Association for Women in Mathematics

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PRESIDENT'S REPORT

Encouraging signs. Over 300 people voted in the recent AWM election - that's about 1/3 of the membership, about 3 times the previous number of voters, and quite a respectable return on a mail ballot. The AWM table was double- and triple-staffed during much of the San Antonio meeting. We've got a lot of new officers on the executive committee. The new decade is off to a highly participatory start.

Executive committee and business meetings. The executive committee met on January 3, the business meeting on January 4, at the San Antonio joint mathematics meetings. For reports on both meetings, see this newsletter. The piece of business of most interest is that dues were raised. They are

$5 for student, unemployed, or retired members (same as now)
$10 for each of the first two years of individual membership (a new category)
$15 for all other individual members (up from $10)
$20 for family members (up from $15)
$25 or more for contributing members.

Dues were raised because we are currently operating at the limit of our funds with no money for emergencies. The new dues schedule takes effect for memberships for the year beginning October 1, 1980.

Appointments. Mary Gray is back as the affirmative action officer (a position no longer on the executive committee). Jill Mesirov, who was by two votes the next highest vote-getter in the AWM election, has been appointed to fill the remaining year of Bhama Srinivasan's position as member-at-large on the executive committee (Bhama is now president-elect).

Does discrimination occur on the basis of sex under peer review? Mira Blattner, who is a rotator in the computer science section of the NSF this year, thinks it may and the NSF is giving her time to study the matter. If you have any suggestions on how she should proceed, write to her c/o NSF, 1800 G Street N.W., Washington, D.C. 20550.

Appreciation. Many thanks to all the people who made the San Antonio meeting such a great success, especially to the speakers, Jessie MacWilliams and Dana Angluin, and to the many women who staffed the AWM table. I would like to express special thanks to Hope Daly of the AMS staff who schedules our meetings, arranges our parties, and in general smooths the way.

Judy Roitman
Math Department
University of Kansas
Lawrence, KS 66045

REPORT OF THE EXECUTIVE COMMITTEE MEETING OF JANUARY 3, 1980

Jill Mesirov was appointed to fill out the remaining year of Bhama Srinivasan's term as member-at-large of the executive committee.

Dues were raised. For the new dues and their rationale, see the president's report in this issue.

Due to outrageous official convention prices, it was decided to pass the hat at the San Antonio AWM party. It is expected that for the same reason the same hat will be passed in San Francisco. Donations will be voluntary and admission remain free.

The main business was a discussion of how and why we endorse candidates for AMS and MAA office. It was clear that no agreement would be reached on criteria for endorsement, and this is as it should be. As the executive committee changes, its perception of candidate desirability will change. After some discussion of alternatives, we remain with the current system of majority vote of the executive committee, clearly announced in the newsletter. More information will go out before we vote on endorsements, however. Previously the only information we had in common was the collection of candidates' statements which, because of the academic calendar, is always highly incomplete.

The above discussion made clear the need for complete candor and freedom of discussion in the executive committee meetings, and with some reluctance we decided to hold closed executive committee meetings. Reflecting this, executive committee meetings will no longer be announced in the Notices, since this carries an implicit promise of open attendance.

We discussed AWM procedure on affirmative action cases, and appointed Mary Gray affirmative action officer, a position she held when it was an executive committee position under the old by-laws. The general feeling was that we can have very little effect on the cases we work on, but our very participation makes it less likely that an institution will repeat the same sort of offense.

Alice Schafer told how Senator Kennedy's office lost the testimony that she, Mary Gray, and I had separately sent on the women in science bill.

Lenore Blum and Alice Schafer spoke of the articles on the future of women in mathematics they were asked to write for Lynn Steen's successor to Mathematics Today. Lenore also spoke about the AWM Reader's continuing efforts to be published. The nibbles are getting more substantial.

Bettye Anne Case is in charge of the summer meeting in Ann Arbor, Michigan.

Respectfully submitted,
Judy Roitman

REPORT OF THE BUSINESS MEETING OF JANUARY 4, 1980

Election results were announced, and reports made on the executive committee meeting of the previous day. Alice Schafer gave the treasurer's report in the absence of Donna Beers. Bhama Srinivasan gave the report of the committee on journal editors. Karen Uhlenbeck gave the report of the committee to choose the Emmy Noether Lecturer.

Judy Roitman announced two liaisons with Women in Math Education: cooperating on an expanded speakers bureau, and co-sponsoring activities at the International Congress of Mathematics Education in August, 1980 in Berkeley, California.

It was announced that Karen Uhlenbeck is on the AMS Nominating Committee and would like names of good candidates, that Bettye Anne Case is eager to help people organize AWM meetings at regional MAA and AMS meetings, and that Mira Blattner is studying sex discrimination and peer review. Karen's address is Institute for Advanced Study, Princeton, NJ 08540. Bettye Anne's address is Math Department, Tallahassee Community College, Tallahassee, FL 32304. For Mira's address and further information, see the president's report.

Judy Roitman passed on a member's suggestion that publication lag be studied. This suggestion was turned down as unworkable and admitting of no clear interpretation. Lee Lorch suggested that we put more effort into media handouts, especially through AAAS. This will be digested by the executive committee at a later date.

Lee Lorch moved that we congratulate Mary Gray for passing the bar exam. The motion was seconded and passed unanimously.

A mathematician writing a free-lance article on what it is like to do mathematics requested that anyone wanting to be interviewed at the San Antonio meetings speak to him after the business meeting.

Respectfully submitted,
Judy Roitman

REPORT FROM SPEAKERS COMMITTEE

by Karen Uhlenbeck, University of Illinois at Chicago Circle and Institute for Advanced Study

The first Noether lecture was given Friday, January 4, 1980, by F. J. MacWilliams of Bell Laboratories and was titled "A survey of coding theory." Dr. MacWilliams had a good-sized audience, and I think we can call the lecture a success. The committee intends to continue the lectures yearly at winter meetings. The AWM is offering airfare and an honorarium of $150. (This may be waived by some speakers due to the existence of other funding sources.) Also, we will continue to hold an informal dinner for the speaker.

The present committee requests that at least one committee member be added, and that at least one member of the speakers committee be appointed from the executive committee of AWM.

In principle we intend to alternate speakers for the Noether lecture from core mathematics and from mathematical fields away from pure mathematics. We also intend to avoid speakers who have recently or are about to give an hour address in another mathematics organization. Neither principle is hard and fast. Suggestions for speakers are welcome.

Committee members are Joan Birman, Vera Pless and Karen Uhlenbeck.

NOTES FROM AWM EXECUTIVE COMMITTEE

Alice Schafer and Martha Jaffe suggest giving gift memberships to friends on birthdays, holidays, etc.

