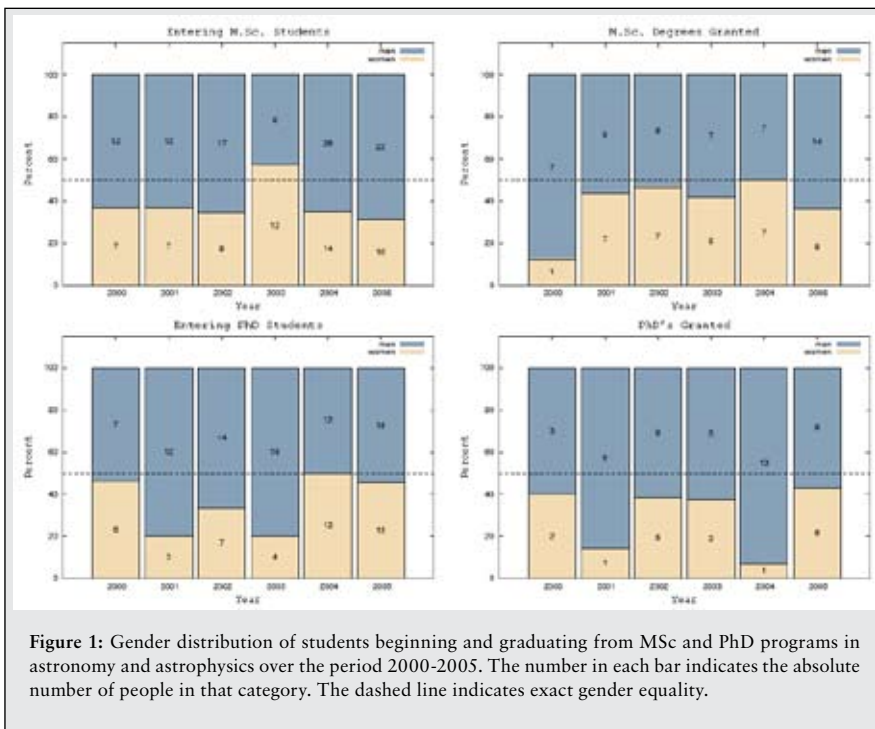


Figure 1: Gender distribution of students beginning and graduating from MSc and PhD programs in astronomy and astrophysics over the period 2000–2005. The number in each bar indicates the absolute number of people in that category. The dashed line indicates exact gender equality.

fellows). However, the news is not entirely rosy. Among graduate students, women are well on the way to comprising 50% of the total. But among faculty, it appears that women are still being hired out of proportion to their representation among the available candidates. Table 2 shows the mean proportional representation of women at all levels of Canadian astronomy over three five-year intervals: 1991–1995, 1996–2000, and 2001–2005. The categories of entering MSc students, entering PhD students, and "other" were not included in Survey 1 and so do not appear for the interval 1991–2000. For the period covered exclusively by Survey 2 (2001–2005), we have supplied the percentage of women at all institutions participating in Survey 2 as well as their percentage representation at only those institutions which participated in both

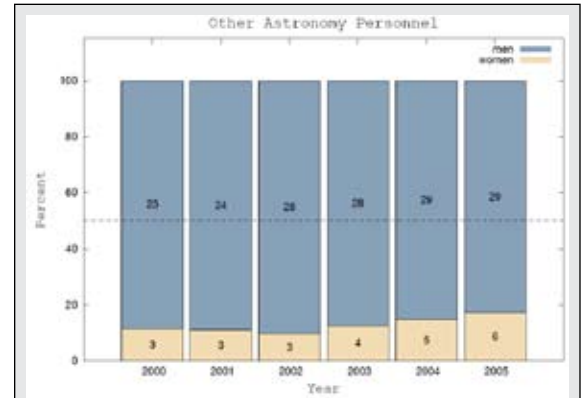


Figure 2: Gender distribution of employees in the "other" category, including sessional lecturers, instrumentalists, observatory staff, etc. over the period 2000–2005. The number in each bar indicates the absolute number of people in that category. The dashed line indicates exact gender equality.

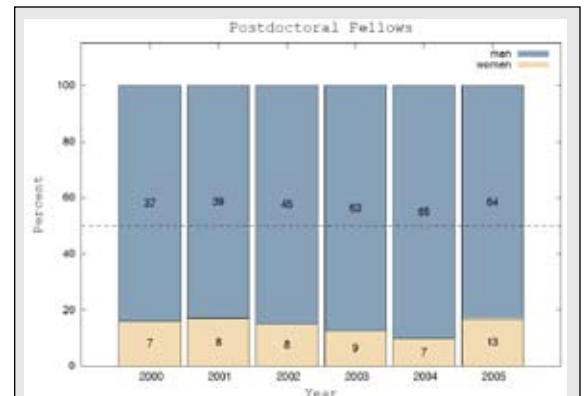


Figure 3: Gender distribution of postdoctoral fellows in astronomy and astrophysics over the period 2000–2005. The number in each bar indicates the absolute number of people in that category. The dashed line indicates exact gender equality.

iterations of the survey. Figures 1–6 show the representation of women in each category as a function of time between 2000 and 2005, using all of the Survey 2 data.

The data from both Surveys 1 and 2 show that the proportional representation of women is highest at the lowest levels of the academic hierarchy. From 1991–1995, 14% of MSc degrees in astronomy and astrophysics were awarded to women and the percentage of women dropped nearly monotonically with increasing academic rank. The same trend is seen in the results of Survey 2: over the last five years, women earned 44% of MSc degrees in astronomy and astrophysics but made up only 4% of full professors. Encouragingly, however, there have been great leaps in the representation of women within each category. For example, comparing only the institutions participating in both survey iterations, the percentage of MSc degrees awarded to women rose from 14% in 1991–1995 to 48%

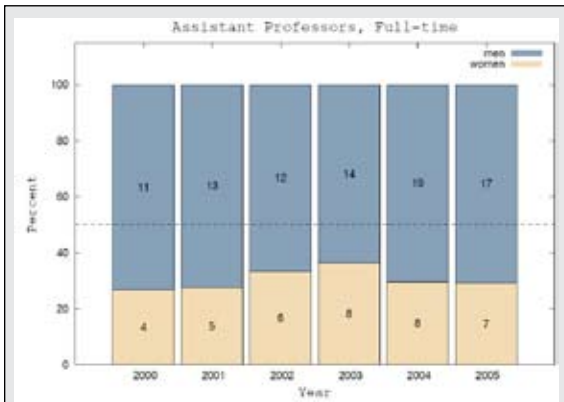


Figure 4: Gender distribution of assistant professors of astronomy and astrophysics over the period 2000–2005. The number in each bar indicates the absolute number of people in that category. The dashed line indicates exact gender equality.

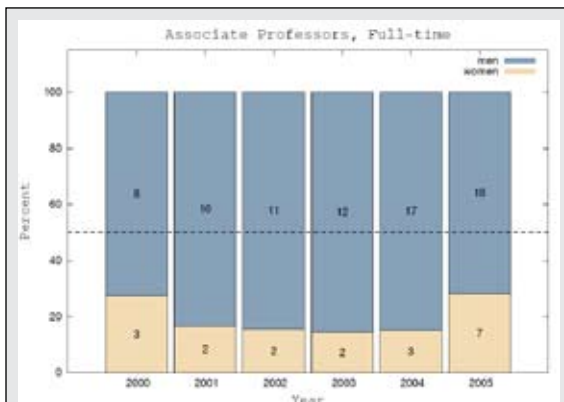


Figure 5: Gender distribution of associate professors of astronomy and astrophysics over the period 2000–2005. The number in each bar indicates the absolute number of people in that category. The dashed line indicates exact gender equality.

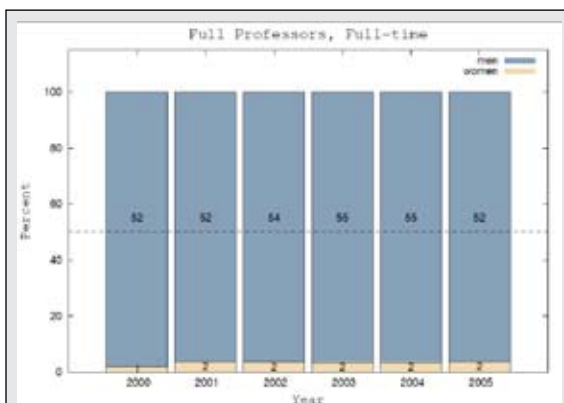


Figure 6: Gender distribution of full professors of astronomy and astrophysics over the period 2000–2005. The number in each bar indicates the absolute number of people in that category. The dashed line indicates exact gender equality.

in 2001–2005. At most levels of academia, the percentage of women in Canadian astronomy has doubled or better since 1991–1995. However, as shown in the right column of Table 2, not only does the percentage of women decline with each level in the hierarchy, the percentage increase in their representation also declines with seniority. Although women more than tripled their numbers among MSc students between 1991–1995 and 2001–2005, their representation among associate professors less than doubled. It is worth noting that the percentage improvement in the representation of women among full faculty cannot even be calculated because there were no female full professors reported in Survey 1.

