

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

“Women Physicists: Observations on the Changing Milieu”

As part of its 20th Anniversary celebration, The APS Committee on the Status of Women in Physics sponsored a panel discussion at the March APS meeting in Indianapolis on “Women Physicists: Observations on the Changing Milieu—Now and Then.” The panel was chaired by Mildred Dresselhaus, MIT, and provided a forum for a lively discussion of problems and challenges facing women in physics today. Because the topics discussed covered a wide range of issues which are likely to be of interest to CSWP Gazette readers, excerpts from the talks by three of the panel presenters: Vera Kistiakowsky, MIT; Irene Engle, U.S. Naval Academy; and Patricia Cladis, AT&T Bell Laboratories, are printed here.

THE ORIGINS OF THE COMMITTEE ON WOMEN IN PHYSICS: HOW MUCH HAS CHANGED AND HOW LITTLE

Dr. Vera Kistiakowsky is a professor of physics at the Massachusetts Institute of Technology. Before coming to MIT, she served on the faculties of Columbia and Brandeis Universities. Until 1960, she did research in the field of experimental nuclear physics; from that time until 1986, she worked in experimental high energy particle physics. Currently, she is doing research in the field of astrophysics. She has been the author or coauthor on more than 100 articles published in professional society journals and more than 120 papers presented at professional meetings. In the late 1960s, Dr. Kistiakowsky became involved in efforts to improve the situation of women scientists and to increase the participation of women in science. In 1970, she wrote a letter to the Council of The American Physical Society, cosigned by 19 eminent women physicists, requesting that an ad hoc committee be established to investigate the status of women in physics. She chaired this committee which wrote a report presenting a statistical picture of the situation, analysis of the results and recommendations to the Society. Since then, Dr. Kistiakowsky has served on other committees and written and spoken on this topic. She was President of the Association for Women in Science, called AWIS, in 1982 and 1983.

“What I brought with me today is what I brought to the annual meeting of The American Physical Society in 1972 in January in San Francisco. I came in with two enormous boxes, and in front of every member of the Council, I plunked down the roster of the women in physics and the report and the appendices. It was a time when there was a good deal of incredulity because of the rapidity with which all of this had happened ... I became interested in women in science in the late '60s. I was one of the people who read Betty Friedan and said, “Gee, that is what happened to

me in the '40s.” It was the classic light bulb going on over the head of a cartoon character. I saw all 350 of my classmates at Mount Holyoke, really intelligent, educated women, rushing over a cliff like lemmings into the sea, to marry, have children and do nothing else. It was not marrying and having children—both of which I've done and are fine pursuits—but it was the nothing else that was indoctrinated into us, but that certainly was the ethos of the time.

In any case, at the end of the '60s, two friends and I ran a workshop in science

for the Boston chapter of NOW, and we thought maybe 12 or so women scientists would show up. We were flabbergasted when 60 women showed up, not just from the Boston area but from all of New England. There was this enormous enthusiasm for getting together and talking out all of the problems that they had had because they had never been together with such a group of women scientists

“I see no reason for a committee on women in physics. There are only two women in physics and I know them both and they are both very happy.”

before. When I went to meetings, I was one or maybe one of two people there who happened to be female. The next thing that happened was I went to the annual APS meeting in New York in 1971 and there was a forum session organized by Brian Schwartz on women in science. It was very interesting, principally in the interaction between the people on the panel and the people in the audience, some of whom said the incredible things
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PUBLICATION INFORMATION

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W I P H Y S —

The Genesis of An Electronic Newsletter

At the Indianapolis meeting of the CSWP, held last March, Bonnie Brownstein, then Director of Physics Profession Programs, proposed that an electronic "bulletin board" be established. This bulletin board would be devoted to issues involving women in physics. Given the growing use of electronic mail by the physics community, Brownstein felt that an electronic forum would enhance our ability to reach out to women physicists in particular, as well as to other interested members of the community. The Committee established a subcommittee, consisting of Brownstein, Luz Martinez-Miranda, and Michelle Shinn, to gather information on the services such bulletin boards provide. The subcommittee was also to look at the costs involved in having this service.

In the intervening months Brownstein was able to secure the services of NYSERNET (the New York Science and Engineering Research Network) to set up and maintain a list server on the Internet. Using information she and Martinez-Miranda had gathered from other "listservs," Shinn drafted the initial welcoming and introduction messages. As a unique name had to be given to our listserv, she dubbed it WIPHYS, pronounced "wiffs," for Women In Physics. On July 9th, Brownstein and Shinn traveled to Syracuse, New York, where they received training on moderating the listserv, and on that day, WIPHYS became operational.

At this time, WIPHYS is in a start-up mode and will not be ready for general use until later in the Fall. The services we intend to provide include:

- 1) A moderated discussion of issues involving women in physics.
- 2) On-line retrieval of the Colloquium Speakers List (CSL).
- 3) Announcements of government or privately sponsored programs designed to aid in establishing the careers of women scientists.
- 4) A repository of names of women seeking roommates for APS meetings.
- 5) A repository of job listings.

This service list is intended to complement and extend the *Gazette*, the CSWP's newsletter. It is our hope that this electronic forum offers unique possibilities to assist in creating an atmosphere of cooperation, mentoring, and support in a field where women are a minority, and thus often feel quite isolated.

—MICHELLE SHINN

NEW FUND ESTABLISHED TO INCREASE WOMEN AND MINORITY FACULTY REPRESENTATION AT CALTECH

A fund to encourage more women and minorities to join the Caltech faculty has been established under a \$100,000 grant from the Booth Ferris Foundation.

