

ENHANCING

Diversity

IN

Science

A Leadership Retreat on the Role of
Professional Associations and Scientific Societies

A SUMMARY REPORT

Washington, DC

February 28, 2008

**Funded by the
National Institutes of Health
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Collaborating Organizations

Collaborative for Enhancing Diversity in Science

AAAS Center for Careers in Science and Technology
American Educational Research Association
American Psychological Association
American Sociological Association
Association of American Medical Colleges
Consortium of Social Science Associations
Federation of American Societies for Experimental Biology
Institute for the Advancement of Social Work Research
Society for Research in Child Development

Recommended citation:
COSSA (Consortium of Social Science Associations). 2008.
*Enhancing Diversity in Science: A Leadership Retreat
on the Role of Professional Associations and Scientific
Societies, A Summary Report*. Washington, DC:
COSSA.



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Acknowledgements

The Planning Committee of the Enhancing Diversity in Science retreat would like to acknowledge the continued dedication and commitment of the leadership of the collaborative organizations who came together from diverse disciplines around a common mission. A special thank you goes to Angela Sharpe of the Consortium of Social Science Associations (COSSA) for her leadership in launching this endeavor and in spearheading the planning, fund-raising and follow-up activities.

We also want to recognize the invaluable knowledge, perspective and expertise shared by the speakers and the leaders of the professional associations and scientific societies who participated in this event, all of whom greatly contributed to its success. The panels and keynote speakers, Shirley M. Malcom, Arthur L. Coleman, Erich D. Jarvis, Andrés E. Jiménez, Raynard S. Kington, Freeman A. Hrabowski III, Wanda E. Ward, Jeremy M. Berg, Ted Greenwood, Joan Y. Reede, Mary Ann McCabe, and Joan Levy Zlotnik, provided a framework for the meeting. The leaders of the professional associations and scientific societies who participated in the retreat (Appendix A) made a generous commitment of time in this effort to collaborate and work across disciplines to meet the challenges of enhancing the diversity in science.

In addition to the National Institutes of Health and the National Science Foundation for their support of the retreat, we thank the American Association for the Advancement of Science's Center for Careers in Science and Technology (AAAS), American Educational Research Association (AERA), American Psychological Association (APA), American Sociological Association (ASA), Association of American Medical Colleges (AAMC), COSSA, Federation of American Societies for Experimental Biology (FASEB), Institute for the Advancement of Social Work Research (IASWR), Society for Research in Child Development (SRCD), American Association for Dental Research (AADR) and the American Dental Education Association (ADEA) for their sponsorship of the meals and the reception.

Mary Ann McCabe of the SRCD deserves special recognition for her willingness to dedicate time and energy in creating, implementing, interpreting, and presenting the results of an exploratory survey (Appendix E) about the training programs supported by professional associations and scientific societies, the goals of these programs, and the evaluations of the programs. We also would like to thank those professional associations and scientific societies who provided thoughtful input by responding to the survey.

We express our sincerest appreciation to Lee Herring (ASA) for reviewing and editing this report.

This publication is also available to be downloaded free of charge from the COSSA website at www.cossa.org/communication/diversity_workshop/diversity.html.

For more information about the Collaborative for Enhancing Diversity in Science (CEDS), email Angela L. Sharpe at diversity@coossa.org.

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Executive Summary

The United States is the world's leader in science. Maintaining this status is considered to be a national priority. Doing so, however, requires the United States to respond to critical challenges. These challenges include shortages of funding for the federal science agencies, increasing global competition, and a shrinking "pipeline" of talented people interested in science, technology, and clinical careers. Embedded in these challenges is one that has remained unsolved for decades: the need to tap and develop *all* of the diverse talents that make up this country's human capital. In addition to asking whether we are preparing sufficient numbers of scientists with the skills necessary to meet the workforce needs of the 21st century, we need to ensure that future generations of scientists fully engage the nation's spectrum of racial and ethnic diversity so all might contribute to and benefit from our scientific achievements. To keep pace in a global economy, the nation must develop and promote the talents of its *entire* population; it cannot afford to squander the capacity of traditionally underrepresented ethnic or racial minorities.

Professional associations and scientific societies have examined racial/ethnic underrepresentation across the science disciplines to determine what they should do to address the problem. For example, organizations such as the Institute of Medicine, the Sullivan Commission, the National Science Board, and the National Workshop on Improving Education in the Social, Behavioral, and Economic Sciences have issued reports and recommendations over the past five years. Similar work has also been conducted on workforce diversity in related professions such as mathematics, chemical sciences, and information technology. So far, the outcomes, as measured by diversity in the science professions, have been poor.

Recognizing that more must be done to increase diversity, the **Consortium of Social Science Associations (COSSA)** organized and coordinated with eight other professional associations and scientific societies to hold a disciplinary-wide retreat on February 28, 2008. The purpose of this retreat was to discuss the role of these organizations in *Enhancing Diversity in Science*. Retreat organizers included: **AAAS Center for Careers in Science and Technology**, the **American Educational Research Association (AERA)**, the **American**

Sociological Association (ASA), the **American Psychological Association (APA)**, the **Association of American Medical Colleges (AAMC)**, the **Federation of American Societies for Experimental Biology (FASEB)**, the **Institute for the Advancement of Social Work Research (IASWR)**, and the **Society for Research in Child Development (SRCD)**. Primary funding for the retreat was provided by the National Institutes of Health (NIH), with additional funding from the National Science Foundation (NSF).

The retreat participants made the following recommendations:

Recruit and Retain Underrepresented Minorities

Professional associations and scientific societies should make recruitment and retention of underrepresented minority scientists goals of their organizations. These organizations should work with their membership, academic institutions, and funding agencies to monitor impact of programs aimed at broadening participation in science and to develop and sustain effective, new initiatives. Specifically, professional associations and scientific societies should:

- Incorporate diversity goals into their strategic plans. They should espouse inclusion principles in their policies, strategies, program designs, and leadership.
- Work to improve the collection and evaluation of empirical data on underrepresented minorities, as well as research on program outcomes. Likewise, they should work with their members to emphasize the importance of good data collection and evaluation at their home institutions.
- Identify, highlight, and reward model programs and best practices for enhancing diversity.
- Communicate with universities about the status of underrepresented minorities in science to raise awareness and demonstrate commitment and leadership in setting expectations and norms for behavior.
- Provide tools, resources, and incentives to improve member mentoring and provide support to under-

represented minorities during transition periods when there may be gaps in mentoring.

- Provide or identify financial support for professional development workshops.
- Advocate for policies and funding to support diversity initiatives.

Enhance Mentoring of Underrepresented Minorities

Mentoring underrepresented minorities should be integral to any initiative or program designed to enhance diversity in the sciences. Organizations should emphasize the importance of mentoring and promote and facilitate mentoring of students and junior scientists by their senior colleagues. Special mentoring efforts should be made for minority scholars. Specifically, professional associations and scientific societies should:

- Collaborate to emphasize the importance of mentoring throughout its member programs and services, and demonstrate the importance of mentoring to their field and their science. This could lead to new models for other institutions.
- Reward faculty for time spent on mentoring and encourage the provision of grants that offer protected time for mentoring activities.
- Demonstrate the importance of mentoring by showcasing the successes of mentored minority scientists and identify a pool of mentors and mentees who can promote the value of mentoring.
- Build an infrastructure to support long-term mentoring relationships and develop a mechanism to evaluate the sustainability of these relationships.
- Collaborate to develop resources and programs to help mentors and mentees understand goals and expectations. Use professional newsletters to promote these resources.
- Invite students to annual meetings for scientific and nonscientific programming and networking opportunities.
- Collaborate to develop definitions of program success and program evaluation metrics and to collect empirical data on program outcomes.

Improve Evaluation of Diversity Program Outcomes

Professional associations and scientific societies should work together to develop a comprehensive data collection and evaluation system to monitor the success of diversity programs. This information should be collected and shared across organizations and with the public to identify trends, best practices, and areas that need improvement to enhance diversity. Specifically, professional associations and scientific societies should:

- Work together to collect and critically review research and best practices on diversity programs that can be evaluated and generalized across disciplines. These data could be used to generate a typology of programs according to goals and career stage. This information should be continually updated and made publicly available by various means (e.g., Internet, journal articles, critical reviews).
- Convey to their members the value of providing demographic data about themselves so as to increase the provision of this information.
- Work with federal agencies to better inform data-collection strategies and to integrate datasets, when possible.
- Advocate for enhancing federal longitudinal data collection strategies for underrepresented minority issues, as well as for including financial support for program evaluation.
- Collaborate with funding agencies and university departments to collect data on minority scientists and diversity programs. Ideally, organizations will work with different departments at the same institution to achieve critical mass across disciplines and to increase awareness of what is being done on the issue and what has proven successful.

Build Public Support for a Diverse Scientific Workforce

Professional associations and scientific societies should work together to communicate the importance of broadening participation in science to their members, the

Executive Summary (Cont'd)

public, and policymakers. Specifically, professional associations and scientific societies should:

- Develop a joint public statement that simply and coherently articulates common goals with regard to diversity and encourages policy development to affirm those goals.
- Gather data to inform policy decisions and work together to identify best practices and common challenges to enhancing diversity in science. This may involve examining the social science research on the benefits of diversity, translating research findings into action steps, and recognizing and supporting good institutional practices.
- Promote the value of enhancing diversity to their members and provide them with the impetus, foundation, and tools to take action on this issue.
- Develop an informal network of individuals that can communicate about diversity in science to the leadership and membership of other organizations.

The United States is the world's leader in science. Maintaining this status is considered to be a national priority. Doing so, however, requires the United States to respond to critical challenges. These challenges include shortages of funding for the federal science agencies, increasing global competition, and a shrinking "pipeline" of talented people interested in science, technology, and clinical careers. Embedded in these challenges is one that has remained unsolved for decades: the need to tap and develop all of the diverse talents that make up this country's human capital. In addition to asking whether we are preparing sufficient numbers of scientists with the skills necessary to meet the workforce needs of the 21st century, we need to ensure that future generations of scientists fully engage the nation's spectrum of racial and ethnic diversity so all might contribute to and benefit from our scientific achievements. To keep pace in a global economy, the nation must develop and promote the talents of its *entire* population; it cannot afford to squander the capacity of traditionally underrepresented ethnic or racial minorities.

Studies of the U.S. scientific workforce reveal a startling picture. The United States fails to take full advantage of its population's unique diversity and the varied perspectives it brings. Studies routinely show that the number of scientists from ethnic and racial minorities are underrepresented across all science disciplines. Following the National Institutes of Health's designation, this report considers those "underrepresented minorities"

to include racial and ethnic groups of black or African American, Hispanic or Latino, American Indian or Alaskan Native, and Native Hawaiian or other Pacific Islander populations.

Several professional associations and scientific societies have examined this racial/ethnic under-representation across the science disciplines. For example, *In the Nation's Compelling Interest: Ensuring Diversity in the Health Care Workforce*¹ (the Sullivan Commission's report) and *Missing Persons: Minorities in the Health Professions*² examined efforts to increase diversity in medicine and in health professions generally. In *The Science and Engineering Workforce: Realizing America's Potential*,³ the National Science Board published recommendations for federal interventions to build diversity among scientists and engineers. The National Workshop on Improving Education in the Social, Behavioral, and Economic Sciences report, *Education and Training in the Social, Behavioral, and Economic Sciences: A Plan of Action*,⁴ extends the analysis beyond the physical and natural sciences. Similar research also has been conducted on workforce diversity in professions such as mathematics, chemical sciences, and information technology.^{5,6,7}

Increased communication and collaboration among professional associations and scientific societies can be a key ingredient in enhancing diversity in science. Working together, these organizations can, for example, formulate incentives, develop and share empirically based knowledge, strengthen mentoring and support for

¹ Institute of Medicine. 2004. *In the Nation's Compelling Interest: Ensuring Diversity in the Health Care Workforce*. Washington, DC: National Academies Press.

² Institute of Medicine. 2004. *Missing Persons: Minorities in the Health Professions*. Washington, DC: National Academies Press.

³ National Science Board. 2003. *The Science and Engineering Workforce: Realizing America's Potential*. Arlington, VA: National Science Foundation.

⁴ Levine, F.J., Abler, R.F., and Rosich, K.J. (eds). 2004. *Education and Training in the Social, Behavioral, and Economic Sciences: A Plan of Action. A Report to the National Science Foundation*. Arlington, VA: National Science Foundation.

⁵ Medina, H.A. 2004. "Doctorate Degrees in Mathematics Earned by Blacks, Hispanics/Latinos, and Native Americans: A Look at the Numbers." *Notices of the American Mathematical Society*, 51(7):6.

⁶ National Research Council. 2003. *Minorities in the Chemical Workforce: Diversity Models that Work. A Workshop Report to the Chemical Sciences Roundtable*. Washington, DC: The National Academies Press.

⁷ Gallivan, M., Adya, M., Ahuja, M., Hoonakker, P., and Woszczynski, A. 2006. "Workforce Diversity in the IT Profession: Recognizing and Resolving the Shortage of Women and Minority Employees." In: *Proceedings of the 2006 ACM SIGMIS CPR Conference on Computer Personnel Research: Forty Four Years of Computer Personnel Research: Achievements, Challenges & the Future*. Claremont, CA: Association for Computing Machinery.

students and scientists, and build awareness and support for diversity in the scientific community and the public at large. On their own, many professional associations and scientific societies have well-established, successful “interventions” to improve the recruitment and retention of underrepresented minorities at various career stages. Nevertheless, when working together they may be even more successful, as they should have new opportunities to learn from one another, craft common messages, and develop best practices and effective approaches, which can be shared with policymakers, higher education institutions, federal agencies, and foundations.


Despite the advantages of collaboration, there have been too few instances in which professional associations and scientific societies have worked together to enhance diversity in science. In an effort to change this, the Consortium for Social Science Associations (COSSA) identified a group of leading nonprofit professional associations and scientific societies with experience in creating and managing diversity programs and navigating constantly evolving funding mechanisms and legal climate for diversity initiatives. Nine of these organizations formed a planning committee to gather more information from federal and association stakeholders on these issues and to plan for the survey project and a retreat, called “Enhancing Diversity in Science.” The planning organizations included:

- American Association for the Advancement of Science’s Center for Careers in Science and Technology (AAAS)
- American Educational Research Association (AERA)
- American Psychological Association (APA)
- American Sociological Association (ASA)
- Association of American Medical Colleges (AAMC)
- Consortium of Social Science Associations (COSSA)
- Federation of American Societies for Experimental Biology (FASEB)
- Institute for the Advancement of Social Work Research (IASWR)

- Society for Research in Child Development (SRCD)

The group’s first meeting was in July 2007. At that meeting, participants made three important commitments:

- 1. Address the challenges of building, managing, and sustaining diversity initiatives in collaboration.**
- 2. Conduct a survey of scientific and professional organizations to explore the nature of scientific workforce development efforts, specifically including those to enhance diversity in science.** The group developed a survey to learn about existing training programs supported by professional associations and scientific societies. Specific information collected about these programs included goals, evaluations, and how many resources were dedicated to researcher training and workforce development. In November 2007, the survey was sent by e-mail to approximately 250 organizations located across the United States. See *Appendix E* for the survey results.
- 3. Plan a leadership retreat where information, experiences, and ideas could be shared and future action steps could be identified.** Motivated by the conviction that there was a critical need to convene the senior leaders (presidents and executive directors) of professional associations and scientific societies to examine ways to enhance diversity through the development of specific action plans, the planning committee organized a one-day leadership retreat on *Enhancing Diversity in Science*. The goal of this retreat was to spawn collaboration among associations, societies, federal agencies, and private foundations that has been heretofore lacking but will be essential to enhancing recruitment and retention of underrepresented minorities in science. With survey data in hand, the retreat was designed to disseminate what we learned about the programs and their efficacy, and to explore what associations and societies can do to further the training of future scientists.



