

CAREER PATHS FOR WOMEN IN THE HEALTH SCIENCES: A GLOBAL PERSPECTIVE

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COLLOQUIUM SUMMARY

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EXECUTIVE SUMMARY

Women scientists the world over face unique barriers to career advancement and achievement. This lack of access to all levels of scientific education and professional development inhibits the growth of not only each scientist herself, but also the society in which she lives: By passing over new talent in the scientific fields, these countries are not realizing their full potential for economic growth and development.

To further explore gender inequities in the health sciences, particularly in developing countries, three Federal agencies jointly sponsored a colloquium that convened October 15 to 16, 2003. The colloquium brought together 70 women and men from around the globe, to identify challenges for women in science, examine how groups have overcome such challenges, and make recommendations for improving the representation of women in the field. The colloquium was developed to initiate programs, policies, and approaches to gender equity in the sciences that can be implemented at the national, local, and individual levels.

This summary offers a glimpse of the issues this colloquium addressed. Those seeking more detailed information about the discussions and resultant recommendations are encouraged to read the full meeting summary.

Key Themes in Workshop Recommendations

Several key themes emerged from the two-day colloquium, ranging from raising awareness about gender inequities in the sciences, to establishing gender-neutral standards for evaluation and promotion (described further below).

1. Recognize the Problem

Collect and publish data. Data is a powerful tool for convincing people and governments that change is necessary, but data on women in the sciences is lacking. Researchers should collect and publish data indicating how often and where women are published, whether and how they advance professionally, and how their professional progress compares to the progress of science in the nation.

Increase awareness of gender inequities. In some regions of the world, women are in situations that lack gender parity, but they are unaware of it. It is critical to bring attention to issues of gender equality in these regions, in order to begin to change both men's and women's expectations of women's role in society.

Learn to use the media. Nongovernmental organizations (NGOs) in Africa often use the news media to bring attention to gender inequity and other social injustices. Following the example of

these NGOs, we should use visual, print, and electronic media to disseminate information about women in the sciences.

2. Sell a Women-in-Science Agenda

Recruit men. Men's support and cooperation must be garnered in the effort to advance the cause of women scientists.

Involve political leaders. Political leaders also should be enlisted to promote the women-in-science agenda. The support of health and science attachés stationed in U.S. embassies around the globe also can help instill -- in governments and individuals alike—a greater appreciation for science and women's role in it.

Work from the “top-down” and the “bottom-up.” Working at the grassroots level to create change is effective, but often it is costly and time consuming; working with leadership is also important. To create change, influence must be exerted at the local and state levels simultaneously.

3. Provide Opportunities for Professional Growth

Emphasize networking. Many women have busy schedules that split their time and energy between responsibilities at work and at home. These simultaneous obligations rarely permit them to take advantage of informal networking opportunities. To expand women's networking opportunities, electronic networking and information-sharing should be explored. In addition, funding agencies should provide travel fellowships that encourage the exchange of ideas among women scientists from different regions of the world.

Emphasize mentoring. In many developing countries, women do not have access to mentors. Again, new technologies for information exchange could be employed to provide women around the world with immediate access to experts in their fields.

Convene small, regional conferences. Small, regional conferences and workshops offer women and men alike more opportunities to network with colleagues than do larger conferences. Such smaller meetings should be encouraged. Pre-conference workshops offer similar opportunities for informal networking.

Make leadership part of the educational curriculum. Women need the same training and guidance that are given to men who are new to leadership roles. They also need to have opportunities to lead, in order to gain leadership experience. Women in science must be granted the space and time to learn through experience how to build their skills as leaders.

4. Recognize and Support Women's Family Responsibilities

Support women's re-entry into the workforce. In addition to increasing the recruitment and retention of women in science, we need to consider the challenges facing women who seek to re-enter the sciences mid-career, after they have been on leave to care for children or ailing family members. Support for re-entry could take the form of training programs or part-time positions to help women balance work and family responsibilities.

Recognize caretaking responsibilities. Women usually are the primary caretakers in a family, and as such they are less likely to consider relocating to advance their careers. They also are less likely to accept positions of leadership that require late hours at the office. As a result, women's career opportunities are more constrained. This inequity might be remedied through job-sharing or by hiring partners at neighboring institutions.

Alleviate the financial burden to women with children. There are additional costs to women when they must pay for childcare in order to participate in study sections and other activities of the sciences. It is critical to provide adequate compensation to such women—for instance, by providing an increase in fellowship stipends.

5. Promote Equality in the Laboratory

Protect women's time in the laboratory. Women are too quickly appointed to administrative positions, where their time is divided into multiple tasks. Consequently, they often become less productive as researchers.

Value collaboration. Women tend to favor a collaborative approach to problem-solving, which is problematic because the scientific community still maintains a traditional focus upon the "independent scientific investigator."

Value qualitative research. Women scientists often tackle problems using a qualitative approach, which is not as highly respected by the scientific community as a quantitative approach.

Encourage interdisciplinary research. Women's work tends to be interdisciplinary; as such, it tends not to fit neatly into a single National Institutes of Health (NIH) institute or center. It was suggested that NIH consider "breaking down barriers" between institutes, in order to encourage interdisciplinary research in the United States, as well as to set an example for other countries' public health efforts.

6. Implement Unbiased Standards for Evaluation and Promotion

Employ different measures of productivity. Traditionally, a researcher's list of publications has served as an indication of her productivity, while her service to the community has gone unacknowledged. New measures of productivity that better quantify women's contributions to science are necessary. For example, a researcher's contributions to a professional society or her skills as a teacher/mentor could be evaluated. Such activities could be required of all investigators and/or could be compensated, further instilling a sense of their importance.

Develop formal standards for promotion. The lack of clear policies for professional advancement is another barrier to women in the sciences. Management should clearly articulate the expectations for promotion and tenure, in order to ensure that the process is unbiased. Regular feedback and review also would help ensure fairness.

7. Recognize and Capitalize on Women's Strengths

Bring visibility to women's achievements. It is not uncommon for a woman's comments at a board meeting or other scientific gathering to be ignored. To bring more attention to women scientists and their contributions, women should be more vocal about their own accomplishments, and they should nominate female colleagues for committees and awards.

Capitalize on women's strengths. Women often display an innate tendency to nurture others; consequently, they tend to be exceptional mentors and role models for younger scientists. Women have been recognized for their cooperation skills, and brain research has indicated that women are better at multi-tasking than men. Encouraging societies to place more value upon these and other, more typically "feminine" skills—i.e., by making mentoring a compensated activity—will begin to bring about gender equity and will enrich the scientific community.

Perhaps the most vivid and enduring image of the two-day colloquium was what one presenter described as "a critical mass of women," moving forward as a group—assisting one another and sharing their knowledge, ideas, and struggles. The image brings together many of the themes of the colloquium—from the emphasis upon mentoring, teaching, and networking to women's strengths in interdisciplinary and collaborative research. It also reminds us that gender equity in the sciences will be a group effort, in which women and men alike will support and encourage one another as they challenge the system.

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I. INTRODUCTION

On a worldwide level, women outnumber men and offer a wealth of untapped talent and potential. Women scientists in particular face unique barriers to career advancement and achievement. The inclusion and integration of women in the sciences must be imperative. Underutilization of women scientists is detrimental to the field's development and limits new scientific discoveries. Women must have access to all levels of scientific education and knowledge, if their respective countries hope to reach their full potential for economic growth and development. The promotion of women scientists and leaders also will help bring much-needed attention to female health concerns.

Despite the fact that women scientists in many countries face substantial barriers to career advancement and gender equality, many have become successful leaders in their scientific fields. They have developed career networks to share their professional experiences with other women scientists, and they have successfully competed with other men and women throughout the world for funding to conduct their scientific research. Although leadership programs and women-specific funding opportunities are still nascent in many developing nations, they do exist and continue to grow as the number of professional women in developing countries increases.

To further explore gender inequities in the health sciences, particularly in developing countries, the National Institutes of Health's (NIH) Fogarty International Center (FIC), Office of Research on Women's Health (ORWH), and National Institute of Environmental Health Sciences (NIEHS) convened a two-day colloquium on October 15-16, 2003, comprised of approximately 70 scientists and science managers, representing countries from around the globe. Participants gathered to address the challenges that women face as they forge careers in science and medicine, and to share lessons they have learned. The colloquium was designed to help explore what can be done to develop gender equity programs, policies, and approaches in the sciences, which can be implemented at the national, local, and individual levels. In her opening comments, Dr. Vivian Pinn, ORWH Director and Colloquium Co-chair, observed that while the group was small in number, it was mighty in power. Among the many accomplished attendees were program directors from Asia and Africa, lecturers from prominent universities in the United States, gender specialists from Canada, and educators from Latin America and the Middle East.

The purpose of the colloquium, as identified by Dr. Sharon Hrynkow, FIC Deputy Director and Colloquium Co-chair, was to look at women in the health sciences, focusing in particular on the differences between women in developing versus developed countries, and to explore the following key questions:

- Are there unique challenges for women in the health sciences around the world?
- How have groups overcome this, and with what support mechanisms?
- What can we learn from each other?

II. OPENING REMARKS

Attendees were welcomed by Dr. Elias Zerhouni, Director, NIH, and Dr. Wanda Jones, Deputy Assistant Secretary for Women's Health, U.S. Department of Health and Human Services, both of whom shared ideas that would emerge as key themes over the course of the two-day conference.

Dr. Zerhouni, for instance, emphasized the critical role that political leadership can play in ensuring that women are represented in science, in both developing and developed countries. He recognized that certain social structural or systemic issues may discourage women in science. For example, because of their competing responsibilities at home, women are not well served by many informal networking venues, such as cocktail hours with colleagues. With so many new frontiers in science to explore, Dr. Zerhouni believes that we can ill-afford to deny any source of talent. He also emphasized the importance of relationships, rather than structure or funding, in the advancement of health and science. He suggested that women can play a major role in forging relationships with communities as well as with individual patients, thereby advancing science.

Dr. Jones distinguished "health" from "medicine," stating that efforts to improve health also benefits medicine. She stressed the importance of mentoring, a theme that would emerge in other presentations and in group discussions throughout the colloquium. She acknowledged Dr. Ruth Kirschstein, Senior Advisor to the NIH Director, who was her own mentor, as well as all mothers, whom she dubbed the "original" though often unrecognized mentors. She pledged the Department's cooperation to be helpful in facilitating the inclusion of women scientists in efforts to address the world's problems for centuries to come.

In closing, both speakers posed the question: How do we create a superstructure in science, within which women can grow, participate, and contribute? Finding the answer to this question is vital, because, as Dr. Zerhouni observed, the scientific field cannot afford to deny any source of new talent an opportunity to contribute.

III. KEYNOTE ADDRESS: WOMEN IN A GLOBAL SOCIETY

Dr. Ilona Kickbusch, Head of the Division of Global Health, Department of Epidemiology and Public Health, Yale School of Medicine

In her keynote address, Dr. Kickbusch examined the role that women, particularly women in science, play in globalization and the interplay among health, gender, and globalization. She opened by emphasizing that gender is an organizing principle of social life and, as such, sits at the core of any examination of women's role in a global society. She went on to define (1) a new global mindset in this era of globalization; it is a mindset that sees beyond many longstanding paradigms, such as the concept of the nation-state; (2) a new political space that provides new opportunities for women and other underserved populations; and (3) a new "collective intentionality," which, simply put, is the collective effort of the global community.

This new collective intentionality has set forth a number of Millennium Development Goals, which recognize, among other things, that health care leads people out of poverty, and that eliminating gender disparities is just as critical as eradicating hunger, debt, and HIV/AIDS among the world's poor. Dr. Kickbusch further suggested that health and gender issues might serve as entry points for increasing awareness of global responsibility, and thus may help to advance the global citizenship agenda. Since they can be clearly measured, improvements in health, in particular, can prove objectively that collective efforts can and do improve the quality of people's lives. Therefore, according to Dr. Kickbusch, women in science must recognize that they have a political responsibility to advance issues of global health.

