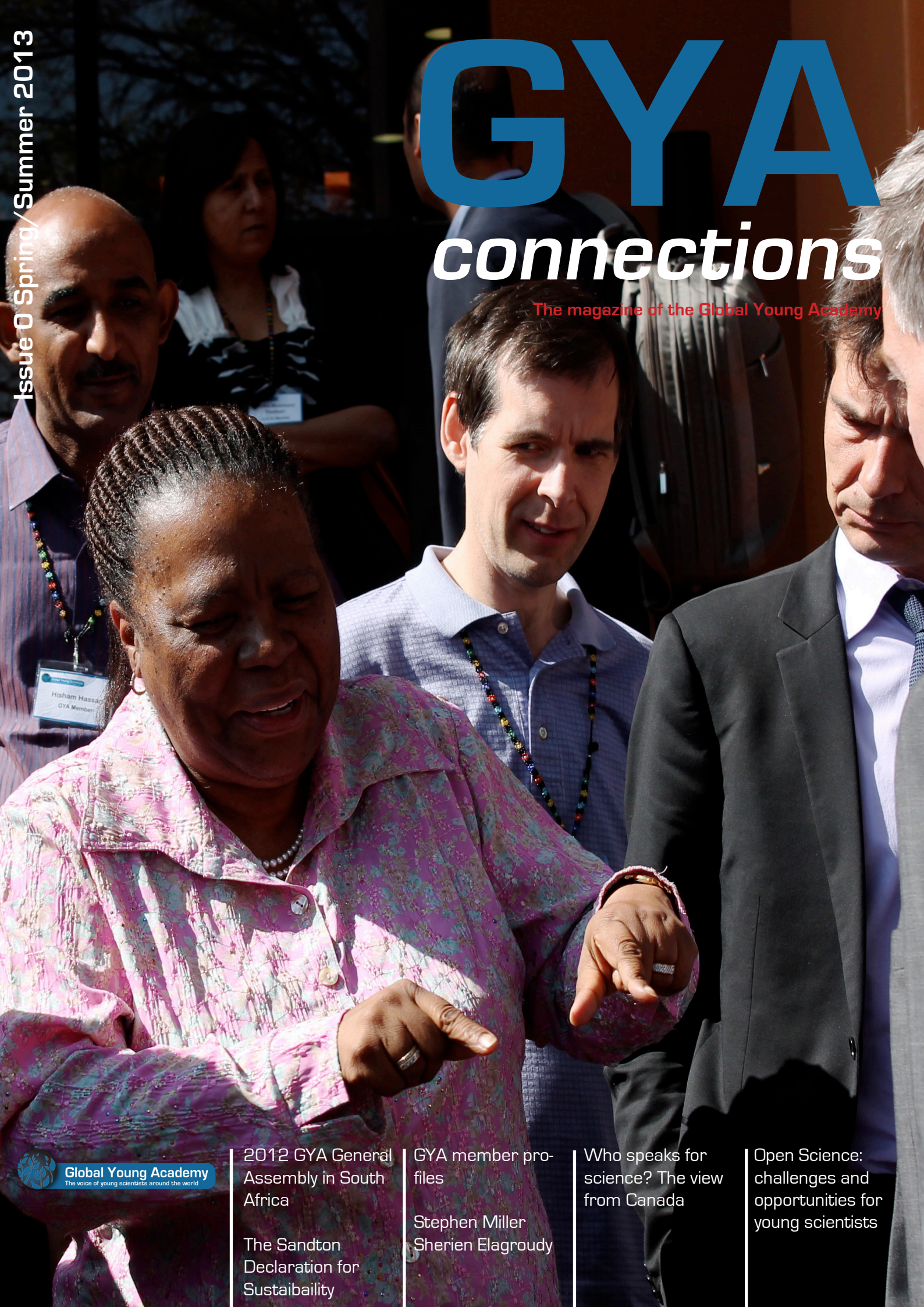
Issue 0 Spring/Summer 2013

GYA connections

The magazine of the Global Young Academy



Global Young Academy
The voice of young scientists around the world

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About the GYA

The Global Young Academy is an international organization that is the voice of young scientists worldwide. Our goal is to empowerand mobilize early-career researchers to use science to make a better world.

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It is hard to believe that it is a mere three years ago that a group of young scientists had the vision to launch a global young academy of science at a World Economic Forum meeting in Dalian, China; to serve as a coordinated global voice for young scientists on science policy and science-society matters.

GYA co-chair Bernard Slippers

In March 2010, the Global Young Academy was launched, supported by the IAP: Global Network of Science Academies, Leopoldina, BBAW and the Junge Akademie in Berlin, Germany. Soon afterwards seed funding was secured from the Volkswagen Foundation, in addition to funding from IAP and TWAS.

In the short space of time since then, a functional organization been established, with its office in Berlin, significant further financial support has been raised, members have served on a number of international panels, launched a number of successful outreach programs, organized and participated in many exciting meetings, produced statements and policy documents, and more.

Clearly, the establishment of the GYA as a platform for excellent young scientists to contribute to broader issues of science development, beyond their specific scientific focus, was well timed and successful. I have no doubt that you will be inspired when you get a sense of these activities, our members and some of the key current discussions in this issue of GYA connections.

Enjoy this issue of our new magazine, connect with us if you see opportunities to engage on issues related to science development and science policy, and keep and eye on the continued development of this exciting Academy.

GYA member Phil Gona meets Alta Schutte at the General Assembly in South Africa.

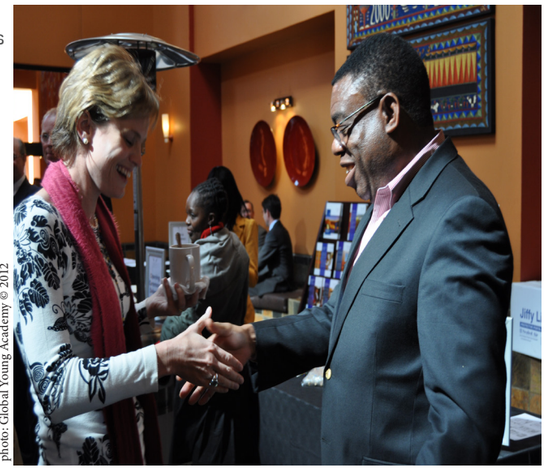

photo: Global Young Academy © 2012

Cover Photo: *South Africa's Minister of Science and Technology, Naledi Pandor, discusses sustainability with members of the GYA in Johannesburg.*

photo © CC-BY-NC Chris Devers (2012)

Open Science: The role of Young Scientists in ensuring free access to information

Open Science is a movement which demands free access to scientific results and data for all. Universities, funding bodies and publishing companies are carefully developing new policies as this movement gains momentum. GYA members have developed a position statement which maintains that the broad aims of the Open Science movement are in the best interest of young scientists, and in the best interest of science itself.

