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U.S.-DPRK EDUCATIONAL EXCHANGES: ASSESSMENT AND FUTURE STRATEGY

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**MOVING
FORWARD**

U.S.-DPRK SCIENCE ENGAGEMENT CONSORTIUM

Linda Staheli

The Democratic People's Republic of Korea (DPRK) has been politically and economically isolated for more than 50 years. Very few opportunities exist for the people of the country to constructively engage with and learn about the outside world. Science diplomacy and engagement has long proven to be a successful avenue through which politically polarized countries have built peaceful ties, and it is a profound mechanism by which otherwise isolated populations can gain detailed and substantive knowledge about the world outside of their borders. However, the opportunities to engage in science diplomacy with the DPRK have been limited and hard won. In 2007, the U.S.-DPRK Science Engagement Consortium was created, inspired by the Syracuse University-Kim Chaek University collaboration. The founding members of the Science Engagement Consortium are CRDF Global (formerly known as CRDF), Syracuse University (SU), the Korea Society (TKS), and the American Association for the Advancement of Science (AAAS). This chapter is an overview of outcomes from the U.S.-DPRK Science Engagement Consortium as it moves forward, particularly with a focus on academic science exchanges.

U.S.-DPRK Scientific Exchange Program Expansion Workshop, May 22, 2007

At its annual meeting in February 2007, AAAS sponsored a panel and working lunch on U.S. scientific cooperation with the DPRK. Following those sessions, SU and CRDF Global met to discuss the SU-Kim Chaek collaboration and the possibilities for taking the SU experience to other U.S. universities and institutions for expanded scientific cooperation. As a result, CRDF Global and SU organized, with support from AAAS and TKS, a workshop on May 22 funded by the Richard Lounsbery Foundation. Fifty participants, largely drawn from nine U.S. universities (Syracuse, Cornell, Rice, Texas Tech, SUNY-ESF, Penn State, University of Missouri, University of Washington,

and Williams College), along with U.S. government and non-governmental representatives and the donor community, attended the one-day workshop. The objectives of the workshop were to highlight the importance of addressing scientific exchange cooperation with the DPRK; to provide a forum for institutions and organizations that have engaged in research collaboration with the DPRK to share their experiences; to promote a better understanding of requirements for engaging the DPRK, particularly on the legal front; to discuss opportunities for funding collaboration; and to facilitate interaction among the diverse group of participants to address needs and opportunities.

Workshop Discussion

Speaking from personal experiences, several speakers recognized the DPRK's sincere desire to build a cooperative relationship with American institutions. They noted the political environment and how a dialogue on scientific collaborations can help the relationship move forward and contribute to long-term political security and economic prosperity for the Korean Peninsula. Specific advice included the following:

- Develop long-term strategies based on strong institutional commitment;
- Develop working knowledge of Korean history and culture;
- Follow all laws and regulations that govern U.S.-DPRK relations;
- Do not underestimate the DPRK's science and technology capabilities; acknowledge yourself as an equal partner, as collaboration should be mutually beneficial;
- Prevent misunderstandings arising from cultural and language differences by asking questions and not making assumptions.

CRDF Global provided an overview of its experience over the past 12 years in advancing international scientific partnerships globally, often in regions where scientific cooperation is challenging. Members of SU and the Korea Society spoke of their long and enduring partnership with Kim Chaek University in the DPRK. AAAS noted its experience working with scientists and partner scientific organizations around the world and expressed a strong desire to utilize its expertise and international network of some 140,000 members to encourage DPRK scientists to more fully join the global science enterprise.

Lessons learned in the workshop included:

- *Put it in writing* to build trust and clearly communicate each other's intentions in order to mitigate resistance caused by lack of understanding;
- *Establish unwavering institutional commitment* with a long-term

outlook, so that collaboration proceeds on a solid foundation based on trust even in the face of uncertain political relationships;

- *Maintain focus* and avoid the temptation to spread yourself too thin;
- *Do not overcommit* and lose sight of your own missions, objectives, and institutional capacity to deliver;
- *Maintain consistency of the participants* to encourage continuity and sustainability of the collaboration;
- *Encourage informal communication* and social interactions to build trust and a friendly environment for constructive discussions.

