CSWP GAZETTE

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

September-October 1985 Volume 5, Issue 3

FOREWORD TO OUR READERS

The editors of this issue were Dr. Luisa F. Hansen and Dr. Marie Machacek. Dr. Machacek has summarized for our readers the article "In the Pipeline" where the authors, Laraine T. Zappert, Ph.D. and Kendyll Stansburry report the results of "A Comparative Analysis of Men and Women in Graduate Programs in Science, Engineering, and Medicine at Stanford University." Dr. Machacek's review follows.

IN THE PIPELINE

Researchers Dr. Laraine T. Zappert from the Dept. of Psychiatry and Behavioral Sciences and Kendyll Stansburry, a Ph.D. candidate from the School of Education at Stanford University, have recently finished "In the Pipeline." I found the study most interesting because I saw profiled in its pages most of my own graduate student and postdoctoral self even down to the annoying fact that I drink too much coffee! ("63% of the women compared to 47% of the men reported drinking caffeinated beverages often"). In light of the recent study "The Tenure Process for Female and Male Physicists" by Dr. Irene Frieze, Prof. Julia Thompson, and Prof. Elizabeth Baranger; the study of women graduate students in engineering at MIT by Prof. Dresselhaus; and the current on-going study of women in physics by Prof. Sylvia Favia and Dr. Rosalie G. Genovese, we as a community have recognized the need to identify and share the common experiences that have affected our ultimate career paths and the importance of quantifying those factors, internal and external, that impact on our success. Our view is not just to understand ourselves, but to develop effective, constructive suggestions which would aid the men and women in the scientific community to encourage women's future contributions in their fields. In this spirit I would like to share some of the statistics and findings of the Stanford study. I can in no way do justice to this 34 page report. Thus I urge interested readers to request the full copy from its authors at Stanford.

The study, "In the Pipeline," examines how men and women go about making the decision to enter graduate work in science, engineering, and medicine; what happens to them academically and psychologically during their studies, and why they decide to continue or discontinue with a Ph.D. degree. A 32 page questionnaire was mailed to all women and an equal number of randomly selected men, excepting foreign students in the above fields. 54% responded producing a sample of 328 women and 299 men. The demographic profiles of men and women were very similar: mean age, 26; predominantly single (73%), without children (94%), and Caucasian (87%). 37% of their fathers and 10% of their mothers had professional or Ph.D. degrees. Over half of the mothers of both men and women had worked outside the home at some point during the respondent's childhood.

Two themes keep reappearing throughout the study. The first one is that women were highly qualified. Affirmative action policies had in no way compromised academic excellence in the student population. There were no differences between men and women with respect to undergraduate grade point average (~ 3.85), average numbers of undergraduate honors, or overall (Math and Verbal) scores on the GRE or MCAT exams. Differences did show up on individual GRE sections. Both men and women scored above 700 on the math section; however, men were significantly higher. Women were significantly higher than men on the verbal section and slightly, although not significantly, higher on the analytical section. No significant sex differences were observed in the number of fellowships received or how the graduate studies were financed. Men and women had comparable grade point averages in graduate school, 3.57 and 3.50, respectively. In all, the picture is of a dedicated group of men and women, possessing impressive credentials, clear of their objectives and demonstrating a high degree of ability and professional commitment to their work. However, 20% of the women compared to 7% of the men reported having experienced some form of discrimination, and although it is important to stress that neither men nor women reported high incidences of sexual harassment, 40% of the women compared to 30% of the men reported having some negative experience with faculty members.