How should we interpret the fact that the representation of women is improving faster at lower levels of academia? Unfortunately, the data in hand do not constitute a sociological study and can't tell us what social factors might be at work. A close look at the numbers shows that, although the total number of women in any job category is small, they are being retained in the system. For example, Survey 1 found that 2 PhD's were awarded to women between 1991 and 1995 and that there was 1 female assistant professor of astronomy. If both of these female PhD recipients stayed in academia and if each spent about 6 years as a postdoc before being hired into a faculty job, we should expect there to be about 3 female assistant professors of astronomy in Canada by the year 2000. In fact we find that there were 4 female assistant professors of astronomy in Canada in the year 2000. Thus, we can conclude that, subject to a strong caveat about small number statistics, female PhD graduates are being retained in the system. The most recent data suggest that the trend of retaining female PhD graduates has continued to the present day. Between 2000 and 2005, there were approximately 4 women and 9 men hired into assistant professor positions. The equivalent numbers for associate professors are 4 women and 8 men. Hence, it appears that, as the representation of women in the candidate pool has increased, so to has the rate at which they are hired.

The recent increase in the representation of women among Canadian astronomy faculty is attributable, in part, to the University Faculty Award (UFA) program of the Natural Sciences and Engineering Research Council of Canada (NSERC). The mandate of the UFA program is "to enhance the recruitment, retention and early career progression of women and Aboriginal people in tenure-track faculty positions in the natural sciences and engineering, in Canadian universities, by providing opportunities for them

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to establish a strong research record". Many of the recent hires of women into faculty positions have been through the UFA program. In future iterations of this survey, we will attempt to specifically track the number of hires made under this program to assess its effect. At present, we lack the data to comment authoritatively on the influence of the UFA program. We do, however, wish to point out that, contrary to the assertion commonly made in the lunch rooms and hallways of academia, the UFA program has not resulted in a particularly strong bias against male job candidates. Although there is evidence from our survey that women are being hired somewhat out of proportion to their representation in the pool of applicants, men still account for about 70% of new hires. Moreover, it is possible to interpret the mandate of the UFA program as specifically intending to facilitate the hiring of women in greater proportions than their representation in the candidate pool. Such a measure would seem to be temporarily necessary to ensure that gender parity is achieved.

A potentially troubling result emerges when we consider the situation among female graduate students in astronomy and astrophysics. As shown in Table 2, women are more likely than men to finish MSc degrees but they are less likely to finish PhD's. During the interval 2000–2005, women made up 39% of entering MSc students and 44% of graduating MSc students. Conversely, women made up 34% of entering PhD students, but only 28% of PhD recipients. We caution the reader here that the small-number nature of these statistics makes the significance of this finding uncertain. However, we emphasize the importance of recognizing potentially adverse conditions which may affect women, rather than holding them accountable for the poor statistics afforded by the size of the Canadian astronomical community.

Strong Growth of the Canadian Astronomical Community

The data collected for Survey 2 show some interesting statistics beyond those related to gender. According to the data, the overall size of the Canadian astronomical community has grown substantially over the last five years. The total number of professors has swelled from 79 in 2000 to 103 in 2005. Impressively, the number of postdoctoral fellows has nearly doubled from 44 to 77 over the same interval. However, the number of graduate degrees granted has tripled, from 13 in 2000 to 36 in 2005.

Conclusions

This is the second of the two large multi-year surveys we have conducted of the Canadian astronomical community on behalf of the Canadian Astronomical Society. Over the 15 years of data, we find an improving trend in the fractional representation of women. The gains are smaller at each subsequent level of academic hierarchy. In addition, the very small number statistics of the Canadian community means that the hiring of one woman into an academic department can radically change the percentage of women. We therefore stress the importance of noting the absolute numbers of the population as well as the fractional changes.

The survey data demonstrate that the overall size of the Canadian astronomical community is increasing. Between 2000 and 2005, the number of graduate degrees awarded in astronomy at the participating institutions tripled from 13 in 2000 to 36 in 2005, the number of postdocs rose from 44 to 77, and the number of full-time faculty rose from 79 to 103. Thus, the number of candidates for faculty positions is increasing faster than the number of available positions. We would like to emphasize that, again because of the small overall size of the Canadian astronomical community, participation in this ongoing survey by all institutions is essential. Particularly because the absolute numbers of women at many levels of academia are still so small, missing contributions from one or two institutions can have a significant effect on our interpretation of the results. Furthermore, we emphasize that the information gathered in this survey is of interest not only to the Canadian astronomical community itself. One of the goals of the Canadian Long Range Plan for astronomy was to increase the representation of women at all levels. Hence, those outside our community to whom we are accountable are actively interested in ensuring that we are achieving our goals. We intend to conduct this survey annually from now on, imposing a fixed term during which institutions will be requested to submit responses. Having made the process of participation as simple as possible, we very much hope for 100% participation in future surveys. ♦

CfA Gender Equity Report *continued from page 1*

Observatory (HCO), and the Harvard Department of Astronomy. With an overall employee and associate base of about 950 individuals, the CfA is one of the largest astrophysical institutions in the world.

The findings of the CGEC are based on the committee's assessment of CfA employee demographics, solicited and unsolicited input from employees, and three independent studies: a web survey of the entire CfA employee population; confidential interviews of a randomly selected, statistically representative, sample of employees; and a statistical analysis of the institutional records of the SAO, which is the largest component of the CfA.

The CGEC finds that even though the CfA has a larger fraction of women postdocs (including those in prestigious named post-doctoral fellowships) than in nationwide statistics, overall the CfA lags behind the national statistics--which themselves need to improve--in the percentages of staff and faculty women scientists, both tenured and non-tenured. At SAO, for example, of the 22 Federal (tenured) scientists hired since 1991, there were 21 men and only one woman (hired in 2003). Women engineers are also nearly absent from the SAO Central Engineering Department. Women are virtually absent from the senior ranks of administrative positions, and hold only a minority of the senior IT positions.

The CGEC study revealed a consistent woman-adverse bias at the CfA. In all areas where a gender gap was detected (e.g., wages/salaries, space allocation, upward mobility), women were generally in a worse position than men. The survey of allotted workspace showed that on average women have smaller office spaces than men, a result echoing that found in gender equity surveys in other institutions. Similarly, a woman-adverse gap is found in rank/salaries. This gap—albeit small—would still result in significant differences in earnings over a career in favor of men. All the discrepancies found in the study, although small, tend to disfavor women.

The analysis of publication rates and citation indices for scientists revealed gender-related differences suggesting that women scientists, especially junior women, tend to collaborate less than their male colleagues. Interestingly, senior women scientists, while having a slightly smaller publication rate compared to the senior men, surpass senior male scientists in citations per paper. A larger percentage of women scientists than men obtain external funding at SAO, but the few large contracts are male-dominated.

This result may point to a higher level of entrepreneurship among women, but can also be explained by a sense of isolation. Since most SAO scientists work in mid to large size projects, if



Credit: Harvard News Office

CfA's Andrea Dupree (right) and Nitya Kallivayalil (left), a grad student in the Department of Astronomy.

male scientists feel part of the team (and women do not), they are less motivated than women to apply for funding.

The web survey and interviews confirmed symptoms of gender imbalance in the perceptions of CfA employees. In particular, concerns were expressed about the lack of upward mobility for women, unwritten rules favoring male employees, lack of adequate mentoring, unfriendly culture and male cliques, lack of management training for SAO supervisors, the SAO performance evaluation process, and the need for more family-friendly procedures at the institution.

A detailed set of recommendations to move the CfA towards gender equality is given in Sections 1.2 through 1.5.

The CGEC feels strongly that a leadership and institutional commitment to gender equity in the CfA workplace is paramount. Without an explicit commitment to these goals by the Director, gender equity will languish. If we are serious about gender equity, we will need to re-think how we hire, reward, and promote CfA employees; and how we attract and further the career development of high-quality individuals. *We recommend that the CfA Director establish an independent mechanism to monitor equity.* This could be achieved by creating a small standing committee chaired by a senior staff member of the CfA, which includes both science and non-science representatives. We also recommend that the Director, in conjunction with this independent equity committee, establish a system of incentives towards achieving equity.

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CfA Gender Equity Report *continued from page 7*

Pepi Fabbiano, Chair of the CfA Gender Equity Committee.

Noting the difficulty in obtaining institutional data for the Gender Equity study, the CGEC recommends that *the CfA Director institute the means for pursuing an ongoing longitudinal monitoring of the entire CfA population*, to compare the career trajectories of different groups at the CfA and to investigate the issue of the disproportionately small number of women in high level positions; and that these statistics should be provided annually to the equity monitoring committee. We further recommend that the longitudinal record study be used to monitor other aspects of equity such as race, ethnic biases, and disabilities; and that for

each new position, statistics should be provided annually to the equity monitoring committee on the gender of the applicants, and the gender fraction at each step of the hiring process. We recommend that full longitudinal studies (similar to those conducted by the CGEC), be performed at 3 year intervals to provide reports for the CfA Visiting Committee.

The CGEC recommends that *the CfA take steps to redress the gender biases uncovered in the present study*, and that as steps to accomplish this the Director ensure that women are members of all the CfA governing bodies and all committees, including promotion and hiring committees; the CfA address the issue of lack of upward mobility

for women employees; and the CfA develop formal mentoring programs.