In considering women scientists' role in a global society, Dr. Kickbusch encouraged attendees to broaden their allegiance and adopt the viewpoint of global citizens. "Our primary interest is not one of women in a nation-state," she said, "but of women in a global society who want to reduce the inequities that we face." She pointed to Shirin Ebadi of Iran, who was awarded the 2003 Nobel Prize for Peace, as an example of such a global citizen whose efforts were not specific to her home country, but supported human development in general. Dr. Kickbusch further noted that, traditionally, women have made significant contributions to human development, including promoting advances in human rights, reproductive rights, and world peace.

In closing, Dr. Kickbusch returned to the issue of gender, emphasizing that gender relations serve as a pathway through which globalization takes effect. She repeated that the globalization process affects health and, therefore, the globalization of health is a pathway to change. Hopefully, more equitable gender relationships will set the stage for both men and women to lead fulfilling lives.

IV. HOW FAR HAVE WE COME? A LOOK AT THE LANDSCAPE

A. Perspectives from Women Scientists in the Developing World

1. Balancing family and professional life in India

Dr. Vijayalakshmi. Ravindranath, Director, National Brain Research Centre, India

Dr. Ravindranath discussed her personal experience as a woman, a mother, and a program director and practicing scientist in India. Although training is available in India, she described the limitations felt by women in her country that stem from the cultural norms in Indian society. For example, she has experienced first-hand the expectation that, even though women scientists are hired as scientists, they are assigned more traditionally female roles, such as coordinating registration or planning the menus for a meeting. Another barrier to the advancement of Indian women scientists is the limited opportunities for mentorship. While Dr. Ravindranath benefited from having mentors in the United States, most Indian women do not have such a support system. In addition, busy schedules involving both work and home responsibilities often prevent Indian women scientists from taking advantage of informal networking opportunities, such as having coffee with a colleague.

Other challenges include the difficulties many Indian women face when trying to re-enter the workforce after having been on leave to attend to family responsibilities. This is a challenge that Dr. Ravindranath suggests could be addressed by ensuring that these women do not leave the workforce in the first place—i.e., by offering them part-time work or other support that would help them balance work and family responsibilities. She described a special fund set up by the government of India to cover the salaries of women scientists for up to three years, which enables them to be re-integrated into the scientific field after being out of the workforce. The program's popularity is evidenced by the fact that it has received approximately five times more applications than it could fund.

Among Dr. Ravindranath's suggestions for drawing more Indian women into science careers were (1) building a career networking system outside of India, and (2) capitalizing upon women's strengths, including their ability to multi-task and their collaborative skills. Dr. Ravindranath noted that, while India's emphasis upon family and the woman's role as caretaker can be limiting, it is also one of her culture's strengths. For example, a woman's mother often will care for the grandchildren while she is at work. The great challenge for India, Dr. Ravindranath concluded, is to distinguish between a woman's traditional role at home and her professional role in the workplace.

2. A woman scientist's path to professionalism in Ghana

Dr. Isabella A. Quakyi, Director, School of Public Health, College of Health Sciences, University of Ghana

At 13, Dr. Quakyi faced the prospect of having to leave school to care for her mother, who was experiencing complications resulting from pregnancy and required surgery. In Ghana, it is the girl's role to look after the family. Boys, on the other hand, were expected to proceed with their education. As it turned out, the surgery was not required, after all; nevertheless, Dr. Quakyi

learned at an early age that, “it’s a man’s world”—one in which a woman’s education is not valued.

Dr. Quakyi went on to boarding school and then to a university where she studied medicine. She was motivated in large part by the loss of her sister, who died at age 25 from tetanus, which was even then a preventable disease. After spending many years in London earning a Ph.D., Dr. Quakyi returned to Ghana -- where, as a single woman with a career and without children, she was an oddity. She was quickly appointed to an administrative position in Ghana, where her time was divided into so many tasks that she became virtually ineffective. Just as Dr. Quakyi was beginning to see no future for herself in Ghana, she was asked by the World Health Organization (WHO) to assist with their vaccine development efforts. From there, Dr. Quakyi went on to live and to work in the U.S. for more than eight years, pursuing opportunities at NIH and Georgetown University.

Dr. Quakyi’s struggles as a woman scientist taught her, among other things, the importance of seeking out other women for support and encouragement. She described what she envisioned as a “critical mass of women” moving forward as a team, assisting one another and sharing their knowledge, ideas, and struggles. She stressed the importance of mentoring and networking to encourage women in the sciences, and she emphasized the importance of applying one’s learning in one’s home country. Dr. Quakyi also emphasized that the opportunities she was granted by the WHO, the NIH, and Georgetown University played a critical role in her ability to advance professionally, and she encouraged continuing collaborations between resource-rich countries and scientists in developing countries.

B. Examples of Successful Programs and Lessons Learned

There are many funding and research opportunities available to women scientists in the U.S. and other developed countries that are non-existent in developing nations. In addition to programs that cater specifically to women, women in developed countries are able to compete with other scientists for a broad range of programs, grants, and research awards. (See Appendix A for a Compendium of Selected Programs.) In reviewing the current state of available offerings for women scientists, six examples were presented and discussed in detail.

1. South African Reference Group on Women in Science and Technology

Dr. Shaidah Asmall, Manager of Science and Gender, South African Reference Group on Women in Science and Technology

The South African Reference Group on Women in Science and Technology (SARG) is a permanent subcommittee of South Africa’s National Advisory Council on Innovation, and consists of South Africans as well as individuals from overseas representing science, technology, and gender concerns. SARG’s objectives are to (1) increase the number of women in science and technology, (2) develop role models for these women, and (3) develop their career paths. Also among SARG’s foremost goals is to improve the quality of life for all South Africans; this includes addressing South African women’s needs from birth to death, such as the need for safety, security, and property rights. Women also need support in their role as caregivers, as well as viable work opportunities that will enable them to contribute to the country’s economic growth.

Data on women in science and technology in South Africa indicate that women comprise most of the instructional staff in nursing schools, but they are not as involved in cutting-edge research. Women are well represented in doctoral programs in South Africa, but they often become administrators rather than practicing scientists. To draw more women in to cutting-edge science and research, SARG has implemented a program called “South African Awards for Women in Science,” which offers fellowships, a lecture series, and awards for distinguished women. SARG also has begun to provide training programs for young women, including a science and technology summer camp for girls.

2. International Women in Science and Engineering (IWISE)

Dr. Ardith Maney, IWISE Co-Director and Professor of Public Administration and Women’s Studies, Iowa State University

International Women in Science and Engineering (IWISE), developed in 1996 at Iowa State University, is a program that helps women in developing countries apply their knowledge to promoting health and development in their own communities. IWISE provides professional development and leadership training, collaboration with U.S.-based researchers, networking opportunities, and support for women-led projects. IWISE partners with local institutions, organizations, and corporations to target midcareer women scientists, particularly those in Africa and the former Soviet Union. Examples of women who have participated in the IWISE program include an immunologist in South Africa working in HIV/AIDS; a scientist from Ukraine conducting Alzheimer’s research; and a researcher from Cote d’Ivoire tracing the genealogy of a herd of lambs that provides food and livelihood for the people of the region.

Dr. Maney, IWISE Co-Director, encouraged attendees at the two-day colloquium to maintain their relationships with their former graduate students, particularly those from developing countries. Doing so will strengthen and expand the networks that link women in science around the world, which is one of IWISE’s objectives. She also stressed that “different science can make better science;” that is, researchers from developing countries can provide a unique perspective that may lead to advances in science and technology that can be applied in developed and developing countries alike.

3. Women in the health sciences in Ghana

Dr. Seth Ayettey, Provost, College of Health Sciences, University of Ghana

Dr. Ayettey provided a history of women in education in Ghana from the early missionaries (1828) to present. He described the current national investment in education, which is evidenced by the growth of adult literacy and education programs, workers’ colleges, and distance learning opportunities, as well as an increasing focus on the education of women and girls.

Dr. Ayettey shared a series of tables comparing the number of women to men in Ghana’s senior high schools, universities, and graduate programs in science. The tables showed that senior high school boys are better represented than girls in science, chemistry, and physics; girls are better represented than boys in food and nutrition. The only scientific field in which high school girls are well represented is biology. All Ph.D. candidates in the school of public health are men, although there has been improvement in the representation of women in Ghana’s medical

schools: While women accounted for only one in ten medical school graduates in the early 1970s, they now account for one in three graduates. Clearly, Ghana has made some progress toward gender equity in education, but still more could be done to increase the representation of Ghanaian women in the health sciences.

Among Dr. Ayettey's recommendations for increasing women's representation is to strengthen capacity at the junior and senior high school levels, as well as at the university level, by (1) providing well-equipped and spacious laboratories, (2) hiring high-quality science teachers, (3) offering computer-assisted learning and promoting tele-education, (4) expanding graduate programs in science, and (5) encouraging exchange programs for students and staff. Dr. Ayettey also stressed the need for a new medical school with modern research equipment and increased capacity. Such a school would likely improve the quality of biomedical research in Ghana, improve the quality of health care delivery, attract research grants, and draw more women into the health sciences.

4. The Third World Organisation for Women in Science of Cameroon

Dr. Mbi Christiana Nso, President, Third World Organisation for Women in Science of Cameroon

The Third World Organisation for Women in Science (TWOVS) is headquartered in Italy with chapters in Asia, Africa, the Caribbean, Latin America, and the Middle East. TWOVS' central objective is to help women scientists use their knowledge and skills to improve the quality of life of people in the third world. To realize this objective, the Cameroon chapter, directed by Dr. Nso, conducts a variety of activities, including:

- Providing women at the grassroots level with the information and technology they need to run self-sustaining agricultural and farming projects
- Providing opportunities for continued training through conferences, seminars, and workshops
- Encouraging women scientists in Cameroon to exchange ideas and information with one another
- Motivating young girls and women in secondary schools and institutions of higher learning to pursue studies in science and technology

Cameroon urgently needs to encourage women to pursue advanced degrees in the sciences. Dr. Nso presented a series of tables showing that women in Cameroon are well represented at primary and secondary school levels, but not at the university level—for example at the University of Yaounde, where women account for only six percent of all engineering candidates. TWOVS' Cameroon chapter has implemented a number of programs to draw women into health sciences programs, including hosting roundtable discussions for students and parents, encouraging science competitions for girls, providing cash prizes to science students, awarding science scholarships, and providing role models in science and technology for young women.

5. Fostering women's research careers: Canadian context

Dr. Miriam Stewart, Scientific Director, Institute of Gender and Health, Canadian Institutes of Health Research

The Institute of Gender and Health (IGH), Canadian Institutes of Health Research, supports research to address how sex and gender interact with other factors that influence health, to create conditions and problems unique to women. To carry out this mission, IGH collaborates with other Canadian funding agencies, including for example the Heart and Stroke Foundation of Canada, the Natural Sciences and Engineering Research Council, and Environment Canada.

While the number of female principal investigators (PIs) in Canada has increased steadily since the mid-1980s, women still represent only 25 percent of the total PIs in the country today. Further, while Canadian women are prominent at the Ph.D. level, they are not as well represented at the postdoctoral and new investigator levels. In addition, among Canadian research chairs, only 12 percent at the highest tier are women. Dr. Stewart also reported that women are better represented in health services and environmental research than in biomedical research.

To foster biomedical research careers among women, IGH met with national funding agencies in January, 2003 to share data regarding women in research, as well as to identify challenges and describe strategies for better representing women in the sciences in Canada. One Federal agency, the Natural Sciences and Engineering Research Council (NSERC), has proposed a number of initiatives for increasing women's participation in science, including paid parental leave, part-time tenure, and female representation on policy and selection committees, to name a few. Future meetings will discuss collaborative strategies for fostering women's research careers.

6. AXXS: Achieving XXcellence in Science

Dr. W. Sue Shafer, Deputy Director, Institute for Quantitative Biomedical Research, San Francisco, California

The purpose of Achieving XXcellence in Science (AXXS) is to advance women's contributions to science through their involvement in professional societies. AXXS was conceived by 20 U.S. scientists representing academe, industry, and government, with sponsorship by NIH's Office of Research on Women's Health, in conjunction with the National Institute of Environmental Health Sciences and the American Society of Cell Biology.

