



Global Young Academy

The voice of young scientists around the world

GYA General Assembly

20-23 May 2012, South Africa

*Sustainability: Lessons on the
road between Rio and Rio+20*



Report



Global Young Academy

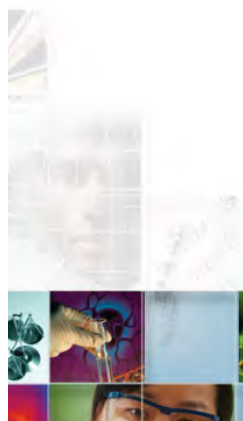
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Attendees of the opening ceremony of the GYA general assembly



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EXECUTIVE SUMMARY

With a program headlined by the South African Minister for Science and Technology, the Editor-in-Chief of Science magazine and other luminaries, the Global Young Academy (GYA) recently completed a very successful General Assembly meeting. The meeting, held in Johannesburg, South Africa, included 80 young scientists from 40 countries, distinguished senior scientists, and science administrators from around the world. With a theme of “Sustainability: Lessons on the road between Rio and Rio+20,” the conference focused on concrete actions young scientists can take to advance a sustainable future. Additionally, the meeting included the founders and founding members of the South African Young Academy of Science (SAYAS), who convened an inaugural meeting to participate in the GYA assembly.

Minister Pandor delivered an inspiring message reminding delegates that, “Rio+20 is an historic opportunity to define pathways to a sustainable future – a future with more jobs, more clean energy, greater security and a decent standard of living for all.” Young scientists have a particular responsibility towards this, and much of this lies in the arena of engaging with the wider society and policy makers to promote an understanding of what is needed to achieve the goals of sustainability.

Other keynote speakers provided examples of how this goal can be accomplished:

Prof. Howard Alper (Co-chair of the IAP: Global Network of Science Academies and GYA Board Member) remarked, “Challenges of clean water and electricity for all are no longer a scientific challenge, they are a leadership challenge” and pointed out to the critical role that University-Industry partnerships can play in influencing leadership on these issues.

Prof. Helmut Schwarz (President of the Alexander von Humboldt Foundation and GYA Board Member) strongly promoted a focus on excellence and interconnectedness in scientific community to build the capacity needed to confront the complex global challenges. His call to ‘fund excellent people, and fund them long term’ resonated with the attendees.

Prof. Bruce Alberts (Editor-in-Chief of Science magazine and GYA Board Member) made a strong call to scientists to get more actively involved and to care deeply about science education. “The future of the world depends on it,” he said. Current approaches that are focused on simply transmitting lists of facts, can bore children, and do not promote an understanding of how science works and what its value to society is. This needs to change urgently and scientists have a responsibility to get involved in changing educational approaches and perceptions.

In addition to stimulating discussion and action in developing more effective strategies for young scientists to contribute to challenges in sustainability, the General Assembly meeting defined the GYA’s



new projects for the upcoming year. In brief, the following examples illustrate a few of the projects developed at the General Assembly meeting.

An inquiry-based science game for high school students was preliminarily translated into English before a world-wide rollout in other languages. The game was played and tested the day after the meeting with learners in a South African school with disadvantaged children.

Several conferences aimed at identifying best practices and creative approaches to science education and outreach along with frontiers in science were planned.

By coordinating regional meetings and other forums of exchange of experience GYA will continue to promote the establishment, development and cooperation of National Young Academies around the world.

A project aimed at defining how to measure academic creativity and scientific output was launched.

Statements drafted included both the importance of scientific outreach and education in achieving sustainability, and the crucial need for gender equality in scientific research. This includes an urgent call to re-evaluate the systems that promote or suppress these goals within the scientific community.

Expansion plans for the GYA's Young Scientists Ambassador program, which stimulates non-traditional scientific exchange and science-society engagement, were developed.

The GYA's statement on grant writing mechanisms was evaluated, and strategies for improving its impact were developed.

GYA members also exchanged their latest scientific results, including new discoveries and insights in quantum materials, open source information, green materials, and genetic analysis. Such science sessions drove the formation of new, interdisciplinary collaborations.

Running from 20-23 May 2012, the General Assembly meeting took place at the University of Pretoria, Gordon Institute of Business Studies (GIBS) in Illovo, South Africa. The Center's outstanding conference facilities supported the conference's goals. For example, a professional media studio was used to record short web videos promoting the GYA's goals, such as establishment of national young academies around the world. The GIBS atmosphere of friendly camaraderie and international collaboration supported the GYA's goals and the meeting.

On 24 May GYA members connected with researchers and the general public around South Africa. As examples, a 'Future of Chemistry' workshop was attended by 9 GYA members from 7 countries and University of Pretoria and staff and post-graduate students from four departments. A number of other seminars and collaboration meetings happened at UP, CSIR, NWU, Limpopo University, UJ, WITS and



other research institutions. Three school outreaches engaged GYA members with schools in Soweto, Alexandra and Pretoria. The feedback is one of excitement and inspiration, both from GYA members and those they interacted with.

The GYA General Assembly was supported by the South African Department of Science and Technology (DST), IAP: Global Network of Science Academies, the German Federal Ministry of Education and Research (BMBF), the Forestry and Agricultural Biotechnology Institute (FABI) and the University of Pretoria. The meeting was hosted by the South African Young Academy of Science (SAYAS), with support from the Academy of Science of South Africa (ASSAf). Several speakers represented the funders, including Prof Robin Crewe (ASSAf and UP), Mboneni Muofhe (DST), Andreas Künne and Maja Clausen (German Embassy in South Africa), Prof Hennie Strydom (Alexander von Humboldt Foundation) and Arne Leeftang (DAAD), pointing out numerous opportunities for scientific exchange and funding relevant to young researchers.

During the last day of the General Assembly, GYA members elected new leadership, including Prof. Rees Kassen of Canada and re-elected Prof. Bernard Slippers from South Africa to serve as Co-Chairs. Also elected at the meeting, the Executive Committee includes Amal Amin (Egypt), Bettina Speckmann (Netherlands), Gabriela Montenegro (Guatemala), James Tickner (Australia), Julia Baum (Canada), Phil Gona (Zimbabwe/USA), Regina So (Philippines), Vidushi Neergheen-Bhujun (Mauritius) and Vinitha Thadhani (Sri Lanka). In addition, three members were selected by the EC to focus on specific strategic projects, including Jeremy Kerr (Canada), Michael Sutherland (UK) and Patrick Arthur (Ghana). The immediate past co-chair Gregory Weiss (USA) will also continue to contribute to this forum.



PROGRAM

The general assembly program was packed, with a strong goal on active discussion, achieving progress in projects, promotion of the Young Academy movement globally, and connecting GYA members and NYAs. Throughout time was made for discussion, and work continued during bus rides, functions, lunch-breaks and more. It is not surprising to look back on the meeting and see the level of excitement, engagement and output that this achieved.

In summary, the program covered:

20 May

Informal start with feedback from working groups, presentation of new ideas, and work on working group objectives. Attendees interacted during a cocktail function. The day ended with Advisory Board and Executive Committee meetings.



21 May



The official opening, headlined by the Minister of Science and Technology, Mrs Naledi Pandor. The speech delivered during the opening is available at (also [Appendix A](#)):

Opening addresses by representatives from ASSAf, SAYAS, GYA and BMBF. The opening session was capped by keynote addresses by board members. The day also saw the presentation of the first science session.



GYA board member, Prof Bruce Alberts delivered a talk to a broader audience at the University of Pretoria. The day ended with a team building function and social event for GYA and SAYAS members, UP personnel and students and visitors.

22 May

Focused on working group activities and a National Young Academy workshop, including feedback from established and recently formed NYAs, together with reports from countries where the process is ongoing.

The day was capped with a stimulating visit to the 'Cradle of Humankind', an inspiring talk by Prof Lee Berger and a dinner function.





23 May

Parallel Science sessions, presentations by funders and related organizations, further work in working groups, working towards a statement from the meeting, discussion of GYA policy related matters, election of a new EC and concluding session and function.

The details of the program follows:



20 May, Sunday

TIME	EVENT	VENUE
	Registration upon arrival	East block foyer
14:00 – 15:00	Welcome and introduction Presentation of new working group ideas Chairs: Prof Bernard Slippers and Prof Gregory Weiss, Global Young Academy (GYA) Co-chairs	Auditorium
15:00 – late	Working group meetings to work on projects (new and existing) and prepare for feedback on Tuesday Chairs: GYA Co-chairs	Classrooms 3, 4, 5 / Ante room / Seminars 1, 3, 4 / FT MBA common room
16:00 – 17:00	Cocktail	East block foyer
16:30	*GYA Board and Executive Committee meeting	Executive dining room
18:00	*GYA Executive Committee meeting	Executive dining room
	Dinner at own time and cost at hotel or surrounding restaurants. Working groups continue work	

All venues refer to rooms on the GIBS, University of Pretoria campus, unless otherwise specified.

*Closed session with attendance by invitation.

21 May, Monday

TIME	EVENT	VENUE
8:30 – 9:30	Arrival of delegates and registration	East block foyer
9:30 – 10:15	Programme director: Prof Bernard Slippers, Co-chair of GYA Welcome addresses: Prof Robin Crewe, Vice-rector, University of Pretoria (including GIBS), President of the Academy of Science of South Africa (ASSAf) and the Network of African Science Academies (NASAC) Prof Gregory Weiss, Co-chair of GYA Prof Jerome Singh and Dr Caradee Wright, Co-chairs of the South African Young Academy of Science (SAYAS) Dr Horst Freitag, the Ambassador of the Embassy of the Federal Republic of Germany to South Africa	Auditorium
10:15 – 11:15	Opening keynote: Mrs Naledi Pandor, Minister of Science and Technology of South Africa Including a discussion with keynote speaker on the theme of the General Assembly Chair: Prof Howard Alper	Auditorium
11:15	Photograph	Steps of East block
11:30 – 12:00	Coffee/Tea	East block foyer
12:00 – 13:00	Keynotes on the role of Academies relating to the congress theme: Prof Howard Alper, GYA Board Member and Chair of the Government of Canada's Science, Technology and Innovation Council: <i>Landscape of Business-University Partnerships: Building Long Term Partnerships</i> Prof Helmut Schwarz, GYA Board Member and President of the Alexander von Humboldt Foundation: <i>Sustainability as Guiding Principle of the Alexander von Humboldt Foundation: Lessons for Research and Research Funding in the 21st century</i> Chair: Prof Amal Amin	Auditorium
13:00 – 14:00	Lunch	Restaurant

21 May, Monday - Continued

TIME	EVENT	VENUE
14:00 – 15:30	Science sessions: GYA members Chair: Gabriela Montenegro	Auditorium
15:30 – 17:00	Transport to University of Pretoria main campus - working trip by bus Chairs: Working group leaders	Meet at North block open parking
17:00 – 18:00	Evening keynote speaker, Prof Bruce Alberts, GYA Board Member and Science Editor-in-Chief: <i>Science and the World's Future</i> Chair: Prof Cheryl de la Rey, UP Vice-Chancellor and Principle	Sanlam Auditorium: UP main campus
18:00 – 19:00	Introduction to Forestry and Agricultural Biotechnology Institute (FABI), entertainment and team building session Chair: Prof Mike Wingfield, Director of FABI	FABI: UP main campus
19:00 – 21:00	Social function and dinner	FABI: UP main campus

22 May, Tuesday

TIME	EVENT	VENUE
8:00 – 9:00	Working group feedback and plans for deliverables and responsibilities Chair: Prof Tilman Brück	Auditorium
9:00 – 11:00	Work in individual working groups Chairs: Prof Bernard Slippers and Prof Gregory Weiss	Classrooms 1, 4 / Exec dining room / Ante room / Seminars 1, 3, 4 / FT MBA common room
11:00 – 11:30	Coffee/Tea	Foyer East block / lawn
11:30 – 13:00	Workshop on National Young Academies - Presentation from established NYAs; Netherlands, Germany, Nigeria, Pakistan - Presentation from recently established NYAs; SAYAS, Liberia, Israel - Presentation from countries busy establishing NYAs; Australia, Canada, Egypt, Sri Lanka Discussion on needs, opportunities to share programs, goals and objectives for GYA Chair: Prof Bernard Slippers	Auditorium
13:00 – 14:30	Lunch packs; Working lunch for working groups and NYAs to further develop ideas and projects Chairs: Working group leaders	Classrooms 1, 4 / Exec dining room / Ante room / Seminars 1, 3, 4 / FT MBA common room
14:30 – 16:00	Transport to Cradle of Humankind - working trip by bus Chairs: Working group leaders	Meet at North block open parking
16:00 – 18:00	Tour of museum at Maropeng	Maropeng
18:00 – 22:00	Braai and social interaction between SAYAS, National Young Academies and GYA members Evening speaker: Prof Lee Berger	Maropeng

23 May, Wednesday

TIME	EVENT	VENUE
8:00 – 10:30	Science sessions: GYA members. Participants work towards common conclusions, ideas and statements Group 1 Chairs: Prof Cheikh Kadir, Prof Shoji Komai Group 2 Chairs: Dr Vinitha Thadhani, Dr Caradee Wright	Auditorium Classroom 6
10:30 – 11:00	Feedback by group chairs on conclusions from the two sessions, and decision on completion of statement from the meeting Chair: Prof Rees Kassen	Auditorium
11:00 – 11:30	Coffee/Tea	Foyer East block / lawn
11:30 – 13:00	Presentations from funders of the conference and related science organizations to sketch opportunities for funding and science development DST, German Embassy, Alexander von Humboldt Foundation and German Academic Exchange Service (DAAD)	Auditorium
13:00 – 14:00	Lunch packs; Working lunch with presentations from candidates for GYA EC	Auditorium
14:00 – 14:30	Voting for new GYA leadership. Non-members continue in parallel session on NYA projects. Chair: Prof Gregory Weiss with assistance from GIBS	Auditorium Classroom 4
14:30 – 15:30	Preparing outcomes from the meeting Chairs: Dr James Tickner and Prof Hans Hilgenkamp	Auditorium
15:30 – 17:00	Discussion and voting on constitutional amendments Chairs: New GYA Co-chairs	Auditorium
17:00 – 18:00	Concluding session. Agreement on plans linked to working groups. Preliminary presentations from countries wishing to host the next GYA General Assembly. Discussion on general themes (e.g. selection, outreach to regions/countries underrepresented) Chairs: New GYA Co-chairs	Auditorium
18:00 – 19:00	*Meeting of old and new Executive Committee Parallel session to work on outcomes from the meeting	Classroom 4 Auditorium
19:00 – late	Farewell dinner and conclusion ceremony Hosts: Prof Bernard Slippers and Dr Caradee Wright	Restaurant

*Closed session with attendance by invitation.

