

CSWP GAZETTE

**A Newsletter of the Committee on the Status of Women
in Physics of the American Physical Society**

July 1986

Volume 6, Issue 2

FEATURE ARTICLE

Dear Colleague:

In the last few years I have become increasingly concerned about certain negative attitudes toward science and mathematics (I will often include mathematics and computer science in the term "science.") developing in so-called feminist circles. My two years at the Bunting Institute, where I had a great deal of contact with non-scientist professional women, convinced me that the situation is more serious than many of you may realize. I am particularly concerned that a few very vocal and visible sociologists are succeeding in promulgating opinions that are detrimental to the advancement of women in science. Let me give some specific examples.

The attitudes expressed by Dr. Mary Poplin in a July 1985 interview with the Boston Globe typify my concerns. Dr. Poplin, a faculty member in the school of education at Claremont College, discussed a recent research project on computer aptitude. The Claremont researchers concluded that women and men had the same aptitude for computer science, but that women had significantly lower interest in computers and related topics. So far, so good. But instead of being concerned that women with an aptitude for computing, science, and mathematics were going into other fields, she seemed delighted. To explain her position she invoked a number of stereotypical misconceptions about science. She stated that women were not interested in working with quantification and that they did not want to go ". . . into science and academic fields that use numbers as their whole means of discovery." She continued ". . . and that's the other explanation about why women are not interested in science—because it doesn't deal with subtleties." She concluded with ". . . Gilligan is women scientists' hope for coming up with a model on which we can conduct research without reducing things to numbers. That's what everyone in the workshop feels." (Poplin was participating in a workshop organized by Dr. Carol Gilligan, a Harvard psychologist noted for her work on

gender differences.) After reading the entire article, I could only wonder if Poplin had ever actually met a real woman scientist.

The public prominence of some sociologists is exemplified by an article in the December 2, 1985 issue of *Newsweek* entitled "Liberation in the Lab." Although the article purports to discuss the opinions of women scientists, it does not quote a single, practicing woman scientist. All of the women quoted work in the social sciences although a few do have scientific backgrounds. A picture of nobel laureate Barbara McClintock and related discussion gives a particularly misleading impression. The discussion is based entirely on Dr. Evelyn Fox Keller's biography; McClintock herself does not appear to even have been interviewed by *Newsweek*. Indeed, most of the article appears to be an exposition of Keller's views on gender and science. However, several non-scientists who discussed the article with me assumed that it was an accurate representation of the predominate thinking of women scientists. Regardless of what one thinks of Keller's work, it should not be represented to the public as the opinion of women scientists.

The *Newsweek* article also contains some rather disturbing remarks by the sociologist, Dr. Sherry Turkle, noted for her book "The Second Self: Computers and the Human Spirit." She claims that by age ten girls and boys have different programming styles; that girls prefer the interactive approach which she refers to as female, artistic, and "soft mastery"; while boys prefer to plan ahead, an approach she refers to as male and "hard mastery." This theme of gender differences in computer science pervades her book very heavily. Other remarks suggest that she does not consider extensive planning of programs to be either necessary or desirable. Although she acknowledges that the interactive approach may produce more bugs, she does not regard this as significant—she even describes one bug in rather favorable terms.

Although it is not necessarily gender-related, I cannot resist commenting on a side issue raised by Turkle's dichotomous distinction between the "artistic" and "planning" approaches. This terminology shows a complete failure to recognize that computer science, like other scientific fields, is ultimately a creative endeavor. She does not seem to understand that the creativity, i.e., the art, does not lie in the programming, which is really a routine process, or in the pictures on the terminal screen. Rather, the really creative part is the study and development of the underlying algorithms, something she seems to consider as technical and unartistic. Thus, Turkle shows great appreciation for the visual artistry of a student programmer, Anne, but does not acknowledge that Anne's invention of a new data structure, a "screened bird," is also a significant *creative* achievement. Turkle, by looking for art in the superficial programming aspect of computers, seems to me like a painter who, when confronted with the score of Beethoven's fifth symphony, claims that it is not artistic because it is not visually attractive. Many of my non-scientific colleagues at Bunting were surprised to learn that scientists consider themselves creative and artistic; they were amazed that I used words like beautiful and elegant to describe theorems and proofs. I fear that such misunderstandings promote negative attitudes toward science which discourage young women from scientific careers.