"We recognize the untapped pool of talent that exists among women and underrepresented minorities, and the shortages in the science and engineering professions that have resulted from their underrepresentation," said Caltech President Thomas E. Everhart. "Caltech has

attempted to take a leadership role in increasing their percentage on our faculty, but their numbers here continue to be lower than we would like. The Booth Ferris Foundation grant will assist us in correcting this imbalance. The Booth Ferris Faculty Fund will enable the provost to supplement division budgets in recruitment efforts, particularly when an unusually talented woman or minority candidate is being sought."

ANNOUNCEMENTS

U p c o m i n g

The APS Committee on the Status of Women in Physics (CSWP) is pleased to announce the following receptions hosted by CSWP Chair Bunny Clark (Ohio State University). Materials of interest to educators and others will be available. All are cordially invited to attend!

Santa Fe, New Mexico: On Thursday, October 15, 1992, from 5–8:00 PM, at the Eldorado Hotel, Zia Room.

Seattle, Washington: On Monday, April 12, 1993, from 7–9:30 PM. A speaker is being scheduled for a 7:00 PM presentation prior to the general reception. Location to be announced.

P u b l i c a t i o n s

An article by Mary Fehrs and Roman Czujko, "Women in Physics: Reversing The Exclusion," appeared in the August 1992 issue of *Physics Today*. The article presents data that shows female representation in physics decreasing as women move along the pipeline toward a career. Actions that should be taken by both institutions and individuals to keep women in the pipeline are suggested.

Reprints of "Women in Physics: Reversing The Exclusion" can be obtained by contacting Roman Czujko, American Institute of Physics, 140 East 45th Street, New York, NY 10017, tel.: 212/ 661-2036.

A w a r d s

The National Physical Science Consortium (NPSC) offers six-year graduate fellowships for women and minorities in the physical sciences. Each fellowship is worth up to \$180,000. Eligibility extends to those who are: U.S. citizens; African American, Hispanic, American Indian and/or female; have (as a senior) 3.0 GPA undergraduate academic standing; eligible to pursue graduate study at a participating NPSC member university; entering or returning students.

For applications, contact: L. Nan Snow, Executive Director, National Physical Science Consortium, New Mexico State University, Box 30001, Dept. 3 NPS, Las Cruces, NM 88003. (Tel: 800-952-4118, or 505-646-6038)

Deadline: November 15 (annually). Announcement of awards will be made the following January.

CONTEMPORARY VIGNETTES: WOMEN PHYSICISTS. WHERE ARE WE? WHAT IS OUR COLLECTIVE GOAL? WHAT IS OUR DIRECTION? AND HOW FAST ARE WE MOVING?

Dr. Irene Engle has been a civilian member of the Physics Department of the United States Naval Academy since 1979. Although she has done work using computer modeling in solid state physics and high energy physics, her current research interests are planetary magnetospheric modeling calculations. From 1981 through 1986, Dr. Engle served on the Committee on the Status of Women in Physics (CSWP) and was editor and primary writer of the Committee's quarterly newsletter since its inception. Concurrently, Dr. Engle served as an APS representative to the American Institute of Physics (AIP) Manpower Division (now known as the Division of Employment and Education Statistics) Advisory Committee (1984-1986) and a three-year elected term as a member of the Executive Committee of the APS Forum on Physics and Society. She was a member of the AP Physics Committee of the Educational Testing Service of Princeton, NJ from 1987 to 1990. During 1988-1991, she served on the American Association of Physics Teachers (AAPT) Committee on Women in Physics (Education). For several years, she has been serving on the Judging Panel for AIP Science Writing.

“... I still recall being inspired by the *Physics Today* article by Professor Kistiakowsky:

“Women in Physics: Harmful, Injurious, Out of Place.”... In the process of thinking about just where are we and where are we moving, I decided that I would address my talk to some of the generally unmentionable social issues, which, at least in the past, have too often contributed destructively to the climate in which women physicists try to go about their business being physicists. Up front I'll say I hope that many of these things I'll mention are definitely things that have improved over 20 years, though sometimes I worry about it.

During the past year or so, there have been occasions to jar my memory of experiences as a participating member of the Physical Society which were previously mercifully buried in the subconscious. In view of the national attention to incidents which have some parallels, it seemed an appropriate time to raise some of these delicate issues here. My hope is that the younger group of women physicists here have not and will not ever need to cope with such phenomena, and that my tales will be merely mildly amusing anecdotes of quaint, bizarre behavior. The fervent hope is that such things are entirely relics of the past. On the other hand, if that should somehow sadly not be the case, it might be useful for younger colleagues to have witness to

the fact that it is possible to cope with what seem horrific events at the time and emerge relatively unscathed, even if you are as basically shy and socially maladroit as I am. I would like also at this time to state that I do not intend ever to reveal the identity of any of the individuals other than myself in any of the vignettes and beg all of you not to engage in any sort of fruitless speculation.

As a beginning physicist at one of my first American Physical Society meetings on my own, I fell into conversation prior to a topical symposium with a fairly eminent gentlemen, now deceased, who was then at just about retirement age. We chatted about a number of things, including the fact that his wife had taken the day to go shopping and sightseeing—and even some topics in physics. I was flattered when he invited me to come sit next to him during the session. Soon after the lights went out during the talk illustrated by the large, old lantern slides, I was horrified to find the man grabbing my far shoulder and near arm with his hands. Initially, my fear was that he was suffering a stroke or heart attack or some other sort of trauma which required my providing some sort of appropriate medical assistance or getting it. As his groping became more intimate, I realized that I was being assaulted and disengaged and fled the scene as quietly as possible.

