

**TESTIMONY OF DAVID J. SKORTON
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**THE GLOBALIZATION OF R&D AND INNOVATION: THE UNIVERSITY
RESPONSE**

**HEARING BEFORE THE HOUSE COMMITTEE ON SCIENCE &
TECHNOLOGY**

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Good morning Chairman Baird, Ranking Member Hall, members of the Committee. My name is David Skorton. I am the President of Cornell University. Cornell University, located in Ithaca, N.Y., with campuses or programs in New York City, Geneva, NY, Appledore Island, ME, Arecibo, PR, France, England, Italy, Singapore, China, Tanzania, Qatar and elsewhere, is the largest and most comprehensive school in the Ivy League and is the land-grant university of the state of New York. Founded in 1865, it is composed of 10 privately endowed and four state contract colleges, including seven undergraduate colleges and seven graduate and professional units. Our

four contract colleges are units of the State University of New York (SUNY). Enrollment is approximately 20,000, with students from every state and more than 120 countries studying under an internationally renowned faculty. Forty Nobel Prize winners have been affiliated with Cornell University as alumni or faculty members, and three Nobel laureates currently are on the faculty, in chemistry and physics.

Cornell is among the top 10 research universities in the nation, based on research expenditures. It is home to four national research centers, in physics, astronomy, and nanotechnology. In addition, it has many interdisciplinary research centers, covering advanced materials, manufacturing, agriculture, astronomy and atmospheric science, biotechnology, electronics, environment, computing and mathematics. Cornell also boasts the nation's first colleges devoted to hotel administration, industrial and labor relations, and veterinary medicine. The university's Weill Cornell Medical College in New York City is a pioneer in biomedical technology, with special-treatment and research facilities including the Center for Reproductive Medicine, the AIDS Care Center, the Hypertension Center, the Institute of Genetic Medicine, and the Burn Center.

Thank you for inviting me to share one university's perspective on the globalization of research, development, and innovation. I commend the members of the Science and Technology Committee for your continuing interest in this important and timely issue. This Committee, along with your Senate counterparts, directed the National Academies to produce the *Rising Above the Gathering Storm* report. I am proud of

Cornell's contributions to that effort – our Vice Provost for Research, Dr. Robert Richardson, was a member of the Committee that produced the report.

In many ways, that document provided a wake-up call for policymakers by compiling a lot of the things we already knew about American competitiveness in one place, and, more importantly, by making a series of recommendations for actions we must take to maintain our position as a world leader in technology, research, and innovation. In the area of higher education, the *Gathering Storm* focused on things we can do at home: increasing federal funding for basic research; providing undergraduate scholarships and graduate fellowships for science, math, and engineering students; and rationalizing the immigration process for international students, faculty, scientists, engineers, and researchers who study and work in U.S. universities and industry.

The Science and Technology Committee has gone a long way toward implementing those recommendations, and I thank you for your efforts. I am also grateful that the *Gathering Storm* is just the starting point of your inquiry into globalization. By calling this hearing, you recognize that it is not just what we do at home that matters; it is what we are doing in the rest of the world that will ultimately determine whether we succeed in the twenty-first century.

COMMITTEE QUESTIONS

The Committee has asked me to address three questions:

1. What was the general motivation for your institution to establish branch campuses overseas? What factors did you consider in making the decision to expand overseas, especially in terms of locations, costs, staffing, and the impact on the home campus?
2. What do you anticipate the effects of these overseas branch campus programs will be on the overall global science and technology enterprise, especially in terms of jobs available to your home and branch campus graduates? What sorts of data and information are you collecting to determine if the effects are matching your original goals?
3. How are you adjusting your home campus science and engineering to better respond to the increasingly globalized economy?

I will address the first question, as it relates to Cornell's branch campus in Education City, Doha, Qatar, later in my testimony.