In the course of our investigations, a broader range of issues than gender equity surfaced. The CGEC recommends that *the CfA improve communications and existing processes*. In particular, we recommend that the CfA set up effective information sources and communication paths for job-related issues that may affect gender equity; that SAO enforce training for supervisors; that the CfA revise the performance evaluation process; and that the CfA review its Ombudsperson and EEOC counselor programs.

In addition, the CGEC recommends that the *CfA improve its social and working environment*, by addressing and changing the present unfriendly culture for all women, and taking steps to facilitate family care processes for employees. Focusing on scientists, the CGEC recommends that SAO and Harvard both strive to achieve gender equity among scientists and faculty; that future CfA Gender Equity studies include graduate students and post-doctoral fellows; and that Gender Balance be a consideration in the choice of speakers and chair-persons at CfA colloquia. Focusing on the technical staff, the CGEC recommends that SAO address the paucity of women in Central Engineering, and the scarcity of women in IT positions at the higher grades.

Focusing on the administrative and support staff, the CGEC recommends that SAO address the scarcity of women in senior administrative positions, and that all scientists, men and women, be made aware of the necessity to engage in respectful behavior in their interactions with administrative and support staff. ❖

From the Director

Thank you for the opportunity to comment on the CfA Gender Equity Report. This report is the result of a sustained effort over many years. It was commissioned by my predecessor, Irwin Shapiro, and completed only recently. The committee worked tirelessly, often dealing with frustrating difficulties with access to data, but has managed to produce a compelling report with many useful recommendations.

We take this report very seriously, and I personally am committed to making progress on the key recommendations. The record of successful recruitment of women scientists into permanent positions is troubling. There are indications that our culture can be unfriendly, which may adversely impact recruiting. It will take time to make significant changes, but we will not tarry in starting to make improvements.

The CfA Gender Equity Committee was led by Dr. Giuseppina (Pepi) Fabbiano. Dr. Fabbiano has presented the report and its conclusion to the Council of the Smithsonian Astrophysical Observatory, and will shortly present it to the Associate Directors. There will also be a discussion with the Harvard Astronomy faculty. We will initiate steps to ensure that this report has sustained impact.

Charles Alcock

Director of the Harvard-Smithsonian Center for Astrophysics



Every Other Thursday by Ellen Daniell is published by Yale University Press, 2006.
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Every Other Thursday: Stories and Strategies from Very Successful Women

By Ellen Daniell

*Editor's note: A friend sent me the book *Every Other Thursday* and I wanted to share it with STATUS readers. At first, the idea of a "consciousness-raising group" seemed very 70s. I then began to realize that the Group that Ellen Daniell describes is a really wonderful thing—perhaps not for everyone—but invaluable for some. If this introductory chapter appeals to you, then I recommend picking up this fabulous little book.*

It's a Thursday evening in November and my turn to host Group! I leave work in time to stop at a deli on the way home. I wish I had time to cook, the way Helen does, but she's retired and I'm not ... yet ... so the deli it is. I lay a fire; that at least is a homey touch. I try to slow down a little, to think about what I want to talk about this evening, wishing I had reserved a few minutes to write some thoughts in my notebook. I have resolved to do advance preparation for my Group work, but I don't stick to my resolve as often as I'd like.

In addition to the pleasure of entertaining these women, I relish having Group at my house because of the luxury of not having to drive home afterward. The meetings often run until midnight, and I always feel a conflict between the dread of being exhausted the next day and my enjoyment of the discussion and laughter.

I put water to boil and get out tea and coffee. Do I need regular coffee for anyone? No, even the last holdouts have turned to decaffeinated beverages in the evening. The doorbell rings at 7:30, and Suzanne is on the doorstep, tall, red-haired, and elegant. "Hi. I allowed extra time in case traffic was bad, but it wasn't!" These moments before the meeting begins are a time to catch up on news with the early arrivers, before the structured work begins. I pull her into the kitchen while I continue to organize. "How are you? How is the family?" As usual, Suzanne's face lights up as she talks about her husband and children. "Maria is applying to colleges in the East, and I'm already thinking about how much I'm going to miss her." Maria is the youngest



among the children of Group members, the last Group kid at home. The news continues. "Kit's fine. He just sent a wonderful e-mail from Mongolia, but I worry about him anyway. Arthur and Nancy are having a rough time looking for two academic jobs in the same place."

Christine arrives next. I hadn't been sure she was coming. She's missed several recent meetings owing to a complicated travel schedule, so I'm especially delighted to see her. I also crave reassurance that she is well, because it has been only a few months since she completed chemotherapy for breast cancer. I give her an enthusiastic hug. The doorbell rings again; Judith, Helen, and Mimi have carpooled from Berkeley.

Mimi's waist-length hair is damp; she has squeezed in a run with a colleague after work. "I'm impressed," I say; "you're doing the important things to take care of your body." "How was your trip?" asks Helen, always the best at keeping

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track of what we're all doing. "The time with my mother was great," I answer, adding a few less enthusiastic words about the business part of the trip. I'm trying to talk to everyone at once, pouting with Judith that we haven't managed to schedule a walk together in a month of trying. "We'll do it after Thanksgiving," she promises.

Only Carol is missing, but she had called earlier to say she might be late. I'm facilitator as well as host, so it's my responsibility to get the meeting started at eight. I start pouring coffee as a signal to begin. Everyone chooses a seat, paying attention to their back needs. Helen sits on the floor. Judith chooses the sofa. Christine joins her, then thinks better of it and takes the antique wooden rocker. I bring straight-backed chairs from the dining room for Suzanne and me. People get out their notebooks. There is preliminary chatter: "Do you have some paper?~ I forgot my notebook." "I need a pen or pencil." "Who wants tea, who wants coffee?" "It is decaf isn't it?"

"Let's get started." I take my notebook out and call us to order. "Does anyone have any feelings they'd like to share?" Suzanne responds, "I'm exhausted and glad I made it." Mimi confesses, "I want to sleep." I offer, "Shall we go straight to strokes and food?" Then I say seriously, "I'm so happy that everyone is here."

"Who would like to work?" I ask. Each person in the circle states how much time she would like. I make notations: Mimi, fifteen minutes; Christine, ten minutes; etc. Tonight everyone asks for ten or fifteen minutes, suggesting that we all have issues to work on, but perhaps not terribly heavy ones. Probably everyone is recognizing the time constraints suggested by having a full Group. When fewer members attend, we miss the wisdom of those who are absent, but we can be more relaxed about time without fear of running too late. Tonight, as facilitator, I'll have to pay particular attention to letting each person know when her requested time is up.

Carol arrives at 8:05. "I'm sorry. I had a student committee that didn't end until seven." She sinks into the remaining spot on the sofa with a sigh. "We've just finished saying how much time we want. Do you want to work?" She shrugs, "Oh, I don't know. I guess ten minutes." By the time Carol joined Group, the rest of us had been together over ten years and had gotten a little lax about keeping to time, so she never has developed the habit of trying to estimate her time. She is also the only one who doesn't keep a notebook to record thoughts and contracts.

I look around the room and get a rush of appreciation. I feel better about myself in the presence of these women, and I expect that in the

course of the evening I will feel more in charge of my life and will gain clarity about the issues I plan to raise. We have been meeting for twenty years, yet every meeting is an adventure. I'll learn something new about life, or myself, or a facet of someone's character, or all of the above.

Next I ask, "Who wants to work first?" I try to catch someone's eye and chuckle as people suddenly begin to study their feet or gaze into the fire to avoid starting. But tonight Suzanne says, "I can go first." Everyone sits up a little and looks at her. "I'm having the winter blues. I am worried about all things. I'm actually very happy in the lab, and good things are happening, but the soft money problem is really bothering me. I feel like I'm up for tenure every year forever." (As an investigator in a "soft money" institution, Suzanne has to write grant requests to cover her own salary, in contrast to university faculty, who have nine months of their salary paid by the institution.)

With this background about her general state of mind, Suzanne moves on to a specific issue. A message from her former postdoctoral adviser telling her that she is "one of the best of her generation of scientists" in their field has produced anger instead of the delight that seems to be the expected response to such a compliment. "Why did he never give me encouragement when I was young, struggling, and in much greater need of it?" We all understand the dilemma, because Suzanne has worked on her complicated professional relationship with this man before. Someone validates her response, saying it's appropriate to be angry with a mentor who withholds deserved praise. "Now that he has come through, you realize how much he has been with-holding." Several people suggest ways Suzanne might respond; she decides she'd like to tell him, "It would have helped me enormously if you had said that earlier." Glancing at my watch, I realize I've been so engrossed in the discussion that we've gone over the fifteen minutes Suzanne requested. "Your time is up; would you like more time?" Suzanne thinks and shakes her head, "No, this has been helpful, and I'm done." Instead of moving on, I say one more thing. "While you're dealing with these reactions, don't forget to take some pride and pleasure in the fact that he feels that way." She agrees, but without enthusiasm. She may appreciate his compliment in the future, when she has dealt with her resentment, but not yet. Judith and Helen have another item, in response to Suzanne's blues, which she's suffered from in other years. They have read of indoor lamps that are supposed to combat depression arising from insufficient daylight. She agrees to look into the product.