The outcome, silly me, was that I attended no more meetings that day. Attempting to view the phenomenon from perhaps another perspective, one could say that it was my presence which was injurious, harmful and out of place, since that presence definitely inappropriately distracted at least one established physicist. I, today, believe that my disengaging without interrupting anyone else's ongoing professional activity was completely correct. What was really dumb of me was to be so upset that I shirked my professional activity for nearly an entire day and yet never told a soul about the experience until nearly 20 years later.

Some later meeting, in the hotel elevator, one of my first January Meetings held outside of New York, I was approached by a Bulletin-carrying bloke inquiring about prices for services. He apparently assumed that I was engaged in one of the older professions for women, unless he was merely out to be gratuitously insulting. I was also holding a Bulletin. This event I thought rather funny at the time but less so as I recall it.

At yet another American Physical Society meeting, one evening in the hotel cocktail bar, I was with a group of fellow physicists, some of whom were well known to me. There happened to be live music and a small dance floor, and several of the acquaintances were interested in dancing, and there was a shortage of female partners—no surprise. I was dancing with one after another without any favoritism, so I was rather surprised when one, whom I knew by reputation but had not previously met, after asking me to dance, very explicitly propositioned me right there on the dance floor. I sort of declined the proposition as gracefully as possible without missing too many beats and discontinued the acquaintance at the end of the number. Actually, at the time I wasn't frightfully insulted, although the approach was not flattering, but I assumed that the attention was benign and was intended to be complimentary somehow. I had forgotten all about that incident until sometime last year when I suddenly remembered it and was belatedly incensed and insulted, after all those many years. It's funny how things just come up.

Well, if these stories give the impression that I'm a real social butterfly and party-goer, remember that I'm selecting incidents associated with APS meetings over a period spanning 20 years.

Soon after joining the Naval Academy faculty and the CSWP, I was attending a social in conjunction with an APS meeting and encountered among the crowd an old acquaintance whom I had not met for some years. We had both relocated since our last meeting and wished to exchange some information via mail. We then exchanged business cards, and I was proud-

"I was horrified to find the man grabbing my far shoulder and near arm with his hands. Initially, my fear was that he was suffering a stroke or heart attack or some other sort of trauma."

ly proffering one of my very first and, actually, last set, and a bystander on the fringe of the conversation interjected very loudly about the impropriety of a woman providing a card to a man. He went on about it at some length. I merely tried to ignore him, as did the other man I was speaking with. In retrospect, he was behaving more honestly than I. He thought my behavior was absolutely outrageous and was expressing his opinion in no uncertain terms. I thought he was out of order and sadly misinformed regarding protocol, but at the time I wouldn't have dreamed of expressing such an opinion in word or in deed.

While I was serving on the APS Committee on the Status of Women in Physics, and soon after the *Gazette* began to be published and fairly widely disseminated, the staff at the New York office of *Physics Today* received an anonymous letter, purportedly from a person presumably male and a New York-based physicist and APS member. In it he expressed the view that the activities of the committee and the support provided by the establishment male physicists were merely ploys on the part of those same,

establishment male physicists to secure "high paying jobs for their female relatives at the expense of the qualified male physicists on the market." He also mentioned something about "blood running in the street." There may yet exist, in the minds of some putative colleagues, that sort of sentiment, expressed or unexpressed, which colors behavior of individuals toward active professional women physicists.

I should interject at this time that no untoward experiences have happened to me at more recent APS meetings that I have attended, including this one. I repeat my hope that the reason is that the climate has significantly changed. The tiny anxiety remains that the reason for my relief is merely my gradual passage into different life phases. I should also add at this time the sincere addendum that by far the majority of all male physicists encountered at the Physical Society meetings and elsewhere have conducted themselves decently and quite often extremely helpfully.

Some years ago, an invited speaker at an AIP Corporate Associates Program illustrated and lightened his talk with some cartoons and jokes that I think had been definitely thought out when he assumed there was going to be an all-male audience. At least one of the sponsoring hosts was sensitive enough to approach each of the very few women who were attending to quietly apologize on behalf of the male group with respect to what had happened and to inquire if the women had been offended. I assured him that although I thought that perhaps things were unnecessarily off-color, I had experienced far more objectionable things in my life.

There are other kinds of social phenomena which, when integrated over time, can perhaps far more seriously interfere with the productivity of individuals than these sort of "horror stories" which we hope are all in the past. In addition to our possibly socially useful over-representation and therefore excess workload on government committees and outreach programs, we all probably have experiences about the visitors to our buildings who, seeking a
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WOMEN IN PHYSICS: WHERE ARE WE NOW? WHERE DO WE GO FROM HERE?

Dr. Patricia Cladis received her PhD in physics in the field of superconductivity from the University of Rochester in 1968, six months after the birth of her twin sons. In 1969, she started post-doctoral work at the University of Paris-South (Orsay), France, doing research in liquid crystals with the Orsay Liquid Crystal Group. Dr. Cladis has been the author or co-author of more than 100 papers. Her current research interest is pattern formation in nonlinear, nonequilibrium, dissipative systems. Most recently, she and her coauthors discovered a fascinating breathing mode when a nonequilibrium driving force perturbs a system from its equilibrium structure. In 1972, Dr. Cladis was one of the first women hired to do physics research at AT&T Bell Laboratories, at least in the physics division. She remained the only woman Member Technical Staff in that division until approximately 1976. During her more than 20 years of physics research, she has seen incremental but positive changes in the status of women in physics, but much remains to be done.