The range of retreat invitees was intended to ensure representation from the full spectrum of physical, natural, and social, and behavioral sciences, including several clinical research fields.

The planning culminated in a day-long retreat held at the Hamilton Crowne Plaza in Washington, DC, on Thursday, February 28, 2008. The retreat attracted 98 leaders from 37 associations, organizations, and societies, as well as representatives of private foundations and federal agencies (see *Appendix A* for a complete list of participants).

Retreat Summary

Enhancing Diversity in Science brought together leaders from professional associations and scientific societies, universities, federal agencies, and private foundations to explore issues related to broadening participation in the science and engineering workforce and to develop a set of actionable recommendations that the organizations could implement individually and in concert.

Speakers were selected to present ideas, catalyze thinking, and set the context for the breakout group discussions. The speakers were asked to describe personal experiences as well as present strategic perspectives for working with government, foundations, and universities. The planning committee encouraged communication and information sharing among participants—through five concurrent breakout sessions in the morning and afternoon—by crafting discussion prompts and assigning informed moderators to focus participation toward clear action steps. (See retreat agenda in *Appendix B*.)

Summary of Keynote and Panel Discussions

The following section summarizes the topics covered by keynote presentations and panel sessions, which provided a framework for the meeting. These sessions addressed the following questions:

- Why is enhancing diversity in science and engineering important?
- What are the obstacles to enhancing diversity in science?
- What are organizations doing to enhance diversity in science?

Why Is Enhancing Diversity in Science and Engineering Important?

As other countries expand their science and engineering enterprises, scholars and policy makers question whether the United States has the workforce capacity to maintain its competitive edge in these areas. The United States has historically met labor force demands by retraining workers from other fields, relying on immigration, out-sourcing, or off-shoring the work, noted retreat speaker **Shirley M. Malcom, head of Education**

“There is a power to leadership of the professional societies that is absolutely undeniable.”

— *Retreat Speaker*
Shirley M. Malcom

and Human resources at the American Association for the Advancement of Science. Now, as other countries recognize the value of investing in science, technology, and education, they are beginning to adopt the U.S. strategy. As a result, the United States may not be able to continue to rely on immigration to satisfy the increasing demand for scientists and engineers. The good news, according to Malcom, is that “we have no shortage [of scientists and engineers] in the U.S... and according to economists, we probably won’t.” She noted, however, that there is a shortage of minority scientists and engineers. The United States has the talent, panelists agreed, to meet the demands of the 21st century workplace.

NIH Deputy Director Raynard S. Kington reinforced this point when he cited U.S. census data showing that 40 percent of the 18-year-olds counted in the 2000 census were African American, Hispanic, or Asian American. This number is expected to be more than 50 percent by 2050. With a majority of the population expected to come from underrepresented groups, we have a “demographic imperative” to ensure that these individuals are represented in the scientific and engineering workforce. “It’s very important... that we don’t waste any talent we might have,” agreed **COSSA’s executive director, Howard J. Silver.**

Although the “demographic imperative” is a strong motivator of efforts to broaden participation in science and engineering, Malcom encouraged participants to consider the value of diversity itself, asking: “What do we gain by having diverse teams? What do these diverse perspectives allow us to do and be and to accomplish?”

At the National Science Foundation (NSF), “passion” for enhancing diversity stems from the belief “that the scientific and engineering enterprise is strengthened by the intellectual diversity of thought, as well as the diversity and the composition of the participants, and by

the belief that excellence exists everywhere,” said **NSF Deputy Assistant Director for Education and Human Resources, Wanda E. Ward.**

Duke University scientist Erich D. Jarvis drew on examples from his own life and the experiences of his students to emphasize that racial, ethnic, and cultural backgrounds influence perspectives on science. “We have to convince people that the reason to have diversity is that it actually breeds success,” said Jarvis.

Demonstrating the value diversity adds to science and education is especially important in the wake of the U.S. Supreme Court’s recent affirmative action decisions. Retreat speaker **Arthur L. Coleman, an attorney and former Deputy Assistant Secretary for Civil Rights in the Department of Education,** said institutions cannot rely solely on “social justice” arguments or on the perceived need for “compositional diversity” to justify diversity-focused programs and policies. Rather, they must demonstrate that there are “research-based educational benefits associated with diversity in the classroom and in the social setting on a university campus.” The Court’s rulings in the University of Michigan cases “held that, the educational benefits of diversity were compelling,” Coleman noted. This has opened opportunities for broadening participation at colleges and universities. The challenge, Coleman said, is to create an “authentically mission-aligned, integrated, and holistic system of policy development” by which institutions can determine the importance of enhancing educational access and the means to achieve it. Coleman strongly emphasized the need for leadership—and the investment of resources, time, and effort that comes with it—necessary to make diversity a priority.

Institutional commitment to diversity is an essential element of the educational programs that successfully move minority students into scientific careers, agreed **Freeman A. Hrabowski, III, President of the University of Maryland, Baltimore County (UMBC).** Citing successes such as his university’s Meyerhoff Scholars Program, he described a campus in which diversity efforts are a central concern to leadership and faculty alike. The result has been a thoughtful and rigorous education for all students and striking success in increasing the number of minority students who have

gone on to complete doctoral degrees in the sciences.

Andrés E. Jiménez, an administrator in the Division of Academic Affairs at the University of California, echoed Hrabowski’s comments when he said that without senior faculty and administrators representing diversity and bringing equity and inclusion into our institutions, “we cannot achieve the goals that we set forth in this conversation today.”

“Singularly among the challenges colleges, universities and professional schools face today is leadership on this issue.”

— *Retreat Speaker*
Arthur L. Coleman

What Are the Obstacles to Enhancing Diversity in Science?

Careers are often described as following a “pipeline” in which individuals progress linearly from K–12 to professional positions. Several speakers noted, however, that career pathways in the sciences are neither linear nor static. Students may acquire an interest in science at many points in their education, and while some go on to become university and college faculty, others establish careers in industry, clinical practice, and government and policy, among other areas. “These are all successful outcomes,” said **Jeremy M. Berg, Director of the National Institute of General Medical Sciences (NIGMS) at NIH.**

There is a particular need, however, to ensure that we have a sufficient and adequately diverse pool of academic researchers. Panelists acknowledged that pursuing a career in science requires students to navigate a series of educational and career transitions. “Every time you move from one level to the next... you lose people” stated Malcom. Attrition of minority students may be especially great because these groups “have not had a strong attachment to science and engineering fields.” This point was underscored by Hrabowski, who addressed specific challenges to encouraging minority students to pursue and complete advanced training in

Retreat Summary (Cont'd)

Erich D. Jarvis

Erich Jarvis is associate professor of neurobiology at Duke University Medical Center where he has recently been named a Howard Hughes Medical Institute (HHMI) investigator. He studies the neurobiology of vocal communication in parrots, hummingbirds, songbirds and humans. His overall goal is to see whether similarities in brain structures across these groups reveal “constraints on the evolution of brain structures necessary for vocal learning.”



Erich D. Jarvis

Jarvis did not immediately set his sights on becoming a scientist. His first love was dance. Raised in New York City, he attended the High School of the Performing Arts to study ballet, and later modern dance. He won scholarships to the Geoffrey Ballet School in New York, as well as the Alvin Ailey Dance School. “There was a lot of psychological support in my family to challenge yourself, do something that has a positive impact on the world, and be ambitious at it if need be.” As he neared high school graduation, he made the decision to transition from a career as a professional dancer to a scientist, believing that he would have a greater impact as a scientist. Jarvis turned down the Alvin Ailey scholarship and attended Hunter College instead where he majored in biology and math.

But dance was never far behind. “I discovered that the discipline I learned as a dancer, the kind of training and the hard work, and the practice and practice until you get it right again — because you can fail a lot of times — was actually very useful, in some ways almost essential for becoming a scientist.”

During his undergraduate years at Hunter, and later at Rockefeller University where he earned in a PhD neurobiology and animal behavior, Jarvis was supported by a Minority Access to Research Careers (MARC) Fellowship from the National Institute of General Medical Sciences. But he struggled with the idea that his ethnicity had become an advantage. Many of his non-white peers looked down on the MARC Fellowship, believing that he was getting a free ride, and Jarvis fought hard not to internalize these negative opinions. Over time, he came to appreciate the value of a MARC Fellowship as well as its necessity.

“We basically have to convince people that the reason to have diversity is that it actually breeds success. Not because you’re trying to be fair, not because you’re forcing somebody to, although those things might work to a certain degree, but because it breeds success. What we need now is more people to lead by example than by being activists; we need the activists, but there is a dearth of people leading by example, and that’s what I decided to try to do.”

In addition to being named a HHMI Investigator, Jarvis is the recipient of one of the most prized awards given by the National Institutes of Health (NIH Pioneers Award), and one of the highest given by the National Science Foundation (Alan T. Waterman Award).

science, especially at the doctorate level. He has had to think hard about how to get minority students at his own institution to value doctoral education and “to get them excited about becoming PhDs, and in some cases, MD-PhDs.” Recruiting and retaining even those students with a strong interest in science can be difficult. Minority students may be faced with inadequate preparation in foundational math and science courses, financial constraints that compel them to take jobs that detract from their studies, and intended or unintended discrimination. Malcom stated that some people still view underrepresented minorities as the “Achilles heel,” rather than the “ace in the hole” in terms of their potential to contribute to science and engineering.

Troubling disparities between minority scientists and others do not end even when scientists move into the ranks of faculty and independent researchers, Kington noted. African American scientists constituted only 1.3–1.8 percent of principal investigators on investigator-initiated NIH grants between 2000 and 2006. Figures for Hispanics are somewhat better, he stated, but “no strong trends in an upward direction” exist for either group. There are also racial and ethnic differences in success rates for NIH grants, said Kington. The success rate for African American scientists in 2006 was 12.6 percent, whereas their white and Hispanic counterparts received grants at a rate of 21.7 percent and 19.2 percent, respectively. It is not understood, however, what the underlying causes are for those differences. Because today’s scientists have a significant role to play both in training and in serving as role models to students and young professionals, the dearth of minorities in the field may make it difficult to recruit and retain people from underrepresented groups in the future.

What Are Organizations Doing to Enhance Diversity in Science?

Broadening participation in science and engineering has long been framed in terms of “trying to fix the students instead of trying to fix the system,” observed Malcom. There is a need, however, for systemic change, and there are myriad opportunities to implement this change. Malcom pointed to the importance of improving the quality of undergraduate coursework and research experiences, providing students with opportunities for men-

toring, networking, and leadership training. She also said it is important to develop resources that highlight the variety of career options in the sciences. Professional associations and scientific societies have a role to play in all of these efforts, she said, including “recognizing and celebrating” champions of diversity and “affecting and informing policies” that enable the community to move forward on these issues.

A survey of professional associations and scientific societies conducted by the retreat’s planning committee found that these groups are indeed engaged in efforts to improve diversity in science. Nearly half of the 93 societies responding to the survey reported that they sponsor formal programs dedicated to minority training and career development, reported **Mary Ann McCabe, Director of the Office for Policy and Communications at the Society for Research in Child Development.** These programs tend to focus on undergraduate and graduate students, but programs also exist for those at the K–12, postdoctoral, and early career stages. (See *Appendix E* for results of the *Enhancing Diversity in Science* survey.)

A wide variety of initiatives are underway in academe, as well. “Programs can work,” said **Joan Y. Reede of Harvard Medical School**, who heads an office involved in more than 20 diversity-related initiatives, ranging from K–12 to faculty development (see sidebar on page 12). In the 18 years that Harvard’s minority faculty program has existed, the number of underrepresented minority faculty members has risen from 185 to 467. Harvard’s biomedical science careers program, a separate nonprofit organization established by Harvard Medical School, the New England Board of Higher Education, and the Massachusetts Medical Society, has served more than 6,000 students and a range of industries and educational institutions. Working together, Reede says, they have “been able to design programs that address students’ awareness of career options, enabling them to understand that there are multiple trajectories in science and multiple ways to enter and exit the system.”

UMBC, has also had tremendous success in advancing minority scientists, noted Hrabowksi. UMBC has been a leader in producing minority bachelor’s degree recipients—particularly African Americans and Hispanics—

Retreat Summary (Cont'd)

who also earned doctoral degrees in science and engineering, a success at least partially attributable to its Meyerhof Scholars Program (see sidebar on page 14). UMBC also holds an NSF ADVANCE grant through which they have been working to increase the representation of women among faculty. These efforts have had an impact: UMBC doubled the number of tenure-track and tenured women in these fields over the course of about seven years.

UMBC's success is partly the result of its sharp focus on

the organizational environment, said Hrabowski. "We work very hard to pinpoint, to highlight and reflect on the strengths of the campus." This includes assessing the institution's capabilities, ensuring that strategies are linked to the people responsible for implementing them, synchronizing activities across individuals and disciplines, and linking rewards to outcomes. On the ground level, UMBC makes a strong effort to prepare students for the rigors of scientific training by providing them with a strong foundation in math and science. For

Harvard Medical School Minority Faculty Development Program

In May of 1990, the Harvard Medical School Faculty Council unanimously approved the creation of the Minority Faculty Development Program (MFDP).

MFDP is designed to support the career development of junior faculty and to address crucial pipeline issues. This includes:

- Increasing the pool of minority students interested in careers in science and medicine;
- Promoting medical students, graduate students, and fellows to develop the needed skills for success in the academic arena; and Advancing the career development of junior faculty.

MFDP is a part of the Harvard Medical School Office for Diversity and Community Partnership.

The Office for Diversity and Community Partnership was created to promote increased recruitment, retention and advancement of underrepresented minority faculty at Harvard Medical School and to oversee all diversity activities involving Harvard Medical School faculty, trainees, students and staff.

DCP seeks to preserve the Harvard tradition of excellence in medicine and science by amplifying the search for, and support of, well-trained faculty, while creating a cadre of medical professionals reflecting the larger community that we serve. In addition, the Office coordinates the School's many and varied interactions with community groups and organizations. The DCP programs and initiatives fall into two broad areas – minority faculty development and community outreach.

The HMS Affiliated Hospitals and Institutions

- Beth Israel Deaconess Medical Center
- The Cambridge Hospital
- Children's Hospital Boston
- The Forsyth Institute
- Joslin Diabetes Center
- Massachusetts Eye and Ear Infirmary
- Massachusetts Mental Health Center
- Mount Auburn Hospital
- Spaulding Rehabilitation Hospital
- Brigham and Women's Hospital
- The CBR Institute for Biomedical Research
- The Dana-Farber Cancer Institute
- Harvard Pilgrim HealthCare
- Judge Baker Children's Center
- Massachusetts General Hospital
- McLean Hospital
- Schepens Eye Research Institute
- VA Boston Healthcare System

Source: http://www.mfdp.med.harvard.edu/about_mfdp/index.htm

instance, students who receive mediocre grades in math and science courses are urged to repeat them so that they achieve mastery before advancing. UMBC is committed to evaluating the success of its efforts and applying the lessons learned to improving the education and experience of all its students and faculty.

Initiatives aimed at broadening participation operate at the federal level, as well. According to Ward, NSF's portfolio includes programs that address individual and institutional-level factors in the successful production of scientists, technologists, engineers, and mathematicians." Institutional programmatic approaches include NSF's premier Math and Science Partnership (MSP) program engages higher education faculty in the improvement of K–12 teaching. Their flagship undergraduate program, the Louis Stokes Alliances for Minority Participation (LSAMP), has proven to be quite successful, said Ward. An analysis of the program shows that LSAMP students were more likely to pursue and to complete a graduate degree than majority or minority students who did not participate in the program. At the graduate level, NSF sponsors the Alliances for Graduate Education to the Professoriate (AGEP) program, in which nearly half of the nation's 1,450 underrepresented minority PhDs have participated.

