U.S. HOUSE OF REPRESENTATIVES
COMMITTEE ON SCIENCE AND TECHNOLOGY
SUBCOMMITTEE ON RESEARCH AND SCIENCE EDUCATION

HEARING CHARTER

Fulfilling the Potential of Women in Academic Science and Engineering Act of 2008

Thursday, May 8, 2008
10:00 a.m. - 12:00 p.m.
2318 Rayburn House Office Building

1. Purpose

On October 17, 2007, the Research and Science Education Subcommittee held a hearing on *Women in Academic Science and Engineering*, during which we examined institutional and cultural barriers to recruitment and retention of women faculty in science and engineering fields, best practices for overcoming these barriers, and the role that Federal research agencies can play in disseminating and promoting best practices.

On Thursday, May 8, the Subcommittee will hold a hearing to obtain comments on a draft bill that would provide for Federal programs to address the needs discussed in the previous hearing.

2. Witnesses

- **Dr. Lynda T. Carlson,** Director of the Division of Science Resource Statistics, Directorate for Social, Behavioral and Economic Sciences, National Science Foundation.

- **Dr. Linda G. Blevins,** Senior Technical Advisor in the Office of the Deputy Director for Science Programs, Office of Science, Department of Energy.

- **Dr. Donna K. Ginther,** Associate Professor of Economics and Director of the Center for Economic and Business Analysis, Institute for Policy Research, University of Kansas.

3. Overarching Questions

- What are the elements of an effective program of workshops to educate participants about gender bias in academic science and engineering and to provide them with strategies to overcome such bias? By what metrics should such workshops be evaluated?

- What demographics data do Federal science agencies already collect in their grant making processes? What demographics data do universities collect on their faculty search and hiring, tenure review and promotion processes? What data are needed to better understand and track gender disparities in academic science and engineering?

- Does the proposed legislation adequately address the Federal role in programs and policies to help overcome cultural and institutional barriers to gender equity in academic science and engineering?

4. Overview

- Although women earn half of the bachelor's degrees in science and engineering (S&E), they continue to be significantly underrepresented at the faculty level in almost all S&E fields, constituting 30 percent (in 2006) of full-time doctoral science and engineering faculty at U.S. colleges and universities and only 19 percent of full professors.

- In 2006, the National Academies produced a report entitled, *Beyond Bias and Barriers: Fulfilling the Potential of Women in Academic Science and Engineering*. The National Academies panel, in addition to dismissing the relative significance of any biological differences (in response to former Harvard President Lawrence Summers' February 2005 remarks on this topic), made a series of recommendations to all stakeholders, including universities, professional societies and the federal government, to address cultural and institutional gender bias in academic S&E.

- On October 17, 2007, the Research and Science Education Subcommittee held a hearing on *Women in Academic Science and Engineering* in which we explored broadly the findings and recommendations of the National Academies panel. Sections 5 and 6 below are taken directly from the 2007 hearing charter, except for updates where more recent data have become available.

- Today the Subcommittee will receive comments on draft legislation that incorporates several of the recommendations from the National Academies panel that were also discussed during the previous hearing, including workshops to increase awareness of implicit gender bias in grant review, hiring, tenure, promotion, and selection for other honors based on merit; extended grant support for caregivers; and improved demographic data collection on federal grant-making.

5. Current Status of Women in Academic Science and Engineering

According to data compiled by NSF, in 2006, women held 30 percent of all full-time science and engineering (S&E) faculty positions at U.S. colleges and universities. Specifically, they constituted 19 percent of full professors, 34 percent of associate professors and 42 percent of junior professors, a category that includes both instructors at 2-year colleges and assistant professors at 4-year institutions.