Bettye Anne Case, Tallahassee Community College, 2405 Idyllic Terrace, Tallahassee, FL 32303: It is desirable to have some sort of AWM activity in connection with each MAA section meeting and each regional AMS meeting, as well as local AWM meetings independent of other meetings. Possible activities include panel discussions, speakers, luncheons, breakfasts, and informal meetings. Upon request, the AWM office in Wellesley will send you a sheet of hints about organizing such an activity and at the appropriate time will send mailing labels of AWM members in your area. If you have specific "how-to" questions, perhaps I can help, or find someone who can! Let's increase our visibility by reaching out to our constituency.

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LAST CALL FOR DUES! Second notices were mailed recently. If you have not paid your dues by April 1, 1980, you will be dropped from the mailing list.

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REPORT OF THE TREASURER January 3, 1980

I. Accounting for the period June 1, 1979 to November 30, 1979

Balance, June 1, 1979 $3314.94

Receipts	
Dues - individuals	$5833.10
- family	537.50
- institutions	1645.00
Advertising fees	220.00
Contributions	429.60
Interest	110.09
Miscellaneous (1)	464.88
Total	$9240.17

Expenses	
Wages (2)	$1135.00
Newsletter (3)	1828.06
Dues and Fees (4)	150.00
Operating Expenses (5)	298.38
Total	$3411.44

Balance, November 30, 1979 $9143.67

(1) This covers $415.21 received for secretarial services to organizations other than AWM.
(2) This covers $250.00 in wages for secretarial services to organizations other than AWM.
(3) Postage and printing.
(4) CBMS, Massachusetts Incorporation Fee.
(5) Supplies, xeroxing, postage for Speakers' Bureau.

II. Membership Statistics

Our mailing list totals approximately 1030 including 80 institutions in the U.S. plus 60 members in Canada and abroad.

Respectfully submitted,

Donna L. Beers

Donna L. Beers
Treasurer

AWM PANEL

by Letitia Korbly and Barbara Smith-Thomas, University of Alabama at Birmingham

AWM sponsored a panel discussion "Southern Women Mathematicians - Changes" at the AMS Southeastern Sectional meeting on November 9 and 10, 1979. Panelists were Dr. Margie Fitzpatrick, Dr. Donna Milton, Dr. Barbara Smith-Thomas, and Dr. Letitia Korbly, moderator.

The panelists discussed their current positions as mathematicians: one a part-time instructor, one a teacher in an industrial setting, and two full-time instructors in a university. Members of the audience, both female and male, introduced themselves and said a few words about their employment.

It was clear that the job histories of the women present were different from those of the men. Most of the older women had not had a continuous full-time career. The women who had been out a few years working full-time claimed the most discrimination. The women who had just finished their degrees seemed to feel they had done as well as or better than males in the job market.

Older men seemed to have slid easily into full-time tenured positions, but the men present who have been out only a few years recounted struggles not much different from the women out a few years.

It appears that discrimination is lessening or ending in most places. Certainly length of time since obtaining the Ph.D. is a significant variable in obtaining, or having obtained, equality of career opportunities for women and men. Because many women have been coming to the job market in the past five years or so, the bad market has hit them proportionately harder. For the newest women Ph.D.'s, job opportunities look as good as new men Ph.D.'s.

However, even these women remembered encountering prejudice, mostly verbal ("Have you ever thought about getting married again?" "Mathematics is perfect for a woman, you can do it while you wash dishes."), during their graduate school years.

WANDA SZMIELEW 1918-1976

by Marek Kordos, Maria Moszyńska, and Lesław W. Szczerba
translated by J. Smólska
reprinted from Studia Logica vol. XXXVI, no. 4 by permission
originally printed in Polish in Wiadomości Matematyczne vol. XXI, no. 1
thanks to Diane Laison, Temple University, for bringing this to my attention

The 27th August 1977 was the first anniversary of the death of Wanda Szmielew.

Born on April 5th, 1918, in Warsaw, she attended secondary school in Warsaw and in 1935 took up studies at the University of Warsaw. She came into contact with the then emerging Polish school of logic (Tarski, Lindenbaum) and in 1938 obtained her first result, concerning the axiom of choice for finite sets. It was only published after the war in Fundamenta Mathematicae (vide [1]).

During the war Wanda Szmielew worked as a surveyor and was engaged at the same time in underground teaching. This did not hinder her from occupying herself with mathematics. The results which she then obtained in group theory were the origin of her future doctoral dissertation on "Arithmetical Properties of Abelian Groups", containing a proof of the decidability of the theory of Abelian groups (vide [6]). This classical paper (awarded in 1956 the Prize of the Minister of Higher Education) was an essential contribution to the foundations of algebra and inspired the future research of A. Robinson and the pupils of Malcev, as well as some other scholars.

In 1945 Wanda Szmielew took up work at the University of Łódź and at the Łódź Institute of Technology, continuing at the same time her own studies, which had been

interrupted by the war. On getting her M.A. in Warsaw in 1947, she was appointed senior assistant to the Chair of Mathematics at the University of Warsaw.

Two years later she received an invitation to study at the University of California at Berkeley, where - in 1950 - she obtained her Ph.D. on the grounds of the already mentioned dissertation written under the guidance of Alfred Tarski. On her return to Poland in the same year, she was made assistant professor at the University of Warsaw. She was promoted to the rank of docent in 1954 and to that of associate professor in 1957.

Wanda Szmielew's entire scientific output belongs to the foundations of mathematics and her results can be assigned to three fields: the foundations of algebra, the foundations of geometry,and set theory. This division, however, obscures the most important characteristic of her creative work: searching for and pointing to the interrelations of these disciplines, finding the algebraic equivalents of geometrical facts and the geometrical interpretation of algebraic notions, and finally creating new notions of algebra, set theory and geometry, particularly useful on the borderline of these disciplines.

Wanda Szmielew's research in the foundations of geometry began with a series of papers concerning hyperbolic and absolute geometry ([11], [12], [13]). (Note: a scientific award of the Polish Academy of Sciences in 1960, the S. Mazurkiewicz award for 1962 of the Polish Mathematical Society for the paper [12].) In [12] she took up the classical Hilbertian problem of the internal coordinatization of hyperbolic geometry (without the continuity axiom) and gave it a new solution, much simpler than the Hilbertian one. In [11] and [13], through the construction of the absolute calculus of segments, she gave an algebraic basis for uniform coordinatization of the two geometries, Euclidean and hyperbolic.

Wanda Szmielew returns to set theory in [14], where she extends the well-known and widely applied notion of a two-argument relation of equivalence to the notion of an n-argument equivalence. This new concept proves extremely useful in geometry: in [15] and [16] she obtains on its basis a very clear and elegant theory of hyperplanes in n-dimensional affine geometry.