AXXS' first meeting, held in 1999, convened 100 officers and executive directors of scientific societies to develop recommendations for action plans in four areas: Leadership; Mentoring and Networking; Best Practices; and Oversight. Since this kickoff meeting, AXXS has established a coordinating team, applied for support for leadership workshops, and published a collection of best practices, including an American Physical Society program for involving more women in physics and an Association of Women Surgeons videotape entitled, "Women are Surgeons." Among AXXS' plans for the future are securing 501(c) 3 status, developing leadership workshops for women, and developing a "report card" that will enable scientific societies to measure how much value they add to the careers of their women members.

V. PLENARY: IS THE CURRENT MODEL OF ACHIEVEMENT AND ADVANCEMENT IN SCIENCE GENDER BIASED?

A. Commentary

Dr. Shirley Malcom, Head of the Directorate for Education and Human Resources Programs, American Association for the Advancement of Science

In addressing the topic of this plenary session, Dr. Shirley Malcom identified a number of ways in which the current model of achievement and advancement is biased against women (some of which are listed below) and suggested specific ways to address these inequities.

- 1. Different and higher standards.** The current model of achievement and advancement in science, modeled by and for men, holds women to different and higher standards and, as such, is outdated. To begin to remedy this, Dr. Malcom suggested that the scientific community (1) implement blind peer review; (2) provide reviewers with explicit review instructions—for instance, indicating clearly that an applicant's gender should not be a consideration; and/or (3) have a program officer assess each review, to ensure that reviews are fair and instructions have been applied appropriately.
- 2. The glass ceiling.** To help women advance to positions of leadership in the sciences, Dr. Malcom suggested that women be represented on search committees, that training or orientation be provided for search committees to help them understand their charge, and that diverse pools of candidates and finalists be required. She also suggested that women be appointed to "ladder" positions that allow them to learn "on the job" as they move toward senior-level positions.
- 3. Women's invisibility.** Many presenters at the two-day colloquium recounted occasions when their contributions at a board meeting or other scientific gathering were ignored. To bring more attention to women scientists and their contributions, Ms. Malcom suggested nominating women for committees and awards, and encouraged women to be more vocal about their own accomplishments.
- 4. Inadequate measures of productivity.** Dr. Malcom stressed the need for data that reflect new measures of productivity that better quantify women's contributions to science. As an example, she cited a research study indicating that, while women scientists had typically authored fewer publications, the ones they had authored were longer, more widely cited, and more significant [citation?]. She encouraged the direct review of significant papers, but also encouraged review committees to consider criteria beyond number of publications when weighing one's contribution to the scientific community. Such criteria might include one's service to the community, involvement in professional societies, and administrative contributions in the university.
- 5. Undervaluing teaching.** One's list of publications tends to be more highly valued than one's skill as a teacher, but high-quality instruction is essential to the advancement of science and technology. Ms. Malcom suggested that the scientific community put more emphasis on teaching by setting outcomes for students and encouraging scientists to involve undergraduates in research.

6. Pedigree. To bolster women scientists' qualifications, Ms. Malcom suggested expanding their opportunities for intellectual exchange and networking. Fellowships, postdoctoral grants, and NIH career awards provide women scientists with rich experiences that better prepare them to advance professionally.

7. Access to networking opportunities. Many of the speakers at the colloquium identified that networking is critical to a scientist's professional and intellectual growth, and the lack of networking is a barrier to women's advancement in the sciences. Ms. Malcom suggested that women become more involved in professional societies and meeting activities, and that professional women explore electronic networking and information-sharing as a way to connect with experts in their field.

8. Lack of clear written policies for professional advancement. Management should very clearly lay out expectations for promotion and tenure, to ensure that the process of professional advancement is unbiased. Regular feedback and review also help ensure fairness.

9. But can she lead? While women have played critical roles as leaders in the home and community, they often are overlooked for positions of political or scientific leadership, out of a concern that they are not experienced leaders. Women need to be recognized for their leadership skills, even when those skills have been gained outside the professional environment. In addition, women need the same kind of support, guidance, and mentorship that men who are new to leadership roles receive. Further, women need to be given the opportunities to lead that build leadership experience; they need the space and time to make mistakes, which is an invaluable part of learning to become an effective leader.

10. Pre-programmed outcomes specialties and subfields. Women in science are still expected to pursue traditionally female specialties, such as pediatrics and family practice. To move beyond these pre-programmed outcomes, women may need to (and often do) obtain additional degrees or credentials and seek further training, to supplement the education and experience they already have. Dr. Malcom also encouraged a review of support provided by field specifically for women, and regular reviews of balance among subfield selections, to detect whether systematic bias exists with respect to specialties pursued by women compared to men.

11. Responsibilities as partners. Another barrier to women's advancement in the sciences is that they often have different responsibilities as domestic partners. Women tend to be the primary caretakers of children, and as such they are less likely to consider moving to advance their careers. A woman's role as mother also often leads her to decline taking a position of leadership that would require late hours at the office, for example. As a result, women's career opportunities are more limited. To address this inequity, Dr. Malcom encouraged the scientific community to consider job shares, hire domestic partners at the same institution, and/or coordinate with neighboring institutions so that partners can advance their careers together.

In closing, Dr. Malcom encouraged attendees to challenge the system. She identified a number of specific points of leverage which could be targeted, including funding priorities, funding criteria, and the structure of research.

B. Response

Dr. Page Morahan, Codirector, ELAM Program, Drexel College of Medicine

Dr. Morahan emphasized that, to advance women in science, we need to change the culture, instead of trying to “fix the woman.” While important, the approach of providing women with the additional skills they need to be successful is not sufficient. A more fundamental problem lies in the current organizational structure in which science is practiced, which assumes that women have deficits to be “fixed” in the first place. Dr. Morahan identified three cultural norms that are particularly problematic for women in science today:

- 1. Academic achievement is individual and independent.** Dr. Morahan questioned the scientific community’s focus on creating a primary principal investigator rather than encouraging a more collaborative approach that shares credit among a team of co-principal investigators.
- 2. Quantitative research is more highly valued than qualitative research.** Women scientists tend to gravitate toward the “large messy problems,” said Dr. Morahan, which often require not only a quantitative but also a qualitative approach. Qualitative research tends to be less valued within the scientific community.
- 3. Work and professional life are viewed as separate.** To illustrate this, Dr. Morahan pointed to the example of Johns Hopkins University, which conducted medicine grand rounds at 8 a.m. every morning, a time when many women have family duties at home. When faculty pointed out that this was not a gender neutral policy, it was changed.

Another way to create change for women is to celebrate women’s strengths. Echoing Dr. Zerhouni’s opening remarks, Dr. Morahan observed that women tend to have strong relational skills, and as such often serve as exceptional mentors and role models to younger scientists. Encouraging societies to place more value on relational (and other more typically “feminine”) skills by compensating mentors for their work might be one way to bring about more gender equity.

To begin to change these cultural norms -- and, with them, to change the culture—Dr. Morahan suggested that we identify approaches to greater gender equity that are working, and build upon those approaches. Equalizing men’s and women’s access to opportunities for advancement also creates a more gender-equitable culture. Dr. Morahan stressed the need to collect and publish data that makes gender inequities immediately apparent, so that they can be addressed more quickly and effectively.

Dr. Morahan closed by encouraging what she called a “tempered radical approach,” which allows an individual to work within the system to create change. Such an approach requires the support of a cohesive group of individuals who trust one another. This often leads to better, more enduring change than does a more revolutionary approach.

VI. BREAKOUT SESSIONS

Highlights from the breakout sessions as reported by participants at the meeting are provided in this section.

A. Proven or Recommended Strategies for Overcoming Barriers to Entry and Advancement in Health Science Careers in the Developing World—Regional Groups

Attendees broke into regional groups to discuss proven or recommended strategies for overcoming barriers to entry and advancement in health science careers in the developing world. Participants were specifically asked to consider the following:

- What can be done to promote and provide cultural, financial, and political support for science as a valid and rewarding career path for women in the developing world?
- What can be done to promote both junior women scientists and female science policymakers and decision-makers at the institutional and national levels?
- How might we address the conflict between women's multiple roles and responsibilities?
- Should we consider an "empowering" or "transformative" approach to career advancement?
- How important is it to engage both men and women in mentoring and networking in the scientific arena?

Highlights from the breakout sessions as reported by participants at the meeting are provided in this section. In general, the discussion groups agreed that there is a need for further political, cultural, and financial support to overcome gender inequities. Many of the groups stressed the importance of establishing networking opportunities for women in science by, for instance, taking advantage of advanced technologies such as the Internet to establish electronic networks of women in science and offering regional conferences and pre-conference workshops that allow women to interact and exchange ideas in more intimate settings. Other suggestions identified by the discussion groups include addressing the challenge of balancing work and family, collecting data on women in science, and engaging men in the struggle to bring gender equity.

1. Middle East

While the Middle East group was surprised to find few problems exclusive to this region, they did identify one challenge that seemed to carry a distinctly Middle Eastern flavor. The group observed that Middle Eastern scientists tend not to take criticism well, and yet the process of having ideas challenged must occur to advance science and medicine. The discussion group suggested that more emphasis should be given to bringing the "right" people together, that is, bringing together scientists that relate well to each other, so that such criticism seems less threatening and instead is viewed as a lively dialectic. Further, women in the Middle East need to understand that accepting criticism is a skill that must be honed to advance professionally in the scientific arena.

Another issue that this group identified as critical to advancing women in the sciences is encouraging change at what they termed "a working level," rather than trying to effect change from the top down. Those who seem to be very influential do not have "staying power," they

said, but those at the working level tend be committed and thus can help implement policy changes that will endure.

Other activities that could promote science careers for women in the Middle East and around the world were also suggested, including the following:

- Value and acknowledge women's work.
- Create a National Council for Women, as Egypt has done by decree from the President. Though the Egyptian Council's function is purely consultative, there is an implementing mechanism.
- Provide technical assistance at all levels. Design and implement training programs that teach women and men alike how to provide mentoring and how to write grants that address concrete problems. Offer programs for young women who have potential, but do not have a scientific background, as Agha Khan University has done in Pakistan to train nurses. Offer workshops in collaboration and evaluation.
- Give mentors incentives to remain engaged.
- Identify and implement mechanisms available through ORWH that could positively impact the reintegration of women into the workforce mid-career.
- Implement interdisciplinary programs.

The main barriers to women's advancement in the sciences, according to the Middle East discussion group, are financial needs and family responsibilities. Economic conditions are difficult, salaries are low, and, consequently, those with talent are often offered and feel compelled to accept multiple jobs and, as a result, burn out early. Further, because of family obligations, the quality of a woman scientist's work sometimes suffers. The absence of sustainable funding was identified as another barrier to advancement.

To overcome these and other barriers, the group emphasized the importance in engaging men in the effort to advance women in science and stressed that a women need not be strident to be a leader.

In closing, the spokesperson for the Middle East discussion group noted that, for many of the women scientists present, the strong family structure was often what allowed them to pursue their professional goals.. The spokesperson worried for her own daughter, however, who would not know such support.

Discussion

Internships. Attendees agreed that internship programs that bring women from the Middle East to the West (i.e., the United States) would help Middle Eastern women learn how to implement successful programs in their home countries. The National Heart, Lung, and Blood Institute (NHLBI) has such a program with Egypt, involving both men and women scientists in a study on hypertension. Other attendees cited similar internship programs in the Middle East.

An interdisciplinary approach. The research agenda pursued by women scientists tends to be interdisciplinary, and as such it often does not fit neatly into a single NIH institute. It therefore was suggested that NIH consider "breaking down barriers" between institutes, to encourage a

more interdisciplinary approach to research. Biomedical research institutions in other countries should be encouraged to take this approach, as well. One attendee pointed to Building Interdisciplinary Centers of Women's Health (BIRCWH) as an example of a successful interdisciplinary approach. BIRCWH is an ORWH-sponsored effort to enhance women's health by encouraging interdisciplinary research.

Appreciating other priorities. An attendee from the Middle East emphasized that security and stability are an overarching issue in the Middle East right now, and that this fact needs to be considered as we discuss moving women in science to the top of the political agenda.

2. Latin America

In Latin America, there is very little data regarding women in science. Further, the data that does exist is often inaccurate. Discussion group participants said that the region therefore needs to collect accurate data on how often and where women have published, whether and how they advance professionally, and how their professional progress coincides with the progress of science in the nation. The group stressed that such data can provide a powerful tool when trying to convince people and governments that change is necessary.