The Global Young Academy has issued a position statement that identifies obstacles that currently stand in the way of giving free access to scientific results and data, and advocates ways forward that will transform scientific research into a truly global endeavour. We call for scientific results to be made freely available for scientists around the world and for future generations. In addition, we suggest that funding bodies should adequately recognise work published in open access journals and online, and moreover recognise and encourage the development of innovative Open Science projects.

Beyond making data available, we feel a long-term strategy for data storage and maintenance also needs to be developed. We are convinced that young researchers can make significant contributions to the set-up, development and maintenance of platforms for open access. This is because they are typically strongly committed to global collaboration and a culture of sharing resources and results. The GYA is particularly concerned about the ways in which lack of access to publicly funded research affects researchers based in developing countries. Publishers and funding agencies should be encouraged to work towards a model that provides them with access free of charge. Furthermore, researchers in developing countries should be helped and encouraged to get involved in the set-up, as well as the use, of infrastructures, databases and journals used to share research results, so as to guarantee genuine exchange of ideas and perspectives across the global scientific community.

Position statement on open science

The Open Science statement was coauthored by Arianna Betti (NL), Sabina Leonelli, Michael Sutherland and Martin Dominik (UK)

The full text can be found at:
http://globalyoungacademy.net/gya-publications

Science and Sustainability in South Africa

In anticipation of the Rio+20 conference, the 2012 GYA General Assembly was held in Johannesburg, South Africa, bringing together more than 80 young scientists from over 40 countries to explore and discuss the theme of sustainability. Here's what happened.

The year 2012 marked twenty years since the Rio Earth summit, widely recognized as one of the first major international conferences to address the environment and highlight the need for a sustainable future. Progress on realizing the goals of the original Rio summit has been slow, with issues like global warming and preserving biodiversity sliding down the priority list of governments faced with stagnating economies and other domestic worries. While it is clear that a sustainable future is in everyone's best interest, the path to achieving this goal is complex. It involves a dramatic rethinking of many aspects of society and its infrastructure, which will require unprecedented levels of international collaboration and cooperation. There can be little doubt that science will play the starring role in this transformation, and work on sustainable technologies is among the key themes 21st century scientific research.

Addressing these issues also requires thinking on time-scales beyond the usual four or five terms of governments. From this perspective it is essential to include young scientists in the conversation, as they will be the stewards of change over the coming decades. With these thoughts in mind the 2012 GYA General Assembly was organized around the theme "Sustainability: Lessons on the Road between Rio and Rio+20". Held in Johannesburg, South Africa, at the Gordon Institute of Business Studies, the conference brought together over 80 leading young scientists from 40 countries and their counterparts in the South African Young Academy of Sciences for five days of days of talks and discussions surrounding concrete actions young scientists can take to advance a sustainable future.

Bruce Alberts (center) and Robin Crewe (right) try their hand at African drumming.

photo: Global Young Academy © 2012

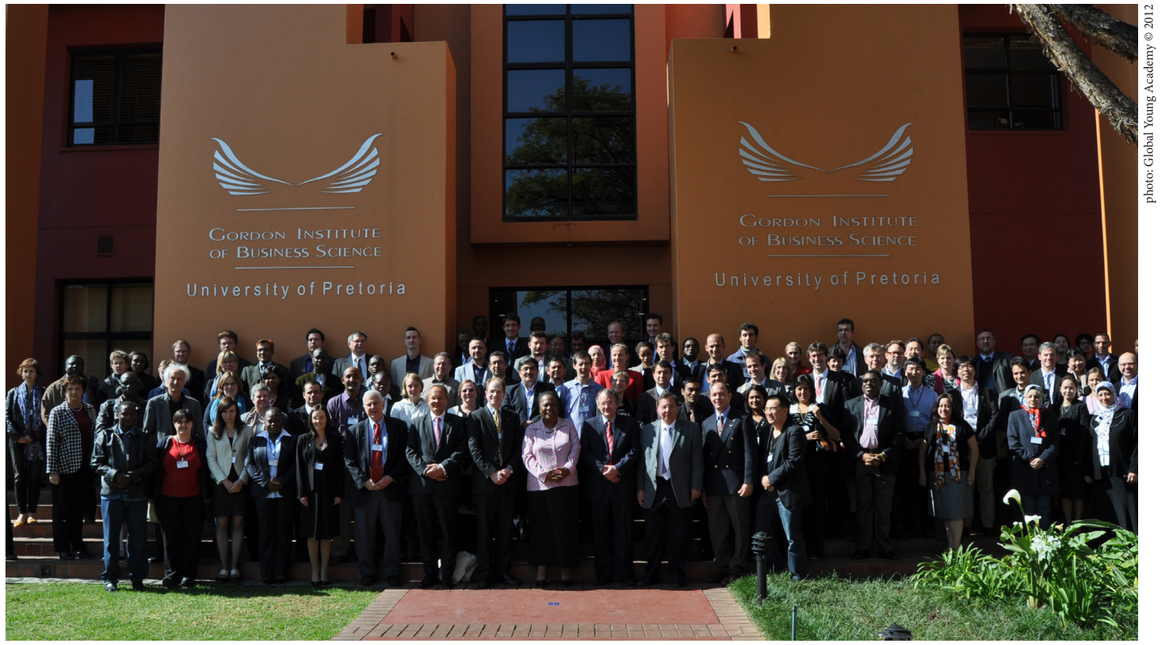

photo: Global Young Academy © 2012

The program was headlined by global scientific leaders who addressed the conference with thought-provoking talks aimed at generating debate. *Naledi Pandor*, the Minister of the South African Department of Science and Technology (featured on this issue's cover) highlighted the challenges that population growth, poverty and gender inequality presented and commented that a truly sustainable future must involve addressing these issues.