24 May, Thursday

Members visit research centres, Universities, Science Councils and schools around South Africa to promote science as a career, or consult on specific topics to a general audience, or to develop collaborations for future work.

**We appreciate
the contributions
made by the
following
organisations:**



**science
& technology**
Department:
Science and Technology
REPUBLIC OF SOUTH AFRICA



2012 | 2013
German-South African
Year of Science
Deutsch-Südafrikanisches
Jahr der Wissenschaft



**Federal Ministry
of Education
and Research**

iap

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YUNIBESITHI YA PRETORIA

twas



ASSAf
ACADEMY OF SCIENCE OF SOUTH AFRICA

SPONSORS AND SUPPORT

The meeting would not have been possible without the generous financial support:

- South African government, Department of Science and Technology: The bulk of the cost of the venue, accommodation, food and associated costs of the meeting. Importantly, DST also sponsored the travel and local costs of a number of African delegates, in an attempt to increase momentum for more NYAs on the continent.
- IAP and TWAS: Sponsoring the majority of travel costs for members from developing countries
- German Federal Ministry of Education and Research (BMBF): Associated with the German-South Africa Year of Science, sponsoring travel and subsistence of German attendees, including invited German participants.
- University of Pretoria and the Forestry and Agricultural Biotechnology Institute: Hosted presentation by Prof Bruce Alberts, and dinner for GYA and SAYAS members, as well as supporting organization of the meeting, and sponsoring accommodation and travel for some board members and GYA members linked to outreach activities.
- ASSAf: Major staff support for engaging with DST and other stakeholders, the organization and running of the meeting, management of finances and media support.
- GIBS: Sponsoring numerous small elements of the meeting, and staff going beyond the call of duty to make the meeting a success. Coordination of one of the outreach projects.
- SAYAS: As host of the meeting, the support from the exco of SAYAS was instrumental in securing funding from DST and engaging with media and other stakeholders.

GYA EXECUTIVE COMMITTEE MEETINGS

GYA EXCO 2011-2012, 20 May

The GYA Exco meets on a 6-8 week basis via Skype. While critically important and very effective, the in person meetings are invaluable to establish relationships, build trust and take critical, strategic decisions.

Matters discussed included feedback on developments in the past year, strategic development, potential amendments to the constitution, membership (both increasing diversity, reach and quality of new members, and current members becoming alumni, a new development for the GYA), finances and fundraising, potential addition of Science to the name and giving NYAs official status (both rejected).



GYA EXCO 2012-2011, 23 May

A joint meeting was held between the previous, and newly elected GYA EXCO. The intention was to hand over the key responsibilities, and thank past members for their selfless contributions to further the goals of the GYA. A special word of thanks was also given to the Managing Director, Dr Heidi Wedel, for the transformative effect she has had on the efficiency of the GYA EXCO, fundraising, GA and other activities. The newly elected EXCO then discussed and voted on the involvement of three additional members to focus on key responsibilities, namely Jeremy Kerr (GYA GA 3), Patrick Arthur (Global Research Council) and Michael Sutherland (newsletter). Key responsibilities for EXCO members, strategic objectives, mode of operation, future meetings and goals.



Combined meeting of the previous and newly elected GYA executive committees, with the GYA managing director, Dr Heidi Wedel (left middle).

ACTIVITIES OF GYA ADVISORY BOARD

Three board members attended the meeting from 20-21 May, namely Prof Bruce Alberts, Prof Helmut Schwarz and Prof Howard Alper. All three members paid their own way to fly to South Africa. Accommodation and other local costs were covered.

GYA board meeting, 20 May

Meeting between GYA Exco 2011-2012 and three board members.

Extremely valuable and fruitful meeting that discussed strategic direction and development of the GYA, opportunities and funding options. Direct opportunities for board members to assist with the strategic development and fundraising goals were also identified.

Keynote talks

Each board members participated in the program as keynote speakers, focusing on divergent issues, but related to the theme of the congress. The talks are available in the members only areas of the GYA website.

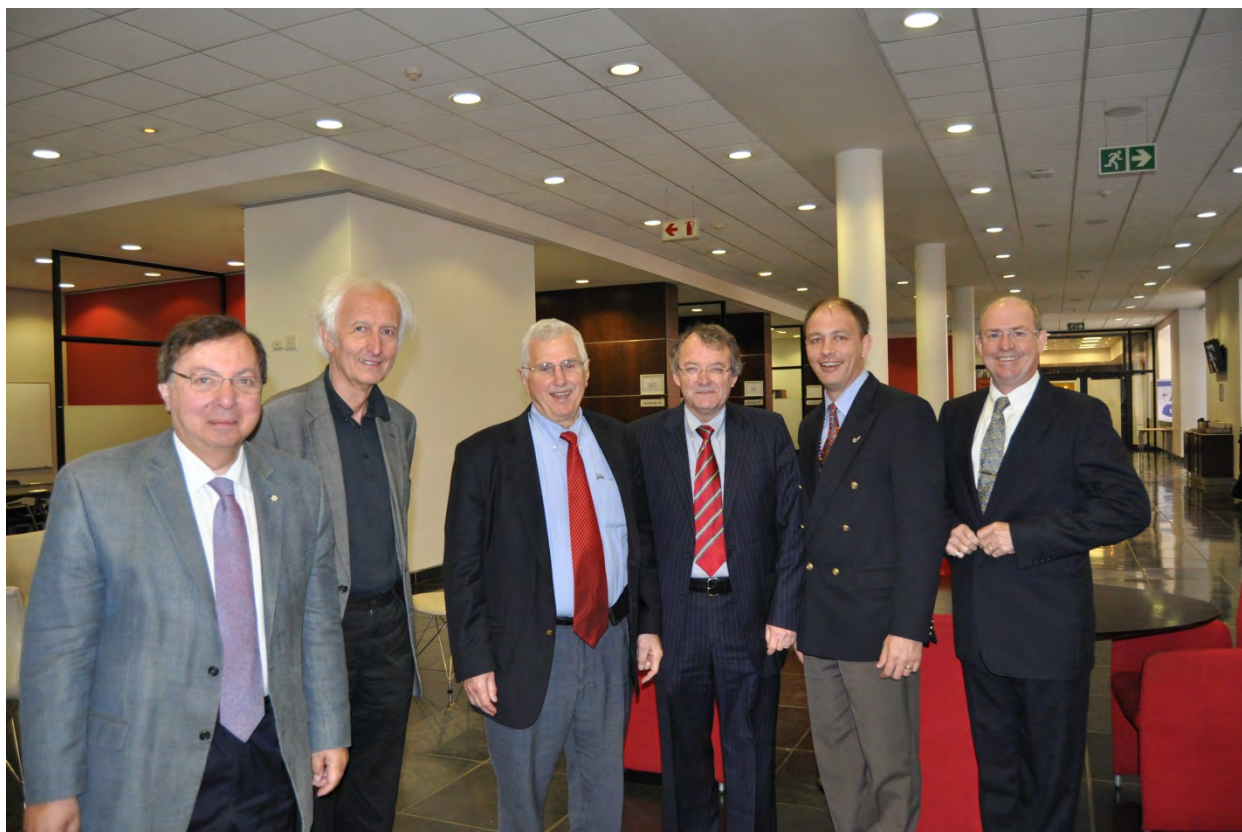
Social engagement with GYA members and other attendees

Board members interacted with attendees during two evening social functions on 20 and 21 May, as well as during breaks. The board members also participated in Working Group discussions, and Science sessions on 20 and 21 May, contributing to discussions.

Media interviews and video material

The three board members had individual interviews with Jeremy Mansfield, organized by the GIBS media team. The interviews specifically focused on the theme of the conference, and contributed to ongoing discussions by GYA members on this topic. Videos from these interviews are available via the GYA website.





GYA board members, Profs Howard Alper, Helmut Schwarz, Bruce Alberts, with Prof Robin Crewe (President of ASSAf), Prof Bernard Slippers (GYA co-chair) and Prof Mike Wingfield (Director of FABI).

WORKING GROUPS

The Working Groups (WG) are at the heart of activities of the GYA. Eleven WGs convened at the meeting and will be active through the next GYA GA. All of them produced videos for presenting the aims of the group on the website. The meeting time was also used to further planning of the WGs and report for each working group was presented during the meeting and written report prepared for submission to the Executive Committee after the meeting. The eleven WGs convened included:

1. Science Game (Leader: Bettina Speckmann, Netherlands)

An inquiry-based science game for high school students was preliminarily translated into English and (positively) tested for cultural sensitivities before a world-wide rollout in other languages. The game was played and tested the day after the meeting with learners in a South African school with disadvantaged children.



2. Women in Science: (Leader: Amal Amin, Egypt)

The intention is to understand the current situation of young women scientists from different regions, their general profiles and research activities and the barriers that limit their participation in science with a view to overcome the gender imbalance in science. At the 2012 GYA GA at Johannesburg, South Africa, the WG identified hurdles that prevent the participation of more women in science and discussed how to encourage women scientists.

3. Unleashing Curiosity (Leader: Martin Dominik, UK)

A project aimed at defining how to measure academic creativity and scientific output was launched.

4. Science4Youth (Leader: Aftab Ahmed, Pakistan)

A pilot project of the National Academy of Young Scientists (NAYS) in Pakistan aimed at motivating students at school and college level was presented and will be extended to 5 more countries.

5. Science Education (Leader: Vinitha Thadhani, Sri Lanka)

Several conferences aimed at identifying best practices and creative approaches to science education and outreach along with frontiers in science were planned.

6. YSAP (Leader: Stephen Miller, USA)

The GYA's "Young Scientist Ambassadors Programs" aims to connect young scientists from countries with traditionally very few links. Currently, this project is funded through the efforts of individual members, but has successfully included visits between South Africa-Réunion Island, US-Indonesia, and New Zealand-Thailand. The IAP: Global Network of Science Academies has agreed to work with us in developing this project further.

7. Policy Contribution (Leader: Rees Kassen, Canada)

Statements drafted included both the importance of scientific outreach and education in achieving sustainability, and the crucial need for gender equality in scientific research. This includes an urgent call to re-evaluate the systems that promote or suppress these goals within the scientific community.



8. Research Software (Leader: Abdullah Bin Tariq, Bangladesh)

This project addresses the challenge of conducting research in developing countries, where the software required for research can be prohibitively expensive. The GYA is the only organization trying to solve this issue, through both identification of Free and Open Source Software (FOSS) and negotiation for discounted rates on software to scientists in developing countries. The WG has started to collect recommended FOSS.

9. State of Young Scientists (Leader: Tilman Brück, Germany; Regina So, Phillipines)

The WG is preparing a report on the state of Young Scientists based on a systematic review of available reports and survey data. At the GA they identified the topics to be addressed in the report and agreed on conducting a survey addressed at young scientists all over the world based on the well-established networks of the GYA as well as various NYA and preparing workshops and/or conferences to discuss the issues.

10. Scientists and Mobility (Leader: Sameh Soror, Egypt)

Following an example in Pakistan the WG will maximize the benefits of expatriate scientists for YS in their home countries by organizing academic events and exchange with them. As a support the WG initiated a database of expatriate scientists from selected countries.

11. Grant Application (Leader: Yael Hanein, Israel; Alexandru Simon, Romania)

The GYA's statement on grant writing mechanisms was evaluated, and strategies for improving its impact were developed.

In addition to the activities of the working groups, proposals for short-term projects were called for during the meeting. Some are likely to lead to the formation of additional WGs by the next GYA GA.

NATIONAL YOUNG ACADEMIES

Globally the Young Academy movement is gaining momentum. Supporting the establishment, development and connection of these Young Academies is one of the main goals of the GYA. The GYA GA served as a meeting place for NYAs. NYAs where we do not have GYA members at present were invited to attend.



Presentations were heard during the workshop from the Sudanese, German and Dutch Young Academies (established), the South Africa, Zimbabwean, Egyptian, Japanese, Scottish, Israeli, Pakistan, Philippines (recently established) and from Australian, Canadian, British, Ghanaian and Senegalese members who are involved in efforts to establish NYAs.

It is clear that the GYA has already begun to impact global science policy through its involvement in developing NYAs around the world. For example, the GYA has directly contributed to the formation of national young science academies in the Philippines, Japan, Zimbabwe, South Africa, Nigeria, and other countries. In many of these countries, the GYA-drafted "Blueprint for the Formation of a National Young Academy" provided a basis for their constitutions, and helped define goals for the nascent young academies. Additionally, a recent DAAD-funded mission to Egypt contributed significantly to the formation of the Egyptian Young Academy of Sciences (EYAS) in the country, where the ministry signed paperwork for its formation the day before the delegation arrived. The GYA will continue to work with Egyptian partners towards launching the EYAS at the end of 2012. Thus, the GYA both directly and indirectly promotes formation of national institutions promoting young scientists.

Once formed, NYAs rely upon the GYA to support their development and for globalization of their activities. For example, at the recent GYA General Assembly meeting in Johannesburg, South Africa, the GYA membership discussed divergent experiences associated with the formation of NYAs, including strategies for successfully convincing senior academies to support their formation. The GYA promotes cooperation between existing NYAs and young scientists seeking to establish young academies. In October, 2012, for example, the GYA in partnership with the Dutch Young Academy will co-host a meeting called "Shaping the Future of National Young Academies," which builds on the GYA's central role in accelerating and leading the national young academy movement.