The group also stressed the importance of networking—a topic that arose repeatedly throughout the two-day colloquium. Interaction should take place between rich and poor countries; the group emphasized that this can be accomplished through interpersonal networks, not just through governments. To establish such networks of women in science, new technologies should be tapped to, for instance, establish electronic mentoring networks through which women in developed countries can mentor junior scientists in Latin America. The discussion group also suggested that United States-based faculty be encouraged to develop collaborative partnerships that involve researchers from Latin America and other regions as coinvestigators. Further, investigators should be encouraged to maintain contact with former fellows and coinvestigators, and regional networks of fellows should be developed to facilitate information exchange closer to home.

International travel fellowships also would help to establish vital networks. Travel fellowships to attend international meetings without giving oral or poster presentations should also be awarded. They would enable Latin American women scientists to travel to other countries, not only to give presentations, but also to engage with conference participants before, during, or after the meeting.

Other suggestions for promoting and providing cultural, financial, and political support for women and science in Latin America were as follows:

- Secure outside funding from the United States, the European Union, and/or Japan, and earmark funding not just for priority areas in basic science and medicine (e.g., cancer, infectious diseases, etc.), but also for less prominent issues.
- Make women in science a political issue and include women in scientific delegations.
- Recognize commonalities across countries and regions, and support comparative research between Latin American countries and between Latin American and developed countries.

- Translate, publish, and distribute research conducted in Latin America. Oftentimes, research has been done but the results have not been widely disseminated.
- Implement programs to place Latin American students as government interns in their native countries and abroad, as is currently being done in Hispanic-American colleges and universities.
- Separate science and politics. Governments in many Latin American countries are very unstable; therefore, funding for research should not necessarily be tied only to government entities.
- Involve the new woman president of the Pan American Health Organization (PAHO) in efforts to promote women in the sciences.

To promote junior women scientists and female science policymakers, the group made the following suggestions:

- Provide access to family planning services in universities to address the dropout rate among young women who have unplanned pregnancies. This trend has been documented in Guatemala and Mexico and is related to the fact that Latin American countries are losing support for reproductive health programs (particularly those funded by USAID).
- Address a similar problem among women who graduate from advanced training programs but drop out of the workforce in order to marry and have children.
- Reverse the trend wherein women are steered away from research careers because they offer less flexibility than, for example, clinical careers.
- Implement institutional changes, such as providing daycare centers onsite, and require states to include money in their budgets for such changes.
- Onsite daycare, job sharing, and telecommuting can help Latin American women fulfill family obligations while pursuing careers in cutting-edge research.
- Advocate to change the educational curricula by lobbying states and ministries.

The Latin American discussion group also emphasized the importance of giving special consideration to the “psychology of males” in Latin America. Latin American culture presumes that men should hold high scientific positions, and that women should serve as mothers and caretakers. There is a critical need, therefore, to situate the issue of women in science in a larger cultural/social context. Further, it will be important to involve men in the process of changing the culture by, for instance, demonstrating that the economic success of the nation is tied to advances in science, where women can and do play a vital role.

Discussion

International small, regional conferences. Discussion focused upon the importance of providing funding for scientists to travel internationally to small, regional conferences and workshops, where women may have better opportunities to network with colleagues than at larger conferences, which often are held in large cities and offer fewer opportunities for interaction. One attendee suggested that FIC partner with Keystone, which hosts small conferences in Colorado on cell biology. Funding travel fellowships would promote increased collaborations and exchange of ideas. It also was suggested that women consider attending the pre-conference

workshops that usually are held prior to larger conferences, where it may be easier to take advantage of informal networking opportunities.

The question of children. While travel to small conferences and workshops will help women grow professionally, one attendee posed the question: "But who will take care of the kids?" There are additional costs to women for participating in study sections and other activities in support of science. The challenge for the scientific community is to provide funding that would appropriately recompense women participants who must provide for the care of children while they are gone.

3. Africa

The Africa discussion group agreed that, in order to promote political support for the advancement of women in science, governments first must recognize the importance of science and technology. Similarly, cultural support could be harnessed by instilling in the general public a greater appreciation for science. The group called upon political leaders from other countries—as well as women in government, women in science, chiefs and community leaders, African nongovernmental organizations (NGOs), and men—to serve as advocates, mentors, and supporters in the effort to bring this issue the attention and understanding it demands, at both the state and grassroots levels.

The group particularly encouraged governments to tap NGOs for support, because in some instances NGOs in Africa are more effective than governments and can serve as models for change. The group suggested that NGOs provide programs to train women in leadership skills; since some NGOs already have established science centers for women, the group suggested that NGOs serve as learning centers for women in science. Developed countries can also provide guidance on how to cultivate the sciences in Africa and how to change attitudes toward women in science.

Also critical is recognizing the important role that education (especially elementary and secondary education) plays in advancing women in science. The group's suggestions for making changes at this level included the following:

- Make leadership part of the educational curriculum
- Encourage more positive attitudes toward science and technology by young people
- Upend the myth that girls do not like science
- Recruit girls and young women into science and technology
- Mentor teachers as agents of change

In addition to promoting political and cultural support, the Africa discussion group emphasized the importance of influencing the appropriate decision-makers in order to obtain much needed financial support—including community leaders, nonprofit organizations, and the corporate sector (e.g., the pharmaceutical industry)—and engaging the corporate sector in private-public partnerships. They also recommended a number of changes related to the funding process that would help women balance their professional lives with family responsibilities. The group suggested that the women receive funding to conduct research in their home countries, that funding agencies take care not to discriminate against older applicants, and that fellowship grants

cover whole families rather than just individuals. Programs helping women re-enter the workplace after a leave of absence would also make progress towards advancing women in science.

Other approaches to promoting women scientists and policymakers at the institutional and national levels in Africa and around the world might include:

- Promoting change at both the political and institutional levels
- Identifying women at universities who can be fast-tracked
- Lobbying for women to be appointed in administrative positions
- Providing training for women transitioning from academic to administrative positions
- Offering interdisciplinary programs, for instance management training programs
- Installing “gender boards” and similar mechanisms at institutions in order to advocate for women and ensure their participation
- Providing training in gender sensitivity

The Africa discussion group closed by stressing the importance of (1) changing the environment within governments and educational institutions to advance women in science and (2) recognizing that each individual, through her words and actions, has the power to effect such change.

Discussion

Grassroots versus “top-down” approach. There was considerable discussion regarding the benefits of working at the grassroots level to influence opinion, versus working directly with opinion leaders. Some contended that working locally, while effective, is costly and time-consuming; others argued that the support of leaders is important, but not sufficient. In the end, however, all agreed that, in order to create change, it is necessary to work with both local communities and prominent leaders.

Other challenges, other suggestions. The lack of infrastructure in Africa was identified as a challenge, as were state statutes—such as those restricting leaves of absence—which can limit a woman’s ability to advance professionally. Suggestions for advancing African women in the sciences included (1) developing programs to encourage networking and professional collaborations; (2) developing formal standards for promotion; and (3) ensuring that women health and science attachés are stationed in U.S. embassies in this region, who could lead by example.

4. Asia

There are very few women vice chancellors and presidents in Asia. There is only one woman director in the Ministry of Science and Technology in India, for instance, and while the Royal Society has established chairs for women, only 3 percent of Indian women are represented in fellowships. Similar inequities exist in Korea, where women are viewed as caretakers rather than leaders in science.

Part of the reason why Asian women are not well represented in positions of power and in the scientific community, according to this discussion group, is the sizeable gap between “paper” and “practice.” For instance, Korea has mandated that 30 percent of all positions be given to women scientists, but this regulation has not been implemented. This speaks to the need for accurate data regarding gender distribution in the sciences, which would make any discrepancy between “paper and practice” apparent. The group emphasized the need for data on male-versus-female representation in universities, as well as data on gender distribution by level (i.e., senior scientists, junior scientist, etc.). Regulations that bring women into science can also be enforced by implementing appropriate legal mechanisms for redress, and closing “loop holes” in the system that permit such breaches in the first place.

Another notable challenge in Asia is that women often are not aware that they have been discriminated against. It is therefore critical to bring attention to issues of gender equality in order to change both women’s and men’s expectations. Further, Asian men need to be recruited in the effort to advance women in science. The group suggested that women do this by demonstrating how the professional advancement of women contributes to the health of the nation and, thereby, improve men’s lives as well as women’s.

Creating and maintaining networks of women scientists around the world is also critical to advancing women in science. Asian women’s networking capacities need to be increased by, for instance, creating chapters of foreign-trained scientists, establishing societies specifically for women scientists, and creating a society or other supportive group of women in leadership positions who are dedicated to mentoring young women scientists. Research travel grants and collaborative research grants would encourage networking among women scientists from developing and developed countries, and linking young women scientists with women in positions of leadership would encourage an exchange of ideas and help women all levels (i.e., entry level through senior positions) learn and grow.

The group also suggested that women scientists harness the support of women in power, including female bureaucrats and institute directors. Other key suggestions included:

- Learning to use the media to bring attention to issues of gender inequity
- Formalizing the promotion process
- Encouraging re-entry of women scientists who dropped out of research due to family commitments
- Conducting policy research

Discussion

During the brief discussion that followed this presentation, participants observed that family support has contributed enormously to the success of many Asian women scientists. If gender inequalities can be rectified, it is believed that the potential for further accomplishment by Asian women scientists would be enormous. Two suggestions were made for advancing women in science in developing countries: (1) Linking gender empowerment with research through a regular research (R01) grant mechanism, and (2) following up with FIC and NIH fellows overseas to track their progress. Participants also observed that family support.

5. Eastern Europe

Eastern Europe is very different from the other regions. Under the socialist regime there was much support for professional women (e.g., day care, family leave). Unfortunately, following the fall of the socialist regime, the infrastructure for these advances eroded. The challenge in this region, therefore, is to revive the successful gender policies and to build upon them. Another difference between Eastern Europe and other regions is that there are more women than men in science, since many men have left to pursue careers overseas, where the salaries are more competitive. The Eastern Europe discussion group suggested that strengthening the region's science infrastructure will attract more people (men and women alike) to the sciences; it also will raise salaries, which in turn will benefit women in science. Other suggestions for developing the infrastructure included:

- Encouraging collaboration between Academies and universities and integration of research with teaching
- Encouraging collaboration between countries so that each country or region has a "center for excellence" with a different focus, as has been done in Africa
- Developing international collaborative structures, as is being done by NIDCR, which offers 2-year planning grants for research collaborations involving three or more countries
- Building capacity in developing countries through (per above) international collaborations in which countries are equal intellectual partners, in which each country brings a different research capability, and which eventually evolves to R01 support

Like many of the other discussion groups, this group also stressed the importance of collecting data on women in science, including for instance conducting studies that identify positions held by women and documenting salary discrepancies between men and women. This information will help governments better understand the inequities faced by women in science and will encourage funders to invest in research. Further, data on women in science will help communities determine what kinds of career development programs are appropriate for women and what career options are currently available to them. Additional social research should assess leadership and training programs (current and past) in each country as well as evaluation and reward structures to determine, for instance, whether the number of scientific papers published is valued over the quality of the papers, whether middle authors are being credited for their contributions, and whether researchers' mentoring efforts are routinely being evaluated.

The discussion group also recommended that funding agencies be encouraged to provide a continuous flow of funds, versus what one discussion group participant called "the staccato effect," wherein a funding agency provides a substantial sum of money followed by a period of no funding. The group echoed the recommendation of the Latin American group regarding the importance of attending local and regional scientific meetings, in addition to (or rather than) attending large meetings overseas, and stressed the importance of establishing formal mentoring networks for women, whose caregiving responsibilities make it difficult for them to participate in informal networks. Other suggestions for supporting women in science included:

- Holding regional meetings to collect success stories and involving funders in such meetings

- Targeting higher education policy development at the ministerial level
- Expanding and regularizing Internet and e-journal access programs and offering training in such programs
- Drawing young people into science by, for instance, offering international fellowship and travel grants

Discussion

A participant in this discussion group shared her experience as a fellow, which allowed her to develop valuable networks and gave her opportunities to work in resource-rich environments. She also noted the dearth of mature scientists available to serve as mentors to the many younger scientists now entering the research pipeline in Eastern Europe.