As seen in this figure from the *Beyond Bias and Barriers* report, most of the social science disciplines and psychology are already dominated by women at both the graduate level and in faculty positions. The percentage of women earning PhD's in other S&E fields has grown steadily in the last 30 years, and has already exceeded 50 percent in the life sciences. However, in 2003 women constituted 34 percent of assistant professor appointments in the life sciences, and slightly less at research universities. Half of this drop-off can be accounted for by including only the available pool of PhD's[1] in the life

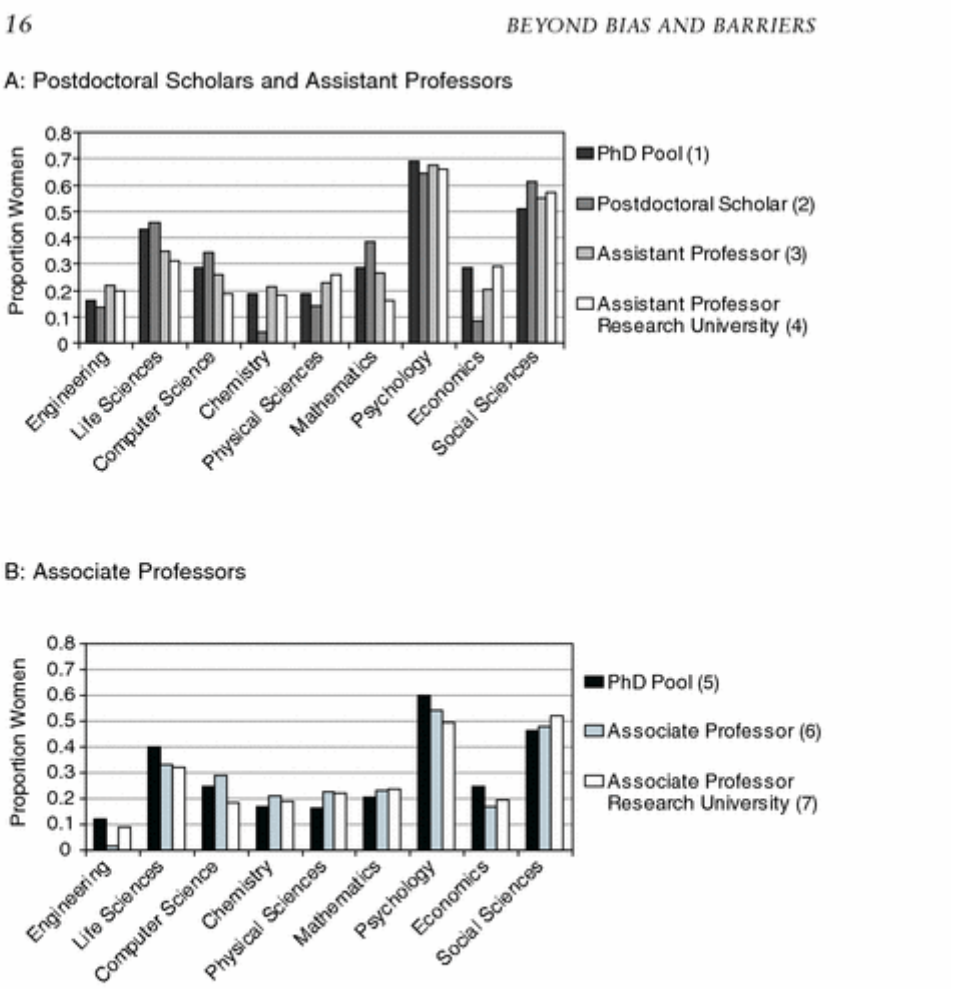

FIGURE 1-2 Comparison of the proportion of women in PhD pools with those in tenure-track or tenured professor positions in 2003, by field.

men

sciences: 42 percent in 2003. But attrition is still high in the step from completion of training to faculty appointment. Female underrepresentation in life sciences faculties continues through the associate and full professor levels. Notably, while the physical sciences continue to have low representation at the graduate level (20 percent), relative to the available pool of PhD's the physical sciences actually show better representation for women in tenure-track faculty positions than the life sciences and other fields with a greater percentage of women PhD's.