The second theme which emerges from the study is particularly significant in light of the first. Despite the excellent academic backgrounds of both men and women in the study, women differed significantly from men in their perception of their abilities, particularly in math and science, and consequently suffered a loss of self-confidence. While no differences in the assessment by men and women of their ability in high school math and science were found ($\sim 70\%$ of both sexes rated their ability as excellent), only 36% of the women compared to 54% of the men rated their ability in college math as excellent and significantly fewer women than men felt that their academic preparation for graduate school was excellent. Furthermore, women more often than men reported often questioning their ability to handle their work (30% compared to 15%), fearing that speaking up will reveal inadequacies (33% compared to 9%), and questioning their ability to make it in their field (24% compared to 9%). Similarly only 30% of the women compared to 57% of the men felt confident in speaking up in class and 42% of the women compared to 62% of the men felt able to negotiate for their needs. That these findings reflect the minority status rather than simply the sex of the respondent is suggested by the fact that the least amount of self-doubt is demonstrated by women in the fields of medicine and the biological and medical sciences where women are represented in larger numbers. The authors suggest that high visibility combined with reduced risk-taking may be contributing factors. The psychological cycle they describe is: "By virtue of low number, visibility is increased. Higher visibility would tend to reduce the probability of risk-taking, particularly in the presence of any uncertainty of competence. Decreased risk-taking diminishes the opportunity to learn from one's mistakes and develop a sense of confidence in one's judgment and ability." Furthermore, the authors point to clinical experience with women's support groups at the Stanford Business School which indicates that having the opportunity to discuss areas of mutual concern and doubt, as well as practice in negotiating skills, greatly enhances self-confidence and the ability to be assertive. The study confirms the greater affiliative need of women and their importance of external validation (for either sex) in entering a nontraditional field. Thus the interpersonal dynamics of the advisor-advisee relationship takes on heightened importance and deserves detailed study. Women (84%) more than men (68%) felt that a mentor would be helpful in graduate school.

Finally, although the sample size for married or cohabitating students was much smaller (only 237; 40 with children), the findings of the integration of work and family life are suggestive. Neither men nor women indicated a willingness to significantly alter their career plans, university, or location for their current partner. Two-thirds of the women compared to one-third of the men reported expecting or experiencing difficulties integrating work and family life demands. 66% of the women compared to 25% of the men reported anticipating or experiencing problems in the timing of children. Women more often than men envisioned taking time out to be a parent, while both sexes were uncertain on how that would affect one's career. Neither sex envisioned the male partner would take time out to be a parent. For students with children, more women (50%) than men (23%) felt it stressful to juggle multiple roles, women reported taking most of the responsibility for household tasks, and nearly 50% of the women compared to 1% of the men reported staying home when a child was ill. Yet, both men and women reported being satisfied with their household and childcare arrangements.

I found many of the above statistics provocative and welcome reader comments.

Dr. Marie Machacek

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SPS SCHOLARSHIP RECIPIENT

We are happy to report that Susan Marie Tholen, of the Univ. of Kansas, has been awarded the first Society of Physics Students Scholarship. This new $1,000 scholarship, funded by the Sigma Pi Sigma Trust Fund, will be awarded annually to an outstanding physics major in her/his junior year on the basis of (a) high scholastic achievement in physics and overall studies, and (b) the exhibition of potential and intention for continued scholastic development in physics, to help the final year of undergraduate study. Membership and active participation in SPS programs is also a requirement. Ms. Tholen, who holds a 4.0 QPA at the end of her junior year, has been doing research under the supervision of Dr. Thomas Armstrong to study and characterize the response of the earth's magnetosphere to the impact of interplanetary shocks based on satellite observations of energetic ions. Recently she reported on her work at a Chapman Conference of the American Geophysical Union. She has spent this past summer working at Bell Laboratories.

Impressed with the high quality and large number of applications received, the SPS Scholarship Committee also announced 17 Honorable Mentions for 1985—86. Of the 17 named, eight are young women. They are: Marie E. Dollard, Fordham Univ.; Diana M. Hampton, Murray State Univ.; Monica H. Marks, Idaho State Univ.; Paula L. Rollins, Loyola College; Carolyn J. Sher, Columbia Univ.; and Wendy M. Tebay, Randolph-Macon College.

Our congratulations and sincerest wishes for continued success go to all of these women!

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LETTERS TO THE EDITOR

The letters of Dr. Charlotte Ward and Dr. Fran Bagenal published in Volume 5, Issue 1 of the *Gazette,* triggered a variety of responses from the readers, as can be seen from the letters that follow.

Dear Editor,

I am writing in response to the letter by Charlotte Ward. Unlike the author, I do not see scientists sharply divided into Nobel Prize Material and Average Joes. Her attitude seems to be more sweet lemon than anything else. Also, unlike Ms. Ward, I don't have any children. To me, the only benefit to be conferred by having a baby would be a reduction in the risk of breast cancer. However, in order to enjoy this benefit to best advantage, I should have had the baby in my teens. Anyway, it expires on my next birthday (30th), and there are only somewhat more than nine months until then.

