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# TWAS newsletter

NEWSLETTER OF THE ACADEMY OF SCIENCES FOR THE DEVELOPING WORLD



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**JACOB PALIS, CURRENT SECRETARY GENERAL OF TWAS, HAS BEEN ELECTED THE ACADEMY'S NEXT PRESIDENT. A NEW COUNCIL HAS ALSO BEEN CHOSEN.**

**J**acob Palis, professor of mathematics at the Institute of Pure and Applied Mathematics in Rio de Janeiro, Brazil, has been elected president of TWAS. The election took place during the TWAS 10<sup>th</sup> General Conference, which was held in Angra dos Reis, Brazil, from 2-6 September 2006. He will assume his three-year term in January 2007.

Brazilian-born Palis, who currently serves as TWAS's secretary general, has been a fellow of the Academy since 1991. He is recognized internationally as a leading mathematician in the field of dynamical systems and the recipient of many international awards, including the Trieste Science Prize (see pages 26-28), the Brazilian Order of Scientific Merit, the Inter-American Prize for Science and the French Legion d'Honneur-Chevalier. Palis succeeds C.N.R.

Rao who has served as president of TWAS since 2002.

"TWAS has become the world's leading voice for the promotion of science and science-based development in the developing

world," Palis said soon after the election results were announced. "It is indeed an honour to be given an opportunity to lead such a vibrant and dynamic organization.

"Despite the progress that the Academy has made in advancing its goals, much more work remains to be done," he continued. "Two areas of particular concern are increasing the participation of women in science, especially in leadership positions, and ensuring that scientists from the least developed countries (LDCs) can pursue successful careers in their own countries. These issues will continue to be focal points of the Academy's agenda during my tenure."

In addition to electing a president, Academy members at the TWAS 17<sup>th</sup> General Meeting, held on 4 September during the 10<sup>th</sup> General Conference, also chose a new council (see box, next page). Returning as vice presidents will be Lydia Makhubu, professor emeritus, University of Swaziland (Africa); Ismail Serageldin, director, Bibliotheca Alexandrina (Arab region); and Jorge Allende, professor of biochemistry, Institute of Biological Sciences, University of Chile

## New President and New Council

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 c/o ICTP, Strada Costiera 11  
 34014 Trieste, Italy  
 tel: +39 040 2240327  
 fax: +39 040 224559  
 email: info@twas.org  
 website: www.twas.org

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SUPPORT STAFF

Sara Dalafi

Liz Ng'ang'a

DESIGN & ART DIRECTION

Sandra Zorzetti, Rado Jagodic  
 www.studio-link.it

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(Latin America and the Caribbean). Joining them will be *Atta-ur-Rahman*, federal minister for higher education in Pakistan (central and south Asia) and *Bai Chunli*, executive vice president, Chinese Academy of Sciences (east and southeast Asia).

*Ali A. Al-Shamlan*, director general, Kuwait Foundation for the Advancement of Sciences; *Eugenia M. Del Pino*, professor of biological sciences, Pontifical Catholic University, Ecuador; and *Abdul H. Zakri*, director, United Nations University's Institute of Advanced Study, Japan, have been re-elected to the council. *Reza Mansouri*, professor of physics, Sharif University of Technology, Iran; and *Keto Mshigeni*, vice chancellor, Hubert Kairuki Memorial University, Tanzania, will be first-time council members. In addition, *José Luis Morán López*, professor of physics, Institute for Advanced Study, Mexico, has been re-elected treasurer, and *Dorairajan Balasubramanian*, director of research, L.V. Prasad Eye Institute, India, will serve as secretary general, replacing Palis.

"TWAS has played an instrumental role in spurring science-based development in the developing world," said Palis. "However, for progress to continue, we must do all that we can to make science and technology integral parts of the development agendas of both governments and international organizations.

"We must also take advantage of the growing scientific proficiency of such developing countries as Brazil, China, India and Mexico," he noted, "to help build the capacities of scientifically deficient developing countries, which are usually the world's poorest countries as well.

"That's why TWAS intends to continue to play a leading role in South-South cooperation in science. It's one of the most effective long-term strategies for reducing poverty and promoting economic growth. The Academy will work hard to convince governments across the developing world that scientific cooperation and exchange is in everyone's interest."



**TWAS COUNCIL, 2007-2009**

- **President:** **Jabob Palis** (Brazil).
- **Vice presidents:** **Jorge Allende** (Latin America and the Caribbean); **Atta-ur-Rahman** (central and south Asia); **Bai Chunli** (east and southeast Asia); **Lydia Makhubu** (Africa region); and **Ismail Serageldin** (Arab region).
- **Secretary general:** **Dorairajan Balasubramanian** (India).
- **Treasurer:** **José Luis Morán López** (Mexico).
- **Council members:** **Ali A. Al-Shamlan** (Kuwait); **Eugenia M. Del Pino** (Ecuador); **Reza Mansouri** (Iran); **Keto Mshigeni** (Tanzania); and **Abdul H. Zakri** (Malaysia).



# NEW CONSORTIUM FOR THE SOUTH

ON 22 SEPTEMBER 2006, THE FOREIGN MINISTERS OF THE GROUP OF 77 AND CHINA (G77) ENDORSED THE CREATION OF A CONSORTIUM ON SCIENCE, TECHNOLOGY AND INNOVATION FOR THE SOUTH (COSTIS). THE DECISION WAS ANNOUNCED AT THE MINISTER'S ANNUAL MEETING HELD AT THE HEADQUARTERS OF THE UNITED NATIONS IN NEW YORK CITY.

**T**he proposal to establish the Consortium on Science, Technology and Innovation for the South (COSTIS) was first made in Angra dos Reis at the General Assembly of the Third World Network of Scientific Organizations (TWNSO) in early September. TWNSO, an existing network of science ministries, research councils and science academies in the developing world that operates under the administrative umbrella of TWAS in Trieste, will be transformed into this new organization.

“COSTIS,” says Dumasani S. Kumalo, permanent representative of South Africa to the UN and chair of the G77, “will provide member states of the G77 with direct access to the developing world’s best scientific minds. The organization

could prove instrumental in placing science and technology at the centre of the developing world’s economic development efforts.”

COSTIS’s secretariat will be located in Trieste, Italy, and operate under the administrative umbrella of the Trieste System of international organizations. These organizations include TWAS, the Abdus Salam International Centre for Theoretical Physics (ICTP), the International Centre for Genetic Engineering and Biotechnology (ICGEB), the Centre for Science and High Technology of the United Nations Industrial Development Organization (ICS-UNIDO) and the *Fondazione Internazionale Trieste per il Progresso e la Libertà delle Scienze* (FIT).

“COSTIS represents a unique blend of political power and scientific and technical expertise,” says

Mohamed H.A. Hassan, TWAS executive director. Hassan briefed the ministers in New York about the consortium. The main focus of COSTIS, he explains, will be to promote science-based economic development in developing countries and to encourage international cooperation in science and technology. “The consortium,” says Hassan, “will provide a unique platform for governmental agencies responsible for funding research and development to interact with leaders in academia and industry.”

COSTIS’s flagship activity will be to convene periodic South-South forums on science, technology and innovation for development that address topics of critical concern, including the development of appropriate and affordable technologies for increasing access to safe



drinking water, energy and the continued expansion of information and communication technologies.

In addition, COSTIS plans to support the creation of scientific centres of excellence; promote the sharing of innovative experiences and best practices in the use of science and technology; and encourage efforts to increase scientific co-operation through international exchange programmes and joint research projects.

“Many successful science-based economic development initiatives have been put in place in developing countries such as Brazil, China and India,” says Kumalo. “As a result, we now have a great deal to learn from one another. At the same time, we do not want ignore the work of our colleagues in the North. COSTIS could serve as a valuable

link between scientific and economic development communities in the developed and developing world.”

“We will seek funding for our initiatives from a number of different sources,” says Hassan, “including individual governments in the developing and developed worlds and international donors and foundations.”

A task force has been created to prepare COSTIS’s statutes and by-laws as well as a portfolio of initial programmes. Members of the task force include Dumansani Kumalo, chairman of the G77; C.N.R. Rao, president of TWNSO; Jacob Palis, president-elect of TWAS; Mohamed H.A. Hassan, executive director of TWAS; Mourad Ahmia, executive secretary of the G77; Yiping Zhou, director of the United

Nations Development Programme Special Unit for South-South Cooperation (UNDP-SSC); Paolo Budinich, president of FIT; and Walter Erdelen, assistant director-general for the United Nations Educational, Scientific and Cultural Organization (UNESCO). Representatives from the Italian government and South Africa’s ministry of science and technology will also be chosen.

The task force plans to complete its work by the end of this calendar year and COSTIS is expected to be fully operational by January 2007. ■

❖ For additional information about COSTIS, contact:  
**M.H.A. Hassan**  
TWAS executive director  
email: [mhassan@twas.org](mailto:mhassan@twas.org).

# TWAS IN BRAZIL

THE TWAS 10<sup>TH</sup> GENERAL CONFERENCE AND 17<sup>TH</sup> GENERAL MEETING TOOK PLACE IN ANGRA DOS REIS, 150 KILOMETRES SOUTH OF RIO DE JANEIRO, BRAZIL, FROM 2-7 SEPTEMBER 2006. SOME 350 SCIENTISTS FROM AROUND THE WORLD – THE MAJORITY OF WHOM WERE MEMBERS OF TWAS – ATTENDED. PARALLEL MEETINGS THAT DISCUSSED SCIENCE POLICY IN DEVELOPING COUNTRIES WERE HELD BY THE THIRD WORLD NETWORK OF SCIENTIFIC ORGANIZATIONS (TWNISO) AND THE GROUP OF 77 (G77).

**T**he TWAS 10<sup>th</sup> General Conference, entitled ‘Scientific Research in Developing Countries: Building a New Future’, was sponsored by the Brazilian Ministry of Science and Technology through its agencies, the National Council for Scientific and Technological Development (CNPq) and the Brazilian Innovation Agency (Financiadora de Estudos e Projetos, FINEP), and the Brazilian Academy of Sciences. It was marked by the first ever TWAS Regional Conference for Young Scientists (RCYS). An agreement to create the Consortium on Science, Technology and Innovation for the South (COSTIS) was also reached during the meeting.

Highlights of the meeting, included:

- The election of a new TWAS President and TWAS Council. President-elect Jacob Palis (TWAS Fellow



1991) will take over the reins of the Academy from current president, C.N.R. Rao, in January 2007. TWAS members also chose a new TWAS Council. Dorairajan Balasubramanian (TWAS Fellow 1997) was appointed secretary general and José Luis Morán López (TWAS Fellow 1991) was re-elected treasurer (For a complete list of council members, see box, page 3).

- An opening ceremony that included presentations by Sergio Rezende (TWAS Fellow 2004), Brazil’s Minister of Science and Technology; Mosibudi Mangena, South Africa’s Minister of Science and Technology; Paolo Bruni, representative of the government of Italy, which





generously supports the activities of TWAS and hosts the TWAS secretariat; Marcio N. Barbosa, deputy director general of the United Nations Educational, Scientific and Cultural Organization (UNESCO); Eduardo M. Krieger (TWAS Fellow 1995), president of the Brazilian Academy of Sciences; and C.N.R. Rao.

- A message sent to the participants and read by Minister Rezende from Brazil's President Luiz Inacio Lula da Silva, in which he called on those attending the conference to take advantage of the opportunity afforded by the event to "reaffirm their commitment to South-South cooperation in science," which, he said, "provides a powerful tool for fostering a world more respectful of its diversity and conscious of its fundamental unity." "At this meeting," the President Lula continued, "let us explore together the myriad possibilities for harness-

***South-South cooperation in science provides a powerful tool for fostering a world more respectful of its diversity.***

ing our common aims and achievements towards the goal of sustainable human development. Our growing technical and financial capabilities enable us to grasp this challenge. The needs and aspirations of our people demand it."

- The awarding, by Minister Rezende, of the 2006 Trieste Science Prizes, the 2006 TWAS Medals, the 2006 C.N.R. Rao Prizes for Scientific Research, the 2006 Abdus Salam Medal and the 2005 TWAS Prizes to 18 eminent scientists.
- Parallel meetings organized by the Third World Network of Scientific Organizations (TWNSO) and the Group of 77 (G77) and China, a consortium of developing countries that act together to make the voice of

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the South heard during political discussions at the United Nations. Some 20 ministers and deputy ministers of science and technology attended the TWNSO Ministerial Forum on 'Financing Science, Technology and Innovation in Developing Countries'. The TWNSO executive board and 9<sup>th</sup> General Assembly also discussed a proposal from the G77 to turn TWNSO into the Consortium on Science, Technology and Innovation for the South (COSTIS), a new organization that will receive the backing of the G77 and China and thus enhance TWNSO's efforts in promoting science and technology for sustainable development in the South. Both TWNSO and the G77 ministers of science and technology in attendance agreed to endorse COSTIS, a decision that has since been ratified by the G77 ministers of finance in a meeting held at the UN headquarters in New York, USA (see article, pages 4-5).

- A talk by David Gross (Nobel Prize in Physics, 2004), Kavli Institute for Theoretical Physics, University of California, Santa Barbara, USA. In his lecture, 'The Coming Revolutions in Fundamental Physics', Gross explained that the standard model of particle physics allied to the theory of relativity had been tested down to distances of the order of  $10^{-18}$  centimetres and were likely valid down to the Planck length of  $10^{-33}$  centimetres. Citing the fact that the most important



product of knowledge is ignorance, he then revealed that what scientists don't know is what happens at distances of less than  $10^{-33}$  centimetres and what happened in the first fraction of a second after the Big Bang, when all the equations of theoretical physics break down. He went on to explain that he expects new results from string theory and supersymmetry to shed light on these areas in the coming years. "String theory has many successes and has much promise," he concluded, "but the best is yet to come."

- The presentation of the 2006 Abdus Salam Medal Lecture by Lu Yongxiang (TWAS Fellow 1990 and



president of the Chinese Academy of Sciences, CAS). In his talk, Lu examined 'The Evolution of Technology and its Outlook', explaining that advances in technology are a part of the evolution of human society, adding that different centres of technological advances have been observed during different periods of human history. He observed that technological evolution had first helped augment human strength through the use of tools and then expand our vision of the world through navigational devices, telescopes and microscopes. "In the future," concluded Lu, "technology will help expand human intellect. We will see the development of intelligent computers, intelligent networks, intelligent machines, intelligent medical diagnosis and treatment, intelligent control of industrial processes, and intelligent environmental protection."

- Lectures by the four 2006 Trieste Science Prize laureates, Chen Ding-Shinn (TWAS Fellow 2001) and Rao Zihe, who shared the prize in the category of medical sciences, and Jacob Palis (TWAS Fellow 1991) and C.S. Seshadri (TWAS Fellow 1988), who shared the prize in the category of mathematics (see pages 26-28). In addition, lectures were presented by the nine winners of the 2005 TWAS Prizes and the two winners of the first C.N.R. Rao Prize for Scientific Research, Bernahu Abegaz (TWAS Fellow 1998), University of Botswana, and Philippe Rasoanaivo (TWAS Fellow 2005), *Institut Malgache de Recherches Appliquées*, Madagascar.

***In the future, technology will help expand human intellect.***

- TWAS Medal Lectures for 2006 were presented by Li Jiayang (TWAS Fellow 2004), who described 'The Molecular Designing of Super Rice', Eduardo Moacyr Krieger (TWAS Fellow 1995), who explained how 'The Increased Baroflex Sensitivity is Important in Mediating the Beneficial Effect Produced by Exercise Training in Hypertension', and Ismail Serageldin (TWAS Fellow 2001), who presented 'Ten Commandments for Global Agriculture'.

- The election of 44 eminent scientists from 16 countries as new members of the Academy, bringing Academy membership to 850. Among this year's new members is Dakhil Jerew, president of the Iraq Academy of Sciences, who becomes the first TWAS Fellow from Iraq. The list also includes scientists from countries under-represented in TWAS such as Nepal, Tunisia and Vietnam, as well as eight eminent women scientists. For a complete list of the new members, see [www.twas.org](http://www.twas.org) and click on the 'Membership' link.