The discussion also addressed the legal environment for working with the DPRK, including regulations that restrict trade and export administration regulations. Organizations and institutions must work closely with lawyers to comply with all U.S. government export control regulations.

Workshop participants agreed that truly effective collaborations will require that a network of funding institutions, government agencies, private sector entities, NGOs, and DPRK entities work together as equal and active partners in a coordinated fashion. Participants further emphasized the need for greater cooperation with the donor community and maintained optimism that such collaborative efforts could generate a suitable environment for scientific collaboration with the DPRK.

Despite the challenges, participants agreed to work to foster concrete academic-based scientific collaboration with the DPRK. Participants expressed reasoned expectations that the workshop would be a precursor to increased scientific collaboration with the DPRK and, as more financial resources become available, will not only set the stage for scientific engagement with the DPRK but ultimately establish connections with social science and humanities programs in the DPRK as well. Finally, workshop participants agreed there should be a concerted and coordinated effort to understand the DPRK's academic science priorities.

Specific workshop outcomes include:

- The workshop was unprecedented in that it brought together key stakeholders from a wide variety of organizations to discuss shared experiences, lessons, challenges, wisdom, successes, and failures regarding scientific collaboration with the DPRK, all of which expanded the range of perspectives and encouraged rich discussion and interaction between many individuals and groups that had not previously had the opportunity to interact with each other.
- Candid discussions resulted in a shared and strengthened understanding of requirements and processes for academic engagement of the DPRK.

- The workshop demonstrated a strong interest by a number of U.S. universities to work toward collaboration with DPRK academics in a variety of key areas of scientific exchange, including but not limited to agriculture, information technology, health, and environmental conservation.
- The workshop set in motion a process to develop an action-oriented planning and coordination body to further explore collaboration with the DPRK in these and other scientific areas of mutual interest. That body will collaborate with stakeholders to identify priorities among institutions and will also provide outreach to the larger scientific community. SU, CRDF Global, AAAS, and the Korea Society agreed to provide leadership to a consortium.

The Establishment of the Consortium

The Consortium was established in August 2007 with an agreement signed by all four founding members and an initial contribution of \$10,000 from each to fund its activities and a small secretariat based at CRDF Global. The Consortium has since worked (via phone meetings twice a month) to educate both governments about the value of scientific engagement as a means of fostering better relations between the two countries—helping policymakers understand how science engagement is different from humanitarian assistance and security engagement—and underscoring that scientific engagement would focus on areas of mutual benefit and not focus on science areas that could be dual use. For the United States this required a significant number of sessions with U.S. stakeholders (scientists, university officials, U.S. government and congressional officials, and members of the donor community) and engagement with the DPRK via the UN Mission in New York City, an effort helped significantly by the solid relationship and trust already established by SU and TKS members of the Consortium.

Consortium members have traveled to New York on numerous occasions and launched a three-year effort to bring senior DPRK UN officials to scientific meetings, specifically the annual AAAS meetings in Boston (2008), Chicago (2009) and San Diego (2010). The DPRK travel, approved by the U.S. government, has been essential in educating senior DPRK UN officials about the value of science engagement and more importantly, in generating the trust and strong relationships necessary to building the collaborations envisioned. The Consortium has also worked hard to ensure that weekly copies of *Science*, published by AAAS, are sent regularly to the DPRK. This has been a feat that has been challenging but highly valued by the DPRK, as we saw firsthand on our visit to Pyongyang.

