

## The Importance of International Collaborations for the 21<sup>st</sup> Century Chemist

As President of the American Chemical Society (ACS), it was my distinct privilege to take part in the recent Sociedade Brasileira de Química (SBQ) national meeting in Florianópolis, Santa Catarina, certainly as a participant but more importantly as an observer. The historical number of women and young chemists that participated in the 34<sup>th</sup> National Meeting, and how involved these populations were, is commendable and speaks highly of the inclusiveness of Brazilian Chemistry. I was particularly struck by the vibrant engagement of the next generation of chemists who presented their research with the same level of enthusiasm they had for dancing the night away at the opening “*feita do AIQ-2011*”.

This spirit and enthusiasm, and in particular the quality of their research posters, have convinced me that the talent and drive are present among the next generation of chemists to ensure that the future chemistry is in good shape. However, this alone is no guarantee that chemistry will be able to solve the pressing challenges of the global society.

It is essential that these young chemists, and certainly the older generations too, be prepared to deal with the reality of the 21<sup>st</sup> century chemistry landscape. Certainly this needs to be accomplished from an educational and professional perspective, but just as importantly scientists from around the world need to be brought together to collaborate on an unprecedented global scale. The magnitude of the global challenges humanity faces – energy, health, environment, clean water and food, sustainable development, security – know no borders, and as chemists neither should we in our efforts to overcome them.

Scientific exchanges result in a multi-tier benefit that goes far beyond the hours and Reais – or Dollars – that are put into them. International exchanges result in pronounced impacts at the individual, institutional, national, and global levels. While to a certain extent the same might be true for a domestic collaboration, I would argue that in that case the impact at each level is greatly muted. International collaborations allow researchers to: 1) more effectively tackle global scientific challenges; 2) seek out the best science regardless of location; 3) access expertise in interdisciplinary fields not domestically available; and 4) share the cost and work burden between nations and labs.

A research collaboration that spans borders enables both parties to receive a fresh influx of ideas and talent

that was not feasible with each working alone. There is also the direct and measurable benefit of increased citations for published work that results from international collaborations.<sup>1</sup>

Benefiting the individual further, an international experience allows a scientist to demonstrate to a potential mentor or employer his or her ability to step outside of a comfort zone and ultimately succeed, setting himself or herself apart from domestically-focused peers. Indeed, mid-to-large sized employers that were surveyed expressed their belief that recent U.S. college graduates were ill prepared in their “Global Knowledge,” a characteristic that was rated last out of a group of 12 choices.<sup>2</sup>

Certainly, the results of this survey are unquestionably directly applicable to U.S. Chemistry, but I believe the larger takeaway message is important for all. Namely, as globalization continues to take hold and the number of companies and research projects that are truly multinational multiplies, an increased premium will be placed on those that have prepared themselves properly to take advantage of the new reality.

While the efforts of the national chemical societies in this International Year have begun to make the case for the benefits of international collaboration these efforts alone are certainly no panacea. As chemists, we shouldn't wait for others to open doors for us; we should actively be seeking out and establishing international collaborations ourselves.

The reality is that the chemical societies and governments do not have the time, funds, or the manpower to promote and engender these collaborations alone. These global problems will not be solved with a top-down approach, but from bottom-up collaborations being driven at the researcher-to-researcher level. As scientists, we need to be more proactive in seeking out these opportunities and not wait until someone tells us what to do or where to go.

The best science sometimes arrives as the result of an accidental meeting at an international conference, or from a recommendation given by a colleague that knows someone working abroad who might be useful for your present project. The point is, as chemists we don't know where our results or curiosity will take us but we need not limit ourselves to only the domestic possibilities. In doing so we are severely limiting what we are able to accomplish both in benefit to ourselves, our institutions, our nations, and our global society. Global networking is essential.