I am actually an ex-physical chemist, although, not entirely to my own choice, I have never actually been paid to be a physical chemist. My M.S. degree is in physical chemistry, however. I am now a medical student. Medicine was always my first choice of career, but when I was 22, I lacked the financial resources to attend without accumulating phenomenal debt. I was always an exceptional student in math, chemistry, and physics, and at the time, it seemed to be the best decision to attend graduate school in chemistry. It might be instructive to discuss the reason I left the field of chemistry, since by all indications, I should have been successful (based on grades and test scores).

My major shortcomings as a graduate student were a lack of research experience and a lack of shop skills (woodworking, machining, etc.). My university offered no formal courses to remediate my lack of shop skills, nor was anyone available to provide informal help to learn. I was, very understandably, unwilling to take on a band saw on my own. My preceptor's assessment of my potential was that I "lacked initiative" and "was trying to be the perfect graduate student." Interestingly enough, my superior at the independent research firm where I worked before starting medical school characterized me as "a very responsible, independent worker who solves problems on her own." Sounds suspiciously like lack of initiative wasn't the problem. I think that the difference was that the firm had a vested interest in helping me to work to my fullest potential, so that they would get the best and most work for their investment. My preceptor had no such motivation or interest. After all, there were sure to be more students arriving in the fall. Why put any effort into a student who might fail, anyway?

I think that professors need to realize that there are many acceptable personalities among intelligent people. They need to be honest with themselves. If they do not like a particular student's learning or coping style, personality, or deficits in training, they have the responsibility not to choose that student for their group, or to help him/her to get over whatever they feel is the student's handicap. I think that one term is plenty of time for the faculty to observe a given student and decide if the student doesn't suit the department's style for whatever reason. It struck me, as a graduate student, that about $\frac{1}{3}$ of the graduate students dropped out during the first year, many after three quarters, and that last year only 27 Ph.D. degrees were awarded by the chemistry department at my university, while about 65 students are accepted into the graduate program each fall. What happened to the other 38 people? Only 14 got M.S. degrees and at least half of them went on to earn a Ph.D. In stark contrast, only 2 or 3 people, on the average, in a class of 235, fail to graduate from medical school each year. I personally think that this is because the chemistry department needs more graduate teaching assistants than it intends to allow to graduate. I think we need less game playing, and more responsible behavior on the part of our esteemed professors, who after all, are only people like the rest of us.

In conclusion, while I always have tried to make the best of the bad situations of my life, I am not about to pretend that I would be as satisfied with a position that is much below my potential as a scientist as with one that would be predicted from my achievement up to the time I started graduate school. Charlotte Ward is making the best of her situation, as I am of mine (ideally, I would have started medical school at the age of 22 instead of 28). This, however, doesn't mean that the "system" that allows these bad situations to develop ought to be perpetuated and condoned by either inactivity on our part, or by the common attitude among the initiated that "I had to suffer, so should you."

(unsigned)

Dear Editor,

What a refreshing and encouraging letter was that written by Charlotte Ward (Mar.-Apr. 1985 *CSWP Gazette*)! Perhaps the letter was something I needed to read at a time when I was feeling rather mediocre and tired of the struggle for either (1) tenure or (2) research funding.

Like Charlotte, I was a "back-door" physicist, with a Ph.D. in physical chemistry and emphasis in theoretical spectroscopy. With a master's in math and computer programming, I felt a true exuberance at the potential that lay ahead, when the hard-earned Ph.D. was finally awarded. Fortunately, I had (during the course of earning my master's) also earned permanent certification in five academic subject areas, for pre-college teaching. They came in handy to finance my doctoral studies, while teaching. My talent seems to lie in a combination of teaching and research, and during those years I was fortunate to gain a wealth of experience in quantum chemistry, college teaching, and, most recently, in biomedical engineering. The latter has provided new insights into my avocation of fifteen years: emergency medical services on a volunteer ambulance! The price I have to pay, however, is lack of tenure, and now, lack of research funding. Although I have been given an "adjunct" status (unsalaried) in a nearby university, I am prohibited from submitting proposals as a principal investigator, because of the lack of tenure (tenure positions are not available). Hence, I am being asked to write the proposal, then add a co-investigator's name, who is a tenured faculty member! Somehow, this does not shout of "equal opportunity." The only bright note, as Charlotte pointed out, is that we all must be ourselves, do the best we can, and try to be content with our lot. Women in science still have a long struggle ahead, and I truly envy many of the editorial staff, who have been successful in finding fulfilling ways of using their talents. I am trying to remain "upbeat," hoping always that the next proposal will "bear fruit." Meanwhile, a lot of pre-college youngsters are reaping some benefits, having a Ph.D. teaching them. The most satisfying aspect remains the community involvement with professional, medical personnel in my ambulance work. New ideas for biomedical research continuously come out of such emergency care. Hence, like Charlotte, I am trying to make the best of a not-too-ideal situation. Encouragement, via the *CSWP Gazette,* goes a long way.