Delegation Visit to Pyongyang

In late 2009, the Consortium was informed by the UN Mission that the DPRK State Academy of Sciences (SAOS) had extended an invitation for the Consortium to send a delegation to Pyongyang. The six-person delegation, led by Nobel laureate Dr. Peter Agre, visited Pyongyang December 10–15, 2009.¹ The delegation was received enthusiastically by their DPRK counterparts as the first U.S. science delegation to visit their country, and was granted the schedule it requested. Below are short descriptions of the delegation's meetings in Pyongyang during which some areas of potential mutual interest for the envisioned scientific engagement were identified.

Branch Academy of Biology

The director of the Branch Academy of Biology welcomed the delegation and gave a short tour of a few research laboratories, focusing primarily on cloning research. Five of the research directors of the academy joined the delegation for a presentation and discussion. The academy includes an institutes of botany, zoology, and experimental biology; a center for biomedicine, a cloning center, an information center, and an agricultural medicine center; a mushroom institute; and a research center of biodiversity and eco-engineering. The academy was founded in 1961 and includes eight institutes, ten experimental farms, a botanical garden, and local laboratories with 1500 members. The broad focus of the academy is research on fundamental biology, research on applications that contribute to national development goals, and the development of high-tech, including biotechnology and nanotechnology.

Branch Academy of Cell and Genetic Engineering

The president of the academy led the delegation on a tour of the facility followed by a presentation and discussion. The academy was founded in 1991 by the late president Kim Il-sung and focuses on bio-pharmaceuticals, stem cell research, transgenic crops via plant biotechnology, bioinformatics, bio-safety, and plant tissue cultures. In short, it covers all areas of biotechnology, bioengineering, including basic research. There are 20 professors, 86 senior researchers, and 40 PhD students. Students are recruited from the SAOS-affiliated University of Sciences. The Central Branch for Bioengineering is the leading division of the academy that engages internationally in joint research. The president affirmed strongly that the DPRK has made science and technology a priority, and in this connection many researchers go overseas and maintain research connections with their overseas colleagues. The president also noted that the average age of researchers is 30, and that 50% of scientists from his academy have international experience. In response to questions about modalities of cooperation, he listed (1) joint research saying, "Our scientists go abroad to conduct research," and (2) collaboration with other organizations through contract research. The academy stated that it

collaborates with a number of countries including China, Thailand, Malaysia, India, Iran, Russia, Germany, Sweden, Bulgaria, and Austria.

Institute of Hydraulic Engineering

The director of the institute gave a slide presentation on the institute's research focus on water resources management in the Taedong River Basin. The institute was founded in 1959 and the main purposes of its research are to protect cities against flood damage, supply sufficient water for industry and irrigation, supply municipal water, generate hydropower, ensure navigation, and support the operation of fisheries. The institute also records and disseminates information on annual precipitation.

University of Sciences

Fifteen senior scientists welcomed the Consortium as the first American delegation to visit the University of Sciences, which was founded in 1967 to train and educate scientists under the auspices of the SAOS. The university has 5000 students; 150 PhDs and professors and 7 departments, including physics, chemistry, biology, computer sciences, and electronics, with English language training and five research institutes. There are 20 research institutes "in the valley" where students conduct their research.

There are hundreds of universities, but the purpose of this one is quite different in that professors from the University seek the best students from Middle School #1 and other genius training schools. Graduates from this university direct and lead SAOS research institutes and departments. They have a great strength in education in basic sciences, with math and physics being a major focus, along with computer science and English education. An electronic library is under development; the university noted that it would have four floors, 10,000 square meters, an electronic reading room, and space for international scientific seminars and lectures. The university plans to have it completed by 2012. International science cooperation is very important. Germany values the university's math and physics graduates, and the Russian Far East University president had visited the university. DPRK professors travel to other countries to give lectures.

Dr. Agre gave a presentation on his research in aquaporins that led to the Nobel Prize, which was very positively received. Aquaporins are water-channel proteins that move water molecules through the cell membrane.