Ward also described newer approaches at NSF to bring together programs to increase synergy and collaboration across those funded activities and within institutions of higher education. The *Innovation through Institutional Integration* (I-3) activity is one such effort and focuses on broadening participation, critical junctures, integration of research and education, a globally engaged workforce, and research and evaluation. She then described NSF support for various professional associations that are

leading broadening participation efforts in STEM education and suggested how such efforts might also operate in a more integrative and collaborative fashion.

Programs at NIH tend to be focused at the undergraduate, graduate, and early career level, said Berg of NIGMS. There is a strong sense at NIH that "by diversifying the university and college faculty, there's a real potential for having a catalytic effect in terms of making science careers...more attractive to groups that have traditionally been underrepresented,"

he said. NIGMS initiatives include: Bridges to the Future, which helps students transition from two-year to four-year colleges and from master's to doctoral degree programs; undergraduate and graduate student development programs: Research Initiative for Scientific Enhancement (RISE), Initiative for Maximizing Student Diversity (IMSD); Minority Access to Research

Careers (MARC), and Undergraduate Student Training in Academic Research (U-STAR); and postdoctoral programs, including the Institutional Research and Academic Career Development Award (IRACDA).

In addition, NIH promotes the participation of underrepresented minorities in science through its institutional National Research Service Award (T32) program. Although T32 is not directed specifically toward underrepresented students, it mandates the inclusion of a minority diversity recruitment plan.¹

Private funders are also engaged in efforts to improve the recruitment and retention of minority scientists. The Alfred P. Sloan Foundation launched an initiative to create centers around the country that bring together large numbers of Native American/American Indian masters and doctoral students. According to program director, **Ted Greenwood**, the foundation also has the Minority

"If you show me a department that cares deeply about students, I'll show you one that's much more easily able to help students of color or women. So much of what we've done that's helped us with minorities now helps us with students in general, in chemistry discovery lab for all students, or in the practices we have for first-year students in science in general."

**— Retreat Keynote Speaker
Freeman A. Hrabowski, III**

¹ There are other NIH training programs such as those at the National Institute of Mental Health (NIMH). Relative to other NIH institutes, for example, NIMH has historically devoted a larger percentage of its budget to research training and has funded T32 grants through professional associations and scientific societies since 1974.

Retreat Summary (Cont'd)

PhD Program, which aims to “increase by 100 per year the number of minority students earning PhDs in mathematics, natural science, and engineering.” The program currently serves 81 faculty members on 43 campuses and provides faculty members who have a record of successfully recruiting, mentoring, and graduating minority PhD students with the resources to increase the number of minority students. The package includes scholarship money provided directly to those students and a small sum to institutions to aid in recruitment. The Sloan Foundation holds participating faculty accountable for both the number and the success of their students. To remain in the program, they must succeed in both respects, Greenwood explained.

A recurring theme in the discussion of recruitment and retention programs was the lack of reliable, empirical data on program outcomes and on workforce training

and development. Participants saw these data as vital for understanding and improving diversity programs and for building a legal basis to show that they are necessary and effective. It is important to have an evidence base to provide clarity “to what programs are supposed to [do] and what they have accomplished and why they’re needed,” said Berg.

In her remarks, Wanda Ward commended the assembled organizations for coming together to “see how to move forward in the production of underrepresented minorities in the STEM fields.” Much more remains to be done, however, and speakers agreed that professional associations and scientific societies can have an impact. “You can reset the value structure. You can help to legitimize things that would otherwise be seen as tangential,” said Malcom. “There is a power to leadership of the professional societies that is absolutely undeniable.”

University of Maryland, Baltimore County The Meyerhoff Scholarship Program — Succeeding Together

“Most programs directed to minority students look at remediation and deficits only, on getting students to operate at a minimum level of academic achievement,” says UMBC President Freeman Hrabowski. The Meyerhoff Program offers the nation a different emphasis, one that focuses on highly able African-American students who aspire to become leading research scientists and engineers.

That fundamental shift has captured the attention of many seeking new perspectives on advancing achievement. Scores of representatives from federal agencies, campuses and corporations across the country have all asked Hrabowski the question, “What are you putting in the water?” They visit UMBC’s campus to find out for themselves. The College Board’s National Task Force on Minority High Achievement praised the Meyerhoff Program as an example that could provide broader educational lessons. “If we can reach these students, then we can learn something about how to help all minority students,” explains task force director L. Scott Miller.

The Meyerhoff Program’s success is built on the premise that, among like-minded students who work closely together, positive energy is contagious. By assembling such a high concentration of high-achieving minority students in a tightly knit learning community, students continually inspire one another to do more and better.

Ultimately, the program helps all students learn how to work together and benefit from each others’ experiences. Joel Oppenheim, senior associate dean for graduate students at NYU’s School of Medicine, is one of the program’s biggest admirers. “In addition to producing excellent students, the Meyerhoff Program turns out scholars who have a sense of themselves, of social responsibility, and of ethics, and who continually challenge themselves to do more. The program imbues it. I’ve never seen the ability to instill this kind of leadership and determination anywhere else.”

Source: UMBC (www.umbc.edu/meyerhoff/index.html)

Breakout Sessions Summary

While the panel and keynote presentations provided the overall framework for the meeting, breakout sessions examined issues in detail. In these sessions, participants considered challenges in the context of the policy and funding landscapes, as well opportunities for collaboration among professional associations, funding agencies, and scientific training, and research institutions. In addition, each of the breakout groups developed recommendations to address the challenges identified in the respective discussions. Subjects covered in the breakout sessions include:

- Recruiting and retaining underrepresented minorities
- Mentoring underrepresented minorities
- Evaluating diversity programs
- Building public support for a diverse scientific workforce

Recruiting and Retaining Underrepresented Minorities

Recognizing that scientists face distinct challenges at different phases of their careers, the *Enhancing Diversity in Science* planning committee established two breakout groups to address the retention of underrepresented minorities in science. The first focused on retention of students, postdoctoral scholars, and early career scientists; the second addressed retention of scientists in early-to-late career phases. Both groups examined the factors that contribute to the attrition of minority scientists, as well as the challenges and constraints that associations face in developing and then sustaining career support and transition programs for these groups. The points listed below reflect the combined comments of both groups:

- Career progression involves a series of transition and decision points as scientists move through educational stages, institutions, and career roles. There is a lack of data on the factors that influence the recruitment into and retention through each of these transition and decision points. Likewise, we know little about the effectiveness of programs aimed at supporting the education and career development of underrepresented scholars and scientists.

- A shortage of peers, mentors, role models, and academic and social support to aid educational and career transitions may contribute to the attrition of minorities from science.
- The academic preparation that minority students receive, particularly at the early stages of their education, may not match or support their aspirations for a research career.

“We start by finding faculty with a record of success with underrepresented minority students or faculty in whom, for other reasons, we come to have confidence that they can successfully recruit, mentor, and graduate minority students with PhDs. That is, we look for champions, faculty champions, of minority students. That’s the word I use: faculty champions.”

— *Retreat Speaker*
Ted Greenwood

- Students and faculty tend to be poorly informed about the full array of career options available to one with scientific training. As a result, many may leave science because they have lost interest in pursuing a traditional academic research career.
- Minority faculty members are often asked to take on more service activities (e.g., committee service, mentoring) than other faculty members. These activities increase their total workload and may diminish their research productivity. As a result, minority faculty may be both overburdened and penalized in tenure and promotion decisions.
- Financial considerations, including loan debt, often constrain the educational and career choices that aspiring scientists make. These pressures are often more severe for individuals with modest financial resources, including many students from underrepresented groups. As a result, these individuals may choose not to pursue careers in science, opting for more lucrative career paths instead.
- Professional association and scientific society staff

Retreat Summary (Cont'd)

have only limited contact with individual students and scientists, making it a challenge to provide nuanced and sustained support to their members.

- Competing priorities for financial resources and staff time prevent some associations from fully meeting the educational, career, and professional development needs of their members.

Recommendations

Professional associations and scientific societies should make recruitment and retention of underrepresented minority scientists a goal of their organizations. These organizations should work with their membership, academic institutions, and funding agencies to monitor impact of programs aimed at broadening participation in science and to develop and sustain effective, new initiatives. Specifically, professional associations and scientific societies should:

- Incorporate diversity goals into their strategic plans. Organizations should espouse inclusion principles in their policies, strategies, program designs, and leadership.
- Work to improve the collection and evaluation of empirical data on underrepresented minorities, as well as research on program outcomes. Likewise, they should work with their members to emphasize the importance of good data collection and evaluation at their home institutions.
- Identify, highlight, and reward model programs and best practices for enhancing diversity.
- Communicate with universities about the status of underrepresented minorities in science to raise awareness and demonstrate commitment and leadership in setting expectations and norms for behavior.
- Provide tools, resources, and incentives to improve member mentoring and provide support to underrepresented minorities during transition periods when there may be gaps in mentoring.
- Provide or identify financial support for professional development workshops.
- Advocate for policies and funding to support diversity initiatives.

Mentoring Underrepresented Minorities

Scientific and professional associations, public and private funding organizations, and universities have developed a variety of programs and resources to provide minority students and faculty with access to effective mentoring. Participants in the breakout group addressing this subject identified the types of mentoring programs offered by associations and considered whether “best practices” have emerged from these programs. They were also asked to discuss challenges to improving mentoring and to consider the obstacles to developing effective mentoring programs at the association level. The discussion yielded the following observations:

- Many faculty do not know how to provide, and students do not know how to seek, effective mentoring. Often, both parties lack information about the goals and process of a mentoring relationship and the responsibilities mentors and mentees have to each other.
- Minority students may be less inclined to seek out mentoring compared to other students, because seeking mentoring may suggest that they are less prepared for a science career than students who do not seek mentoring.
- Minority students may desire mentors of their own background, but qualified minority mentors are limited. Those individuals who *are* available often become overloaded with demands to mentor, to serve on campus and national committees, and on professional and scientific boards.
- Faculty perceive that their colleagues and institutions do not support effective mentoring by recognizing the time and resources required or by offering incentives and rewards for effective mentoring. At many institutions, mentoring does not contribute to faculty career advancement since tenure, promotion, and funding all generally depend on research, publication, and grant success and not on mentoring.
- Competing funding priorities make it difficult for professional and scientific associations to develop and sustain mentoring programs.

Recommendations

Mentoring underrepresented minorities should be integral to any initiative or program designed to enhance diversity in the sciences. Organizations should emphasize the importance of mentoring and promote and facilitate mentoring of students and junior scientists by their senior colleagues. Special mentoring efforts should be made for minority scholars. Specifically, professional associations and scientific societies should:

- Collaborate to emphasize the importance of mentoring throughout its member programs and services, and demonstrate the importance of mentoring to their field and their science. This could lead to new models for other institutions.
- Reward faculty for time spent on mentoring and encourage the provision of grants that offer protected time for mentoring activities.
- Demonstrate the importance of mentoring by showing the successes of mentored minority scientists and identify a pool of mentors and mentees who can promote the value of mentoring.
- Build an infrastructure to support long-term mentoring relationships and develop a mechanism to evaluate the sustainability of these relationships.
- Collaborate to develop resources and programs to help mentors and mentees understand goals and expectations. Use professional newsletters to promote these resources.
- Invite students to annual meetings for scientific and nonscientific programming and networking opportunities.
- Collaborate to develop definitions of program success and program evaluation metrics and to collect empirical data on program outcomes.

Evaluating Diversity Programs

Efforts to assess the effectiveness of programs that strive to improve the participation of underrepresented minorities in science are often hampered by a lack of agreement on what the goal of diversity programs should be and a lack of data on program outcomes. To address these issues, breakout session participants were asked to identify distinct and shared goals among association diversity programs, consider the outcomes that need to

be measured to assess progress toward these goals, and discuss how associations are measuring these outcomes. Participants were also asked to identify challenges to collecting and using outcomes data. The following themes emerged:

- Reliable data on minority individuals, at various career stages, can be difficult to obtain, difficult to share, and inconsistently recorded and stored.
- It is difficult to assess the efficacy of programs aimed at enhancing minority participation in science when monitoring and evaluation are undervalued, under funded, and under reported.
- The goals and intended outcomes of diversity programs, and their funding sources, are not always clearly articulated and change over time. This makes it difficult to evaluate the success of these programs as the “yardstick” can be constantly shifting.
- Methods for evaluating the success of diversity programs are frequently inadequate, as evaluation criteria are often imprecise, difficult to measure, or altogether lacking.
- Comparing program outcomes across organizations is complicated, even when programs share common goals. Organizations may use different units of measurement and employ different data collection strategies based on their interests and capabilities.
- The collection of data on minority populations is becoming increasingly difficult as race and ethnicity categories change and increasing numbers of people choose not to provide race and ethnicity information. In addition, there are concerns about confidentiality and privacy disclosure such that some organizations may not be able to collect or share their data.
- Success in science has typically been defined by an individual’s ability to obtain an academic research position and federal research grants. There can be, however, a wider range of successful outcomes. In evaluating the success of diversity efforts, it is vital to broaden the range of what are considered to be successful and desirable outcomes.

Retreat Summary (Cont'd)

- Design of and funding for program assessment and evaluation has, for too long, been an afterthought. Maintaining contact with program participants, especially over longer time periods, is not always feasible.

Recommendations

Professional associations and scientific societies should work together to develop a comprehensive data collection and evaluation system to monitor the success of diversity programs. This information should be collected and shared across organizations and with the public to identify trends, best practices, and areas that need improvement to enhance diversity. Specifically, professional associations and scientific societies should:

- Work together to collect and critically review research and best practices on diversity programs that can be evaluated and generalized across disciplines. These data could be used to generate a typology of programs according to goals and career stage. This information should be continually updated and made publicly available by various means (e.g., Internet, journal articles, critical reviews.)
- Show members the value of providing demographic data about themselves so as to increase the provision of this information.
- Work with federal agencies to better inform data-collection strategies and to integrate datasets, when possible.
- Advocate for enhancing federal longitudinal data collection strategies for underrepresented minority issues, as well as for including financial support for program evaluation.
- Collaborate with funding agencies and university departments to collect data on minority scientists and diversity programs. Ideally, organizations will work with different departments at the same institution to achieve critical mass across disciplines and to increase awareness of what is being done on the issue and what has proven successful.

Building Public Support for a Diverse Scientific Workforce

Programs aimed at increasing the participation of minori-

ties in higher education have come under increasing public, legislative, and legal scrutiny in the wake of the U.S. Supreme Court's rulings on the University of Michigan's diversity practices. In view of these decisions, this breakout group was asked to discuss challenges related to increasing support for minority programs among the public, policy makers, and funding agencies. The following themes emerged from this discussion:

- Professional associations, scientific societies, universities, and many other organizations have been unsuccessful in demonstrating the importance of diversity in educational and scientific settings. Enhancing diversity has been promoted as a way to correct racial imbalances (i.e., affirmative action) rather than as an educational, societal, and economic benefit. The complexity and unfamiliarity of these arguments is a major obstacle to building public support for diversity programs.
- Four decades of investment in diversity programs have led some to believe that a great deal of progress has been made and that special efforts to enhance diversity are no longer necessary. This perception erodes support for diversity programs, both in the present and for the future.
- A national consensus on the importance of educational diversity and the merits of a diverse scientific enterprise does not exist—this is reflected in our professional associations and scientific societies. Recognizing the lack of an internal consensus on the nature and importance of diversity, many leaders are hesitant to make broadening participation an organizational priority.
- A lack of diversity within association and society leadership, staff, and membership often limits their ability to promote diversity more broadly.

Recommendations

Professional associations and scientific societies should work together to communicate the importance of broadening participation in science to their members, the public, and policy makers. Specifically, professional associations and scientific societies should:

- Develop a joint public statement that simply and coherently articulates common goals with regard

to diversity and encourages policy development to affirm those goals.