“I must have been one of the first women to benefit from the founding of the APS Committee on the Status of Women in Physics by Vera Kistiakowsky and others. I came to Bell Labs in 1972 because my mother sent me (I was in France at the time) a copy of *Physics Today*, where it was reported what a panel discussion on Women in Physics at an APS meeting had to say about the status of women in physics. I was very encouraged, so I looked for a job in the U.S. There was a dip in the U.S. job market at the time (1971-1972). I was told that all the “Green’s Function Experts” were walking the streets. But, in France, I had discovered *escape into the third dimension*. You can read about it in a recent edition of Landau and Lifshitz. And, I got a job at Bell Labs.

When you are a woman in physics, you tend to get very philosophical because people keep asking you “What’s the matter with *you* that *you* are in physics?” or “What’s the matter with *women* that they are *not* in physics?” So, I wrote things down to clarify my thoughts as I was ill-equipped to in terms of my education. I didn’t know philosophy because I had only studied physics and mathematics. I didn’t know much sociology—geography, even, until I actually went to physics conferences in some of these places. And now, here I was, expected to provide answers to *really* big questions, such as, “What is the meaning of life?” So, I wrote a couple of essays.

One of them is called, “Women in Science: How High the Moon,” il-

lustrated by Gary Larson’s very first cartoon. The title is in reference to a nursery rhyme that I think everyone in the English-speaking world knows. The nursery rhyme is “Hey diddle diddle, the cat and the fiddle, the cow jumped over the moon...” In Gary Larson’s cartoon, you see a cow that has tried to pole-vault—unsuccessfully—over a very high bar and is being throttled by the bar. In the corner, there’s a little cat with a fiddle saying, “We still have another year of hard work before us before we can start on the moon.” I thought it was a good illustration of the status of women in science. We have another year of hard work before us before we can start on the moon. But then, you know, that’s not too bad. The cow has tried to vault more than her length. Even hanging by her head from the bar, her tail is still *far* from the ground.

My talk, “Women in Science: How High the Moon,” was basically stimulated by friends at Bell Labs and many of my colleagues in physics. There was a women’s support group in 1987, 1988. I was trying to understand why there are so few women in physics. People were saying, “You know the problem with women—they don’t do mathematics. They don’t know any math.” All right. But I don’t think it’s true. Women can do math if they want to. But, perhaps, women can learn more from men than mathematics. The way I posed the problem is the essay was, “What can women learn from men, other than mathematics, that will help us gain recognition in a man’s world?” I came up with 10 things I thought we

could learn from men other than mathematics:

- Survival: *the inalienable right to life;*
- War: *We mutually pledge to each other our lives;*
- The naming of things: *consciousness;*
- Patterns of play: *carried into the workplace;*
- “They had the truth, and chose to fight for it”: *David and Goliath;*
- Assertiveness: *You teach what you accept;*
- Law: *Injustices can be institutionalized by making them legal;*
- Sociology: *Thought style is a social product;*
- Dreams: *strategic intent!*
- Sagacity: *the specific genius of the explorer...Tragedy is not our business either.*

Obviously, I can only touch on one or two of the topics here but am happy to

“What can we women learn from men, other than mathematics, that will help us gain recognition in a man’s world?”

send a preprint to anyone interested. I am sure that you can all add to this list. As you can see, these are topics outside the traditional domain of physics and math. *But*, being a physicist interested in “complex, nonlinear, dissipative systems,” I didn’t let that stop me from tackling the problem.

To me, physics is a way of thinking. It is not one thought. It is a powerful way of thinking because it creates new knowledge. Like art and love, it’s a universal language. A truth in physics is the same around the world, on the moon, in heaven and hell, that bootstraps us onto the next truth. A question that has been raised is, “Yes, but are there male
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Kistiakowsky/Origins of the Committee

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one used to hear said about women in those days. After that was over, I went up to Faye Ajzenberg-Selov, who was on the panel, and said that she should really organize a committee in the Physical Society to do something about it. And she said, "No, you do it. I'll sign the letter, but you do it." So that's how it got started. We got the letter signed and I took it to the 1971 Washington meeting. The committee was approved, we started work, and as I have said, we reported in January of '72, which is pretty quick work for the amount of study that we did.

The reason we were able to do this was because Jerry Wiesner, the president of MIT, got me a Sloan Foundation grant for \$10,000. This caused some consternation. I believe we were the first committee of The American Physical Society to get outside funding, and there was a little bit of question as to how one would deal with it... [On the committee] we had people from colleges, universities, national laboratories, and we had Gloria Lubkin, and we also had three gentlemen to make us honest, Allan Sachs, Charlie Slichter and Steven Weinberg. And we had somebody who was very important as moral support... when we had our only meeting at Columbia, Dr. Chien Shiung Wu was solidly behind us. We split up into four working groups so that we could get the report done in such a short time, and all of the four, colleges, government and national laboratories, industry, and universities sent out questionnaires. There was also a questionnaire sent out for the roster. Women physicists must have felt they were absolutely being deluged with questionnaires. This and a computer run on the 1970 National Register of Scientific and Technical Manpower were made possible by the money. If we hadn't had those \$10,000, none of this would have been possible.

But in fact it was possible, and we put together both the roster and the report. The latter contained recommendations, one of which was that a committee on the status of women in physics become a standing committee of The American Physical Society...