The GYA also identifies and globalizes outstanding projects developed by NYAs. For example, the Dutch Young Academy created an excellent inquiry-based science game for 10-13 year old students. The game involves piecing together clues about an alien form of life to develop a comprehensive picture of its ecosystem; in short, the kids think like scientists, formulate hypotheses, test them, and then report their results. At the GYA general assembly meeting, the game was translated from Dutch to English by the GYA members. Next, under GYA auspices, the game will be translated into German, French, Zulu, Afrikaners, Arabic, and many other languages. The game was tested at a South African township school during outreach activities by GYA members after the general assembly meeting. The students and teachers really enjoyed the project. In the future, the GYA will apply for funding for a project aimed at assessing the game. The GYA will continue to look for similar opportunities to develop highly effective NYA projects for a global audience.



Podcasts

Two podcasts were produced in the professional media studio of GIBS to promote the Young Academy movement. The videos include a general discussion and call to join the Young Academy movement by the co-chairs of GYA (Profs Gregory Weiss and Bernard Slippers). A second video discuss the role and experience of senior Academies in the establishment of Young Academies by one of the co-chairs of the South African Young Academy of Science (Dr Caradee Wright), and the executive officer of the Academy of Science of South Africa (Prof Roseanne Diab). These videos are available on the website of the GYA.



SANDTON DECLARATION

The theme of the GYA's General Assembly, "Sustainability: Lessons on the road between Rio and Rio+20" reflects the GYA's core function of empowering young scientists to weigh-in on science policy and science-society issues. At the general assembly meeting, the GYA drafted an important statement on sustainability ([Appendixes B and C](#)). Rather than calling on the public to take action, the statement is addressed to scientists, and implores scientists, especially young scientists, to take three actions to achieve a sustainable future. First, all scientists must engage with policymakers and the public. Second, the scientific community must remove barriers that discourage engagement with the public (e.g., career metrics that negatively weight scientific outreach). Third, scientists must foster the broadest possible scientific literacy. Thus, rather than asking for more research in areas of science related to sustainability, the statement calls on young scientists to take concrete, achievable actions to advance a sustainable agenda. This statement, termed the Sandton Declaration, has been submitted to groups attending the Rio+20 meeting, has been distributed to Science Academies around the world and was promoted through a press release to media organizations around the world at the time of the Rio+20 meeting. Members of the GYA are also promoting the principles promoted in the declaration by engaging with the scientific community via various forums. For example, a letter to the South African Journal of Science by the co-chairs of GYA will appear in July ([Appendix D](#)).

OUTREACH ACTIVITIES

A new and unique feature of this meeting was an active engagement of the attendees with research organizations, science centres and schools to actively work towards some of the goals of the GYA within the communities or country where the meeting is held. These include bridging the gap between developed and developing nations, supporting science academies and science education. It is hoped that this will be an enduring feature of the GYA general assembly meetings in future, especially when such meetings are held in developing countries. Apart from contributing to these communities from the skills base of the GYA, GYA members are also enriched by their experience of direct engagement with a community that they otherwise might have limited interaction with. Not all these activities are recorded, as members made arrangements individually. Those reported here are for which reports are available, and serves to illustrate the diversity and impact of the activities.



The outreach activities can be grouped into two categories:

Academic outreach

Future of Chemistry workshop, University of Pretoria ([Appendix E](#))

Physics collaboration strengthened between Oxford University and CSIR, NMMU and ASSAf ([Appendix F](#))

International health research and biostatistics collaboration strengthened with NWU ([Appendix G](#))

Water research, CSIR (APPENDIX X)

A number of scientific talks and associated meetings and collaborations occurred, including a talk on Evolutionary biology and genomics, FABI, University of Pretoria, Prof Rees Kassen, Macro-ecology and conservation, University of Pretoria, Prof Jeremy Kerr and more.

Non-Academic outreach

Outreach to Thuto-Kitso Comprehensive School, Fochville with Sci-Bono Discovery Centre ([Appendix H and I](#))

Outreach to Diocesan School for Girls, Pretoria, 24 May ([Appendix J](#))

GIBS-FABI outreach to Alexandra and the Sandton View High School, including testing of the Science Game 'Expedition Moondus', 24 May ([Appendix K](#))

Science projects presented for school learners at Sci-Bono Discovery Centre, 25 May ([Appendix L](#))

"Speak to a Scientist" public talk and media communication by Dr Marc Creus ([Appendix M](#))

The reports captured in the appendixes do not represent all the outreach activities, but aim to give an overview of the extent, impact and potential of the outreach activities following the GYA.



PERSONAL IMPRESSIONS AND GENERAL FEEDBACK

Prof Steven Miller, USA



I attended the 2012 Global Young Academy General Assembly in South Africa as one of two GYA delegates from the United States. The experience—regarding both the General Assembly and our extracurricular activities—**far exceeded my expectations and I will count this trip among the most interesting and informative of those I have enjoyed during my career.**

This year's General Assembly facilitated another quantum leap of progress. GYA members established new working groups, elaborated old ones and, very importantly, created new personal connections between young scientists from around the world. This bonding experience is highly rewarding and I predict that untold benefits will arise from these interactions over the next several decades.

Many individuals are to be thanked and congratulated for a highly successful meeting. For me, they made possible a long string of experiences that will difficult to forget, including:

- Hearing from the South African Minister for Science and Technology, Mrs. Naledi Pandor.
- Conversing with Helmut Schwarz, President of the Alexander von Humboldt Foundation (to which I may soon apply).
- Hearing from Professor Bruce Alberts, Science Editor-in-Chief.
- Participating in a "team building session" by banging on drums.
- Discussing the Young Scientist Ambassador Program (YSAP) with members from the newly formed South African Young Academy of Science (SAYAS).



- Hearing about the considerable progress made by Young National Academies worldwide and knowing that the GYA played a significant role in establishing several of them.
- Visiting the Cradle of Humankind site and museum in Maropeng, where some of the oldest human and humanoid fossils have been unearthed.
- Witnessing one of the most inspirational and moving lectures ever from Lee Berger, famed paleoanthropologist.
- Sighting the Southern Cross constellation for the first time.
- Being invited to present a lecture at the Frontiers of Chemistry Workshop at the University of Pretoria.
- Visiting the Union Buildings in Pretoria.
- Visiting CSIR (Council for Scientific and Industrial Research) and having a personal tour of the CSIR laser lab that boasts some of the world's most powerful lasers (thanks Daniel!).

It is hard to comprehend and digest the density and import of these experiences. Indeed, [the Global Young Academy continues to be one of the most challenging but rewarding ventures of my career.](#)

[Dr Mihaela Zigman, Germany](#)



In spite of the fact that we reached the state of global communication among young scientists without actually meeting in person, I believe that [this very meeting proved that facing the global as well as local problems together we can achieve more than I have personally ever expected before.](#)

Becoming a new GYA member in 2012, I have been given a chance to contribute to this group of highly motivated minds to not only meet up and exchange opinions, but also actively work together towards solving issues in this very exceptional environment of South Africa. Although I have participated at a



variety of worldwide scientific meetings and workshops before, I have previously never experienced a meeting with such a high inter-disciplinary and international interaction rate and such a sincere desire for productivity with the common goal and desire, to promote science.

While I deeply believe that corroborating young scientists of diverse disciplines will foster results in science that could not be achieved otherwise, I would like to note that this very meeting also gave me a chance to discuss about a putative project that would encompass a crossroad between physics and biology. An idea that me as a biologist nor the colleagues from the field of physics would not have come up with otherwise.

I have personally learned a great deal through the discussions within our working group itself that was not only very active, vivid but also productive within the given time frame that everyone has generously reserved away from their daily obligations. I am certain that we could not have ever proceeded that way if we were not all present there, alongside with the great and immediate support of more senior GYA and also board members.

Moreover, at the meeting I have not only got familiar with scientists from countries I have not met before, but also with many common obstacles that young scientists are facing worldwide. The awareness of the needs and common issues of the scientists from the developing and developed countries on one hand, and a chance to actively contribute towards promoting science through education of upcoming generations on the other, was only a further confirmation that I would like to contribute to the actions of these very group of young scientists in the future as well.

It was an **exceptional opportunity, highly motivating**, I believe also a great momentum for everyone attending it and I would highly recommend to foster that kind of meetings in future.



APPENDIXES

Note to the reader: The following appendixes capture the spirit and essence of various aspects the second annual Global Young Academy (GYA) meeting in Johannesburg, South Africa. The reports for talks, sessions, working groups and outreach activities were prepared by different attendees, which results in somewhat uneven coverage.



APPENDIX A

Opening address by Mrs Naledi Pandor, Minister of Department of Science and Technology, South Africa

President of the Academy of Science of South Africa and President of the Network of African Science Academies (NASAC), Prof. Robin Crewe;
 Co-chair of the Global Young Academy (GYA), Prof. Gregory Weiss;
 Co-chairs of the South Africa Young Academy of Science (SAYAS), Prof. Jerome Singh and Dr Caradee Wright;
 ASSAf's Executive Officer, Prof. Roseanne Diab;
 South Africa Young Academy of Science Executive Committee Members;
 Programme Director, Prof. Bernard Slippers Distinguished Guests;
 Academics, Researchers, Scientists, and Students;
 Ladies and Gentlemen

The South African Young Academy of Science (SAYAS) has hit the ground running. It was launched only in September last year (2011). Barely a year later SAYAS is hosting the General Assembly of the Global Young Academy! I commend both ASSAf and its energetic offspring, SAYAS.

I am delighted to say a few words on the theme "Sustainability: Lessons on the road between Rio and Rio+20".

Rio+20 is the shortened name for the United Nations Conference on Sustainable Development to take place in Rio de Janeiro, Brazil, in June 2012 – twenty years after the landmark 1992 Earth Summit in Rio. At the Rio+20 Conference, world leaders, along with thousands of participants from the private sector, NGOs and other groups, will come together to talk about how we can reduce poverty, advance social equity and ensure environmental protection on our crowded planet.

The official discussions will focus on two main themes; (1) how to build a green economy to achieve sustainable development and lift people out of poverty; and (2) how to improve international coordination for sustainable development.

As we go into Rio+20 we are reminded that 20 years on the matrix of challenges has not changed much since the 1992 Earth Summit. I want to highlight a matrix of challenges facing the world today. These are:

- The world today has 7 billion people – by 2050, there will be 9 billion,
- One out of every five people – 1.4 billion – currently lives on \$1.25 a day or less,
- A billion and half people in the world don't have access to electricity,



- Almost a billion people go hungry every day, and
- Greenhouse gas emissions continue to rise, and more than a third of all known species could become extinct if climate change continues unchecked.

Rio+20 is an historic opportunity to define pathways to a sustainable future – a future with more jobs, more clean energy, greater security and a decent standard of living for all.

I attended COP 17 in Durban and came away with an understanding that among the most pressing issues facing the world today is that of population growth. It is estimated that by mid-century world population will have grown to more than 9 billion. Population growth is one of the three principle factors determining the human impact on the environment, the other two being economic growth and technological processes.

The world is undergoing the largest wave of urban growth in history: already, over half the world's population is living in towns and cities, and by 2030 this number will swell to almost 5 billion, with urban growth concentrated in Africa and Asia.

At the same time about one out of seven persons who currently live on the planet live in extreme poverty, defined by the World Bank as living under \$1.25 per day. Unemployment, underemployment or vulnerable employment is the key contributor to low household incomes and low household incomes are also closely linked to food insecurity.

Today, food insecurity is largely a question of household incomes, but food insecurity is rapidly becoming a question of the availability of food itself. Because of competing uses of food (for fodder and biofuels, for example), climate-change related hazards and other factors, food production will need to increase at a relatively high rate. According to the Food and Agriculture Organization of the United Nations' (FAO) 2010 estimates, world agricultural output will need to grow by 70 per cent to feed a population of 9 billion people with rising levels of consumption.

Food insecurity cannot be delinked from questions of availability of land for agriculture. Four in five women in developing countries consider agriculture as their primary source of livelihood. Yet in sub-Saharan Africa only one in five landholders is a woman. The failure to address the persistent inequalities that undermine rural women's status and well-being should be the priority area of focus for governments leading into the Rio+20 conference in June.

We will not achieve sustainable development if we do not achieve gender equality.

Closely connected to gender equality are the multi-pronged and multi-stakeholder responses to its climate-change challenges that South Africa is embracing and implementing.

On 12 October 2011, Cabinet approved a National Climate Change Response White Paper. It spells out the country's key global policy commitments. It aims to achieve a fair, inclusive and effective



global agreement that is in line with goals to end poverty and promote sustainable development. South Africa is a signatory to the Kyoto Protocol, which is the United Nations-driven response to curb global temperature increases.

South Africa's "Climate Change Response" policy aims to reduce South Africa's greenhouse gases through complementary adaptation and mitigation strategies. It includes a timetable to review greenhouse gas emission reductions and the implementation of sustainable development policies every five years.

There are other policies that reflect our national commitment to shift the country to a low-carbon socio-economic development path. Both the New Growth Path and Industrial Policy Action Plans, for example, outline various "green economy" initiatives. The Industrial Policy Action Plan contains a commitment to foster the "greening of industrial development". It specifically recognizes the potential benefits to be reaped from promoting "green" and energy-saving industrial development, and is closely aligned to government's "Renewable Energy White Paper".

In addition to exploring options for greater water efficiency in industrial applications, these policies also considers wind, biomass and waste management, and ways to efficiently harness solar energy. There has, for instance, been growing demand for solar water heaters, which is considered to be a very labour-intensive industry alongside its environmental spinoffs. Treasury's "Carbon Tax" discussion paper specifically calculates the social costs and benefits from activist state policies to curb emissions from polluting firms. The longer-range plans emerging from the National Planning Commission indicate similar steps in this direction.

Ladies and gentlemen, a greener but also a more prosperous planet is in all our best interests. On 17 November 2011, the South African government and its social partners signed the Green Economy Accord, as an outcome of social dialogue on the South African New Growth Path – a plan in which South Africa set a goal of creating five million new jobs by 2020.

Through the Accord, South Africa has committed to concrete steps to reduce dependence on coal-based energy, to develop a local industry to produce the necessary technologies, and to create more opportunities for workers and for small businesses and co-operatives.

The Accord helps lay a basis for greater employment creation and equality, as it both aims to secure a sustainable future for all South Africans and sets out how South Africa can participate in the growing green technological revolution.

To date, 140 000 solar water heating systems have been installed at household level. The South African government is committed to a target of ensuring the installation of one million solar water heating systems at household level by 2014.