- The announcement of the winners of the TWAS Prizes for 2006: Heong Kong-Luen, Malaysia, in agricultural sciences; Pedro Leon, Costa Rica, in biology; Che Chi-Ming, China, in chemistry; Rengaswamy Ramesh, India, in earth sciences; Chang Chun-Yen, Taiwan, China, in engineering sciences; Claudio Landim, Brazil, in mathematics; Jacinto Convit, Venezuela, in medical sciences; and D.D. Sarma, India, in physics. Among the winners, D.D. Sarma is the first woman physicist to be hon-



oured by TWAS in the 20-year history of its awards schemes, and Pedro Leon and Jacinto Convit are the first scientists from Costa Rica and Venezuela, respectively, to receive TWAS Prizes. For additional information on these prize winners, visit [www.twas.org](http://www.twas.org) and click on the 'Activities' link.

- The announcement by the TWAS Council of the recipients of the TWAS Medal Lecturers for 2007: Anwar Nasim (TWAS Fellow 1987) from the Asia region; Keto Mshigeni (TWAS Fellow 1987) from the Africa region; and Hernàn Chaimovich (TWAS Fellow 2000) from the Latin America region. The lectures will be presented at the next TWAS General Meeting scheduled to take place in Pakistan in November 2007.

***The excellence of the research presented by the young scientists and their enthusiasm provided a valuable addition to the proceedings.***

- An examination of the current state of science in Brazil in two sessions, 'Capacity Building in Brazil: Inventing a New Future' and 'Science Technology and innovation in Brazil', as well as special sessions on 'New Science for Energy, Food Production and Health', and 'Advances in Nanoscience and Nanotechnology'. In addition, two symposia focused on issues relating to 'Global Change and Developing Countries' and 'Life Sciences in Africa', during which nine eminent scientists from sub-Saharan Africa provided examples of successful initiatives for addressing critical social and economic issues in their countries.

- The first TWAS Regional Conference for Young Scientists (RCYS). Some 25 young scientists from 12 countries in the Latin America and Caribbean region were invited to attend the meeting and present their work to fellow participants, as well as to the 220 TWAS Fellows and 100 other eminent scientists from around the world who attended the TWAS General Conference. Conference themes included 'The Challenge of Neuroscience', 'Biomedical Progress: Epidemiology and Infection', 'Signals and Cancer', and 'Molecular and Cellular Development'.

"The excellence of the research presented by the young scientists and their enthusiasm for their work provided a valuable addition to the proceedings of the TWAS General Conference," said Jacob Palis, TWAS president-elect. "Not only did the young scientists benefit from presenting and discussing their work

with the eminent scientists present at the TWAS conference, but I sincerely believe that TWAS members enjoyed listening to and discussing the young scientists' presentations. We hope that future TWAS conferences will host similar young scientists conferences." The TWAS RCYS was co-organized by the TWAS Regional Office for Latin America and the Caribbean Region and the Brazilian Academy of Sciences (see article, pages 21-25).

- The adoption of a new category of TWAS membership – Young Affiliates.





Following the success of the first TWAS Regional Conference for Young Scientists (RCYS), it was agreed to continue to engage the best young scientific talent in TWAS activities. Each year, the five TWAS regional offices will appoint up to five Young Affiliates, each appointment to last five years. Young Affiliates will be invited to attend TWAS meetings and receive the *TWAS Newsletter* and other publications.

- The establishment of three new categories of TWAS Prizes aimed at honouring people who are not necessarily scientists but who promote science in developing countries. The US\$3,000-prizes will be awarded by each of the five TWAS regional offices with the subject area rotating on an annual basis. In 2007, the first prizes will be awarded to individuals who have promoted public understanding and the popularization of science; in 2008, to individuals who have advanced science education; and in 2009 to individuals who have helped build scientific institutions.



- Reports of the three standing committees created during the previous TWAS meeting in Alexandria, Egypt, in 2005. The Standing Committee on Biotechnology, chaired by Manju Sharma (TWAS Fellow 1995), presented a series of recommendations, including holding a workshop on biotechnology for scientists, policymakers and the media immediately prior to the next TWAS meeting to be held in Pakistan in November 2007. The Standing Committee on Women in Science, chaired by Lilian Alvarez Dias (Cuba), proposed that TWAS needs to work to increase the visibility of women in science, citing the UN target of reaching at least 30 percent women in administration and decision making positions. To achieve this, the committee appealed to TWAS to increase the visibility of the Third World Organization for Women Scientists (TWOWS) through a fundraising committee, new programmes and the creation of an endowment fund. The Standing Committee on the Social Sciences, chaired by Ismail Serageldin, highlighted the fact that it had been difficult to engage the economic and social science communities in TWAS. “In all of the natural sciences, as well as economic science,” said Serageldin, “we have a rational framework of experimentation that directs our thoughts and conclusions. This is not

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## FUTURE MEETINGS

The 18<sup>th</sup> General Meeting of TWAS will take place in Islamabad, Pakistan, on 13-15 November 2006. As in Brazil, the meeting will feature a Regional Conference for Young Scientists (RCYS), organized in collaboration with the TWAS Regional Office for Central and South Asia. Sessions will be devoted to examining the state of science in Pakistan. There will also be a workshop that will bring together scientists, policymakers and the media to discuss issues relating to biotechnology. For additional information, contact [info@twas.org](mailto:info@twas.org).

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true in the social sciences, which need a different mechanism to measure excellence. The challenge for the scientific community,” he continued, “is to become involved in such a dialogue.”

- An update on the TWAS Regional Offices, which are now operating in five regions of the developing world: in Beijing under the auspices of the Chinese Academy of Sciences for the east and southeast Asia region; in Bangalore under the Jawaharlal Nehru Centre for Advanced Scientific Research for central and south Asia; in Nairobi under the African Academy of Sciences for sub-Saharan Africa; in Alexandria under the *Bibliotheca Alexandrina* for the Arab region; and in Rio de Janeiro under the Brazilian Academy of Sciences for Central and South America and the Caribbean. The offices have held conferences and symposia, launched awards programmes for young scientists, developed websites, and publicized and distributed information

about TWAS programmes both to scientists and scientific institutions throughout their regions.

During the general discussion that took place at the conclusion of the TWAS General Meeting, several critical issues were raised concerning the programmatic activities of the Academy, especially those concerning the least developed countries (LDCs).

Mahir S. Hussein (TWAS Fellow 2005) noted that most of TWAS’s funding comes from Italy and Sweden, and added that there was a need to attract matching funding from the South.

Ahmed Azad (TWAS Fellow 2002) noted that many members of TWAS committees and the winners of the TWAS Prizes were from the larger countries in the South. “There is a need,” he said, “to look towards



the LDCs and include them in TWAS activities, perhaps by having a representative from an LDC on the TWAS Council.” In the same vein, Chistopher Chetsanga (TWAS Fellow 1988) recommended that TWAS find a way of rotating presidents so that, in future, a president from a small country could be elected. Romain Murenzi (TWAS Fellow 2005 and Minister of Science and Technology, Rwanda) also noted that African scientists were absent from the list of TWAS Prize winners and urged TWAS Fellows from Africa to work together to change this.

Souleymane Mboup (TWAS Fellow 2000) added that attending TWAS General Conferences and General Meetings was important for African scientists, largely because of the networking opportunities it afforded. “However, the costs can be prohibitive,” he added. He recommended that TWAS contact relevant ministries of science and technology in advance of each meeting and ask them to provide financial assistance.

Vincent Titanji (TWAS Fellow 2004) spoke of the difficulties African scientists have in accessing scientific literature and asked if TWAS could get a ‘joint subscription’ either for its Fellows or perhaps for scientists working in LDCs.

Sospeter Muhongo (TWAS Fellow 2004) highlighted that, in Africa, the regional offices of the International Union of Science (ICSU), TWAS and the United Nations Educational, Scientific and Cultural Organization (UNESCO) were working together and that the TWAS and ICSU offices were developing a joint work-

plan. “The most important thing for Africa,” he said, “is capacity building, especially through the creation of scholarships for MSc and PhD students, which governments have rarely been able to afford to fund. We need to increase the number of African students that travel to Brazil, China and India for higher degrees with support from TWAS,” he added.

Mohamed Hassan, TWAS executive director, replied, saying that, under the 2007 workplan presented at the conference, of the 50 research grants provided by TWAS next year, a large proportion will go to African scientists and that the main target of the TWAS fellowships programme is African scientists. He stressed, however, that all awards are made on the basis on competition and merit.

Concluding the conference, Palis, as president elect, expressed his gratitude to outgoing president Rao

and to executive director Hassan for their work in representing TWAS in recent years and reiterated that he will work together with the TWAS Council and all members to advance and expand the Academy’s goals in the future.

Rao, bringing his last meeting as TWAS president to a close, revealed that: “Of all the things I have done in my life, I value my association with TWAS as the most precious. If the Academy can continue to inspire such sentiments in both its leaders and its general membership, then TWAS is poised to build on its current strengths for the greater benefit of both science and sustainable development in the South.” ■

***Of all the things  
that I have done,  
I value my association  
with TWAS as  
the most precious.***





SOME 18 MINISTERS OF SCIENCE AND TECHNOLOGY AND HIGH-LEVEL SCIENCE ADMINISTRATORS MET ON 4 SEPTEMBER IN ANGRA DOS REIS, BRAZIL, AT THE THIRD WORLD NETWORK OF SCIENTIFIC ORGANIZATIONS (TWNSO) 9<sup>TH</sup> GENERAL ASSEMBLY. THE OFFICIALS CAME TO PARTICIPATE NOT ONLY IN THE ASSEMBLY BUT ALSO IN A MINISTERIAL FORUM ON SCIENCE, TECHNOLOGY AND INNOVATION.

# MINISTERS MEET IN BRAZIL

*With the Consortium on Science, Technology and Innovation for the South (COSTIS) scheduled to begin operations next January as a successor to Third World Network of Scientific Organizations (TWNSO) (see article, pages 4-5), the ministerial forum marked the concluding event of this 18-year-old organization.*

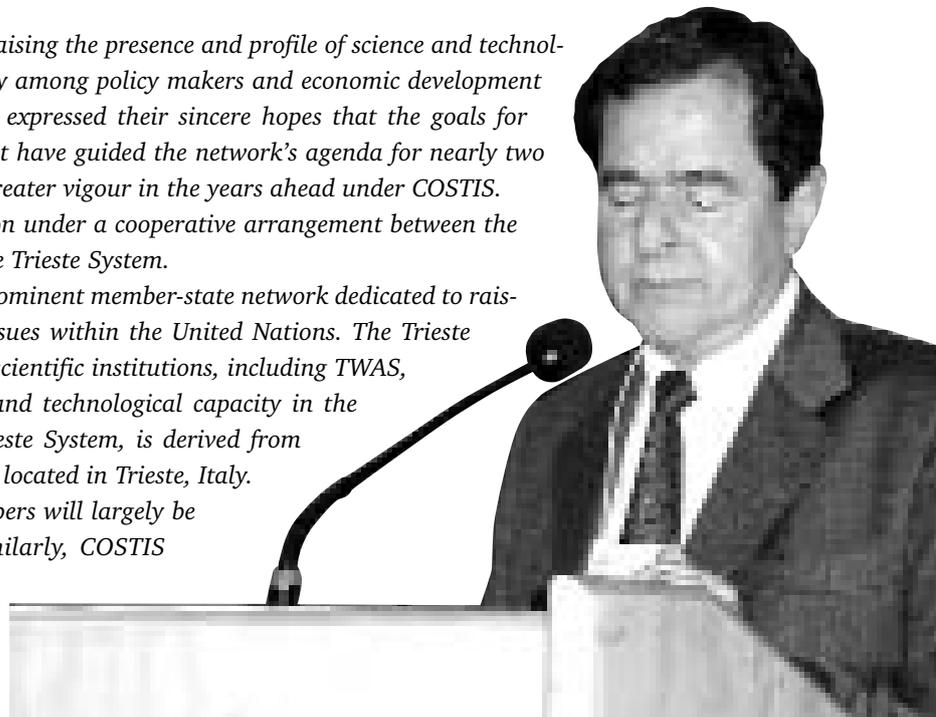
*TWNSO has played a key role in raising the presence and profile of science and technology in the developing world, especially among policy makers and economic development specialists. Participants in the forum expressed their sincere hopes that the goals for which TWNSO was created – and that have guided the network’s agenda for nearly two decades – will be pursued with even greater vigour in the years ahead under COSTIS.*

*This new organization will function under a cooperative arrangement between the Group of 77 and China (G77) and the Trieste System.*

*The G77 is the largest and most prominent member-state network dedicated to raising the profile of developing-world issues within the United Nations. The Trieste System is a network of international scientific institutions, including TWAS, which focuses on building scientific and technological capacity in the developing world. The name, the Trieste System, is derived from the fact that all of the institutions are located in Trieste, Italy.*

*The initial roster of COSTIS members will largely be comprised of TWNSO members. Similarly, COSTIS statutes and bylaws will be based on those that have guided TWNSO.*

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“*Good education is not only a key ingredient to sustainable economic development but also a fundamental right.*”

**Peter Msolla**

*Minister of Higher Education,  
Science and Technology  
Tanzania*

The ministers and other high-level officials present at the TWNSO Ministerial Forum for Science, Technology and Innovation examined a broad spectrum of scientific issues facing the developing world. They did so largely by describing the state of affairs in their own countries.

For example, Sergio Rezende, Brazil’s minister of science and technology, spoke about his nation’s expansive science and technology programmes, which now receive more than US\$700 million annually. Brazil’s efforts have not only produced tens of thousands of researchers over the past few decades but have also enabled Brazil to gain an international presence in such cutting-edge fields as the development of biofuels and the manufacture of mid-sized jet airplanes.

Kong Cho Ha, Malaysia’s deputy minister of science, technology and innovation, outlined the recent progress that Malaysia has made in developing an effective programme for scientific capacity building. This encouraging trend has been spurred by increased investments in the nation’s universities, research centres and science academy and by reforming its industrial and trade policies to encourage research and development in such fields as advanced materials, alternative energy and nanotechnology.

Julio Escobar, national secretary of science, technology and innovation in Panama, examined efforts to put science to work for Panama’s economy despite the nation’s small size and limited resources. Escobar not only highlighted the government’s growing direct investments in public-sector science and technology initiatives but also its recently instituted fiscal and regulatory reforms, such as providing tax credits for research firms, that are designed to promote science in the private sector.

Young Rip Pyon, president of the Academy of Sciences in the Democratic Peoples Republic of Korea, explained his nation’s

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## FIELDS OF DREAMS

*The Vienna Plan of Action, put forward by UN organizations some 30 years ago, recommends that nations spend 1 percent of their annual gross domestic product (GDP) on science and technology. Although the use of the percentage of GDP as an indicator was called into question by some ministers during the meeting in Brazil, it is a simple and commonly used guide for making comparisons between nations. Developed countries, for example, typically devote between 2 and 3 percent GDP to their science and technology budgets.*

*Every official present at the TWNSO Ministerial Forum for Science, Technology and Innovation pledged that his or her country would aim to devote between 1 and 2.5 percent GDP to research and development by 2020 at the latest. Today that level ranges from 1.4 percent in China, to 0.9 percent in Malaysia, and as low as 0.16 percent in Sri Lanka, 0.15 percent in Panama and 0.1 percent in Zambia.*

*Fields of scientific interest, which participants thought represented the greatest pay-off for society, included agriculture, biotechnology, health, natural products (most notably, related to the discovery of pharmaceuticals), fisheries and marine products, nanotechnology and information and communication technologies.*

determined efforts to advance science and technology despite its limited resources and diplomatic isolation.