Her further investigations concern the foundations of Euclidean geometry. Basing geometry on a new system of axioms in terms of the relation of congruence and relation of betweenness (A. Tarski, "What is elementary geometry", The Axiomatic Method, 1959, pp. 16-29) constituted an enormous step forward with respect to the Hilbertian approach. The system of propositions generally known as the Szmielew-Tarski system of axioms is a considerable improvement of Tarski's system of axioms, and the proof of the representation theorem which is based on it is being taught at many universities in different countries. The treatment of Euclidean space as a relational structure of such simplicity has made it possible to talk about modern geometry in the language of general algebra and has led to the solution of numerous problems of the foundations of Euclidean geometry. One of Wanda Szmielew's results was the finding of an algebraic equivalent of the Pasch axiom, which led to the rise of the so-called Pasch-free Euclidean geometry (see [17]). Other results in this field are to be found in [22] and in [18] - [20].

It may seem strange that the geometry based on the Szmielew-Tarski system of axioms, though it has become an essential part of modern mathematics, has not had a monograph devoted to it. The reason why Wanda Szmielew delayed writing one was her conviction that the system was not yet sufficiently simple and natural. Eventually she worked her way to a new conception of the foundations of Euclidean geometry - a conception in which the starting point is affine geometry based on the notion of parallelity -- Wanda Szmielew realized within the last few years (vide [24]), working almost to the last minutes of her life.

She expended a great deal of care and ingeniousness on teaching. It was typical of her to strive for beauty and perfection in everything. She gave her best both in her lectures and in directing the work of others. She was extremely sensitive to other people. She tried to instil into her pupils her own passion for creative work, her perseverance and love of method and precision, and also her rare gift for organizing work. For her pupils she was always the best friend and protector.

List of publications

1. On choices from finite sets, Fundamenta Mathematicae 34(1946), pp. 75-80
2. Decision problem in group theory, Proceedings of the Xth International Congress of Philosophy 1949, pp. 763-766, Amsterdam
3. Arithmetical classes and types of Abelian groups, Bulletin of the American Mathematical Society 55 (1949), p. 65
4. with A. Tarski, Theorems common to all complete and axiomatizable theories, Bulletin of the American Mathematical Society 55 (1949), p. 1075
5. with A. Tarski, Mutual interpretability of some essentially undecidable theories, Proceedings of the International Congress of Mathematicians (1950), p. 734, Cambridge
6. Elementary properties of Abelian groups, Fundamenta Mathematicae 41 (1954), pp. 203-271
7. with K. Borsuk, Podstawy geometrii (Foundations of Geometry), Biblioteka Matematyczna (Mathematical Library) 10, Warszawa 1955, PWN (Polish Scientific Publishers), p. 363
8. Some metamathematical problems concerning elementary hyperbolic geometry, Proceedings of the International Symposium on the Axiomatic Method, 1958, pp. 64-69, Berkeley
9. Some metamathematical problems concerning elementary hyperbolic geometry, The Axiomatic Method, Amsterdam 1959, pp. 30-52
10. with K. Borsuk, Foundations of Geometry, Studies in Logic and the Foundations of Mathematics, Amsterdam 1960, p. 444
11. Absolute calculus of segments and its metamathematical implications, Bulletin de l'Académie Polonaise des Sciences Serie des Sciences Mathématiques, Astronomiques et Physiques 7 (1959), pp. 213-220
12. A new analytic approach to hyperbolic geometry, Fundamenta Mathematicae 50 (1961), pp. 129-158
13. New foundations of absolute geometry, Methodology and Philosophy of Science, Stanford University Press 1962, pp. 168-175
14. Wieloargumentowe relacje równoważnościowe (Multiargument Equivalence Relations). A paper commissioned by the Institute of Mathematics of the Polish Academy of Sciences, 1963; the manuscript, of 20 pages, deposited in the IM library.
15. Zastosowanie wieloargumentowych równoważności w geometrii (Applications of Multiargument Equivalences in Geometry). A paper commissioned by the Institute of Mathematics of the Polish Academy of Sciences, 1963; the manuscript, of 25 pages, deposited in IM library.
16. Teoria hiperplaszczyzn w absolutnej geometrii affinicznej (Theory of Hyperplanes in Absolute Affine Geometry). A paper commissioned by the Institute of Mathematics of the Polish Academy of Sciences; the manuscript, of 23 pages, deposited in the IM library.
17. with L. W. Szczerba, On the Euclidean Geometry without the Pasch axiom, Bulletin de l'Académie Polonaise des Sciences, Serie des Sciences Mathématiques, Astronomiques et Physiques 18 (1970), pp. 659-666
18. The Pasch axiom as a consequence of the Circle axiom, Bulletin de l'Académie Polonaise des Sciences, Serie des Sciences Mathématiques, Astronomiques et Physiques 18 (1970), pp. 751-758
19. A statement on two circles as the geometric analog of Euclid's field property, Bulletin de l'Académie Polonaise des Sciences, Serie des Sciences Mathématiques, Astronomiques et Physiques 18 (1970), pp. 759-764
20. The order and the semi-order of n-dimensional Euclidean space in the axiomatic and model-theoretic aspects, Grundlagen der Geometrie und algebraische Methoden - Potsdamer Forschungen - Reihe B, Heft 3 (1974), pp. 69-80
21. with K. Borsuk, Podstawy geometrii (Foundations of Geometry), 2nd edition
22. The role of the Pasch axiom in the foundations of Euclidean geometry, Tarski Symposium (Proceedings of an international symposium to honor Alfred Tarski, University of California, Berkeley, June 1971), 1974, pp. 123-132
23. Oriented and non-oriented linear orders, to appear in Bulletin de l'Académie Polonaise des Sciences, Serie des Sciences Mathématiques, Astronomiques et Physiques.

24. Od geometrii afinicznej do euklidesowej (From the Affine Geometry to Euclidean Geometry), to appear
25. From the Affine to Euclidean Geometry (the translation of [24]), to appear.
26. Concerning the order and the semi-order of n-dimensional Euclidean space, to appear in Fundamenta Mathematicae.

CLIMBING THE ACADEMIC LADDER: DOCTORAL WOMEN SCIENTISTS IN ACADEME: part two

a report to the Office of Science and Technology Policy from the Committee on the Education and Employment of Women in Science and Engineering
Commission on Human Resources, National Research Council
National Academy of Sciences, Washington, DC, 1979

CONSTRAINTS, BARRIERS AND POTENTIAL (Chapter 1)

The evidence in this report shows, as have previous studies, that women are represented in very small percentages in the doctoral labor force of engineering and the physical sciences. The percentages are somewhat larger in the life sciences, psychology, and the social sciences, but even in psychology, the major field with the largest participation by women, women were only 23 percent of the doctoral labor force in 1977.