We present the 2003 data in this charter because those data were analyzed and presented in a way that more recent data have not been. However, since the last hearing, NSF has published 2006 data as part of *Science and Engineering Indicators 2008*. From 2003 to 2006, the representation of women in full-time senior faculty positions (associate and full professors) at all universities has increased by 1 to 2 percent in all of the major natural sciences fields- where chemistry is included in physical sciences - and by just under 1 percent in engineering. Not surprisingly, psychology and the social sciences saw slightly larger increases, but in no S&E field other than psychology do women represent more than 30 percent of senior faculty positions.

Women who start out on academic pathways in S&E fields leave for other career paths at higher rates than their male counterparts, even though for the fields in which attrition is highest, women show increased representation at the postdoctoral level. Postdoctoral positions are a necessary prerequisite to faculty jobs in most S&E fields. From among those who leave post-faculty appointment but pre-tenure review, men are more likely to move into other employment sectors and women are more likely to move into adjunct positions. However, in most fields, women and men faculty who are reviewed receive tenure at similar rates. As faculty move up in rank, there are again differences between men and women, this time in promotions, awards and even salary.

6. Institutional and Cultural Bias and Barriers

In 2006, the National Academies produced a report entitled, *Beyond Bias and Barriers: Fulfilling the Potential of Women in Academic Science and Engineering.* The report was largely in response to the outcry over then Harvard President Lawrence Summers' 2005 remarks, in which he attributed what many thought to be a greatly exaggerated level of significance to a biological explanation for female underrepresentation in academic S&E. The NAS panel reviewed the existing literature on gender differences in cognition and biology and concluded that, "if systematic differences between male and female scientific and mathematical aptitude and ability do exist, it is clear that they cannot account for women's underrepresentation in academic science and engineering[2]." Instead, the panel focused on the need to fix institutional, social and cultural bias and barriers.

To this end, the National Academies panel made a number of recommendations to all stakeholders. The panel called on university presidents and provosts to provide clear leadership in changing the culture and structure of their institutions, and deans and

[2] Critics of the NAS report disparage the panel for dismissing the significance of biology before all of the scientific evidence is in.

department chairs to take responsibility for implementing changes to recruiting, hiring, promotion, and tenure practices. They recommended that higher education organizations form an inter-institution monitoring organization and that scientific and professional societies help set professional and equity standards across the activities they lead, such as awards and conferences. The recommendations made to the federal government ranged from rigorous enforcement of federal anti-discrimination laws by enforcement agencies, to better data collection, to provision of workshops to minimize gender bias by NSF and other Federal funding agencies. The full list of recommendations is in the report summary: http://books.nap.edu/catalog.php?record_id=11741.

The status of women in academic S&E has improved appreciably in the last three decades, and institutions across the country are continuing to address institutional barriers to gender equity. However, the National Academies panel argues that changes in institutional policies are necessary but not sufficient – even many policies that appear on the surface to be equitable in fact disadvantage women. For example, many women who want children struggle with the intersection of the tenure clock and their biological clock. Many more men are also making work/life balance career decisions[3]. In order to attract top faculty candidates who want both career and family, a number of universities offer the possibility of an extension of the tenure clock – the number of years to tenure review – for assistant professors who have a child while under the clock. But in most cases young faculty feel pressure not to request this extension for fear that they will be judged differently in the tenure review process. In this case, cultural norms undermine a well-intentioned policy, and women, who are more often the primary caregivers for infants (especially if they breast feed), are disproportionably disadvantaged. Some universities have instituted an automatic rather than voluntary extension of the tenure clock in an attempt to overcome those cultural barriers.

The report also discusses at length a phenomenon known as "implicit bias," in this case an implicit assumption of what a scientist is supposed to look like, i.e., a man, and probably a white man. The panel cites a Swedish[4] study of peer-review scores, in which men received systematically higher competence ratings by their peers than equally productive women. In fact, women postdoctoral fellowship applicants included in that study had to be twice as productive (as measured by defined, quantitative measures of productivity) than their male counterparts to be judged equally competent. A similar claim has just been reported in *Nature News* by a woman physicist who was a postdoctoral fellow at DOE's Fermi Lab in Illinois until 2005[5]. This field of research is still relatively young, but the collection of evidence supporting the notion of implicit gender bias in academic S&E continues to grow. Minority-group women, as members of two major demographic groups historically excluded from the scientific enterprise, face their own unique set of challenges.