- Gather data to inform policy decisions and work together to identify best practices and common challenges to enhancing diversity in science. This may involve examining the social science research on the benefits of diversity, translating research findings into action steps, and recognizing and supporting good institutional practices.
- Promote the value of enhancing diversity to their members and provide them with the impetus, foundation, and tools to take action on this issue.
- Develop an informal network of individuals that can communicate about diversity in science to the leadership and membership of other organizations.

Conclusions

The consensus that emerged from the retreat is that enhancing the diversity of the scientific workforce is a shared aspiration. This cannot be accomplished, however, through a single or simple step divorced from institutions' and organizations' overall work and missions. There will be success when the commitment is infused in all aspects of an organization and at all levels of leadership. Most importantly, diversity must be understood as involving not merely a certain number of students, faculty members or workers, but as an essential element of science and of growing a field or discipline. This commitment must be demonstrated by specific actions by organizations, working both individually and in concert. Using their influence, resources, and expertise, America's professional associations and scientific societies can move the issue forward on many fronts.

Next Steps

The planning group recognizes that a collective leadership around enhancing diversity in the sciences is urgently needed. The retreat planning group therefore formed the Collaborative for Enhancing Diversity in the Sciences (CEDS) group to address some of the recommendations that resulted from this retreat.

One challenge that emerged early on is the need to develop a common public statement that articulates common goals with regard to diversity and encourages policy development to affirm those goals. As Arthur Coleman noted during the retreat, we must continue to communicate simple and coherent messages to the scientific community and the public. With this goal in mind, CEDS will continue its efforts to establish and promote a clearinghouse of information about what associations and societies are already doing to enhance diversity in the sciences. It will continually reach out to these organizations to discuss further collaborations.

Retreat Summary (Cont'd)

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Appendix A

Enhancing Diversity in Science

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Enhancing Diversity in Science

Retreat Agenda

- 8:00 – 8:30 AM** Continental Breakfast
- 8:30 – 8:40 AM** Welcome and Introductions
Howard J. Silver – Executive Director
Consortium of Social Science Associations
- 8:40 – 9:15 AM** Framing the Issue
Shirley M. Malcom – Head, Education and Human Resources
American Association for the Advancement of Science
- 9:15 – 10:15 AM** Panel One – Challenges and Obstacles to the Recruitment and Retention of Underrepresented Minorities in Science
Arthur L. Coleman
Holland & Knight
Erich D. Jarvis – Associate Director
The Jarvis Lab, Department of Neurobiology, Duke University Medical Center
Andrés E. Jiménez – (moderator/discussant)
Academic Administrator, Division of Academic Affairs, University of California Office of the President
- 10:15 – 10:30 AM** Break
- 10:30 – 11:30 AM** Breakout Groups
Group 1: Evaluating Diversity Programs Outcomes – *Franklin Park A*
Group 2: Mentoring Underrepresented Minorities – *McPherson Square*
Group 3: Retaining Underrepresented Minorities in Science: Students Through Early Career Professionals – *Farragut Square*
Group 4: Retaining Underrepresented Minorities in Science: Early Through Later Career Professionals – *Franklin Park B*
Group 5: Generating Support for a Diverse Scientific Workforce – *Hamilton Ballroom*
- 11:45 – 1:15 PM** Lunch
Remarks and Introduction of Speaker
Raynard S. Kington – Deputy Director
National Institutes of Health
Keynote Speaker
Freeman A. Hrabowski, III – President
University of Maryland, Baltimore County
- 1:15 – 1:30 PM** Break

Appendix B (Cont'd)

1:30 - 2:30 PM

Panel Two – Successful Models and Future Initiatives

Wanda E. Ward – Deputy Assistant Director

Education and Human Resources Directorate, National Science Foundation

Jeremy M. Berg – Director

National Institute of General Medical Sciences, National Institutes of Health

Ted Greenwood – Program Director

Alfred P. Sloan Foundation

Joan Y. Reede – (moderator/discussant)

Dean for Diversity and Community Partnership, Associate Professor of Medicine, Harvard Medical School

2:30 - 2:45 PM

Results of Survey to Professional Associations and Scientific Societies

Mary Ann McCabe – Director

Office for Policy and Communications, Society for Research in Child Development

2:45 - 3:45 PM

Breakout Groups

Group 1: Evaluating Diversity Program Outcomes – *Franklin Park A*

Group 2: Mentoring Underrepresented Minorities – *McPherson Square*

Group 3: Retaining Underrepresented Minorities in Science: Students Through Early Career Professionals – *Farragut Square*

Group 4: Retaining Underrepresented Minorities in Science: Early Through Later Career Professionals – *Franklin Park B*

Group 5: Generating Support for a Diverse Scientific Workforce – *Hamilton Ballroom*

3:45 - 4:00 PM

Break

4:00 - 5:30 PM

Summaries from Breakout Groups and Discussion and Identification of Future Action Steps

Joan Levy Zlotnik – (facilitator)

Executive Director

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5:30 - 6:30 PM

Reception

Enhancing Diversity in Science

Speakers' Biographies

Jeremy M. Berg

Jeremy M. Berg is the Director of the National Institute of General Medical Sciences (NIGMS) at the National Institutes of Health. He assumed this position after 18 years on the faculty of Johns Hopkins University. His research interests are centered on the roles of metal ions, particularly zinc(II), in biological systems and on the structural and thermodynamic basis of molecular recognition processes including protein-metal ion, protein-DNA, protein-RNA, and protein-protein binding.

Berg received his B.S. and M.S. degrees in Chemistry from Stanford University. During his time at Stanford, he was actively involved in research with Professors Lubert Stryer and Keith Hodgson. He then moved to Harvard University where he completed his Ph.D. research in the laboratory of Richard Holm, working on synthetic structural and reactivity models for the active sites of molybdenum-containing enzymes. He moved to Johns Hopkins University School of Medicine in 1984 as a postdoctoral fellow in the laboratory of Carl Pabo, investigating the structures of DNA-binding proteins bound to their DNA targets. In 1986, he joined the faculty of the Department of Chemistry on the Homewood campus of Johns Hopkins as an Assistant Professor. He was promoted to Professor in 1990. Later that year, he moved to become Professor and Director of the Department of Biophysics and Biophysical Chemistry and Director of the Markey Center for Macromolecular Structure and Function at Johns Hopkins University School of Medicine. In 2001, he was named Director of the Institute for Basic Biomedical Sciences at Johns Hopkins. He moved to his present position at NIGMS in November, 2003.

His honors include a Presidential Young Investigator Award (1988-1993), the American Chemical Society Award in Pure Chemistry (1993), the Eli Lilly Award for Fundamental Research in Biological Chemistry (1995), and the Maryland Outstanding Young Scientist of the Year (1995). He also received teaching awards from both medical students and graduate students and served as an advisor to the Johns Hopkins Postdoctoral Association since its founding. He is the author of more than 100 research publications and three textbooks: *Principles of Bioinorganic Chemistry* (with Steve Lippard), *Biochemistry* (5th Ed.) (with John Tymoczko and Lubert Stryer), a *Clinical Companion to Biochemistry* (with Kirstie Saltsman and Gordon Tomaselli).

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Coleman served as Deputy Assistant Secretary of the U.S. Department of Education's Office for Civil Rights (OCR) from June of 1997 until January of 2000 following his service as Senior Policy Advisor to the Assistant Secretary for Civil Rights from November of 1993 until 1997. Throughout his Department of Education tenure, Mr. Coleman was responsible for the development of federal civil rights legal policy in education. His focus included issues relating to standards reform, test use, students with disabilities, English language learners, affirmative action, sexual and racial harassment, and gender equity in athletics. Mr. Coleman was a Partner in the firm of Nelson Mullins Riley and Scarborough in Columbia, South Carolina, where he practiced law from 1984 until 1993. He was also Counsel at Nixon Peabody LLP in Washington, D.C. from 2000 until 2004. Coleman has served as an adjunct professor at two law schools and at one graduate school of education. He has spoken widely and published extensively regarding legal and policy issues in education.

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Prior to joining the Sloan Foundation in 1992 he spent eight years as Director of the International Security Policy Program in the School of International and Public Affairs at Columbia University. Between 1974 and 1984 he was Assistant and then Associate Professor of Political Science at the Massachusetts Institute of Technology. For two years, from 1977 to 1979, he was on leave from M.I.T. as a Senior Policy Analyst in the Office of Science and Technology Policy in the Executive Office of the President.

Greenwood received a B.Sc. in physics from the University of Toronto, and an S.M. in physics and a Ph.D. in Political Science from M.I.T. He has written widely on U.S. and NATO defense and arms control policy; environmental, health and safety regulation; and domestic and international energy policy, especially nuclear power and nuclear waste management. At M.I.T. and Columbia he taught courses on arms control; conventional and nuclear force structure planning; quantitative methods for defense planning; science, technology and public policy; and the politics of energy and the environment.

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Freeman A. Hrabowski, III, has served as President of UMBC (The University of Maryland, Baltimore County) since May, 1992. His research and publications focus on science and math education, with special emphasis on minority participation and performance.

He serves as a consultant to the National Science Foundation, the National Institutes of Health, and universities and school systems nationally. He also sits on several corporate and civic boards. Examples include the Carnegie Foundation for the Advancement of Teaching, Alfred P. Sloan Foundation, Constellation Energy Group, the France-Merrick Foundation, Marguerite Casey Foundation (Chair), McCormick & Company, Inc., and the Urban Institute.

Examples of recent awards or honors include election to the American Academy of Arts & Sciences and the American Philosophical Society; receiving the prestigious McGraw Prize in Education, the U.S. Presidential Award for Excellence in Science, Mathematics, and Engineering Mentoring, and the Columbia University Teachers College Medal for Distinguished Service; being named a Fellow of the American Association for the Advancement of Science and Marylander of the Year by the editors of the Baltimore Sun; and being listed among Fast Company magazine's first "Fast 50 Champions of Innovation" in business and technology. He also holds a number of honorary degrees, including most recently from Haverford College, Princeton University, Duke University, the University of Illinois, the University of Alabama-Birmingham, Gallaudet University, Goucher College, the Medical University of South Carolina, and Binghamton University.

He has co-authored two books, *Beating the Odds* and *Overcoming the Odds* (Oxford University Press), focusing on parenting and high-achieving African American males and females in science. Both books are used by universities, school systems, and community groups around the country.

Born in 1950 in Birmingham, Alabama, Hrabowski graduated at 19 from Hampton Institute with highest honors in mathematics. At the University of Illinois at Urbana-Champaign, he received his M.A. (mathematics) and four years later his Ph.D. (higher education administration/statistics) at age 24.

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Erich D. Jarvis

Erich Jarvis is an Associate Professor in the department of Neurobiology at Duke University Medical Center. He attended the High School of the Performing Arts in New York where he studied dance, majoring in ballet. His ambition then was to become a renowned dancer. But his father's interests in science and the natural world (James Jarvis collected fossils and gazed at the stars while living in nature, and he often expounded on mathematics) and his mother's admiration of science influenced Erich's choice of career paths. He attended Hunter College in Manhattan, receiving a B.A. degree with a double major, Biology and Mathematics, in 1988. While at Hunter he was accepted into the Minority Biomedical Research Support (MBRS) and Minority Access to Research Careers (MARC) programs where he worked with Rivka Rudner, a bacterial molecular genetics professor at Hunter College. He studied genes that control protein synthesis, and from this undergraduate work, Jarvis published or was co-author on five papers in major scientific journals. From there, he attended graduate school at The Rockefeller University where and received his Ph.D. in neurobiology in 1995, one of only 52 African-Americans to earn a Ph.D. in biological sciences that year.



Erich D. Jarvis

After completing a post-doctoral fellowship with Fernando Nottebohm, Jarvis received an appointment as an assistant professor in Duke's department of neurobiology. At Duke, he heads a laboratory of 15 researchers with an annual budget approaching \$1 million. In 2002, he was the recipient of the Alan T. Waterman Award, the highest award given by the National Science Foundation to promising young researchers. In 2005, Jarvis received the Pioneer Award from the National Institutes of Health (NIH) to pursue high-risk and ground-breaking projects involving the insertion of novel genes into the brains of non-vocal learning birds. Jarvis received two other NIH funded grants in 2005. One grant involves using Microarray analysis to study vocal driven gene expression in songbirds, and the other involves using Bioinformatics to study neural networks.

Jarvis still finds time to take dance classes, African dance in particular, with students at Duke University. He has a diverse lab, is director of minority recruitment for his department, and enjoys challenging projects on how the brain generates complex behaviors.

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Andrés E. Jiménez

Andrés Jiménez is director of the University of California Program on Opportunity and Equity (UCPOE), an UC-wide academic public service program that applies independent, nonpartisan scholarly research expertise to public policy issues. UCPOE has offices in Berkeley, UCLA, and Sacramento. Jiménez has researched and written about society and politics in the United States and Mexico, U.S. race and ethnic relations, U.S. immigration policy, and U.S.–Latin American relations. He has published commentaries in the *New York Times*, the *Los Angeles Times*, *La Opinion*, and the *San Jose Mercury News*. His analysis and commentaries have also been aired on National Public Radio, Pacifica Radio, the British Broadcasting Service, the Univision Network, and the Telemundo Network. Jiménez received his BA in politics and Latin American studies from the University of California, (UC) Santa Cruz, and pursued doctoral studies in political science at the University of California, Berkeley.



Andrés. E. Jiménez

Before joining UCPOE, Jiménez directed for more than sixteen years the UC California Policy Research Center after coordinating research programs at the Institute of International Studies and the Institute for the Study of Social Change at the University of California, Berkeley for more than a decade. Jiménez serves as member of the State Advisory Council of the Center for California Studies at California State University, Sacramento and the Public Policy Institute of California. He has participated on the editorial committees of the *Harvard Journal for Hispanic Policy* and the *Journal of Hispanic Higher Education*. Jiménez was twice elected to the national Policy Council for the Association of Public Policy Analysis and Management (APPAM) for the 1994-1998 and 2001-2005 terms. He currently serves as chair of the national APPAM Diversity and Equity Committee. He also served on the Advisory Board for a major RAND Corporation study of the effects of large-scale immigration on California, the Board of Directors of the International Institute of the East Bay, and the Newcomers Task Force of Contra Costa County, which he chaired.

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Raynard S. Kington

Raynard S. Kington was appointed Deputy Director of the National Institutes of Health (NIH) as of February 9, 2003. The Deputy Director, NIH, functions as the Principal Deputy Director to the Director, NIH; and shares in the overall leadership, policy direction, and coordination of NIH biomedical research and research training programs of NIH's 27 Institutes and Centers with a budget of almost \$29 billion and 18,000 employees. Prior to this appointment, he had been Associate Director of NIH for Behavioral and Social Sciences Research since September, 2000. In addition to this role, from January, 2002 to November, 2002, he served as Acting Director of the National Institute on Alcohol Abuse and Alcoholism. Prior to coming to NIH, Kington was Director of the Division of Health Examination Statistics at the National Center for Health Statistics (NCHS) of the Centers for Disease Control and Prevention (CDC). As Division Director, he also served as Director of the National Health and Nutrition Examination Survey (NHANES), one of the nation's largest studies to assess the health of the American people. Prior to coming to NCHS, he was a Senior Scientist in the Health Program at the RAND Corporation. While at RAND, Kington was a Co-Director of the Drew/RAND Center on Health and Aging, a National Institute on Aging Exploratory Minority Aging Center.



Raynard S. Kington

Kington attended the University of Michigan, where he received his B.S. with distinction and his M.D. He subsequently completed his residency in Internal Medicine at Michael Reese Medical Center in Chicago. He was then appointed a Robert Wood Johnson Clinical Scholar at the University of Pennsylvania. While at the University of Pennsylvania, he completed his M.B.A. with distinction and his Ph.D. with a concentration in Health Policy and Economics at the Wharton School and was awarded a Fontaine Fellowship. He is board-certified in Internal Medicine and Public Health and Preventive Medicine. In 2006, Kington was elected to membership in the Institute of Medicine of the National Academy of Sciences.