Other speakers provided concrete examples of how this goal can be accomplished. *Howard Alper*, (Co-Chair of the IAP Global Network of Science Academies) remarked "Challenges of clean water and electricity are no longer scientific challenges, they are a leadership challenge" and highlighted the critical role that University-Industrial partnerships can play in influencing leadership on these issues. *Bruce Alberts* (Editor-in-Chief of *Science* magazine) made a strong call to scientists to get more actively involved in science education and public engagement. Current approaches that are focussed simply on communicating lists of facts fail to promote an understanding of how science works and more importantly, the value of science to society, he argued. This needs to change urgently and scientists have a responsibility to get involved in changing educational approaches and perceptions. "The future of the world depends on it," he said.

In between keynote speakers, the attendees broke off into working groups tackling a diverse range of topics connected with the general theme of sustainability, including science policy, science education and outreach, open source software for research and the mobility of scientists in developing countries.

> "Challenges of clean water and electricity are no longer scientific challenges, they are a leadership challenge"
> Howard Alper, IAP co-chair

Informed debates like these are at the heart of the GYA. From the small working groups emerge policy statements and reports which seek to capture young researcher's viewpoints on key issues from a multidisciplinary and international perspective, in a way that has not previously been possible.

An excellent example of this is the *'Sandton Declaration on Sustainability'* - the major outcome of the South Africa General Assembly, which is published alongside this article. The statement suggests scientists share a responsibility for ensuring a sustainable future and outlines a vision for how they might realise this goal. In addition to being knowledge creators, scientists must be able to mobilize this knowledge and ensure it is used effectively. The key is engagement at all levels of the decision making process. The declaration is a call-to-arms for scientists, rallying them to do a better job at creating dialogue with industry, governments, funding agencies and the general public. As a blueprint for the future, it can be hardly more appropriate that this comes from the collective effort of early career researchers.

M. Sutherland

Delegates at the meeting stand with South Africa's Science and Technology Minister Naledi Pandor.

The Sandton Declaration on Sustainability

23 May 2012
Johannesburg, South Africa

The key output of the GYA 2012 assembly, the Sandton Declaration is a call to scientists to actively engage with decision makers and the public to ensure that science lies at the heart of the sustainability debate. It was unanimously supported by the attendees and made available to the delegates of Rio +20.

Twenty years ago, the 1992 Rio Conference on Environment and Development inspired a generation of young people to take up the global challenge of forging pathways to sustainability. Many of those who did are now emerging scientific leaders whose research programs are dedicated to understanding and discovering solutions to this challenge. These leaders are represented in the Global Young Academy.

On the cusp of Rio+20, we stand in a unique position as inheritors of the world that was promised in 1992. Having come of age in the lead-up to Rio+20, we, the Global Young Academy, now add our voice to that of the established stakeholders from the scientific community. We are moved to do so by the deep-seated belief of the necessity to chart a vastly different course of action for our global society over the next twenty years.

The Global Young Academy recognizes the vital role that scientific and technological innovation will continue to play as we advance toward sustainability. It is now, and must continue to be, a central component of a sustainable future. Yet, lack of scientific knowledge is not the immediate impediment to progress. Though we have much to learn, we have learnt enough in the last twenty years to take action.

The aspirations that emerged from Rio have not been matched by commensurate actions, with the dangerous consequence that sustainability is now more distant than ever. We acknowledge the complexity of the situation in a multi-stakeholder world with different, sometimes opposing, interests. Nonetheless, current trajectories must be reversed immediately. Here, we offer three means for scientists to accelerate progress towards a sustainable future.

> "Scientists, whether academic, government, or industry-based, must actively engage with civil society and decision-makers to convey the urgency of the global challenges that lay before us."

First, all scientists, whether academic, government, or industry-based, must actively engage with civil society and decision-makers to convey the urgency of the global challenges that lay before us. The GYA will support efforts to bring scientific evidence to bear directly on the policy and decision-making processes. By mobilizing scientific knowledge we will also help communities understand how their choices may hinder or accelerate progress toward sustainable development goals.

Second, obstacles to initiating this dialogue must be overcome within the scientific community itself. The Global Young Academy recognizes scientific excellence as a pre-requisite to having a credible voice in this dialogue. Yet, we are concerned that metrics of success for scientists typically discourage public engagement and outreach. This must change. Public engagement must be valued, and not seen as something best left to others.

Third, we must foster scientific literacy in the broadest sense. The goal here is to ensure that citizens engage in informed societal debate and make informed choices regarding the future of their communities. The Global Young Academy will work to transform scientific education from rote-learning to inquiry-based problem solving, building from kindergarten through post-secondary education, that will illustrate how scientific discoveries are made and how past evidence catalyses them. This transparency will build both public trust in scientific information and their capacity to weigh the evidence supporting competing positions in the transition to sustainable development.

The world cannot spend another twenty years in further discussions about the path toward sustainability. Progress toward a sustainable future must accelerate, and it must be both inclusive and enduring. The time for action, commensurate with the immediacy and diversity of sustainability challenges, is right now. The Global Young Academy believes that scientists, and science, are fundamental to realizing the goals of sustainability. Rio+40 must be a celebration of progress.

Science and Politics

Who speaks for science?

The view from Canada

Scientists and politicians can sometimes be worlds apart when it comes to dealing with pressing societal issues. Is it possible to bridge the gap between the two cultures? GYA Co-Chair Rees Kassen shares his experiences from Canada.