Romain Murenzi, Rwanda's minister of science and technology, asserted that his nation was slowly overcoming decades of chaos and genocidal violence to embark on a nationwide programme for economic development based on sustained investments in science and technology. Rwanda's strategy, he said, was currently focusing on upgrading the nation's university system and laying a strong foundation for the development of centres for research and technology transfer in such fields as biotechnology and telecommunications.

High-level representatives from other developing countries gave equally detailed – and, for the most part, upbeat – presentations on the current state of science and technology in their nations. Officials from Brazil, Cuba, Costa Rica, India, Iran, Kenya, Mozambique, Nigeria, Pakistan, Senegal, Sri Lanka, Sudan and Tanzania were among the participants in the wide-ranging discussions that took place, all of which were designed to provide an opportunity to share experiences and have participants learn from one another.

Despite their widely varied experiences and conditions, participants touched on a number of shared principles and strategies that suggest the developing world has embraced a new paradigm for economic development that is far different from the paradigm that shaped economic development policies during the second half of the 20<sup>th</sup> century. This new paradigm, which places science and technology in a prominent position in overall efforts to combat poverty and attain sustained economic growth, is driven by the following precepts:



*“In recent years, the competitive advantage in natural resource endowment is increasingly being substituted by comparative advantages in science and technology.”*

**Alsacia Atanascio**  
Executive Director,  
National Resources Fund  
Mozambique

- Building scientific and technology capacity is now recognized as an essential – indeed irreplaceable – element for sustained economic development. In addition, innovation – broadly defined as putting science and technology to work for the creation of new products and services that promise to benefit society, curb poverty and add wealth to



the economy – is increasingly accepted as an equally critical element of success. In fact, innovation is now widely accepted as one of the primary by-products of science and technology capacity building efforts. As Romani Murenzi, Rwanda’s minister of science and technology, noted: “The central role of science and technology as key sources of long-term sustainable growth is no longer a matter of debate.”

- Rhetoric in support of science and technology, participants asserted, must be backed by systematic and sustained financial investments designed to enhance both the capabilities of individual scientists and the capacities of scientific institutions. Participants agreed that such investments, at minimum, must eventually reach at least 1 percent of a nation’s gross domestic product (GDP). Participants also agreed that each of their nations should focus on improving universities and building research centres capable of achieving levels of excellence comparable to the best institutions in other developing countries – and ultimately comparable to the best institutions in the world. They also called for the construction of technology parks and innovation centres that seek to transform scientific discoveries into concrete products and services as well as the awarding of research grants that help ensure that scientists who are trained within their own countries are able to pursue successful careers upon graduation. In other words, participants agreed, successful science-based development strategies depend on both the levels of funding and the way in which the money is spent. Progress, of course, is stymied when resources are inadequate, participants concurred. But poorly spent resources, even when available in adequate sums, are likely to undermine efforts for sustained science-based development over the long term. The bottom line, participants noted, is that benefactors, most notably governments, must be persuaded to invest in science and technology. Money must then be spent wisely and in ways that have significant pay-offs for society.
- Examples of successful applications of science and technology to promote economic development in the developing world now abound, participants observed, not just in terms of individual projects but also in terms of broad national policies. Such is the case in China where

### CUBA’S EDUCATION REVOLUTION

*In 1961, soon after the fall of General Fulgencio Batista and the rise of Fidel Castro, Cuba embarked on a campaign to wipe out illiteracy, which at the time stood at 25 percent of the population. Today, Cuba has a literacy rate of 97.8 percent and some 6.5 percent of the population have earned university degrees, one of the highest percentages in the developing world. The most notable areas of success in Cuba’s education revolution are in medicine and public health. Cuba’s public healthcare system is one of the best in the developing world. Indeed some of Cuba’s health indicators, including infant mortality rates, are comparable to those in the developed world. Cuban-trained doctors are sent to other countries, primarily in Central and South America and the Caribbean, to care for people. Indeed, they were dispatched to Indonesia after the giant ‘killer’ tsunami struck in December 2004 and to Pakistan following the devastating earthquake in 2005. In addition, some 12,000 students from Africa and Latin America are now enrolled in medical schools in Cuba.*

investments in science and technology have increased by 20 percent since 2005. Indeed the percentage of GDP invested in science and technology has risen from 0.7 percent in 1991 to 1.4 percent in 2004. Paralleling this increase in investment in science and technology has been a dramatic – indeed a historic – rise in China’s GDP. In 1995, China’s GDP was US\$0.75 trillion; growing at an annual rate of approximately 10 percent, by 2005 it had reached US\$2.2 trillion. While not as spectacular as the experience in China, other nations – for example,



Brazil and India – have experienced similar trends. Again increased investments in science and technology have gone hand-in-hand with rising GDP. In India, for example, GDP grew at an annual rate of 7 percent from 1994 to 2004 and 7.6 percent in 2005. Such trends offer important examples – models, if you will – for other developing countries, strongly suggesting that they too can replicate this success. At the same time, successful efforts in Brazil, China, India and other nations offer opportunities for South-South exchange that can help build scientific capacity and fuel economic growth at a rapid pace. “There is a wealth of knowledge and information on international cooperation in science and technology that we can share among us,” observed Mosibudi Mangena, South Africa’s minister of science and technology.

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“Nigeria is taking steps in training, improved infrastructure and legislative reforms that are designed to enable it to leapfrog into the global knowledge economy. In 1999, Nigeria had less than 500,000 telephone ‘lines’; today, it has 25 million ‘lines’, 95 percent of which are cell phones. The nation’s telecommunications industry is now worth US\$10 billion.”

**Turner T. Isoun**  
Minister of Science and Technology  
Nigeria

- Devising a long-term strategy for building scientific and technological capacity is essential and governments have a key role to play in such efforts. Participants, however, contended that developing countries must also encourage the development of an active and profitable private sector that includes a

large number of knowledge-based companies requiring investments in research and development. Why is the creation of a strong private sector so important? First, a successful private sector is able to create challenging, well-paying jobs in numbers that the public sector cannot and, second, the private sector is a more likely venue for innovation where scientific and technological knowledge can be turned into profits that benefit the entire nation. That is why Kapil Sibal, India's minister of science and technology, urged his colleagues to convince their governments to invest in industries where they may enjoy a strategic advantage – for example, in the production of agricultural commodities, natural products, and minerals (if well-endowed with natural resources), or in new technologies, such as biotechnology, nanotechnology, and communication and information technologies, where relatively level playing fields could lead to rapid advances and ultimately to parity with developed countries.

While participants agreed that investments in science and technology in many developing countries have been encouraging, they also concurred that critical challenges remain stubbornly in place.

Efforts to build scientific and technological capacity in developing countries, participants readily acknowledged, usually begin from extremely low levels and take place in impoverished, fledgling nations that have limited financial resources and fragile governments. Successful efforts to build such capacity, in contrast, require long-term investments and sustained commitments from government – in short, money and willpower are needed to embrace science and technology as critical tools for development. Historically, developing countries have had little of either.

Moreover, efforts to build a firm base in science and technology must compete with the need to address more immediate critical needs. As a result, governments must balance these short- and long-term goals in an environment marked by a chronic shortage of funds, much like impoverished families must seek to stretch

### MODEST STEPS IN MALAWI

*Like many of its neighbouring countries, Malawi, a small landlocked nation of some 12.5 million in southeast Africa, hopes to transform itself from an impoverished import-dependent nation into an export-oriented nation of modest wealth over the next few decades – and to do so with the help of science and technology. In 2003, the Malawi government created a science and technology fund to advance its lofty goals. It intends to use the fund to provide research grants and loans to scientists and scientific institutions, prizes and awards to worthy scientists, and seed money for joint research and development projects. P.V. Kachimera, principle secretary of Malawi's ministry of science, technology, notes that while the fund represented a significant step forward, it has not been well managed and that money "continues to be distributed on an ad hoc basis." He also noted that Malawi spends just 0.2 percent of its GDP on research and development and that it has very low number of researchers who, not surprisingly, work in poorly equipped and maintained facilities. The country, moreover, experiences periodic food shortages and suffers from an HIV/AIDS epidemic that now claims the lives of some 100,000 people each year. With more than 60 percent of the population living in poverty, Kachimera acknowledges that Malawi will not be able to build a strong foundation in science and technology without outside help.*



meagre budgets to cover such basic needs as food and housing while trying to build a secure financial future.

The participants concluded the TWNSO Ministerial Forum for Science, Technology and Innovation with a discussion on the strategies that they would like to see COSTIS pursue in its efforts to promote sustainable development in the developing world.

For COSTIS to achieve its primary goals of building capacity in science and technology, Sibal, India's minister of science and technology, urged the nascent organization to establish two funds, drawing on contributions from G77 member states. Sibal's colleagues expressed strong support for the general thrust of his proposal.

One fund, he said, should be used to invest in such high cost initiatives as nanoscience and nanotechnology, vaccine development and the creation of new materials. The second fund, he said, should be used to address everyday critical needs that require immediate attention. These needs, articulated in the UN's Millennium Development Goals (MDGs), call for among other things a sharp reduction in poverty, effective steps for expanding access both to safe drinking water and adequate sanitation, improved measures for maternal and child health, and devising

effective strategies for reversing environmental degradation. Adequate funds, Sibal added, should also be made available to ensure that nations across the developing world can share information about their experiences and forge partnerships for joint projects that would enable scientists and economic development practitioners to learn from one another.

Overall, there was a guardedly optimistic tone to the presentations and discussions at the TWNSO Ministerial Forum on Science, Technology and Innovation. Participants were for the most part encouraged by recent trends within their own countries and expressed hope that if such trends were to be sustained and expanded in the years ahead, scientific

and technological capacities could be significantly strengthened as part of an overall strategy for sustained economic growth.

Participants readily admitted that daunting challenges remained and success was by no means assured. But at least for now, a new paradigm for sustainable development gave participants hope that, with the help of science and technology, a better future might await the 80 percent of humanity living in the developing world. ■





# GENERATION NEXT

AMONG THE HIGHLIGHTS OF THE 10<sup>TH</sup> TWAS GENERAL CONFERENCE, HELD IN ANGRA DOS REIS, BRAZIL, WAS THE FIRST TWAS REGIONAL CONFERENCE OF YOUNG SCIENTISTS (RCYS). MORE THAN 25 YOUNG SCIENTISTS FROM SEVEN COUNTRIES IN THE LATIN AMERICA AND CARIBBEAN REGION WERE INVITED TO ATTEND AND PRESENT THEIR WORK TO FELLOW PARTICIPANTS, AS WELL AS TO THE 220 TWAS FELLOWS AND 100 OTHER EMINENT SCIENTISTS FROM AROUND THE WORLD ATTENDING THE TWAS CONFERENCE.

**T**he first TWAS Regional Conference of Young Scientists (RCYS) focused on 'Promoting Life Sciences for Sustainable Development'. Sessions were dedicated to 'The Challenge of Neuroscience', 'Biomedical Progress: Epidemiology and Infection', 'Signals and Cancer', and 'Molecular and Cellular Development'. A series of 14 poster presentations covered a range of other topics, including the functional compounds in snake venom, computer-based screening of protein functions and nonlinear optical properties of organic molecules.

## AN HONOUR

"I regard my selection to the meeting as a prize... Yes, a prize!," says Marcelo Einicker Lamas, associate profes-



sor at the *Instituto de Biofísica Carlos Chagas Filho*, Federal University of Rio de Janeiro, Brazil. Lamas's work focuses on the transport of ions across membranes and is aimed at unravelling the normal physiology of the kidney and providing insights into disfunctions that could lead to kidney diseases.

Rosmari Rodriguez Roche, "Pedro Kourí" Tropical Medicine Institute, Havana, Cuba, echoed Lamas's sentiments. "When I received the invitation," she says, "I felt highly honoured, especially because there are many talented young scientists in the Latin American region." Roche has analysed the genetic sequences of dengue virus isolates obtained during an epidemic of the disease in Cuba that occurred in 1997. A key fea-

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## FIRST UP

*The honour of opening the first ever TWAS Regional Conference of Young Scientists fell to Stevens Rehen, Department of Anatomy, Federal University of Rio de Janeiro, Brazil. In his presentation on 'Aneuploidy and Mosaicism in the Human Brain', he explained that not all brain cells contain the same number of chromosomes and that the number of brain cells containing an extra chromosome or missing one changes with age. "Such changes," concluded Rehen, "may have implications in the development of such diseases as Alzheimers."*

ture of this epidemic was that the disease increased in severity during the outbreak. Roche has identified genetic differences between 'severe' and 'mild' forms of the disease and is now planning to determine if – and how – these variations cause the severe symptoms that were observed.

## AN OPPORTUNITY

The young scientists participating in the meeting also highlighted the fact that it was their first opportunity to attend a lecture by a Nobel Laureate. Although the RCYS meeting focused on the life sciences, all participants attended the presentation by David Gross, who won the Nobel Prize for physics in 2004. His lecture,

that were organized as part of the TWAS 10<sup>th</sup> General Conference (see pages 6-13). But it was the attendance by TWAS members during the presentations of the young scientists that really gave the principal investigators of tomorrow the opportunity to discuss their work with eminent scientists.

"TWAS Fellows attending both the oral and poster presentations of the young scientists increased the quality of the discussions," says Roche.

In addition, the wide-ranging presentations of the young scientists – covering subjects from cell biology to ecology – meant that the young scientists had the opportunity to become involved in questions and discussions beyond their normal fields of study. Indeed,

'The Coming Revolutions in Fundamental Physics', focused on such concepts as string theory and supersymmetry (see page 8).

The young scientists also took advantage of the other symposia

this was one of TWAS's specific goals when organizing the RCYS – that participants gain insight into how their work is part of a larger effort to develop science in the South.

“Not only during the scientific programme, but also during coffee breaks and meals, we had the opportunity to interact with researchers from different scientific fields and from other parts of the world,” says Lamas. “These interactions are important as they help open our minds to wider issues.”



Thanks to TWAS and the Brazilian Academy of Sciences, I had the opportunity to discuss scientific issues with other researchers outside my usual area of interest,” adds Israel Vega, *Universidad Nacional de Cuyo*, Mendoza, Argentina. “I think this exchange can not only help me gain new perspectives on my own research but can also be the start of future joint multidisciplinary projects.”

Vega presented a poster on her work with unusual cyanobacteria that live within the cells of certain aquatic snails. “Since lichens involving cyanobacteria have been used as bioindicators of air-borne pollutants,” explains Vega, “we envisage the possibility of using the association between the snail and cyanobacteria that we have discovered as a bioindicator of metal pollution in freshwater bodies.” Laboratory tests have already confirmed that the snails

### MISSING COUNTRIES

*The 28 participants at the first TWAS Regional Conference of Young Scientists came from seven countries in the Latin America and Caribbean region: Argentina, Brazil, Chile, Costa Rica, Cuba, Mexico and Uruguay. “This served to highlight the fact that, although there were several representatives from such countries as Argentina, Brazil and Chile, science is scarce in a large part of our continent,” observes Roberto Nespolo, Instituto de Ecología y Evolución, Universidad Austral de Chile, Chile.*

– and the bacteria that live in their mid-guts – can sequester such toxic elements as arsenic, mercury and uranium.

### PATHWAY TO SUCCESS

“The TWAS RCYS provided a unique scientific forum for stimulating discussion between young scientists from Latin America,” confirms Flávia Car-

valho Alcantara Gomes, Department of Anatomy, Federal University of Rio de Janeiro. “For me, however, the main thing was that the meeting provided an opportunity

to discuss practical aspects of a career in science, such as obtaining grants and importing laboratory equipment. These issues are serious obstacles to young scientists in many developing countries.”

Gomes’s research involves characterizing growth factors secreted by cells within the brain that control the development of nerve cells and their fate during embryogenesis.

The aim is to gain new insights into the treatment of neurodegenerative diseases.