At the same time South African business is committed to working with government to develop, establish and then publicise a sustainable funding plan to support the installation of one million solar water heating systems.

A capital allocation of about R22 billion will be set aside for green projects over the next five years and a further R3 billion will be made available for manufacturing of green products and components.

The government also commits to the procurement of renewable energy as part of the plan to expand the energy-generation capacity of the country. To date, government has committed for the supply of 3 725 MW of renewable energy by 2016 as a first step to realising the goals for renewable energy under the Integrated Resource Plan 2010 – 2030.

As a contribution to sustainable development, my Department is working at establishing (i) a bioeconomy strategy and (ii) new Centres of Excellence that will have a focus on sustainable development areas of research.

The bioeconomy strategy will facilitate more bioeconomy-related Research Chairs, Centres of Excellence and related industries.

Programme Director, ladies and gentlemen, as I conclude, I was told that on Tuesday you will be visiting the Maropeng centre at the 'Cradle of Humankind'. We are proud to be the custodian of such a famous archeological site where some of the best known human and humanoid fossils have been unearthed. As you tour the facility remember that **“all of humanity shares an African heritage. We are one diverse species across the globe with our roots in Africa”**.

I thank you.



APPENDIX B

GYA Sandton Declaration on Sustainability

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.

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 such discussion. 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 have the tools to engage in 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, at all levels from kindergarten through post-secondary education. An inquiry-based approach will illustrate how scientific discoveries are made and how past evidence catalyzes them. More transparency will build both public trust in scientific information and capacity to weigh 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.



APPENDIX C

Press release to announce and release the Sandton declaration with the Rio+20 meeting

The Global Young Academy (GYA) calls on scientific community to lead the march to sustainability

Berlin, June 20th, 2012 – The Global Young Academy today issued a **sharply worded statement** calling on the scientific community to do more to promote progress towards global sustainability. “The problem is not science, it is leadership”, said GYA co-chair Rees Kassen.

Members of the GYA feel a special urgency on sustainability, since many of them came of age in the period between the first ‘Earth Summit’ on sustainability at Rio in 1992, and the United Nations Conference on Sustainability - the so-called Rio+20 meeting – starting today. “We are the inheritors of the decisions being made over the next three days”, said GYA co-chair Bernard Slippers, “so we have a vested interest in charting the way forward”.

The ‘**Sandton Declaration**’ makes it clear that sometimes scientists are their own worst enemy. Reward structures in science often discourage or even punish public engagement and outreach. “This must change”, Kassen says. The declaration calls on the scientific community to **revise its reward structures** to value knowledge mobilization by scientists themselves. It also encourages scientists to take a more active role in **promoting the use of scientific evidence in decision-making and encouraging inquiry-based science education** in schools and universities.

About GYA

The Global Young Academy, founded in 2010, is the voice of young scientists around the world. Members are chosen for their demonstrated excellence in scientific achievement and commitment to civil society. Currently there are 172 members from 54 countries.

For more information

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APPENDIX D

Letter in the July issue of South African Journal of Science

Title: Young scientists reflect on how to affect real change for Rio+40

Authors: Bernard Slippers (South Africa) and Rees Kassen (Canada)

Reference: South African Journal of Science, Issue 108(7/8), article #1340.

The Rio+20 Conference on Sustainable Development (20–22 June 2012) forces reflection on progress since the original UN Conference on Environment and Development that was held in Rio de Janeiro in 1992. Scientific knowledge relevant to sustainability has grown exponentially since the first conference, but concrete steps to achieve sustainability have been slow or even non-existent.

For example, leading forest pathologists and entomologists from around the world recently issued the 'Montesclaros Declaration',¹ calling for a phasing out of trade in live plants and plant material given the threats this trade holds for forests globally. The call reflects a measure of desperation from scientists working with many natural ecosystems and witnessing an unprecedented, rapid decline in their sustainability – in this case, caused by the increasingly rapid homogenisation of pest and pathogen communities between forests of the world, with devastating effects.

Why is the call unlikely to be heeded? The plant trade industry is worth billions of dollars annually, and being able to buy an assortment of woody plants from a local nursery is taken for granted by the public. But importantly, the data on damage from pest and pathogens spread via plant trade is hidden from public view in scientific journals. It is hard to imagine how such a well-hidden literature could motivate the public to put pressure on local governments and industries to adopt policies to limit potential damage from the live plant trade.

Attendants at the meeting of the Global Young Academy (GYA) – an organisation representing 173 elected early career researchers from all fields of science and from 54 countries – held in Johannesburg in May 2012 grappled with questions around sustainable development. The 20 years between Rio and Rio+20 cover the period during which many of us were recruited to, trained in, and successfully started careers in science. It has been a period marked by an unprecedented rate of scientific discovery, unimaginable increases in interconnectedness (both in terms of research and how research outputs are shared) and a rapid change in how scientific output and impact are measured.

The consensus that emerged from the GYA meeting is that, while there has been much progress in knowledge and innovations to improve global sustainability, implementation has lagged. These impediments appear often to be political, rather than technical. In Canada, for example, the government has banked its economic recovery on development of the oil sands in northern Alberta and, has made efforts to reduce the environmental regulation required to do so. Decisions like this lead one to ask what the value of yet another high-level meeting on sustainability is all about?



No doubt Rio+20 will help raise the profile of the most pressing, cross-cutting issues the world faces in achieving sustainability. Consensus statements on the need for change and the imperative of action will abound. Yet, real progress towards sustainability will come only from constituencies, not consensus statements. In Johannesburg, GYA members decided that what matters much more for achieving progress on sustainability is raising the level of knowledge more broadly in civil society by improving the quality of scientific education. This progress hinges on the ability of scientists to communicate effectively with decision-makers, and the development of a bond of trust between society and scientists.²

The scientific community needs to face up to its own shortcomings in this regard. Few of the young scientists attending the GYA meeting could attest to being encouraged or equipped for communication outside the scientific community during their training. There is also little motivation in current evaluation criteria to stimulate a more outward looking and engaging approach from these young scientists. In fact, most evaluation and promotion criteria appear to discourage such activities.

These mistakes cannot be repeated for the next 20 years, when the increases in the pressures on natural ecosystems and society will be even greater. If we are to make progress towards sustainable resource use, then scientists will have to accept the responsibilities that come with the privilege of being knowledge creators. These responsibilities include sharing knowledge more effectively. It is only in this way that we stand any hope of ensuring our communities' sufficient motivation, and our leaders' sufficient understanding, to make the decisions that seem so obviously necessary and urgent to those who have access to the relevant information.

References

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APPENDIX E

Future of Chemistry Workshop, University of Pretoria, 24 May

Participants

Marc Creus (Switzerland)

Gregory Weiss (USA)

Sherein Elegroudy (Egypt)

Amal Amin (Egypt)

Vintha Thadhani (Sri Lanka)

Stephan Miller (USA)

Regina So (Phillipines)

Oded Hod (Israel)

Prof Debra Meyer, Head of Department of Biochemistry, with students and staff, UP

Prof Egmont Rohwer, Department of Chemistry, with students and staff, UP

Students from the Department of Chemical Engineering, UP

Dr Regina So (Phillipines)

GYA members both from developed and developing countries met with the administrators, faculty and students of the University of Pretoria for a short discussion on the future of chemistry at the boardroom of FABI on May 24, 2012.

In the meeting, there were two short keynote talks followed by a focus group discussion. Prof. Stephen Miller gave a talk on Renewable plastics, focusing on plastics which are water soluble and lignins as source of raw materials. Prof. Debra Meyer gave a short summary of research that is being carried out by UP faculty and students on TB, Malaria and HIV treatment, monitoring and diagnosis.

For the focus group discussion, it was discussed that science is closely linked to society. However, society also has to accept science. How can a society be more open to science? First, scientists should engage the public. It is the responsibility of the scientists to educate the public on the topics and issues related to science, instead of making them difficult. Second, an inquiry-based science education helps the students to be more engaged in their learning.

The future of science lies with the scientists- collaboration of scientists amongst themselves to solve global problems, and engaging the public on the benefits and frontiers of science.



Prof Sherein Elegroudy (Egypt)

I attended the "Future for Chemistry" workshop at FABI, University of Pretoria. We had fruitful discussions on the future of chemistry in drug diseases, biodegradable plastics, with faculty members from the dept. of chemistry, biochemistry and zoology at University of Pretoria. I then had a seminar and open discussion with Prof. Thoko Majozi, chemical Engineering Dept., and his research team. I gave a presentation on my research work, followed by presentations given by each of Prof. Majozi's research team on their work as well. We then discussed possible collaborations and how we can integrate our research work and the possible venues for that, such as African Union Grant and South Africa-Egypt research visits. Dr. Majozi then kindly invited us all for some snacks at UP, before he drove me to a guesthouse. Dr. Majozi will be visiting Cairo sometime this month so will have a chance to talk more about concrete research topics.

Prof Gregory Weiss, USA

Following the Chemistry workshop, Prof Weiss gave a talk to BSc Biochemistry Honours students and staff, with the title: "Exploring Biology and Chemistry with Nanometer-scale Electronics". Prof Weiss says: "This day was quite enjoyable, and helped contribute to several linkages between SA and US scientists (e.g., between Debra Meyer and a HIV collaborator at UC Irvine). Also, I agreed to help the Chemistry Department recruit two outstanding new faculty members." The latter comment relates to a meeting between Prof Weiss and Prof Egmont Rohwer and Prof Anton Stroh.

Prof Debra Meyer, South Africa

Prof Meyer says: "Thanks for the exposure to some of the GYA members, it was educational. The students thoroughly enjoyed Prof Weiss's lecture (we had hons, MSc and PhD's as well as some lecturers present). Prof Verschoor had a brief meeting with Greg afterwards and they exchanged contact details for further contact. Greg was also kind enough to put me in touch with an HIV/AIDS researcher at UC Irvine and I promised to keep him posted on whether it leads to anything."

Notes made by Prof Meyer during the workshop discussions (chaired by Prof Weiss):

1. **In Africa the future of chemistry is dependent upon collaboration.**

Strong ties exist between RSA & Egypt with the developed rather than developing world (to an extent also with each other – NRF funds?)

The subject Chemistry obviously has a role to play in the development of drugs (PRD)

There is also a role for the subject in the development of diagnostics

2. Chemists/scientists should work with/collaborate with economists and politicians.



3. Scientists could/should form a union to formally 'take on' politicians, on science related issues.
4. **Scientists have an obligation** to:
 - Speak up often;
 - Not just to promote our research agenda.
5. Science communication needs to be improved.
Students should be trained in communicating science to the public.
6. One outcome of this workshop could be to ask Bruce Alberts for a special edition of Science magazine for the general public in parallel with the scientist version:
 - Counter arguments were that the 'Scientific American' is already geared towards being for the general public.
 - For improved science communication — scientist and journalist should join hands and/or form links.
 - Science literacy for non-scientists should improve.
 - The Canon — about science literacy.
7. More practical work rather than just/mostly theory.
8. Force lecturers to learn how to teach and to **'Nurse curiosity'**.
9. Tel Aviv University example:
 Open days at university → for general public to listen to science/art lectures.
 Scientist goes to parliament and explains science content.
 There are also many examples of this in the USA (e.g SENCER)
9. Poor infrastructure leads to brain drain:
Brain drain — the world has a co-responsibility (if you take scientists from an under developed area for benefit of already developed regions).
 International collaboration to have cutting edge facilities available to prevent exodus to developed areas.
 Developed governments should give money to institutions rather than governments so money gets to where it should go.
10. People from developing countries find it difficult to compete on the same level as those from developed countries — e.g publication reviewers can ask for a researcher to try another technique when this technique is not available at the lab in question.
 One way of solving (the above-mentioned) infrastructure problems is collaboration.
 Developing country researchers should establish niche areas e.g. rice research in Philippines.



11. Future of chemistry in this 'trans-disciplinary' era?

How do you define yourself — chemist/biochemist/molecular biologist?

Basic degree training must be specific and post graduate training trans-disciplinary.

Prof Amal Amin

On 24th of May, the group of the future of chemistry including myself travelled to University of Pretoria to meet the partners from SA.

It was nice meeting where I and possibly be others from developing countries could meet partners from Africa for the first time. We are used to always moving to the north (Germany, France, USA, etc). I generally consider that Africa is a most important region for us as Egyptians and we must strengthen relations given the geographical and political importance as far neighbors at the same continent. I and other partners from SA feel guilty towards Africa where we have to think together away from other considerations.

During that meeting we heard to interesting lectures from both Prof. Miller from the University of Florida and Prof. Debra Meyer from the University of Pretoria.

The most attracting thing in the lecture of Prof. Meyer was that she focused on specific goals or targets for investigation and treatment of common and serious diseases in Africa (i.e. AIDS), of relevance where we as African partners suffer from poverty related diseases. I totally agree that we should combine efforts to face these challenges.

Following the talks, the audience discussed the future of chemistry and hence the future of science in the continent, including issues such as:

1-Brain drain where the solutions from our points of view will be with Enhancement of the environment and infrastructures needed by scientists whether inside research places or environment outside by enhancing their living conditions and encouraging them to excel in their work as the most valuable and permanent treasure in Africa (human resources)

2-Science illiteracy among the public and hence less students in the scientific fields and accordingly less chemistry students than other fields which is considered as big threat for the future of science in the continent and hence its real development

That matter was extensively discussed where we agreed on enhancing the tools of educating science and may be encouraging the scientists to rewrite summary for each publication in simpler way for less scientific levels such as students and scholars. Also, the new generations of scientists must learn how to communicate to the public in better way to create what is called societal scientific awareness.



3-Lack of funding and sometimes, long processes of awarding funding between the sources or agents of funding to the research institutes which sometimes lowering the eligible amount of funding. That problem can be solved by direct funding to institutes themselves and enhancement of the infrastructures of the research institutes. Additional facilities must be given to the institutes to get their own real funding by scientific bilateral collaboration away from routine and other political considerations or at fewer restrictions.

Final word focused on the need to unification of scientists efforts towards more support for science and its role in societies with policy makers so that they will consider science as more prominent player in solving the problems, increase the public awareness, encouragement of scientific education and the necessity of taking the scientific advice in the critical matters in addition to increasing of fund, priority and care to science.