Kington's research has focused on the role of social factors, especially socioeconomic status, as determinants of health. His current research includes studies of the health and socioeconomic status of black immigrants, differences in populations in willingness to participate in genetic research, and racial and ethnic differences in infectious disease rates. His research has included studies of the relationship between wealth and health status; the health status of U.S. Hispanic populations; the determinants of health care services utilization; the economic impact of health care expenditures among the elderly; and racial and ethnic differences in the use of long-term care.

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Shirley M. Malcom

Shirley Malcom is Head of the Directorate for Education and Human Resources Programs of the American Association for the Advancement of Science (AAAS). The directorate includes AAAS programs in education, activities for underrepresented groups, and public understanding of science and technology. Malcom serves on several boards—including the Heinz Endowments and the H. John Heinz III Center for Science, Economics and the Environment—and is an honorary trustee of the American Museum of Natural History. In 2006 she was named as co-chair (with Leon Lederman) of the National Science Board Commission on 21st Century Education in STEM. She serves as a Regent of Morgan State University and as a trustee of Caltech. In addition, she has chaired a number of national committees addressing education reform and access to scientific and technical education, careers and literacy. Malcom is a former trustee of the Carnegie Corporation of New York. She 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, from 1994 to 1998, and from 1994-2001 served on the President's Committee of Advisors on Science and Technology. Malcom received her doctorate in ecology from Pennsylvania State University; master's degree in zoology from the University of California, Los Angeles; and bachelor's degree with distinction in zoology from the University of Washington. She also holds 15 honorary degrees. In 2003 Malcom received the Public Welfare Medal of the National Academy of Sciences, the highest award given by the Academy.



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Mary Ann McCabe

Mary Ann McCabe is Director of the Office for Policy and Communications, Society for Research in Child Development (SRCD), and Associate Clinical Professor of Pediatrics, George Washington University School of Medicine. Her work focuses in science policy, social policy, and the dissemination of research findings in developmental science on behalf of SRCD. She also directs the SRCD Congressional and Executive Branch Fellowship programs. SRCD is an interdisciplinary organization of developmental scientists that was founded by the National Research Council in 1933. One of the five current SRCD strategic goals focuses on the importance of diversity, including seeking additional ways to increase the number of developmental scientists from underrepresented ethnic and racial groups.



Mary Ann McCabe

Prior to assuming her position with SRCD, McCabe was the Director of Training in Psychology and Director of Health Psychology at Children's National Medical Center. McCabe was trained as an undergraduate in developmental research at Clark University, and then continued developmental research and clinical training for her doctorate at the Catholic University of America. She completed a clinical internship and advanced fellowship at Children's Hospital of Boston, Judge Baker Children's Center, and Harvard Medical School. Her areas of research have focused in neuropsychological and behavioral sequelae of medical treatments in children, and her writing has extended to minors' capacity for involvement in decision making about medical and mental health treatment and research. She continues research collaboration and teaching, and maintains a small clinical practice.

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Joan Y. Reede

Appointed as the first Dean for Diversity and Community Partnership in January 2002, Joan Y. Reede is responsible for the development and management of a comprehensive program that provides leadership, guidance, and support to promote the increased recruitment, retention and advancement of under-represented minority faculty at Harvard Medical School (HMS). This charge includes oversight of all diversity activities at HMS as they relate to faculty, trainees, students, and staff.

Reede is director of the Minority Faculty Development Program and faculty director of Community Outreach Programs at Harvard Medical School. In addition, she holds the appointments of associate professor of medicine at HMS, associate professor of society, human development and health at the Harvard School of Public Health, and assistant in health policy at Massachusetts General Hospital. Prior to coming to HMS in 1989, Reede served as the medical director for a Boston community health center and for the Commonwealth of Massachusetts Department of Youth Services. Reede has worked as a pediatrician in community and academic health centers, juvenile prisons, and public schools.

Over the past fifteen years, Reede has created and developed more than 16 programs at HMS that aim to address pipeline and leadership issues for minorities and women who are interested in careers in medicine, academic and scientific research, and the healthcare professions. Supported by a dedicated staff, she has developed mentoring programs for under-represented minority students from the middle school through the graduate and medical school levels. Reede has also designed a training program for middle and high school teachers, developed science curricula for public schools, implemented research and exchange clerkship programs at HMS, and designed and implemented two innovative fellowships in minority health policy for physicians, dentists and doctoral-level mental health professionals.

In addition, Reede founded the Biomedical Careers Program (BSCP) in collaboration with the Massachusetts Medical Society and the New England Board of Higher Education. BSCP is a collaborative, community-based organization involving academia, private industry, medical centers, public education, and professional societies. This organization is designed to identify, support and provide mentoring for under-represented minority students, trainees, and professionals pursuing biomedical careers. In recognition of her far-reaching accomplishments, Reede has received numerous awards. A graduate of Brown University and Mount Sinai School of Medicine, Reede completed her pediatric residency at Johns Hopkins Hospital in Baltimore, Maryland and a child psychiatry fellowship at Children's Hospital in Boston. She also holds an MPH and an MS in health policy and management from the Harvard School of Public Health.

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Joan Y. Reede

Howard J. Silver

Howard Silver serves as the Executive Director of the Consortium of Social Science Associations (COSSA) in Washington, DC, a position he has held since 1988. The Consortium, supported by more than 110 professional associations, scientific societies, universities and research institutes, promotes attention to and federal funding for the social, behavioral, and economic sciences and serves as a bridge between the research community and the Washington policy making community. Silver previously served COSSA as its Associate Director for Government Relations from 1983-88.

Prior to joining COSSA, Silver was a consultant for legislative and political research, a political campaign manager, and a legislative analyst in the U.S. Department of Education. He has taught political science and public policy at a number of colleges and universities. Silver came to Washington in 1980 as an Institute for Educational Leadership Policy Fellow.

Silver has testified before Congress, spoken at many professional meetings on federal funding of science, and written extensively on executive-legislative relations, the federal budget process, and science policy as it affects the social and behavioral sciences. In 2001, to celebrate the Consortium's 20th Anniversary, he co-wrote and edited, *Fostering Human Progress: Social and Behavioral Research Contributions to Public Policy*. In 2006, he published "Science and Politics: The Uneasy Relationship" in *Open Spaces* magazine.

Elected by his science policy colleagues, Silver served from 1994-2000 as the Chairman of the Coalition for National Science Funding (CNSF), an ad-hoc advocacy group with membership from scientific and engineering societies, higher education associations, and industrial groups. A tribute to his leadership of CNSF appeared in the November 1, 2000 issue of the *Congressional Record*. In 1998, he was elected a Fellow of the American Association for the Advancement of Science. He is a co-founder of the Association for the Accreditation of Human Research Protection Systems. In 2006 he became the President of the National Capital Area Political Science Association, after serving on its council. He was on the planning committee for the 2004 Gordon Research Conference on Science and Technology Policy. From 1998-2000 he served on the Council of the American Political Science Association (APSA) and has twice served on the Executive Committee of the Council of Professional Associations on Federal Statistics.

Silver received his Ph.D. in Political Science from The Ohio State University in 1975. A native of New York City, he obtained his B.A. from the City College of the City University of New York in 1969.

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Howard J. Silver

Wanda E. Ward

Wanda E. Ward is the Deputy Assistant Director for Education and Human Resources. Throughout her tenure at NSF, Ward has served in a number of science and engineering policy, planning, and program capacities. These include: Acting Assistant Director for Education and Human Resources (Summer 2006 – January 31, 2007); Acting Assistant Director for Social, Behavioral and Economic Sciences (2004-2005); Deputy Assistant Director for Social, Behavioral and Economic Sciences (1999-2007); Assistant to the Deputy Director for Human Resource Development, Office of the Director (1997-1999); Senior Staff Associate for Policy and Planning, Office of the Assistant Director, Directorate for Education and Human Resources (EHR; 1994-1997); and Program Officer in EHR (1992-1994). From 2001-2002 she was on assignment at the Council on Competitiveness as Chief Advisor to the new initiative, BEST (Building Engineering and Science Talent) where she provided leadership in the launch and development of this public-private partnership, established to carry out the implementation of a national diversity initiative called for by the Congressional Commission on the Advancement of Women and Minorities in Science, Engineering and Technology Development. In SBE, Ward provided critical leadership for development of several NSF-wide activities, including the Human and Social Dynamics priority area, the Science of Learning Centers program, Cyberinfrastructure and the Social Sciences, and the ADVANCE program. She also directed the launch and development of a major activity in SBE to broaden participation through strategic, regional alliances among the top 25 institutional producers of underrepresented minorities at the B.S. and Ph.D. levels. These endeavors led her to forge international research and workforce development collaborations in both developed and developing nations, including China, Europe and South Africa.



Wanda E. Ward

Since joining the Foundation, Ward has also led or served on several NSF and interagency task forces, working groups, commissions and committees. These include: Co-Chair, Subcommittee on Social, Behavioral and Economic Sciences (SBES), the President's National Science and Technology Council (NSTC) Committee on Science (COS, 2004-2005); NSF representative to the Interagency Working Group on the U.S. Science and Technology Workforce of the Future, NSTC COS (1997-1999); Executive Liaison to the Co Vice-Chair of the NSTC former Committee on Education and Training (CET) and Executive Secretary of the NSTC CET Subcommittee on Excellence in Science, Mathematics, and Engineering Education (1994-1996). In this latter capacity, she played a key role in the initial interagency planning, development, and implementation of the Presidential Awards for Excellence in Science, Mathematics, and Engineering Mentoring Program (PAESMEM, established by the White House Office of Science and Technology Policy and administered by the National Science Foundation). In 2005, the NSTC COS SBES published the report, *Combating Terrorism: Research Priorities in the Social, Behavioral and Economic Sciences*.

Before joining NSF, Ward served as tenured Associate Professor of Psychology and Founding Director of the Center for Research on Multi-Ethnic Education at the University of Oklahoma, Norman. She has also held academic positions at the University of Illinois at Urbana-Champaign and the Johns Hopkins University Center for Social Organization of Schools. She took the B.A. in Psychology and the Afro-American Studies Certificate from Princeton University and the Ph.D. in Psychology from Stanford University.

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Joan Levy Zlotnik

Joan Levy Zlotnik has served as the Executive Director of the Institute for the Advancement of Social Work Research (IASWR) since 2000, working to build social work research resources and to translate research to practice, policy and education. She is actively involved in the national policy arena working on the promotion of social work research and behavioral and social science research opportunities. Previously she served as Director of Special Projects and Special Assistant to the Executive Director at the Council on Social Work Education, and as Staff Director for the Commission on Families and Government Relations Associate at the National Association of Social Workers. She has directed federal grants and projects supported by the Annie E. Casey Foundation, John A. Hartford Foundation, Gill Foundation, Kellogg Foundation and the Ford Foundation and has developed and implemented legislative and regulatory strategies to advocate for prevention and early intervention services for vulnerable children, families and older persons. Her areas of interest include building a competent health and human services workforce, promoting community-university partnerships, evidence-based practice, and dissemination and implementation research.



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Appendix D

Enhancing Diversity in Science

Retreat Planning Committee

K. Lee Herring

Lee Herring is a policy and communications specialist whose experience is concentrated in basic science, engineering, and health-related public relations, media relations, as well as public affairs. He has worked in senior positions in a number of key behavioral and social science organizations, did extensive communications consulting for the National Foundation for Brain Research, and served as a media relations officer in the Office of the Director of the National Science Foundation. He is currently the director of communications at the 102-year-old American Sociological Association.

Herring served from 1986-1990 in senior-level communications and government relations positions in the American Psychological Association's Science Directorate. From 1990-1997, he was Director of Communications for the American Psychological Society and oversaw the emergence of its extensive and successful journal-publishing program. He was an IPA (Intergovernmental Personnel Act) rotator in the National Science Foundation's Office of Legislative and Public Affairs (1997-1999), where he served as a spokesman for the agency and coordinated media relations for the National Science Board; Education and Human Resources Directorate; Social, Behavioral & Economic Sciences Directorate; and the Computer and Information Science and Engineering Directorate. Herring was Director of Public Affairs at the American Council of Engineering Companies, where he served as chair of the committee that coordinated the then-50-year-old National Engineers Week. There he pioneered an innovative new industry magazine, *Engineering Inc.* Herring did communications consulting work for the Decade of the Brain initiative, National Parkinson Foundation, American Obesity Association, and other health-oriented organizations.

Herring received a BA in psychology from Tulane University in 1975 and pursued graduate studies in experimental psychology at the University of Georgia, where his research interests were in learning and memory. Among other affiliations, he is a member of the National Association of Science Writers and the Vienna Photographic Society.

Jennifer A. Hobin

Jennifer A. Hobin is a Science Policy Analyst for the Office of Public Affairs at the Federation of American Societies for Experimental Biology (FASEB). At

FASEB, Dr. Hobin works on issues related to scientific training and career development, clinical research, and teaching evolution. Her duties include tracking and analyzing policy changes, developing policy recommendations, and producing communications materials and outreach tools. Prior to joining FASEB, Dr. Hobin was a Christine Mirzayan Science and Technology Policy Graduate Fellow at the National Academies' Committee on Science, Engineering, and Public Policy, where she contributed to a report on maximizing the potential of women in academic science and engineering. She earned her Ph.D. in biopsychology from the University of Michigan by describing the neural circuits mediating the context-specific expression of Pavlovian fear memory. She has a BA in psychology from Stony Brook University, serves on the policy committee for the National Postdoctoral Association, and is Vice President for Programs of the Washington DC Metropolitan Chapter of the Association for Women in Science.

Elizabeth Hoffman

Elizabeth Hoffman is a Legislative and Federal Affairs Officer in the Science Government Relations Office of the American Psychological Association. She received her Ph.D. in psychology from The George Washington University in 2001 and worked as a research psychologist at the National Institutes of Health before joining the faculty at Georgetown University Medical Center. While at Georgetown, Elizabeth studied social perception using brain imaging techniques and received a Young Investigator Award from the Cure Autism Now Foundation. In 2005, Elizabeth was awarded a policy fellowship from the American Psychological Association and spent a year as a Congressional Fellow in the office of Senator Christopher Dodd (D-CT). During her tenure in Sen. Dodd's office, Elizabeth worked to secure passage of the Combating Autism Act which was signed into law in 2006. Elizabeth has been at the APA since 2007 where she advocates and lobbies on behalf of APA members on science research and policy. She serves as the primary APA liaison to the National Institute of Mental Health, the National Institute of Neurological Disorders and Stroke, and the National Aeronautics and Space Administration.

Mary Ann McCabe

See speakers' biographies.

Angela L. Sharpe

Angela Sharpe is the Deputy Director of Health Policy for the Consortium of Social Science Associations. She is responsible for lobbying Members of Congress and their staff on health and behavior research, and representing COSSA to executive branch agencies, particularly the Department of Health and Human Services. She runs two coalitions out of the COSSA office: The Coalition to Protect Research (CPR), which has functioned to protect peer reviewed research projects from congressional attempts to defund them; and the Coalition For the Advancement of Health Through Behavioral and Social Science Research (CAHT-BSSR), which works with National Institutes of Health's (NIH) Office of Behavioral and Social Science Research to infuse health and behavior issues throughout NIH. She is also a member of the Ad Hoc Group for Medical Research's Steering Committee.

She joined the COSSA staff in June 1995. She previously served as a legislative assistant to former Rep. Carrie P. Meek (D-FL) and to the late Rep. R. Lawrence Coughlin (R-PA). Prior to working on Capitol Hill, Sharpe worked for the Library of Congress' National Library Service for the Blind and Physically Handicapped. She earned her Master in Government from The Johns Hopkins University. She received a B.S. in Industrial Relations and a B.S. in Psychology from the University of North Carolina at Chapel Hill.