Regarding the second question, let me say that it is not yet clear what the effects of branch campuses will be on the global science and technology enterprise. The opportunity to expand the pool of knowledge for interactions, collaborations, and the exchange of ideas will benefit all nations. The specific outcomes will depend on several factors beyond the purview of higher education including the regulatory environment, the political environment, the economic climate supported by the host country and foreign investment, as well as our ability to attract and retain American students in STEM fields. Our past experience, though, indicates that institution-to-institution cooperation can play

an important positive role in promoting cross-cultural understanding and that real and substantial benefits accrue to the U.S., to our institutions, to our students, staff and faculty, and to the process of innovation, which is the driver of our economic competitiveness in a globalized world. Data will be gathered concerning performance on standardized examinations and employment outcomes of students in the branch campus programs.

Regarding question three, concerning adjustments we are making on our own campus to the challenges of globalization, we are responding to the increasing demands of our students for language instruction, including in the critical need languages of Arabic, Mandarin, Russian, Hindi, and Farsi. We are encouraging students to pursue study abroad, and we have created new undergraduate programs, such as our undergraduate major in China and Asia-Pacific Studies, which is designed to train future leaders who are equipped to address the inevitable challenges and negotiate the delicate complexities in US-China relations. Our faculty are encouraged to undertake collaborative research and engage in joint teaching ventures. We consider it imperative that both our students and faculty learn to understand world cultures as well as business practices and norms.

GENERAL COMMENTS ON INTERNATIONAL COLLABORATIONS

Before I elaborate on the questions posed by the Committee about Cornell's international programs, I would like to emphasize that the issue of globalization for universities is much broader than whether and in what form we export our students,

educational programs, and research enterprise. Science and engineering are already international and have been to an increasing extent for decades. University scientists and engineers collaborate with colleagues from throughout the world. Specialized “big science” facilities like CERN in Switzerland and Cornell’s High Energy Synchrotron Source attract an international cadre of researchers. International scientific and professional meetings provide opportunities for scholarly exchange and networking. All these enterprises help advance knowledge and provide learning opportunities for American students and faculty members as well as for their colleagues from other nations.

International collaborations also provide unique research opportunities for American faculty in fields from population genetics to economics, sociology and global health, and they can provide unique resources, such as genetic material that can be useful in breeding more stress-resistant, flavorful or productive crops. They can also address problems and issues in which the U.S. and international collaborators both have a stake. For example, in keeping with a conversation with India’s Prime Minister Singh in January of this year, Cornell will work with other U.S. universities and Indian counterpart institutions to create a faculty-led Indo-U.S. working group to develop joint research agendas on critical challenges of mutual or complementary interest to the two nations.

One of the greatest contributions that research and land grant universities have made over time is the development of human capacity through the dissemination of our research, teaching, and outreach. I understand that the Science and Technology

Committee does not have jurisdiction over foreign affairs or international aid programs, but I do not think we can talk about what universities are doing overseas without considering our capacity to address global inequalities.

I firmly believe that the enhancement of human capacity relies on and ensures political stability, security, robust public health, and effective education, which, in turn, lead to inquiry, discovery, and innovation in places where they are most needed. Since the Industrial Revolution, and increasingly in the last half century, innovation has led to enormous economic growth; the foundation of innovation is research; and the seat of fundamental research is the university. The university is also the seat of undergraduate, graduate, and professional education – education that leads to new generations of those who inquire, who discover, who innovate.

For the U.S. to retain its strength in science and technology and its leadership in the global economy and to contribute meaningfully to the solution of the world's problems, we must attract the best and brightest students, staff and faculty members to our universities and to our business and industry irrespective of their national origins; we must instill an international perspective in all our students; and we must collaborate with others internationally as never before – for their benefit and ours and for inter-cultural understanding. I firmly believe that international education and research are among our country's most effective diplomatic assets.

The Science Committee has jurisdiction over the programs that fund the research that can be deployed by universities, through their international programs, and by governments, NGOs and others, to raise living standards, improve health, provide economic opportunities, and promote peace in the poorest nations in the world. I believe we can draw on a lesson from our nation's history. Just as Secretary of State George Marshall proposed a massive program of aid and redevelopment for a war-ravaged Europe, I am calling for a new national approach, with university teaching, research, and outreach at its center, to address the socioeconomic inequalities that threaten our nation and the world and to spur economic growth through innovation and capacity building as the Marshall Plan did 60 years ago through aid and joint planning.