B. Challenges to Research Funding Agencies

This discussion group was asked to consider the kinds of realistic policy changes that could be put in place in order to provide support during different periods in a scientist's development (see Table 1). Two broad clusters of issues emerged. One encompassed the myriad of problems that face girls and women in relation to the health sciences in both developed and developing countries. The other related to programs that are supportive of efforts to enhance the opportunities for women in the health sciences. How these two dimensions intersect help frame the discussion as to future directions.

The group identified a number of problems, including the lack of women in the research pipeline, the lack of mentors to support women, and the under-utilization of women scientists. Another challenge is the lack of data about women in science. While there are numerous programs that support women seeking careers in science, there is an absence of evaluative data indicating whether such programs are effective. Funding agencies, therefore, need to be encouraged to support evaluative research. Also needed are case studies of women scientists who have responsibilities as caregivers. Such case studies, carried out in multiple settings, involving women scholars in science from different countries and cultures, could communicate the nature of the problems and the steps required to diminish their negative impacts. Case studies are also needed of programs that promote scientific partnerships between men and women. Such studies should involve women and men from different countries and cultures in order to provide a spectrum of experiences.

The financial and caregiving burdens placed upon women with children also hinder women's progress in the sciences. The group stressed the importance of providing adequate compensation to women fellows with family responsibilities, such as a 10-percent increase in stipend to cover childcare expenses. As one discussant put it, no university should accept an individual as a student or postdoctoral fellow without providing benefits for her dependents. The group also suggested that, in addition to providing funding for women scientists to travel to the United States, it would also be beneficial to fund programs in developing countries, thus permitting more women to remain near their families as they pursue advanced research.

Table 1: Possible Supportive Responses Preparing Women for Science Careers During Specific Periods of Career Development

Levels of Education & Professional Maturity	Flaws in Support Systems	Empowering Women for Careers in Science	Programmatic Examples	Culture-Sensitive Responses
K – 12 th GRADE	Weaknesses in the “pipeline.” Lack of guidance, mentoring.	Curriculum materials. Training the teachers in science. Role models	Regional training centers, Mauritania. Columbia University secondary teachers in summer science experiences. Peace Corps volunteers working with youth.	Locally distinctive initiatives -- sensitive to gender, religion, level of professional development
COLLEGE	Lack of mentoring, inadequate role models, shortages of funds.	Gender sensitive community-relevant scholarships Mentoring	University of Indiana/Moi University Kenya faculty/ student exchange. Aga Khan University School Nursing as entry path to science.	Partnerships involving men. Mentoring. Experiences in science-based activities.
GRADUATE POST-GRAD	Inadequate funding, particularly for foreign scholars with family burdens	Mentoring. Provision of financial support for family burdens	Ford Foundation. Region specific reproductive health. U.S. barriers to women/minorities	Partnerships involving men. Mentoring.
LEADERSHIP	Lack of partnerships and mentoring for career development	Increased support for women with family burdens. Gender-neutral. Opportunities for cross-national visiting	All of the above can provide opportunities for women in science	Experiences in other cultures. Mentoring.

Another important topic of discussion was how to recruit girls and young women in developing countries into the sciences. The group had a number of suggestions to address this issue, including:

- Partnering with international lending organizations and NGOs, many of which fund primary education
- Working with existing community centers to support girls in science
- Providing scholarships for girls in the developing world
- Developing regional mentoring centers
- Providing role models and mentors for girls and young women from kindergarten through post-graduate studies and beyond
- Selling the concept of “health” instead of “science” to attract young women to science programs

- Encouraging young women to take a full curriculum in math and science
- Targeting young women who are nursing students as potential candidates for the sciences

The group expressed concern about what they perceive as a “dumbing down” of the educational process in the United States. They emphasized the importance of making education engaging for children and young people in order to spark their interest in the sciences and other fields.

Discussion group members identified a number of programs operated by federal agencies, foundations, NGOs, and/or universities that enhance opportunities for women in the health sciences. Model programs of proven effectiveness to encourage the movement toward science of girls and women could be developed and encouraged in multiple countries. The Ford Foundation, for instance, has developed a reproductive health program that is region specific and operated out of local offices. Aga Khan University in Pakistan has a program that recruits young Muslim women into nursing, and a partnership between the University of Indiana and Moi University in Kenya offers 1-year research exchanges for faculty and students. (See Appendix A for fuller descriptions of a range of programs that can enhance opportunities for women in the health sciences.) Further, universities in those countries could develop cross-national institutional partnerships. An advantage of this direction of programmatic thinking would be that programs could be established in those locations at much lower cost than bringing such individuals to the U.S. It would not be difficult to interest universities in those nations in women’s participation in science projects, including programmatic evaluation.

Other suggestions for supporting women in the sciences were offering more “women-in-science” programs in developing nations, encouraging cross-national institutional partnerships, involving men in efforts to advance women in science, and using the Internet as a tool for networking and information exchange.

Discussion:

The discussion highlighted the challenges facing women scientists. One attendee pointed out that many bright women are not even applying for research grants, because stipends are inadequate to cover additional expenses such as childcare.

VII. PERSPECTIVES FROM ABOVE THE GLASS CEILING

Dr. Carola Eisenberg, Lecturer on Social Medicine, Harvard Medical School

One of only three girls in her grammar school in Argentina, Dr. Carola Eisenberg went on to become Dean of Students at the Massachusetts Institute of Technology (MIT) and today is a lecturer at the Harvard Medical School. As she described her journey from Argentina to Harvard, Dr. Eisenberg reflected upon difficult times, including the first time she had to fire an employee and the challenge of earning the respect of her male colleagues at committee meetings. She also recounted an incident involving the undergraduate student newspaper at MIT, which challenged her skills as a leader and administrator and forced her to take a stand on the issue of free speech.

Dr. Eisenberg acknowledged the women before her who paved the way for her own successes, including Cecelia Grierson, who founded the first nursing school in Argentina; Carey Thomas, founder of Bryn Mawr College; and the four Quaker women who gifted money to Johns Hopkins University (JHU) on the condition that women be admitted to the medical school. “If I have seen further,” said Eisenberg, quoting Isaac Newton, “it is from standing on the shoulders of giants.”

The number of women applicants to medical schools in the U.S. grew significantly from 1939 to 1990, and has grown tenfold in the last decade. In 2002, four leading universities had women presidents, and today there is a woman Chair of Surgery at JHU. Dr. Eisenberg encouraged women and men alike to celebrate these successes, but cautioned that it is not yet time to declare victory as there remains much to do. For example, she reported that women on faculty at Princeton University still are paid less than their male counterparts and are not promoted as quickly as men [citation].

Dr. Eisenberg closed by expressing her gratitude for being part of a profession that provides such personal satisfaction, and she encouraged those present at the colloquium to share this message with their students and other young people in their lives.

VIII. WHERE DO WE GO FROM HERE? STRATEGIES FOR CHANGE

Dr. Vivian Pinn, Director, Office of Research on Women's Health

In her summary of the colloquium, Dr. Pinn agreed with Dr. Eisenberg's assessment that, while we have made progress, there still is much to do in order to promote the advancement of women in the sciences around the world. Dr. Pinn identified some of the themes of the colloquium and highlighted key action items, which are listed below:

- Exert influence at both the grassroots and Federal government levels, in order to affect change
- Empower women over the entire lifecycle of their careers
- Consider not just the recruitment and retention of women in science, but also the re-entry of women into the sciences after a hiatus
- Emphasize mentorship and networking; develop collaborative partnerships; make leadership a part of the educational curriculum; and recognize the role of women leaders
- Gather data documenting gender biases, including disparities in salaries, promotion rates, and job responsibilities; educate women who are unaware of these disparities; and use the media to bring attention to gender inequities
- Require clear policies for professional advancement and ensure that existing regulations that promote women in science are implemented
- Work with political leaders to promote the women-in-science agenda
- Build a strong infrastructure for scientific research and promote an interdisciplinary approach to research
- Take advantage of new technologies for information exchange
- Share information and efforts – i.e., by developing a central listing of best practices
- Assess the efficacy of current programs and efforts

Dr. Pinn reminded attendees of Dr. Malcom's call to "challenge the system," as well as another prominent theme of the colloquium: That each individual is a potential agent of change. She also identified action items specific to the National Institutes of Health, as follows:

- Develop a central listing of organized efforts regarding gender and science, within the U.S. and in different global regions.
- Collect and share information about travel fellowships, to encourage networking among nations
- Consider public-private collaborations, such as partnering with the regularly held conferences (such as the Keystone Conferences in Colorado, or the Gordon Conferences)
- Consider providing family care compensation for women who attend scientific meetings
- Hold pre-conference workshops focusing on career enrichment in the sciences

Dr. Pinn identified a handful of Federal efforts that already have begun to address some of the challenges identified in the colloquium, including Building Interdisciplinary Centers of Women's Health (BIRCH); ORWH's Specialized Centers of Research (SCOR); and Achieving XXcellence in Science (AXXS).

Dr. Pinn closed by encouraging the group to recognize the differences among the regions and cultures represented at the colloquium. Dr. Pinn also stressed the importance of basing priorities upon the unique needs of each individual community.

IX. CONCLUDING REMARKS

It is perhaps most fitting to close by drawing upon remarks made by Dr. Ruth Kirschstein—who, during her distinguished 48 years at the National Institutes of Health, has mentored countless women scientists and served as Deputy Director and Acting Director of NIH as well as the Director of the National Institute of General Medical Sciences.

In a reception following the first day of the colloquium, Dr. Kirschstein observed that, despite their diverse backgrounds, women scientists around the world face similar challenges related to the current structure of the scientific establishment, which dictates how science is conducted. Women often display an innate tendency to mentor and nurture others, but this tendency can sometimes thwart professional aspirations for advancement. Dr. Kirschstein praised this nurturing tendency as the very essence of womanhood, and called upon the scientific establishment to do more to reconcile these conflicting tendencies.

Dr. Kirschstein cited research from the Women's Health Initiative and breast cancer advocates underscoring the fact that their caregiving responsibilities sometimes have a deleterious effect upon women's health. She cautioned women science professionals to be particularly cognizant of their own well-being. Dr. Kirschstein also called on women scientists to be more assertive and to begin with the premise that they are worthy of occupying influential positions. It may be reasonable to expect only incremental progress toward accommodating the needs and recognizing the accomplishments of women scientists – but sometimes evolution demands drastic leaps in development. Dr. Kirschstein urged all those in attendance at this colloquium to take such leaps.

X. EPILOGUE

[to be provided by FIC]

APPENDIX A
COMPENDIUM OF SELECTED PROGRAMS DESIGNED TO ADVANCE
CAREERS FOR WOMEN SCIENTISTS

I. THE DEVELOPED WORLD

There is an abundance of funding and research opportunities available to women Scientists in the U.S. and other developed countries. Not only are there programs that cater specifically to women, women are able to compete with all scientists for a broad range of programs, grants, and research awards that scientists in developing countries lack. The economic wealth of developed countries allows for the promotion of scientific research that is non-existent in developing nations. Below are several programs and organizations available to women in the U.S. and U.K. Programs in the U.K. reflect more sensitivity to the family constraints that women scientists encounter, and seem to offer more flexible programs than in the United States.