APPENDIX F

Physics collaborations stimulated between Oxford University and CSIR, ASSAf and NMMU

Prepared by Dr Jamie Warner

My visit to South Africa was made possible by funding from the Global Young Academy, The Oppenheimer Fund at Oxford, and the Royal Society. I thank all of these organizations for the support.

I arrived in Johannesburg on the morning of the 18th of May 2012. My first activity was to meet with Professor Angus Kirkland, who is a colleague from the Department of Materials at Oxford University. He was visiting Pretoria for a NRF funding meeting. I spent the day with Prof. Kirkland visiting Soweto and discussing South Africa and he provide tips on collaborating.

On the 19th of May, I met with a collaborator Dr Patience Mthunzi, who is based in the Council for Scientific and Industrial Research (CSIR) in Pretoria. She took me to Soweto again and showed me many insights into the culture and history of South Africa. We discussed my plan to visit CSIR the following week and our collaboration. This discussion continued the following day on Sunday the 20th of May. By learning some of the history of South Africa, I was able to begin to understand the culture and society, which is important when developing relationships such as collaborations.

My main activities started with the Global Young Academy General Assembly on Monday the 21st of May, running through to the 23rd of May. The talks were of an excellent standard from well regarded academics, politicians and intellectuals. During the conference, I met many people and got involved in several topical discussions. In particular two key contacts were made. I have been trying to establish connections with Ethiopia, with the aim of building Oxford-Ethiopia connections and helping to promote science and education in Ethiopia. Although driven by me, this interest is highly motivated by the fact that my wife is from Ethiopia and I have a passion for the country. I have been trying to develop connections to Ethiopia through their UK embassy in London. This started well, but faded quickly with little response from the people in Ethiopia. During the conference I met Hilluf Reddu who was attending from Ethiopia. He is currently undertaking a PhD in the University of Addis Ababa, and is normally a lecturer at Axum University. We talked many times throughout the conference and have now established a connection since returning home. He has returned back to Ethiopia and started the communication. He has secured interest from senior members of the University and government. We shall take this forward and hopefully I will visit within the next 6 months to give a series of talks on science and then I hope to welcome top visiting students from Ethiopia in my lab for summer projects. We talked about encouraging more Ethiopian students to apply for PhD's in Oxford and getting more scholarships from donors. This fits in well with the working group 'Young Ambassadors' I joined as part of the Global Young Academy activities.



The second connection made at the conference was with Dr Takalani Rambau, who is the Liaison Manager from the Academy of Science of South Africa (ASSAF). During the final day of the conference we spent the evening discussing my interest to collaborate with Dr Patience Mthunzi from CSIR. Dr Rambau saw this opportunity as a great test-case to present to the Academy of Sciences for the Developing world (TWAS). I was asked to come to ASSAF the next day in Pretoria, as I had already planned to go to Pretoria that day to visit CSIR. I then arranged for Dr Mthunzi and myself to visit ASSAF, where we were greeted by Dr Rambau and also Dr Xola Mati, who is the Chief Operations Officer. We spent 2 hours discussing how the collaboration between Oxford and CSIR could be supported by a pipeline of PhD and Masters students funded by TWAS. Dr Rambau was optimistic that funding for a Post-doc for 1 year, 1 PhD scholarship for 3 years, and 3 Masters scholarships for 2 years could be obtained, approaching 2 million Rand. We were asked to prepare a 2 page proposal outline and provided this to Dr Rambau on Tuesday the 29th of May. We are now waiting to hear back from the meeting between ASSAF and TWAS.

On the 24th and 25th of May I spent the day at Pretoria and primarily at CSIR. I was hosted by Dr Mthunzi at the National Laser Center. She did a fantastic job at introducing me to the Director of the center and other members, she arranged for me to get lab tours with other groups and have lunches with them. I felt very welcomed and look forward to going back. There is definitely great energy and passion at the NLC at CSIR. I gave an hour presentation on the 25th of May on the topic of graphene, which was well received. During this time I was able to spend time in the lab with Dr Mthunzi to understand how my graphene samples need to be prepared. We have now established a collaboration on growing stem cells on graphene, with samples already exchanged and results underway. This collaboration brings together my experience in graphene material science with Dr Mthunzi's experience in stem cell growth and their controlled differentiation using laser treatment. We shall explore the use of graphene as a biocompatible support for enhanced targeted stem cell growth.

I then travelled to Durban on the 26th of May and on the 28th of May I drove to the University of Zululand, which is located about 140 kms north of Durban in Richards Bay. I visited a collaborator Prof. Neerish Revaprasadu, whom had visited me in Oxford before. This visit was the most disappointing out of my entire trip to South Africa, mainly because of the poor hospitality and organization of Prof. Revaprasadu. I had substantial problems with arranging a hotel and finding the campus, and when arriving at 11am after driving for nearly 2 hours I was not offered any food or drink until I had to request it. There were several other incidents that left an unpleasant taste in my mouth. The inability to get edible food at the University made this visit unpleasant, plus the treatment by the host was the worst I had experienced in all of my travels around the world. I gave a presentation for an hour that was attending by only 15 people, of which most were lecturers or Professors. This was not what I had imagined my impact would be in this University, where it was needed most. I found all the labs were



empty of people and the energy and passion missing. My feeling is that it is not Oxford or myself that needs to work with the University of Zululand, it is South Africa. My efforts are better spent with people and places that are ready to make international impact and have the desire to achieve at the highest level.

I found this passion and desire in my next stage of the journey in Port Elizabeth. I visited Nelson Mandela Metropolitan University (NMMU) from the 31st of May to the 4th of June. I was looked after exceptionally well by Prof. Mike Lee and Prof. Jan Neethling from the Department of Physics. I was encouraged to travel to NMMU by Prof Kirkland, who is a visiting Professor there. It was well worth it and I will definitely be back. I had brought graphene samples with me and for two days I worked with one of the scientists on their brand new electron microscope. They had a new facility and instruments that were world class and enabled us to get great results. We were able to identify individual metal atoms that contaminate our samples and using spectroscopy identified them as iron. The director of the electron microscopy center Prof. Jan Neethling was very excited and got the local newspaper down to interview us. The story can be found online: <http://www.peherald.com/news/article/6645>

Or as below:

Title: Graphene research a coup for NMMU

07 June 2012

Hendrick Mphande

SCIENTISTS at Nelson Mandela Metropolitan University made a major breakthrough – the first of its kind in Africa – when they found their new multimillion-rand electron microscope produced excellent images of a substance that has the potential to revolutionise the electronics industry.

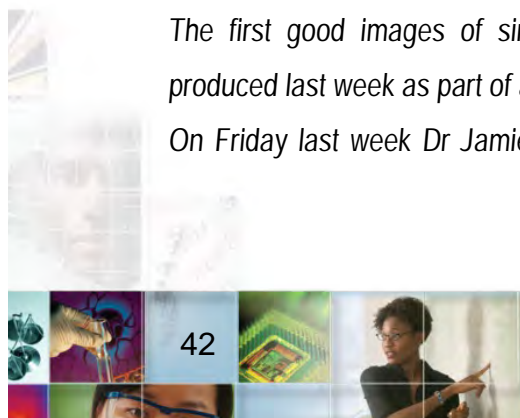
While the substance, called graphene – which was first identified by scientists in the UK in 2004 – is researched on a small scale globally, Africa has until now not had a microscope advanced enough to isolate single atoms in graphene.

Graphene, which consists of a single layer of carbon atoms packed in a honeycomb structure, is stronger than steel and conducts electricity as well as copper, giving it a promising future as part of high-speed electronic devices.

NMMU's director of the Centre for High Resolution Transmission Electron Microscopy (HRTEM), Prof Jan Neethling, said the microscope could provide information about the nanostructures of many types of material. The centre was set up late last year at a cost of R126-million.

The first good images of single iron atoms in graphene from the microscope were successfully produced last week as part of an initiative in collaboration with Oxford University in the UK.

On Friday last week Dr Jamie Warner of Oxford's department of materials, together with his NMMU



peers Neethling, Prof Mike Lee and Dr Jaco Olivier, witnessed the breakthrough. Neethling said the state-of-the-art Centre for HRTEM provided excellent opportunities for students to undertake world-class research.

For the past two years researchers at NMMU and Oxford University have been working together to produce a technique to identify high-quality graphene. "There are only a handful of research groups in the world who are able to perform this experiment," said Warner, who was in Nelson Mandela Bay to witness the breakthrough first hand.

By using a special imaging mode, a finely focused beam of electrons is scanned over the specimen, producing an image at a 100-million times magnification. After optimising the electron microscope for a day, Olivier succeeded in producing clear images of single iron atoms bonded to the carbon atoms in graphene. "This achievement proves the Centre for HRTEM at NMMU has the equipment and expertise to participate in cutting- edge research programmes with top international scientists," Warner said.

Overall, the visit to South Africa was very **productive, eye-opening, exciting, and the first of hopefully many**. I will strengthen my collaborations with Dr Mthunzi from CSIR and Prof. Neethling from NMMU. I have already started to apply for another travel grant from the Royal Society to go back to South Africa and get more research activity. I have made an excellent contact in Dr Rambau from ASSAF, who will help me organize visits to Universities and Schools during my next trip to South Africa. He is very **passionate about helping people with little privilege, which links in with my ambitions**.

I thank the support from GYA, Oppenheimer Fund and Royal Society.



APPENDIX G

Health research and biostatistics collaborations with NWU

Participants

John Muyonga (Makerere University in Uganda),

Gabriela Montenegro-Bethancourt (from Guatemala, a PhD student in Germany)

Phil Gona (University of Massachusetts Medical School) (prepared the report)

Alta Schutte (North West University, South Africa)

John Muyonga, a Food Scientist from Makerere University in Uganda, Gabriela Montenegro-Bethancourt from Guatemala also a Nutrition PhD student in Germany, and Phil Gona, a Biostatistician from Zimbabwe but working at the University of Massachusetts Medical School in the USA were extremely delighted to participate in outreach activities at North-West University(NWU), Potchefstroom Campus (see itinerary below) following the close of the 2nd GYA GA in Johannesburg, South Africa. Initially, as the discussions and plans about the outreach gathered momentum before the GYA GA, we all did not know what to expect. We were honored to be special guests to two departments at NWU: Nutrition (Prof Johann Jerling hosting) and Human Physiology (Prof Alta Schulte hosting).

We arrived on NWU campus from Johannesburg around 11 am on May 24, we were met by Prof Johann Jerling who, together with three interns, an MSc and a PhD student took us to Rysmierbult farming community 40 km in the country-side to observe and experience a farm-school Nutrition Project. This project in nutrition science serves as Marinka vd Hoeven's PhD project and was designed to demonstrate the nutritional efficacy of traditional vegetables. Nutritional efficacy will be demonstrated by comparing micro-nutrients concentrations in blood samples drawn before and after the implementation of the study in children who received the traditional vegetable And those concentrations will be compared to measurements taken in children who ate the standard diet offered to pupils at the same school. The blood samples are processed back at the Nutrition Department labs at NWU by the three interns who also accompanied GYA members to the farm-school. For more than one hour at the primary school, we were awestruck by how meticulously the study, which has all the features of a community clinical trial, was designed and implemented. I, Phil Gona, have designed Food and Drug Administration (FDA) sanctioned clinical trials, I can attest unequivocally that this community nutritional trial passes the FDA test even though the setting is in rural and remote Africa. We were impressed beyond belief. As a clinical trialist myself, I asked many questions and received very convincing answers. John Muyonga and Gabriela Montenegro-Bethancourt also, asked piercing questions based



on their backgrounds in food science and human nutrition and made suggestions on how findings could be disseminated to influence policy.

We toured the school classrooms, the vegetable garden, and study kitchen after which we had lunch near an irrigation pump surrounded by vast farmland and cattle grazing fields. In the van-ride to and from the farm, we engaged in interesting conversations with the interns and graduate students who appreciated to be in our company. We returned to the university to a packed afternoon program (see itinerary copied below). Phil Gona was immediately ushered to Human Physiology Department where he was hosted by Prof Alta Schulte, PhD, who is the Principal Investigator for a scientific project called Hypertension in Africans Research Team (HART) whose primary focus is on Early detection of cardiovascular/heart diseases in black South Africans. Phil was introduced to the departmental scientists, clinic and lab scientists, and PhD students. Prof Alta gave an overview of current projects that are on-going in the department including HART. There were about 16 NWU participants at this event. There was a constant exchange of ideas since HART project has components that are identical to the Framingham Heart Study in Massachusetts where Phil has been an Investigator/Senior Biostatistician for many years. Phil then gave a talk based on his research at Framingham Heart Study, the talk was titled "Potential Statistical Errors when Adding Biomarkers to Risk Prediction Models for Heart Disease" followed by an extended question and answer session. John and Gabriella held a separate concurrent meeting with Prof Jerling in Nutrition department at which they exchanged information about their respective institutions and identified possibilities for collaborations.

The three of us GYA members regrouped that evening and were honored with a special dinner with the NWU Prof. Marlene Viljoen, Dean Health Sciences, Profs Johann Jerling and Alta Schulte. By the end of dinner and a long day, we all had gotten to knowing and liking each other very well. The following morning was another busy day; all three of us of GYA members attended the Journal Club held in Nutrition Department attended by 25-30 faculty, students and staff. John had toured various specialized labs early that morning. In the Journal Club, John first described in brief the history of and membership requirements for GYA. He encouraged students to become familiar with the newly formed South African Young Academy of Science (SAYAS) as a conduit to becoming future GYA members. He then described the academic programs in Nutrition at Makerere University and showcased the different consumer products that have been put in the market through research and enterprenurial incubation activities at Makerere. Next, Gabriela described in a very personal way her journey including obstacles as a woman scientist to becoming a nutrition PhD student in Germany and the different nutrition projects and programs she is involved with in Guatamala. Phil closed the meeting by presenting the same talk (this was by by porpular demand) he gave the previous day. John left soon after the Journal Club to catch his flight at OR Tambo International Airport. Phil and Gabrialia continued to tour several nutrition labs with Prof Marlien Pieters serving as guide. Dr Karin Conradie and also a geneticist, Dr.