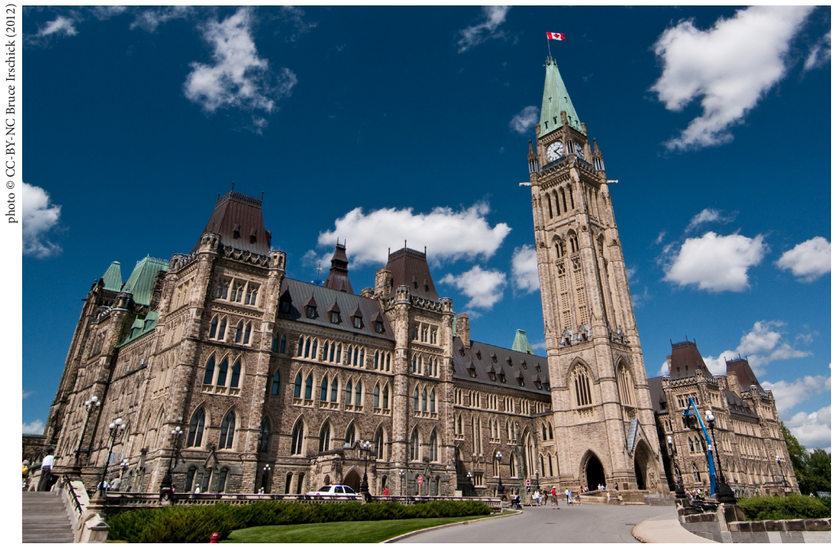

photo © CC-BY-NC Bruce Irschick (2012)

The Canadian parliament buildings in Ottawa. At present, only 17 of 308 sitting MPs have a degree in natural sciences, health sciences, or engineering.

On July 4, 2012, research teams at CERN in Geneva announced the discovery of a particle having all the hallmarks of the Higgs boson. The announcement was made cautiously, but with an obvious sense of excitement. This was big news. By all accounts, we now had experimental confirmation that the last remaining particle in the standard model's menagerie of the most basic components of matter might actually exist. The story went viral. There was talk of 'the God particle', the Twitterverse came alive with boson-jokes, and many heralded a new age for physics.

To be fair, the hype did get out of control from time to time. Many pundits predicted, incorrectly for the moment at least, a Nobel Prize for CERN and Higgs. Others, like *Dan Gardner* from Vancouver's *The Province* newspaper, questioned the value of the whole endeavour: 'People are starving, Earth's a mess, and our best minds are doing what?' was the headline. In the meantime, the geek media did their level best to explain the importance of the results and to justify why it all matters in the first place, to anyone who cared to listen.

But who is this so-called anyone? Or, more precisely, who is listening when science speaks? For an answer we can turn to science journalists, since their livelihood depends on them knowing their audience. *John Rennie*, former editor in chief at *Scientific American*, commented once that people read either because they have to, for work, or for entertainment. This is equally true in science, which means that the 'anyone' following the Higgs story is either, to a first approximation, a scientist or an already-committed consumer of science stories.

Higgs may be unusual in the amount of attention it received for a science story. It is, after all, hard to resist a story about the God particle. For the majority of science stories, though, the only people paying attention are, for the most part, those who would have paid attention anyway. If this is true for the public at large, it is also true for one small but extremely important segment of that public: the elected officials who represent them. It is no surprise, then, that scientists are often frustrated in their efforts to get a fair hearing in decision-making and public affairs: there is no one at the other end who is listening to them.

The question is, what to do about it? Here I offer some reflections on the disconnect between scientists and elected officials, and discuss approaches currently underway in Canada to help bridge this gap.

Science walks into a bar and no one notices

A good part of the problem is that, with the exception of a few high profile figures and issues, science has effectively zero visibility among politicians. They are simply too busy to pay much attention. I have heard it said that in Canada, at least, Members of Parliament (MPs) spend up to 50% of their time dealing with just a single constituency issue – immigration appeals – on top of their regular parliamentary duties. When you add in travel between their constituency itself and the seat of government in a physically large country, there is precious little time left over to devote to understanding the intricacies of any issue, scientific or otherwise.

It is also the case that many are not trained in science. Canada's House of Commons has just 17 of 308 sitting MPs with at least a first degree in the natural sciences, engineering, or health sciences, according to the Canadian government's PARLINFO website. Most of the rest come to public life from a background in small business or law. But by itself this number is meaningless. Is 17 large or small? Well, consider this. If one uses nation-wide graduation rates in these disciplines as a guide, we would predict something like 98 MPs to have a science background. There is clearly a deficit here in the receptivity of the political class to science.

Scientists, for their part, seem reluctant to do their part. Most of us got into science out of a fascination for research and a love for knowledge. A mud-slinging political life was not for us. We also have a tendency to be accurate and comprehensive with our advice, rather than to the point and persuasive as is often needed in political life. And sometimes science seems to bear a heavier burden in the public eye for getting things wrong, as the recent conviction of six leading geoscientists in Italy for failing to give adequate warning about the chances of a major earthquake attests.

And to top it all off, we have a hard time letting go of our labs to participate in public life. The Canadian House of Commons has just one MP with a PhD in science, for example. The same is true of the UK, as *David Adam* of *The Guardian* reported earlier this year. The last US House of Representatives (2008-12) fares somewhat better, with eleven according to the website hillwho.com.

So, not only are most elected officials not trained in science, they do not regularly work alongside scientists as colleagues or interact with them as friends. Perhaps it is no surprise, then, that contrary to what most scientists might wish or think, science does not have any sort of preferred voice in decision-making. We have not cultivated an audience that is receptive to it. At best, politicians see us as a lobby group, just like any other. Science, and more generally evidence, clearly faces an up-hill battle in the halls of legislative power.

It starts with us

One of the biggest obstacles to cultivating a better relationship between decision- makers who use evidence and the researchers who collect and create it can be scientists theselves. I know that this statement goes against the grain of what most scientists think. But consider this. A study released last year showed that scientists tend to blame poor policy decisions on a scientifically illiterate or uninterested political class and a media that oversimplifies complex ideas or unfairly sensationalizes controversy [1].

In other words, the problem is them, not us. If only, the thinking goes, politicians understood science better they wouldn't make 'wrong' decisions. But this misunderstands the problem entirely. Poor scientific decisions in politics are not necessarily a result of a lack of understanding. They are a lack of time and, more worryingly, motivation. *Peter Calamai*, former science-reporter for the *Toronto Star*, once remarked that it is one thing for the non-science public to not understand what the standard model in physics is. It is quite another, potentially more damaging, that the vast majority of people feel it doesn't matter they don't know. The same applies to our elected officials.

What we need is a new way for scientists to engage with elected officials. Simply stating the facts doesn't work. Scientists need to recognize and accept that, at the end of the day, they are playing politics.

The PAGSE approach

For the past three years I chaired the Partnership Group for Science and Engineering (PAGSE) – an association of science and engineering societies that provides the consensus opinion of the research community directly to the Canadian federal government. We estimate that we represent somewhere on the order of 50 - 60,000 researchers who, by virtue of their membership in a professional society, are members of PAGSE. Our membership comes from all sectors of research life including academia, government, and industry.