Returning to my main topic, I would like to discuss the feature article in the March 1985 issue of the Radcliffe alumnae magazine. It is entitled "Women who could rule America," and contains statements by possible candidates for cabinet level positions. Curiously, although there were no candidates for several significant positions—such as secretary of state, the article contains not one, but three(!) candidates for the Director of NSF. Now I would have little difficulty in coming up with the names of several women scientists who would make excellent directors of NSF. However, none of the three Radcliffe candidates is a practicing woman scientist. All three are women with scientific backgrounds who now work in public policy or social science areas. One of the three, former biologist Dr. Dorothy Zinberg, did present an excellent

statement which showed considerable understanding of both the problems facing NSF and the funding of basic research. However, the other two, Dr. Evelyn Fox Keller and Dr. Shirley M. Malcom, presented a joint statement so devoid of insight into the relevant issues that I consider it totally unacceptable for a potential director of NSF. The article also contains two candidates for Secretary of Health and Human Services, only one of whom even mentioned NIH and related issues involving biomedical research in her statement. Even if one found some of these candidates more acceptable than I do, the failure to propose even a single active scientist from so many candidates sustains the public misconception that qualified women scientists do not exist.

My final example concerns an article by Dr. Sheila Tobias in the June 1985 issue of *Physics Today* in which she attempts to extend her theories on math anxiety to "physics anxiety" and possibly even "science anxiety." Although I missed this article when it first appeared, my attention was drawn to it through a subsequent series of offensive letters by men vehemently opposed to Tobias' views. After reading the article, I realized that, although I still found the tone of the men's letters offensive, I shared many of their underlying concerns. Although the article has some useful insights, Tobias makes no distinction between women who really have fundamental difficulties with basic mathematics, capable women who do not have the proper mathematics background for studying physics, and capable, well-prepared women who choose to go to law, medical, or business school rather than pursue scientific careers. Thus, the article left the male letter-writers with the impression that most women cannot succeed in physics courses with the traditional high standards, and that more women will pursue careers in the physical sciences only if we promote special introductory programs, remedial courses, and spoon-feeding. Her rebuttal does nothing to dispel this view. She objects to the view that physics and mathematics require special talent and ability as an elitist one that keeps women out of the physical sciences; she does not seem to consider the possibility that mathematics and physics do require special ability but that many women, as well as men, do possess the necessary talent to pursue careers in the physical sciences.

Although Tobias devotes a great deal of attention to "cures" for physics anxiety, she does not mention the prophylactic effect of proper math preparation. Neither the importance of encouraging women to take the necessary math courses in high school, nor the value of stimulating programs to encourage the talented, are discussed in her article. On the contrary, she seems to feel that students with only 3 years of high school math are well-prepared for calculus, physics, and engineering. Women students who disagree merely "think" that they are inadequately prepared! In some ways, Tobias' ideas resemble those of Turkle, who also seems to feel that the subject must change in fundamental ways in order to accommodate women. In particular, Turkle seems to feel that we should not insist upon teaching women students to *plan* their computer programs. Instead Turkle feels that the field should change to accept the less-structured interactive and "artistic" approach that she considers feminine.

One recurrent idea in many articles of this type is that women are more intuitive than men, where intuition and logic are perceived of as opposites. In this context the notion that women are more intuitive seems suspiciously like a rewording of the old bigoted male accusation that women can't think logically. Another distressing theme, which did not surface in the examples above, is that women are naturally more inclined to the biological sciences because of their "nurturing" instincts. I am particularly sensitive to this misconception because, as a young graduate student in chemistry, I was told that women should study biochemistry rather than physical chemistry. (Undeterred, I wrote my thesis on a mathematical problem in quantum chemistry, beginning a continuous transformation to mathematical physics.)

Although I would like to dismiss such opinions as belonging to a

misinformed minority, I fear that they are actually the tip of a very serious iceberg. As the examples from *Newsweek* and *The Boston Globe* illustrate, these women have succeeded in attracting a great deal of attention and publicity to themselves and their views. They are frequently perceived of as women scientists and as *spokespersons* for women scientists. Non-scientists, particularly feminist academics, assume that their views represent the majority opinion of women scientists.