CORNELL'S APPROACH TO GLOBALIZATION

While "globalization" is a relatively new concept, Cornell, like many American universities, has a long international history. Ours dates back to our founding, when five international students enrolled in the first class in 1868. Since then, Cornell has educated thousands of international students. Currently we enroll more than 3,000 international students from 120 countries on campus. We rank thirteenth among the top 25 leading host institutions for international students in the U.S., even though our total enrollment is much lower than many of the other institutions on that list.

Whether these students return to their home countries or stay in the U.S. to work or continue their studies, they contribute to America's strength. Those that stay in this country, especially in the sciences and engineering fields, help fill a real need for

scientific and technical talent within universities and in industry. Those who return to their home countries often maintain contact with their former professors and students in their academic programs, laying the foundation for continuing collaboration and admissions referrals to our graduate programs.

While enrolled at Cornell, international students contribute to the diversity of the campus community and contribute positively to the education of all students. This helps broaden the US students' knowledge and understanding of world cultures, which they will need as they enter the marketplace and seek jobs in our international economy.

Today Cornell's international programs involve all of our colleges and professional schools and nearly every program on campus. Most visibly – and perhaps of greatest interest to the Committee – we opened a branch campus of our medical school in Doha, Qatar in 2001. We offer a joint degree program in Singapore (hotel/hospitality) and dual degree programs in China (Asian studies/political science) and India (agriculture). We operate our own study abroad programs in France, Rome, Tanzania, Nepal, Berlin and Tokyo. About 500 Cornell students each year enroll in a Cornell study abroad program or at an international university, with assistance from Cornell Abroad, for a semester or a year.

In forging long-term academic alliances with foreign entities, we ask two key questions: What makes the relationship worth pursuing? What will make the relationship work? The guiding principle governing the evaluation, planning,

negotiation, approval, establishment and operation of an academic alliance abroad is two-fold: the benefits must be compelling and the risks must be manageable. (See Appendix A)

Our approach to globalization is essentially one of building capacity – we believe that as part of our mission we have a responsibility to carry out research on issues where new knowledge could make a difference, to extend ourselves to institutions of higher learning in other parts of the world, and to ensure access to our own system of higher education here at home. As I noted above, we do this in a number of ways:

- through our branch campus in Qatar;
- through interdisciplinary majors and joint or dual degree programs with overseas universities chosen to be of mutual benefit;
- through formal agreements with overseas universities to promote international exchanges in specific programs;
- through foreign study at Cornell centers in other countries; and through study abroad programs that focus on one student at a time.

Through organizations like Engineers for a Sustainable World, which was founded at Cornell and is now a nationwide organization, students can apply their engineering knowledge to address the needs of communities in the developing world. Many of our students have a strong interest in engaging in public service as part of their academic programs, and programs of this sort provide opportunities to learn while performing service on an international scale.

We offer instruction in more than 40 languages including the critical need languages of Arabic, Hindi, Farsi, Mandarin, and Russian. Four of our area studies programs – East Asia, South Asia, Southeast Asia, and Europe – are recognized as National Resource Centers by the U.S. Department of Education. This designation signifies the breadth and excellence that these programs maintain in areas critical to U.S. national interests. Supported in part by federal funds, the programs directly promote the teaching of languages and also make their expertise available to the regional community by presenting films; organizing lectures, seminars, and workshops; and publishing books and working papers.

International Outreach and Collaboration

Cornell's first significant international outreach project – the Cornell-Nanking Crop Improvement Program – began in the 1920s with three Cornell plant breeders who led a team that developed new strains of higher yielding rice, wheat, and other staple crops. Its most important legacy was the development of a generation of Chinese plant breeders who could carry on the work in China once Cornell's formal involvement ended. You may have read about the project – Pearl S. Buck, M.A. '25, accompanied her husband John, an agricultural economist, to Nanking and wrote about her experiences in *The Good Earth*.

Today we have well over 150 agreements for programs in more than 50 countries that run the gamut of arts and sciences, engineering, the professions, agriculture, and

labor relations. Our peers offer many of the same types of international programs as we do, but Cornell is among the leaders in the scale and scope of its international efforts.