The list of cultural norms that appear to disadvantage women also includes the favoring of disciplinary over interdisciplinary research and publications, and the only token

[3] Currently, 42 percent of women in tenure and tenure-track careers have children, while 50 percent of their male colleagues have children.
[4] Sweden has been named by the United Nations as a world leader in gender equity.
[5] Nature News, Vol. 452, 24 April 2008, Pg. 918

attention given to teaching and other service during the tenure review process[6]. Thus it seems that it is not necessarily conscious bias against women but an ingrained idea of how the academic enterprise "should be" that presents the greatest challenge to women seeking academic S&E careers. Overcoming these cultural barriers is much more difficult than just enforcing anti-discrimination laws or making university policies more family friendly. And even among those who passionately advocate for change, there is no consensus about how or if to modify some of those core practices that have defined the academic enterprise for generations.

7. Workshops on Gender Bias

In January 2006, officials from the Department of Energy (DOE), NSF and National Institutes of Health partnered in support of a workshop on gender bias for chemistry department chairs from across the country. The goal for this conference was to "develop and implement strategies to significantly increase the number of women chemists in tenured academic positions in our research universities and eliminate the gender biases that negatively impact their career progress." In addition to department chairs, participants included lab heads from DOE National Labs and representatives of societies and federations. The workshop did result in a report of the challenges and issues addressed[7]. However, the federal agencies did not sponsor any long-term follow-up of the departments whose chairs participated. The physics community followed with a similar workshop in May 2007[8]. Today's DOE witness participated or served as an advisor in both the chemistry and physics workshops and will address the elements of an effective workshop in addition to metrics for evaluation.

8. Questions for Witnesses

Dr. Carlson

- The draft bill requires Federal science agencies to collect annual composite information on demographics, field, award type and budget request, review score, and funding outcome for all applications for research grants to universities supported by those agencies. How much of these data are already collected by the National Science Foundation (NSF) for their own grants? What level of effort and resources are required by NSF to collect all of the data as listed in the draft?
- Assuming that the Director of the Office of Science and Technology Policy established a uniform policy for collecting and reporting such data based on the NSF model, what level of effort and resources would be required of NSF to store and publish the data from all of the Federal science agencies?

[6] While the reasons are unclear, it appears that women are more likely to engage in interdisciplinary and collaborative research, and to put more energy and time into teaching and mentoring activities than their male colleagues.
[7] http://www.chem.harvard.edu/groups/friend/GenderEquityWorkshop/GenderEquity.pdf
[8] http://www.aps.org/programs/women/workshops/gender-equity/index.cfm

Dr. Blevins

- Based on your own experience in helping to organize workshops to address gender bias in the chemistry and physics communities in 2006 and 2007, what are the elements of an effective workshop? In answering this question, please address workshop content, format, speakers, and participant categories, in addition to any other elements that are important to an effective workshop.

- What metrics should be used to evaluate the success of such workshops in changing individual behavior and institutional culture related to gender equity in academic science and engineering?

- Are there challenges in overcoming gender bias that are unique to the National Laboratories? Should the workshops have sessions that are tailored specifically to National Laboratory participants?

Dr. Ginther

- What data are needed to better understand gender disparities in university departments of science and engineering?

- The draft bill provides for a program of workshops on gender bias in academic science and engineering. What are the elements of an effective workshop? In answering this question, please address workshop content, format, speakers, and participant categories, in addition to any other elements that are important to an effective workshop. What metrics should be used to evaluate the success of such workshops in changing individual behavior and institutional culture related to gender equity in academic science and engineering?

- The draft bill requires a uniform Federal policy for extending the period of grant support for federally funded researchers with caregiving responsibilities. Do you have any recommendations for what such a policy should look like?

- Does the proposed legislation adequately address the Federal role in programs and policies to help overcome cultural and institutional barriers to gender equity in academic science and engineering?