Dr. Jane Slezak, Adjunct Post-Doct.
Research Assoc., RPI, Troy, NY 12180

Dear Editor,

I was fascinated to read the copy of the *CSWP Gazette* that somehow found its way to me (Vol. 5, #1). Of special interest was the letter from Fran Bagenal, now teaching at I.C. where I studied as an undergraduate. I would be very glad if you could send me a copy of the *Gazette* with the letter from Los Alamos, since I can only guess what may have been said in it, from the replies contained in this issue.

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2. Interference Effects between Different Optical Harmonics

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2. Instantons, Tunnelling Modes and the Surface Polaron Problem
3. Spin Polarized H on the Surface of Liquid He: Polaronic Aspects and Surface Spin Relaxation

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2. Molecular Photodissociation

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1. Probing the Nucleus with High-Energy Photons

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1. Surface Enhanced Raman Scattering
2. Colloidal Crystals

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2. Local Area Networking Applied in Digital Images in Radiology

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2. Continuum Theories of Nuclear Reactions
3. Resonances in ^{12}C in the 19 to 22 MeV Region

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2. Europium as a Laser-Induced Fluorescent Probe of Metal Binding Sites in Biomolecules

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1. Excited States and Photodissociation of Small Molecules

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1. Nonlinear Transport Phenomena in Potassium Molybdenum Bronze

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1. Origin of Magnetism in Iron
2. Bond Length Determination with EXAFS

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1. Direct Photon Production at the CERN ISR

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1. Semiconductor Devices for High Frequencies

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2. Laser Induced Desorption Analysis of Surface Defects and Contaminants

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2. Quantum Effects in Spin Dynamics

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1. Symmetry in Heavy Nuclei
2. Experimental Tests of Supersymmetry in Heavy Nuclei

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1. $(TMTSF)_2PF_6$ and Related Compounds: Phase Transitions, Nonlinear Conductivity, and Superconductivity
2. Solitons in Highly Correlated Quasi One-Dimensional Crystals

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2. High Energy Solar Physics from Balloons, Satellites, and Space Stations

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1. Single Event Phenomena
2. Ion Immune CMOS Logic Designs
3. Design Criteria for Logic Stability in Radiation Environments

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2. Molecular Theories of Smectic-A and Reentrant-Nematic Liquid-Crystalline Phases

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Professor Laura Eisenstein
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3. Application of Thermodynamics in Determining Consistent Thermophysical Properties for Reactor Safety Calculations

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1. Application of EXAFS to Zn-Metalloproteins

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1. The Coolability of Degraded Nuclear Reactor Cores

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1. Ion Beam Interactions in Solids

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1. Test of Microscopic Optical Model Potentials over a Wide Mass and Energy Range
2. Livermore Pulsed-Sphere Program: Neutron Cross Sections for Fusion Reactors

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As one of four girls in a graduate student body of forty people or so, I welcome your concise publication and look forward to the next edition.

Yours sincerely,
C. A. Oxbomow

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LITERARY VEIN

Dr. Lali Chatterjee, a theoretical physicist from Calcutta, India, enjoys writing poetry and children's stories in her free time. The themes and characters that she portrays in her literary work are borrowed from her physics background. However, the complexity of the subject gets disguised under her "storyteller" style. She has sent the following poem:

The Electron's March for Freedom

There was a little electron
That went round and round and round
It spun in its little sub-shell house
So snug and safe and sound.

We do not know if it was a ball,
Or a wavy, wiggling wave;
We'll call it simply Mr. X
For want of a better name.

Now Mr. X had friends and foes,
Living in the same atomic city.
They all paid homage to the central core,
Their master and their Nuclear Deity.

One day a foolish human
Took the metal in which they stayed
And by some means fair or foul
Gave it heat and made it red.

Now Mr. X he got it first
He caught the fever really bad

In excitement he raced about
And seemed to have gone completely mad.

He jumped right out of his sub-shell house
Into the next adjacent one.
He stood there quite as proud as Punch
And marvelled at what he'd done.

The fever unabated he went on jumping
And jumped to the outskirts of his town
There he watched the big wide world
With a frown upon his crown.