Wayne Towers, PhD, Senior Subject Specialist at the NWU Center for Excellence for Nutrition, who earlier on had attended the Journal Club, showed us the Nutrigenetics Lab and also the Hypertension Research and Training Clinic still under construction. We discussed possible areas we could work together, such as the Human Heredity and Health in Africa (H3Africa) Initiative - a partnership between the African Society of Human Genetics, the US National Institutes of Health. We visited the research clinic in Nutrition Department, the more specialized labs and clinic at HART before having tea with the HART team. We toured the new clinic building before going to lunch. Phil Gona had a short statistical consult with Carla (PhD student) and Shami (PhD supervisor) regarding analytic strategies for a study designed to show the effect of HIV/AIDS and treatments for HIV on parameters of aortic stiffness before going to lunch with our two hosts. .

The three of us GYA members left NWU energized, encouraged, and inspired. Our hosts, Students, interns, faculty, and the Dean of Health Sciences at NWU were gracious with their expressions of gratitude and that they learned a lot from us the visiting GYA members even in the very short period we were on campus. We do hope that the conversations and talks we engaged in during our outreach will, to quote Bruce Alberts, Editor-in-Chief of Science, "catalyze the formation of multidisciplinary scientific collaborations that generate innovative new discoveries". Phil Gona and Alta Schutte are engaged in serious discussions right now to "establish and formalize the collaboration between NWU and University of Massachusetts Medical School (where Phil Gona is an Associate Professor of Biostatistics) by making future plans to 1) conducting collaborative research and write joint grant applications for funding for the Early detection of cardiovascular/heart diseases in black South Africans study, 2) Phil Gona to teach short biostatistics courses to faculty and students at NWU, and 3) Phil Gona offering statistical instruction and consulting. We are developing plans for a faculty exchange whereby, if funded, Prof Alta Schulte of NWU/Human Physiology visits the University of Massachusetts and also visit for a few days the world class longitudinal study called the Framingham Heart Study. It is important at this early phase to prove that our collaboration is fruitful and accomplishment of the three activities will serve as motivation in subsequent years and that other NWU departments such as, Pharmacy, Human Movement Sciences. Furthermore, John Muyonga and Prof Johanns are exploring collaborative research projects and staff and student exchange visits between NWU and Makerere University.

Finally, **our experience in this outreach has affirmed that the passion that young scientist bring to science builds networks of trusted personal relationships that can bridge disciplines for a lifetime.** Thank you to GYA and GYA sponsors, **we all left South Africa different persons than we arrived.**



Alta Schutte (North West University, South Africa)

Herewith I would like to express my gratitude for the giving us the opportunity to host three members of the Global Young Academy during 24-25 May 2012 at the North-West University (NWU) in South Africa. John Muyonga, Gabriela Montenegro-Bethancourt and Philimon Gona visited the Hypertension in Africa Research Team (HART) and the Centre of Excellence for Nutrition (CEN) at the University during this period. We had very successful discussions, including lectures by GYA members and university staff, visits to field projects and laboratories, as well as individual discussions with scientists and postgraduate students.



Gabriela Montenegro-Bethancourt visiting a rural school site as part of a research project by the Centre of Excellence for Nutrition.



Alta Schutte, John Muyonga, Phil Gona, Marlene Viljoen (Dean: Faculty of Health Sciences, NWU), Gabriela Montenegro-Bethancourt at a restaurant.



Phil Gona having biostatistics discussions with PhD student and supervisor at the facilities of the Hypertension in Africa



First meeting face-to-face between Alta Schutte and Phil Gona at the GYA meeting.

Research Team (HART)

The collaboration between Phil Gona (University of Massachusetts) and myself has developed to such an extent that we have secured funding from the NWU for a Visiting Scientist (Phil Gona) for another two-weeks at the NWU during August 2012. We are in the process of developing various strategies to continue this win-win situation for both institutions.

We are excited about the future possibilities and therefore I wish to thank the GYA and SAYAS for creating this opportunity, and also wish you much success with your activities.



APPENDIX H

Outreach to Thuto-Kitso Comprehensive School, Fochville with Sci-Bono Discovery Centre, 24 May

Participants

- Jauad El Kharraz (France/Morocco)
- Reza Afshari (Iran)
- Jeronimo Maze (Chile)
- Javier M. Moguerza (Spain)
- Rob Jenkins (Scotland)



Place

We met at the the Sci-Bono discovery Centre in Johannesburg at early morning on May 24, 2012. From there, we took two cars to Fochville in the North West Province (<http://www.nwpg.gov.za/education/>) of South Africa, and we were received in Thuto-Kitso Comprehensive School (Fochville) by its director: Ms. Eunice Mabiletsa. Thuto-Kitso School is in Fochville, a small town 30 miles WSW from Soweto (<http://goo.gl/maps/a72f>). Upon arrival in the morning, each of us was then assigned to a class.

Activities

After the presentations of the participants (GYA members) a briefing on the school was given by the director of the school; Ms. Eunice Mabiletsa, who also presented us a couple of professors charged by receiving us in their classes.

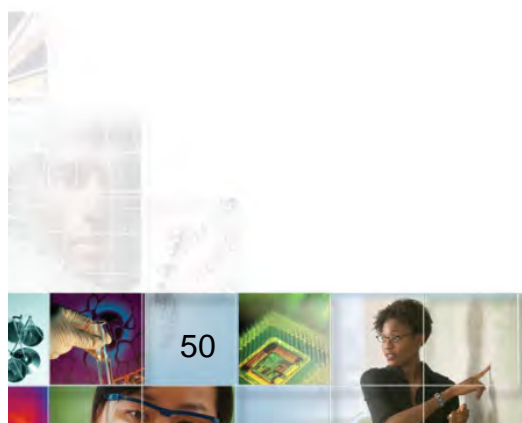
Each one of us (the 5 GYA members) prepared a presentation or a game before the day before. Each one of us was directed to a different class. Almost of us conducted by 3 class sessions as an average. The learners/students were 9-14 years old, wearing the school uniform.

The learners were able to interact on topics ranging from soft matter, DNA, polymers, environment and water, climate change, remote sensing, mathematics, physics, chemistry, pollution, renewable energies, to astrophysics and space.

Dr Reza Afshari (Iran)

Following the successful 2nd general assembly of Global Young Academy, I got the opportunity to go for related outreach activities on 24th July 2012. We went via the Sci-Bono Discovery Centre, a non governmental organization funded to bring extra education to deprived students of South Africa. We met with the principal Ms. Eunice Mabiletsa and other staff of the Thuto-Kitso Comprehensive School. This school provides food for the children as well.

As a physician and based on the request of the SCI-BONO authorities, I talked about diseases prevention and health with focus on common cold, tonsillitis, pneumonia, HIV/AIDS and drug abuse. I got the opportunity to go to four classes. These students were very enthusiastic and eager to participate in these sessions. As can be seen from the pictures, we all enjoyed this opportunity; so energetic and happy students were.





Dr Jauad El Kharraz (France/Marocco)



Personally, I conducted the first session in a mathematics class, and waited the professor to give his learners an exercise on mathematical equations (derivatives and limits), then I tried to observe and check the responses and the way all the students were following to solve out the questions, and tried to explain and help some of them. Then, I got the opportunity to talk about the importance of saving water and save our environment from pollution; I used a power point support (see the file enclosed with this report). They were very keen to listen quietly and they gave me a lot of questions, especially as I explained to them that other kids in countries such as Jordan or Somalia struggle to get a safe drinking water, in the first case because of water scarcity and in the second case because of drought, water scarcity, climate change and conflicts/wars, etc.

I moved then to another class where the learners were younger, and I talked about science in general and its importance in achieving all what we have now in hands and they asked me a lot of questions, among others: when the world will end? How big is the planet, what kind of studies I carried out, what is the best science?! I told them it does not really matter which science you decide to enter inside straight out of school, it all rocks and useful for our society and the whole humanity, even if I mentioned the quote of the famous physicist Sir Ernest Rutherford (as I am also a physicist) when he said: "All science is either physics or stamp collecting", but clarified that any scientists will defend the most his own science, while all sciences remain very important.

After a lunch break in the professors' room, I visited another class where the professor was preparing a presentation on a chemistry experience. He gave me the floor at the beginning, and I gave them a long speech about my career, the studies I carried out, the importance of choosing a career and a science we love, because science is a passion. They were very enthusiast, and asked me a lot of questions, such as: how can we become scientists? What is the extent of using solar energy instead of oil!!! What are the space black holes? One student told me he has not good marks in physics and wanted to become an IT engineer, so I explained to her the importance to doing well in mathematics and physics which are the basis, and then explained to her that there is the part of IT related to software and the one related to hardware, and encouraged her to keep up working hard to achieve her dream. Many others told me what they want to become in the future, and tried at the end to take with me photos with their own mobiles, etc.

We found the learners very enthusiastic, attentive, participative, and very excited to learn. The professors told them before our arrival that they were going to meet scientists that usually they see only in TV and books, so in part that was a reason for their excitement.

Definitely, it was an exciting journey, we had a lot of fun, and it was fascinating to meet all those young learners.



I believe we could contribute somehow to **raising awareness of the benefits and contribution of science and technology to the society and the whole humanity for those young learners, and those next scientific and economic actors in South Africa!**



Dr Rob Jenkins, member of the Royal Society of Edinburgh Young Academy

I was assigned to Grade 10 Mathematics (Geometry) with Christina Nchapha, and joined her in two consecutive 1 hour sessions with different groups (approx 40 pupils in each group). The pupils were clearly hugely excited about the visit, and were eager to hear about life in Scotland, as well as careers in science. As can be seen from the accompanying photographs, they were a lively and engaged bunch, and had plenty of questions on many topics. It was a pleasure to meet them.

One of the pupils asked a very interesting question concerning the extent to which our private mental lives are under our own control, as opposed to being driven by external stimuli. I used this as an opportunity to conduct a live demonstration of the well known Stroop effect [<http://bit.ly/WmLTH>]. This is a classic effect in cognitive psychology which neatly illustrates some limits of executive control. The demonstration requires only some printed lists of words in different colours of ink (I used an iPad), a stopwatch (several volunteers offered to time events on their phones), and some experimental participants (there were many volunteers). The demo worked extremely well and generated a great deal of follow-on questions. During the Q&A, I passed the iPad around so that pupils who did not participate in the demonstration could try it out for themselves. The demo also provided an opportunity to work through some basic principles of data analysis (e.g. why a mean of several samples is a better estimate than a single sample), and the scientific method (e.g. how systematic observations and analysis can inform theory). I related both of these points their foundational study of mathematics.

A comment from the teacher about teenage pregnancy triggered a wider discussion of the importance of education and wise decision making. I drew on the board a simple diagram of recursive forks in a path. The consequences of some decisions close off certain options for good (e.g. underage pregnancy, drug addiction, prison), whereas others keep options open, or open new ones



(e.g. education). This diagram engaged the pupils strongly and drew approving comments from the teacher.

Since returning, I have sent photos of the classes to Christina Nchapha, who will share them with the class. I have also sent four books (3 Psychology, 1 Mathematics) that address specific questions raised by the pupils.



Dr Javier M. Moguerza (Spain)

I interacted with two classes, with ages 11 to 12 in both classes. Basically, I demonstrated to the students the laws of probabilities. To this aim, we used a deck. It was a muppets deck, with cards containing the different character from this TV series, namely: Kermit the Frog, Miss Piggy, Fozzie Bear, Gonzo the Great and Rizzo the Rat, among others. The students had to choose ten cards from the deck. Then, from the group of ten cards, each student has to chose randomly one of the ten cards, and just say to everybody the name of the character pictured in the card chosen, and put the card back in the group of ten cards. We annotate on a board the different characters appearing, and then from this information we guess how many cards do we have among the ten cards corresponding to character. In all the cases, the students were able to guess the correct number of cards corresponding to each character.

After that, I showed to the students a presentation of real applications of Statistics and Probability. Basically, applications to image recognition. I think they really liked the applications and many of them said that they would like to become scientists, and develop in the future similar tools to the ones that I



showed. The experience was really nice, and I have to say that the faces of the students while I was explaining the applications cannot be described with words. Amazing!!!



Dr Jeronimo Maze

I participated in the class led by Eugene Zondo on mathematics. A group of 30 to 40 students from the eleventh grade were organized in the classroom sharing tables with other 5 to 8 persons. I presented myself as a scientist from Chile and a brief description of what I do. Then we distributed a preliminary list of mathematical exercises to evaluate their skills. We observed their performance on those exercises and then Eugene decided to handle the other list of mathematical exercises he had prepared for them. We walked through the class answering questions and making sure students understood the exercises. Students were enthusiastic and having no problem on asking questions other than mathematical ones. I spent a good time.

On the second part of the class, I gave a presentation on "The Mysterious Behaviour of Light". I covered topics such as the speed of light, relativity and rainbows. Students were listening very attentively and asking all kind of questions. I followed a suggestion by Javier Moguerza and I explained the fact that, since the speed of light is finite, we always look at the past. They were astonished to know that the light we receive from the closest star resembles events that occurred about 4 years ago.

For lunch we, people from Sci-Bono, GYA participants and schoolteachers, gathered together for some sandwiches at the administrative offices of the school where we share our experiences and some amusing traditions about soccer culture and teams such as Pirates and Chiefs. In the afternoon session, I gave my presentation to students from the twelfth grade. They were keen to understand rainbows formation and other light effects they have experienced.



We all came back to the Sci-Bono museum (also our starting place). It was a great experience I hope to soon repeat it again in any other country.



APPENDIX I

Outreach to Thuto-Kitso Comprehensive School, Fochville with Sci-Bono Discovery Centre, 24 May

Thabang Molise, Project Officer, School Support, Sci-Bono Discovery Centre

On the 24th May 2012, the Sci-Bono Outreach Programme welcomed the GYA guest scientists to join them on our school visit. This outreach programme is two-pronged and is aimed at both high schools and primary schools. The main aim of this programme is to assist the disadvantaged rural and township schools with difficult areas of the Maths, Science and Technology syllabus. This is done through innovative teaching programmes.

The teams left Sci-Bono at 07h30 for the Thuto-Kitso Secondary School (Informal settlement) in Fochville in southern Gauteng.

On our arrival at the school the staff and the learners were prepared to experience the joys of teaching and learning. We received a warm welcome from the Principal and the staff at large.