A number of senior scientists then stood up and gave short presentations on their research in English in the following areas:

- Mathematics and the greatest math problem
- Protein structure prediction
- High-temperature superconductivity
- Laser plasma systems projects

- Microbiology, digestibility of animals
- Time series predicting
- Computer architecture
- Nano materials
- Transgenic and transgenic bean; stem cell isolation and culture.

Institute of Thermal Engineering

Dr. Jong Jinchang welcomed the Consortium and described the institute with a PowerPoint presentation. Following is a rough summary. The institute was founded in 1973. More than 80% of the DPRK's energy comes from coal, oil, and other fossil fuels (they said this is compared to 25% in some other countries), so a major issue is the effective use of coal. The DPRK uses coal in thermal power plants, as there is virtually no crude oil or natural gas in the DPRK; 100% of oil is imported. Increasing energy efficiency is a second priority; increasing efficiency of thermal processes—development of new heat exchanges or new elements; heat pump. Research in renewable energy: mainly in solar; using boil water to generate steam. Development of rural energy is a very big priority, in biomass. The goal is to provide 80% of a rural household's energy in biomass gasification with biomass pellets.

Korean General Red Cross Hospital

The Consortium was given a tour by the director of the hospital of the hospital's orthopedic surgery, ENT, and general surgical facilities, and was also showed rooms with MRI and CAT machines. The hospital was built in 1948. Patients receive medical care free of charge; it is the largest hospital in the country. Doctors are recertified every year. There are 11 years of compulsory education; after age 17, doctors go from "middle school" to medical school. It takes 6 years for a general medical college education followed by a postgraduate work. When asked, representatives of the hospital stated that lack of medical equipment and supplies is their biggest problem.

Grand People's Study House

The Consortium was given an excellent tour by Dr. Jong Thae On, head of the complimentary book section, and Dr. Kim Sung Gi, sub-director of the Foreign Exchange Department. It was noted by our hosts that they strongly appreciated receiving *Science*, commenting that they receive many donations of English language books from the United States—including from NGOs such as the Asia Foundation. The Grand People's Study House is a library and a lecture hall with a social education center that provide lectures on a range of subjects; the House is in the process of becoming fully digitalized. It has its own foundation; it also has its own intranet. Dr. Thorson noted that the e-library is an important way to advance science and it is the objective of

the DPRK to reach world standards regarding its e-library. In response it was noted that in 2002 officials from the Study House visited the United States, specifically the Library of Congress and Harvard University. The Study House has had international cooperation with many other countries.

Central Informational Agency for Science and Technology, State Commission for Science and Technology

The mission of the agency is to provide the latest information to scientists; it has more than 10 varieties of publications and is a leading network service for S&T information. The agency is actively conducting exchange and information with other countries, including an international S&T information center in Moscow and the Asian Pacific Information Network. (The agency represents the DPRK in both collaborations.) The agency has many ways that it can access information: by purchasing information, exchanging information, or soliciting donations from international organizations and private foundations. The agency's main task is to develop an information retrieval system, a search engine. It presented the KRDB information retrieval system, which is twenty years in development; the agency has 120,000 registered users in Korean, English, Chinese, Russian, and Japanese.

Next Steps

The Consortium's visit to the DPRK in December 2009 resulted in the identification of several mutual areas of interest with DPRK Academy of Sciences, based on a draft MOU that was signed and finalized by both the Consortium and the SAOS representatives within four months of the visit. The collaborations are to focus on areas of mutual interest and areas that are not dual use.