Not only are there relatively few women scientists and engineers in the labor force, but employed women scientists have not shared their men colleagues' advancement in either position or salary. Two general questions emerge from this picture: why are there so few women scientists, and why is their progress so slow? To approach these questions it is appropriate to consider, albeit briefly, some of the constraints and barriers that have contributed to the paucity of women among the ranks of professional scientists and engineers.

Sex Differences in Scientific Aptitude

There are certain widely held ideas concerning areas of sex differences, and in the past it has been difficult--for specialists as well as for nonspecialists--to assess the validity of these ideas due to inadequate knowledge or research about human behavior. There is now an encyclopedic compilation and discussion of the results of psychological research on sex differences by Maccoby and Jacklin (1974), which makes possible a clearer understanding of what is myth, what is fact, and what has not yet been established. It should be noted that Maccoby and Jacklin find very few documentable differences between the sexes, and that the large majority of studies they review has focused on children.

The data presented and carefully analyzed by these psychologists include some that are especially pertinent to this report. It has been shown, for example, that the two sexes are similar in their early acquisition of quantitative concepts and their mastery of arithmetic in grade school, but that boys' mathematical skills increase faster than girls' from about age 12. The solving of mathematical problems requires, in varying degrees, verbal skills at which more girls than boys excel (M & J, 1974, pp. 75 ff.), visual-spatial ability at which more boys than girls excel (pp. 89 ff.) and analytical capacities in which there are no sex differences (pp. 98 ff.). Thus it is not certain how much of the sex difference in observed mathematical ability results from the difference in visual-spatial ability, and how much can be accounted for on the basis of exposure to and encouragement in mathematics during secondary school and thereafter. However, even if it were found that more boys than girls were genetically endowed to be facile in mathematics, there are obviously other factors that contribute to the 14-fold difference in the number of women and men who have received science doctorates.

One broad consideration relates to the fact that, at all levels of schooling, until recently fewer girls than boys have proceeded to the next level even though, at each level, girls have regularly received higher grades. This attrition of girls and young women from the educational ladder has had an effect on all areas of endeavor, including the pool of doctoral scientists. Can the less frequent participation of females through the ranks of formal education be accounted for on the basis of motivation?

The design of research in this area is such that we have clues only to some elements of the larger dynamic of achievement motivation. Both girls and boys demonstrate motivation to achieve (M & J, 1974, pp. 135 ff.), and the few sex differences that are observable when success is measured by some objective standard, such as school performance through the high school years, show superior achievement by girls (pp. 135-136). There is some evidence to suggest that boys' achievement motivation is stimulated by competitive conditions, that is, by the prospect of being compared favorably with respect to peers. Girls appear better able to sustain motivation for achievement in the absence of such conditions (pp. 141, 149).

Closely related to achievement motivation are self-esteem and self-confidence. When females and males rate themselves in these areas (in the absence of comparisons with others), the results are strikingly similar (M & J, pp. 150-53). However, in spite of these attitudinal similarities, males approach a variety of tasks, particularly new ones, with more confidence than do females. Although women apply high standards to their work and perform well, they predict that they will not do as well in the future as their previous performance would indicate (p. 154). By the time of the college years, women believe that their achievements are due to factors other than their own skills and hard work. In contrast, men exhibit a marked sense of personal potency: they believe they have the power to control their own destiny, they overestimate their position in the dominance hierarchy, and their sense of self-worth is enhanced by positive feedback while they are relatively insensitive to (do not seem to "hear") negative feedback (pp. 157-178).

The sex differences addressed here, namely the verbal and visual-spatial differences that emerge at about age 12, and the differences in perceived sense of personal potency and interpersonal competitiveness that emerge at about age 17 or 18, appear to be the ones most relevant to an aptitude for science. However, there is a lack of data to indicate the extent to which these aptitudes or behaviors are essential for individuals entering scientific careers. The remainder of this chapter, based on a number of retrospective studies (see, for example, NRC 1975a, and references cited therein), will discuss the personal qualities, motives, educational opportunities. and categories of significant others that, together, seem to have influenced individuals in becoming scientists.

Cultural and Structural Barriers

It is unnecessary to provide documentation that science and technology have been considered--until recent times--inappropriate careers for women in our society, so ubiquitous has been this belief. In this section we shall examine briefly some of the cultural and structural barriers encountered by girls and women in acquiring their formal education.

As we noted earlier, the differences in the skills of boys and girls, which are minimal or nonexistent during the primary school years, begin to appear at adolescence. The factors that assume importance at this time and ultimately produce distinct educational outcomes for men and women require investigation. Traditionally, this was the time at which training diverged--boys could take mechanical drawing while girls could not. Less obvious developments may also produce significant results. In a study conducted some time ago, the values of peer groups in coeducational high schools were shown to be related to the limitation of girls' aspirations and performance (Coleman, 1961). We need to know whether such values have been altered in a new social climate and what other influences are significant as adolescents begin to plan for their adult roles.

In any event, at the secondary school level, the percentage of girls participating in mathematics and science courses decreases as the sophistication of these courses increases, dropping sharply when the courses are not required (Ernest, 1976). The decreases in participation are so large that we may surmise a lack of encouragement or expectation is a factor.

In turn, preparation that has been marginal or inadequate in high school predisposes to low participation by women in science and mathematics courses during the college years. Thus the size of the pool of women with appropriate credentials for continuing to graduate

science programs is considerably smaller than would be expected solely on the basis of academic ability and the range of courses available in secondary school and college. Indeed, measured by ratings at the secondary school level and undergraduate grades, women who completed doctorates were, in the aggregate, more highly qualified academically than the men who did so. What happened to the women who were as well qualified as the men?

Studies on undergraduate academic environments have brought to light a number of elements that appear to be closely related to the development of talent in women. Among those most frequently hypothesized is the presence of substantial numbers of women faculty who serve as role models: a strong, positive correlation exists between the proportion of women faculty and the number of women students who are subsequently cited for career achievement (Tidball, 1973). More specifically, the women's colleges, where for many years at least half of the faculty members have been female, have graduated almost one-third of the women who have gone on to receive doctorates in science and engineering, even though these colleges granted less than 15 percent of all bachelor's degrees received by women during the comparable time span (Tidball, 1975). It must be recognized that other factors that exist in the women's colleges may be contributing to such results--distinctive distributions of fields in which degrees are granted, the values that are shared by predominantly female student bodies, and the degree of insulation from male students displaying greater self-confidence. We need to know more about the ways in which these factors operate. It should also be noted that the women's colleges represented by these women achievers and scientists exhibit considerable diversity in terms of admissions selectivity, academic expenditures, geographical location and nature of sponsorship (i.e., private or public).

Women students who subsequently completed doctorates were most likely to have earned BA's, if not from women's colleges, then from baccalaureate institutions that had a long and continuous history of women graduates who attained doctorates, and that offered strong academic preparation in several areas of study (Tidball and Kistiakowsky, 1976).