The scientists were allocated different grades by the team. They were asked to share their knowledge and motivate young learners. Every scientist was given an opportunity in every grade and they shared their expertise and knowledge with the learners, they talked about their fields of study and then answered the questions raised by learners.

It was fascinating for both learners and educators to have visitors from different countries to share their knowledge with them and above all to understand their environment.

Scientists found it very exciting to be exposed to the real life situation in Gauteng where teaching and learning differs from their country of origin.

On our way back from Fochville, we decided to give our visitors a tour of the Hector Peterson Memorial in Orlando and then passed Ex-President Mandela's old Soweto house nearby. This was cherry on top for them to understand and see where the Soweto 1976 uprising occurred and then spread to many parts of South Africa. They appreciated our hospitality and our endeavour to expose them to many the other things that they never expected to see.

On behalf of the Team, we would like to thank the organisers for this opportunity.



Name of school : Thuto – Kitso in Foshville

Date: 24 May 2012

GRADE	CLASS	NUMBER OR LEANERS	NAME OF THE SCIENTISTS	TOPICS DISCUSSED
10	MATHEMATICS	40	REZA	HIV and infectious disease
		35	JAVIER	The Future and Statistics
10	PHYSICAL SCIENCES	46	Rob Jenkins	How Psychology is related to Science
		35	Rob Jenkins	
11	MATHEMATICS	45	Jeronimo Maze	Astronomy and how light was formed
11	PHYSICAL SCIENCES	45	Jauad El Kharraz	Satellites
12	MATHEMATICS	14	Jauad El Kharraz	Water Purification Processes
12	PHYSICAL SCIENCES	14	Jeronimo Maze	Astronomy and how light was formed



APPENDIX J

Outreach to Diocesan School for Girls, Pretoria, 24 May

Participants

Yael Hanein (Israel)

Julia Baum (Canada)

Maryam M. Matin (Iran)

Evelyn Runge (Germany)

Co-ordinator: Caradee Wright (South Africa)

Four GYA conference delegates agreed to take time on Thursday, 24 May 2012, the day after the conference, to visit a high school, St Mary's Diocesan School for Girls, in Pretoria and share something about their career and their science. The teacher, Ms Jacqui Brown, arranged for two sessions, each with a different grade of learners, first Grade 12 learners (aged approximately 18 years) and second, Grade 11 learners (17 years). Each of the GYA conference delegates gave a 10 minutes talk or presentation to the two groups of learners and then engaged in an energetic and interesting series of question and answers between the learners and themselves.

Caradee Wright (event co-ordinator) says: "Engaging with a diverse group of young female learners is an inspiring experience. During all four talks/presentations made by young scientists, the learners were completely enthralled by what they were hearing. This became especially evident during the question and answer sessions, when many learners had questions to ask, ranging from details and explanations about science and technologies, to career questions, such as how to pursue a career in science journalism. The value of this YSAP activity must not be underestimated – **young scientists talking to future generations makes science in society real and relevant, and inspires young minds!**"





Prepared by Caradee Wright



APPENDIX K

GIBS-FABI outreach to Alexandra and the Sandton View High School, including testing of the Science Game 'Expedition Moondus', 24 May

Dr Heidi Wedel (Germany, GYA)

With his strong call to scientists to get more actively involved in science education, Editor-in-Chief of Science magazine Prof. Bruce Alberts met open ears and minds at the International Conference of the Global Young Academy (GYA) in South Africa. Among many other activities, GYA members and their guests used their General Assembly to take global an inquiry-based science game developed by the Dutch Young Academy. Many GYA members familiarized themselves with the content and the mechanisms of the game. A working group improved the preliminary English translation and checked the game for cultural compatibility with countries of non-Western cultural traditions. No issues were identified and hence it seems that the game can indeed be used worldwide without changes to its content. Prof. Mathias Kläui from Mainz University enthusiastically took the lead for a translation into German in order to make this game accessible to schools in Germany.

After the conference, a group of 8 young scientists, among them 4 Germans, visited Alexandra, the largest township in Johannesburg, meeting with inhabitants who are role models for improving education and job opportunities. One of them had set up an informal initiative to help children from disadvantaged backgrounds to discover and develop their potential. Other contacts included a businessman who was amongst the first to introduce formal business in the informal settlement.

As a highlight the group visited Sandton View High School, a governmental school at the borders between Sandton and Alexandra, attended by black children, many from disadvantaged backgrounds. Here the group met a small science class. In the 12th grade, only 28 pupils out of an original 40, most of them girls, continued science lessons as these are perceived as "very hard". After initial hesitation, some of the children expressed quite concrete ideas about what they wanted to study if they ever had the chance to go to university. Following an open dialogue between pupils and the international group of scientists, the delegates introduced the science game *Expedition Moondus*. The students take on the role of researchers exploring an unknown planet called Moondus. They try to find out as much as possible about the planet itself, its nature, culture, and the inhabitants. The students answer questions based on available material on Moondus including observations, notes of other researchers and 'ancient sources' of the Moondians. In short, the children think like scientists, formulate hypotheses, test them, and then report the results.

The visit to Sandton View High School was the first opportunity to test whether this game could also be played in other countries and cultures. The GYA group had brought with them a preliminary English version of the game with coloured prints and distributed question in three different difficulty



grades to teams of 2 pupils. The children took it up with huge enthusiasm and excitement. They ran to check the information available in the classroom, trying to be the first to solve as many questions as possible. It was obvious that they enjoyed the motivating game very much. After 45 minutes the winners, two girls' teams, were symbolically awarded the "German-South African Year of Science" pen.

After this success, having received the permission of the Dutch Young Academy, GYA will ask South African authorities to have the game translated into and produced in all official South African languages, possibly accompanied by a monitoring study.



Bongiwe Ramaboea (GIBS)

The first stop of the trip was at a scene where the delegates could view the entire township from a distance, to set the context before we ventured into our journey.

The guide, who is a resident of Alexandra township, gave the delegates a brief history of the township as well as South Africa as a whole. We then drove to meet a gentleman by the name of Isaiah who, in the past, volunteered to provide extra Maths and Science lessons. The interesting thing about Isaiah is that he is not qualified but has the gift of understanding the subjects.

Our next stop was at Piecky's stationery shop where we met the owner of the first black owned stationery shop in Alexandra. Our last trip before lunch was at a graphic web design store. The delegates kept motivating our hosts and giving them advice on how they could improve their businesses through the use of technology.

Our trip to the Sandton View High School was an amazing one. Firstly the delegates engaged with the Science teacher as well as the Vice Principal. We then met a vibrant group of 28 Grade 12 Science learners. It was clear that Science was not made "attractive" enough at a school level as the learners told us that the rest of the learners felt sorry for Science class. We had a question & answer session where learners wanted to know more about the different options in the field of Science and ways in which Science can be made interesting at school.

After the Q&A session we played the Science game from the Netherlands. **The energy in the room was beyond measure.** Overall a successful day!



APPENDIX L

Science projects presented for school learners at Sci-Bono Discovery Centre, 25 May

Participants

GYA members (from left to right in photo):

- Regina So (Philippines)
- Evelyn Runge (Germany), of the German Young Academy- accompanying as photographer & assistant in experiments on this occasion-
- Ranjini Bandyopadhyay (India)
- Martin Dominik (UK)
- Marc Creus (Switzerland)



Place

Sci-Bono discovery Centre in Johannesburg.

Times

Participants were kindly picked-up from the Hotel in Sandton at 07:45am. At the centre, we started with a meet and greet including coffee and biscuits at 08:30am and the schools programme started at 09:30, finishing by about 12:00. Thereafter, we were invited kindly to a finger-lunch at the centre to meet several staff of the Sci-Bono Discovery Centre and two journalists from a Japanese newspaper. Before being returned by car to the Hotel, via a sight-seeing route including Alexandra, we had time to explore the science centre's exhibitions.

Outreach Activities/ Schools Programme

The learners, ages 10-15, were able to interact on topics ranging from soft matter, DNA, polymers, to planets. Two sessions were conducted by each members. The GYA members found the learners very attentive, participative, and very excited to learn.

After the session, the GYA members were given the chance to go around the science discovery centre. As you can see from the picture, aside from enjoying teaching, they also had a lot of fun.



Dr Marc Creus

With the excellent assistance of staff at the Centre, we isolated a white, stringy substance, from two types of fruit: bananas and strawberries. Scientists now know that this substance is found in all living organisms and is referred to as “DNA”.

Learners were divided in groups of four or five people and each group was given a sample of fruits to mash-up and extract with a mixture of water, salt and detergent. The samples were then warmed-up and filtered. Addition of cold ethanol then separated the white substance, which learners could scoop-up with a small metal hook and touch (protocols given below).

I explained that DNA was first discovered using very similar methods by someone from Basel in the 19th century (Friedrich Miescher) -not from fruit, but from infected wounds of people!-. However, the significance of Miescher’s finding was not fully realized at the time. We discussed DNA, what it is and why it is called “the molecule of life”. Students explained where they had heard of DNA and we discussed examples of where analyzing the DNA in further detail could be useful, for example in hospitals or by the police. We compared the DNA from strawberries and bananas, which looked very similar: DNA is found in all of us: all living organisms have chemically similar building-blocks, since we are all related in evolution.

Many students asked questions and many took the printed protocol with them, especially from the older group. It was exciting for all of the learners just to wear lab-coats, to make a messy-mash of fruit of detergent, to smell the strength of pure ethanol and to pick up and touch the purified “goo” of DNA. **I think that learners were surprised to see that science can be quite simple and messy!**

The protocol for the experiment performed is available on the GYA website (globallyoungacademy.net)



Dr Regina So

I talked about the science of polymers via “show and tell”. The students were asked to volunteer and form a polymer chain. The concepts of monomer and polymer were discussed. The students were then asked to give examples of polymer based from the definition. Most of the learners were shy to guess; however, for those who were brave enough to answer, some of them were able to get the answers right.

Some examples of natural and synthetic polymers were shown and we talked about their properties, characteristics and day-to-day applications. Learners were tasked to make slime from polyvinyl alcohol and borax and colorful alginate beads. They were then asked to find applications for the polymers they made.



Dr Ranjini Bandyopadhyay (India)

I had prepared a powerpoint presentation and a few simple science experiments for school children that introduced the subject of ‘soft’ (viscoelastic) materials. Some examples of soft, viscoelastic materials that we see every day are sand, shampoos, soap, shaving foam and cornflour suspensions. The theme of my talk was the non-intuitive ‘non-Newtonian’ flow observed in these materials - they are neither solids like wood or window glass, nor are they simple Newtonian liquids like oil or water. Instead, their deformation and flow behaviors lie somewhere in between the two regimes of perfectly solid-like and perfectly liquid-like. Sand on the beach, for instance, is a solid and we can walk on it, but grains of sand can flow like a liquid under the action of gravity.

I gave two 45 minute lecture-demonstrations to learners from schools in and around Johannesburg. The age of my audience was between 10 and 14 years and the titles of both my lectures was ‘How do soft materials move when pushed really hard?’.

After starting with an introduction to our institute, the Raman Research Institute founded by the Nobel laureate Sir CV Raman, I explained the concept of softness through some simple examples of everyday materials.



I spoke about Prof Pierre de Gennes, the founding father of soft matter science, and illustrated with some more examples the two defining features of soft materials: complexity and flexibility.

I followed this up with a short discussion on solids and liquids. I demonstrated that soft materials are neither pure liquids nor pure solids by discussing two examples. The first example was silly putty which can bounce like a solid at short times but can also flow like a liquid under gravity if the waiting time is long enough. Next, I gave the examples of marmalade, ketchup and mayonnaise as materials that can retain their shapes like solids but can flow like liquids under the shearing action of a knife. I demonstrated with a popular shaving foam (Gillette Foamy) that aqueous foams behave like solids when at rest, but can flow easily when tapped with a finger.

Next, I showed two experiments that demonstrate the unusual flow of cornflour suspensions. In the first demonstration, I asked for a volunteer who would stir the suspension first slowly (cornflour shear-thins, that is, flows more easily under these conditions) and then rapidly (causing the sample to harden like a solid). This sample was passed around so that everyone could see for themselves how cornflour behaved very differently from common fluids such as water and oil. I then showed a video taken in my laboratory in Bangalore, India, of dancing cornstarch 'monsters' that form when these suspensions are vibrated.

Next, I showed the learners some youtube videos of leaping jets of shampoos (the Kaye effect), the rod-climbing behaviors of gum, egg yolk and a cross-linked polymer (the Weissenberg effect), the die swell of polymers (the Barus effect) and the 'tubeless syphon' effect or Fano flow observed in polymer solutions. The reasons behind these observations, specifically the causes for the departures observed from Newtonian flow, were discussed briefly.

I concluded my lecture by telling the students why sand is interesting and about the common segregation effects that are observed in mixtures of grains. One example that I used was that of the Brazil nut effect – when I shake a bowl of mixed nuts, why does the biggest nut always rise to the top?

The idea behind my talk was to convince my audience that simple experiments do not need fancy, expensive equipment but can be done in the kitchen. **We just need to have an eye to recognize and appreciate the fascinating physics that is everywhere around us!** I can only hope that I could convince the students that doing Physics could be a lot of fun.

My trip to SciBono was an **enriching experience for me. The energy and enthusiasm of the learners was infectious.** I would like to thank the SciBono Discovery Centre and the Global Young Academy for giving me this priceless opportunity and look forward very much to the next occasion when I can interact with school learners and the other wonderful people at the SciBono.





Dr Martin Dominik (UK)

I prepared some images that were suited to stimulate the imagination and provoke new thoughts on the topic of planets in the Solar System and beyond, and what it means for planet Earth and ourselves. However, I avoided to work along a scripted presentation but rather engaged in a dialogue, allowing the conversation to drift into various directions according to the core interest of the school students. In fact, the two sessions evolved differently. We started with one of NASA's "Blue Marble" pictures of planet Earth, and I invited the students to characterise our planet. We rather promptly arrived at water and an oxygen-rich atmosphere being important characteristics, and we realised their importance for life on Earth. Realising that the "Pale Blue Dot" image, taken by Voyager-1, shows planet Earth was a stunning experience. Subsequently, we explored the Solar System, and the amazing diversity of planets orbiting stars other than the Sun. Amongst many other things, we also talked about the transit of Venus on 5/6 June 2012, and on the theme of comparative planetology, I was able to make a surprising point about the existence of storms on Mars (after having been asked about tornadoes and cyclones).