"I'll go next, before I get too tired," Mimi says. "I have one more lecture to go in my big

course. After that I can work on my mini-contract from last time to get down to choosing anti-stress strategies." In the previous meeting she had told us about attending a workshop on dealing with stress, and someone had suggested the affirmation "Life's events happen. How we feel about it is up to us." Mimi goes on: "I feel incompetent because I'm so unable to cope, unable to keep up with all the demands that are made on me day after day. I'm focusing only on the people and things that are mad at me, so I'm surprised when someone isn't. Yesterday someone did something nice to help me out and I burst into tears." She ends her work by reaffirming the contract about strategies to reduce stress, and adds, referring to her upcoming sabbatical, "I'm hanging on until we go away in January."

Judith, connecting with Mimi's work on stress and overload, asks to go next. "I have been saying no to invitations and requests, creating space in my life. Now I'm compulsively filling up the space, dotting i's and crossing t's. I'm falling back on old habits. My need to be somebody is tied up in work, and work feels empty." She sees younger scientists going through the anxiety and pressure to produce that she once experienced, and she feels exhausted, somehow still caught up in those pressures, even though she thought she had gone beyond them. Moving on to other difficult work, she says, "I often feel like my feelings are frozen. I have so many ways of avoiding getting through to my feelings." She makes a list: "raging, going numb, working insanely hard." Then she exclaims, "I'm stuck. Stuck in Group, stuck in life, stuck, stuck, stuck!" There's a pause. No one is sure how to help. Mimi breaks the ice with, "I'm depressed, Suzanne's frantic, and Judith's STUCK." The laughter feels good, and Judith gets unstuck enough to proceed. "I'm frantic about filling the gaps I've created." For the short term she proposes, "I will do nothing for an hour a day and watch what comes up." She articulates a more long-term contract, too: "I will honor my battle." Helen adds a suggestion: "Learn to love your gaps."

I look at Carol, Christine, and Helen to see who's interested in going next, and Christine speaks up. "I'm in meltdown. I've been trying to work on my organizational skills and my therapist said, 'You don't need any more organizational skills, you need time to organize.' I have plenty of help [in the lab, in her home]. I need to take time to tell them what to do." I think what a wonderful raconteur Christine is, as she describes a scene from her life as a metaphor. "John and I figured out a schedule for our lives over the next six months. We figured out how to do it on the computer, we finally got it done, and the computer crashed and erased it all. I feel like I've

surrendered to a higher power." Getting down to specifics, she makes a contract to make time for necessary discussions with staff and students. Looking at her watch before I check mine, she says she's finished and adds with dramatic portent, "But this work will continue."

Carol says, "I want to talk about some emotional issues, and I'm amused that I'm not talking about all the lab problems. I meant to, but I figured out the most critical answers as I was planning how to tell you about them." She talks a little about family issues. Her mother, Mollie, aged eighty-five, moved in with her in the early summer, and they are getting used to each other. "Mom has to have things a certain way, and she has to organize everyone to help it be that way. I, in contrast, will never organize other people." Carol, reflecting on how Mollie's style differed from that of Carol's husband, muses, "He also wanted things just so, but he would do them himself, not in a compulsive way, and it became fun to do them together." Carol doesn't really want feedback on this. She's using Group to voice explanations and emotions she's working out for herself.

Carol turns to the specter of the upcoming lectures she will have to give as part of "BioReg" (Biological Regulatory Mechanisms), a legendary course at the University of California at San Francisco taught by a team of high-powered faculty. "I still feel like the new kid on the block. This course demands perfection that I can't deliver." Christine, for whom poor teaching evaluations in that course were a major source of angst and depression in the past, is approaching the course in a different way. "I'm using it to think about science broadly and my science in particular. It's a totally different attitude, not terror." For Carol, it helps just to hear how hard it was for Christine and how lecturing, once difficult for all of us, had become easier with time. Also, she tells us later, describing her fears helped her organize in her mind what she needs to do to prepare.

Helen reports that she has new hearing aids. "They are wonderful, and Health Net Senior Services paid for it all. I'm already hearing the difference." We all feel relieved, knowing that the old devices had been uncomfortable and that Helen had feared the higher cost of new technology. She has been thinking about her fears. "I spend time being fearful, but also time being fearless. Sometimes I don't speak out because of being fearful, but at other times because it feels right to be in the background." Encouraged by Group to define the fears, she listed "fear of saying something inappropriate, fear of not having enough money (but I have also taken risks with regard to money), fear of not

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marrying again [she pauses to question whether that is really a fear], fear of Death.” Then she listed the brave things she had done: “adopting children, leaving my husband, buying a house alone, quitting my job.” She’s been enjoying her first grandchild, and her face becomes even more animated as she tells us about Salina. “She’s learned to talk now and loves to sing. Yesterday I listened to her belt out a song, and with a little difficulty figured out it was ‘Can You Feel the Love Tonight?’ It’s from *Lion King*. She probably doesn’t have any idea what the words mean, but she has the video and she can sing it! I laughed and laughed.”

I go last, as the facilitator usually does, asking that someone else keep track of my time. I am planning to quit my job, which has created a problem. “Now that I know I’m going to leave Roche, I’ve become extremely impatient with its shortcomings.” Letting loose the feelings I have been suppressing, I rant about “idiotic decisions and choices.” I’m concerned that my irritation will show and prevent me from accomplishing what I want to before I leave. Most of my work involves patient compromise with managers in other parts of the company and skillful negotiation with outsiders. I’m good at it because I usually stay calm and laugh a little. “I think I’m losing it.” Everyone agrees that my response to the situation is natural. “You now have the luxury of being pissed. You can’t let yourself be that pissed off at a place until you know you are not going to stay there.” Someone adds, “You’re evolving—or maybe revolving—out the revolving door.” I go on to talk about other sources of pre-retirement anxiety, admitting that I feared not having external approval for my achievements. More immediately, I am worried about telling my terrific boss that I’m retiring. I’m not planning to do it for several months, but I’m already anxious. Group advises that I dedicate time to the details, considering the best and worst things that could happen. My contract is, “I will write the ‘quitting’ scene as a play and imagine it exactly as I would like it to go.” This kind of role playing has been useful in the past.

Judith says, “Your time is up.” I nod, return to my facilitator role, and ask, “Time for strokes and wine?” Everyone pitches in to slice bread, open wine, pour water. We are easy with one another in the kitchen, and this preparation is the transition into the less formal part of the evening. I have set the table with heirloom china that my mother has recently given me, reminding Group of its special significance. We sit down, talking about this and that, filling our plates and glasses. After ten minutes, Judith says, “I have a stroke for

Suzanne.” Everyone quiets down. Suzanne looks attentively at Judith, preparing to accept the stroke. “You confronted the complicated feelings that compliment aroused in you instead of feeling guilty that you weren’t just proud and pleased.” Suzanne says simply, “Thank you.” This is the best way to respond to a stroke, although we may sometimes add a few words, as long as they are positive. Helen has a stroke for Mimi, “about recognizing and appreciating the helpfulness of others in the midst of your stress.” Mimi looks surprised, and I wonder if she’s thinking of protesting, but she follows good-stroke etiquette and does not demur. I give Christine a stroke “for the way you tell a story and make us laugh while getting right to the heart of things.” Suzanne says, “I have a stroke for Carol, for the care and attention you are giving to establishing your life with your mother.” Christine follows up on that: “I have a corollary stroke. That you are taking care of yourself and considering your own feelings as well as Mollie’s.” Carol beams and nods, absorbing the appreciation. Judith says, “A stroke for Helen for her feedback about learning to love my gaps,” and then, with a mischievous look, “and a visual stroke for Ellen.” I sit up straight and try not to preen. “For how you look tonight. Those earrings are gorgeous with your hair, and you look elegant and comfortable.” I thank her and reflect on how good everyone looks to me. Lots of gray hair in varying styles, laugh lines intensifying by the year, and a sense of forthrightness. Stroke etiquette prohibits a response in the vein of, “Oh but not as beautiful as everyone else,” and I focus silently on my sense of pleasure and comfort.

We slip back to general talk about our lives, families, and mutual friends, punctuated with an occasional remembered stroke. Mimi gives me one about a walk we took recently, “busting ass” on steep trails as I asked her questions about her research. She beat me to the punch with that stroke; it was a wonderful walk, and I respond that I was astonished and impressed how clearly she explained unfamiliar science to me. And so on. Judith says regretfully, “I’ve really got to go. Tomorrow morning is looking awfully close.” “Ouch,” says Christine. “Me too.” Everyone checks her watch and sighs. There is great attention to hugs all around and a few promises to call with information or to set up a date for a lunch or a walk. Carol and Suzanne get into a conversation while we’re clearing the table and stay a little longer than the others. I load the dishwasher, turn off the porch lights when the last car has pulled out, and sit for a moment with the last of my wine. I’m rejuvenated, full of new ideas, more confident, and weary. ❖

Group Is...