Victoria Mendizabal, *Fundación Convivir*, Centre for Research, Training and Information, Buenos Aires, Argentina, also highlighted some of the difficulties facing young scientists in developing countries, especially

***Attendance by TWAS members gave the principal investigators of tomorrow the opportunity to discuss their work with eminent scientists.***

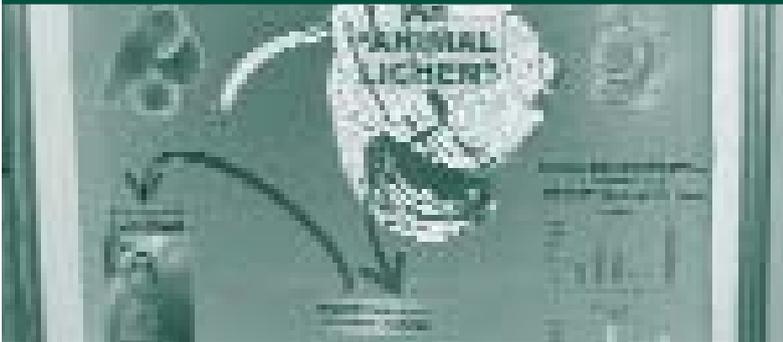
when applying for grants or returning to their home countries after postgraduate or postdoctoral training abroad. “The chance to share with other young scientists from the region not only my research but also the

the evolutionary potential of populations. For his model, he is using an aphid, *Rhopalosiphum padi*, that reproduces asexually on grasses and cereals during the summer when adult female aphids give birth only to young female aphids. In the autumn, however, a sexual generation is produced that flies to an alternative host, the bird-cherry tree, where mating takes place and eggs are laid. Most studies on sexual repro-

## ORGANIZATION

*The TWAS Regional Conference of Young Scientists (RCYS) was co-organized by the TWAS Regional Office for Latin America and the Caribbean and the Brazilian Academy of Sciences and coordinated by Francisco Barrantes (TWAS Fellow 1991).*

*Future RCYS meetings are being planned for Kenya (13-15 December 2006), and Pakistan (13-15 November 2007).*



challenges I face has been fruitful and could help pave the way for future collaborations,” she says.

Mendizabal’s work, carried out at the *Universitat Pompeu Fabra*, Barcellona, Spain, is based on an analysis of cannabinoid compounds – many of which are pharmacologically active and can be used as ‘recreational’ drugs or to treat such conditions as ‘wasting’ associated with HIV/AIDS.

“The meeting was a good opportunity to talk with senior and influential scientists that one would not otherwise meet, and to learn about the politics of science in both my home country, Chile, and abroad,” adds Roberto Nespolo, *Instituto de Ecología y Evolución, Universidad Austral de Chile*, Chile.

Nespolo is studying population genetics and, in particular, the role of sexual reproduction in determining

reproduction have considered the long-term, evolutionary benefits to the species in question. The annual cycle of *R. padi*, however, allows Nespolo to determine the short-term effects of sexual reproduction in a population.

***This novel initiative of TWAS confirms the claim that science is an essential investment in the economic and cultural advancement of the developing world.***

## TO CONTINUE

“The excellence of the research presented by the young scientists and their enthusiasm for their work has provided a valuable addition to the proceedings of the TWAS General Conference,” says Jacob Palis, president-elect of TWAS and vice president of the Brazilian Academy of

Sciences. “Not only have the young scientists benefitted by presenting and discussing their work with eminent scientists,” he continues, “but I sincerely believe that the TWAS Fellows enjoyed listening to and discussing the young scientists’ presentations. We hope that future



TWAS conferences will host similar young scientists conferences.”

Beyond these interactions, perhaps the greatest impact that can arise from such a meeting of young scientists – and others planned by TWAS and its regional offices (see box, page 24) – is summed up by one of the young participants:

“Both scientists and the public are preferentially exposed to the scientific achievements of scientists working in developed countries. Furthermore, we constantly receive a subconscious message telling us that science in developing countries, if it actually exists, should focus on issues relating to hunger, neglected diseases and so on,” says Stevens Rehen, Department of Anatomy, Federal University of Rio de Janeiro.

“Knowing this, and after five years studying abroad, I nevertheless decided to return to Brazil and face the challenge of studying the biology of embryonic stem cells in my home country.

“The opportunity given to me to attend the TWAS

#### YOUNG AFFILIATES

*Following the success of the first TWAS RCYS, TWAS members agreed to continue to engage the best young scientific talent in TWAS activities. Each year, the five TWAS regional offices will appoint up to five Young Affiliates, each for a period of five years. Young Affiliates will be invited to attend TWAS meetings, receive the TWAS Newsletter and other publications and participate in other Academy activities.*

conference in Angra dos Reis has convinced me that I made the right decision. During this meeting, it became clear to me that scientists in developing countries should indeed study neglected diseases and ways to decrease poverty. But they should also study nanotechnology, stem cell biology, gene therapy, quantum physics and other issues at the cutting edge of science.

“This novel initiative of TWAS, hosting, for the first time, a gathering of young scientists, confirms the claim of the Academy that science is an essential investment in the economic and cultural advancement of the developing world,” he continues. “Through such actions, TWAS has the potential to inspire a new generation of leaders.” ■

# TRIESTE SCIENCE PRIZE 2006

IN JULY, TWAS AND *ILLYCAFFÈ* ANNOUNCED THE WINNERS OF THE 2006 TRIESTE SCIENCE PRIZE. THE FOUR NEW 'TRIESTE LAUREATES' INCLUDE TWO MEDICAL RESEARCHERS WHO HAVE MADE FUNDAMENTAL CONTRIBUTIONS TO OUR UNDERSTANDING AND PREVENTION OF LETHAL INFECTIOUS DISEASES AND TWO MATHEMATICIANS WHO HAVE SHED LIGHT ON SOME OF THE WORLD'S MOST MIND-BOGGLING MATHEMATICAL PROBLEMS.

**T**he Trieste Science Prize was established to bring recognition and distinction to the developing world's most eminent scientists who have not yet been honoured by other international award schemes dedicated to highlighting scientific achievement.

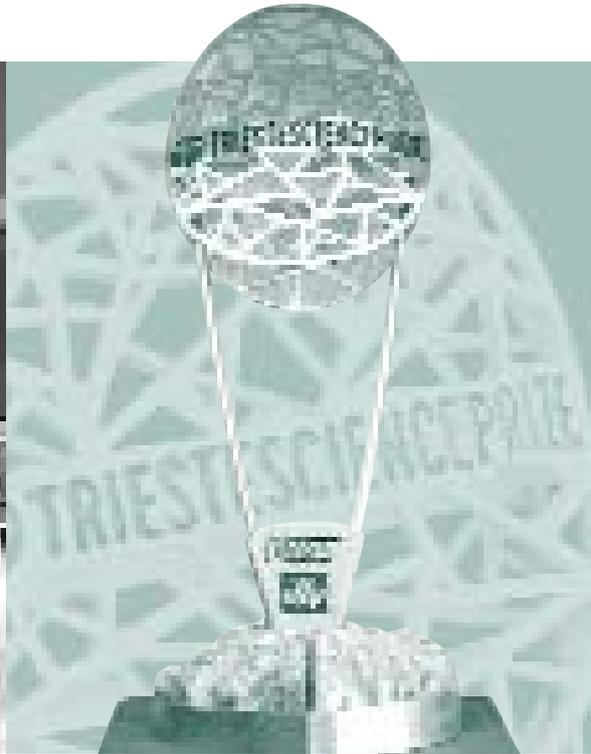
Each year, a cash award of US\$100,000 is divided between eminent researchers from the South working in two scientific disciplines. The winners of the first awards, presented in 2005 in the fields of physics and biology, were T.V. Ramakrishnan (TWAS Fellow 1991) and Sergio Henrique Ferreira (TWAS Fellow 1993). This year, the prizes for medical sciences and mathematics were each shared between two prominent scientists from the South. All four prize winners were invited to the TWAS 10<sup>th</sup> General Conference in Angra dos Reis, Brazil, where they were presented their awards by Sergio Rezende, Brazil's Minis-



ter of Science and Technology. Each new 'Trieste Laureate' also presented an overview of their work to conference delegates.

## VIRUS VACCINATIONS

Chen Ding-Shinn, dean of the National Taiwan University College of Medicine and chair of the Taiwanese government's Hepatitis Control Committee, was honoured in the field of medical sciences for the leading role he has played in uncovering the factors responsible for the transmission of the hepatitis B virus from mothers to infants and for proving that this viral disease was associated not only with liver cirrhosis but also with liver cancer. He used this knowledge to gain support for a comprehensive vaccination campaign in Taiwan – a strategy that has since been adopted by countries across the globe. Thanks to



Chen's efforts, the incidence of hepatitis B has declined rapidly and hepatocellular carcinoma has become the first human cancer to be prevented through immunization.

### SARS STRUCTURES

Rao Zihe, professor at Tsinghua University and director of the Chinese Academy of Sciences' Institute of Biophysics, Beijing, was recognized for his world-class contributions to structural biology and his studies of viruses responsible for human diseases. Rao led a team of Chinese researchers

who deciphered the first crystal structure of the coronavirus that causes Severe Acute Respiratory Syndrome (SARS). His findings provide a potential framework for the design of anti-SARS drugs. The SARS epidemic infected more than 8,000 people and caused more than

800 deaths in 2003. With the rising incidence of infectious diseases and the risk of pandemics, Rao's focus on the relationship between protein structure and function – and ultimately on protein engineering and drug design – has gained increasing global attention.

*The Trieste Science Prize was established to bring recognition and distinction to the developing world's most eminent scientists.*

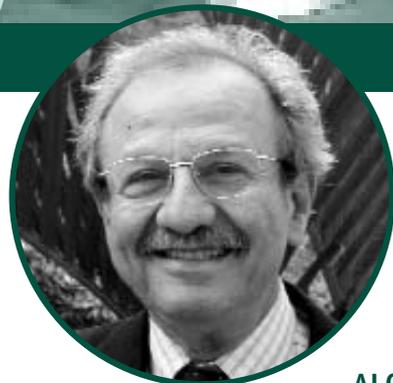
### NONLINEAR COMPLEXITY

Jacob Palis, director-emeritus of the Institute of Pure and Applied Mathematics (IMPA) in Rio de Janeiro, Brazil, is one of the world's foremost mathematicians in the fields of multi-variable dynamical systems, a sector of mathematics that seeks to understand how nonlinear complex phenomena behave over the long term. Such studies have helped enhance our understanding of population growth patterns, global climate change and even fluctuations in the stock market. Palis has also been a driving force behind efforts to strengthen the study of mathematics in Latin America. He served as the director of IMPA for more than a decade, transforming the institution into a world-class centre for mathematical





illy



research and Latin America's foremost institution for the training of young mathematicians.

### ALGEBRAIC GEOMETRY

C.S. Seshadri, founding director, Chennai Mathematical Institute in India, was honoured for the prominent role he has played in shaping the field of algebraic geometry, one of the dominant fields in mathematics today. He is a leading figure in such cutting-edge topics as the theory of vector bundles and quotient and compact homogenous spaces. He is also recognized as the creator of the Standard Monomial Theory and Seshadri Constant, which have found important applications both in mathematics and physics. Seshadri has also been the leading force behind the creation of the Chennai Mathematical Institute, which over the past decade has emerged as one of the world's pre-eminent centres for mathematics.

"The Trieste Science Prize," says Andrea Illy, president and chief executive officer of *illycaffè*, "offers my company an opportunity to acknowledge the work of scientists in the developing world who have made critical contributions both to science and their societies. The accomplishments of the four prize winners have enriched both their societies and ours, improving the quality of all of our lives. These are enduring values that *illycaffè* pursues in all of its actions."

***The accomplishments of the four prize winners have enriched both their societies and ours.***

"In just its second year, the Trieste Science Prize has emerged as one of the most recognized and valued prizes for scientists from the developing world," adds C.N.R. Rao, outgoing TWAS president. "This year's prize winners are world-class scientists who

have not only made fundamental contributions to their fields but have also played prominent roles in the development of scientific institutions in their own countries. They are not only worthy of our congratulations but also worthy of our thanks for making our world a better place." ■

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# AFRICAN ACADEMY OF SCIENCES: 20 YEARS ON

LAST YEAR, THE 20<sup>TH</sup> ANNIVERSARY OF THE AFRICAN ACADEMY OF SCIENCES WAS MARKED BY TWO EVENTS: THE SIGNING OF A SEAT AGREEMENT WITH THE GOVERNMENT OF KENYA, ITS HOST NATION, AND A NEW STRATEGIC PLAN DESIGNED TO STRENGTHEN THE ACADEMY'S ACTIVITIES AND ITS PROFILE, BOTH IN AFRICA AND BEYOND.

**I**n the early 1980s, Thomas Risley Odhiambo, one of Africa's most eminent scientists and a tireless champion of the need to build scientific capacity in Africa, led a difficult but ultimately successful campaign to create the African Academy of Sciences (AAS). The inaugural meeting of AAS took place in Trieste, Italy, in 1985 under the auspices of the Academy of Sciences for the Developing World (TWAS), which had played an instrumental role in AAS's creation. AAS and TWAS have enjoyed a close and productive relationship ever since.

If Odhiambo, who died in May 2003 at the age of 72, were alive today, he would indeed have relished the 20<sup>th</sup> anniversary celebration of AAS, which was held at its secretariat in Nairobi, Kenya, in December last year. Even more importantly, he would have been pleased by



the positive developments that the Academy has experienced over the past several years – developments that have enabled the institution to exert an ever-greater impact on science-based development in Africa.

AAS's anniversary celebrations coincided with the official signing ceremony of a 'head-quarter agreement' with the Kenyan government. The agreement grants AAS an international charter that not only bolsters the Academy's credibility, but also lays the groundwork for broadening its programmatic activities. Buoyed by this turn of events, the Academy's president, Mohamed H.A. Hassan, cites AAS's new strategic plan for 2006-2009 as a blueprint designed "to strengthen the Academy's activities and raise its visibility both in Africa and across the globe."

“The international mandate afforded by the agreement with the Kenyan government,” notes Hassan, “will enable AAS to raise its profile on the global stage of science. Equally important, it will provide a broad range of benefits that were previously beyond the Academy’s reach.” The newly bestowed diplomatic status, for example, allows all purchases to be tax-free and all salaries to be tax-exempt. The savings incurred will not only increase AAS’s purchasing power but also provide higher take-home pay for scientists and staff. That, in turn, should make it easier to recruit and maintain highly qualified personnel.

Last February, Stephen Gaya Agong became the Academy’s new executive director replacing G.B.A. Okelo, who had served in that capacity since 1996.

Born in Kenya and trained in Africa (at the University of Nairobi, where he received bachelor and master degrees in agricultural science and plant breeding) and in Germany (at Justus Liebig University, Giessen, where he earned a doctorate degree in agricultural science), Agong brings a wealth of experience to the post, having worked for more than 15 years as a professor, researcher, policy analyst and manager both in academia and government. He thus assumed the post with a deep understanding of current trends in global science as well as a full appreciation of Africa’s development needs.

Agong admits that the challenges facing AAS are daunting. But he quickly adds that his task has been made easier by the strong foundation that the Academy has built over the past two decades.

“The fact that the Kenyan government has now accorded AAS international status,” he says, “means that the nation’s leaders appreciate the contributions



that a financially secure and well-functioning Academy will make to society. More importantly,” he adds, “it signifies the Kenyan government’s readiness to assist the Academy in advancing its agenda for science-based sustainable development not only in Kenya but across the continent. It is our hope that Kenya’s generosity will encourage other African countries to do the same.”

AAS secretary general, Shem Arungu-Olende, observes that the Academy hopes to draw on its experience over the past 20 years to guide its current and future agenda. “We will continue to strengthen AAS programmes that are already in place in such areas as forestry conservation and access to safe drinking water. At the same time, we will initiate new activities in such critical areas as public health and energy.”

Arungu-Olende earned a doctorate in electrical engineering from the University of London, UK, and is currently chair and CEO of Queconsult Ltd., a Nairobi-based company offering consultancy advice in the energy, engineering, environment and economics sectors.