Research and extension carried out abroad can provide valuable assistance to the host country while frequently also creating knowledge that can be applied to problems in the U.S. In the case of agricultural research, for example, cooperation with agricultural scientists abroad creates opportunities to share germ plasm that can be used to enhance pest resistance, flavor, drought or cold resistance, productivity and other characteristics that can increase the value of U.S. crops. To improve apples, for example, genetic diversity is critical for such important traits as insect resistance and fruit quality. Toward this end, researchers from the Cornell University-based Plant Genetic Resources Unit at Geneva, New York have organized and led expeditions to Kazakhstan's wild apple groves since 1989, and now maintain a living library of apple species that is used by researchers at the Experiment Station and worldwide.

Our work in India goes back more than 50 years, and with the formation of the new Indo-U.S. working group I mentioned earlier, we see potential for addressing issues and research areas that will benefit both nations. Similarly, we need the capabilities of other universities to address such world problems as global climate change, alternative energy, AIDS/HIV and other global health issues.

In engineering and other high technology fields, a strong presence internationally helps us attract the very best students in the world to study in the U.S. While some of

these students will return to their home countries, others will find employment with U.S. companies, contributing to the ability of those companies to innovate. This will be increasingly important to U.S. companies as the current “baby boom” generation of scientists and engineers nears retirement age.

Yet, even now, fewer of the best students from Asia are coming to the U.S. to study. We will not have the workforce to conduct necessary research that leads to innovation and prosperity without international students. We will also have a hard time replacing the current generation of faculty members at our universities and scientists and engineers in our industries without international students. We must continue these international collaborations and exchanges as we build our capacity as well as capacity overseas.

The Committee’s questions suggest that in creating international collaborations and partnerships, we are giving something away. Let me stress again, as strongly as I can, that the benefits of these collaborations accrue to the U.S. at least as much as to our partners abroad. A new national plan to build capacity at home and abroad is, in my view, essential to establishing strong and economically vibrant nations and to ensuring world peace.

EXAMPLES OF INTERNATIONAL PARTNERSHIPS

The following examples of Cornell international programs are illustrative of the types of our overseas initiatives. It would be impractical for me to list every one of our

international programs in my written statement – the Mario Einaudi Center for International Studies, which has coordinated Cornell’s international programs since 1961, has compiled an exhaustive list of our international centers, programs, and initiatives in its 121-page annual report. I am providing a copy of this report for the hearing record. Interested readers can read or download the annual report at <http://www.einaudi.cornell.edu/initiatives/ar.asp>

Branch Campus – Weill Cornell Medical College-Qatar

Weill Cornell Medical College in Qatar (WCMC-Q) is the first American medical school to offer its degree overseas; it is also the first coeducational institution of higher education in Qatar. It is one of five American universities to be represented in Education City, Doha, Qatar. The others are Carnegie Mellon University, Virginia Commonwealth University, Texas A&M University, and Georgetown University.

Cornell was invited to open our medical school by the government of Qatar through the Qatar Foundation for Education, Science and Community Development. The school was established in April 2001 as a partnership between Cornell and the Qatar Foundation. The Qatar Foundation is a private, non-profit organization set up in 1995 by Sheikh Hamad Bin Khalifa Al-Thani, Emir of the State of Qatar, and headed by his wife, Sheikha Mouza Bint Nasser Al-Misnad. The Foundation assumed all the expenses of construction, operation, and maintenance of the campus. Those costs are estimated to be \$750 million over ten years.

Cornell saw this invitation to establish a new medical school in Qatar as an opportunity to provide medical education in an important region of the world and thereby become part of the developing trend in medical education, which takes advantage of modern communication and transportation, and enhances Cornell's reputation as an international university. The new school provides an opportunity for students from the Middle East to obtain a quality medical degree in their home region of the world and improve the quality of health care in the region. It provides opportunities for our faculty to experience the challenges of teaching in another culture and to investigate the unique medical problems of the region through research in population genetics and other fields. Just recently Qatar announced that they would devote 2.8% of the country's gross domestic product to research. It is also a potential source of international patient referral to our medical center in New York City.