Jean H. Shin

Jean H. Shin is Director of the Minority Affairs Program at the American Sociological Association. He joined the ASA staff in 2006 after seven years working at McDaniel College in Westminster, MD, where he was Associate Dean of Academic Affairs for First Year Students and an Associate Professor of Sociology. He received his B.A. from the University of Virginia and his M.A. and Ph.D. from Indiana University-Bloomington. At ASA, he directs the Minority Fellowship Program, now in its 34th year, as well as working with diversity-related committees and task forces, science policy initiatives, and all student programs.

Paula Skedsvold

Paula Skedsvold serves as Director of Education Research Policy for the American Educational Research Association (AERA). She received a Ph.D. in Experimental Psychology from the University of South Carolina and a J.D. from the Georgetown University Law Center. She has worked in numerous settings over the last eighteen years—including federal government, state government,

Capitol Hill, and professional research societies—on science, social, and health policy issues. She previously staffed the Social and Behavioral Sciences Working Group of the National Human Research Protections Advisory Committee and also served as Science Policy Analyst at the National Institutes of Health's (NIH) Office of Behavioral and Social Sciences Research. Before joining NIH, Skedsvold was a Congressional Science Fellow in the offices of Congresswoman Nancy Pelosi and Congressman John Lewis. She has also served as Policy Analyst for The Council of State Governments-Midwestern Office, Senior Legal Research Analyst at Georgetown Law's International Women's Human Rights Clinic, and Scientist in the Public Interest for the Society for the Psychological Study of Social Issues. At AERA, Skedsvold is responsible for working with federal agencies, Congress, and advocacy groups to facilitate the development of sound research policies.

Ann Steinecke

Ann Steinecke is the Senior Staff Associate, Diversity Policy and Programs, at the Association of American Medical Colleges. In 2005, Ann joined the AAMC's Division of Diversity Policy and Programs of the AAMC as a senior staff associate. She leads the health care disparities strategy team, co-directs the division's cultural competency team, oversees the division's publications, and provides leadership on strategic planning and thinking.

Prior to joining the Division, Ann was the Deputy Editor of Academic Medicine. In addition to her responsibility for the journal's research publications, she managed the peer review system; staffed the Academic Medicine—GEA-RIME Task Force, which issued "Review Criteria for Research Manuscripts," in September 2001; conducted writing workshops; and served as the journal's contact with the medical education community. She edited the journal's theme issue on medical education research, which was published in October 2004.

Ann received a BA in English from Mount Holyoke College (1983); an MA in creative writing from New York University (1987); and a PhD in American Literature from the University of Maryland (1996).

Karen Studwell

Karen Studwell, J.D., is a Senior Legislative and Federal Affairs Officer in the Government Relations Office of the American Psychological Association's Science Directorate. Karen has been with APA for six years and serves as the primary APA liaison to the National Institute of Child Health and Human Development (NICHD), the

Appendix D (Cont'd)

Institute of Education Sciences (IES) and the Centers for Disease Control and Prevention. Karen received her bachelor's degree in business administration from Ohio University and her law degree from Seattle University.

Richard Weibl

Richard (Ric) Weibl works to strengthen AAAS career development offerings in support of future and current scientists and engineers. Weibl served as an editor for Science's Next Wave, manager of the national Preparing Future Faculty program, and on staff of the Association of American Colleges and Universities. He has held positions at several different colleges and universities.

George L. Wimberly

George L. Wimberly is the Director of Social Justice and Professional Development at the American Educational Research Association (AERA). In this role he coordinates association efforts concerning social justice, diversity, equity, and advocacy in education research. He manages the AERA dissertation and postdoctoral fellowship programs, provides national exposure to these fellowship opportunities, and works directly with grantees and their institutions. This involves working with dissertation and postdoctoral fellows through the AERA/IES fellowships, and partnerships with The American Institutes for Research (AIR) and Educational Testing Service (ETS).

He earned a Ph.D. in sociology from the University of Chicago where his research focused on African American students' educational attainment. He previously served as the Assessment Research Coordinator for the Montgomery County Maryland Public Schools where his research examined achievement gap and student performance issues. As a researcher at ACT Inc., he conducted studies on how urban schools and students use standardized test information for course placement, curriculum development, and postsecondary planning. He has authored/ co-authored several policy reports on the transition from high school to college among African American and Hispanic students and presented this research at many national conferences and colloquia.

Joan Levy Zlotnik

See speakers' biographies.

Enhancing Diversity in Science

Survey of Professional Associations and Scientific Societies

A small group of concerned professional associations and scientific societies¹ convened to explore opportunities for collaboration in their efforts to enhance diversity in science. They sought empirical data on a fundamental question: “What are professional associations and scientific societies doing now?” This led to the development of an exploratory survey of a broad array of professional associations and scientific societies.

This 27-question electronic survey was sent to executive directors of 250 professional associations and scientific societies, representing all major scientific disciplines. The invitation to participate did *not* alert the recipients of the survey to the focus on enhancing diversity, so as to minimize bias in sampling toward those organizations with high interest in this area.² Following two reminder mailings, 93 of the 250 organizations responded.³ Of these respondents, 78 completed the full survey, giving us a final response rate of 31 percent. Most of the respondents were dues-based individual membership organizations (80 percent), and a smaller number represented consortia of organizations (28 percent) and/or institutions (25 percent). The size of organization membership ranged from a low of 3 (a federation representing three societies) to a high of 150,000 (an organization representing individual members).

The overall goal in the survey was to place the activities and outcomes of programs designed for underrepresented minorities *in the* context of programs for training/career development for all scientists in a particular field. Survey questions about an organization’s concerns, programs, and goals were first posed regarding training for *all* scientists in that field (i.e., not just underrepresented minorities), and then a subsequent section of the survey included these same questions focused solely on training scientists who are underrepresented minorities. This was intended to minimize the likelihood of a “response set,” or the tendency to respond similarly to the same question for both groups. This report provides the separate findings across these two sets of questions in tandem, including graphs that depict responses about both groups together. We hope, thus, that readers will be able to place the associations’ efforts to enhance diversity in the context of their general programs to build and enhance their scientific workforce.

Given the relatively small size of this sample, the survey results should be viewed as exploratory, suggesting areas for further study. Whenever possible, qualitative information is summarized so as to be generalizable across disciplinary fields. The survey findings provide insights about the programs of professional associations and scientific societies that aim to enhance diversity in the scientific workforce and provide a basis for initiating collaboration.

¹ Representatives from the following organizations collaborated in the development of the survey: American Educational Research Association (AERA), American Psychological Association (APA), American Sociological Association (ASA), Association of American Medical Colleges (AAMC), Consortium of Social Science Associations (COSSA), Federation of American Societies for Experimental Biology (FASEB), Institute for the Advancement of Social Work Research (IASWR), and the Society for Research in Child Development (SRCD). SRCD was the lead association for developing and administering the survey and analyzing the data.

² The email message in which a hypertext link to the survey was embedded follows: “A group of professional associations and scientific societies are exploring mutual concerns about building the future scientific workforce. One important step in this process is to gather information from a broad array of organizations as to what they are doing now regarding training future scientists. We ask that you please complete the brief survey in the link below to provide some basic information.... Data will be encrypted in the transmission of your survey, and any compilation of findings will be in the aggregate. We will share the compiled results of the survey with all the respondents. In addition to this survey, we are also: meeting with federal agencies about programs; tracking meetings, reports and recommendations that focus on this issue; and seeking to find creative ways to address this area in the future.

³ A list of the associations and societies that responded to the survey is at the end of this report.

Results

The vast majority of survey respondents indicated being “concerned,” to “extremely concerned” about the future availability of sufficient numbers of scientists, particularly those who are from underrepresented minority groups. (See Figure 1.)

FIGURE 1

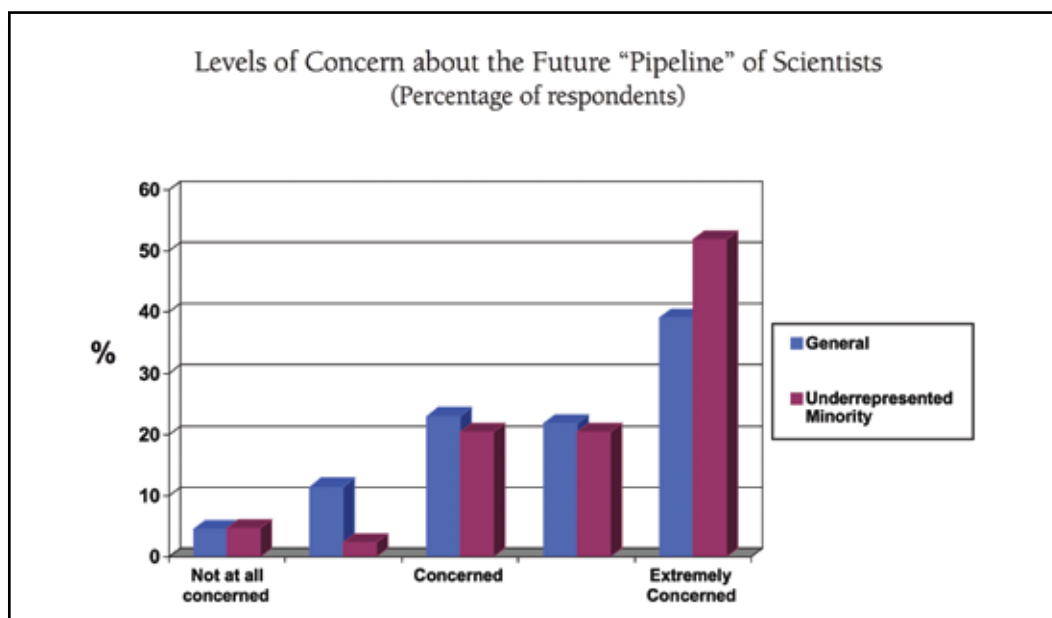


TABLE 1

When asked to describe their “concerns” about the pipeline for the scientific workforce in their field *generally*, survey respondents offered the following:

- An aging science workforce and disproportionate increase in retirement over the next decade, when compared to the availability of new scientists to replace them
- The shrinking science workforce resulting in less new science, an unstable evidence base for clinical practice, and fewer new faculty to train future generation of scientists
- Competition in career direction between clinical practice and academic research due to a disparity in salaries
- Increased clinical demand and decreased research funding, making it more difficult to pursue a science career
- Increased competition in career direction across industry/private sector, academia, and government service
- Lack of public concern for the future science workforce
- Increased practice of importing science and technology talent from overseas, rather than emphasizing workforce development in the United States
- Reduced funding for research, discouraging potential scientists
- A break in the pipeline of young investigators would take decades to repair
- Oversupply of scientists in some fields
- Increased demand for broadly trained scientists with skills in interpersonal communication, teambuilding, and business/management (in addition to science)
- Lack of interest in government service by young scientists
- Research experience during undergraduate training may be critical for retention in science careers
- A changing science workplace, as a result of global competition in science and technology
- Greater need to increase the diversity of those being trained in science careers

When asked to describe “concerns” about the future pipeline of racial/ethnic minority scientists, respondents emphasized the following themes:

- Importance of a science workforce that reflects the demographics of the country
- Importance of a clinical workforce that reflects the demographics of patient populations (Many underrepresented groups have the fastest-growing populations)
- The negative impact (particularly on Latinos) of immigration policies on diversity in science
- Lack of diversity in the science workforce means important questions and perspectives are being missed
- Diversity is a platform for innovation and success
- Pursuit of careers in clinical practice, rather than science, by students from underrepresented groups
- Early acquisition of the necessary baseline knowledge for students to be prepared to enter a science or technology curriculum
- Need for increased effort to recruit underrepresented minorities into science careers from undergraduate science programs
- Importance of personal connection and role models to enhance both early interest and success in science
- Barriers and challenges for achieving success in science careers faced by minority students (e.g., financial, social, cultural, and the availability of appropriate mentors)
- Need to promote the participation, visibility, and advancement of underrepresented minorities within scientific associations and fields
- Negative impact of salary levels, debt burdens, and decreased research funding for enhancing a diverse science workforce
- Need to prioritize enhancing diversity, beyond growing the number of scientists generally

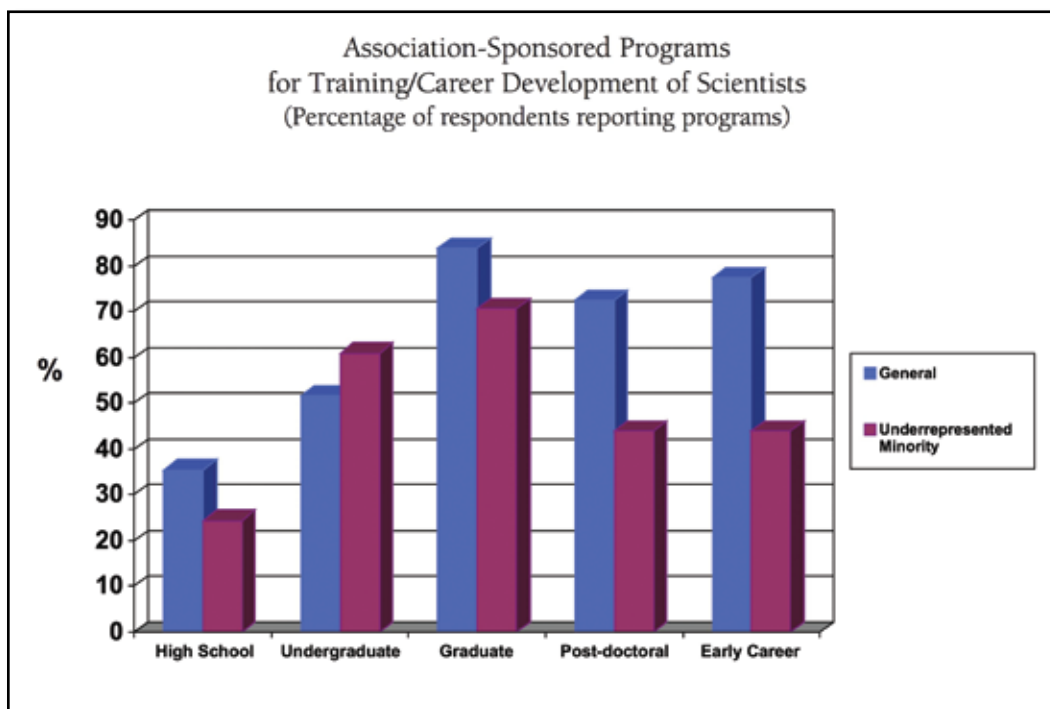
Appendix E (Cont'd)

Respondents were also asked to report “any other specific interests (beyond pipeline issues) in the training/career development of racial/ethnic minority scientists that may be unique to your field.” Their responses clustered in 10 areas that generally apply across many fields of science:

- Health disparities
- Education disparities
- Other specific research issues (e.g., international development, poverty, cultural differences, issues related to neighborhoods and communities, issues related to urban and rural populations)
- Cultural competence in care
- Cultural competence in research (e.g., sensitivity, asking the right questions)
- Mentoring
- Promoting multicultural research
- Increasing minority participation in clinical trials
- Retaining and advancing scientists
- Leadership development
- Translating research for practice

A majority of respondents reported that they currently sponsor formal programs for training/career development of scientists, and almost half reported programs dedicated to underrepresented minorities. The programs for underrepresented minorities are most commonly targeted to undergraduate and graduate students. (See *Figure 2*.)