U.S. Based Programs:

The Fogarty International Center (FIC) — promotes and supports scientific research and training internationally to reduce disparities in global health. While supporting the conduct of needed research in priority global health areas, FIC develops human capital and builds research capacity in the poorest nations of the world where the need is the greatest. Conscious of the fact that two thirds of the world's population bears a disproportionate burden of illness and premature death, FIC has embarked on an ambitious program to begin redressing these inequities through various international research and training programs, some of which are the largest (or only) of their kind. These grants allow institutions in the U.S. to work in partnership with colleagues in the developing world to conduct research and, in the process, to build a cadre of young foreign investigators positioned to address the scientific challenges in the most crucial areas, including HIV/AIDS, emerging infectious diseases, bioethics, medical informatics, population and health, environmental and occupational health, maternal and child health and others. In addition, research grants awarded to teams of U.S. and foreign investigators are creating partnerships that enable scientists worldwide to share insights and methods. Although Fogarty's programs are not specifically targeted at women, they are especially encouraged to apply by means of appropriate language in Fogarty's requests for applications. For example, both the Global Health Research Initiative Program for New Foreign Investigators (GRIP) and the International Research Scientist Development Award (IRSDA) are aimed at junior scientists and both allow extensions of eligibility periods for candidates who have interrupted their careers because of illness or family commitments. The GRIP is intended to promote productive re-entry of NIH-trained foreign investigators into their home countries while the IRSDA is aimed at promising U.S. investigators wishing to build careers in global health. Many of the Fogarty training programs require the applicants to develop a process for adequate representation of women among the selected trainees, and all programs include encouragement to women applicants <http://www.fic.nih.gov/programs.html>

Radcliffe Institute Fellowship — offered to individuals who come from a wide range of academic disciplines, including science. Although mainly targeting women, men and scholars from developing countries are encouraged to apply as well. Fellows are awarded up to \$50,000

for one year of research. Total access to Harvard University's research and library facilities is granted as well. www.radcliffe.edu/fellowships/bunting.html

ADVANCE Program — offered by the National Science Foundation (NSF) in 2001, provides Fellows Awards, Institutional Transformation Awards, and Leadership Awards. These are all meant to facilitate women's advancement in U.S. academic institutions. The Fellows Awards will be given to 20-40 women who are either just establishing or re-establishing academic research and educational careers. This program replaced the jointly sponsored NIH/NSF Professional Opportunities for Women in Research and Education (POWRE) program begun in 1997. POWRE attempted to diminish gender differences and barriers in postgraduate science positions. POWRE was an individual fellowship program intended to foster professional growth during the tenure-track years and to increase the pool of female role models in science and engineering. An extremely competitive program: only 26% of women who applied were funded. This program did make a difference, but did not deal with more institution-wide problems and the issue facing most women: balancing family and work. Female professors felt they were expected to undertake heavier teaching loads and serve on committees, etc. More so than their male counterparts. Also, women professors felt the pressure to be female role models. POWRE awardees felt the need to gain credibility among male faculty. www.nsf.gov/home/crssprgm/advance/start.htm

Women's International Science Collaboration Program — is sponsored by the American Association for the Advancement of Science. Primary aim of the program is to increase participation of women in international scientific research. It was inspired by the low number of women who have applied for general NSF grants that offer funding for researcher to work with overseas scientific collaborators. This program is unique in that it funds American women scientists to work with women scientists overseas, including women scientists in developing countries. <http://www.aaas.org/international/wiscnew.shtml>

The Clare Boothe Luce Program — is administered by The Henry Luce Foundation, the privately funded program supports undergraduate scholarships, graduate fellowships, and term support for tenure-track appointments at the assistant or associate professorship level for women scientists. Funding is awarded at the university level. Thus far, 110 Clare Boothe Luce Professorships have been awarded. <http://www.hluce.org/4bcbldes.html>

Ford Foundation — has an approach for developing countries that is region specific related particularly to reproductive health coming out of local offices, which is sensible since those who program on the ground have a good idea of what is needed in that location. Secondly, work of the foundation in the U.S. is focused on funding research that will help to understand the barriers and incentives related to women and minority groups in science.

Columbia University — has a program that brings secondary school teachers into research programs during summers. It gives them experience of working directly with scientists, gaining insights and examples of research they can bring to their students. These are successful and replicable programs that could also be implemented as international programs. Data are available to document their effectiveness.

University of Indiana — has a well established partnership program with Moi University in Eldoret, Kenya. At least one faculty member, as a team leader, lives there for a full year at a

time. It is a two way street, with both faculty and students visiting back and forth between the two institutions. Students and faculty have commented that this has been a life-changing experience for them. It is seen as a two-way model that helps people on both sides. It is stable and has been on going for 14 years.

The Peace Corps — places volunteers in developing countries where they can be strongly supportive of young women interested in science. The volunteers often work in rural areas where they interact with communities and parents and can identify young girls who have the interests and capacities for moving toward careers in science. The PC partners with other organizations which may provide scholarship opportunities for girls in school. They set up mentoring centers for girls who can benefit from career guidance.

Kellogg Foundation — has been developing a component for their international support for development that is focused on adolescents. Adolescents are often left out of development programs, and this approach provides opportunities for them to select careers and educational opportunities that could be a distinctive opportunity for them. Here is an area where facilitating interests in science could be an important part of supporting career development of young people, including, of course, young women.

The Aga Khan University—, in Karachi, Pakistan provides an example of how nursing can be a step toward advancing the roles of women in the health sciences. The School of Nursing at AKU attracts young women in a Muslim society into a field that has broad potential for service to humanity, with the possibilities for onward progression into science. There are multiple opportunities for exposure to challenges in science, for response to human need, for mentoring of young women as they seek to sort out the directions their lives might take. Of course, AKU is only one of many such institutions, but it could be seen as a model program that could interact with others, regionally and globally.

Tropical Institute for Community Health and Development (TICH), Kisumu, Kenya — is an institution that seeks to provide a sound research-oriented evidence base for policy development as well as decision making in the management of Community Health and Development Programs. In the 2001 Masters class, 67 percent of the graduating class were women. The graduates are entering various scientific fields, and currently the six TICH graduates registered in Ph.D. programs and seeking support are all women. Their doctoral work contributes not only more professionals in the various medical science fields, but also to the growing pool of local researchers.

European Union Based Programs:

European Women in Science and Humanities — is an organization that promotes the interests of women scientists in Western Europe. Only 1 percent of all university professors in science and technology in Western Europe are female. In the former Soviet Bloc, the percentage is higher. This organization offers a communication network for women scientists. Currently, they offer no funding. http://www.the-scientist.com/yr1997/august/comm_970818.html

Women in Science, Engineering and Technology — is a network of European women scientists based in England. Funded by the EU and national funding bodies. Major aims are to increase the number of girls and women studying science, engineering, and technology subjects

and to help them progress to related careers, to develop women's technical and entrepreneurial skills through training initiatives and projects, to create information exchanges and networking opportunities for women in science, engineering, and technology, and to promote and support research into areas relating to women in non traditional fields. <http://www.shu.ac.uk/witec/>

Association for Women in the Sciences, Engineering, and the Technologies (AWiSE) aims to promote science careers for women, act as a forum, provide a network of support, and act as a resource for information. AWiSE receives funding from the U.K. Department of Trade and Industry and the Wellcome Trust. AWiSE supports young women entering a career in science as well as women returning to the science workforce. Although no specific funding programs exist, AWiSE provides career advice and mentoring via their membership as well as contacts with liaisons in industry and education. <http://www.awise.org/about.htm>

Athena Project — is sponsored by Loughborough University, and aims to increase the number of female senior academics in science, engineering, and technology (SET). It also aims to improve the career development of women in SET (their recruitment, retention, participation, progression, and promotion). The project works in partnership with universities. The goal is to influence the current organizational climate and the structures and processes that encourage or deter women from participating in and progressing to the top in a university setting. Major funding for the project is provided by the U.K. Office of Science and Technology. The project awards funding to universities to study institutional barriers to advancement. It also provides mentoring and networking for women scientists. Additionally, the Athena Project supports the Local Academic Women's Network (LAWN). LAWN provides seminars, mentoring, workshops, and conferences to provide support and aid to women scientists interested in learning more about career advancement tactics. <http://www.athena.ic.ac.uk/more.htm>

Daphne Jackson Trust — The trust offers women scientists in England fellowships to return to the scientific workforce. <http://www.daphnejackson.org/>

The Wellcome Trust — Offers funding in the U.K. that caters to women. They fund part-time research work, re-entry into science fellowships, and extended grants to women who require maternity leave. The fellowships are for up to four years of research and study. <http://www.wellcome.ac.uk.en/l/awtvispolwmnflx.html>

Female Researchers in Joint Action (FREJA) Programme — A program funded by the Danish government that encourages young female scientists to pursue research careers in all scientific arenas. Total funding for the years 1998-2002 is 10.5 million Euro.

**The German government offers contact stipends and re-entry stipends for scientists interested in re-commencing a research career. The majority of stipends are awarded to women. Additional funding has been given to create full-time faculty positions for women scientists in particular. Similar programs exist in Scandinavia as well.

II. THE DEVELOPING WORLD

There is little in terms of leadership programs and specific funding for women scientists in the developing world. As with their male counterparts, women scientists in the developing world must compete for funding from international sources that requires an advanced knowledge of

English and grant writing. In spite of this paucity of programs, women scientists in the developing world have begun to organize and create informal networks to offer support and guidance, career advice, and access to databases of potential international funding opportunities. Below are some programs and networks identified for women scientists in the developing world:

UNESCO – L’Oreal Fellowships — Fellowships are each worth a maximum of \$10,000. The fellowships will give a boost to promising research in the life sciences, helping the recipients to start new projects and hopefully launching them on a lifetime of scientific achievement. Awarded as part of the "For Women in Science" program, the fellowships benefit women working in doctoral and post-doctoral research who have already distinguished themselves by their talent and commitment. These fellowships are awarded to women throughout the world. They are not developing country specific, but have benefited women in Egypt and India, among others. <http://www.loreal.com/loreal-women-in-science/commitment/commitment2.asp>

International Organization of Pakistani Women Engineers — A network of women engineers in Pakistan that offers small scholarships for high school, undergraduate, and graduate work in engineering. www.iopwe.org

Women Scientists Scholarship Scheme, Indian Department of Science and Technology — The Department of Science and Technology has recently developed two new schemes to aid women scientists. One program offers scholarships to women scientists that have the potential to positively impact the development of India. The scholarship grant would specifically fund research and development of new technology that could improve conditions in urban slums and poor rural populations. The duration of the grant is two years. Another program funded by the Indian government provides three-year research grants to women who are interested in re-entry the scientific work force after a break to raise a family.

European – Eurasian Network of Scientists and Engineers — A network of women scientists and non-governmental organizations based in Ukraine. Serving Eastern Europe and Eurasia. www.iwisenonline.net

African Women in Science and Education — Regional Network of women scientists based in Kenya. www.iwisenonline.net

International Women in Science and Engineering (IWISE) — Implemented by Iowa State University in partnership with UNESCO. Its mission is to “enhance the status of women scientists and engineers from developing countries and emerging democracies and assist their efforts to improve conditions in their communities and countries.” The IWISE Leadership Program brings women scientists from developing countries to the U.S. to garner leadership training that will benefit other women scientists in their home countries. However, recently they have focused on working with women scientists in their home countries, as it is extremely costly to bring them to the U.S. Mentoring and leadership training is done so that these women can train other women scientists. Internet resources have been created that provide on-line curriculum materials, etc. IWISE is gradually creating a network of women scientists in the developing world. www.iwisenonline.net

Third World Organization for Women in Science — A relatively new organization. Their objectives are to: (a.) “strengthen the research efforts of women scientists working and living in

third world countries and increase their scientific production and efficiency, (b.) recognize, support, and encourage the scientific and technological achievements of women in the third world, (c.) facilitate access to education and training opportunities for young and promising women scientists in the third world, and (d.) promote the involvement of women in science and technology professions, scientific leadership, and decision-making processes, both at the national and international levels." Their funding sources are quite varied and the only major fellowship they currently offer is a *Fellowship to Young Women Scientists from Sub-Saharan Africa and Least Developed Countries for Postgraduate Training*. They have a directory of women scientists in the third world and publish a journal on women scientists in the South. www.twows.org

National Research Foundation of South Africa — Offers support to women who conduct individual research. It is meant to aid women who have family obligations and experience advancement limitations. <http://www.nrf.ac.za/funding/guide/rcd.stm>

South African Reference Group on Women in Science and Technology (SARG) — SARG was created due to the need for women scientists' meaningful participation and contribution in the development of R&D in South Africa. Moreover it will serve as a vehicle for gender mainstreaming of the sciences in South Africa. Recognition awards will be made in the following categories: The Frances Ames Distinguished Women Scientists Lecture Series, the Distinguished Woman Scientist Award, and the Women Scientist Fellowships. <http://www.sarg.org.za>

Other:

The majority of female-focused funding and aid programs in the developing world deal with gender equality, getting women into the workforce, female health issues, etc. These are all fundamental problems that developed countries no longer face. Funding for research and leadership programs for women scientists in the developing world are not a priority for many funding and charity organizations thus leaving women scientists to fend for themselves and develop their own resources and support mechanisms.