The Academy’s abiding interest in scientific capacity building and in gaining greater government recognition and support for science-based development will not be pursued abstractly. Instead, it will be applied directly to critical societal concerns. For example, the Academy plans to launch a programme aimed at improving the research and clinical expertise of Africa’s medical scientists and practitioners. Specifically, the programme will be designed to combat infectious tropical diseases such as ebola, malaria and typhoid fever.

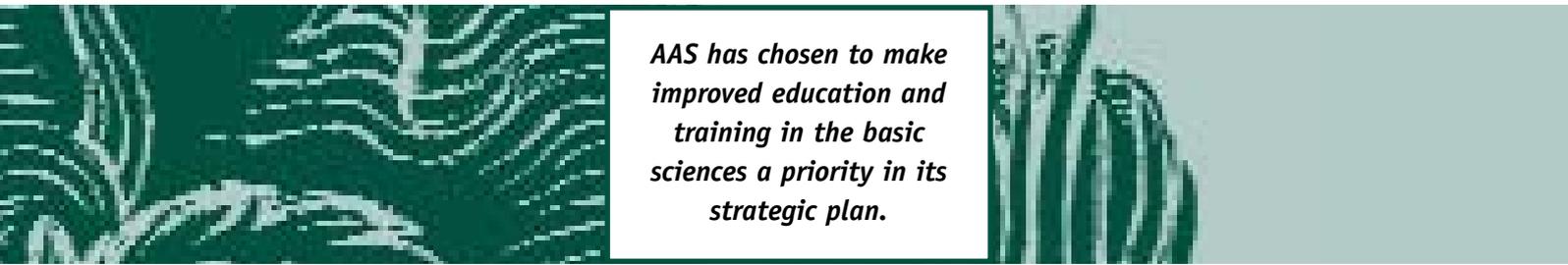


“Until recently,” Arungu-Olende observes, “these largely ‘forgotten’ diseases received neither the attention nor resources they deserved from the global scientific community. African researchers and doctors,” he adds, “have a responsibility to address these issues, which impact Africa more than any other continent. It is the goal of AAS to encourage and assist both medical researchers and practitioners in this effort – and, more importantly, to encourage governments to do the same.”

Following the recommendation of the AAS General Assembly, held in Abuja, Nigeria, in September 2004, the Academy has also chosen to make improved educa-

“Creating a critical mass of scientists who are well-trained in biology, chemistry, mathematics and physics,” he says, “is an essential element of a strong educational system. It is also a prerequisite for effective decision-making. Indeed, a nation cannot compete successfully in today’s global knowledge-based economy without an adequate contingent of scientists engaged in basic science research.

“That,” laments Agong, “places Africa in an unenviable position of having to build its capacity in the basic sciences at the same time that it seeks to develop an effective strategy for utilizing science and technology



***AAS has chosen to make improved education and training in the basic sciences a priority in its strategic plan.***

tion and training in the basic sciences at all levels of education, and especially in universities, a priority in its strategic plan.

“Indigenous capacity in the basic sciences serves as the foundation for sound decision-making in both technology and economic development policies,” says Arungu-Olende. “In the developing world,” he adds, “basic sciences have not received their fair share of science funding – funding that is far less than other continents spend.”

Understandably, there has been great pressure both from governments and international aid agencies to invest in applied science and technology under the assumption that Africa’s critical problems – hunger, greater access to safe drinking water, more reliable sources of energy, and improved public health – must be tackled immediately, and that greater expertise in the basic sciences, however laudable a goal, will not provide the skills that are needed to meet these problems in a timely and reliable fashion.

While this argument cannot be dismissed, Arungu-Olende cautions that neglecting the basic sciences carries long-term consequences for national economic and social well-being.

as key elements in its overall strategy for sustainable development.”

The world’s poorest continent is thus faced with the difficult task of building its entire scientific enterprise – both basic and applied – at the same time.

“Given our limited resources, we would prefer to be able to limit the focus of our concerns,” says Agong. “But we have not been accorded that luxury and thus have no choice but to move ahead on all fronts as best we can.”

AAS’s strategy for the basic sciences has four fundamental aims: to improve training and research facilities in schools, universities and research centres; to support and develop scientific exchange and, more specifically, to create networks, especially among African universities; to encourage the popularization of science; and to boost scientific achievement through the sponsorship of grants and awards.

To further champion science-based sustainable development in Africa, the AAS strategic plan will seek to expand the Academy’s efforts to encourage cooperative research projects among scientists and institutions across the continent.

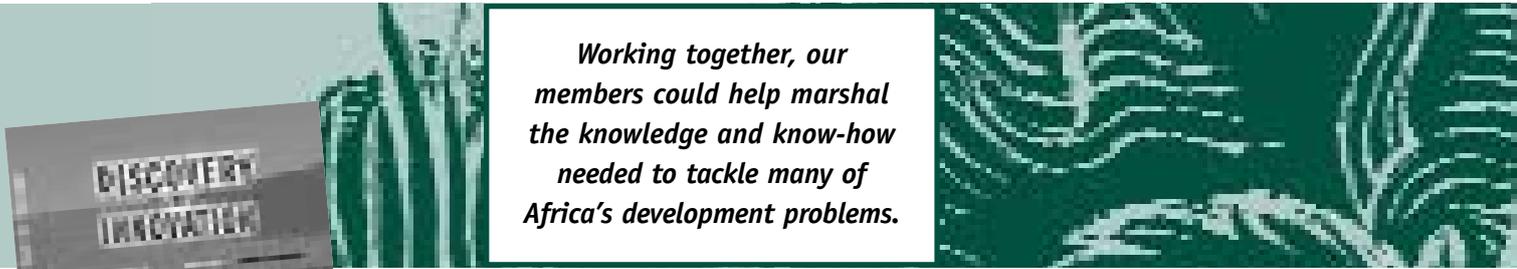
“We currently enjoy strong collaboration with a number of organizations – for example, the Nairobi-based

International Centre of Insect Physiology and Ecology (ICIPE) – that we think can not only be expanded but also serve as models for other partnerships,” explains Agong. To this end, AAS has opened discussions with the World Agroforestry Centre (ICRAF), also in Nairobi, and the World Vegetable Centre, an international not-for-profit organization in Arusha, Tanzania, to explore ways of working together on initiatives of mutual interest.

AAS also intends to assume a leadership role in building and strengthening merit-based science academies in Africa, largely by participating – often in a leading role – in activities sponsored by the recently constituted Network of African Science Academies

– it is estimated that the number of African-born scientists working abroad exceeds those who remain at home – but also to nurture a research environment that helps transform scientific discoveries from intriguing ideas into valuable products, processes and services. This effort will involve, in part, creating forums for discussion that bring critical science-based issues to the public’s attention and that encourage decision makers to invest in science.”

“This year,” explains Arungu-Olende, “we moved the Thomas Odhiambo Memorial Lecture from AAS headquarters to the University of Nairobi and, for the first time, we engaged in a publicity campaign designed



*Working together, our members could help marshal the knowledge and know-how needed to tackle many of Africa's development problems.*

(NASAC), which was launched with the support of the InterAcademy Panel on International Issues (IAP). “There are currently just 13 merit-based science academies among Africa’s 53 nations and many of these academies are weak and

underfunded,” notes Hassan. “AAS believes that the absence of science academies in Africa represents a loss not only for the scientific community but for society at large.”

AAS is also gaining recognition from such organizations as the African Union (AU), which has granted the Academy observer status, and the New Partnership for Africa’s Development (NEPAD), which has invited AAS to participate in meetings on science and technology.

AAS’s ultimate goal is to play a central role in Africa’s efforts to build a knowledge-based economy that draws on the expertise of African-born scientists who choose to live and work in Africa. As Arungu-Olende observes: “We hope not only to stem the brain

to make the public aware of the event. These lectures have previously been low-key affairs largely appealing to other Academy members. But this year we tried to engage as many people as possible, especially in the academic community.”

To elevate the presence of scientists in policy discussions across the continent, AAS has solicited support from the Kenyan Ministry of Science to re-institute the Research and Development Forum (RANDFORUM), a body designed to coordinate discussions on science and technology issues of importance to Africa that was established in 1992 but was put on hold due to inadequate resources. RANDFORUM had spurred the creation of top-level, continent-wide forums – workshops, conferences and roundtable discussions – on science and technology bringing together grassroots activists, scientists and policy makers to discuss issues of common concern in settings designed to minimize misunderstanding and suspicion. AAS hopes to rekindle these events by reconstituting RANDFORUM as a viable organization.

To enhance information sharing, AAS also hopes to develop a virtual library that will preserve and make



accessible key sources of information – scientific data, government reports, monographs, newspaper and magazine articles, news broadcasts and electronic files on a host of issues – including climate change, energy and HIV/AIDS – that are of critical importance to Africa. The library will pay particular attention to reports published by United Nations organisations, international development banks, and national and regional organisations in Africa. The Academy also plans to publish an electronic newsletter examining science-based development issues across the continent.

AAS is keen to showcase the expertise of its membership and to utilize this expertise in its programmatic initiatives and overall efforts to promote science-based development. “AAS Fellows, now numbering 130, represent an invaluable source of knowledge in a wide range of fields in the natural and social sciences,” says Arungu-Olende. “Working together, our members could help marshal the knowledge and know-how needed to tackle many of Africa’s development problems.”

While the contributions of AAS Fellows will drive the Academy’s work, AAS will also seek to engage the larger science and technology community both in Africa and the African diaspora as well as industrialists and entrepreneurs both at home and abroad.

“We appreciate the scope and complexity of the problems that Africa faces,” says Agong, “and we realize that sustained progress can only take place if we engage both the scientific and development communi-

ties and the public and private sectors in collective action. In fact, one of AAS’s primary responsibilities will be to serve as a broker in this effort,” he adds.

While AAS’s financial outlook has brightened over the past few years, thanks largely to the generosity of the governments of Kenya and Nigeria (in 2003, the Nigerian government donated US\$5 million to the AAS’s endowment fund), it nevertheless remains important for the Academy to establish a firm financial base.

“The ideal situation,” says Arungu-Olende, “would be for the Academy to build on Nigeria’s generosity and expand the endowment fund through contributions from other sources. My hope is that each African government will decide to invest in the fund,” he says. “It is, after all, an investment in the future of their people.”

As a sign of its growing strength and vitality, AAS will soon open its new headquarters on a two-hectare site that it owns on the outskirts of Nairobi. The new building, financed by the endowment fund, will not only be the site of the AAS secretariat but also house NASAC and the regional office of TWAS.

The headquarters will include a state-of-the-art library, computers, internet connections and a conference centre. “We will use these facilities to launch a scholars-in-residence programme for eminent researchers from across Africa that we hope will lead to thoughtful analyses of the continent’s most critical problems,” says Arungu-Olende. “It is all part of AAS’s ongoing efforts to become the world’s pre-eminent institution for the study of pan-African issues related to science and technology.”

“Thomas Odhiambo,” says Hassan, “would be proud of the Academy’s efforts and optimistic about the journey that lies ahead. In his distinctive and elegant voice, he would be reminding us that science must play a critical role in Africa’s future and that scientists, both individually and collectively, have a sacred responsibility to help ensure a brighter future for all the people of Africa.

“It is my hope,” Hassan adds, “that the African renaissance Odhiambo so fervently campaigned for throughout his long and fruitful life will take hold in the years ahead and that the AAS will play a critical role in this noble effort. There could be no more fitting tribute to his memory.” ■

# AN ACADEMY IN ZIMBABWE

ZIMBABWE'S FIRST MERIT-BASED ACADEMY OF SCIENCES WAS OFFICIALLY LAUNCHED IN OCTOBER 2004. FIVE MONTHS LATER, IN MARCH 2005, ALONG WITH THE NEWLY FORMED TANZANIAN ACADEMY OF SCIENCES, THE ZIMBABWE ACADEMY OF SCIENCES (ZAS) BECAME THE NEWEST MEMBER OF THE INTERACADEMY PANEL ON INTERNATIONAL ISSUES (IAP), A GLOBAL ASSOCIATION OF SCIENCE ACADEMIES HEADQUARTERED IN TRIESTE, ITALY. ZAS FOUNDING PRESIDENT, CHRISTOPHER J. CHETSANGA (Twas Fellow 1988), DESCRIBES THE STATE OF SCIENCE IN ZIMBABWE, EXPLAINING HOW THE FLEDGLING ACADEMY WAS CREATED AND WHAT IT HOPES TO ACHIEVE IN THE FUTURE.

Since the late 1980s, education has been compulsory in Zimbabwe. The nation is now reaping the benefits of these efforts. Zimbabwe's literacy rate, which stands at 90 percent of the adult population, is the highest in Africa. Traditionally, the government of Zimbabwe has also supported science. This is reflected in the fact that the country is home to 13 universities. With 20,000 students, Zimbabwe Open University (ZOU), which encourages home learning, is the nation's largest university. Considering that the population is about 13 million, Zimbabwe

currently has more than one university per million inhabitants, one of the highest ratios on the continent.

One danger of such a high ratio is that those lacking the skills they need to succeed may nevertheless be enrolled as students. In Zimbabwe, the opposite is true. Admission to universities is very competitive. Indeed competition for places is so high that the Zimbabwean government has established committees to draft charters for three new state universities, scheduled to open within the next two years. The role of the National Council of

Higher Education, which I chair, is to ensure that these new universities – and their more established counterparts – meet quality assurance standards.

Graduates emerging from these universities with degrees in science also enjoy a number of career opportunities within the country. In particular, the government of Zimbabwe funds a large agricultural research and extension organization, the Department of Agricultural Research and Extension (AREX), which operates under the auspices of the Ministry of Lands and Agriculture. It also funds the

National Forest Research Centre and the Scientific and Industrial Research and Development Centre (SIRDC), which focuses on biotechnology, metrology, electronics and environmental, engineering and computer sciences. In addition, there is the Tobacco Research Board at Kutsaga Research Centre, funded by a levy placed on farmers. The centre, which is the largest institution devoted to tobacco research in the world, has an impressive suite of modern research laboratories.

### BEGINNINGS

Discussions concerning the creation of an academy of sciences in Zimbabwe began in 1999. The creation of the academy was delayed, however, until we were certain that there was a critical mass of potential members. In 2004, when the Zimbabwe Academy of Sciences (ZAS) was inaugurated, we decided that the country did indeed have a number of outstanding scientists who were conducting innovative research and publishing articles in international journals.

ZAS began with 45 founding fellows. At our first annual general meeting in April 2005, another 10 fellows were elected, and at our second general meeting in May 2006, we added 11 more fellows. Less than two years after we began our operations, we are over half-way (66 fellows) to our agreed membership cap of 120 fellows.

Five years before the creation of ZAS, leading scientists within the country began to study other academies to understand how they op-



erate. We observed that there is more than one type of academy. The operational activities of the Russian and Chinese academies of sciences, for example, are closely linked to the countries' political systems, whereas long-established academies in Europe and the United States exercise greater independence (although with their governments providing most of their funding, these academies must also pay attention to the opinions of their financial supporters). We modelled ZAS on this more independent type of organization.

The InterAcademy Panel (IAP) proved instrumental in helping us establish our academy. First, it of-

fered advice on the organization's statutes. Later, once ZAS became an IAP member in March 2005, we received a US\$5,000 grant under IAP's capacity building for young academies programme, led by TWAS, which also hosts the IAP secretariat.

This helped us hire a secretary and establish our offices. The Zimbabwean Ministry of Higher and Tertiary Education also provided a starter grant in 2005, which enabled us to deal with some of the logistical issues involved in getting an academy off the ground. For example, we used these funds to rent office space, buy office stationery and cover other operational needs.



ZAS has also become involved in the Network of African Science Academies (NASAC), another young organization, created in 2001, again through the IAP capacity building programme for academies. Working with NASAC has introduced us to other African academies. The information we have obtained through discussions with TWAS and other long-established academies has proven useful in establishing and maintaining our operations.

### ACTIVITIES

So what have we been able to achieve in a fairly short period?

Although we have not achieved all that we would like, I believe we have been quite successful. And, of course, we plan to do much more in the future as we gain experience and acquire additional resources.