> "Not only are most elected officials not trained in science, they do not regularly work alongside scientists as colleagues or interact with them as friends. Perhaps it is no surprise, then, that contrary to what most scientists might wish or think, science does not have any sort of preferred voice in decision-making."

photo © Dean Medeiros (2012)

Thierry Chopin, Professor at the University of New Brunswick, presenting a talk to MPs on sustainable aquaculture at a Bacon & Eggheads breakfast in Ottawa.

PAGSE undertakes a number of initiatives designed to engage parliamentarians in discussions on scientific research. Probably our most important activity is to submit a Brief to and testify before the House of Commons Standing Committee on Finance, which makes recommendations on budget spending to Cabinet. Our aim is not to lobby on behalf of any particular group or issue, but rather to explain to lawmakers what investments in research would best serve the country as a whole.

We also meet regularly with top civil servants responsible for government departments that have science as part of their core mission. These meetings are tremendously important and valuable, on both sides of the table. The departments, after all, are the ones feeding advice directly to the Ministers. It is therefore important for us to know what their priorities are and the challenges they face. In turn, PAGSE provides a ready national network that the bureaucrats can access, if necessary, for expert opinion and advice.

We also run two education projects. One is our flagship Bacon & Eggheads program, a breakfast seminar series where top-flight researchers address Parliamentarians, their staff, the media and bureaucrats on scientific issues in their field. We work hard to identify excellent researchers who are also outstanding communicators on topics that are of current relevance to the political and legislative agenda of the day. The speakers make their presentation over breakfast – before the work of Parliament begins in earnest for most MPs – and we allow ample time for informal discussion and interaction before and after the presentation. Bacon & Eggheads thus provides a space for parliamentarians and researchers to interact, face-to-face in an apolitical atmosphere.

The other is a newer project called *SciencePages* where we aim to increase discussion on topical issues having science at their core by summarizing, briefly and in accessible language, the current state of knowledge and policy. Each issue is prepared by a team of three interns – one each from science, policy, and communications – peer-reviewed by experts in both science and policy, and distributed to Parliamentarians and the public. This approach has the advantage of filling two important gaps in the Canadian science-policy landscape. One is the need for short, readable, and, above all, credible notes on science-related issues. The other is the opportunity for the vast pool of young, talented, individuals interested in science and policy to get hands-on experience working at the interface between these two disciplines.

PAGSE has had an impact, at least on the side of improving the level of interaction between researchers and politicians in Canada. Although it is rarely possible to know the inner workings of government decisions, many of PAGSE's recommendations have at least been in tune with recent actions. Examples include the creation, in 2010, of an internationally competitive postdoctoral fellowship program and, in 2011, increased support for international training and research. These were both suggestions that came, in part, from PAGSE.

In the shadow of evidence

PAGSE has established credibility amongst policy-makers in Canada. Its work happens quietly, behind the scenes. We try to work with the government to improve the climate, on behalf of Canadians, for research, innovation, and evidence-based decision making. Because it is not a lobby group, it also does not criticize. This means it has to be careful of what it does and does not say. There is a fine line between providing a consensus opinion and lobbying, and PAGSE works hard not to cross it.

This means there is a limit to what PAGSE can do. PAGSE has been most effective when it speaks on 'policy-for-science' initiatives aimed at improving the climate for research and innovation. Successes have been harder to come by in the other direction, on 'science-for-policy', perhaps because there are too many ways in which statements can seem partisan, especially when it comes to the environment and sustainable resource use. Recent government decisions weakening habitat protection for fish species

and environmental regulations on resource extraction are a case in point.

There may be room here for a more vocal, pro-active approach, one that can hold the government to account on issues regarding the use of evidence in decision-making. If so, it won't be PAGSE who will take up the charge. Some other institution or organization will have to step up to do this work. In some countries this is the role played by national academies or other groups, such as the American Association for the Advancement of Science (AAAS), that take on the mantle of being advocates for science. In Canada, despite numerous attempts over the years, no one organization has emerged to fill this gap.

The situation may be changing, however. Last July, close to 2000 scientists, all dressed in lab coats and carrying a casket into which was delivered reams of data, text books, and other paraphernalia of

"scientific expertise and experience cannot be chopped and changed as the mood suits."

the scientific life, marched through the streets of Ottawa to Parliament Hill. They staged a mock funeral eulogizing the 'death of evidence' in decision-making by the federal government and the muzzling of government scientists.

By most accounts the event was a success. *Nature* ran a lead editorial on the march, noting, in a direct message to the federal government, that, "scientific expertise and experience cannot be chopped and changed as the mood suits." Perhaps as a result, when a government plan to pipe bitumen from the tar sands of northern Alberta to the British Columbia coast came under fire, it was the Prime Minister, *Stephen Harper*, who announced that the decision on where and how to construct a pipeline would be based on science. This is significant. That it was the PM who made the statement and not, as would normally be the case, one of his Minister's is a signal that the government heard what the marchers were saying.

A place for science in politics

The leading challenge confronting scientists is not the quality of our science, it is the receptivity of decision-makers to that science. There is a sense shared by many around the world that the level of receptivity is worryingly low. The triumphs and hopes of science are not their triumphs or hopes.

Scientists have to shoulder some of the blame for this situation. For too long we have seen ourselves as above the fray of politics, with the result that we have effectively removed ourselves from the decision-making process. This cannot continue.

We need to be willing and effective communicators with civil society and decision makers. The aim here is to increase the receptivity of the political class to science, so that when the time comes to make decisions, science gets at least a fair hearing. PAGSE, with its quiet, non-advocative approach, is one way of doing this. A more pro-active, responsive approach such as the activism of this past summer's march on Parliament Hill may be another. No doubt a combination of both is worthwhile, and the challenge for the future will be to strike the right balance between the two.

[1] J.C. Besley and M.Nisbet (2011). *Public understanding of science.* DOI:10.1177/0963662511418743

Rees Kassen is a Professor in Experimental Evolution at the University of Ottawa. He is currently Co-Chair of the GYA.