Beahrs Environmental Leadership Program — is a program, sponsored by the University of California, Berkeley that helps individuals to garner funding to attend the course at Berkeley. It focuses on mid-career professionals to enhance their skills and broaden perspectives on sustainable environmental management. Many women scientists have participated, but it is not geared specifically towards women, nor is the program for people only from the developing world.

Foundation for Advancement of Medical Education and Research (FAIMER) Institute — is a leadership program aimed at leadership development of both women and men mid-career medical school faculty from developing countries – especially from Sub Saharan Africa and South Asia. Efforts are made to have an equal gender distribution, although the make-up of each class depends upon the quality of applicants and their geographic locations. All travel and program expenses are provided by FAIMER for participation in two on-site sessions in the U.S. and on-line support for completion of a leadership action project at the home institution. www.faimer.org

FAIMER Individual Fellowships in Medical Education (IFME) — funds female and male medical school faculty from developing countries for a 6-month to 1-year fellowship at a medical school in the U.S. While the fellowship is focused on gaining expertise in medical education, fellows are also often involved in efforts to enhance their clinical or research expertise. Follow-up fellowships for short-term visits of up to 3 months are also available. www.faimer.org

Ford Foundation and Rockefeller Foundation — offer funding for scientists in the developing world, but have no female-focused programs and support.

Kellogg Foundation — does much work in the developing world, but focuses mainly on organizations that provide developmental aid (improving education, health care, economic aid). They do not offer funds for scientists and researchers.

Management Development for Women in Higher Education — The School of Oriental & African Studies of the University of London and the Association of Commonwealth Universities have united for the first time in offering an international management development program for women in higher education. This is a capacity building program that will enable women who attend the program in London to return to their home institutions and train and encourage other women interested in senior academic positions. The program will focus on several areas including: developing management skills, women in research, women and governance in higher education, and women and mentoring. The first program took place in August 2003. The next program will take place in February 2004. For more information, E-mail mdw_conference@soas.ac.uk

**APPENDIX B
FINAL AGENDA**

**Colloquium on Career Paths for Women in the Health Sciences:
A Global Perspective**

*Sponsored by the Fogarty International Center, the Office of Research on Women's Health, and
the National Institute of Environmental Health Sciences*

OCTOBER 15-16, 2003

Lawton E. Chiles International House (Stone House)
Building 16, NIH Campus
Bethesda, MD

October 15

8:30-9:00 a.m.	Registration and Coffee
9:00-9:15 a.m.	Welcome Elias A. Zerhouni, M.D., Director, National Institutes of Health Wanda Jones, Ph.D., Deputy Assistant Secretary for Health (Women's Health), Department of Health and Human Services
9:15-9:30 a.m.	Charge to the Group from Colloquium Co-Chairs Vivian Pinn, M.D., Director, Office of Research on Women's Health Sharon Hrynkow, Ph.D., Deputy Director, Fogarty International Center
9:30-10:00 a.m.	Keynote Address Women in a Global Society Ilona Kickbusch, Ph.D., Head of the Division of Global Health, Department of Epidemiology and Public Health, Yale School of Medicine
10:00-10:30 a.m.	BREAK
10:30-12:00 p.m.	How Far Have We Come? A Look at the Landscape Moderator: Sharon Hrynkow, Ph.D., Deputy Director, Fogarty International Center <ul style="list-style-type: none">• Perspectives from women scientists in the developing world• Examples of successful programs and lessons learned for women scientists in the developed and developing world

12:00-12:30 p.m.

Discussion

12:30-2:00 p.m.

No-host LUNCH

(Natcher Building Cafeteria, Atlanta and Boston Rooms)

2:00-3:00 p.m.

Plenary: Is the current model of achievement and advancement in science gender-biased?

Introduction: Dean Jamison, Ph.D., Fellow, Fogarty International Center

Commentator: Shirley Malcom, Ph.D., Head of the Directorate for Education and Human Resources Programs, American Association for the Advancement of Science

Respondent: Page Morahan, Ph.D., Co-Director, ELAM Program, Drexel College of Medicine

- Challenging a gender-biased system of achievement and advancement. Can the model be changed to become gender-neutral or facilitate gender appropriate career achievement and advancement?

3:00-5:30 p.m.

Breakout Sessions: 1.) Proven or Recommended Strategies for Overcoming Barriers to Entry and Advancement in Health Science Careers in the Developing World – Regional Groups

Charge to groups: Karen Hofman, M.D., Director, Division of Advanced Studies and Policy Analysis, Fogarty International Center

Issues for discussion:

- What can be done to promote and provide cultural, financial, and political support for science as a valid and rewarding career path for women in the developing world?
- What can be done to promote both junior women scientists and female science policymakers and decision-makers at the institutional and at the national level?
- Conflict between multiple roles and responsibilities
- Empowering approach vs. transformative approach to career advancement?
- Importance of engaging both men and women in mentoring and networking in the scientific arena

2.) Challenges to Research Funding Agencies

Leader: John Bryant, M.D., President, Council for International Organizations of Medical Sciences

- What realistic policy changes can be put in place to promote change and provide support at different times? (K-12 education, undergraduate science education and medical schools, junior researchers, senior researchers who are placed to become leaders)

5:30-7:00 p.m.

Reception at Stone House

Remarks by: Ruth Kirschstein, M.D., Senior Advisor to the Director, National Institutes of Health

October 16

8:00-8:30 a.m.

Coffee

8:30-9:00 a.m.

Perspectives from Above the Glass Ceiling

Carola Eisenberg, M.D., Lecturer on Social Medicine, Harvard Medical School

9:00-10:30 a.m.

Reporting from Breakout Sessions and Discussion

Moderator: Yvonne Maddox, Ph.D., Deputy Director, National Institute of Child Health and Human Development

10:30-11:00 a.m.

BREAK

11:00-12:00 p.m.

Where Do We Go From Here? Strategies for Change

Moderator: Vivian Pinn, M.D., Director, Office of Research on Women's Health

- Summary of participant suggestions of potential future program models
- Presentation and commentary on models the NIH may consider for the future to equalize the playing field

12:00-12:15 p.m.

Final Comments

- END -

APPENDIX C

BIOGRAPHICAL SKETCHES OF PRESENTERS

Shaidah Asmall, MBCHB is currently the Director of the Science and Gender/Disability Unit at the National Department of Science and Technology. She is directly involved in establishing and running the South African Reference Group for Women in Science and Technology. Dr. Asmall obtained her MBCHB at the University of Natal in 1985. Before being appointed as the first Black district surgeon in Pretoria, South Africa she worked in private practice in Cape Town, South Africa and in the United Kingdom. As Chief Medical Officer for the Gauteng Department of Health, she provided training in Clinical Medical-Legal Services. During this time, she served on the National Justice Task Team for Rape and Sexual Offences. Subsequently, as Deputy Director, she was responsible for 17 primary health clinics in Pretoria. Before assuming her current position, she was Senior Medical Superintendent of the city of Tshwane, South Africa, where she was responsible for coordinating hospital services.

Seth Ayettey, M.D., Ph.D. is Provost of the College of Health Sciences at the University of Ghana. Prior to this post, Dr. Ayettey was Dean and Vice-Dean of the University of Ghana Medical School, where he also served as Head of the Department of Anatomy from 1981-1995. His current research focuses upon a comparative, ultra-structural study of vertebrate cardiac muscle, with special reference to the transverse tubular system, innervation, cell junctions, and the distribution of cytoplasmic organelles. The primary aim of these studies is to determine morphometric differences among species, and to relate such differences to the design and function of cardiac cells.

John Bryant, M.D. works in governance, teaching, research, and consulting for various organizations and universities. He is a Senior Faculty Associate of the Johns Hopkins School of Public Health, Emeritus Professor of the Aga Khan University, and a member of the Institute of Medicine of the National Academy of Sciences. He has served as Dean of the School of Public Health at Columbia University, and Director of the Office of International Health in the U.S. Department of Health and Human Services. From 1993 to 2003, Dr. Bryant was President of the Council for International Organizations for Medical Sciences, a Geneva-based organization founded by the WHO and UNESCO in 1950. Currently, Dr. Bryant's major interest is Africa; he is a Visiting Professor at the Tropical Institute for Community Health and Development in Kisumu, Kenya, where his teaching focuses upon issues related to human rights, equity, and fairness, particularly in relation to the poor and disadvantaged.

Carola Eisenberg, M.D. is a Lecturer on Social Medicine at Harvard Medical School, where she practices adult psychiatry and teaches courses on human rights and international medicine. She served as Dean for Student Affairs at MIT from 1972 to 1978. Dr. Eisenberg was the first woman to occupy that position, as well as and first woman to serve on MIT's Academic Council, which is the university's highest academic governing authority. In 1978, she was appointed Dean for Student Affairs at Harvard Medical School, where she served for 12 years. From 1990 to 1992, she was Director of Harvard's International Program for Medical Students. Dr. Eisenberg received her M.D. from the University of Buenos Aires and received training in psychiatry at the Hospicio De Las Mercedes, the Johns Hopkins Hospital, and the University of Maryland. She was one of the five founding members of Physicians for Human Rights, which shared in the 1997 Nobel Peace Prize for its participation in the campaign to ban land mines.

Karen Hofman, M.D. is Director of the Division of Advanced Studies and Policy Analysis the Fogarty International Center (FIC) of the National Institutes of Health, where she responsible for analyzing social, economic, and public health policies. She also develops strategies and programs to address global health disparities through medical research. Dr. Hofman has performed clinical, molecular, and policy-related

research related to pediatrics, genetics, and developmental disabilities. Prior to joining FIC, she served on the faculty at Johns Hopkins. She has served as a consultant for the Pan American Health Organization (PAHO) and the University of Cape Town's Child Health Policy Unit. She obtained her medical degree from the University of Witwatersrand in Johannesburg, South Africa.

Sharon Hrynkow, Ph.D. is Deputy Director of the Fogarty International Center (FIC) of the National Institutes of Health. Among Dr. Hrynkow's specific areas of focus at FIC are efforts to combat "brain drain" among junior scientists from developing nations who are trained in the U.S. She also is developing initiatives to address gender issues related to global health. A native of Rhode Island, Dr. Hrynkow received her PhD. in neuroscience from the University of Connecticut. After completing postdoctoral training in the area of brain development at the University of Oslo, she became a Science Officer at the U.S. Department of State, a position she held for roughly three years. At the State Department, she worked on a range of health and science issues of import to the U.S. foreign policy community, including HIV, AIDS, chemical safety, and biotechnology. She worked with interagency partners, State Department leadership, NGOs, and business leaders to produce the first U.S. International Strategy on HIV/AIDS. Dr. Hrynkow is a member of numerous professional organizations and has been published in *Neuroscience*, *Brain Research*, and other journals in her field. She was elected to the Council of Foreign Relations in 1996.

Dean Jamison, Ph.D. is a Senior Fellow at the Fogarty International Center (FIC) of the National Institutes of Health, where he is on leave from his position as a Professor at the University of California, Los Angeles. Before joining the UCLA faculty in 1988, Dr. Jamison spent many years at the World Bank, where he was a senior economist in the research department; health project officer for China and Gambia; division chief for education policy; and division chief for population, health, and nutrition. He served as lead author for the World Bank's *1993 World Development Report: Investing in Health*. He also served as Director of the WHO's Geneva-based Economics Advisory Service. A member of the U.S. Institute of Medicine, Dr. Jamison received his B.A. and M.S. from Stanford University and his Ph.D. in economics from Harvard University.