Academy members believe that their newly formed organization, as the voice of the country's top scientists, should play a leading role in promoting the sustainable development of Zimbabwe. Our efforts at lobbying government officials to support technology-based industrial development in Zimbabwe have received some positive

responses, despite a downturn in Zimbabwe's economy that has limited funds for new initiatives. For example, ZAS fellows' involvement in promoting applications of biotechnology in agriculture and the participation of some of our fellows in serving as lecturers in the University of Zimbabwe's master of science in biotechnology programme has contributed to the development of biotechnology in Zimbabwe.

ZAS members also advised the government that it had been too slow in responding to a potential outbreak of avian influenza – particularly the much-feared H5N1 strain of the bird flu virus that has been detected in many Asian and European countries as well as Nigeria and four other African countries. Although the virus has yet to reach southern Africa, we encouraged the government to inform people about the dangers, how the symptoms appear in infected birds and what to do if there was a suspected case of the disease.

Our pleas have received a good response. The government has established a committee to publicize the dangers of the virus. The Veterinary Research Services unit of

the Ministry of Lands and Agriculture has assured us that it has the capacity to test for and identify the bird flu virus if any suspected cases are reported. A reasonable level of preparedness has been established but we still need to continue to lobby on this issue. The government has yet to create a website with information about the bird flu virus or to provide a telephone hotline for reporting cases of sick or dead birds, for example.

ZAS members are also expressing their concerns about another virus, HIV. Zimbabwe has one of the world's highest HIV/AIDS infection rates. While the rate is estimated to have declined from 24.6 percent in 2003 to 20.1 percent in 2005, a recent report by the World Health Organization (WHO) has confirmed that the average lifespan of Zimbabwean women is 34 years, the lowest in the world. Zimbabwean men don't fare much better – their average lifespan is 37 years.

Part of the problem is that the disease has spread from the towns and cities, where historically most HIV/AIDS transmission occurred, to rural areas. Ignorance has been a major factor.



To counter this ignorance, plans have been put in place to create a working group of ZAS fellows with expertise in the medical sciences. The group will devise a publicity campaign for local communities and high schools to raise awareness of the HIV/AIDS pandemic.

The academy is also getting involved in areas that are critical for the development of the country, notably applications of biotechnology in agriculture. Through our members' research, we aim to develop techniques to improve crop production. Then, through ZAS, we intend to develop a forum to disseminate information to farmers.

Zimbabwe has strong clothing and leather sectors and a well-established mechanical engineering industry. Physicists, engineers and other specialists among ZAS members are assisting these industries to improve their products so that they become more competitive in the global marketplace.

The work that Robson Mafoti, director general of the Scientific and Industrial Research and Development Centre (SIRDC) and his team of scientists in the construction industry offer an excellent example of how ZAS fellows are promoting industrial activities in Zimbabwe. They have developed a micro-concrete tile that three factories in three different cities are now manufacturing. Such research and development support will assist companies to expand and thus employ a larger number of workers. That, in turn, will help reduce Zimbabwe's high unemployment rate.

Several ZAS fellows are promoting the use of computers and information and communication technologies (ICTs) at the national scale. For example, Gilford Hapanyengwi, a ZAS fellow who attended the IAP workshop on promoting ICTs in Dakar, Senegal, in January 2006, has participated in many forums, including several in high schools, to promote comput-

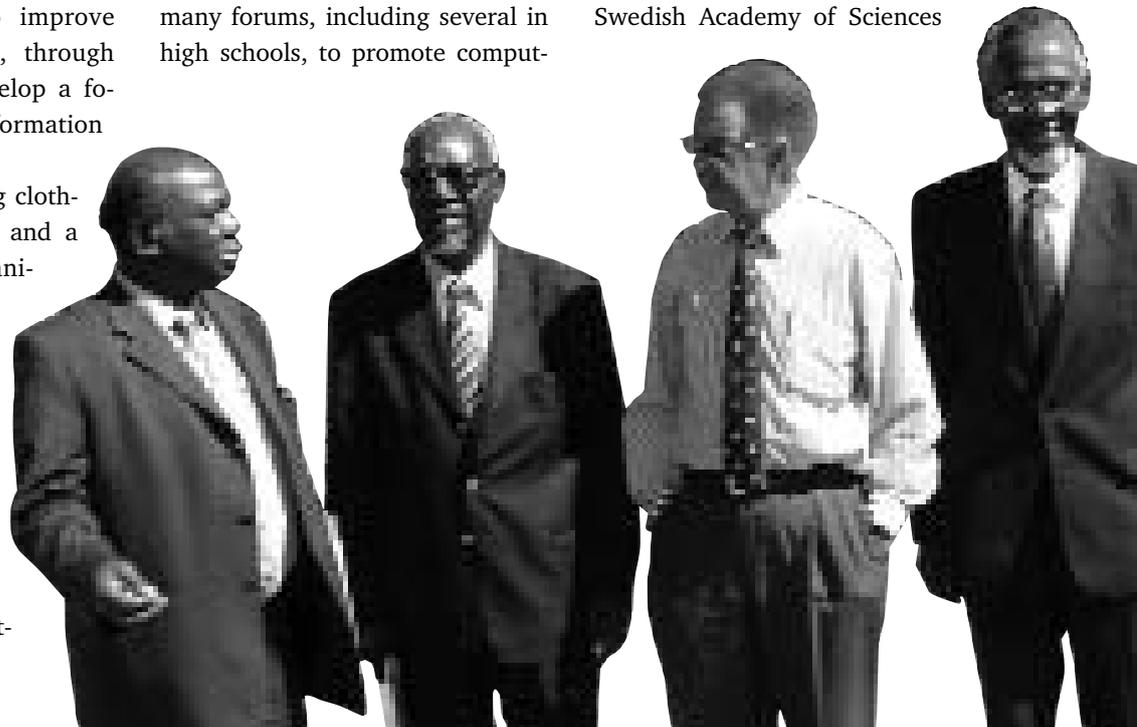
erization and greater national understanding of the importance of ICTs. Six of Zimbabwe's universities currently offer degrees in computer science and are proving instrumental in nurturing the human resources needed to drive the ICT revolution in Zimbabwe. We are moving ahead in this area but there is still a long way to go.

### MENTORING STUDENTS

Like many other academies, ZAS has established programmes designed to increase public understanding and appreciation for the work of scientists.

One scheme that has created some excitement is our lecture series on Nobel Prize winners. This came about when we realized that many Zimbabweans, including science students, did not know much about the Nobel Prizes.

Each year, when the prizes are announced, we contact the Royal Swedish Academy of Sciences





to obtain profiles of the award winners and materials that offer easily understood summaries of their work. We then enlist a ZAS fellow to present a public lecture about the contribution to science that has been made by one of the new Nobel laureates.

The idea is that, if we make young people aware of the best science in the world, we will stimulate them to attain greater achievements in their own scientific research.

We have also launched an annual awards scheme for three of Zimbabwe's best university students graduating in the life, physical and social sciences. The students are selected from Zimbabwe's 13 universities. Launched in October 2005, three students have been honoured so far. Each has received a national citation and one million Zimbabwe dollars (approximately US\$4,000).

Lectures and awards will help nurture the next generation of young scientists. However, it may be more important for practicing scientists to be given opportunities

to interact with other scientists from around the world. For this reason, we have actively promoted several TWAS research grant and scientific exchange programmes – including the South-South fellowships provided by Brazil, China and India – in our universities. I hope many Zimbabwean students will take advantage of the excellent opportunities that such programmes provide.

ZAS has also assumed responsibility for selecting candidates for the national TWAS Prize for Young Scientists, a task previously carried out by the Research Council of Zimbabwe. Such prizes, which include a cheque for US\$1,000, are awarded to young scientists who have demonstrated high levels of accomplishment in their research work.

#### IN TIME

For our fellows, especially the 45 founding fellows, the past two years have been an exciting time. ZAS's admission to IAP was particularly pleasing for many of our fellows because it demonstrated to

the world that the international scientific community had accepted us. We continue to seek ways to share our expertise as scientists with the nation at large and to see if we really can become agents for national development.

To achieve this, we must first put our academy on a firm financial footing. The grant we received from IAP has helped and we have received additional support for 12 months from the Zimbabwe Ministry of Higher Education. We are presently waiting to see if financial support will be approved for another 12 months.

However, we must not become too dependent on government funds because this may compromise our independence. Indeed, the academy's membership is keen to assert that its views are autonomous and not necessarily those of the government. To this end, many fellows contribute to ZAS activities from their own pockets. Other sources of funding are being sought, including from the private sector, and I am confident that something will work out.

In the meantime, I am certain that we have established a firm foundation for our academy. Through our association with IAP and NASAC, we hope to boost not only science in the whole of Africa, but to play a significant part in the sustainable development of the continent. ■

✦ **Christopher J. Chetsanga**  
President  
Zimbabwe Academy of Sciences  
email: [cchetsanga@zol.co.zw](mailto:cchetsanga@zol.co.zw)



# PREPARING WOMEN FOR SUCCESS

THE EFFORTS OF THE THIRD WORLD ORGANIZATION OF WOMEN IN SCIENCE (TWOWS) TO ADVANCE ITS GOALS RECEIVED A SIGNIFICANT BOOST IN 1998 WHEN THE SWEDISH INTERNATIONAL DEVELOPMENT AGENCY (SIDA) AGREED TO FUND A FELLOWSHIP PROGRAMME FOR YOUNG WOMEN SCIENTISTS FROM SUB-SAHARAN AFRICA AND THE LEAST DEVELOPED COUNTRIES (LDCS). TO DATE, MORE THAN 150 WOMEN FROM 37 COUNTRIES HAVE BENEFITTED FROM THE INITIATIVE.

*“After trying so hard for so long and getting virtually nowhere, I had just about decided to give up.” That’s how Intisar Elteraifi describes her nearly decade-long struggle to complete her PhD – a struggle that began in the late 1990s in her native Sudan.*



Elteraifi hails from Gezira, one of Sudan’s 26 states. Lying between the Blue and White Niles along the east central corridor of the country and home to one of Africa’s most extensive irrigation systems, Gezira is Sudan’s pre-eminent agricultural region. Cotton, wheat and a cornucopia of fruits and vegetables are cultivated there, helping to feed a nation still troubled by hunger.

Controlling insect pests has helped the region’s successful efforts in intensive agriculture. The blanket spraying of chemical pesticides, often dispensed from helicopters and crop dusters, has been the control method of choice. While these efforts have

helped to dramatically increase yields, they have not been cost-free. Pesticide-related air and soil pollution pose health risks to farmers and pesticide residues endanger the food supply in subtle yet significant ways. Elteraifi’s research and, more specifically, her doctoral dissertation are designed to examine such concerns and to present alternative strategies that both farmers and the public might find acceptable.



Drawing on her background as a forester and on her research on the sivilculture of neem, a tree with unique cosmetic and medicinal properties used to treat such afflictions as skin rashes, inflammations and fevers, Elteraiji wanted to explore the possibility of increasing the usefulness of neem by examining its potential as an environmentally-friendly alternative to chemical pesticides.

Substantial obstacles, however, impeded her efforts: “The University of Gezira has poorly stocked libraries and poorly equipped laboratories. Furthermore, the government of Sudan provides virtually no funding for research and fellowships are difficult, if not impossible, to come by. Students, in fact, often take money out of their own pockets to finance their research.”

Elteraiji’s problems were not unique. Indeed many of her colleagues faced similar problems. Employed as a lecturer at the University of Gezira, she did not have sufficient financial resources to cover the costs of her research. Meanwhile, her family, which had helped to put her through both bachelor’s and master’s degree programmes at the University of Khartoum, had depleted their resources and could not continue to support her studies.

The opportunity that enabled her to move beyond these roadblocks and toward a viable career in her chosen field of study arrived on an unremarkable day. Elteraiji chuckles when recalling what happened: “I was on a bus seeing off a friend from Khartoum University who had come for a visit. In an unguarded moment of exasperation and for reasons that I still

## WHAT’S TWOWS

*The Third World Organization for Women in Science (TWOWS) is an independent, non-profit and non-governmental body. TWOWS, which functions under the administrative umbrella of the Academy of Sciences for the Developing World (Twas) in Trieste, Italy, is the first international forum to bring together eminent women scientists from the South to strengthen their role in the development process and increase their representation in positions of scientific and technological leadership. Since its official launch in Cairo, Egypt, in January 1993, its main objectives have been to monitor and promote the research and training of young women scientists living and working in developing countries, to boost their scientific productivity and efficiency, and to enhance their collaboration and participation in research and decision-making at national and international levels.*

don’t understand, I asked my friend, who did not work with scientists, whether she knew of any opportunities that might help me complete my research. To my surprise, she said yes. Since I didn’t have a blank piece of paper, I scribbled the website address she suggested on the back of my hand.”

Upon returning to the university, Elteraiji looked up the address on the internet. The website, she learned, belonged to the Third World Organization for Women in Science (TWOWS). “I promptly became a member and then proceeded to apply for a fellowship,” she explains.

Elteraiji was awarded a TWOWS Postgraduate Training Fellowship in 2000, a turn of events that placed her long-standing efforts to pursue a career in science on the right track. Elteraiji’s choice of the Kenya-based International Centre of Insect Physiology and Ecology (ICIPE) as her host institution made sense given that she already had ties to this institute. In 1995, she had attended a training programme at ICIPE focusing on how to grow and use neem. During her

visit, she met Ahmed Hassanali, a renowned Tanzanian scientist and head of ICIPE's Behavioural and Chemical Ecology programme. Elteraifi describes Hassanali as "one of the best scientists" in the field. Fortunately, her proposed dissertation project aligned directly with his scientific interests.

Elteraifi's stint at ICIPE began in 2000 and, for the next three years, she divided her time between Kenya and Sudan, conducting bench work at ICIPE and returning to the University of Gezira each year to collect and evaluate neem samples as well as to conduct nursery experiments for drought tolerance.

"ICIPE both waived my bench fees and freely supplied the chemicals that I needed. I also enjoyed access to ICIPE's excellent library. In addition to attending classes, I took advantage of ICIPE's stimulating research environment to draft articles and interact with scientists from around the world," says Elteraifi.

Relieved of the burden of hunting for resources and able to devote all of her efforts to her studies and research, Elteraifi was awarded a PhD from the University of Gezira in 2004, nearly six years after she had begun her quest and four years after she had been awarded a TWOWS fellowship. Today she is

an associate professor and head of the environmental sciences department at her *alma mater*.

While Elteraifi's obstacles proved difficult, they pale in comparison to those faced by Marycelin Baba, a member of TWOWS from Nigeria. Before being selected for a TWOWS fellowship, Baba was trapped in a decade-long campaign to complete her doctorate degree. With my career "stuck in place for such a long time," Baba notes that she felt "completely stranded" and considered quitting on several occasions. "I really can't explain what kept me going and neither can my family and friends."

With an academic background in the medical sciences, Baba had enrolled as a doctoral student at Nigeria's University of Ibadan in 1995. She wanted to conduct research in the fields of virology and microbiology and, more specifically, to examine ways to manage such devastating diseases as brucellosis, dengue fever, malaria and tuberculosis that afflict millions of Africans. As Baba notes, "despite the public health threats they pose, these diseases, at least until recently, had failed to receive the attention that they deserve, especially among medical researchers in developing countries."

***After trying so hard for so long and getting virtually nowhere, I had just about decided to give up.***



“A primary reason these diseases continue to pose a serious health threat,” she continues, “is that they are difficult to diagnose, especially in their early stages, and especially in poorly equipped hospitals and clinics in developing countries where such diseases are most prevalent. The symptoms of several of these diseases – for example, dengue fever and typhoid – mimic those of malaria and thus can be easily misdiagnosed. And apart from tests that are readily available for the detection of HIV/AIDS and polio, routine screening rarely takes place. As a result, these diseases often go undiagnosed until they have reached advanced stages. This often leads to complications and higher rates of morbidity and mortality than would otherwise be the case.”