...Initially I got innumerable comments about the formation of the first commit-

tee. The one that is most vivid is that somebody came up to me at a meeting of chairs of committees and said, "I see no reason for a committee on women in physics. There are only two women in physics and I know them both and they are both very happy." And he didn't mean me, he meant Trudy Scharf-Goldhaber and Chien Shiung Wu, neither of whom were very happy, one of whom was supporting us, and the other one of whom was on the committee. The fact is that when we got through with our work, we were able to demonstrate that there were far more than two women in physics. We ended up with 441 PhD women on our roster, and on the order of 1,300 women altogether on the roster of women in physics... We identified more PhD women physicists than were on the National Register of Scientific and Technical Manpower at that time. There was a significant discrepancy between the two numbers.

And there were other things that were said. The most common was, "Oh, yes. I had this wonderful woman graduate student. She was so brilliant. But, of course,

"The place where [affirmative action made] a big change was in industry, and the reason was very simple: Industry was the one place where the federal government really had clout."

she got married, had children and quit." So one of the things we really looked at was to see whether it was true all these women who got PhDs had dropped out of the workforce. We were able to do this by comparing the Register with the Doctorate Records file of the National Research Council. And we found that 94% of the men who got degrees within a given period were left in the field, according to the Register. This is statistical, not looking at individuals. And 80% of the women. So, in fact, there was a higher at-

trition rate for the women, but it was certainly not that every woman who got a PhD quit. And since a lot of the women were in fact working part-time or seeking employment, according to our data, there is possibly another explanation rather than dropping out.

The thing that was most heartrending were the comments that came in on questionnaires, because we always left space for people to say whatever they wanted to. The one that I remember most vividly was the woman whose husband worked somewhere in the Midwest where there was no other university, no other opportunity for doing science, and the university not only would not give her a job, they would not let her use the library, they would not let her come to seminars. In essence, they just discarded her as something totally unworthy of being part of the company of scientists.

...Margaret Rossiter wrote a wonderful book called *Women Scientists in America* and in it she reported that in *American Men of Science from 1906 to 1920* there was a set of women identified as scientists. She studied these; she got all the statistics on them. Of those women, four were women physicists. At the end of the century, several things had happened: women's colleges had been established, forming a place where women could get jobs; the credentials for being a professor had been upped—it had now become necessary to get a doctorate—and as the doctorate programs in the United States were established, women were admitted to them. So one place the United States did fairly well was in an early start on women doctorates. In the field of physics... in the 1920s, 4% of the PhDs in physics went to women. It then dropped steadily to the '50s. The high point was in 1920, when 19% of the PhDs went to women in physics; the low point was in 1958, when 1.8% of the PhDs in physics went to women... It started to climb up again in the '60s and '70s. And it continued. ... Here is a comparison of doctoral degrees granted for three years: 1971, 3.2% for physics; 1980, 6.8% for physics, 1989, 9.2%, and my memory is that in 1990 we broke the two-digit barrier and it was 10.5%. It has just been a very great change.

One reason was the persistence of women relative to that for men in the fields of mathematics and sciences increased, not very dramatically for mathematics, quite dramatically for the physical sciences, spectacularly for the biological sciences and psychology...

There was also the question of how many of the women were in fact working. These are data from the Register, these are not data from the roster, so there is some disagreement between the various numbers that are quoted. But...in fact, 73% of the PhD women were working full time, 16% were working part time and 5% were unemployed and seeking work. But the fact of the matter is that on the questionnaire from the roster, we got comments that said that many of the women who were working part time would like to work full time, so there is a question not only of employment but also of underemployment. Also, some of the full-time employment people were working at jobs that did not reflect their training.

We also looked at the number of physicists in various kinds of jobs: 69% of the women were in educational institutions, 8% in government, 3% in non-profit and 8% in industry. The biggest difference between men and women was in industry: 25% of the men PhD physicists were in industry. There were also differences within these various categories. We compared women faculty at the top 10 physics departments in '71-72. I later wrote something for *Physics Today* so I also have numbers on '78-79. If you look at the totals for the top 10 you'll see there was in fact an increase, but if you look at the numbers that are represented, it was pretty puny... There were four professors in the top 10 in that first year. There were 11 in the second ('78-79). I believe of those 11, something like six or seven were at MIT.

The thing that is interesting is that that is the period when affirmative action was at work. It did not make much impact on the academic institutions. Nor did it make much impact on the federal laboratories. If you look at physics, you'll see that the percentage of women among new hires in '74-78 was still pretty small. It was slightly less than the number who got PhDs. There was nothing terribly affirmative about that; it was

just staying pretty much at the same level. The place where there was a big change was in industry, and the reason was very simple: Industry was the one place where the federal government really had clout. They did not give contracts unless you had affirmative action, and the result was that while the percentage increase for men between '73 and '77 was 24%; the percentage increase for women was 199%. And if you look at the next period, between '77 and '81, the numbers were 23% and 106% respectively. So this was the one place where affirmative action was effective.

[Recent statistics still show] that the salaries of women are less than the salaries of men... You can always make the argument that they're newer to the field, and therefore they're more likely to be junior and therefore more likely to earn less. Let me say that when we did the study on women in physics, we got salary figures for subsets of the total sample. We broke them down by rank. We broke them down by age. We broke them down into categories so small that you sometimes just had one woman in a category. You can say that data are not significant if you have such small categories, but the fact of the matter is that, no matter how you decompose the

sample, the women always earned less, with one exception: senior women in government. One woman wrote on a questionnaire an answer to why this was the case. She said, "It's very simple. The men get appointed to administrative positions, we stay in the research ranks. We do not get the promotions to the high administrative positions. Therefore, we are more senior; therefore, we do in fact earn as much if not more than the men."