The two groups were substantially different in the dynamics of the interactions. In general, they appeared to be used to seeing a teacher as an authority rather than a facilitator. It needed a bit of time to create a basis of trust for getting them into a conversation. However, they mostly did not overcome the principle of raising their hand rather than just speaking up. Some carefully took notes on what seemed to interest them particularly, while others took their opportunity to ask some questions about science that were completely unrelated to what I planned to talk about (e.g. electricity and storms). **I think that it was also an interesting experience for them to learn that a scientist is not someone who knows everything, but rather someone who knows how to enquire the unknown.**

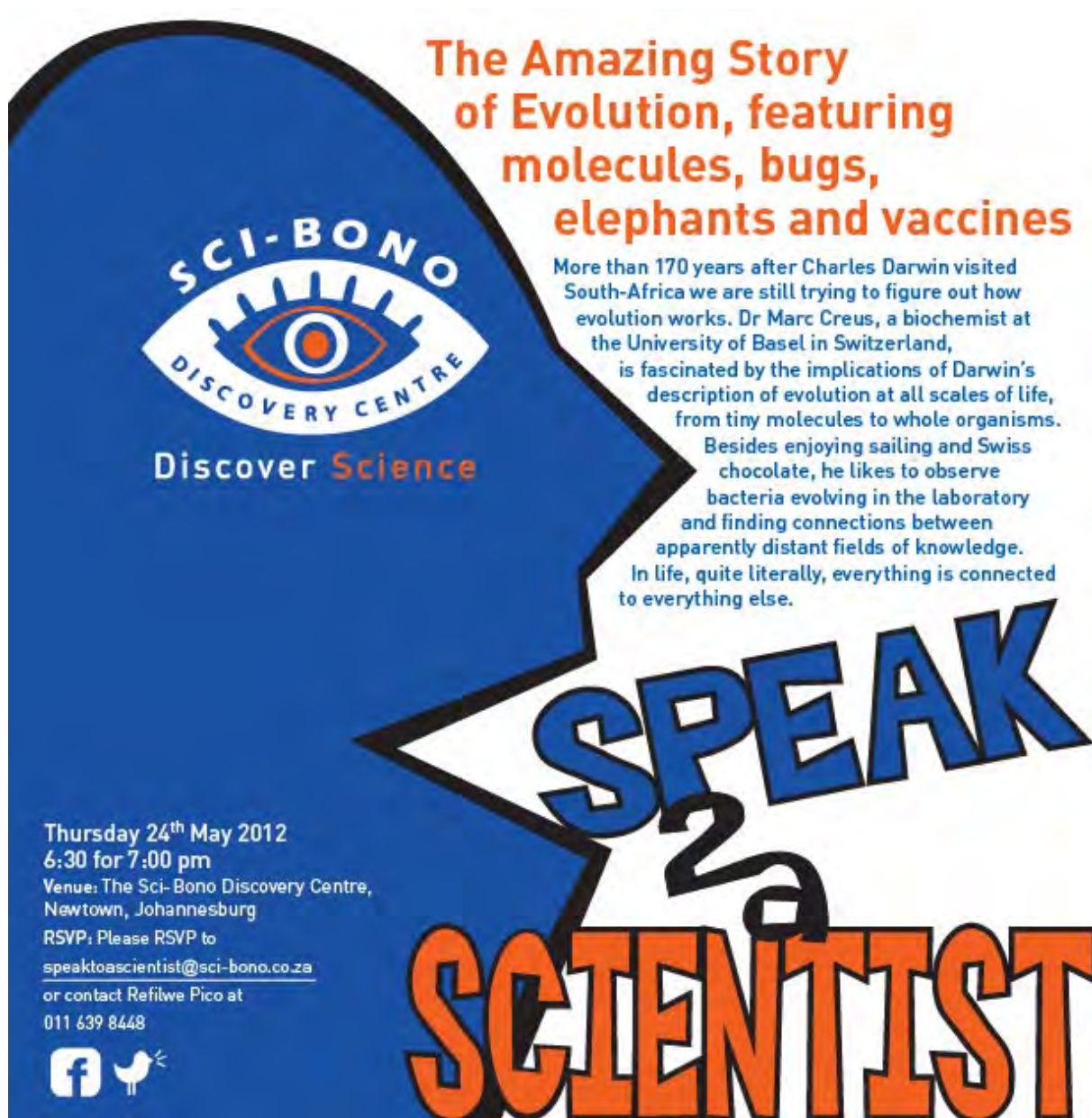


APPENDIX M

“Speak to a Scientist” public talk and media communication by Dr Marc Creus (Switzerland)

“Speak to a Scientist” event at the Sci-Bono Discovery Centre

Dr Marc Creus gave presentation on the topic of evolution in front of about a hundred interested members of the public. This presentation was organized by the Sci-Bono Discovery centre as part of their regular “Speak2aScientist”. The event was widely publicized in the media, online and on the radio.



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**The Amazing Story
of Evolution, featuring
molecules, bugs,
elephants and vaccines**

More than 170 years after Charles Darwin visited South-Africa we are still trying to figure out how evolution works. Dr Marc Creus, a biochemist at the University of Basel in Switzerland, is fascinated by the implications of Darwin's description of evolution at all scales of life, from tiny molecules to whole organisms. Besides enjoying sailing and Swiss chocolate, he likes to observe bacteria evolving in the laboratory and finding connections between apparently distant fields of knowledge. In life, quite literally, everything is connected to everything else.

**SPEAK
2a
SCIENTIST**

Thursday 24th May 2012
6:30 for 7:00 pm
Venue: The Sci-Bono Discovery Centre,
Newtown, Johannesburg
RSVP: Please RSVP to
speaktoascientist@sci-bono.co.za
or contact Refilwe Pico at
011 639 8448

f t





During the presentation members of the public were engaged in an experimental game co-invented by Rob Jenkins and Marc Creus on the day before this event. The game illustrated how evolution works and began by handing out two cards with a single word to two volunteers on the front seats with the word "TOOL", that represent two competing species.

Flip a coin

Heads: change 1 letter and pass it on, e.g. FOOL. If it is passed on, it replicates (2 copies are handed over to the next line) - i.e. there are two words passed to two different people, each with "FOOL".

Tails just pass it on. Each FOOL gives just one other fool.

Selection filter is: Does the word make sense in English? If it does not make sense, this word cannot continue being passed on, because it is not adapted to the English environment. The lineage becomes extinct.

If you reach the edge of the room or group, extinction from the edges to create more space

At the end of the demonstration, many words are generated from a single original word, but the process has probably generated several extinctions that stopped along the way. Words that are generated from lineages that split early on end up further away from each other and are usually the most different from each other. are distantly related:

FOOT, FOOL COOL, etc.

The talk was followed by a lively question time and informal chat. The topics included questions about how life started...**What are we made of and how did it all start...**in Darwin's warm little pond? The meaning of "complexity" in biology...How can such a simple process of mutation and selection lead to such beautiful and complex biological constructs?

On radio, Dr Marc Creus gave a live interview to KgomoTso, as part of the Jenny Crys-Williams show known as the Friday mix of Radio 702, a National Radio Station – touted as a talk radio station. The interview was part of programme where they talk about upcoming events.



School outreach at the Sci-Bono Discovery Centre in Japanese media

In the context of school outreach activities at the Sci-Bono Discovery Centre on May 25th 2012, GYA members interacted with two journalists of The Yomiuri Shimbun, one of the largest newspapers in Japan. After experiencing various of the activities and following discussions on the importance of science in society, Mr Takeshi Kuroiwa (kuro6040@yomiuri.com) wrote a report on science education in South-Africa (copied below).

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「What do you want to bring to an abandoned island?」(無人島に何を持っていく?)

使いたい気持を語る

ヨハネスブルクの科学館でイチゴやバナナのDNA抽出に取り組む子どもたち

黒人の理数系学力底上げ

ヨハネスブルク中心部にある科学館「サイ・ボン・デイスカバリー・センター」。子どもたちがイチゴやバナナをすりつぶし、台所洗剤と塩水を混ぜる。そこに講師がエタノールを加えると、白い綿のようなDNAが現れた。「オー」と歓声を上げる子どもたち。

アパルトヘイト(人種隔離政策)の影響が色濃く残る南アフリカで、算数と理科の学力向上に向けた取り組みが活発だ。同センターでは、同様のプログラムを年30回ほど実施している。この日は、小学6年生ら29人を対象に、DNAに関する特別授業が行われていた。

背景にあるのは、理数系学力の低迷だ。国際教育到達度評価学会(IEA)によると2003年の「国際数学・理科教育動向調査」によると、南アの中学2年の数学の平均得点は26.4点で、参加した46か国・地域で最下位。1位のシンガポール(60.5点)に比べると半分以下だった。

アパルトヘイト時代、黒も続いている。白人の10分の1程度で、深竹志、写真も

南ア・ヨハネスブルク

ヨハネスブルク協力隊員が職業訓練校で理数科を教えるなど、国外からの支援

全人口の約8割を占める黒人の学力底上げが課題となっており、センターは土曜日を利用し、タワシツプと呼ばれる旧黒人居住区の高校などで数学や物理などの授業などを実施している。このほか、日本からも青年海外協力隊員が職業訓練校で理数科を教えるなど、国外からの支援

入学者を増やす「撒き餌」ではと勘ぐってしまう◆事実、雇用コンサルタントの海老原嗣生さんは「資格を並べても就職できるわけじゃない」と。企業が求めているのは、考え、学ぶ力だというのだ。それを意識

資格取得で何をを目指すか

今春卒業の大学生の就職率は94%。超氷河期と表現される状況から脱却する兆しはあるものの、景気の先行きは不透明で、企業の採用マインドに向けた特訓講座を設けていた。学外の専門学校などに通わせる費用を補助するケースも私立大を中心に3割に上る

大学の

認めるか。と片岡教諭とがで

ヨハネスブルク

アフリカ

南アフリカ

インド洋

大西洋

An online version of the article published in the Japanese newspaper The Yomiuri Shimbun can be found here <http://www.yomiuri.co.jp/kyoiku/jijou/sekai/20120601-OYT8T00251.htm>



Title: Raising the academic ability of math and science in African children

English translation from the Japanese kindly provided by Prof Masaki NAKAMURA, member of the GYA; <masaki@celas.osaka-u.ac.jp>

"In the heart of Johannesburg is the Sci-Bono Discovery Centre. In this science museum, children grind up pieces of strawberries and bananas before adding some dishwashing liquid and salt water. They cheer as white strands of DNA appear after their teacher adds some ethanol to the mixture.

Efforts to improve South Africa's science and mathematics education standards are on a rise following years of racial segregation. This science museum runs programs for children 30 times every year. Today, 29 sixth graders have come to the museum to learn about DNA.

The level of South Africa's science and mathematics education has long been at a stand still. The country's eighth grade students were ranked the worst of 46 nations in mathematics according to a Trends in International Mathematics and Science Study by the IEA (International Association for the Evaluation of Education Achievement) in 2003. The country's average score of 264 points was less than half of the best country's score, an average of 605 points by students in Singapore.

During the apartheid era, black people had received only a tenth of the education budget white people did, creating an even serious gap in academic ability. Sci-Bono Discovery Centre manager Michael Ellis had said it has been 20 years since apartheid had been abolished, but nothing has changed to improve the academic achievement gap.

Raising the academic capabilities of the country's black people, which make up about 80 per cent of the entire population, has been making headlines. At this science centre, teams are sent out to schools in largely black communities on Saturdays to hold special classes in science and math. International communities also support the move, and even Japan Overseas Cooperation Volunteers are sent over to help teach classes."



Interview for the South-African national newspaper "The Star"

The Sci-Bono Discovery Centre arranged a meeting at GIBS with Ms Theresa Taylor (theresa.taylor@inl.co.za), a freelance journalist with a biology degree. This interview led to a short article published on May 25th.

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Helping to promote knowledge of science

May 25 2012 at 09:00am

THERESA TAYLOR
theresa.taylor@inl.co.za

They wear goggles that make them look like bugs and cover their bodies in white coats. The words they use can confuse the average person, and even the mundane list of chemicals on the back of your shampoo bottle sounds scary – things like Methylisothiazolinone and Polyquaternium-10.

This mystery surrounding scientists means they are generally out of the mainstream limelight until someone discovers a new species, announces a species is threatened, or makes progress on a well-known disease.

But the thought processes going on behind the scenes of a scientist's work can be just as valuable to the general public as their discoveries; it speaks to our own problem solving and learning.

"Many people think (science is) just about geeks discovering things on their own," says biochemist Dr Marc Creus from the University of Basel in Switzerland.

25/05/2012 Dr. Marc Creus, a Biochemist at the University of Basel in Switzerland, is fascinated by the implications of Darwin's description of evolution at all scales of life, from tiny molecules to whole organisms. He was speaking to The Star at the Gordon Institute of Business Science in Illovo, Sandton. Picture: Moeletsi Mabe

"Our job is not only to give answers but to come up with questions."

Creus is part of the Global Young Academy, which has held a conference over the past week in Joburg.

The organisation aims to be a voice for, and encourage debate among, young scientists around the world.

This week about 100 brains from numerous countries have been trying to reach out to South Africans and share a little of their expertise.

"We take the view that science is important and should be taught properly, and not just to scientists," says Creus.

He relates how a teacher can teach five-year-olds about plant growth by making them run around outside with socks on. When they come back to the classroom they collect what they picked up from their feet and the teacher asks them to identify seeds in all the muck. She also asks how they could test that what they have identified as seeds, are actually seeds.

"After a while even a five-year-old will come to the conclusion that you can plant them and see if they grow ..."

"You need a creative teacher who will not just tell children "You need to learn this", but will engage them in playful learning."

"This question-based and logical approach to learning follows the same pattern a scientist would use"

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Online version of article in "The Star": <http://www.iol.co.za/the-star/helping-to-promote-knowledge-of-science-1.1304489#.T9tHKMXhfNo>