FIGURE 2



Program Funding Sources

Professional association and scientific society programs are funded by society funds, federal agencies, and private foundations. The federal agency funders that survey respondents cited include: Agency for Healthcare Research and Quality; Centers for Disease Control and Prevention; Department of Energy; Health Resources and Services Administration; Institute of Education Sciences; National Institutes of Health (National Institute on Drug Abuse; National Institute of Mental Health; National Institute of Neurological Disorders and Stroke); National Science Foundation; Office of Disease Prevention and Health Promotion; and Office of Naval Research. The programs/funding mechanisms include: NSF's Alliances for Graduate Education Program (AGEP), and NIH's Minority Access to Research Careers Program (MARC) and K12, R13, R25, T14, T32, T36, U13 grants. Private funding sources include: American Institutes for Research; Educational Testing Service; Robert Wood Johnson Foundation; A.S.P.E.N. Rhoads Research Foundation; Burroughs Wellcome Fund; Fred H. Bixby Foundation; William T. Grant Foundation; graduate school consortia; pharmaceutical companies and other corporate sponsors; and private donations.

Respondents were asked to "describe the nature of activities" for each program and target audience. Professional associations and scientific societies offer a wide range of programs (with different terminology), and their activities can be clustered into three areas: information sharing; active participation; incentives and funding. (See Table 2.)

TABLE 2
Nature of Activities in Programs

	Information	Participation	Incentives/Funding
For High School Students	Web portals	Activities at annual meetings*	Scout badges
	College fairs**	Academic enrichment	Science career awards
	Career fairs	Curricula	Contests
	Career information	Hands-on engagement	Scholarships*
	Videos	Summer camps	Travel awards**
	Brochures	Lab camps	Outreach grants
	Outreach programs*	Summer, Saturday programs	
	Access to profiles of minority scientists**	Science projects	
	List-servs**	Tutoring	
	Leadership development		
	Mentoring*		
	Professional dev for teachers		
For Undergraduate Students	Seminars	Mentoring*	Scholarships*
	Electronic quiz	Leadership development	Travel awards*
	Career sessions for student meetings	Grad school appl. assistance	Research grants
	Career fairs*	Prep for graduate school*	Research Fellowships*
	Brochures	Summer programs*	Enrichment funds*
	Videos	Networking activities*	Membership discounts*
	Open Houses on campus	Activities at annual meetings*	Poster competition*
	Peer communication**	Internships	
For Graduate Students	Seminars	Mentoring*	Scholarships*
	Career consultations	Leadership development*	Travel awards*
	Career fairs	Lab visits	Fellowships*
	Online chats	Advanced institutes	Research grants
	Highlight careers in pubs.	Workshops* incl grant-writing	Pilot study funds
	Career placement service	Summer programs**	Dissertation awards*
	Job boards/job banks	Activities at annual meetings*	Stipends
		Professional dev. Courses*	Subsidized events
		Committee representation	Conference support
		Prep for post-docs*	Membership discounts
		Internships*	Journal discounts
		Special interest groups	Service awards
		Networking**	Research awards*
		Mentoring award**	
		Poster competitions*	

	Information	Participation	Incentives/Funding
For Post-doctoral Students	Career postings	Mentoring*	Travel awards*
	Career placement service	Workshops* incl. grant-writing	Fellowships*
	Career consultations*	Professional dev opportunities*	Stipends
	Job banks	Networking*	Research awards*
	Online resources	Committee representation	Pilot study funds
	Information products	Lab leadership training	Conference support
	Surveys	Internships	Poster competitions*
		Annual meetings*	Membership discounts
		Special interest groups	Meeting discounts
			Teaching awards
			Service awards
			Policy Fellowships
For Early Career Scientists	Seminars*	Mentoring*	Fellowships
	Job banks	Special interest groups	Young Investigator awards
	Online resources	Professional dev. courses*	Early career awards
	Career consultations*	Faculty dev. programs*	Pilot study funds
		Guidance about tenure	Letters of support for grants
		Grant-writing workshops	Research grants
		Advanced institutes	Poster competitions
		Leadership development*	Research awards*
		Research-to-policy training	Travel awards*
		Committee representation	
	Annual meetings*		
	Networking**		

*These items were also specified for programs targeted to underrepresented racial/ethnic minorities

**These items marked were only identified for programs targeted to underrepresented racial/ethnic minorities

Respondents were also asked to “indicate the goal or intended outcome” of each program, among possibilities ranging from simply promoting interest in science to success as an independent researcher. (The questions regarding outcomes of general programs and those dedicated to underrepresented minorities were not contiguous in the survey.) Data indicate that general programs and those dedicated to underrepresented minorities appear to share the same goals and outcomes for high school students, post-doctoral students, and early career professionals. However, the relative emphasis among goals may diverge for undergraduate programs and graduate school programs dedicated to underrepresented minorities. (See Figure 3, and Figures 5-9. Arrows indicate the points of particular interest between outcomes for general programs versus those targeted to underrepresented minorities.) This raises issues for further research: (1) Completion of the doctoral degree may carry particular emphasis for undergraduate programs dedicated to underrepresented minorities; (2) Pursuit of a science career and completion of the doctoral degree may carry particular emphasis in graduate school programs dedicated to underrepresented minorities.

FIGURE 3

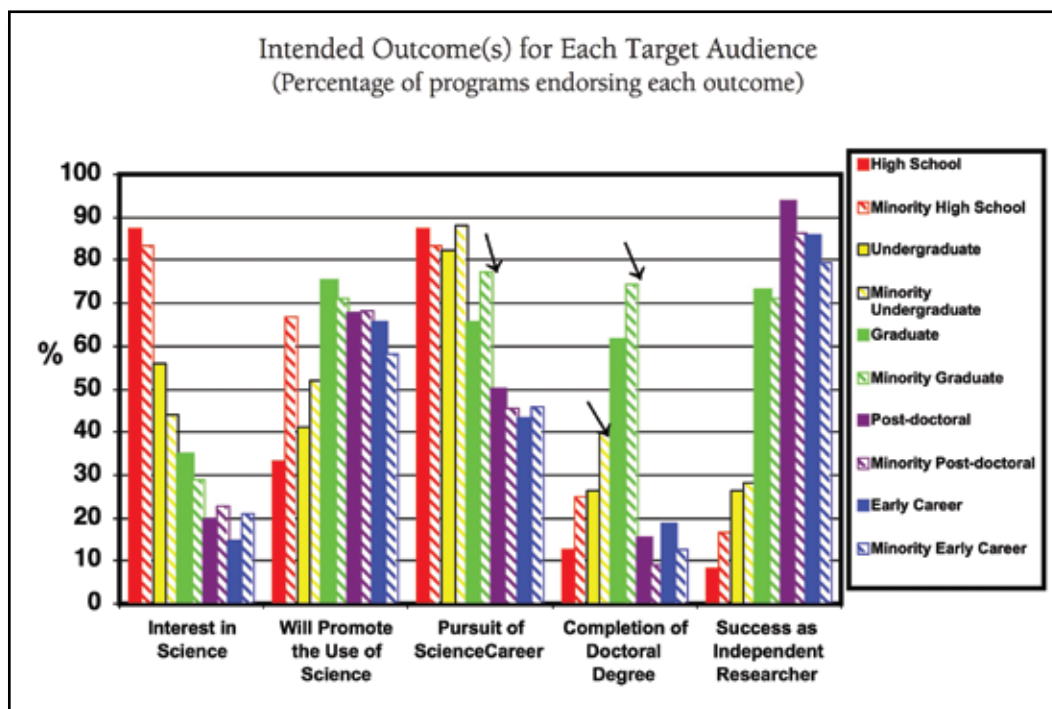


TABLE 3

When asked if they had expected outcomes for their programs beyond those listed in the survey, the respondents also reported:

Desired General Program Outcomes	Desired Underrepresented Minority Program Outcomes
Leadership development Awareness of funding resources Teaching skills Preparation for academic careers Communicating value of science to public	General empowerment Professional success beyond research careers Feedback to association regarding needs Raising awareness of importance of diversity in science Recruitment into field
Outcomes Shared by both General and Underrepresented Minority Programs	
Promoting academic excellence Becoming a role model Mentoring Networking/building a community of scholars Building capacity	

Only 1/3 of survey respondents are currently measuring outcomes of their programs. (See Figure 4.) Within this small group, the frequency with which different outcomes are being measured varies widely.

When asked to describe how they are measuring the target outcomes for their programs, this subsample of respondents included a range of both general and specific “measures.” (See Table 4.) The source of measurement is primarily self-report and institutional records. Finally, the majority of these survey respondents (approximately 75 percent) report that they collect data regarding the demographics of their members, including students.

FIGURE 4

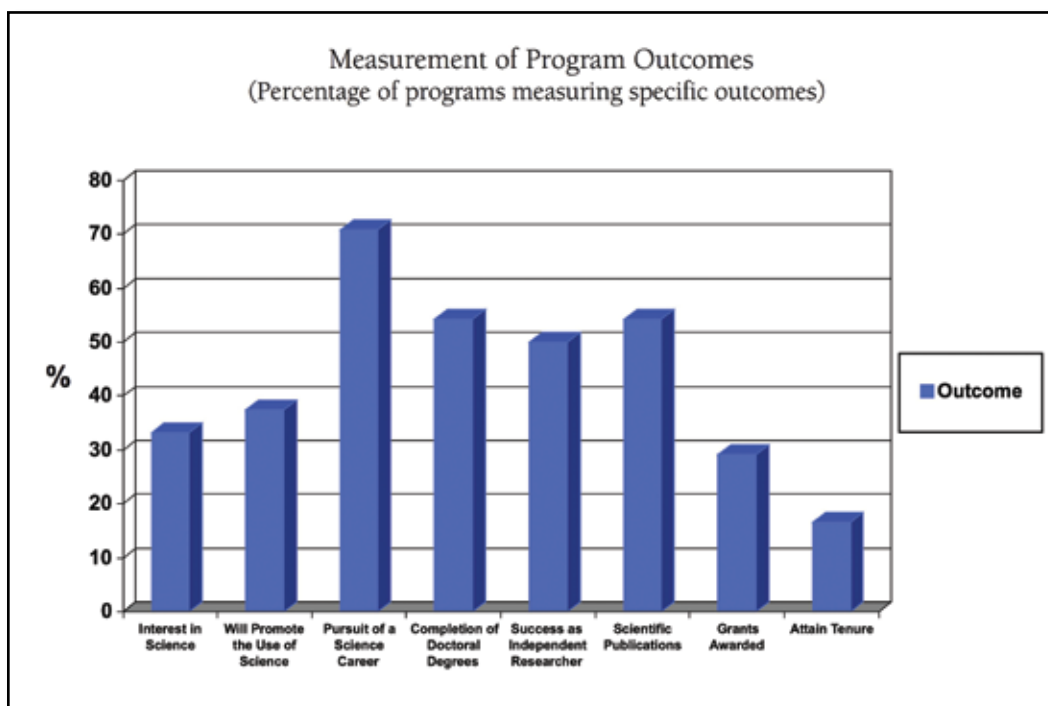


TABLE 4

When asked to describe how they are measuring each of the target outcomes for their programs, respondents listed:

Interest in Science

- Number of students who have continued with science degrees or related fields
- Feedback from participant evaluations
- Number of hits to webpage
- Completion of degree

Will Promote the Use of Science

- Description of science-related activities
- Follow career choices
- List of outreach activities
- Type of work/practice setting
- Project reports
- Promotion of careers in science
- Involvement in research, leadership roles, teaching

Pursuit of Science Career

- Collection of data for education and career choice
- Number who have entered science degree programs
- Completion of advanced degrees
- Program evaluation
- Feedback from participant evaluations
- Number of inquiries regarding science careers
- Attendance at career fairs
- Career choices

Completion of Doctoral Degrees

- Completion of degree
- Confirmation of degree by individual, department, or employer
- Dissertation abstract
- Categorization of highest degree obtained

Success as an Independent Researcher

- Participants' reports of success measures
- Number of research grants awarded
- Number of positions held
- Number of publications
- Number of presentations
- Peer-reviewed award
- Membership in scientific society/professional association

Scientific Publications

- Participants' lists of scholarly publications
- Nature, scope and number of publications
- Publications in peer-reviewed journals
- Abstracts submitted
- Compare participants' publications with similar scientists who did not participate in program

Grants Awarded

- Number of grants, as PI or Co-PI
- Number and size of grants
- Nature, scope, and number of grants
- Receipt of foundation funds
- Success rates of NIH grant applications, primarily R01 grants