I have been a Sigma Xi Lecturer for the last year and a half, and one of the talks I give is "Reflections on Women in Science." I haven't done any research on it for 10 years so I can't say that I'm a scholar on this topic any more. But the thing that struck me is that people still ask me to talk about this... there is this resurgence of interest in women in science. So much changed between Margaret Rossiter's time and my time. So much has changed between my time and the time of young people today, and yet some things are still the same. The same questions get asked. The same problems get discussed. The same remedies get proposed: networking. Although things have changed and women are a substantial minority within The American Physical Society, there still are problems to overcome." □

Engle/Contemporary Vignettes

(Continued from Page 4)
person not in his office, will pass many open doors, perhaps even coffee-klatches with other men, and spying a woman innocently seated and immersed in her work, will burst in and interrupt and ask questions which she is usually incompetent to answer, i.e., "Where's Mr. X? When will he be back?" etc. The attendant disdain when she confirms her incompetence in these matters is no help.

Also, students often perceive women faculty as kinder and gentler and more accessible for extra help. I think this is fine, although I have my doubts that it's necessarily true. My present institution has a policy that students are entitled to extra instruction from their own instructors upon demand. Personally, I hate to see a student wasting potentially valuable academic time just standing propping up a wall waiting to see an instruc-

tor. Often, if I can at all make the time, I invite a wallflower into my office and offer assistance instead of the regular instructor. About half of the time my offer is accepted. On one occasion I spent about an hour with a young male student. He seemed happy with the result. A couple of days later, he knocked on my closed door and requested additional help. I put aside the exam I was preparing and acceded to his request. We spent about 40 minutes, and again he appeared to have benefitted. Even now I think it's a thoroughly worthwhile allocation of my time. However, my ego could probably have benefitted in remaining ignorant of his thinking as expressed casually as he was packing up his gear. He mentioned that he had seen his own, non-professorial instructor earlier but had not wanted to take up the man's whole free hour. That attitude expressed by that youngster

that the time of a woman professional is intrinsically far less valuable than that of a man, is undoubtedly prevalent all around us, although rarely so ingenuously expressed.

“There are some signs that in these turbulent economic times, our momentum toward equity in opportunity and rewards for productivity is abating, and that a reversal may even be underway.”

Although in our increasingly bureaucratic society, all of us, men and women professionals alike, are tasked with many jobs which are intrinsically of no scientific or social value—apart from the fact that they have been mandated to be done--we must all do our fair share of these nasties. All too often, it is women who are assigned a disproportionate share of these no-value tasks to do as collateral activities along with their proper function. I raise this issue along with

apologies I can offer no solutions to the problem.

Now, to return to remembrances which were in part Thomas-hearing inspired, and to close on a bright note. A close friend recently received a nice letter from one of her old graduate school colleagues. In his letter he apologized for explicit events, although he was rather general about them, involving sexist remarks made in her presence and directly to her. He went on to say that his conscience had been pricked by the events reported in the new media. Particularly encouraging and amusing to my colleague and myself is that she could not for the life of her recall what could have been the precise substance of any remarks for which the chap was apologizing.

Now, to return to initial questions I asked myself, and some personal, “back of the envelope,” answers.

“Where are we women physicists?” Some doors have opened. We’ve come a long way but we’re not there yet.

“What is our collective goal?” I believe that I speak for our male as well as

female colleagues to summarize that our goal is for full opportunity for each of us to develop to be the best physicist and professional that it is possible for the individual to be.

“What is our direction? How fast are we moving?” There are some signs that, in these turbulent economic times, momentum toward equity in opportunity and rewards for productivity in fulfilling goals is abating and that a reversal may even be under way.

We all soldier on, being the best physicists and professionals we can be in niches in which we find or have created for ourselves. If inappropriate kinds of conduct create unnecessary barriers for any of you or your colleagues, I would like you to feel that you can turn to the wider physics community for moral support and possibly even constructive advice and assistance in coping with the problems. This option to seek, without embarrassment, collegial support in dealing with problems, is, in my opinion, the best bit of progress we have made toward our collective goals.” □

Cladis/Where Are We Now?

(Continued from Page 5)

physicists and female physicists?” This is a very good question. I think the answer, in physics at least, is “no,” but the traditional socialization of women is different than the traditional socialization of men. It’s an historical feature of humanity, not a particular culture. In any culture, there are differences between male and female socialization. In “broad brush” terms, historical “feminine” socialization is: “Look to men—existing power groups appointed by *canon* law—for answers to problems. Don’t trust yourself. Do not, for one minute, believe you can solve the problem or, more importantly (certainly in physics), DEFINE the problem. In return, men will tell you how to think of yourself. Depending on the correlation between male expectations and your performance, you will be rated on their ‘good girl spectrum’.”

This is not an anti-male diatribe. I love men, individually and generally. I’m just

trying to explain in a few words what I see as historical “feminine” socialization because, historically, a culture based on this kind of “religious thinking” has been the kiss of death for any creative endeavor. Original thinking is essential for expanding the knowledge base of physics. It’s a creative field. But to think creatively, you have to believe in yourself, that it’s okay for you to do physics, that you don’t have a problem doing physics. *You* are not the problem. So, what is the problem? Well, I think, as many members do, that it’s social expectations. And I am really encouraged. Society is changing. There have been significant changes in U.S. society since 1972.