That non-scientists do regard the views of this vocal minority as orthodox was impressed upon me during my stay at the Bunting Institute. Most of the women I met at Bunting ordinarily had little or no contact with women scientists, whom they assume to be far rarer and more isolated than we actually are. (One seemed surprised to learn that I actually knew other women physicists and mathematicians.) Their attitudes toward science ranged from enthusiastic amateur to severe anxiety and avoidance. But most of them, regardless of attitude, received their information about women scientists from sociologists, some of whom they regarded as scientists. (One considered Sheila Tobias to be the quintessential woman mathematician.) As a result, their views about science and women scientists were often quite distorted. Furthermore, because the social scientists in question are widely regarded as staunch feminists, dissenting views are sometimes regarded as non-feminist.

Having, I hope, convinced you that there is cause for concern, I now come to the problem of what to do about it. Frankly, I don't

know. Obviously, we should speak out whenever possible. Because of the disturbing tendency to dismiss individuals who hold opposing views on these issues as "non-feminist," I feel that it is particularly important for organizations, such as the CSWP, to take a stand. In order to do this effectively we need to find ways of increasing our visibility. Ideally, news agencies seeking commentary on such issues should seek out representatives of CSWP and similar organizations, rather than social scientists. We need to find mechanisms that facilitate and encourage this. Perhaps the APS office could assist us.

Nor do I mean to condemn all social scientists. Many of them do excellent and important work. But we do need to be aware of, and deal effectively with, those whose work affects the progress of women in science. I think that we also need to find more ways to communicate informally with non-scientists. We should take advantage of hidden opportunities, as might occur when one serves on a university-wide committee, to interact with non-scientists.

I hope that those of you who have persevered in reading this rather long article found it stimulating. I would appreciate your comments and suggestions.

Sincerely,
Mary Beth Ruskai
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CSWP GAZETTE

A Newsletter of the Committee on the Status of Women
in Physics of the American Physical Society

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NOTE TO OUR READERS

The questionnaire to be used for data intended for the Roster of Women in Physics is enclosed with this issue, as it was inadvertently left out of most copies of the July issue of the *Gazette*. If you are updating information for an existing Roster entry, please supply your Roster number; this may be found in the upper right corner of the mailing label on the *Gazette*. The "Foreword" in the July *Gazette* issue contains additional material concerning the utilization of the Roster. Information on each questionnaire, or each Roster entry, is kept confidential.

Please send your Roster information and any other requests, letters, or suggestions to Dr. Miriam Forman, APS, 335 East 45th Street, New York, NY 10017. The information will then be forwarded to the appropriate CSWP member.

FOREWORD

With the encouragement of colleagues on the APS Committee on the Status of Women in Physics, your editor presents in this issue of the *Gazette* an editorial (slightly cut) that she wrote for *The Cornell Engineer* in 1952, while an undergraduate in Cornell's five-year Engineering Physics program. For comparison, there follow some selected portions of news items, provided by CSWP-member Dr. Evelyn Hu, that appeared in a recent issue of the IEEE publication, "The Institute." Comparison of these 1952 and 1986 articles shows the enormous improvements that have been accomplished by engineering schools in the enrollment of women (and minority) students. We note that the scholastic honorary society for engineers, Tau Beta Pi, did not admit women to full-fledged membership until 1975 (as local chapters "didn't want women at their 'smokers,'" according to one chapter advisor). However, today women students frequently are leaders in Tau Beta Pi chapters; and the Society of Women Engineers has grown from small groups of two or three women at each engineering school to flourishing and highly visible organizations at most universities.

Although any given physics department has much less visibility and less influence than an entire school of engineering, are there lessons physicists might learn from engineers in regards to strategies that could be used to attract more qualified women into the discipline of physics?

Another field closely related to Physics, that of Astronomy, is represented in this *Gazette* by excerpts from an article "Women's Work," written by well-known astronomer Vera Rubin for *SCIENCE* 86, with comments on Dr. Rubin's article found in a recently launched Astronomy Newsletter.

Results from a survey of M.I.T. graduate students, concerning differences between men and women students, have been described by Mildred S. Dresselhaus, former APS president, in a recent issue of *Physics Today*. Dr. Dresselhaus's article is excerpted here. Also presented is a biographical sketch of Dresselhaus that appeared in a University of Chicago publication earlier this year.

An updated list of Colloquium Speakers is included in this *Gazette*.

Janice Button-Shafer
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SPS SCHOLARSHIP RECIPIENT

The Society of Physics Students (SPS) has announced that Tania M. Slawewski, a junior physics major at Lycoming College in Williamsport, Pennsylvania,

has been selected as the second recipient of the Society of Physics Students Scholarship. She will receive a grant of \$1000 to help fund her final year of undergraduate study.