- Women who came together to discuss professional concerns and have become confidantes and friends, continuing to meet for more than twenty years.
- Commitment to cooperative action in a competitive world.
- A forum for professional problem solving.
- A sounding board, a reference point, a source of perspective and challenge to comfortably held views. “What would Group say?”
- A meeting every other week, a session to be scheduled, a calendar priority. “Are you going to Group Thursday?”
- A source of personal enrichment, acknowledgment and enhancement of personal power, an arena in which to recognize and renew our authentic selves.
- A celebration of life, letting it all in. “I can hardly wait to tell Group.”
- Solace, a lifeline, a place where we can expect any fear or weakness to be met with compassion and where we are committed to compassion for others.
- A chance to help one another, to offer opinions and share experiences.
- Twenty-four years of history, influenced by former members who have contributed to its conception, organization, and evolution.
- Hard work ... hearty laughter ... welcome home.



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Affecting the Climate for Women in Physics: The CSWP Site Visit Program



By Meg Urry

Each scientific institution has its own culture. Some are welcoming and relaxed. In others the atmosphere is more formal, almost corporate. But occasionally the climate feels hostile or alien to women. Often it is hard for insiders to see just what is wrong and/or to effect change. Then it is time to seek some outside advice.

Since its inception in 1990, the Site Visit program of the American Physical Society's Committee on the Status of Women in Physics¹ has visited 34 physics departments and 5 research facilities (see Box 1). The primary goal of the CSWP program is to improve the environment and increase numbers of women in physics at all levels, from undergraduate ranks through senior faculty. It has long been recognized that climate and culture are major factors in women leaving or staying in science. By focusing specifically on how the environment affects

women scientists, CSWP Site Visit committees are able to address issues directly affecting their retention and success. Furthermore, women are often the “canaries in the coal mine,” pointing to environmental issues that are unhealthy for both men and women. CSWP site visits can sometimes point to simple solutions that prevent major problems from developing.

Anatomy of a CSWP Site Visit

CSWP site visits must be requested by the department chair (or equivalent administrator, in the case of non-academic institutions). This demonstrates an active interest in improving the situation for women and thus optimizes the chances for a positive outcome. While there may well be departments in greater need than those who invite CSWP inspection, little can be accomplished without the commitment of a strong local leader in a position of authority. If you are wary of approaching your department head to suggest a site visit, I suggest you look for a sympathetic faculty member, preferably senior, who can make the case. Often an initially reluctant chair is swayed by arguments that a site visit would make the department look good, that it might improve recruitment, or satisfy an institutional requirement to address gender issues. But many chairs genuinely want to improve their department and welcome an

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Pilot Program	Date
University of Maryland	April 1990
University of Pennsylvania	February 1991
Bryn Mawr College	February 1991
University of Virginia	November 1991
Rensselaer Polytechnic Institute (RPI)	March 1992
NSF Funded	Date
Williams College	April 1992
University of Illinois at Urbana	October 1992
Michigan State University	
SUNY at Stonybrook	April 1994
University of New Mexico	November 1993
University of Texas at Austin	May 1994
Kansas State University	Winter 1993
Stanford University	January 1994
Harvard University	April 1994
University of Rochester	May 1994
North Carolina State University	November 1994
California Institute of Technology	April 1996
Columbia University	April 1997
Post-NSF grant	Date
University of Colorado at Boulder	March 1997
University of California, San Diego	May 1998
Princeton University	November 1998
William & Mary	April 2000
UCAR/NCAR *	July 2000
Penn State	October 2000
University of Maryland (return)	February 2001
Argonne National Lab *	January 2002
University of Wisconsin	April, 2002
University of Iowa	May 2002
NASA/Goddard (w/ COM) *	December 2002
Purdue University	February 2003
Univ of Minnesota	March 2003
Duke University	April 2003
Ohio State University	October 2003
University of Washington	April 2004
Colorado School of Mines	October 2004
University of Arizona	October 2004
University of Michigan	March 2005
NIST/Gaithersburg *	August 2005
NIST/Boulder *	September 2005
Iowa State University	November 2005
JILA/University of Colorado, Boulder	October 2006
Indiana University	March 2007
Total: 35 colleges/universities, 6 research facilities*, 1 return visit (Univ of Maryland)	

external site visit from a prestigious organization such as the APS. Unfortunately, not all requests for a visit can be met as the CSWP has sufficient budget for only 2–3 visits per year. Usually requests are taken in order of receipt.

Site visit committees are organized by a member of the standing CSWP committee who has been appointed to serve as CSWP Site Visit Coordinator for one year. It is his or her responsibility to organize committees for each of the 2–4 site visits per year. These are constituted much like the usual departmental visiting committee, i.e., each consists of 3–5 physicists with expertise overlapping the main subfields represented in the department. Most of the committees are all female, the thinking being that women in the departments being visited will feel freer to talk to an all-woman committee. An alternative view is that men should be included, in part because they might be granted greater authority by male faculty resistant to a negative assessment. There is no documented evidence about either potential effect, however. Finally, there is an attempt to balance experienced senior scientists (including the committee chair) with younger physicists.

In general, the Chair and committee members are all well-known, highly respected physicists. One department chair commented after a site visit that the key to making his faculty receptive to the committee's report was "the stature of the committee members, who were very well respected and had no political axe to grind." He thought that an outside committee could be significantly more effective than a university-based group, both because department members were more willing to speak freely to outsiders and because outsiders were seen as free of internal university politics.

Prior to the actual site visit, the APS administers a survey, to be completed by the department and various segments of the departmental community. This includes basic demographic information disaggregated by gender, such as the numbers of students at each level, their graduation rates, the number of postdoctoral fellows, faculty at each level, etc. The surveys are evaluated by experienced statisticians at the American Institute of Physics and results are provided to committee in advance. No results are reported for 5 or fewer responses in any given group, so that anonymity is preserved. The survey gives the Site Visit Committee a sense of the general feeling in the department and notifies them of any specific issues that need to be considered. Typically about 20–30% of the students in the department complete the survey, raising the possibility that it does not accurately reflect departmental attitudes, something the committee is careful to take into account. In addition, the chair of the committee typically has several discussions with department chair or administrator prior to visit, to get an idea of the major issues.

The actual site visit lasts one or two days, depending on the size and complexity of the organization. The day usually starts with a meeting with the department chair, followed by discussions with leaders and/or representative members of groups such as undergraduates, grad students, post-docs, faculty, department administration, and administrative staff (e.g., directors of undergraduate and graduate studies). Typically, women and men meet separately with the committee, to ensure that everyone feels free to speak openly. At some point during the visit, the committee also talks with administration officials (deans and/or the provost), to get the institution's view of the department. After the visit, the site visit committee writes a report, usually within a few weeks of the visit. The entire process is confidential, from the interviews through the final report. Identifying characteristics are omitted from the report, to preserve the anonymity of department members.

The final report is sent to the department chair. Usually the chair shares the report, either the summary or the detailed report, with faculty and administration. One year later, the chair is asked to give the CSWP a response to the report, indicating how the recommendations have been implemented and giving a preliminary assessment of their utility.

Findings on the Climate in Physics Departments

The APS Site Visit program has visited a wide range of institutions—from large state universities to small colleges, and everything in between, including some Government research labs. Despite this diversity of institutions, site visit committees do find some surprising similarities in climates found in different departments. Typically undergraduates are very enthusiastic about physics, and there are few differences in attitude between men and women. First- and second-year graduate students are similarly enthusiastic about physics. They like their classes and, though in many cases anxious and daunted by the challenges ahead, most remain very keen on physics.

By the later years of graduate school, however, strong differences between men and women can emerge. Senior women graduate students sometimes appear discouraged and battle-weary. They speak of having made the wrong choice to pursue physics. They tell the visiting committee that they don't like it, aren't cut out for it,

The numbers:

Although girls make up nearly half of high school physics classes, by the time of college graduation, they have dropped to 20% of the majors². In terms of career progression, the largest differential attrition of women occurs during the undergraduate years, suggesting that a focus on undergraduate education could have the largest effect on increasing the number of women physicists.

don't know how to do it well, and certainly should have done something else. They can't wait to get out, get away from the department, and from academia, and some say they are planning to finish up only because it took them so long to come this far. At one university, a 5th year graduate student—who had an outstanding reputation in her field—talked of being absolutely and completely without any good ideas, and said she wouldn't have the first idea of what to propose for a grant or how to plan a research program for a faculty job. She was practically in tears as she described what she perceived as her complete unsuitability for her chosen field.

Yet she was well known by physicists outside her university as being a very bright and promising scientist.

Few of the men say anything remotely like this. Any discouragement is usually manifested as reduced ambition (relative to the projected standards typical of most departments, namely that one should aspire to a faculty position at a top research institution); for example, they expressed interest in faculty positions at a 4-year teaching college rather than a research-intensive university. The much stronger alienation of women physics graduate students is both striking and very worrying.

Student disaffection is relatively easy to detect—they are young, idealistic and fairly willing to talk. When it comes to faculty it is often much harder to assess the true climate—they are heavily invested in the system and less willing to be perceived as rocking the boat. While junior faculty often seem as if they are progressing normally and expect fair treatment, nearly every senior woman faculty tells a different story. Their concerns range from minor annoyance to major disgruntlement. Many speak of a lack of respect from colleagues, of not being listened to or heard, and of having little say in departmental affairs. One senior woman—enormously respected and well-known—said she really didn't know why she had been hired; she felt she was barely tolerated and certainly not supported by other faculty, especially those in her subfield. Overall, senior women faculty in physics express a sense of marginalization, as well as a lack of access to resources, much as was described in the famous MIT report on women faculty in the School of Science, and in many reports since³.