The role of the societies and governments in these exchanges should be to allow smooth operation, provide input and resources where needed, and to generally step aside and let chemists follow their innate curiosity to where the best science is regardless of within whose borders it lies. ACS is supremely interested in facilitating these opportunities for chemists and this necessity is ingrained both as part of our Mission Statement and in our Constitution, particularly Sections 2 and 3 of Article II which read:

Sec. 2: To foster the improvement of the qualifications and usefulness of chemists, the SOCIETY shall be concerned with both the profession of chemistry and its practitioners.

Sec 3: To foster the objects specified in this Article, the SOCIETY shall cooperate with scientists internationally and shall be concerned with the worldwide application of chemistry to the needs of humanity.

In fulfillment of these tenets, both ACS and I welcome continued Societal-level interactions between ACS and SBQ.

However, I believe that much remains to be done in this regard, particularly at the ground-level between the 33 Technical Divisions of ACS and the 13 Scientific Divisions of SBQ. Researchers in the United States in particular have much to glean from their Brazilian counterparts when it comes to the fields of green chemistry, natural products chemistry, and the development of alternate energies and fuels. There are equally areas where the ACS Divisions could conversely provide ideas and input to the members of SBQ. I would encourage the members of these technical divisions to begin a self-started dialog to determine future methods of international collaboration on how chemists in Brazil and the United States can more closely work together on common areas of interest.

Going forward, and as a legacy of my time as ACS President, I want to issue a challenge to our technical divisions to actively seek out their international counterparts and to take the lead on their own internationalization. These researcher-to-researcher international collaborations are essential to ensure both the health of the global chemical enterprise and success in battling the pressing global challenges.

I welcome the opportunity to work with you the reader further on this endeavor and am actively seeking good ideas on how we can promote international collaborations,

particularly between Brazil and the United States. Please contact me if you want to help; email me at: [president@acs.org](mailto:president@acs.org). I've also setup a discussion group on the ACS Network to facilitate further dialog, please visit <https://communities.acs.org/groups/brazil-usa-collaboration-exchange-and-networking> to engage in the conversation and to discover additional resources describing the benefits of international collaboration.

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## References

1. Knowledge, Networks and Nations: Global Scientific Collaboration in the 21st Century. The Royal Society, March 2011. [http://royalsociety.org/uploadedFiles/Royal\\_Society\\_Content/Influencing\\_Policy/Reports/2011-03-28-Knowledge-networks-nations.pdf](http://royalsociety.org/uploadedFiles/Royal_Society_Content/Influencing_Policy/Reports/2011-03-28-Knowledge-networks-nations.pdf)
2. How Should Colleges Assess And Improve Student Learning? Employers' Views On The Accountability Challenge. January 9, 2008. [http://www.aacu.org/leap/documents/2008\\_Business\\_Leader\\_Poll.pdf](http://www.aacu.org/leap/documents/2008_Business_Leader_Poll.pdf)
3. Nancy B. Jackson is President of the American Chemical Society. She is also manager of the International Chemical Threat Reduction Department in the Global Security Center at Sandia National Laboratories which assists the U.S. Department of State and other federal agencies in solving problems related to international chemical security. Dr. Jackson is a National Affiliate of the U.S. National Academies, a Fellow of the American Association for the Advancement of Science, and a recipient of the 2005 American Indian Science and Engineering Society Professional of the Year Award. Dr. Jackson has a BS degree in chemistry from George Washington University, from which she won a Distinguished Alumni Achievement Award in 2005, and a PhD in chemical engineering from the University of Texas at Austin.
4. With more than 163,000 members, the American Chemical Society (ACS) [www.acs.org](http://www.acs.org) is the world's largest scientific society and one of the world's leading sources of authoritative scientific information. A nonprofit organization, chartered by the United States Congress, ACS is at the forefront of the evolving worldwide chemical enterprise and the premier professional home for chemists, chemical engineers and related professions around the globe. ACS is committed to "Improving people's lives through the transforming power of chemistry."