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scientists in political life

While the number of politicians with scientific training is alarmingly low in many countries, there are examples of scientists and engineers who have played hugely influential roles in the political sphere. These include:

- Angela Merkel, Chancellor of Germany, holds a PhD in **Quantum Chemistry**. Her doctorate was entitled "Investigation of the mechanism of decay reactions with single bond breaking and calculation of their velocity constants on the basis of quantum chemical and statistical methods"
- Tony Tan Keng Yam is the President of Singapore and holds a PhD in **Applied Mathematics** from the University of Adelaide.
- Eight of the top nine political posts in China were until recently held by politicians with Engineering degrees, including President Hu Jintao who has a degree in **Hydraulic Engineering**, and Wen Jiabao, who has a degree in **Geomechanics.**
- Petr Nečas, the Prime minister of the Czech Republic holds a graduate degree in **Plasma Physics** from the University of J.E. Purkyně in Brno.

Stephen A. Miller

University of Florida

Each issue we profile members of the GYA. Here Stephen Miller tells us about his research in polymer chemistry, how he became involved with the organisation, and why he's excited about the GYA Young Scientist Ambassador Program.

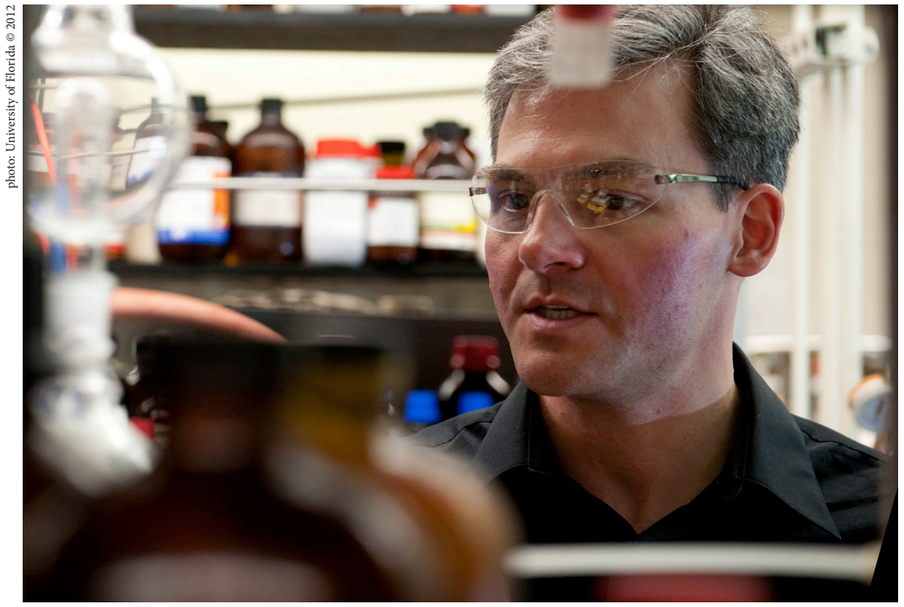

photo: University of Florida © 2012

Stephen Miller in his polymer chemistry lab at the University of Florida.

My involvement with the international young scientist movement began in September 2010, when I attended the World Economic Forum's "Annual Meeting of the New Champions" held in Tianjin, China as a Young Scientist delegate nominated by the U.S. National Academy of Sciences. I had no idea what to expect from this meeting, but it turned out to be one of the most revealing and eye-opening experiences that I have ever had. There I met and interacted with some of the most interesting young scientists in the world.

A misconception that was summarily dispelled was that I might not have very much in common with a group of about 55 people from 40 countries. On the contrary, I was surprised how well I could relate to almost every Young Scientist whom I met—not only with regards to scientific interests, but including travel experiences, common acquaintances, sports, cultural inclinations, and even humour.

Genesis of the Young Scientist Ambassador Program.

In Tianjin, the Young Scientist delegates were tasked with creating a legacy project, and I eventually became a champion for one of the ideas. *Lynn Loo* (also a Young Scientist from the USA) and I were the principal authors of a charter document that aims to establish the Young Scientist Ambassador Program (YSAP). Much of the brainstorming for this proposal happened during lunch periods and free time throughout the meeting, but the program coalesced during the Debrief and Wrap-Up session when about twenty Young Scientists convened (others worked on other legacy proposals) to discuss objectives and specific future tasks. Seven Young Scientists (*Arsen, Charles, Lynn, Javier, Maryam, Steve,* and *Marvadeen*) volunteered to be on the YSAP Advisory Committee.

When I returned to the U.S., I created a website for the program (http://gya-ambassador.org) and that has served as the nexus for establishing connections and posting ambassador mission reports. As stated in the charter, the YSAP is designed to bridge the international scientific gap by facilitating cultural, scientific, intellectual, or educational interactions. The ambassadorships must be non-traditional; that is, interaction must occur between two countries that are at different stages of scientific development, or between two countries that historically have had minimal scientific contact.

The Young Scientist Ambassador Program is designed to facilitate interaction between countries at different stages of scientific development.

http://gya-ambassador.org

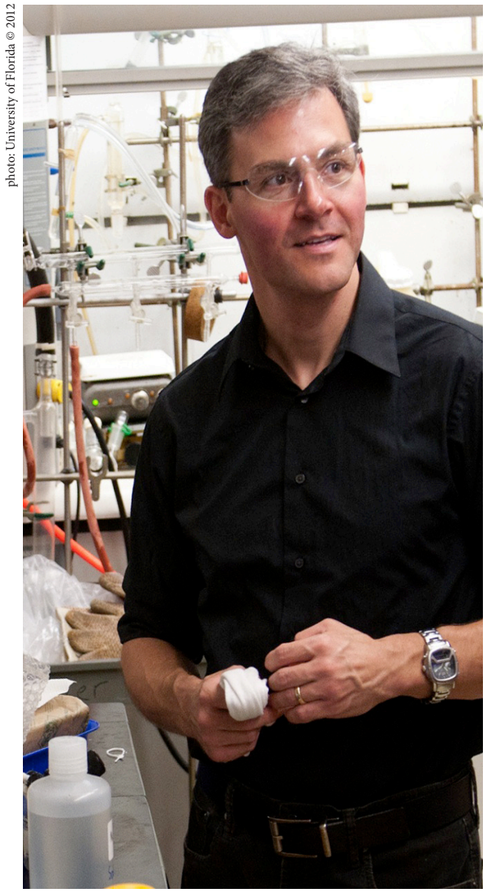

photo: University of Florida © 2012

Stephen Miller's group conducts fundamental research on the synthesis of new polymers and the development of new catalysts.