Wanda Jones, Dr.P.H. is Deputy Assistant Secretary for Health (Women's Health) in the U.S. Department of Health and Human Services, where she is also the Director of the Office on Women's Health. Since her selection in February 1998, Dr. Jones has focused her efforts on eliminating health disparities for women through a variety of programs and initiatives, including the National Centers of Excellence in Women's Health, the National Community Centers of Excellence in Women's Health, the National Women's Health Information Center, and the Panel of Experts on Minority Women's Health. Dr. Jones has long been recognized for her leadership on women's health issues in the federal and state public health communities. Prior to her current position, Dr. Jones was the Associate Director for Women's Health at the Centers for Disease Control and Prevention (CDC) in Atlanta. She obtained her doctorate in Public Health Laboratory Practice from the University of North Carolina. Dr. Jones joined the CDC in 1987 as an HIV laboratory trainer. In 1990, she became the Assistant Director for Science in the Office of the Associate Director for HIV/AIDS, where she was active in policy issues related to HIV laboratory testing, women and AIDS, HIV vaccine development, and health care workers.

Ilona Kickbusch, Ph.D. is Professor for Global Health at the Yale University School of Medicine's Department of Epidemiology and Public Health. Presently on leave of absence from Yale, she is serving as a senior advisor on Millennium Development Goals and Health Targets to the Director of the Pan American Health Organization. Before joining Yale in 1998, she had a distinguished career with the World Health Organization, where she initiated the Ottawa Charter for Health Promotion, a seminal document of the new public health. Dr. Kickbusch is deeply committed to women's health issues; during her time with the WHO, she launched the initiative, "Women's "Health Counts" – a project which led to the publication of women's health reports throughout Europe. In the context of the Yale Program on

Bioethics, she chairs a working group on, "Globalization, Gender and Health." Dr. Kickbusch has published widely, has received many prizes and honors, and is a member of numerous boards and advisory groups. Most recently, she served as the distinguished scholar leader of the Fulbright New Century Scholars program, "Health in a Borderless World." Her key academic interest is in establishing interdisciplinary global health studies. Her research interests lie in the field of health and foreign policy in a changing global environment, and in the interface among globalization, modernization, and health. Dr. Kickbusch is a political scientist with a Ph.D. from Konstanz University in Germany.

Ruth L. Kirschstein, M.D. is the Senior Advisor to the Director of the National Institutes of Health (NIH). She was named Acting Director of NIH in January of 2000 and continued to serve in that capacity until May of 2002. Prior to that, Dr. Kirschstein served as NIH's Deputy Director, Director of the National Institute of General Medical Services, and Acting Associate Director for Research on Women's Health. A native of Brooklyn, New York, Dr. Kirschstein received a B.A. from Long Island University and an M.D. from the Tulane University School of Medicine. She interned in medicine and surgery at Kings County Hospital, Brooklyn, and conducted residencies in pathology at Providence Hospital, Detroit; the Tulane University School of Medicine; and NIH's Warren G. Magnuson Clinical Center.

Yvonne Maddox, Ph.D. was named Deputy Director of the National Institute of Child Health and Human Development in January, 1995. From January of 2000 to June of 2002, she also served as the Acting Deputy Director of NIH. Dr. Maddox received her doctorate in physiology and biophysics from Georgetown University, and has had a wide array of biomedical research and teaching experiences. Throughout her academic and government career, Dr. Maddox has been recognized as a champion of women's issues. She has served as Board Chair of the Center for Development and Population Activities, an international organization that focuses upon improving the health and welfare of women in developing countries. She has played a vital role in the identification of issues related to women as scientists and participants in research studies, at NIH as well as at the U.S. Department of Health and Human Services.

Shirley Malcom, Ph.D. is Head of the Directorate for Education and Human Resources Programs at the American Association for the Advancement of Science (AAAS). Dr. Malcom serves on several boards—including the Howard Heinz Endowment; the H. John Heinz III Center for Science, Economics and the Environment; and the National Park System Advisory Board—and is an honorary trustee of the American Museum of Natural History, as well as a former trustee of the Carnegie Corporation of New York. She serves as a Regent of Morgan State University and a trustee of the California Institute of Technology. Dr. Malcom also has chaired a number of national committees addressing education reform and access to scientific and technical education, careers, and literacy. Dr. Malcom is a fellow of the AAAS and the American Academy of Arts and Sciences. She served on the National Science Board (the policymaking body of the National Science Foundation), where she also served on the President's Committee of Advisors on Science and Technology. Dr. Malcom received her doctorate in ecology from Pennsylvania State University. In 2003, Dr. Malcom received the Public Welfare Medal of the National Academy of Sciences, which is the highest award given by the Academy.

Ardith Maney, Ph.D. directs Iowa State University's International Women in Science & Engineering (IWISE) program, which works to advance the careers and professional advancement of women in academic and research fields in emerging democracies and developing countries. Dr. Maney has directed IWISE projects in central and eastern Europe, the former Soviet Union, and Africa, where she has worked in collaboration with UNESCO and the National Academy of Sciences, as well as European governments, universities, foundations, and corporations. Since 1998, she has directed a project that has provided career training and job-seeking skills to more than 1,500 women scientists in Kharkiv, Ukraine. The project assists women whose jobs were lost and careers were disrupted by the economic changes that have taken place in that region since 1991. Before the dissolution of the USSR, Kharkiv was a major center of academe, science, and defense, and it continues in that role today, in independent Ukraine. Dr. Maney's

scholarly work focuses upon women and leadership, community governance, nongovernmental management, and higher education reform. She is a professor of public administration and women's studies at Iowa State University and has been a Fulbright lecturer in the Czech Republic (1994) and in Lithuania (2002).

Page S. Morahan, Ph.D. is co-Director of the Hedwig van Ameringen Executive Leadership in Academic Medicine (ELAM) Program for Women; Founding Director of the National Center of Leadership in Academic Medicine, a mentoring program for junior faculty; a tenured Professor at the Drexel University College of Medicine, where she serves as a part-time faculty member; and co-Director of the Global Leadership Institute of the Foundation for the Advancement of International Medical Education and Research. She has an independent consulting practice in strategic career planning and leadership development, and has served in numerous leadership positions at the medical school and university level since 1982. She was the first woman President of the Association of Medical School Microbiology and Immunology Chairs, in 1990. Dr. Morahan has published extensively in scientific research, education, and organizational development, and she has developed a web site for faculty development resources. Her current research interests include design, implementation, and evaluation of leadership development and mentoring programs; the advancement of women; and expanding the definition of faculty scholarship. Dr. Morahan received her Ph.D. in microbiology from Marquette University.

Mbi Christiana Nso, Ph.D. is a Pharmacist/Phytochemist and Executive Board Member of the Third World Organisation for Women Scientists (TWOVS), and President of the Cameroon Chapter of TWOVS. She currently is Head of the Natural Products Research Unit for the Cameroon Academy of Science (CAS), and an Executive Board Member of the AU/Scientific, Technical and Research Commission. Dr. Nso received her doctorate in Phytochemistry from the University of Strathclyde in Glasgow, England.

Vivian Pinn, M.D. is the first full-time Director of the Office of Research on Women's Health (ORWH) at the National Institutes of Health, an appointment she has held since 1991. In 1994, she also was named NIH's Associate Director for Research on Women's Health. Dr. Pinn came to NIH from the Howard University College of Medicine in Washington, D.C., where she had been Professor and Chair of the Department of Pathology since 1982. Prior to that, she held appointments at Tufts University and the Harvard Medical School. Dr. Pinn has long been active in efforts to improve health and career opportunities for women and minorities. She recently led a national effort to re-examine priorities for the women's health research agenda for the 21st century; this program involved more than 1,500 advocates, scientists, policymakers, educators, and health care providers, through a series of scientific meetings across the nation. The meetings were designed to determine the progress of the women's health research agenda, and to identify continuing or emerging areas in need of research. Dr. Pinn received her M.D. from the University of Virginia School of Medicine, where in 1967 she was the only woman and minority in her class.

Isabella A. Quakyi, Ph.D. is Director of the School of Public Health at the University of Ghana's College of Health Sciences, where she is also Professor of Immunology and Parasitology, as well as Head of the Department of Biological Bases of Public Health. Prior to joining the University of Ghana, Dr. Quakyi was Associate Research Professor in the Department of Biology at Georgetown University (1990-2001), where she is currently an Adjunct Professor in the Departments of Biology, Microbiology and Immunology. Dr. Quakyi has extensive experience in medical parasitology and tropical diseases; she has spent over three decades conducting research on the immunology of *Plasmodium falciparum* malaria (immunodiagnosis, immunopathogenesis, autoimmunity, and vaccine development), and continues to work on the biology, epidemiology, and acquisition of natural immunity to malaria. Dr. Quakyi teaches and trains physicians and scientists in capacity building and the transfer of biotechnology.

She collaborates with a consortium of international scientists from laboratories in Africa, Australia, Europe, and the U.S. She is a member of the WHO's Steering Committees for Pathogenesis and Applied Genomics; Research Strengthening; and Vaccine Discovery Research. Dr. Quakyi received her Ph.D. in Immunoparasitology from the London School of Hygiene & Tropical Medicine.

Vijayalakshmi Ravindranath, Ph.D. is Director of the National Brain Research Centre in New Delhi, India. She is also a professor in the Department of Neurochemistry with the National Institute of Mental Health and Neuro Sciences (NIMHANS), Bangalore. Dr. Ravindranath is identifying newer aspects of brain functions other than those commonly studied, such as neurotransmission and receptor interactions. Her research interest is focused upon the two major areas: (i) study of the xenobiotic metabolizing capability of the central nervous system, with particular reference to the metabolism of psychoactive drugs and environmental toxins in the brain, and (ii) the role of oxidative stress in brain damage and the functional status of the endogenous antioxidant, glutathione, with special reference to reperfusion injury following cerebral ischemia. She also is studying excitotoxicity caused by environmental glutamate receptor agonists, and iatrogenic damage caused by the administration of typical neuroleptics. Dr. Ravindranath received her Ph.D. from Mysore University in Mysore, India.

W. Sue Badman Shafer, Ph.D. is Deputy Director of the Institute for Quantitative Biomedical Research at the University of California, San Francisco, where she also has served as Assistant Vice Chancellor for Research Administration. Prior to her affiliation with UCSF, Dr. Shafer was with NIH, where she was Deputy Director for the National Institute of General Medical Sciences and Associate Director for Extramural Activities. She has nearly 30 years of experience leading and managing broad-based scientific research programs in both government and academe. Dr. Shafer conceived and developed the idea for AXXS '99, and also obtained workshop funding from the NIH Office for Research on Women's Health in order to increase women's contributions to science. She received her Ph.D. in zoology and developmental biology from the University of Florida, Gainesville.

Miriam Stewart, Ph.D. is Professor at the University of Alberta, Canada, where she is on the faculty in the Departments of Nursing; Public Health Sciences; and Medicine. She is a Health Senior Scholar at the Alberta Heritage Foundation for Medical Research and a former Scholar of the Medical Research Council of Canada and National Health Research Development Program. At the University of Alberta, Dr. Stewart also has been the Director and Chair of the Centre for Health Promotion Studies; Director of the Atlantic Health Promotion Research Centre; and, co-principal investigator and co-creator of the Maritime Centre of Excellence on Women's Health. Following an international review, Dr. Stewart was appointed the first Scientific Director of the Canadian Institutes of Health Research, Institute of Gender and Health. Dr. Stewart's research emphasizes social determinants of health and their relevance to policies and programs for vulnerable populations. In the research programs and research centres, she has focused on building research capacity; mobilizing interdisciplinary and multi-site research teams; creating research infrastructures; and establishing partnerships with members of the public, practice, and policy domains.

Elias A. Zerhouni, M.D. began his tenure as the 15th Director of the National Institutes of Health on May 20, 2002. Dr. Zerhouni has overseen the completion of the doubling of the NIH budget. He also is implementing a new research vision for NIH that focuses the biomedical research community's attention upon new pathways of discovery, forms research teams for the future, and re-engineers the clinical research enterprise. Prior to joining NIH, Dr. Zerhouni served as Executive Vice Dean of the Johns Hopkins University School of Medicine, where he also was Chair of the Russell H. Morgan Department of Radiology and Radiological Science, and Martin Donner Professor of Radiology and a professor of biomedical engineering. His research in imaging has led to advances in Computerized Axial Tomography (CAT scanning) and Magnetic Resonance Imaging (MRI) that resulted in 157 peer-reviewed publications and eight patents. Dr. Zerhouni served on the National Cancer Institute's Board of Scientific Advisors from 1998-2002, and has been a member of the Institute of Medicine since 2000.

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