The final MOU highlights the following areas:

1. Identification of shared research priorities, such as basic sciences, biological sciences, and information technology
2. Reciprocal exchanges

A reciprocal science delegation visit to the United States by the SAOS
Regular exchanges, as agreed by the two sides

3. Joint workshops and training
E-library/virtual science library
English language training for scientists
Science and math education
Talent identification and development
The preparation of research papers for publication
Current biomedical research approaches
Renewable energy, such as solar, wind, hydro, and biomass

4. Joint publications (further details will be spelled out in additional sub-agreements); translation of high-impact articles from *Science* over the past ten years

A more detailed example of one area of mutual interest is in the development of digital libraries. Building on the SU-Kim Chaek collaboration in the information sciences and digital libraries, CRDF Global joined SU in discussions with the chancellor of Kim Chaek University in February 2010 regarding the possibility of establishing a virtual science library—similar to what CRDF Global developed with the Iraq Virtual Science Library² and is now introducing in other countries. CRDF Global and SU, the latter of which has experience working with the DPRK in digital libraries, provide a solid foundation to move forward on such a project—should funding be identified—as one of a handful of first steps to build scientific capacity in the DPRK so the DPRK is better positioned to work with U.S. scientists.

Conclusion

Over the past three years, the U.S.-DPRK Science Engagement Consortium has successfully laid the groundwork for expanded academic science engagement with the DPRK by working closely with both governments, university stakeholders, and both countries' scientific establishments. Consortium members have met monthly, held dozens of meetings, and traveled to NYC on numerous occasions to consult with the UN Mission. CRDF Global's fifteen years of experience implementing thousands of research collaborations and building scientific capacity globally, coupled with AAAS' prominence as the world's largest professional science organization and publisher of *Science*, builds on the already established success of SU's academic research engagement with the DPRK via Kim Chaek University. The Consortium is able to engage the top scientific leaders in the United States, as was demonstrated when AAAS president and Nobel laureate Peter Agre enthusiastically agreed to lead the Consortium delegation to Pyongyang in December 2009. Consortium Members were further able to help DPRK counterparts during this initial stage with regular contributions weekly to the DPRK of Science.

In three subsequent meetings with DPRK officials in the United States in January and February 2010, two in New York and one in San Diego, the DPRK UN Mission reinforced its commitment to working with the Consortium and enabling foundational projects to become a reality. The UN Mission demonstrated this best by offering to help the Consortium with raising funds. The Consortium has developed a strategy for the next three years that involves identifying specific areas for research collaboration and capacity building initiatives, developing enhanced communication modalities including a newsletter and LISTSERV, creating evaluation metrics to ensure outcomes and build on lessons learned, developing an advisory body, and

formalizing the secretariat to ensure that collaborations are identified and funding is secured.

Consortium members, many of whom have worked in the U.S. government managing international science engagements, have the expertise globally and with the DPRK to move science engagement collaborations forward. Consortium members are also fully cognizant of the challenges of engaging the DPRK and recognize the value of small, incremental steps. The Consortium has invited the DPRK SAOS to send a five-person delegation to Atlanta in 2011 and expects to move to the next phase in its engagement now that the first three-year phase of the Consortium is finalized.

In sum, long-term engagement is the right strategy with the DPRK. Engaging in non-sensitive areas of research collaboration—areas that are mutually beneficial—can serve to eventually help bring the DPRK scientific community into the world community of science. This is in the long-term interest of the United States, the DPRK, and the world.

Notes

¹ Delegation members: Dr. Peter Agre, university professor and director of the Malaria Research Institute at the Johns Hopkins Bloomberg School of Public Health and 2009-2010 president of AAAS; Ms. Cathleen Campbell, CRDF president and chief executive officer; Dr. Stuart Thorson, Donald P. and Margaret Curry Gregg Professor in the Maxwell School at SU and fellow at SU's Systems Assurance Institute; Dr. Vaughan Turekian, chief international officer for AAAS and director of AAAS's Center for Science Diplomacy; Mr. Max Angerholzer, executive director and secretary of the Richard Lounsbery Foundation; and Ms. Linda Staheli, U.S.-DPRK Science Engagement Consortium coordinator and CRDF senior staff associate. Dr. Fred Carriere, adjunct professor at SU, was to join the delegation but had a medical emergency in Beijing en route and returned to NYC. The delegation to Pyongyang was largely funded by the Richard Lounsbery Foundation.

² See <http://www.ivsl.org/>.