"Why are we bound? this electron thought
To our city's central Head?"
He gave a very fiery speech
And here is what he said:

"Friends, electrons, Countrymen,
Let's get out of this beastly den.
We'll march our way to freedom friends
Right out of this Atomic Pen.

The others too they thought it fun,
They'd also got the heat you know,
Left, right, left, they marched,
All together, friend and foe.

They reached the edge of the metal
To find a potential barrier high
A fence that was so large and wide
There seemed no option but to fly.

Then each of those tiny fellows
Drew its wave into itself
And as the human went on heating
Flew straight out like a fairy elf.

Outside they found it was a bait—
They weren't free as they had thought
Straight in a mad mad race they ran
And landed on another electrode.

So the march for freedom ended.
The poor little souls—they remained bound.
Sorry the ending wasn't happier,
They still spin round and round and round.

Explanatory note from the author: The poem describes thermionic emission. The emission of electrons from a metal and their subsequent attraction to the positive electrode in a valve.

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HOUSING 1986 WINTER MEETING

Women members of AAPT, APS, and SPS who would like to share a room with another woman member at the Joint Winter Meeting in Atlanta, Georgia, should complete and return the coupon below to Virginia Rawlins. Even if you are not presently certain that you will be attending the meeting, your reply would be appreciated. Hotel accommodations will be more than $90 per room. Exact rates will be published in the September *AAPT Announcer*. You will be contacted personally by 1 December 1985, concerning your finalized travel plans. Hopefully, room assignments can be completed by 1 January 1986, and you will be provided with the name, address, and phone number of your roommate(s) before the meeting.

In order for the housing assistance to be successful, please mail by 1 October 1985, the information form following, to:
Virginia Rawlins
Dept. of Physics, North Texas State Univ.
Denton, TX 76203
Office: (817) 565-2626, Home: (214) 235-7335.

Housing for Women Members—1986 Winter Meeting

Date of Arrival:_____ Date of Departure:_____

Name:_____
(please print)

Business Address: _____ Home Address: _____

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Office Phone: ( ) _____ Home Phone: ( )_____

Hours: (_____)

Please check appropriate boxes:

☐ Smoker ☐ I wish to be in a 2-person room
☐ Non-smoker ☐ Would room with smoker ☐ I'll survive in a room for 4 people

Special accommodations required—Please specify: _____

Before October 1985, send this coupon to: Virginia Rawlins, Dept. of Physics, North Texas State Univ., Denton, TX 76203. Office: (817) 565-2626. Home: (214) 235-7335.

POSITION OPEN

Nominations and applications are invited for the position of "Dean of the College of Natural Science" at Michigan State Univ. Applicants must have a Ph.D. degree or its equivalent and evidence of strong accomplishment in scientific research and in administrative leadership. Candidates must meet standards for appointment at the rank of professor (with tenure) in an academic department in the college. Expected starting date is 1 July 1986 or as soon as possible thereafter.

Nominations should be sent as soon as possible. Applications are preferred by 1 November 1985. Send to:

Dr. James Bath, Chairperson, Search and Rating Committee.
c/o Office of the Provost
436 Administration Building
Michigan State University
East Lansing, MI 48824

(MSU is an Affirmative Action/Equal Opportunity Institution)

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WOMEN FEATURED IN SCI./ENG. RECRUITMENT BOOKLET

"Dear Prospective Stanford Graduate Students:
Women still remain the largest pool of talent available for increasing the size and quality of the science and engineering labor force." Thus begins an innovative 52 page graduate recruitment booklet "Stanford Women in Science and Engineering" featuring Dr. Gail Hanson, experimental particle physicist from SLAC, on the cover and inside pictures, personal anecdotes, research statements, and interviews in the form of faculty/alumna/student profiles of more than 46 Stanford women in the fields of geology and geophysics, engineering, physics, chemistry, mathematics and computer science, biological sciences and medicine. Not so different from CSWP's *Physics in Your Future* although aimed at a substantially more advanced audience, a booklet such as this increases the visibility of active women professionals in fields such as physics where women are still a minority. It demonstrates the excitement, energy, and humanity these women bring to their work, and presents not only role models but potential contact persons for women students: new postdoctoral junior faculty within a given institution. For more information contact:

Ms. Jaqueline Peterson, Office Manager
Office of the Vice-Provost and
Dean of Graduate Studies and Research
Stanford University
Stanford, CA 94305

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