Global Young Academy

I was encouraged by *Greg Weiss* (former GYA Co-Chair) and others to apply to the GYA, and I was thrilled to be admitted as one of thirty-two new members in the 2010 admissions round. Many of the new members attended the Tianjin meeting with me, and my participation in that meeting absolutely inspired me to continue this rewarding pathway involving international service and friendships with young scientists from around the world.

One of my primary motivations for joining the GYA was to implement and expand the Young Scientist Ambassador Program. At the 2011 GYA–General Assembly in Berlin, the YSAP was formally adopted as an official Working Group, thereby expanding the YSAP's prestige and reach. To date, twelve Ambassadors have officially participated in five distinct programs. The five corresponding Mission Reports can be found at the YSAP website. In June of 2011, I served as an Ambassador and visited Indonesia where, among other activities, I recruited the first Indonesian member of the GYA, *Vanny Narita*. Mission reports for all the YSAP ambassadors as well as information on how to apply to the program can be found on the GYA webpage.

Research Activities

My ongoing research projects all deal with critical aspects of polymer chemistry, which is a branch of chemistry involved with linking up molecules into long chains through the process of polymerization. While much effort is devoted to the detailed, fundamental understanding of the science, our ultimate motivation is the application of this understanding to real polymeric systems; thus, we have forged alliances and collaborations with major chemical companies clearly interested in applied polymer science, including Saudi Basic Industries Corporation (SABIC), Dow Chemical Company, Sumitomo Chemical, and NuVision Bioplastics.

Single-Site Catalysts for Olefin Polymerization

My very first undergraduate laboratory project commenced in 1992 at Stanford University. This project dealt with studying catalysts useful for linking together carbon based molecules called olefins, and in various forms, I have conducted this brand of research now for two decades. Catalysts are key components of industrial chemistry, as they are able to change the reaction rate of a chemical reaction without being directly consumed in the process.

This continued investigation into catalyst design has resulted in two of the most stereochemically selective catalysts known—meaning that the primary spatial arrangement of the synthesized molecule can be controlled to a very high degree. One catalyst is highly isoselective, making isotactic polypropylene (the kind that dominates the polypropylene market today) and the other catalyst is highly syndioselective, making syndiotactic polypropylene (a far less commercialized but promising variant). These two catalysts seem to retain the record for isoselectivity and syndioselectivity despite massive industrial competition that has spent billions of dollars on such efforts over the last 20 years.

Synthesis of Sustainable Polymers

Recently my group has been involved in research efforts to develop organic and polymerization chemistry to exploit biorenewable feedstocks for the preparation of novel plastics—ultimately for commercial implementation. Importantly, the polymeric properties are usually targeted to mimic those of polymers currently made from fossil fuels. Thus, they may replace extant polymers as fossil fuel feedstocks increase in price and decrease in supply.

We target mainly packaging plastics where there is considerable potential for environmental optimization. Today, over 200 billion kilograms of synthetic polymers are produced each year, but only about two percent are green polymers. Our philosophy is to replace traditional plastics with those having a green birth and a green death. This means that the chemical source of the polymer should be sustainable (usually from plants) and the degradation behaviour of the polymer should allow the polymer to degrade in years or decades instead of centuries or millennia.

photo: Global Young Academy © 2012

Stephen Miller in Indonesia with local young scientists, which he visited as part of the YSAP program.

"Today, over 200 billion kilograms of synthetic polymers are produced each year, but only about two percent are green polymers. Our philosophy is to replace traditional plastics with those having a green birth and a green death."

One approach identifies methanol as an increasingly important and sustainable platform chemical, largely because it has disparate sources: natural gas, methane hydrates, or wood. Note that methanol is called wood alcohol because 100 years ago, all of our methanol derived from the anaerobic distillation of wood. Some believe a return to this process is likely and we are now designing reactions that convert methanol-based feedstocks into polymers. For example, we have recently discovered and optimized a novel method for converting formaldehyde and carbon monoxide feedstocks into polyglycolic acid, a polyester which has much potential as a green packaging plastic.

Probably the most successful synthetic green polymer available today is polylactic acid (PLA). This material is available from Natureworks™, derives from cornstarch, and has a reasonable propensity for biodegradation. However, PLA has certain drawbacks, including a limited useful temperature range and slow degradation in abiotic or cold environments, such as landfills or the ocean. We have pioneered a method to incorporate a hydrolytically sensitive functional group (an acetal) into the main-chain of PLA. This improved PLA is tougher, stronger, quieter, more flexible, less brittle, more optically transparent, and has a wider useful temperature range. Another important advantage is that it degrades abiotically. So unlike PLA, it will degrade at the bottom of a landfill through simple hydrolysis. It will even degrade in distilled water or seawater and our extrapolations suggest that it will degrade fully in 5 to 10 years in the ocean. Initial target applications include disposable blister packaging and film applications, such as grocery bags. Replacing the one trillion polyethylene bags produced each year is a daunting, but interesting challenge.

Sherien Elagroudy

Ain Shams University, Cairo

Egyptian scientist Sherien Elagroudy approaches environmental studies from an international perspective. Here she tells GYA connections about her work on wastewater management, and how involvement in the GYA has helped her find new collaborations and new audiences for her research.

photo: Global Young Academy © 2012

Sherien Elagroudy with delegates at the 2012 World Economic Forum meeting in Tianjin, China.

I'm an environmental and solid waste expert, and I received my PhD in environmental science from Ryerson University in Canada. Since 1998 I've been working as a university staff member at Ain Shams University, and I conduct research concurrently as a post-doc at the American University of Cairo. My research interests are mainly in the fields of anaerobic digestion, production of solid fuel from solid waste and sludge treatment and disposal. These projects often have an international dimension, and I have conducted short term fellowships at Yale University and at the Centre de Coopération International en Recherche Agronomique pour le Dévelopment (CIRAD) in France for instance. I am also involved in several EU-funded projects to establish new curricula in environmental studies.