The CSWP Site Visit Program *continued from page 15*

Many male faculty are supportive of their women colleagues and eager to improve the climate for women in physics, as well as to increase the number of women faculty and students. Some, however, view women colleagues as under-talented or overly difficult. Phrases such as “high maintenance” emerge. The sense you get is of the women faculty being not so much harmed by overt discrimination as diminished by being ignored or dismissed. After spending a decade or more of being overlooked, many senior women faculty adjust by withdrawing. Sometimes they focus their interests away from research into teaching or administration outside the department, or into some endeavor on a field independent of their male colleagues, thus reinforcing the (erroneous) impression that they are not suited for or interested in cutting-edge research. This in turn can have the subtle negative consequence of lowering faculty expectations of women graduate students.

CSWP site visits reveal that many U.S. physics departments have climates less than optimal for the full flowering of talent within them. In many cases, the faculty are unaware of the negative effects of simple—and apparently unbiased—departmental practices. The site visits help to document the status of women within the department, and to illustrate how perceptions and reality impact them. A few simple, practical recommendations often can decisively improve the climate.

Typical Recommendations of a CSWP Site Visit Report

For undergraduates, the advising structure and climate are the key issues. It is important for faculty to be accessible and supportive. Making sure the students have a comfortable, convenient student lounge is invaluable, as are social activities like pizza parties, chairman’s teas, picnics, and other activities that humanize the department for students. The department should feel like a comfortable “home” for students. A decent web presence and connectivity (e.g., an email listserv for undergraduate majors), along with strong Society of Physics Students organizations, can also improve the undergraduate physics experience. On occasion, it is necessary to pay attention to sexism, which is not rampant but remains (surprisingly, given that we’re in the 21st century) alive and well on today’s campuses. More than one young woman has been told she is not suited to physics, or isn’t smart enough, or lacks some other requisite ability. At one university, a young man told the Site Visit Committee that he did his physics homework only with other male physics majors because he “knew they were smarter than

the women.” When questioned further on this point, he admitted he had never actually talked to any of the women about physics, so had no basis for his prejudice. In such an environment it is relatively easy for women physics majors to be made to feel inadequate. Yet it is simply remedied by faculty demonstrating respect for the intellect of women students in their classes.

Other recommendations might address recruitment of majors—why is it that so many more men than women major in physics? It helps to de-emphasize pre-college technical background, which is largely irrelevant. Departments may expect their majors to come primarily from honors introductory physics classes filled with students with top scores on AP Physics exams, but this kind of record reflects the quality of the high school more than it does innate aptitude for physics. In the right environment, bright, enthusiastic students can quickly make up for little or poor high school experience in physics. Departments should recognize and facilitate different entry points to the major. In addition, research shows that women respond well to innovative teaching techniques, where traditional “chalk and talk” lectures and competitive atmospheres are de-emphasized in favor of cooperative and/or interactive learning. Providing such classes, especially at the introductory level, has the potential to increase the number of majors overall, not just the number of women, by appealing to students who are less attracted to traditional physics instruction.

Undergraduate physics students often hit problems in their sophomore year when the workload and style tends to get tougher. Faculty tend to see these “crank and grind” courses (e.g. classical mechanics, E&M, quantum) as the first test of whether a student “has what it takes” to be a physicist. This is the time when it is key that students develop good study habits, get together in study groups and ask the instructor about things they do not fully understand. Some departments have found it helpful to pay senior students to hang out as informal tutors in study lounges, a tutoring room or physics labs. They report this not only helps junior students get over this “roadbump” but the upper division students also improve their mastery of basic material which helps their GRE performance. Once students gain experience and confidence they are often launched on their own successful path. Most women in physics have trouble not from a lack of math or physics ability but from an essentially sociological problem of developing good study habits and enhancing a natural curiosity about the physical world.

For graduate students, the first year or two can be particularly important, as students take

qualifying exams and join a research group. Orientation to the department is therefore very important, and might better be spread out throughout the first year rather than crammed into the busy first week on campus. Training for teaching assistants is helpful, as is a targeted research seminar to inform beginning students about available research opportunities in the department. Senior graduate students can be organized to mentor junior graduate students. Often this springs up organically from within the student body, but it can also be organized by the department administration. In some departments, unequal work burdens in different assistantships and/or uncertainty in future research support has lowered graduate student morale; this can be mitigated by department level or administration intervention. Stress in general can be relieved by appropriate measures. For example, to reduce the stress from qualifying exams, departments can give special classes and/or offer problem-solving sessions in the semester preceding the exam. Perhaps most importantly, there should be regular communication between graduate students and departmental leadership, if necessary through official groups (if the department is very large). The guiding principle should be that the present graduate students were admitted to the program in the expectation they would succeed, and that the department intends to support them and help them as necessary to achieve that end.

Most importantly, the sometimes seemingly opaque graduate career process must be perceived to be fair. Some departments have found that having senior graduate students on the committee that makes up the qualifying exams not only results in a better exam but also allows the senior student to witness that the system is fair. Obviously, when it comes to discussing individual performances on the exams it is not appropriate to have students present.

Compared to students, postdocs are more easily lost in the shuffle. Fewer universities have offices devoted specifically to the postdoc population, even though most have long-standing structures for undergraduate and graduate students. Postdocs are also more vulnerable, since the good opinion of their single research supervisor largely dictates the progress of their career, and they are much more isolated in research groups than students who share other classes or teaching duties with a broad range of classmates. Thus the most important recommendation for postdocs is to integrate them into the department in ways not dependent on the research group. As with other groups, the department chair should meet regularly (at least once per year) with postdocs as a group, to assess whether there are systemic issues that need to be

addressed. In the event of problems within their research group, postdocs should be encouraged to approach the chair or any other faculty they deem accessible. Where appropriate, departments could appoint a "Director of Postdoctoral Fellows" just as they do for undergraduates and graduate students. Finally, it is important to increase the number of women postdocs, both for their professional development and for creating a cadre for future faculty hires. Some departments and universities have offered institutional support (for partial salary) when a faculty member hires a female postdoc.

Recommendations for faculty tend to reflect the particular circumstances of individual departments, as few have more than a handful of women. Some general statements can be made, however. Junior faculty focus almost entirely on developing their careers and achieving tenure, and for many this crowds out other considerations such as whether they actually like the department. This may explain why it is the senior women faculty who tend to describe problems (e.g., MIT report). Department chairs must be vigilant in ascertaining the job satisfaction of their women faculty and making sure their access to resources (including salary) is on par with men in the department. At some institutions women faculty get together, often across departments, to talk about common issues; groups of senior women faculty can be very effective at getting departments and universities to address their concerns. The range of attention given to family issues (such as child care, maternity and paternity leave, extensions of the tenure clock for birth or adoption) varies enormously with institution. But there are examples for other institutions to follow, tabulated on many of the NSF ADVANCE web sites⁴. Similarly, institutions are sharing information on how to handle the "two-body problem" (e.g., procedures for obtaining two jobs at the university or nearby, the possibility for part-time status and/or shared faculty positions, etc.). Departments can help by, for example, holding meetings at family-friendly times.

Most universities and departments recognize the unique responsibilities of role models, particularly women and minority faculty in physics, who typically carry a disproportionate service burden (advising minority or female students, filling the diversity slot on committees, leading efforts to recruit and retain more women and minorities, etc.). One way to alleviate this burden is to recruit more women faculty. A number of departments, no matter how well-intentioned, have documented quite a remarkable string of failures in recruiting women faculty. They conclude that women physicists

The CSWP Site Visit Program *continued from page 17*

are in big demand and are difficult for any one department to “land.” In fact, women scientists report otherwise—few say they were heavily sought after for faculty positions. Thus it seems to be the case that a few women superstars are eagerly recruited by multiple universities while many other talented women are out there and available. The late Denise Denton talked about how universities should conduct real, active searches for new faculty, scouring the terrain for excellence rather than waiting for it “to come in over the transom.”⁵ There was a recent case of a potential new woman neuroscientist—a “super-star”—who was apparently warned off an MIT faculty position by the discouragement of an individual senior male professor. It only takes one hostile interview to leave a bad taste that might be the difference, for a hotly recruited candidate, between accepting and rejecting a particular offer.

Broader recommendations center mainly on the importance of communication and a process to address concerns. Regular meetings between the chair and women students, postdocs, and faculty, are important. Establishing and encouraging groups of women in physics is relatively easy and very effective. The days of girly magazines and pinup calendars are largely gone, if not completely eradicated. But sexual harassment, however rare, is unfortunately not gone. Women isolated in research groups can be particularly vulnerable; in wanting to fit in, they are reluctant to antagonize anyone and thus are at a loss if collegial friendliness crosses the line to unwanted attention. Departments need to have clear means of addressing such events. Young women need role models, whether indigenous (e.g., women faculty in the department) or imported (e.g., seminar and colloquium speakers). Both the CSWP and the CSWA maintain lists of women, sorted by institution, background, and subfield, that facilitate finding appropriate speakers.