Cornell has full authority and discretion to select and supervise the academic and administrative staff; admit, enroll and instruct students Cornell deems qualified; establish manageable personnel appointment and student enrollment benchmarks and time lines; ensure equal opportunity and non-discrimination anchored in U.S. and New York State law to students, faculty and staff; and prescribe plans and set standards governing the operation of the pre-medical and medical programs of Cornell caliber and quality.

Pre-medical faculty hold appointments at Cornell University; medical faculty are members of academic departments at Weill Cornell Medical College. The pre-medical program is a non-degree set of courses in the sciences basic to medicine, with seminars in

writing and medical ethics. The medical program, which replicates the curriculum taught at Weill Cornell in New York City, features a variety of learning experiences, including problem-based learning, case-based conferences, journal clubs, lab work, and lectures.

The pre-medical program began in 2002, with 25 students enrolled. The medical program matriculated its first class of 16 students in 2004. By 2006, the pre-medical program had matriculated 46 first-year students, while the medical program had matriculated 26 first-year students. We are looking forward to awarding the first medical degrees in Qatar in the spring of 2008, and we will be monitoring the success of the degree candidates as a way to gauge the rigor of the program. We are hoping that many of these students will stay in the Middle East, which desperately needs more qualified physicians.

More information about Cornell's branch campus in Qatar and the medical education program at WMCC-Q is available at <http://www.qatar-med.cornell.edu/> and in Appendix B.

Joint Programs

- **Singapore.** The Master of Management in Hospitality Program is a joint degree program. This yearlong, 3-semester program can be taken either completely in Ithaca or by spending six months in Ithaca and 6 months at the Nanyang Institute of Hospitality Management at Nanyang Technological University in Singapore.

- **India.** The Agriculture in Developing Nations Course is a joint Cornell-India distance education course. Students in the course, from Cornell and from three Indian universities, listen to the same lectures. The Indian students come to Cornell at the end of the fall semester for a two-week tour of agriculture/agribusiness facilities on the Cornell campus in Ithaca and at Cornell's New York State Agriculture Experiment Station in Geneva, and elsewhere in the Central New York area. In January, Cornell students in the course join their counterparts in India for tours of Indian agricultural and agribusiness sites and prepare team projects. The College of Agriculture and Life Sciences has offered this course for 30 years, to prepare students to work in a global economy. A complementary (and older) version of the course focuses on agriculture in South and Central America.
- **Tanzania.** The Weill Bugando University College of Health Sciences and the Weill Bugando Medical Center in Mwanza, Tanzania have formal affiliations with Weill Cornell Medical College. Through this affiliation, Weill Cornell Medical College students and faculty gain valuable international clinical and research experience. This program helps address the immediate health needs of people in Tanzania and train more physicians for a country that currently has only one doctor for 25,000 people compared to one per 400 people in the U.S.

Scholarly Exchange Programs

- **China.** The Tsinghua University-Cornell College of Engineering Partnership is a scholarly exchange program, primarily involving faculty, in areas where both

institutions have knowledge to share. Building on many years of informal faculty and graduate student exchanges, Cornell and Tsinghua University signed a formal exchange agreement in 2004. My predecessor, Hunter Rawlings opened the first Tsinghua-Cornell workshop, which focused on information science and computer engineering, in Beijing in November 2005. A group from Tsinghua came to Cornell the following spring (2006) for sessions on nanotechnology. Faculty from the Cornell Center for the Environment went to Tsinghua in June 2006 to share perspectives on environmental research. This year Tsinghua will send some 30 faculty members to Cornell for sessions on energy, environmental quality and global climate change. We have a similar agreement for research collaboration and scholarly exchange with Jiao Tong University in Shanghai.