One of the major research themes my colleagues and I are investigating is low-cost sustainable wastewater treatment technologies using industrial byproducts. The guiding question for us is: "how can we produce high quality treated water from municipal wastewater treatment plants using a sustainable solution?" Our proposed approach is to treat domestic wastewater using industrial solid wastes (e.g cement kiln dust, limestone, or marble slurry) which will overcome the high capital and operational cost, large footprint and huge energy consumption in conventional wastewater treatment plants. Using byproducts in this way also serves to mitigate the environmental and health impacts of industrial waste. Our experimental work is still ongoing, but we have very promising preliminary results.

One important aspect of my research work is that there is a strong opportunity for industrial collaborations. I am currently head of the solid waste unit at Chemonics Egypt Consultants for instance, and have been involved in several projects in solid waste and hazardous waste management and wastewater treatment plants in Egypt.

Involvement with the GYA

I joined the GYA in 2012. It was pure chance that I came across the website, but a lucky one, I admit. I admired the idea behind the academy and immediately decided to apply for membership. I am thrilled to have been selected to join this very well-selected group of young scientists. I attended the general assembly meeting in South Africa in 2012, and there I got to meet other young scientists from all over the world and exchange ideas on how to foster science and how to have our voices heard. I also had a chance to meet up with *Warinthorn Songkasiri*, Senior Researcher at the Excellent Center of Waste Utilization and Management (ECoWaste) in Thailand. Sharing the same research interests, we are investigating opportunities for collaboration.

I also participated in the "Shaping the Future of Young Academies" symposium that was co-organized by the GYA and the Dutch Young Academy in Amsterdam in late October 2012. The symposium brought together representatives from existing National Young Academies, as well as scientists from countries in the process of establishing young academies. I found it a very influential and beneficial meeting. There was a good exchange of information between the delegates, and this inspired fellow GYA members *Amal Amin*, *Sameh Hamdy* and myself to do our best to establish an Egyptian young academy in the next couple of months.

Meeting of the New Champions

Another great opportunity that I am thankful to the GYA for was the chance to participate in a World Economic Forum meeting. As a GYA nominated "Young Scientist" delegate, I attended the Forum's annual "Meeting of the new Champions", in Tianjin, China, which was organised under the theme: "Creating the Future Economy". The meeting brought together well over 2,000 stakeholders from more than 90 countries, and I travelled to China with four other GYA nominated delegates: *Xingsheng Liu*, *Sameh Soror*, *Jauad El Kharraz* and *Aftab Chattha*. The participants could choose from among 115 official sessions, covering very diverse topics ranging from health, education, society, population growth, poverty, advancement in science and technology, politics and many more. The sessions were very interactive and ranged from one to one discussion panel discussion, illustrations and ideas lab, etc. I had the chance to talk about "Solid Waste Management Technologies in Developing Countries" in the "Ideas Lab" session. I compared several solid waste management technologies and their market and maturity level, and how these would best suit developing countries. This was actually a great opportunity to discuss my ideas with this diverse group of scientists, businessmen, stakeholders.

> "I had the chance to speak in the "Ideas Lab" session at the World Economic Forum meeting. I compared several solid waste management technologies and their market and maturity level, and how these would best suit developing countries. This a great opportunity to discuss my ideas with this diverse group of scientists, businessmen and other stakeholders."

Besides attending the forum, we, as young scientists, had the chance to meet and discuss with *Howard Alper*, Chair and President of the Science, Technology and Innovation Council of Canada, *Wan Gang*, Minister of Science and Technology of the People's Republic of China, *Shirley Ann Jackson*, President of Rensselaer Polytechnic Institute, and *Philip Campbell*, Editor-in-Chief of Nature magazine. The meetings were very interactive, with a lively back-and-forth between the Young Scientists and the guests of honour.

I am grateful for all the great opportunities the GYA has offered me in just one year. I am full of power and enthusiasm to add my energy to those of my colleagues at the GYA to try to achieve the goals and expectations of young scientists all over the world.

The 2013 GYA calendar

18-20 March Interdisciplinary German-South African Symposium "Socio-ecological novelty - Frontiers in sustainability research" in Berlin (GYA, SAYAS and Junge Akademie)

13-15 May International Expert Workshop "The Global State of Young Scientists" in Hannover, Germany

15-18 May GYA General Assembly 2013 in Halle (Saale), Germany.

13-15 October Sharing the Start-Up Experience - Entrepreneurship Training for Young Scientists and Engineers.

photo: SIYAS © 2012

GYA member Vinitha Thadhani with Sri Lankan young scientists at the General Assembly of the Association of Academies and the Societies of Science in Asia meeting in Columbo.

Global Young Academy
The voice of young scientists around the world

Recent News

GYA at the European Gender Summit The second European Gender Summit was held in November 2012 at the EU parliament in Brussels. GYA member *Mihaela Zigman* and other scientists met with leaders of diverse fields engaging with gender equality. The aim was to mainstream policies to enhance both quality and benefits of research and innovation for science and society.

Malaysian Young Academy With an Inaugural Colloquium in December, Malaysia has launched a Young Scientist's Network, with a 2012 protem committee chaired by *Mohd Basyaruddin Abdul Rahman* a GYA member and a member of the Malaysia Genome Institute. The colloquium included sessions on Early Career Development and on young scientist's views of Malaysian research policy. GYA Executive Council member *Regina So* was there to share her experiences from the Philippine Young Academy. Website and plenty of pictures at: www.ysn-asm.org.my

Belgian Young Academy The Royal Flemish Academy of Belgium has decided to form an independent and autonomous Young Academy. The aims of the new organisation are 1. Reflection on science and science policy 2. Science communication, and 3. Interdisciplinary research. It joins the now 20 countries which have established a National Young Academy. Congratulations!

More information can be found on the Jonge Academie's Website: http://www.jongeacademie.be

Sri Lankan Young Academy Another Young Academy has been launched in 2012 – this time in Sri Lanka. These exciting news were forwarded to us by GYA- Member *Vinitha Thadhani*.
The launch was supported by the National Academy of Science Sri Lanka (NASSL) and the inauguration took place prominently during the General Assembly of the Association of Academies and Societies of Science in Asia (AASSA), with many senior academies present.
The goal of the organisation is to give young scientists of Sri Lanka a voice, and to link with other national young academies, as well as international academies – such as the GYA.

Polish, Israeli Young Academies With Poland and Israel also forming Young Academies earlier in 2012, this brings the total to 20!