Aside from the proportion of women faculty, other variables are of considerable significance to the development of talent in women undergraduate students. One of these relates to the attitudes of women and men faculty toward the students they teach and toward themselves as academic professionals. Both women and men faculty tend to be supportive to students of the same sex to a greater extent than those of the opposite sex, and far more women than men are in tune with issues of particular concern to women in academe (Tidball, 1976). The relatively small proportion of women faculty on most campuses suggests that there will be fewer faculty who believe in women students' competence and hold high expectations for their accomplishment. Additionally, women faculty generally rate themselves as unsuccessful, particularly when they compare themselves with male peers. Elements of professional activity that correlate most strongly with self-assessments of success differ for women and men faculty: Women emphasize a variety of elements that includes teaching, alliance with women-related issues, and association with successful men; men exhibit a strong positive focus on the research image of the institution and a strong negative emphasis on teaching (Tidball, 1976). Thus, students are taught by women faculty who tend not to think well of themselves and men faculty who tend to be most supportive of men students but who often do not think well of teaching. The examples of women achievers for students in most undergraduate institutions are faculty clustered in the lower ranks without tenure and faculty whose salaries are lower than those of their male colleagues at every rank. Additionally, women faculty members tend to be underemployed or misemployed so that their energies are dissipated in peripheral activities which do not accord them the professional recognition conferred on male faculty (Reagan and Maynard, 1974).

Career options for science majors have traditionally emphasized the necessity for a full-time commitment, based in part on the relatively high cost of teaching science and hence the investment that has already been made by the time of college graduation. The idea of not "wasting" one's education is applied more vigorously to the science student

than to the English major. It is not easy to participate in some scientific endeavor alone, at home, or without benefit of special equipment or facilities. It is also deemed more difficult to keep up in the sciences on a part-time basis or an interrupted schedule. Just how essential full-time and uninterrupted commitment is for those who would contribute to the scientific endeavor has not been put to rigorous test.

If the constraints within the formal setting of undergraduate institutions are compounded by the cultural bias that holds the study of science to be unsuitable for women, it is perhaps not surprising that there are relatively few women scientists.

Graduate education itself is not without additional hurdles for women. The barriers of cultural and structural origin found in the undergraduate setting are intensified, while new constraints appear as the women comes closer to membership in the profession. Two collections of articles draw attention to many of these constraints: Graduate and Professional Education of Women (American Association of University Women, 1974) and Research Issues in the Employment of Women (NRC, 1975a).

A paper in the latter collection describes the usual situation for women graduate students in science. In Perrucci's study (1975), the graduate students and faculty of six science departments were survey respondents. The results indicate that occupational role socialization in academic science departments may differ for women and men graduate students. Women Ph.D. candidates are more likely than their male classmates to believe that faculty members expect most career goals to be held mainly by men. The extent to which the faculty members of a department do, in fact, attribute these goals primarily to male students is inversely related to the strength of career commitment among women graduate students in that department. Among the departments studied, chemistry had the largest percent of faculty holding such "male-oriented" views (Perruci, 1975, pp. 109-110).

Questions on attitudes toward female graduate students were also included in the Carnegie Commission's national survey of faculty and graduate students (Feldman, 1974). Male students and faculty agreed, to a greater extent than female students and faculty, that female students are not as dedicated as their male counterparts, although in no case did the proportion in agreement reach 50 percent. In general, agreement was highest in fields with fewer women graduate students. In the sciences, the highest percentages of faculty affirming the lesser dedication of women were found in biochemistry and chemistry with the lowest percentages in anthropology and political science. The greatest student agreement was found in chemistry and botany and the least in psychology (Feldman, 1974, pp. 70-71).

The same study included a more detailed analysis of commitment among men and women students in five science fields having large proportions of respondents agreeing with the lesser dedication of women. In all five fields, the women had higher undergraduate grade point averages than the men. Nevertheless, the female students were more likely than the males to state that inability or emotional strain might lead them to drop out of graduate school. Among students having a close working relationship with a professor, however, women were no more likely than men to anticipate dropping out. Lower percentages of women than men considered their relationships with their closest professors to be of this kind (Feldman, 1974, pp. 112-113).

The assumption that science is a masculine endeavor emerges and re-emerges throughout all phases of women scientists' academic and professional development. The impact of family life--marriage itself as well as the rearing of children--is regularly raised as an issue of major proportions which women are supposed to defend or deny. The conflicts for women between attitudes deemed appropriate for scientific careers and those associated with feminine roles are very real even though the inevitability of such conflicts has not been demonstrated. On the other hand, the practical support structures that would enable women to engage more freely in their work are not regularly and dependably available.

Discrimination against women, as students and as professional scientists, has been well documented. Reference to some of this evidence is presented in other chapters of

this report. Anti-nepotism practices in many employment situations, as well as numerous "non-actionable" behaviors, tend to have larger negative effects on women than on men even though they are not strictly illegal or easy to document. Rowe (1974) has constructed an extensive catalog of discriminatory behaviors that regularly impinge upon women and thereby reduce the energies they have available for productive work.

Conclusions

The thrust of this chapter has been to suggest that there are both cultural and structural factors favoring the attrition of girls and women from science programs, starting at an early age. The effects of these factors are cumulative, so relatively few of the women who early in life showed an interest and aptitude for science are finally represented among the ranks of professional scientists.

Significant changes in this traditional picture began in the 1960's. The women's movement gave impetus to an immense and highly diverse research endeavor in which scholars from many fields and points of view have addressed issues pertinent to the education and employment of women, including those of women in science and engineering. As this report will show, more women are proceeding from high school to college and on through graduate programs, and more women are seeking and gaining professional employment. The talent pool of women scientists is larger than many have presumed.

Study Recommendations

1. Research is needed to clarify factors influencing the growing disparity during adolescence between boys' and girls' interest and achievement in mathematics and science.
2. The marked difference between single-sex and coeducational colleges in focusing women's interests in the sciences suggests the need for closer study of the influence of higher education environments on sex differences.

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NIE/NSF GRANTS

The National Institute of Education has the following basic mission: to promote equity and to improve educational practice. Grants are awarded in three broad program areas: Teaching and Learning, Educational Policy and Organization, and Dissemination and Improvement of Practice. The Institute is firmly committed to strengthening the quality, relevance, and credibility of educational research through greater involvement of women and members of minority groups that historically have been underrepresented in social science research. For this reason, NIE encourages organizations to seek out qualified women and minority candidates for principal investigator and other key professional positions within NIE-sponsored projects. The Institute also conducts various special activities to increase the involvement of minority and women-owned firms in NIE work.

Grant competitions are announced in the Federal Register. Requests for Proposals are formal procurement actions which are awarded to the best bidder and are announced in the Commerce Business Daily. Approximately $2 million has been set aside to support unsolicited proposals. Proposals must be received by June 30 to be considered in the November review cycle. Application guidelines are available from the NIE Unsolicited Proposals Coordinator, (202) 254-7920, National Institute of Education, Washington, DC 20208. The document Funding Opportunities at NIE: FY 1980 is also available.