Just before I left Bell Labs to come to this meeting, Lou Lanzerotti handed me an NRC Report: “More Women in Science: A Goal for the 1990s.” This is Millie’s [Dresselhaus] committee where she says, “We’re looking at

strategies at all levels, long term and short term. Our goal is to have impact into the next decade and beyond.” Well, the interesting thing that struck me about this report was that it wasn’t about giving money to people to study what is wrong with women. You know: “What is wrong with women that they aren’t in physics?” The feature that struck me about this report was the change in emphasis from programs geared to providing women with survival skills for living in hostile territory towards ones to effect long-lasting social changes from hostile to friendly for *all* people. Society *is* changing now. As society changes, the roles of women and men will change and adapt. In a sense, it’s a tremendous opportunity for every woman and every man to influence how changes will happen; an opportunity to define oneself without taking away the right of other people to “feel good about themselves.”

I’d like to give you a small sample of my

1987 philosophical tome on women in science (“Women in Science: How High the Moon”), where I discussed some of the things that I thought we women can learn from men other than mathematics. The first thing I thought we could learn about is survival. This is crucial to the existence of any society. Yet in many of our cities, we don’t have survival. Some inner city children have to risk their lives to go to school. Nobody thinks that’s OK. We may not know yet what to do about it, but nobody in the U.S. thinks that’s OK, and we will keep on trying to find solutions to this and other problems. Survival, the inalienable right to life. We all want it, and most of us take it for granted. It’s written into our constitution. But, what happens when your survival is threatened or your values are compromised? Historically, society’s response to that has been war. And in war—this is again taken from the Declaration of Independence—we mutually pledge to each other our lives. A strong bonding takes place among people at war that is very striking. In a small way, I’ve experienced that with colleagues in research. We had a collaborative effort going and we ran into other people, other physicists, who disagreed. They turned out to be provably wrong, of course, but there was a *fierce* fight. *We* were on one side and *they* were on the other and ...WOW! I can attest to the fact that one forms strong bonds with people you have gone to the wars with, even intellectual wars.

Historically, when men are in a situation where they cannot get their point across by reasoning, that’s it. They get on with it, get armed, kill the guys threatening them. I was discussing this with a statesman of science, a very distinguished Bell Labbie who’s since moved away from Bell Labs but knows a lot about statesmanship. I posed the problem the following way: “Here’s this group of women. They want one thing, and here’s this group of men saying, ‘No way!’ How do you get your point across? Maybe the solution is for women to have the atomic bomb. You know we wouldn’t *use* it or anything like that. We love our husbands, sons, fathers, friends, etc. We love men. We couldn’t *use* the bomb on you. It is only there to lend credibility to our argument.” The statesman of science was appalled, naturally enough. He said to me: “No! No! That’s not the way to go. You do not want the atomic bomb. What

you should do is read this book *Weapons and Hope* by Freeman Dyson.” I very much recommend the book to you. It’s about war. It’s a series of interesting essays about the philosophies of men to war, the reactions of people to war and other things. Basically, Dyson is a proponent of disarmament. No bombs at all. But Dyson is a *reasonable* person. Sometimes there may not be a “reasonable” way to protect your values *and* survive.

What else can I discuss in this short time from the long list I thought women can learn from men—other than mathematics. Maybe patterns of play. There was a sociologist, Harry Harlow, who came to Bell Labs and gave a talk about how he had induced depression in nine baby monkeys. The way he did it was to take the baby monkey away from the mother monkey at a very early stage and keep the baby separated from its mother by a glass partition. The baby could see its mother, but not get to her. This was amazing! One of the first big colloquia I attended at Bell Labs. Harlow then pointed out, “The *baby* monkey was depressed, but the *mother* monkey was not. What does *that* say about the speciousness of mother love compared to the love of a child for its mother?” Then all nine depressed monkeys—they were, indeed, all male monkeys—were turned over to nine psychiatrist monkeys, who were all female. Gradually, the psychiatrist monkeys got the depressed monkeys out of their depression. However, girl monkeys play entirely differently from boy monkeys. Boy monkeys go out, fight, define turf and don’t just sit around giggling and primping their hair like girl monkeys watching all that fun.” The recently cured boy monkeys were now playing like girl monkeys! Next, Harlow introduced this whole group of 18 monkeys into a larger group of monkeys. At first the boy monkeys continued to play like girl monkeys. But gradually, they noticed the other boy monkeys and started to play like them—“like the men they *really* were,” he said.

People have studied human children at play. Carole Gilligan has written a book describing patterns of human boys’ play and human girls’ play. It has been observed that in boys’ play, there is a lot of conflict, a lot of shouting back and forth,

but eventually the conflict is resolved and play is resumed, even by the boys who felt badly dealt with in the conflict. In contrast, when conflict occurs in girls’ play, girls are observed to separate and withdraw. They don’t stand there and fight, resolve the issue and get on with it.

Yesterday [at the APS meeting] it was very interesting. In one of the sessions, someone was saying, “Here it is” very proud of his talk. And another guy shouted out from the back of the room, “That’s wrong!” Just like that. Just an at-

“Here’s this group of women. They want one thing, and here’s this group of men saying, ‘No way.’ How do you get your point across? Maybe the solution is for women to have the atomic bomb.”

tack. Not terribly scientific, I thought, but very “macho.” I think I (and probably many other physicists, both male and female) would have been too surprised to react immediately. But a classic male reaction (a male colleague seated next to me told me) would be to counterattack like “You’re full of it” or something like that. You know, “punch the guy in the nose,” at least figuratively. But society is changing. There may be a better way.

In short, what I have learned these past 20 years is that women can do physics if they want to. **You** can do physics if you want to. But *believe* in yourself. There is nothing wrong with you. You are all right! Physics is an exhilarating way of thinking. Nobody can take that power away from you. I think it’s worth fighting for.” □

The American Physical Society

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CSWP ANNOUNCES 1992-1993 "TRAVEL GRANTS FOR WOMEN COLLOQUIUM SPEAKERS" PROGRAM

The APS Committee on the Status of Women in Physics (CSWP) is pleased to announce that the "Travel Grants for Women Colloquium Speakers" Program is entering its third year. The program is designed to stimulate the recognition of women physicists.