Despite the critical importance of her research, Baba’s work stalled just months after it began. “The university didn’t have the materials and facilities that I needed to do my research. So, I initially used a portion of my salary to purchase such critical items as reagent kits from abroad. Sadly, I soon realized that I

did not have the personal resources to continue to do this over the long run.”

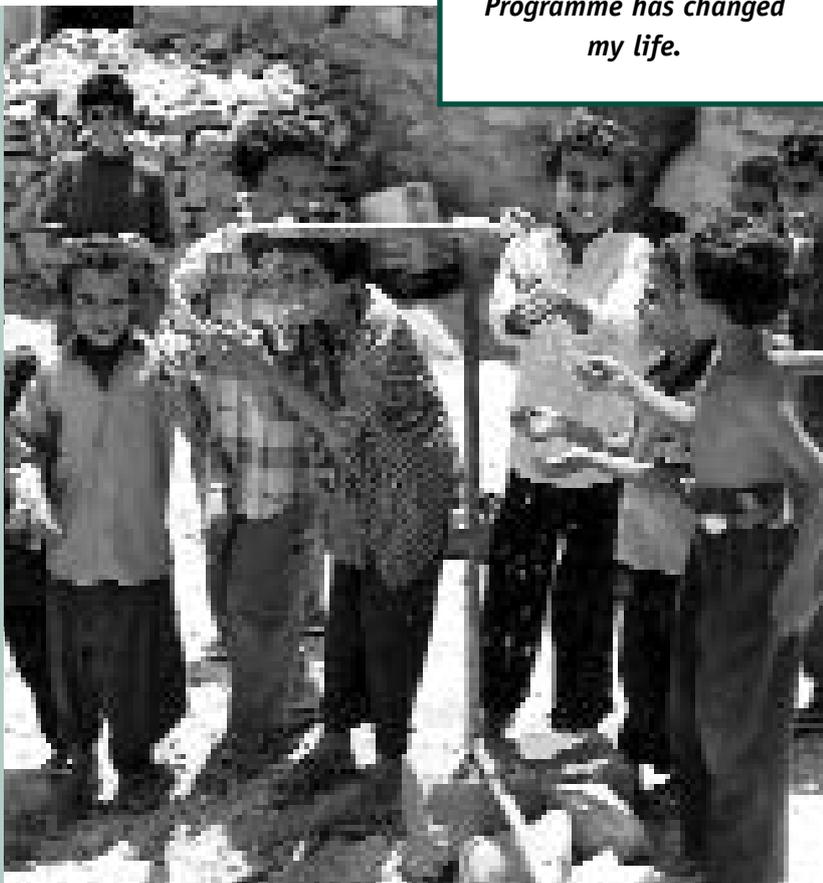
In the face of these obstacles, Baba considered changing her dissertation topic. However, she ultimately decided that she was too committed to her research to alter her course of study. “Developing countries such as Nigeria must build and equip state-of-the-art diagnostic facilities as part of their overall efforts to improve the health of their citizens,” she notes. “Researchers, in turn, must play a central role in such initiatives.”

Unwilling to abandon her commitment, she decided to stay put and wait for opportunities to open up in her chosen field of study. It was a risky decision and she might still be waiting if her husband had not come across information about the TWOWS fellowship programme.

Baba applied for and was awarded a fellowship in 2002. While continuing her enrolment at the University of Ibadan, she obtained a part-time placement at the *Institut Pasteur de Dakar* in Senegal, a turning point that greatly accelerated the pace of her doctoral studies. Not even the departure of her supervisor, which she calmly refers to as “a minor setback”, prevented her from completing her work and obtaining her PhD in 2003. Today, she works as a lecturer in the department of immunology at the University of Maiduguri Teaching Hospital in Nigeria, where she also serves as director of the World Health Organization (WHO) National Polio Laboratory.

Baba’s colleague, Esther Oluwayemi, experienced similarly frustrating challenges. Born into a middle-class Nigerian family that placed a premium on education, Oluwayemi displayed a passion for chemistry at an early age. She earned a bachelor’s degree in 1994 and her master’s degree in 1997 from the University of Ibadan and then enrolled as a doctoral student

***The TWOWS Postgraduate Training Fellowships Programme has changed my life.***



## WHAT'S SIDA

*The Swedish International Development Agency (Sida) is a government agency operating under the Ministry for Foreign Affairs. Its primary goal is to make it possible for poor people to improve their living conditions. Sida works independently within the framework established by the Swedish parliament and government, which specify the budget, the countries with which Sida works and the focus of Swedish international development cooperation. Sida administers slightly more than 60 percent, about US\$2 billion, of the country's total contribution to international development cooperation. Sida is a global organization with approximately 50 embassies and offices around the world. It is the largest contributor to the TWOWS Postgraduate Training Fellowships Programme.*



in analytical chemistry at Ladoke Akintola University of Technology, also in Nigeria.

Analytical chemistry is a multidisciplinary field with many real-life applications. Measurements derived from analytical chemistry studies, for example, help to assure the safety and quality of food, pharmaceuticals and water. Such measurements also aid in the compliance of environmental laws and regulations and boost the ability of physicians to diagnose disease. "They can even prove essential to business and commerce by helping inspectors verify the authenticity of products, thereby reducing the number of copycat items," Oluwayemi explains.

Analytical chemistry's usefulness, however, depends on the precision of the measurements. As a result, researchers not only need a thorough knowledge of chemistry but also access to sophisticated instruments. Unfortunately, for Oluwayemi, her university did not have the equipment she needed to do her work.

While she struggled to make the best of a difficult situation, a colleague of hers told her about the TWOWS fellowship programme. With her husband's encouragement, she applied.

After being notified that she had been awarded a fellowship in 2001, Oluwayemi searched for a partnering university with a programme relevant to her research interests. She opted for the University of Hyderabad's School of Chemistry in India, which proved to be an excellent choice. Indeed the school recently received a 'five star' rating from the Indian National Assessment and Accreditation Council (NAAC). "Analysis costs money, but my supervisor, M.V. Rajasekharan, made sure that I had sufficient funds to carry out my research." After spending nearly all of 2005 in India, Oluwayemi returned to Nigeria in February 2006 to complete her research. She hopes to receive her PhD from Ladoke Akintola University of Technology later this year.

Huda Basaleemn grew up in Yemen, one of the poorest countries in the world. The youngest of six siblings, Basaleemn was fortunate to be raised in a family that not only appreciated the value of education, but also recognized her academic potential at an early age. Her elder brothers, moreover, did well in school, serving as excellent role models.

This strong foundation for success contributed to Basaleemn's outstanding performance in school. In 1982, for example, she scored the second highest marks overall in a nationwide test given to all secondary students. In 1989, she received her medical degree

## HOW THE TWOWS FELLOWSHIP PROGRAMME WORKS

*The TWOWS Postgraduate Training Fellowships Programme is open to female students (generally below 40 years of age) in sub-Saharan Africa or least developed countries (LDCs) who wish to pursue postgraduate training leading to a master's or doctorate degree at a centre of excellence in the South outside of their own country. Applicants must have a master's degree (or equivalent), or a bachelor's degree with honours in a field of natural science. Each fellowship is offered for a maximum of three years and covers travel expenses and provides a modest monthly living allowance. The applicant can enrol as a full-time research student at an institution outside her country or register as a Ph.D. student at her home institute and undertake part of the research programme at a host institute in another developing country. The programme is supported by funds generously provided by the Swedish International Development Cooperation Agency (Sida).*



from the University of Aden accompanied by an award for superior grades and performance.

Basaleemn has continued to display the same level of excellence in her work as a medical doctor, researcher and lecturer. She has participated in academic discussions and training forums across the Arab region and has published an impressive list of articles on health and nutrition in peer-reviewed international journals. In 2003, Basaleemn was appointed head of the tumour registry at Aden University's Cancer Centre – a post she has held in addition to her teaching responsibilities at the university.

Despite these achievements, opportunities for Basaleemn to pursue a PhD degree remained elusive. "After earning a master's degree in public health at Alexandria University, Egypt, I solicited help from aid agencies seeking, without success, to obtain funding to pursue a PhD," she explains.

Basaleemn eventually heard about the TWOWS fellowships programme through the Yemeni Society of Women in Science and Technology. "Rokhsana Mohm'd

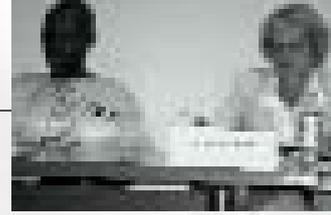
Ismail, president of the society and director of Aden University Women's Centre for Research and Training and TWOWS' vice president for the Arab region, encouraged me to apply for the fellowship," she says.

Her successful application allowed her to join the Universiti Kebangsaan in Malaysia as a student in public health while continuing her enrolment at Aden University. She began the programme in September 2005 and hopes to earn her degree by 2008.

Her doctoral thesis focuses on a holistic approach to childhood health and development that experts in the field refer to as integrated management of childhood illness (IMCI). She is not only examining state-of-the-art medical interventions but also exploring the role that families and communities play in such efforts. At the same time, Basaleemn continues to conduct research on the relationship between nutrition and cancer in Yemen and, more generally, in the Arab region.

So there you have it. Four women. Four journeys. Four destinations. Yet a single common refrain: "The TWOWS Postgraduate Training Fellowships Programme," each says, "has changed my life." It's a refrain echoed by the 150 women who have participated in the programme – a number that continues to grow each year. ■

*For additional information about the TWOWS Postgraduate Training Fellowships Programme for Women from Sub-Saharan Africa and the Least Developed Countries, see ❖❖❖ [www.twows.org](http://www.twows.org)*



# IMPROVING THE HEALTH OF MOTHERS AND INFANTS

THE TRIESTE-BASED INTERACADEMY MEDICAL PANEL (IAMP) WILL SOON LAUNCH A PROJECT SEEKING TO PROVIDE BASELINE INFORMATION ON THE STATE OF MATERNAL AND PERINATAL HEALTHCARE IN DEVELOPING COUNTRIES. THE ULTIMATE GOAL IS TO DEVISE A COUNTRY-BY-COUNTRY STRATEGY FOR REDUCING THE HIGH RATES OF MOTHER AND INFANT MORTALITY AND MORBIDITY THAT CURRENTLY PLAGUE MANY NATIONS IN THE SOUTH, ESPECIALLY NATIONS IN SUB-SAHARAN AFRICA.

**A** woman in Tanzania is 100 times more likely to die during pregnancy or childbirth than a woman in Sweden; a newborn baby is 25 times more likely to die during his or her first week of life.



These grim statistics, a stark reflection of the gnawing health gap between the developed and developing world, served as the focal point of discussion at a recent workshop on Reducing Perinatal and Maternal Mortality in Poor Countries. The InterAcademy Medical Panel (IAMP), a global network of medical academies and medical divisions within science academies that operates under the administrative umbrella of the Academy of Sciences for the Developing World (TWAS),

organized the workshop, which took place on 25-26 September 2006 in Trieste, Italy. The two-day event was sponsored by the Swedish International Development Agency's Department for Research Cooperation (Sida/ SAREC).

"High rates of mother and infant mortality and morbidity throughout the developing world," says David P. Urassa, project coordinator at Muhimbili University College of Health Sciences department of community health in Dar-es-Salaam, Tanzania, "are due to many inter-related problems." Poverty, inadequate nutrition, lack of health information conveyed to women and families, and even poor transportation and referral networks, which prevent patients from getting



## ABOUT IAMP

*The InterAcademy Medical Panel (IAMP) is a global network of medical academies and medical divisions within science academies that is committed to improving health worldwide and especially in developing countries. Its current membership totals 64. IAMP's most recent general assembly took place in Beijing, China, in April 2006, where IAMP representatives agreed a broad-based agenda that included not only the development of a strategy to reduce perinatal and maternal morbidity rates (see main text) but also an investigation of better diagnostic techniques and preventative treatment for rheumatic fever; the development of a series of workshops on science writing for young scientists and clinicians; an assessment of networks devoted to monitoring and sharing of information on the spread of infectious diseases; and a comprehensive study of the quality of care in hospitals. These new initiatives were launched in addition to IAMP's existing efforts to promote a global mother-child health research network. IAMP members also served on the advisory committee to the editors of the Disease Control Priorities Project (DCCP). For additional information about IAMP, see [www.iamp-online.org](http://www.iamp-online.org).*

from one health facility to another. All of these factors play a role in the poor healthcare that mothers and infants receive,” notes Urassa. “But the most important factors, by far, are the lack of skilled medical personnel and the poor state of healthcare facilities.”

Unlike some other developing countries, where home births are commonplace, the majority of women in Tanzania eagerly seek clinical help during their pregnancy and usually go to hospitals to deliver their babies. In fact, in Tanzania, nearly 90 percent of all infants are born in hospitals, compared, for example, to just 25 percent in the Philippines.

Tanzanian women seek hospital care largely because of the lack of basic equipment for obstetric and neonatal care and the limited number of well-trained professional healthcare personnel at clinics and dispensaries in their villages and communities. Moreover, they simply do not have confidence in the ability of the medical staff working in local healthcare facilities to address their needs, especially in emergency situations.

“As a result,” says Urassa, “Tanzania’s health clinics and dispensaries are often underutilized while the

nation’s hospitals, especially its national and municipal hospitals, are overwhelmed.”

“Muhimbili National Hospital, where I work,” Urassa notes, “delivers more than 12,500 babies each year. On average, that amounts to more than 30 babies each day, or more than one baby every hour.

With just two to three physicians present (the hospital has a total of nine full-time obstetricians on staff who work around-the-clock on rotation), only those mothers and infants who face serious medical emergencies attract the attention of a doctor. During busy periods, even ailing mothers and infants experiencing troubled births are not attended to.”

Tanzania, in short, has a high rate of institutional healthcare for mothers and infants and, at the same time, a high rate of maternal and infant mortality and morbidity. The vast majority of Tanzania women are going to hospitals to receive care but too many of them – and too many of their babies – are dying unnecessarily or experiencing serious illness or injury because of poor care.

The situation in Tanzania is not unique. Indeed, as Bill Oyieke, who works as an obstetrician at Kenyatta National Hospital in Nairobi, notes, large urban hospitals in Kenya, such as his hospital, also oversee the births of thousands of babies each year. “Pumwani Maternity Hospital, Kenya’s largest maternity hospital, tries” – and Oyieke emphasizes the word ‘tries’ – “to manage more than 25,000 births a year.”

Maria Asunción Silvestre, a consulting neonatologist at the University of the Philippines College of Medicine, is quick to add that even though there are many more home births in the Philippines than in Tanzania or Kenya, the system's inadequacies are not that much different. "Hospitals in the Philippines," she says, "may not be quite as overwhelmed as those in Tanzania or Kenya but there is nevertheless an acute shortage of well-trained medical personnel. Doctors, nurses, midwives, and pharmacists are in all short supply. And birthing places – whether at home or in an hospital – are woefully understaffed and poorly equipped."

"Efforts to address the problem," says Urassa, "should begin with the training of personnel and, in Tanzania's case, that training should start with medical personnel working in frontline healthcare facilities such as health centres and dispensaries." (As in many developing countries, Tanzania's dispensaries not only provide drugs but also offer basic medical services for preventative care and common ailments.) "If we turn our health centres and dispensaries into basic emergency obstetric care institutions that people have con-

fidence in, we can alleviate some of the enormous pressures currently placed on our hospitals. Everyone would benefit from such an effort, especially the mothers and infants we are seeking to help."