NIE and NSF are initiating a joint program of development and research to improve the teaching and learning of school mathematics through the use of modern information-handling technology. The purpose is to capitalize on the strengths and the vision of investigators as to how modern information-handling devices can best facilitate the instructional process in mathematics.

The current revolution in availability, at low cost, of sophisticated information-handling technology, including personal computers and video recorders and players, may provide important new means of aiding teachers to broaden and deepen mathematics instruction, including testing and applications to everyday life and to science. We now have the potential to adapt instruction to the needs and difficulties of individual students. New understanding of cognitive processes and of the important effects of the social context of teaching and learning may enhance the effectiveness and acceptability of technologically based aids to instruction.

Primary emphasis in the program is on the development of prototypes of (1) educationally relevant software, (2) instructional courseware, and (3) methods for assessing students' progress. These should respond to pedagogical needs and opportunities, and be developed with the involvement of students and teachers and appropriately modified on the basis of experience. Associated research aimed at improving our knowledge of mathematics teaching and learning processes is an essential element in the program.

A program announcement with full information on submission of proposals is available from either agency. Mailing announcements will be hastened if requests are accompanied by two self-addressed adhesive labels. The first deadline is already past. The second is August 19, 1980. Addresses: Joint NSF-NIE Mathematics and Technology Program, Science Education Directorate, National Science Foundation, Washington, DC 20550 (Telephone: 202/282-7910) or National Institute of Education, Washington, DC 20208 (Telephone: 202/254-6572).

OF POSSIBLE INTEREST

The National Women's Studies Association will hold its annual convention at Indiana University, Bloomington, Indiana, from May 16-20, 1980. The program will include panels, seminars and papers in feminist education as well as presentations in the arts. Participants can look forward to discussions of Women's Studies Programs in academic institutions and of feminist alternatives to traditional education. For further information

contact Judy Markowitz and Barbara Fassler, Conference Coordinators, Women's Studies Program, Towson State University, Towson, MD 21204. Phone (301) 321-2859.

March 9 - June 19, 1980. "The Dinner Party," by Judy Chicago. Tapestries, ceramic plates, and embroidered runners celebrating and symbolizing women's contribution to Western culture. On display at the University of Houston at Clear Lake City. For further information contact: Dr. Clavin Cannon, Dean, UH/CLC, Houston, TX 77058.

The Subtle Revolution: Women at Work is a comprehensive study on working women. It is published by the Urban Institute, a nonprofit research organization, 2100 M St., NW, Washington, DC 20037.

Here are some highlights from a bulletin of the National Center for Education Statistics. They are based on fall 1976 enrollment reports by institutions of higher education. * There were 125 institutions in the nation which identified themselves as women's colleges, with a total enrollment of 109,549. * Only 47 women's colleges (38 percent) were attended exclusively by women. By contrast, 82 of 109 men's colleges (75 percent) enrolled men only. * Women's colleges averaged 876 students, 4.7 percent of whom were men. By contrast, men's colleges averaged 274 students, 4.1 percent of whom were women. * Nine out of every 10 students in women's colleges were undergraduates. * Blacks constituted the largest racial/ethnic minority group attending women's colleges, accounting for 8 percent of the total enrollment. * Among those students attending colleges for women, 24 percent or 25,892 attended on a part-time basis. * Most women's colleges were private 4-year institutions located near the eastern seaboard.

The Women's Educational Equity Communications Network is a two-way communications system and an information service established in 1977 and operated by the Far West Laboratory for the Department of Health, Education, and Welfare, U.S. Office of Education, under the auspices of the Women's Educational Equity Act. WEECN * facilitates contact among persons, groups, and agencies who are working on behalf of women's educational equity; * participates in national and regional conferences; * publishes Network News and Notes, a forum for the exchange of ideas; * answers questions by providing information on projects, materials and activities; * collects screens, classifies, and stores resources; * publishes bibliographies, information guides, directories, information packets, and an abstract journal; and * conducts computer searches of a number of educational databases. WEECN's information resources cover all educational levels from pre-school through reentry and continuing education and its services are available to teachers, administrators, counselors, curriculum specialists, preservice or inservice trainers, researchers, students, parents, and concerned citizens. Address: WEECN, Far West Laboratory for Educational Research & Development, 1855 Folsom St., San Francisco, CA 94103.

The CCEW-Women's Center, University of California, Berkeley, publishes a newsletter called Connections. Recently the Center sponsored a symposium at the annual meeting of the American Association for the Advancement of Science. Offering evaluation data on successful science intervention programs, the symposium was called "Effective Strategies for Promoting Participation of Women and Minorities in Science." The two sessions were "Precollege Science Intervention: Needs and Programs" and "Research and Action Programs at the Postsecondary Level."

Peterson's Annual Guide to Careers and Employment for Engineers, Computer Scientists, and Physical Scientists is a career guide to show college graduates in the technical disciplines how to link their academic background with employment opportunities in over 800 research, manufacturing, consulting, and government organizations. Address: Peterson's Guides, 228 Alexander St., Princeton, NJ 08540.

Since 1964, the National Aeronautics and Space Administration has supported a program of summer faculty fellowships for engineering and science educators. This year's deadline is already past. The Summer Faculty Program Committee of the American Society for Engineering Education (Suite 400, One Dupont Circle, Washington, DC 20036) supervises the programs, which are operated by co-directors from the NASA centers and their collaborating universities.

DEADLINES: Mar. 24 for May-June, May 24 for July-Aug., July 24 for Sept.-Oct.

ADDRESSES: Send all newsletter material except ads to Anne Leggett, Math. Dept., Western Illinois University, Macomb, IL 61455. Send everything else to AWM, Women's Research Center, Room 204, Wellesley College, 828 Washington St., Wellesley, MA 02181.

JOB ADS

Institutional members of AWM receive two free ads per year. All other ads are $10.00 apiece and must be prepaid. The vacancies listed below appear in alphabetical order by state. All institutions advertising below are Affirmative Action/Equal Opportunity employers.

University of Alabama, Birmingham. Dept. of Mathematics. University of AL, University Station, Birmingham, AL 35294.
(1) Tenure-track position beginning Sept., 1980. Normal teaching load 2 courses per quarter. Applicants should be active in one of following research areas: continua theory; rings and modules, set theory, logic or combinatorics; spectral theory of differential operators; etc. Send resume & 3 letters of recommendation to Peter V. O'Neil, Chmn., Dept. of Math,at address above.
(2) Asst./Assoc. Professor (tenure track) position for teaching & research in applied mathematics starting 9/1980. Candidates with experience in interdisciplinary research are preferred, but those wishing such research may apply. Dept. has a math clinic in applied math; appointees will be expected to supervise contracts in math clinic. Send resume & 3 letters of reference to Prof. J. Buckley, Math Dept. , at address above.
(3) Visiting position for research mathematician during 1980/81 academic year. Rank, salary and length of stay are negotiable. Send vita, 3 letters of recommendation to Peter V. O'Neil at address above.

