Written Testimony
Before the
Committee on Science and Technology
Subcommittee on Research and Science Education

by
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Dr. Baird (chairman), Dr. Ehlers (ranking member), members of the Subcommittee, thank you for the opportunity to testify on the critical role that U.S. non-governmental organizations play in cultivating, promoting, and coordinating international science and technology cooperation.

The American Association for the Advancement of Science (AAAS) is the world's largest multidisciplinary scientific society and publisher of the journal, *Science*. Although we were founded in the United States and our name begins with the word "American", that term belies the inherent role that we play in the international arena. Approximately 20 percent of our members are from outside the United States. Moreover, 35 to 40 percent of the research articles we publish in *Science* have authors located outside of the United States.

As the largest general scientific society in the world, our membership allows us both to draw upon scientists from around the world and to access scientists from a very wide range of fields, including the natural, physical and social sciences, as well as engineering and medical science. This depth and breadth of membership provides a massive resource base for action.

AAAS also has an array of well established and recognized program activities in science education, science policy, science communication, and science and national security. This diversity allows us to engage stakeholders from all regions and sectors required to promote and sustain a robust dialogue with the global scientific community.

Over the years, AAAS has worked hard to broaden its efforts to advance science internationally through a range of meetings and education exchange activities. AAAS's portfolio of programs, publications and members are critical to our efforts to build coalitions among other science organizations, non-governmental organizations (NGOs) and international governments for addressing a wide range of science-society issues and for providing a framework for our broader international efforts. As a AAAS Board of Directors' resolution states, "science is often a means to bridge the political chasm that divides nations." It is a sentiment that is embodied in all of AAAS's international interests and is echoed in our Mission "to advance science and serve society throughout the world."

AAAS International Goals and Missions

While AAAS's international activities typically involve convening special workshops or fostering educational exchanges, our projects can best be characterized as supporting two key and mutually reinforcing objectives:

- Helping to build and knit together the global science enterprise
- Promoting what is called science diplomacy

Building a Global Science Enterprise

Science is by definition global in scope and application - it knows no borders, is not constrained by geography, and no one country has a monopoly on it. Advancements in astronomy, mathematics, biology and medicine can find their roots in a rich history of scientific inquiry, discovery, and the sharing of knowledge whether from Meso-America, the Middle-East, or Europe.

That said, the United States has invested in a rich portfolio of basic and applied research across a diverse spectrum of disciplines, established a higher education system that is envied around the world, and developed a robust scientific infrastructure. Because of these investments, our national science and technology activities are at the very forefront of the world's scientific enterprise. These investments have also greatly benefited human health and well-being, increased standards of living and economic growth, and helped build an informed democratic society.

Because of our international character, we at AAAS believe it is both our mission and a great opportunity to build international partnerships that assist other nations as they begin to become integrated into the global science enterprise. In support of our objective "to serve society," we help developing nations establish the requisite scientific infrastructure in order that they too may better reap the benefits of science as a basis for both their own scientific advancement and their economic and social development.

Two recent examples of such international efforts include:

Women Leaders in Science and Engineering Conference. AAAS worked in collaboration with the U.S. Department of State and the Government of Kuwait to organize the Women's Leaders in Science and Engineering Conference in Kuwait City in 2007. AAAS was able to assemble a delegation of U.S. women scientists and engineers along with nearly 200 female scientists representing the 22 Arab countries. The conference allowed international scientific peers to share experiences and lessons learned in mentoring, scientific publishing and academic leadership. Beyond building practical skills, the conference also provided a critical opportunity for networking and building relationships for potential collaborations in the future; not only between the U.S. and Arab nations, but among the Arab nations present.

Research Integrity Workshop in China. Last September, AAAS conducted a workshop in collaboration with senior members of the Chinese scientific research and policy

community on the subject of research integrity and misconduct. The assembled U.S. delegation included journal editors, former university presidents, and government officials. Chinese delegates include presidents of their universities and leaders of government agencies with responsibilities for science and technology. Because integrity and trust are so critical to scientific research and collaboration, this type of dialogue provided a valuable framework for future partnerships and the further development of China's own standards for the ethical conduct of scientific research.