Do the CSWP Site Visits Cause Change?

Ideally, a successful CSWP site visit would result in improvements in the department climate, leading to greater numbers of women students, postdocs, and faculty, as well as greater satisfaction of everyone with their environment. Because of the scope of the CSWP program, it has not been possible to carry out a formal evaluation. Instead, 6 months after the site visit, chairs are asked to report on changes by answering a specific questionnaire from the APS. Thus, most of the information is self-reported, short term, and ultimately anecdotal. It would be extremely valuable to have a formal evaluation of the effectiveness of the program on, say, a 5-year time scale.

Chairs and department members are generally very positive about the CSWP site visit program. Nearly all report better communication, especially between chairs and women students. There is greater openness about the topic of departmental climate, and a shift away from always looking to the women faculty for answers toward seeing climate issues as something that the faculty as a whole need to address. Nevertheless, one must be realistic that some faculty are allergic to change and that in academia few things happen swiftly.

Responses from individual women faculty were mixed. Some talked of tremendous changes, and said their lives had been strongly affected. One of the most discouraged women faculty was, within a few years of the visit, chair of her department. Another said, “one of the most important things that happened was that you educated our chair... about some of the difficulties in our department. Consequently he has worked to improve the lives of women (faculty, students, etc) in the department [and] he is interested in hiring more women faculty.” Others are less positive, one saying she was “unsure whether things have changed in any substantive way” although the chair’s efforts “have led to a quieter and more collegial environment.” Some expressed concern about negative fallout from her university administration because of negative comments in report, although the chair thought it more likely the department would have been punished if he hadn’t taken the step of inviting the CSWP intervention.

In general, the more committed the chair, the more positive about the visit and the more substantial the response to the CSWP Site Visit Committee Recommendations. One chair expressed gratitude for the “thorough and honest assessment of what the climate in the department is or was” and reported that, for example, the recommended changes for undergraduates had led to “larger and much more active SPS chapter.” In some cases, the chairs went beyond the recommendations and devised new ways to better the career progress of women physicists. Indeed, another hallmark of successful departments is that they take things further after the site visit, figuring out how to bring like-minded faculty into leadership positions within the department, and how to institutionalize climate change.

Perhaps the most important effect of the CSWP site visit is the newfound realization that it is largely up to the men in the department to effect change, where previously everyone turned to the women faculty to say “Please do something to fix this.”

To Request a CSWP Site Visit

CSWP site visits are instigated when a department chair contacts any member of the

CSWP or Sue Otwell, APS Staff Liaison to the CSWP¹. Because the program is carried out by volunteers already heavily burdened with other “diversity” responsibilities, only 2–4 visits per year can be organized. Funding for the visit is shared between the APS, which pays for the committee chair’s travel expenses, and the department, which covers expenses for the other committee members. From 1992–1997, the NSF

funded CSWP site visits, to 10 universities. Typical costs are roughly \$1500 per person. There is a \$500 charge (\$100 for laboratories) per site visit to offset costs associated with programming and tabulating student surveys. Department chairs are urged to request support for the visit from the administrative officer responsible for the recruitment and retention of under-represented groups. ❖

References:

- ¹ For a list of member of the CSWP see www.aps.org/educ/cswp/index.html. Sue Otwell can be contacted via otwell@aps.org. See also Barbara L. Whitten, “Improving the Climate for Women in Physics, Site Visit Program,” CSWP Gazette, Fall 2000 and “Best Practices for Recruiting and Retaining Women in Physics”, CSWP <http://www.aps.org/programs/women/reports/bestpractices/index.cfm>
- ² Rachel Ivie and Katie Stowe, Women in Physics and Astronomy, 2005, AIP Publication Number R-430.02, February 2005 (see <http://www.aip.org/statistics/trends/reports/women05.pdf>)
- ³ The NRC has posted a list linking to many of the gender equity studies http://www7.nationalacademies.org/cwse/gender_faculty_links.html
- ⁴ Websites of programs with ADVANCE grants from NSF <http://www.nsf.gov/crssprgm/advance/itwebsites.jsp>
- ⁵ See January 2007 for the transcript of Denice Denton’s presentation to the Women in Astronomy II conference in June 2004. A presentation on her Faculty Recruitment Toolkit can be found at http://www.engr.washington.edu/advance/resources/faculty_recruitment.pdf

Also:

- APS Women Speakers program: <http://www.aps.org/educ/women-speaker.cfm>
- Judy R. Franz, “Improving the Climate for Women in Physics” See <http://www.aps.org/educ/cswp/visits/summary.cfm>
- Mary Fehrs and Roman Czujko, “Women in Physics, Reversing the Exclusion,” *Physics Today*, August 1992, pp. 33–40
- Barbara Whitten’s later report, “What Works? Increasing the Participation of Undergraduate Women in Physics”, B. Whitten, Colorado College, 2004. <http://www.coloradocollege.edu/dept/PC/WhatWorks2004/web%20pages/Home.htm>
- Acknowledgments: For this article I am indebted to Sue Otwell, Staff Liaison to the CSWP at the American Physical Society, who filled in many technical details.



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Review of Two Paths to Heaven’s Gate, Nan Dieter Conklin

Reviewed by Joan T Schmelz



As a graduate student working at Arecibo Observatory in the 1980s, I never knew that an American woman was there at the beginning, when radio astronomy was born. In those days when I desperately needed a role model, there seemed to be none available. So imagine my delight in learning (after all these years!) that such a role model had been there all the time, but her story, her life, and her accomplishments were unknown to me—until now.

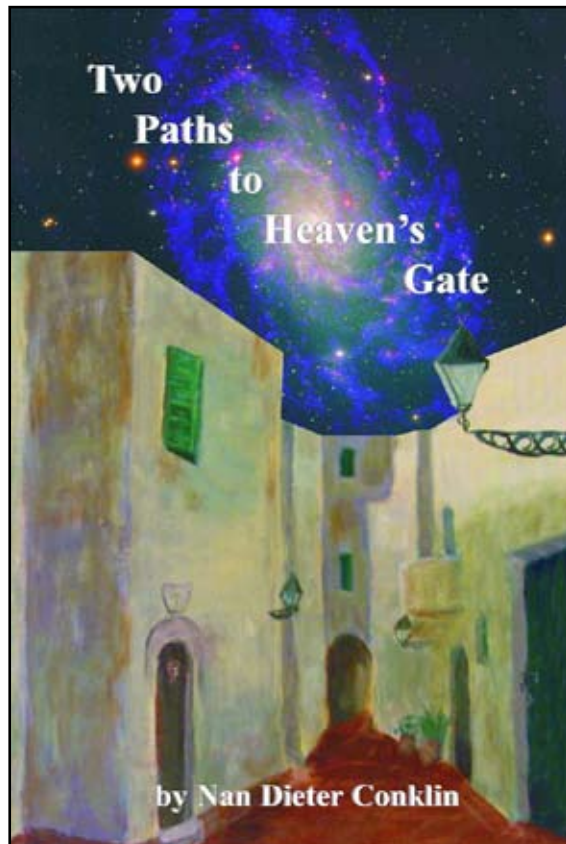
Nan Dieter Conklin had a distinguished career in astronomy that began on Nantucket

Island with a Maria Mitchell fellowship in 1947 while she was still an undergraduate. She then worked at the Naval Research Laboratory in Washington and published her first paper, “Solar Outbursts at 8.5 mm Wavelength,” in 1952. She earned her Ph.D. in 1958 at Harvard with a thesis entitled, “Neutral Hydrogen in M33.”

Her professional career took her from the Air Force Cambridge Research Laboratory to the University of California at Berkeley. She studied neutral hydrogen gas in the Milky Way and other nearby galaxies and was involved in the discovery in interstellar OH masers. She is the author or coauthor of almost 50 scientific publications including several in *Nature* and many in the *Astrophysical Journal*.

Continued on page 20

Heaven's Gate Book Review continued from page 19



Nan writes about her joys and accomplishments—her scientific discoveries, her children, and the long-awaited love of her life. She also writes about her individual struggles—her failed marriages, her estranged daughter, and her multiple sclerosis. She is honest and frank with us, her readers, as she allows a glimpse into the world in which she lived and worked. She takes us on the journey of her life, both

the personal and the professional. Although there are bumps as well as unexpected twists and turns in the roads she took, she seems to navigate them both successfully, hence her choice of title, *Two Paths to Heaven's Gate*. In the 21st century, when women in astronomy (and in all professions) struggle with the balance between work and family, Nan once again becomes a role model. She grappled with these same issues in the 1950s!

Nan tells us in her introduction that this book started as a chronicle of her life in science, which is now available on the NRAO Archives web site (http://www.nrao.edu/archives/Conklin/conklin_top.shtml). Her creative writing group pressed her to make the story more personal. After reading the book, I find that I would have pressed her in a different direction—more scientific details, more about the many radio astronomy pioneers she worked with, more about what it was like to be a woman in a field so dominated by men at a time when women were not expected to work outside the home. But this is Nan's story, and she has told it well. Thank you, Nan for re-entering the astronomy scene as one of our much-needed role models.