California State University, Fullerton. Dept. of Mathematics. Tenure track position for Fall, 1980 for applied mathematician. Ph.D. required. Prefer applicants with outstanding teaching qualifications, computation experience, and backgrounds in modeling, combinatorics, numerical analysis, applied statistics or optimization. Rank and salary determined by experience and qualifications. Send vita to: Chair, Selection Committee, Dept. of Math, CA State Univ., Fullerton, CA 92634.

Pomona College. Dept. of Mathematics. Asst. or Assoc. Professorship, tenure track beginning 9/1980. Teaching load, 9 hours per semester. Ph.D. & demonstrated excellence in teaching & research required. Prefer candidates with strong backgrounds in computing. Contact Prof. Harry Millikin, Chmn., Math Department, Pomona College, Claremont, CA 91711.

San Francisco State Univ. Dept. of Math. Opening for Coordinator of Center for Mathematical Literacy. Asst. Professorship (tenure track) is devoted partly to teaching and partly to curriculum coordination, research & development. Coordinator would supervise Math Without Fear, Statistics Without Fear & Computers Without Fear classes, train faculty & tutors & extend program; in addition he/she would teach course in some dept. in univ. Specific dept. depends on qualifications of candidate. Salary range $16,368 - 19,680. Closing date 3/15/80. Send resume & 3 reference letters to Dr. Diane Resek, Math Dept., San Francisco State University, 1600 Holloway, San Francisco, CA 94132.

San Jose State University. Dept. of Mathematics. Asst. Professorship starting Fall, 1980. Ph.D. in Math with competence in Statistics or Applied Math. Demonstrated ability & interest in teaching at undergraduate level. Salary $16,368 - 19,680. Teach 12 hours per semester. Significant professional activity for eventual tenure. By 3/15/80 send curriculum vita to Chmn., Math Dept., San Jose University, San Jose, CA 95192.

University of California, Berkeley. Dept. of Mathematics. Professorship in Mathematics, starting date & salary negotiable, in areas of algebra, analysis, applied math, foundations or geometry. Ability to furnish scientific leadership required. By 3/15/80 send vitae, list of publications and names of 3 referees to R. Hartshorne, Vice Chairman for Faculty Appointments, Univ. of CA, Berkeley, Berkeley, CA 94720.

University of California, Davis. Dept. of Mathematics. Tenure-level position in computer science or applied mathematics beginning Fall, 1980. Required: established record in use of modern mathematical methods in applications oriented problems; competence in teaching computer science at graduate & undergraduate levels. By 3/2/80 send resume & 3 letters of recommendation to Dr. David G. Mead, Chairperson, Dept. of Math, Univ. of CA, Davis, CA 95616.

University of California, Davis. Dept. of Mathematics. Asst. Professorship (with possibility of Assoc. Professorship for an established scholar) in computer science or applied mathematics. Ph.D. required in computer science or closely related field and evidence of potential in research & teaching. Prefer applicants with strong mathematical background. By 3/2/80 send resume & 3 letters of recommendation to Dr. David G. Mead, Chairperson, Dept. of Math., Univ. of CA, Davis,CA 95616.

University of New Haven. Mathematics Dept. Asst./Assoc. Professorship (tenure track) Fall, 1980. Required: Ph.D. in Mathematics, knowledge of & experience in Computer Sciences, demonstrated teaching excellence & research ability. Duties include helping dept. develop strong undergraduate programs. Send resume, transcripts & 3 references to W. Thurman Whitley, Chmn., Dept. of Math, University of New Haven, West Haven, CT 06516 by 3/20/80.

University of Delaware. Dept. of Computer & Information Sciences. Opening for Professorship and Department Chairperson available immediately. Required: Ph.D. in Computer Science or its equivalent & strength in building research and graduate programs. Background in software technology preferred. Send vitae & names of 3 referees to Prof. David J. Farber, Chmn., Search Committee, Dept. of Electrical Engineering, Univ. of Delaware, Newark, DE 19711.

Gallaudet College. Dept. of Mathematics. Tenure track Asst./Assoc. Professorship starting Fall, 1980, at world's only liberal arts college for the deaf. Prefer Ph.D. in Computer Science or Mathematics. Professional experience should include aspects of software design, operating systems & compilers as well as incorporating computer science courses in a liberal arts education. Salary is competitive based on qualifications and experience. Individuals possessing sign language skills are encouraged to apply. Other qualified applicants must be willing to attend 8-week paid orientation program for training in sign language etc. By 3/1/80 send resume & application to Dept. of Math, Gallaudet College, Wash., D.C. 20002.

National Science Foundation. Washington, D.C. 20550
Program Directors in the Division of Mathematical and Computer Sciences: Mathematical Sciences Section. These positions periodically become available. Salaries range from $34,713 to $50,112 per annum. Applicants should have a Ph.D. or equivalent experience and training in an appropriate field, plus six years of successful scientific research experience. A broad knowledge of the field & some administrative experience are also required. For information, call E. Paul Broglio, Div. of Personnel and Management (202) 632-4106.
Asst. Program Director in Mathematical Science Section, Division of Mathematical & Computer Sciences: Algebra program, Salary ranges from $29,375 to $45,126 per annum. Applicants should have Ph.D. in appropriate field plus six years of successful scientific research experience. A broad general knowledge of the field and some administrative experience are also required. For further information, contact E. Paul Broglio, Div. of Personnel and Management (202) 632-4106.

Indiana University. Dept. of Mathematics. Expect 4 openings at various levels in both pure & applied mathematics beginning Aug., 1980. Prefer candidates whose fields are algebra, analysis, topology, statistics and applied mathematics, but will consider outstanding candidates in any field. Contact Morton Lowengrub, Chmn., Dept. of Math, Indiana University, Bloomington, IN 47001.

University of Lowell. Dept. of Mathematics. Tenure track position in fields of Mathematical Statistics or Operations Research beginning 9/1980. Minimum salary $17,000. Required: Ph.D. in Probability Theory, Mathematical Statistics or Operations Research; high quality teaching & research activity; interest in curriculum development. By 3/15/80 send vita, statement of current research interests & 3 letters of recommendation to Dr. I. Jacob Weinberg, Chmn., Personnel Committee, Dept. of Math, University of Lowell, Lowell, MA 01854.