Science Diplomacy

AAAS's second major objective is to act as a catalyst for what is called "science diplomacy." The over-arching goal of science diplomacy is to use international scientific cooperation to foster communication and cooperation among the peoples of diverse nations and to promote greater global peace, prosperity and stability. Science diplomacy is receiving more and more attention in both the scientific and international relations community.

It might be useful here to draw a somewhat subtle distinction between science diplomacy as conducted by governments and science diplomacy as carried out by non-governmental organizations. As emphasized in a recent Congressional Research Service Report to the Congress[1], science and technology can be used very effectively by government agencies as a diplomatic or foreign policy tool either to help foster another country's development or to increase understanding of U.S. values and ways of doing business. As used by non-governmental organizations, science diplomacy has typically been used to maintain communication and cooperation links among the citizens of countries when their governmental relationships might otherwise be strained or limited[2]. In addition, non-governmental science diplomacy can help build relationships among civil society entities to foster closer people to people relationships whether governmental relationships are good or strained. From my point of view, governments should be interested and supportive of all of these forms of science diplomacy.

Perhaps the most well known example of the success of science diplomacy is the scientific exchanges that took place between the U.S. and the former Soviet Union throughout the Cold War years. These engagements not only helped advance fundamental scientific research, but they also were critical for reinforcing trust between two nations with tense official relationships. In fact in many instances, it provided the only relationship between the two.

AAAS believes this use of scientific collaboration and communication is essential both to the advancement of science and its use for the benefit of our global society. For these reasons I am very pleased to announce today the creation of a new AAAS Center for Science Diplomacy.

The Center is to be guided by the over-arching goal of using science and scientific cooperation to promote international understanding and prosperity. It approaches this goal by

[1] Stine, D.D., "Science, Technology, and American diplomacy: Background and Issues for Congress", Congressional Research Service, May 22, 2008.
[2] Lord K.M. and Turekian V.C., "Time for a New Era of Science Diplomacy", *Science*, February 9, 2007: Vol. 315 no. 5813, pp. 769 - 770.

providing a forum for scientists, policy analysts and policymakers through which they can share information and explore collaborative opportunities. We are particularly interested in identifying opportunities for science diplomacy to serve as a catalyst between societies where official relations might be limited, and to strengthen existing partnerships in science and technology.

The Center's initial activities will focus on:

- Analyzing current and past domestic and international science diplomacy efforts and deriving lessons learned from those that have succeeded;
- Characterizing the major barriers to successful science diplomacy, such as educational and human resource issues, funding problems, or other policy issues; and
- Leveraging existing and building new partnerships with appropriate stakeholders in both the scientific and the international affairs communities to develop new initiatives and projects and expand ongoing successful ones.

Constraints on AAAS Programs

AAAS faces the same dilemmas that the U.S. government faces: how best to balance domestic versus international interests, and how best to balance short-term versus long-term goals. International cooperation takes time to develop and nurture, particularly if it requires infrastructure development in one of the cooperating countries. The impacts of science diplomacy also can take a long time to be realized, since the scientific work must be done and trust must be nurtured over time.

Both collaboration and diplomacy require clear time commitments, and we are limited by the ability of our scientific members to take time from their own research careers to share their expertise and build the necessary relationships. We are fortunate at AAAS, because we can draw upon a very large membership of notable scientists that have both an eager interest in and the necessary experience of working internationally. But that is not always enough. Many large scientific organizations, not only those represented here today - CRDF, AAAS, and the Academy – assist scientists in some capacity to participate in the range of international activities that our organizations sponsor. By collaborating and supporting one another, our organizations are able to maximize the quality of international endeavors, while minimizing the resources required.

Some Potential Government Activities

I will conclude by identifying some possible steps the government might consider in order to better position the United States in undertaking international science activities.

First, we need more efforts like this hearing to raise the profile of these issues, to the government, to the public and to the scientific community. I hope that other committees, particularly those dealing with foreign relations, will work jointly with the Research and Science Education Subcommittee to continue the discussion of the importance of international scientific cooperation and science diplomacy as tools in facilitating international peace, prosperity and security, and build upon the efforts that you have already launched.