- Purpose:** The program is intended to expand the opportunity for physics departments to invite women colloquium speakers who may prove role models for women undergraduate and/or graduate students and faculty. The program also reinforces the awareness of the accomplishments of women physicists.
- Grant:** The program will reimburse institutions for up to \$500 for travel expenses for either of two women colloquium speakers invited during the 1992-1993 academic year.
- Qualifications:** All physics and/or science departments are encouraged to apply. Invited women speakers should be physicists or in a closely related field, such as astronomy or geophysics. For your convenience, a copy of the CSWP Colloquium Speakers List for Women in Physics has been included in this packet, but selection need not be limited to this list.
- Guidelines:** Reimbursement is for travel and lodging expenses only. Honoraria or extraneous expenses at the colloquium itself, such as refreshments, are not reimbursable. Travel by car is reimbursable at 25¢ per mile.
- Application Procedure:** Institutions will be reimbursed in the order applications are received. Institutions must submit the attached application form together with any receipts for the travel expenses for either one of the two speakers. Requests for Travel Grants should be submitted **after** both women speakers have actually spoken. For the convenience of institutions who have scheduled speakers for later in the academic year, **four** travel grants will be reserved for those institutions which submit a letter of intention to file, with the dates of the anticipated colloquia and the names of the speakers. Both speakers must have actually presented their talks by April 16, 1993.

For further information, please feel free to contact: The Travel Grant for Women Colloquium Speakers Program, APS, 335 East 45th Street, New York, NY 10017 or 212-682-7341.

Colloquium Speakers List of Women in Physics Enrollment/Modification Form • August 1992

The *Colloquium Speakers List of Women in Physics* is being compiled by The American Physical Society Committee on the Status of Women in Physics. The list will be maintained by the APS office in a geographical listing and a listing by field. Comments, questions and entries should be addressed to:

Colloquium Speakers List of Women in Physics • APS • 335 East 45th Street • New York, NY 10017

To enroll or to update your current entry, please fill out this form and return it to the address above. Please print clearly or type.

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Please check the boxes below if you would be available for occasional "Career Day" presentations to students in:
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New Entry Modification of Existing Entry

To register a new title, give the title as you want it to appear (first word and proper nouns capitalized) in the left column below. Then check the section(s) where it is to be inserted. Also check the box above if this is a MODIFICATION of an existing entry. If more than four talks are registered, please use an additional copy of this form, stapling them together. A limit of seven total entries (check in right hand column) will be imposed.

Title	<input type="checkbox"/> Accelerators <input type="checkbox"/> Env/Energy <input type="checkbox"/> Nuclear/Particle <input type="checkbox"/> Astrophysics <input type="checkbox"/> Fluid/Plasma <input type="checkbox"/> Optics/Optical Physics <input type="checkbox"/> Bio/Medical <input type="checkbox"/> Geophysics <input type="checkbox"/> Talks for General <input type="checkbox"/> Chem/Statistical <input type="checkbox"/> Interface/Device Audiences <input type="checkbox"/> Cond Matter <input type="checkbox"/> Molec/Polymer
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INTEGRATED ROSTER LIST HAS EXPANDED SEARCH CAPABILITY

The APS Committee on the Status of Women in Physics maintains a Roster of Women in Physics. The Roster is the basis for statistical reports on women physicists, mailing lists corresponding to announcements and publications of the CSWP, and confidential recruitment searches. The Roster is not made available to commercial or political organizations as a mailing list, and all information is kept strictly confidential.

APS also maintains a Roster of Minorities in Physics, corresponding to parallel activities of the Committee on Minorities in Physics. A new computer program is currently being implemented at APS which will integrate the existing Minorities and Women's Rosters in a single list searchable by as many as four parameters simultaneously. Possible search fields for the new program include: Roster List, field of physics by highest degree, current field of physics, degree type, year of BA/BS/MA/PhD, university, workplace (generic), race, zip code, computer entry date.

Organizations, including universities, national laboratories and private corporations, requesting searches for recruitment purposes are charged \$100 per search, plus postage (mailing to prospective candidates are handled by the APS office to maintain confidentiality).

Although the Roster is employed to serve

women and minority physicists, the Roster is open to anyone interested in issues affecting these groups, including students, educators, and program administrators. Roster forms are available for enrollment or updating previous entries by contacting Arlene Modeste, at APS: 212/682-7341.

1992 LUISE MEYER-SCHUTZMEISTER AWARD TO RAJ SESHADRI

Raj Seshadri is the 1992 winner of the Luise Meyer-Schutzmeister Memorial Award. The award is sponsored by the Association for Women in Science Foundation and is named for a Senior Physicist at Argonne National Laboratory who was a world-renowned nuclear spectroscopist and a Fellow of the American Physical Society. Dr. Meyer-Schutzmeister died in 1981. The award in her memory grants \$1000 to a female graduate student in physics.

Dr. Seshadri earned her Ph.D. from Harvard in June 1992. She came to the U.S. from New Delhi in 1983 to attend Mount Holyoke, where she majored in physics and mathematics, with a minor in computer science. She went on to study physics at Harvard and did her thesis on statistical mechanics of magnetic bubble arrays in thin garnet films.

Dr. Seshadri is currently working at AT&T Bell Laboratories as a postdoctoral fellow.

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