Smith College. Dept. of Mathematics. Asst. Professorship in 9/1980. One year with possibility of second year. Minimum salary $16,200. Teaching duties are 3 undergraduate courses per semester, one of them at upper level. Superior scholarship & teaching required. Send resume & 3 letters of recommendation to James Callahan, Chair, Math Dept., Smith College, Northampton, MA 01063.

Wellesley College. Dept. of Mathematics. Possible opening for September, 1980. Asst. Professorship with salary at least $17,000. Evidence that Ph.D. will be completed by 9/1980 required. Teaching load approximately 8 hours per week. Contact Chairman, Dept. of Mathematics, Wellesley College, Wellesley, Mass. 02181.

Worcester Polytechnic Institute. Dept. of Mathematical Sciences. Asst. Professor, tenure track. Applied mathematician, supporting emphasis in major program in numerical methods or having research interests paralleling current work in dept. (applied analysis, differential equations, mathematical physics, mathematical statistics, applied probability, mathematics of communication). Strong commitment to teaching & an interest in interacting with faculty & students from other disciplines. Send resume to P.W. Davis, Dept. of Mathematical Sciences, W.P.I., Worcester, MA 01609.

Michigan Technological University. Dept. of Mathematical & Computer Sciences. Applications invited for tenure track positions at all levels in expanding computer science program. Senior positions require Ph.D. & strong research record. Asst. Professorship requires Ph.D. in Computer Science (or work in final stages of thesis preparation). Instructorship requires Master in Comp. Sci. Send resume & 3 letters of reference to Dr. Linda Ottenstein, Chair, C.S. Recruitment Comm., Math & Comp. Sciences, MI Tech University, Houghton, MI 49931.

Moorhead State University. Dept. of Mathematics. Instructor of Asst. Professorship (tenure track) Sept., 1980. Rank & salary dependent on qualifications. Asst. Prof. 79/80 salary range - $14,314 - 22,153. Duties: teaching undergraduate courses 12 hours per quarter; advising students and university and departmental committee work. Required: Ph.D. in Math, although candidates finishing dissertation will be considered. By 3/15/80, send completed Moorhead application, transcripts & 3 to 5 references to Dr. Milton Legg, Chmn., Dept. of Math, Moorhead State University, Moorhead, MN 56560.

University of Minnesota, Duluth. Dept. of Mathematical Sciences. Head of Dept. of Mathematical Sciences. Duties include dept. administration, teaching & research. Salary & rank commensurate with experience. Dept. (20 faculty) offers undergraduate degrees in math, statistics and computer science. Ph.D. or equivalent required. Submit resume, 3 references & short statement of professional goals by 3/25/80 to Dr. Sylvan Burgstahler, Dept. of Math Sci., Univ. of MN, Duluth, Duluth, MN 55812.

Aeronautical Research Associates of Princeton, Inc. Openings for Research Scientists & Engineers. Looking for scientifically trained persons who are interested in careers in research, both theoretical & experimental, rather than management. We are interested in persons having B.S. through Ph.D. levels. Opportunities exist, subject to receipt of industrial & commercial contracts, in following areas: Structural Analysis & Mechanics; Electro-optics; Fluid Mechanics; Acoustics & Unsteady Aerodynamics; Combustion; Environmental Fluid Dynamics; Oceanography; Computer Science. Send resume to Ann-Marie Barber, A. R. A. P., P. O. Box 2229, Princeton, N. J. 08540.

Rensselaer Polytechnic Inst. Dept. of Mathematical Sciences. Asst. or Assoc. Professorship (tenure track) starting Sept., 1980. Strong research potential required. Prefer research interests in Applied Mathematics and/or Numerical Analysis - Scientific Computing. Teaching 6 to 7 hours/week per semester. Also anticipate 2 or 3 visiting appointments - all levels. Send resume to Prof. R. C. Di Prima, Dept. of Math Sciences, R.P.I., Troy, N. Y. 21281.

Syracuse University. Dept. of Mathematics. Asst. Professorship in Statistics. Required: Ph.D., research potential & compatibility with research activity in Dept. Teaching load, 2 courses. By 3/15/80 send detailed vita, 3 letters of reference and (for new Ph.D.s) a transcript, to Prof. Jack E. Graver, Chmn., Dept. of Math, Syracuse University, Syracuse, N. Y. 13210.

Vassar College. Computer Science Studies. Tenure track Asst. Professorship starting 8/15/80. Initial 3 year term. Required: active plans for continuing research & commitment to teaching undergraduates; competency in teaching courses such as Data Structures, Compilers, Programming Languages, Modeling & Similation; interest in developing computer literacy of faculty & students of liberal arts. Teaching load: 9 hours per week. Minimum salary of $15,000 for Ph.D. Generous fringe benefits. By 4/15/80 send resumes & transcripts and have 3 letters of reference sent to Prof. Winifred Asprey,Dir., Computer Center, Vassar College, Poughkeepsie, N.Y. 12601.

Oberlin College. Dept. of Mathematics. Oberlin, Ohio 44074. Instructor/Asst. Professorship. Full-time 3 year continuing position beginning 9/1980. Duties: teach Operations Research, a one-semester course emphasizing deterministic models; teach 4 other courses during year, selected from those offered by dept.; supervise student independent reading & help with senior Honors Program; participate in academic advising, service on committees & research.

Oberlin College (con'd)
Required: Ph.D. completed by 9/1980, demonstrated skill in undergraduate teaching; background in operations research and applied math. By 3/15/80, send application, vita, transcripts etc. to Samuel Goldberg, Chairman, Dept. of Mathematics.

Oberlin College. Dept. of Mathematics. Oberlin, Ohio 44074. Instructor/Asst. Professorship. Full-time, one year, noncontinuing position for academic year 1980-81. Incumbent will (a) teach 5 courses (3 one semester, 2 the other) selected from beginning & advanced courses offered by dept. and (b) supervise student independent reading & help with senior Honors Program. Required: Ph.D. completed by 9/1980, demonstrated skill in undergraduate teaching & in productive scholarship. By 3/15/80, send application, vita, transcripts etc. to Samuel Goldberg, Chairman, Dept. of Mathematics.

University of Pennsylvania. Dept. of Mathematics. Tenured position in mathematics at the University of Pennsylvania may be available, starting with academic year 1980-81 or 1981-82. Applications are invited now. Contact Prof. D. Rim, Chmn., Personnel Committee, Dept. of Mathematics, University of Pennsylvania, Philadelphia, PA 19104.

Northeast Missouri State University. A position for a Ph.D. on Computer Science. Twelve hours teaching. A temporary position for a Ph.D. in Pure Mathematics. Must have recently published. Preference will be given individuals who have completed post-doctoral research in pure mathematics. Both positions are at rank of Assistant Professor. Beginning date--August 25, 1980. Applications must be received by April 1. Send to Dr. Dale Woods, Head, Mathematics Division, Northeast Missouri State University, Kirksville, MO 63501.

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March-April, 1980

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