An example of a topic that could be explored in a joint hearing might be mechanisms to assist the State Department in the development of better strategies for evaluating science and technology cooperation agreements. Too often the signing of these agreements seems to be an end to the process rather than the start of a long-term, strategic relationship.

Moreover, an analysis could be undertaken jointly by the scientific community and the international relations community to provide guidance for more strategic use of these agreements. This guidance could serve not only to help foster international scientific collaborations and overall relationship building, but also for addressing the many societal challenges we face, such as sustainability, climate change, health, etc.

I also believe there are steps that might improve the effectiveness of the international programs of U.S. governmental research agencies. One concern is that some agencies may be limited by statute in their ability to use federal funds to support international activities because they are not allowed to pay the costs for foreign participants. Many agencies, of course, do participate in joint international projects (e.g., the Space Station), but many still are unable to use their budgets to help pay any of the costs for foreign participation. Although we do agree with the view that U.S. taxpayer funds should be used primarily to support American science, there are instances, such as in international science development activities, where this limitation impedes the ability of the programs to achieve their goals. Specifically, many countries simply cannot afford to support their side of the collaboration, and therefore the collaboration is doomed before it has begun. It is worth noting that the European Commission 7th Framework Program includes a new policy that allows non-European institutions to apply for research funding.

In the realm of science diplomacy, I would encourage Congress and the State Department to organize a workshop or roundtable of relevant stakeholders from the scientific and international affairs communities to look at ongoing efforts and analyze the possibility of establishing new funding mechanisms to catalyze the types of international science cooperation that are consistent with and reinforce the foreign policy objectives of the United States.

Finally, I believe that any efforts to raise the profile and effectiveness of international science require strong White House leadership, mostly likely through a Presidential Science Advisor with sufficient rank to work across the government, most likely the rank of Assistant to the President. Furthermore, the Office of Science and Technology Policy must also have an associate director who has a clear international mandate and the ability to work with the State Department and the National Security Council on issues of international science cooperation.

As science and technology are ever-more imbedded in every aspect of modern life and in every major global policy issue, it is essential that that all relevant parties -- the Executive Branch, Congress, scientific organizations and their members, international think tanks, foundation leaders, and others, work together in a deliberative manner to determine ways and places where science and technology cooperation might be better incorporated into international relations, not only government to government, but critically, civil society to civil society.

APPENDIX A

American Association for the Advancement of Science (AAAS)

The American Association for the Advancement of Science (AAAS) is the world's largest general scientific society, and publisher of the journal, *Science* (www.sciencemag.org). AAAS was founded in 1848, and includes 262 affiliated societies and academies of science, serving 10 million individuals. *Science* has the largest paid circulation of any peer-reviewed general science journal in the world, with an estimated total readership of one million. The non-profit AAAS (www.aaas.org) is open to all and fulfills its mission to "advance science and serve society" through initiatives in science education, science policy; international programs; and an array of activities designed both to increase public understanding and engage the public more with science.

APPENDIX B

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Alan I. Leshner is Chief Executive Officer of the American Association for the Advancement of Science (AAAS) and Executive Publisher of its journal, Science. From 1994 to 2001, Dr. Leshner was Director of the U.S. National Institute on Drug Abuse at the National Institutes of Health (NIH), and from 1988 to 1994 he was Deputy Director and Acting Director of the National Institute of Mental Health. Prior to that, he spent nine years at the National Science Foundation, where he held a variety of senior positions, focusing on basic research in the biological, behavioral and social sciences, on science policy and on science education. Dr. Leshner began his career at Bucknell University, where he was Professor of Psychology. His research has focused on the biological bases of behavior, particularly the role of hormones in the control of behavior. Dr. Leshner is an elected member of the Institute of Medicine of the National Academy of Sciences, and an elected fellow of the AAAS, the American Academy of Arts and Sciences, and the National Academy of Public Administration. He has received numerous awards form both professional and lay groups for his national leadership in science, mental illness and mental health, substance abuse and addiction, and public engagement with science. He received an A.B. degree in Psychology from Franklin and Marshall College and M.S. and Ph.D. degrees in Physiological Psychology from Rutgers University. He also has been awarded six Honorary Doctor of Science degrees.