Attain Tenure

- Whether attain tenure and in what year

FIGURE 5

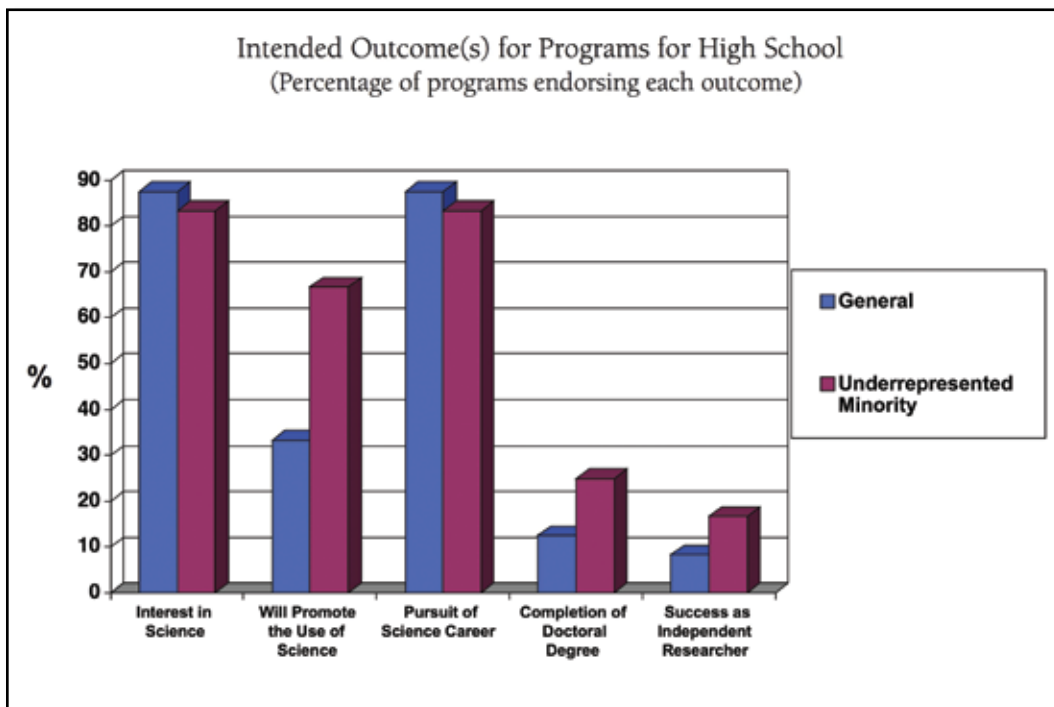


FIGURE 6

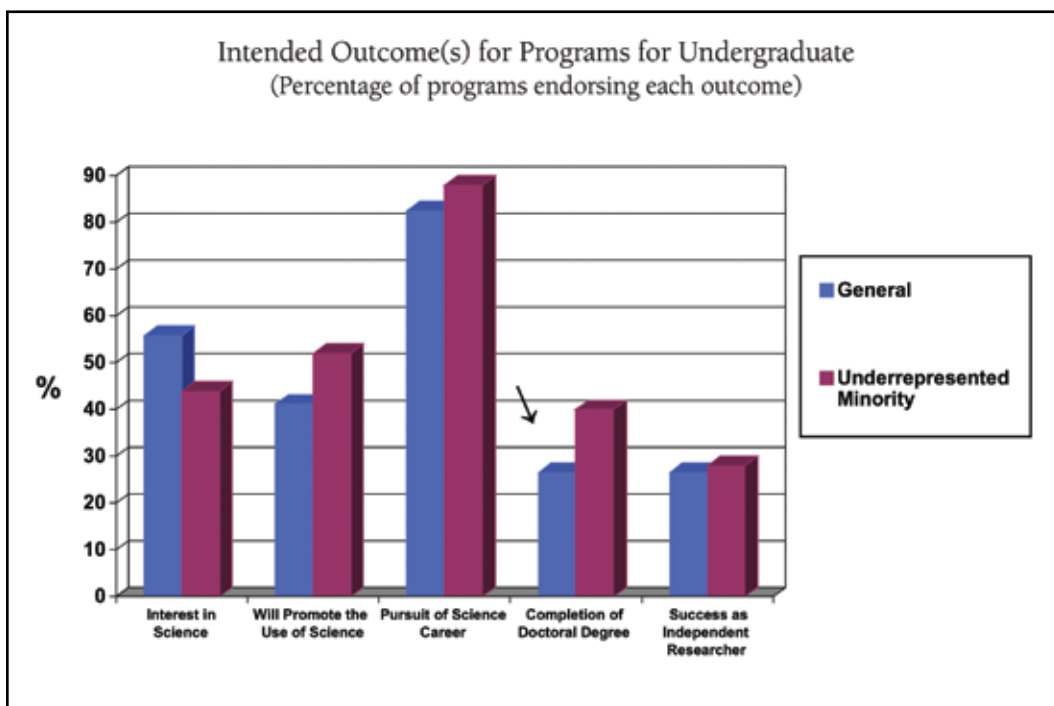


FIGURE 7

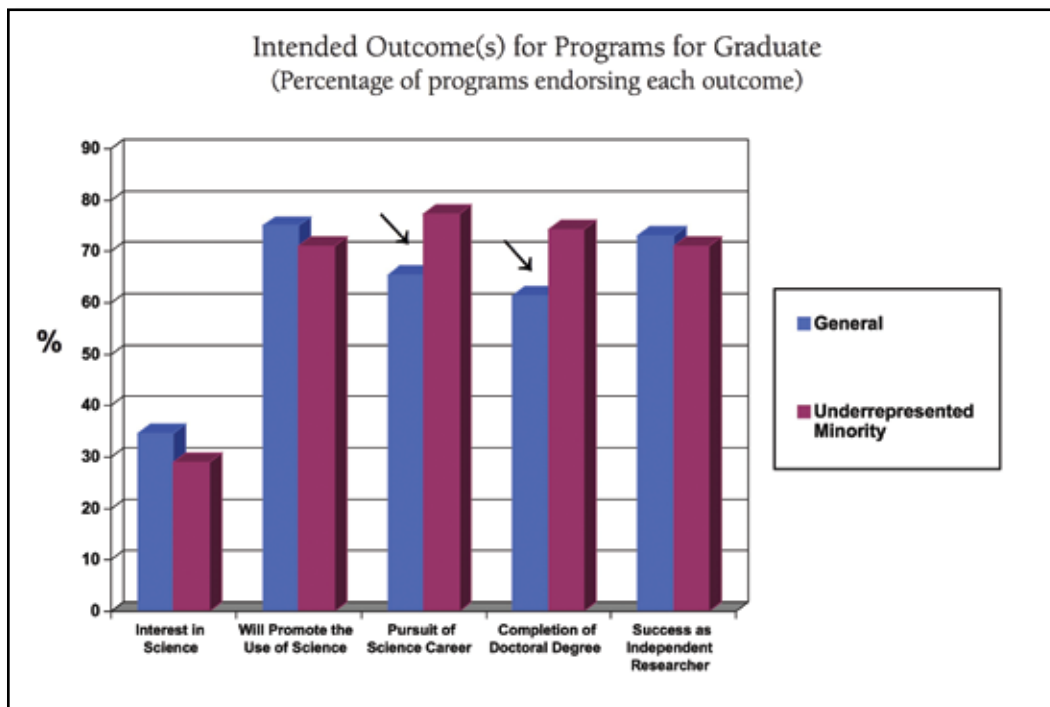


FIGURE 8

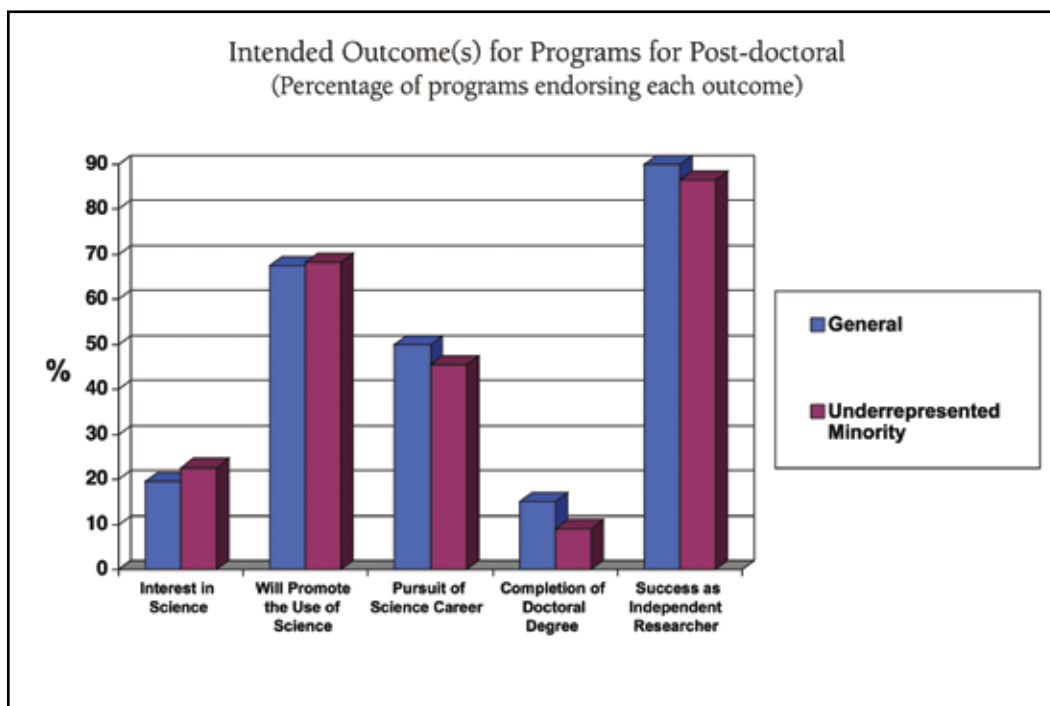
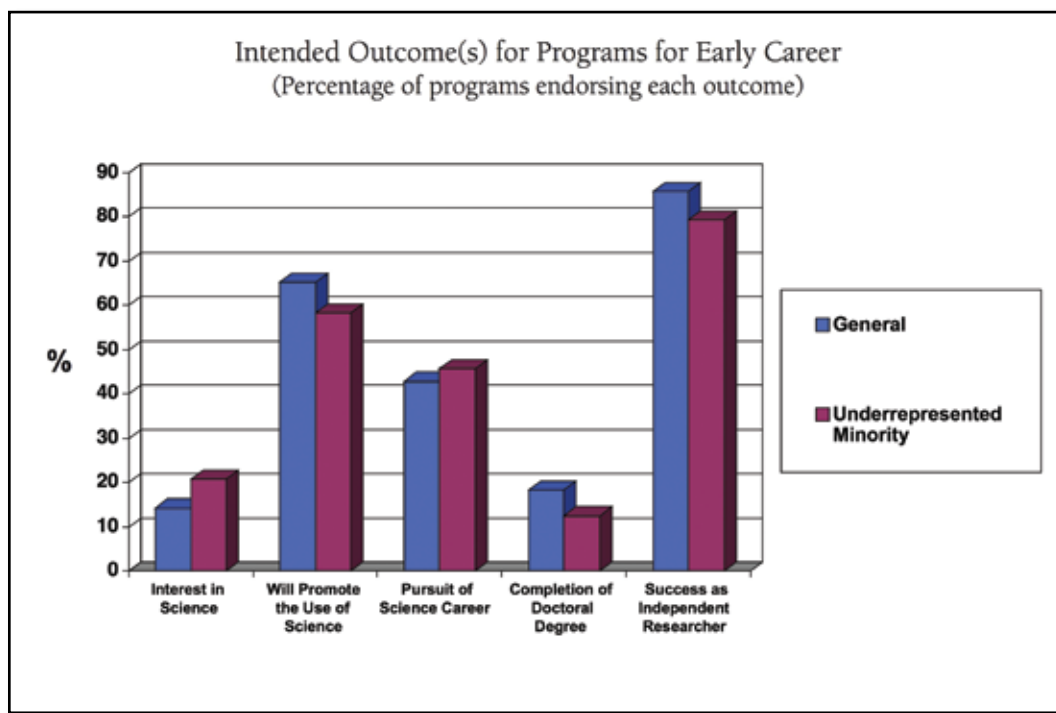


FIGURE 9



Conclusions

Professional associations and scientific societies from diverse fields of science share concern about the future availability of sufficient numbers of scientists, particularly those from underrepresented minority groups. This shared concern can serve as a solid starting point for collaboration. This exploratory survey provides a “snapshot” of what associations are currently doing to build the scientific workforce and to enhance the participation of underrepresented minorities in science. The results of the survey can encourage other focused research in this area. There is a clear opportunity for collaboration in terms of defining success and measuring program outcomes.

The CEDS Planning Committee would like to thank those professional associations and scientific societies who shared their time and thoughtful input in responding to the survey.

Professional Associations and Scientific Societies Responding to Survey

AcademyHealth

American Academy of Child and Adolescent Psychiatry

American Agricultural Economics Association

American Anthropological Association

American Association of Colleges of Osteopathic Medicine

American Association for Dental Research

American Association for Public Opinion research

American Association for Respiratory Care

American Association for the Study of Liver Diseases

American Association of Colleges of Nursing

American College of Neuropsychopharmacology

American Economic Association

American Educational Research Association

American Geological Institute

American Geriatrics Society

American Institute for Medical and Biological Engineering

American Mathematical Society

American Medical Student Association

American Occupational Therapy Association

American Physical Society

American Physiological Society

American Political Science Association

American Psychological Association

American School Health Association

American Society for Microbiology

American Society for Clinical Laboratory Science

American Society for Biochemistry and Molecular Biology

American Society for Engineering Education

American Society for Nutrition

American Society for Parenteral and Enteral Nutrition

American Society of Limnology and Oceanography

American Society of Plant Biologists

American Sociological Association

American Statistical Association

American Thoracic Society

Association for Prevention Teaching and Research

Association for Public Policy Analysis and Management

Association for Research in Vision and Ophthalmology

Association for Women in Mathematics

Association for Women in Science

Association of American Medical Colleges

Association of American Veterinary Medical Colleges

Association of Population Centers

Association of Public Health Laboratories

Association of Schools and Colleges of Optometry

Association of University Centers on Disabilities

Association of Women's Health, Obstetric and Neonatal Nurses

Biophysical Society

College on Problems of Drug Dependence

Congress of Neurological Surgeons

Council of Professional Associations on Federal Statistics

Consortium of Social Science Associations

Council of State and Territorial Epidemiologists

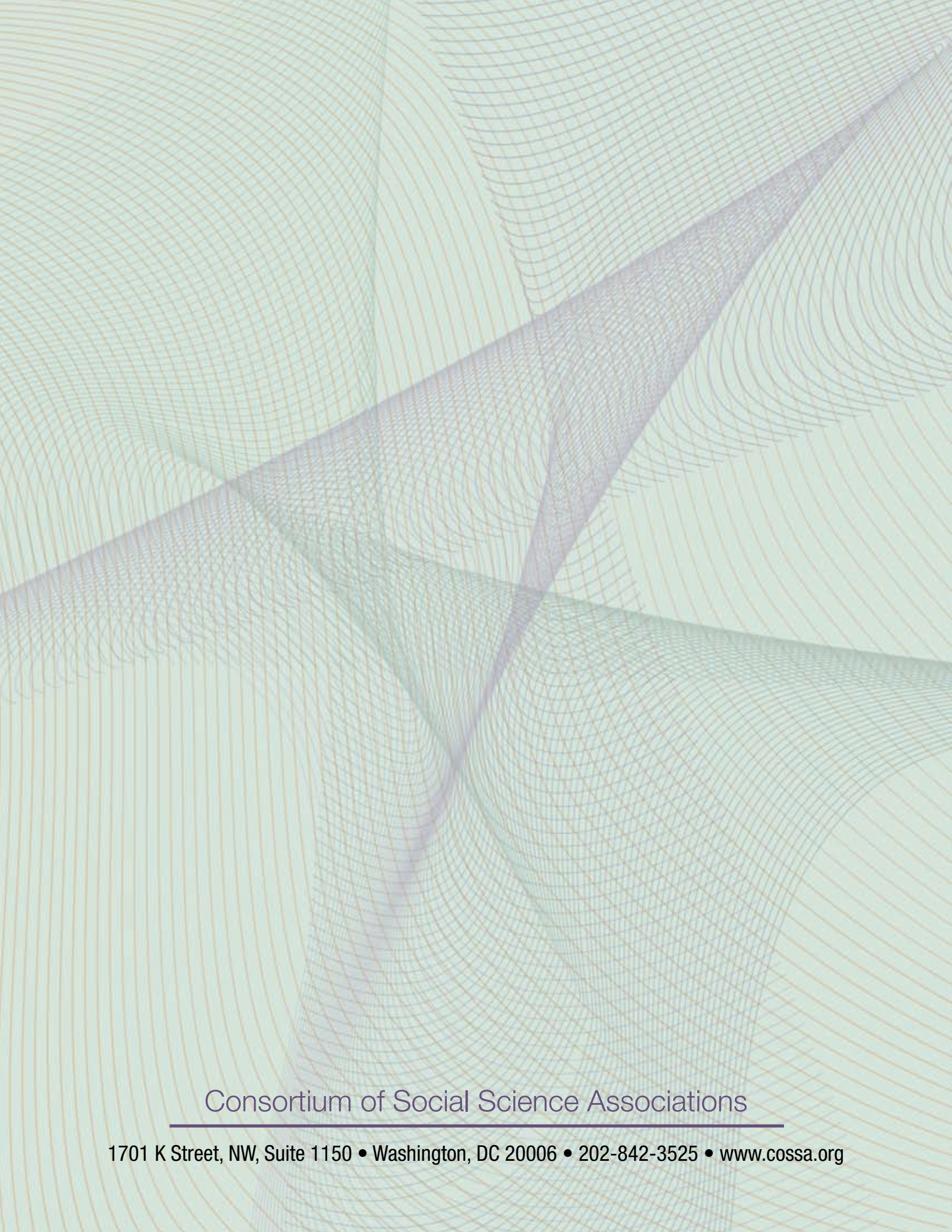
Council on Social Work Education

Council on Undergraduate Research

Federation of American Societies for Experimental Biology

Appendix E (Cont'd)

Federation of Animal Science	National Technical Association
Federation of Pediatric Organizations	North American Regional Science Council
Genetic Alliance	Ornithological Council
Institute for the Advancement of Social Work Research	Population Association of America
Midwest Political Science Association	Population Council - Fred H. Bixby Fellowship Program
National Association of Councils on Developmental Disabilities	Rural Sociological Society
National Association of Children's Hospitals and Related Institutions	Society for Developmental and Behavioral Pediatrics
National Association for the Education of Young Children	Society for Neuroscience
National Association of State Universities and Land-Grant Colleges	Society for Pediatric Research
National Association for Public Health Statistics and Information Systems	Society for Research in Child Development
National Association of Pediatric Nurse Practitioners	Society for Research on Adolescence
National Association of School Psychologists	Society for the Psychological Study of Social Issues
National Caucus of Basic Biomedical Science Chairs	Society for the Scientific Study of Religion
National Communication Association	Society of Behavioral Medicine
National Council on Family Relations	Society of General Internal Medicine
National Opinion Research Center	Society of Hospital Medicine
National Postdoctoral Association	Society of Mexican American Engineers and Scientists, Inc
National Society of Black Engineers	Society of Women Engineers
	The Endocrine Society



Consortium of Social Science Associations

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