Two Paths to Heaven's Gate is part autobiography and part scientific history. It is a book worth reading, and its author, Nan Dieter Conklin, is a woman worth getting to know. ❖

To obtain a copy of Two Paths to Heaven's Gate send a check for \$13 (\$10 plus \$3 s&h) to: Archives, National Radio Astronomy Observatory, 520 Edgemont Rd., Charlottesville VA 22903-2475.

SNIPPETS

NEWS BRIEFS AND HIGHLIGHTS

Dorrit Hoffleit



Photo by Chia-Hsien Lin

Dorrit Hoffleit celebrated her 100th birthday with friends and colleagues on March 13th, 2007. She died on Monday 9th of April.

Michael Rupen wrote in the AASWOMEN newsletter "She was probably best known in professional circles as the editor of the Bright Star Catalogue, but also had close contacts with the amateur community, especially through the AAVSO. She won the van Biesbroeck prize for contributions to the field in 1988, and the Annenberg Prize for science education in 1993... despite having officially "retired" in 1975".

A biographical essay of Dorrit Hoffleit written by Pangratios Papacosta was published in the January 2006 issue of STATUS and the material below is excerpted from that article.

Dorrit Hoffleit was born on March 12, 1907 in Florence, Alabama, of German parents who came to America for a better life. After a childhood of hard work on the family farm in Pennsylvania, Dorrit followed her Harvard-bound brother and enrolled at Radcliffe College. Upon her graduation in 1928, she accepted a position as a research assistant at the Harvard College Observatory, where she earned a minimal salary—just 40 cents per hour. She chose this over a much higher paying job working with a statistician, and never regretted the decision. Harlow Shapley, the director at the Harvard College Observatory at the time, encouraged Dorrit to pursue graduate work. Dorrit took graduate classes at Radcliffe and earned an MA in 1932. She loved to work on meteors, a phenomenon that she found fascinating. She remembers an August evening in 1919 when she and her mother witnessed the rare and spectacular phenomenon of a bright Perseid colliding with an equally bright sporadic meteor. That event, etched permanently in her mind, was the single cause of a life long fascination with the night sky.

Dorrit completed her doctoral degree at Radcliffe with a thesis on the spectroscopic

absolute magnitudes of stars, for which she won an award for best original work. Her work included such areas as the study of variable stars, meteor velocities and stellar distance measurements using trigonometric and spectroscopic parallaxes.

In 1956, at the age of 49, Dorrit became the director of Nantucket's Maria Mitchell Observatory, which operated mostly during the summer season. She was also offered a position at Yale University for the rest of the year. During her 21 years at Nantucket, she initiated and supervised a summer program that provided 102 college-aged women with research opportunities in astronomy. Of these young women more than 20 have gone on to become professional astronomers. Consequently these women astronomers became role models to hundreds of other young women aspiring to follow an astronomy career.

Dorrit Hoffleit's career is summarized at <http://www.cwhf.org/hall/hoffleit/hoffleit.htm>

Some wonderful footage associated with her centennial symposium can be found at <http://www.aavso.org/news/dorrit100.shtml>



Dorrit's Girls at MMO in 1975 (see January 2006 STATUS for further details).
Credit: From the Dorrit Hoffleit Collection of the AAVSO Archives.

New Harvard President

STATUS readers have probably heard about the new President of Harvard University. The first woman to hold the position, Professor Drew Faust is a historian of the US Civil War and Dean of the Radcliffe Institute for Advanced Studies. In recognition of its roots in Radcliffe College,

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Snippets continued from page 21



Photo by Kris Snibbe/Harvard News Office

the Institute maintains a special commitment to the study of women, gender, and society. So, what are the possible implications for women in science at Harvard? Certainly she is a refreshing change from Larry Summers (see extensive discussion of the “Summers debacle” in the STATUS of June 2005). But it could be argued that President Summers in fact did a great service to women in science—he

brought the issue to the front of the news—on three occasions in as many months the issue of women in science was on the front page of the New York Times. His “unfortunate remarks” suggesting that women may lack innate ability in math and science spurred a huge national debate. Since she oversaw the work of Harvard’s subsequent Task Forces on Women Faculty and on Women in Science and Engineering, Professor Faust must very familiar with the issues. The recent report from the Harvard-Smithsonian Center for Astrophysics (see page ?? in this issue) suggests there is still much work to be done. We wish her well at a challenging task.

Paid Maternity Leaves: Berkeley, Princeton, Colorado join Stanford and MIT

Paid maternity leave for graduate students is a hot topic—discussed at a recent AAS meeting. At UC Berkeley, the Graduate Council of the Academic Senate has just passed a provision allowing six weeks of paid maternity leave for female doctoral students¹. Berkeley claims to be at the forefront of family-friendly benefits and bases their new policy on an extensive survey of graduate students in which women stated that family issues were a “very important” factor in choosing whether to continue in research.

An April 7th article in the Chronicle of Higher Education² reports a similar announcement from Princeton: “In an effort to provide a “continuum” of support for graduate students who are new parents, the university will offer three months of paid leave from research and teaching to birth mothers. Primary caregivers of both sexes will be allowed an extra semester to complete their

studies, and will be able to apply for extensions of academic deadlines and financial support.” The Chronicle article mentions that Stanford and MIT already have similar policies.

Meanwhile, the Dean of Arts & Sciences at the University of Colorado, Boulder has provided funds for an astronomy graduate student to be on maternity leave at half-pay over the summer. This “fellowship” is being cautiously tested in the physical sciences where women are particularly underrepresented. Administrators seem concerned that such a policy will “open the flood-gates” of women graduate students in science looking for support while having babies. The faculty who worked hard to cajole the Dean into the deal, seeing the scarcity of women graduate student having babies (the last time in the Colorado astronomy program was 15 years ago), just shake their heads and laugh “Now wouldn’t that be great—bring it on!”

References:

- ¹ Berkeley news release: http://www.berkeley.edu/news/berkeleyan/2007/03/07_maternity.shtml
The full text of the policy: http://www.grad.berkeley.edu/policies/memo_doctoral_parent.shtml
- ² The Chronicle of Higher Education: <http://chronicle.com/daily/2007/04/2007040503n.htm>

The Opt Out Myth

A recent AASWOMEN e-newsletter posted a link to a report discussing how the topic of well-educated women quitting their careers and choosing to stay at home with their babies has become a recurrent old chestnut of journalism. The report by E.J. Graff¹ is aimed at the journalism profession but presents reflections on personal choice vs. public policy that apply to other professions as well as provides valuable insight into discussions of such issues in the public media. Below are some excerpts from Graff’s report which starts out by pointing out that the “high-flyers” who are opting out are usually affluent:

“Here’s why this matters: if journalism repeatedly frames the wrong problem, then the folks who make public policy may very well deliver the wrong solution. If women are happily choosing to stay home with their babies, that’s a private decision. But it’s a public policy issue if most women (and men) need to work to support their families, and if the economy needs women’s skills to remain competitive. It’s a public policy issue if schools, jobs, and other American institutions are structured in ways that make it frustratingly difficult, and sometimes impossible,

for parents to manage both their jobs and family responsibilities. Only 4 percent of women in their mid- to late thirties with children have advanced degrees and are in a privileged income bracket.

Women are chastised for working by Caitlin Flanagan (a woman rich enough to stay home and have a nanny!) in *The Atlantic*. But such “my-friends-and-me” coverage is an irresponsible approach to major issues being wrestled with by every American family and employer.

These stories are misleading in a second important way. The women in these articles often say their skills can be taken right back onto the job. It’s a sweetly optimistic notion, but studies show that, on average, professional women who come back after time away—or even after working part-time, since U.S. women working part time earn 21 percent less per hour worked than those who work full time—take a hefty and sustained pay cut. In other words, interview these opt-out women fifteen years later—or forty years later, when they’re trying to live on skimpy retirement incomes—and you might hear a more jaundiced view of their “choices.”

Still, if they were pushed out, why would these smart, professional women insist that they chose to stay home? Because that’s the

most emotionally healthy course: wanting what you’ve got. “That’s really one of the agreed-upon principles of human nature. People want their attitudes and behavior to be in sync,” said Amy Cuddy, an assistant professor in the management and organizations department at Northwestern Kellogg School of Management. “People who’ve left promising careers to stay home with their kids aren’t going to say, ‘I was forced out. I really want to be there.’ It gives people a sense of control that they may not actually have.”

The moms-go-home story’s personal focus makes as much sense, according to Caryl Rivers, as saying, “Okay, let’s build a superhighway; everybody bring one paving stone. That’s how we approach family policy. We don’t look at systems, just at individuals. And that’s ridiculous.”

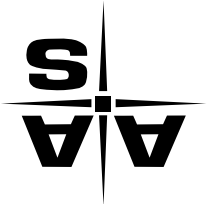
References:

- 1 The Opt-Out Myth by E.J. Graff of the Gender & Justice Project at the Brandeis Schuster Institute for Investigative Journalism published in the Columbia Journalism Review, March/April 2007. The following link has additional references and resources <http://www.brandeis.edu/investigate/gender/optoutmyth.html>

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“I’m not asking you to change your spots. I’m just asking you to take out the garbage.”



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