Ms. Slawewski, while maintaining a 3.98 grade-point average out of a possible 4.00, has developed a great interest in gravitation and will take an independent study course on the topic during her senior year. In addition to her class work at Lycoming College she will serve as a laboratory assistant and a planetarium operator for the Department of Astronomy and Physics, a writing tutor for the Department of English, and a violist with the Williamsport Orchestra. The Lycoming College SPS Chapter has flourished during Ms. Slawewski's two terms as chapter president.

WE HEAR THAT...

Dr. Sheila Evans Widnall, president-elect of the American Association for the Advancement of Science, has been appointed to the Abby Rockefeller Mauzé chair at the Massachusetts Institute of Technology. This professorship is reserved for the appointment of distinguished women scholars who will encourage advancement of women in the professions, industry, and the arts. Internationally recognized for her original research in fluid mechanics and aerodynamics, Professor Widnall is a fellow in both the American Physical Society and the American Institute of Aeronautics and Astronautics, and was elected to the National Academy of Engineering in 1985.

The late Dr. Judith A. Resnik, NASA Mission Specialist and a member of the Society of Women Engineers, is being honored by the establishment of a new medal. The Board of Directors of the Society decided in June of 1986 that the medal, the Resnik Challenger Medal, will be awarded to a woman engineer for "visionary contributions to space exploration." The Society is also developing a Resnik Scholarship, with contributions being received from donors around the world (by SWE Headquarters, 345 East 47th St., New York, N.Y. 10017).

Dr. Susan M. Simkin, astronomer in the Department of Physics and Astronomy at Michigan State University, and chair of the American Astronomical Society Committee on the Status of Women in Astronomy, has started "A Newsletter for Women (and Men) in Astronomy." She reports that "the women in mathematics seem to have developed a much better picture (than have astronomers) of their problems and devised viable solutions. The Newsletter of the Association for Women in Mathematics appears to have helped in this."

[Dr. Simkin includes in her first Newsletter a "literary review" of the article "Women's Work—For women in science, a fair shake is still elusive," written by well-known astronomer Vera Rubin, for the July/August issue of *SCIENCE* 86. Portions of her review and of Dr. Rubin's article are presented elsewhere in this issue of the CSWP *Gazette*.]

Dr. Tricia Reeves, of Kansas State University, has won an American Postdoctoral Fellowship in Physics from the American Association of University Women. The few other awards in this category went to scholars in the fields of biology, economics, and literature. Shangyuan Huang of China won an International Fellowship from AAUW to study in the field of Optic Fibers at Stanford University. The American Postdoctoral Fellowship is an award of \$15,000; the International Fellowship, an award of \$10,000.

LETTERS

All but the last of the letters presented here were sent in response to the "Feature Article" of the July *Gazette*, written by Mary Beth Ruskai of the

University of Lowell (Department of Mathematics). Dr. Ruskai expressed her concern over "certain negative attitudes toward science and mathematics developing in so-called feminist circles."

Dr. Ruskai, who does mathematical physics, presently heads the New England section of the American Women in Science organization. Her article that appeared in the *Gazette* has also been printed in the newsletter of the Association for Women in Mathematics; responses will appear in the November-December issue of the AWM newsletter.

Dear Dr. Ruskai,

I enjoyed reading your well-written, well-documented piece in the latest CSWP *Gazette*. As others take up the topic and pursue the points you raise, I would hope that an effort could be made to avoid creating divisiveness between "scientists" and "social scientists," since most of the latter consider themselves scientists. It is a good deal less provocative to say that social scientists do not understand what it is like to be a physical or biological scientist than to say that social scientists do not understand what it is like to be a scientist.

I don't think we want to discourage the work of social scientists who explore differences between boys and girls, and between men and women, and address the question of what relevance, if any, these differences have for careers and creative effort. At the same time, your main point is a very important one—that the methods and nature of the social sciences differ so markedly from those of the physical and biological sciences that most social scientists cannot speak with any authority about what it is really like to be a practicing physical or biological scientist.

Your excellent article deserves wide attention.

Sincerely,
Kenneth W. Ford
Consultant for Educational Programs
The American Physical Society

Dear Dr. Ruskai,

I read with interest your letter in the latest CSWP *Gazette* and share your concern. I would like to suggest that the lack of participation by women scientists in "women's issues" results from (1) a lack of time (they're busy *doing* science, not talking about it); (2) a disinclination to generalize and write or speak publicly on any subject without data (Since the gathering of relevant data is not their research area, they have available only the data of social scientists or anecdotal data related to their own experiences or those of friends or acquaintances.); (3) lack of experience with popular or non-scientific writing.