- **Developing Nations.** The Cornell International Institute for Food, Agriculture, and Development (CIIFAD) is an international extension and outreach program that pairs faculty and students from Cornell's College of Agriculture and Life Sciences with partners in Africa, Asia and Latin America. The CIIFAD program initiates and supports innovative programs that contribute to improved prospects for global food security, sustainable rural development, and environmental conservation around the world. Many of these programs seem to increase food security in developing countries by linking scientists and farmers in Asia, Africa, and South America with agricultural researchers in advanced labs in developed countries. CIIFAD, for example, help promotes a system of rice intensification to increase the productivity of irrigated rice by changing the management of plants, soil, water and nutrients. The system, which can double yields while requiring

only half as much water, is now being tried in nearly 40 countries around the world.

- **United Nations University Food and Nutrition Programme for Human and Social Development (UNU-FNP).** The UNU-FNP, created to address issues of world hunger, has been housed at Cornell University since June 1996. It has developed networks of scholars and universities which include nutritional scientists, food scientists, agronomists, biochemists, biostatisticians, epidemiologists, economists, sociologists, and others, to assist in the application of nutrition knowledge to combat hunger and address global nutrition issues. Cornell works jointly with Wageningen University, the Netherlands and Tufts University, to administer the UNU-FNP.
- **France.** Cornell University Center for Documentation on American Law in Paris is a scholarly partnership with the French court system. The center, which opened two weeks ago on July 16, is located within the court in the Palais de Justice. It houses 13,000 law books from Cornell's Law Library and offers special training and instruction in online research by Cornell law librarians. This new partnership supplements Cornell Law School's current relationships in France, including its 14-year joint venture with the University of Paris 1 (Panthéon-Sorbonne), the Summer Institute of International and Comparative Law in Paris, and a four-year American/French law degree program.

Undergraduate Majors

- **China-Asia Pacific Studies.** The China and Asia-Pacific Studies Program is an interdisciplinary, international undergraduate major for Cornell students. The CAPS program combines intensive study of Mandarin, Chinese history, culture and foreign policy with study and work/internship experiences in Washington, D.C. and at Peking University in Beijing. It is designed to equip students for leadership roles in a variety of fields including business, government service, diplomacy, education and journalism. A maximum of 20 students are admitted as CAPS majors each year.

Cornell International Facilities

- **Italy.** The Cornell in Rome Program is an educational program for Cornell students based at a Cornell facility. For 20 years, Cornell's College of Architecture, Art and Planning has offered students an opportunity to study in Rome with a home base at a Cornell facility. The curriculum for the Rome Program includes art and architecture studios, core courses in planning, art and architectural history, theory and criticism, photography, drawing, Italian language and culture, and cinema. On average about 55 students participate each semester.

Study Abroad

- The Cornell Abroad program offers Cornell undergraduate students a way to spend a semester or an academic year abroad as an integral part of the undergraduate experience. Study abroad programs are largely tailored to

individual students' needs, and may be run directly by Cornell, by other American colleges and universities, by freestanding study abroad agencies, or directly by programs that have been developed to meet the special academic interests of Cornell students. Every year, approximately 500 Cornell students participate in this program, studying in 45 countries around the world.

CONCLUSIONS AND RECOMMENDATIONS

As I conclude my remarks, I would like to go back to the concept of universities as the catalyst for a new approach to capacity building in the developing world. Much of the work and resources must come from governments through traditional vehicles, such as the U.S. Agency for International Development, as well as promising new approaches such as the Millennium Challenge Corporation and others. The initiatives aimed at strengthening competitiveness and STEM education, both from this committee and the administration, are pointing us as a nation in the right direction. However, universities must play a central role -- through capacity building based on comprehensive programs of teaching, research and outreach -- to assist countries struggling to meet the needs of their citizens.

Indeed, the development of human capacity is the basis for the most robust strategies for ameliorating global inequalities and is one of the most significant contributions that our great universities make. No single university, acting alone, can achieve what will be needed in tomorrow's world. Together, however, the nation's great research universities -- public and private, land grant and Ivy league -- working with our

government, the private sector, NGOs and, most critically, our colleagues overseas -- can offer a more focused application of our own resources to reach out, materially and directly, to assist and improve the quality of life elsewhere.

Chairman Baird, thank you again for inviting me to testify at this hearing. I would be pleased to answer any questions the Committee may have.