This leaves the social scientists who devote their professional lives to such issues, and who often do rather soft science, as the spokespersons for women scientists.

I don't have any very specific suggestions for changing things, however. Those of us who teach non-science students can try to dispel some of the myths. I will circulate your letter to some of the more outspoken feminists on our campus. Perhaps it should be reformulated as an article with wider distribution.

Sincerely,
Dr. Katheryn Rajnak
Department of Physics
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Kalamazoo, MI 49007

Dear Mary Beth,

Thanks for your article in the CSWP *Gazette*; I thought I was alone in disbelieving all the "research" about women's abilities in math and science. What a promotion for science/math anxiety those non-scientific studies are!

A bit of encouraging news . . . I have been teaching "engineering" physics (2-year sequence, calculus based) at this community college for 31 years and I did my graduate and undergrad work at UCLA when there were almost no women in physics. Things *are* changing, despite the social scientists. About 15–20% of my students are now women, albeit a large number are not

American born (perhaps the culture shock for Asian and Middle Eastern women is so great they don't know they are not supposed to be good in math/science).

I believe the source of these attitudes has been documented (?) in the math anxiety of female grade school teachers who consciously or otherwise influence girls to fear and dislike math. Many of my female students had to take a lot of makeup work in math before starting college level work; fortunately, the community college is very good at this.

Girls, then, need role models, preferably at a very early age. Grade school teachers need to lose their math anxiety, too. Can we get to them in our communities? Perhaps it is time for a campaign. Many of us would like to help design or carry-out the necessary work.

Incidentally, as you probably know, women science/math students are wonderfully nurturing and feminine in the best possible way. They have made these last 5–10 years of teaching much more rewarding for me; they express appreciation!

I am sure you will receive a great deal of mail from other women. If you send out any general response, please put me on your list.

Sincerely,
Geraldine Karpel
Professor, Physics
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Torrance, CA 90506

Dear Dr. Ruskai,

I did find your letter in the CSWP July *Gazette* stimulating enough to want to respond, even if, as "not economically active," I may be outside the group of women scientists you planned to reach.

While the problem of sociologists, who may know little, and understand less, of the mathematical and physical sciences, speaking for women scientists would appear to be real, some sort of register of suitable, willing women scientists might be able to be publicized.

But the underlying problem of real misconceptions of the nature of scientific work affects not only women (and others) who might consider entering these fields. If there was more real knowledge of the nature of work in the physical and mathematical sciences among all non-scientists the problem wouldn't be so serious. The particular version I'd met was that physical sciences were for people who wanted nice, safe, set answers, and didn't want to face the real intellectual challenge of more open-ended fields—a symptom of acute, rampant ignorance. But the image of the intelligent, uncreative, inartistic, greasy grind is pervasive—it runs through the recent "Insiders Guide to Colleges" our son's been reading—and a symposium on Engineering careers left him put off by the vision of a lifetime searching for a "better bolt." All not gender-related, but I think girls are more discouraged by this sort of image.

Unfortunately I was unable to find Dr. Tobias' article to reread at this point. I agree entirely that traditional high standards must be kept in physics courses. But, as I remember the original article, some of the "remedial spoon-feeding" dealt with what could have been described as "science-readiness" that ought to have been acquired before or in primary school. Unfortunately this lack of exposure would appear to be self-perpetuating and it would appear to be connected to the high percentage of college students with a pre-Newtonian understanding of mechanics reported in *Physics Today* several years ago. I agree entirely that improved mathematical preparation at *all* levels would help the situation immensely, but by secondary school it's often too late. I came away from Dr. Tobias' article with the feeling that something at the Sesame Street level was needed.

I was lucky. I came from a technically/scientifically literate family and had uncles who considered such things as explanations of aerodynamics natural when faced with entertaining two-year-old girls. I also was able to go to one of the "seven sisters" colleges before the great coeducation push so that social pressures against doing physics were minimal. But my high school didn't even allow physics for academic girls unless they planned on nursing, and I was told that I couldn't do German as the available space was needed for boys who needed it for "their" science! I expect we've all run into something

on that order— and it's well worth making a fuss about it, if it hasn't stopped yet (as I hope it has). But I'm all too afraid that girls are still steered to biological sciences and away from advanced maths in too many cases.

Sincerely,
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