"The high maternal and perinatal mortality and morbidity rates that we find in many developing countries," observes Jan Lindsten, former chief executive officer of Karolinska Hospital and professor emeritus of medical genetics at *Karolinska Institutet* in Stockholm, Sweden, "is particularly tragic because we know what measures can be taken to dramatically reduce the incidence of death and illness. These measures are no secret either to the medical or public health communities," he adds. "Indeed, a great deal of research has already been done and proven methods of practice have been put in place in many facilities in both the

***Efforts to address the problem should begin with the training of personnel.***

**ABOUT AXIOS**

*Axios, a Dublin-based organization created in 1997, specializes in the design, delivery and validation of quality healthcare programmes and in the creation and implementation of programmes designed to increase access to pharmaceuticals in the developing world. Axios focuses on participatory initiatives to improve the coordination and integration of local healthcare priorities and medical resources. Projects emphasize rapid access to treatment and care and concentrate on long-term sustainability, scalability and capacity building. It has worked closely, for example, with pharmaceutical companies in the developed world on the design and management of drug donation and access programmes for the developing world; with governmental agencies and grassroots organization in Tanzania on initiatives to improve the treatment and care for victims of HIV/AIDs; and on improving the diagnosis and treatment of breast cancer in Ethiopia. It now has offices in 10 countries. For additional information, see [www.axios-group.com](http://www.axios-group.com) and [www.axiosint.com](http://www.axiosint.com).*



developed and developing world.” Lindsten served as chair of the workshop and will continue to direct the follow-up activities.

“We know, for example, that if we keep newborn babies warm and clean, if we take appropriate steps to minimize the threat of infection, if we rely exclusively on breast feeding, and if we encourage close physical contact between mother and infant, we can substan-

tially improve the prospects not only for survival but for the improved health of both mothers and children. We also know that the availability of such inexpensive equipment as obstetric forceps, neonatal resuscitation packs and vacuum extractors, as well as the ability to expertly perform procedures that stop haemorrhaging, that overcome prolonged or obstructed labour and that enable safe abortions to take place can substantially reduce maternal and infant death rates.”

“The challenge is to develop strategies that can be sustained over time within a nation’s existing health-care institutions and that can be implemented at a scale that makes a difference,” notes Timothy Dye, director of the department of research and evaluation at Axios International. “Medical research is important,” he notes, “but it is not a sufficient criteria for success. Better management and administrative practices, for example, are also important and, so too, are initiatives to increase the range and effectiveness of public health education and communication programmes.”

## MILLENNIUM GOALS

*Two of the eight United Nation’s Millennium Development Goals (MDG) focus on mother and child healthcare issues.*

*Goal number four calls for reducing global mortality rates for children less than five years of age by two thirds by 2015. That would decrease the current annual average global death rate for children under five from nearly 80 deaths per 1,000 live births per year to just over 26 deaths per 1,000 live births per year over the next decade. Since more than 90 percent of these deaths occur in developing countries (in Tanzania, for example, the number of deaths per 1,000 live births for children under five stands at 126; in Sweden, it is less than five), this goal cannot be met without substantial improvements in healthcare in developing countries.*

*MDG number five calls for the global rate of maternal mortality to be cut by two-thirds by 2015. Since the global figure for maternal mortality currently stands at 348 per 100,000 births, this means that the rate would have to fall to 116 maternal deaths per 100,000 births, if this goal is to be met. Again, the vast majority of the progress will have to take place in the developing world. In Tanzania, for example, the maternal mortality rate is 1,500 per 100,000 births; in Sweden, it is just four.*

*Experts estimate that 95 percent of all maternal and infant deaths are preventable if both mothers and children receive quality healthcare, following proven medical procedures currently practiced in many countries throughout the world.*

*For additional information about the MDGs, see [www.un.org/millenniumgoals](http://www.un.org/millenniumgoals).*





## MORE ON MOTHER AND INFANT HEALTH IN TANZANIA

*“Although terribly crowded and under-staffed, municipal hospitals are where most women in Dar-es-Salaam go to deliver their babies,” says David P. Urassa, who headed and served as the principal author of the Dar-es-Salaam Region Perinatal Care Needs Assessment, a comprehensive year-long study of maternal and perinatal healthcare in the Dar-es-Salaam region, home to more than 2.5 million people and more than 60 healthcare facilities. Urassa, project coordinator at Muhimbili University College of Health Sciences department of community health, Dar-es-Salaam, Tanzania, presented the study’s findings, which were published earlier this year, to the participants of the IAMP workshop on Reducing Perinatal and Maternal Mortality in Poor Countries.*

*The 60 plus public health facilities in the region of Dar-es-Salaam include three municipal hospitals (the largest of which is Muhimbili National Hospitals), five health centres and 54 dispensaries.*

*These numbers, however, tell only a small part of the story. When it comes to healthcare, it’s the quality of care that makes the difference and the quality in Tanzania is often very low.*

*The root causes of poor quality care and associated high institution-based maternal and perinatal mortalities and morbidities, the report concludes, are due to inadequate maternity and neonatal infrastructure, a shortage of skilled staff, insufficient medical equipment and supplies, poorly organized referral systems and the absence of an effective network between major elements of the healthcare systems, most notably between the hospitals, healthcare centres and dispensaries.*

*The study’s major recommendations flow directly from the evidence-based shortcomings that are detailed in the assessment. These recommendations include the purchase and distribution of essential equipment; recruitment of sufficient staff to provide round-the-clock basic obstetric healthcare services in all hospitals*

*within the region; increased and continuous classroom and on-the-job training for staff; establishment of a neonatal care unit in each of the municipal hospitals to reduce the patient load at Muhimbili National Hospital, the only hospital in the region that currently has such a unit; the drafting of clinical and healthcare management standards and guidelines and the publication of educational materials on maternal and perinatal care designed to upgrade procedures and practices throughout the healthcare system; development of a more effective patient referral system that includes reliable ambulances, telephones and radio communications at all municipal hospitals and health clinics; and the establishment of comprehensive reporting system that draws information from all stakeholders as part of a larger process to carefully monitor progress toward the desired goals.*

*Despite all of the obstacles and challenges faced by Tanzania’s healthcare system, in general, and efforts to care for mothers and infants, more specifically, Urassa is guardedly optimistic that things will improve in the near future.*

*“We know what needs to be done,” he says, concurring with the sentiments expressed by other workshop participants. It’s largely a matter of acquiring additional resources and applying those resources in an efficient manner in order to improve the overall management and administration of the healthcare system.”*

*Urassa adds that “the highest political authorities, including Tanzania’s president and minister of health, who have read and voiced their support for the recommendations outlined in our report, fully appreciate the broad impact that better healthcare, especially for mothers and children, can have, on societal well-being. As a result, they are determined to move ahead on reforming the system.”*

*For a copy of the complete report, please contact the IAMP secretariat at [info@iamp.org](mailto:info@iamp.org).*

Comprehensive healthcare programmes, for example, in Costa Rica, Cuba and Sri Lanka, show that countries do not have to be rich to drastically reduce mortality and morbidity rates among mothers and infants. In Costa Rica, for example, maternal mortality rates declined from 55 per 100,000 births in 1990 to 25 per 100,000 live births in 2000 and infant mortality decreased from 14 per 1,000 live births in 1993 to 11 per 1,000 live births in 2004, largely due to government-sponsored programmes that focused on simple and relatively inexpensive interventions and adequate

### SUCCESS IN SRI LANKA

*Sri Lanka's per capita annual gross domestic product (GDP) is less than US\$800. Experts, moreover, estimate that Sri Lanka spends less than US\$1.50 per capita a year on maternal and neonatal healthcare. Nevertheless, its national programme for maternal and infant health, launched nearly a half century ago, has resulted in a dramatic reduction in maternal and infant death rates. In 1959, when Sri Lanka's per capita GDP stood at US\$290, its nationwide maternal and neonatal death rate stood at 50 per 1000 live births. In 1980, thanks largely to the increased availability of mother and infant healthcare services and the improved training of healthcare personnel, especially in small rural villages and communities, the maternal and neonatal death rate fell by half to 25 deaths per 1000 live births and between 1980 and 2000, it fell another 50 percent to less than 13 deaths per 1000 live births. Such public health success stories are not as uncommon as you would think. China, Cuba and Malaysia have followed a similar path to achieve dramatic improvements in maternal and infant mortality and morbidity rates. The problem is that too many countries have not. For additional information, see the Disease Control Priorities Project (DCCP), Disease Control Priorities in Developing Countries (2nd edition), especially chapter 26, "Maternal and Perinatal Conditions, and chapter 27, "Newborn Survival." The text is available online at [www.dcp2.org/pubs/dcp](http://www.dcp2.org/pubs/dcp).*

and continuous training for medical personnel. In Cuba, mortality rates for both mothers and infants fell by more than 50 percent over the past decade and in Sri Lanka maternal mortality rates fell by one-third and infant mortality rates by half over the same period. "These are real success stories," says Dye, "that offer valuable lessons for other developing countries."

While lessons do abound, it is also true that successful healthcare programmes for mothers and infants are based on evidence that can only be acquired through a detailed assessment of local and national conditions.

"That's why those participating in the workshop decided that the first step should be to develop a series of baseline studies," says Lindsten.

"We will send an inquiry to IAMP members asking if they are interested in developing such a study," he adds, "and then work with interested members to secure funds and develop strategies for preparing studies that not only examine the state of health of mothers and infants but also examine the effectiveness of the interventions that are currently in place. We hope that the Tanzanian study presented at the workshop can serve as a model for other national assessments."

"Our ultimate goal," notes Lindsten, "is to reduce mother and infant mortality and morbidity rates. But to do so we must first work from a solid base of information."





## MOTHER AND CHILD HEALTH RESEARCH NETWORK

*The Mother and Child Health Research Network became operational in 1998. The website, [www.mother-child.org](http://www.mother-child.org), receives funding and management support from the Canadian Global Health Research Initiative. The scheme began as a programme of the InterAcademy Panel on International Issues (IAP), based in Trieste. With IAMP's transfer to Trieste in 2003, the Mother and Child Health Research Network became a IAMP-affiliated programme. The primary goal of the website is to provide a means for scientists from all disciplines working in reproductive or child health to communicate with one another. The network now counts scientists from more than 50 countries among its members.*



And that's what the studies will seek to do: provide evidence-based data that can help policy makers and healthcare practitioners determine where to apply their resources in order to improve the survival rates and overall health of a nation's most vulnerable citizens. "This is not just a moral obligation," observes Lindsten. "It also one of the best ways to ensure a healthier and more prosperous nation."

"Improving the health of mothers and children is a goal that virtually all nations share. No one campaigns against it," wryly notes Priscilla S. Reddy, head of the National Health Promotion Research and development at South Africa's Medical Research Council.

The good news is that over the past few decades a number of nations have made substantial progress in addressing this critical issue.

"But that doesn't mean the job is done," Reddy points out. Many developing nations still lag far behind in protecting the health and well being of mothers and infants. By some measures, the widest health gap between those living in the developed and

developing worlds is reflected in the disparity in mortality and morbidity rates that currently exists between mothers and infants living in the North and South.

"This disparity is not only unconscionable but it can no longer be dismissed as a consequence of poverty and ignorance," Reddy observes. "A growing number of developing countries, including some very poor developing countries, have shown that we know what to do and have the resources to do it."

The project that IAMP is about to launch is intended to build on the momentum that is already in place in order to achieve even greater progress in reducing mother and child mortality and morbidity rates in the future.

"It is a worthy goal," says Reddy, "and it is a goal that is within our reach." ■

***Improving the health of mothers and children is a goal that virtually all nations share. No one campaigns against it.***

*For additional information about the IAMP Mother-Child Health Initiative, contact [iamp@twas.org](mailto:iamp@twas.org)*

*TWAS Newsletter, Vol. 18 No. 3, 2006*

# WHAT'S TWAS?

**THE ACADEMY OF SCIENCES FOR THE DEVELOPING WORLD (TWAS) IS AN AUTONOMOUS INTERNATIONAL ORGANIZATION THAT PROMOTES SCIENTIFIC CAPACITY AND EXCELLENCE IN THE SOUTH. FOUNDED AS THE THIRD WORLD ACADEMY OF SCIENCES BY A GROUP OF EMINENT SCIENTISTS UNDER THE LEADERSHIP OF THE LATE NOBEL LAUREATE ABDUS SALAM OF PAKISTAN IN 1983, TWAS WAS OFFICIALLY LAUNCHED IN TRIESTE, ITALY, IN 1985, BY THE SECRETARY GENERAL OF THE UNITED NATIONS.**

TWAS has more than 800 members from 90 countries, 73 of which are developing countries. A 13-member Council is responsible for supervising all Academy affairs. It is assisted in the administration and coordination of programmes by a secretariat, headed by an Executive Director and located on the premises of the Abdus Salam International Centre for Theoretical Physics (ICTP) in Trieste, Italy. The United Nations Educational, Scientific and Cultural Organization (UNESCO) is responsible for the administration of TWAS funds and staff. A major portion of TWAS funding is provided by the Ministry of Foreign Affairs of Italy.

The main objectives of TWAS are to:

- Recognize, support and promote excellence in scientific research in the South.
- Provide promising scientists in the South with research facilities necessary for the advancement of their work.
- Facilitate contacts between individual scientists and institutions in the South.
- Encourage South-North cooperation between individuals and centres of science and scholarship.

TWAS was instrumental in the establishment in 1988 of the Third World Network of Scientific Organizations (TWNISO), a non-governmental alliance of 150 scientific organizations in developing countries, whose goal is to assist in building political and scientific leadership for science-based economic development in the South and to promote sustainable development through broad-based partnerships in science and technology.

...[www.twnso.org](http://www.twnso.org)

TWAS also played a key role in the establishment of the Third World Organization for Women in Science (TWOWS), which was officially launched in Cairo in 1993. TWOWS has a membership of more than 2,500 women scientists from 87 developing countries. Its main objectives are to promote research, provide training, and strengthen the role of women scientists in decision-making and development processes in the South. The secretariat of TWOWS is hosted and assisted by TWAS. ...[www.twows.org](http://www.twows.org)

Since May 2000, TWAS has been providing the secretariat for the InterAcademy Panel on International Issues (IAP), a global network of 90 science academies worldwide established in 1993, whose primary goal is to help member academies work together to inform citizens and advise decision-makers on the scientific aspects of critical global issues. ...[www.interacademies.net/iap](http://www.interacademies.net/iap)

The secretariat of the InterAcademy Medical Panel (IAMP), a global network of 64 medical academies and medical divisions within science and engineering academies, relocated to Trieste in May 2004 from Washington, DC, USA. IAMP and its member academies are committed to improving health worldwide, especially in developing countries.

...[www.iamp-online.org](http://www.iamp-online.org)

## WANT TO KNOW MORE?

TWAS and its affiliated organizations offer scientists in the South a variety of grants and fellowships. To find out more about these opportunities, check out the TWAS website: [www.twas.org](http://www.twas.org)

## FELLOWSHIPS

Want to spend some time at a research institution in another developing country? Investigate the fellowships and associateships programmes: [www.twas.org/Exchange.html](http://www.twas.org/Exchange.html)  
TWOWS offers postgraduate fellowships to women from least developed countries (LDCs) and other countries in sub-Saharan Africa: [www.twows.org/postgrad.html](http://www.twows.org/postgrad.html)

## GRANTS

Are you a scientist seeking funding for your research project? Then take a look at the TWAS Research Grants scheme: [www.twas.org/mtm/RG\\_form.html](http://www.twas.org/mtm/RG_form.html)  
Is your institution seeking funds to collaborate with a research institute in another country in the South? The TWNSO grants programme may be able to provide support: [www.twnso.org/grants.html](http://www.twnso.org/grants.html)

## EQUIPMENT

But that's not all TWAS has to offer. For instance, do you need a minor spare part for your laboratory equipment – no big deal, really – but you just can't get it anywhere locally? TWAS can help: [www.twas.org/mtm/SP\\_form.html](http://www.twas.org/mtm/SP_form.html)

## TRAVEL

Would you like to invite an eminent scholar to your institution, but need funding for his/her travel? Check out the Visiting Scientist Programme: [www.twas.org/hg/vis\\_sci.html](http://www.twas.org/hg/vis_sci.html)

## CONFERENCES

Are you organizing a scientific conference and would like to involve young scientists from the region? You may find the help you need here: [www.twas.org/mtm/SM\\_form.html](http://www.twas.org/mtm/SM_form.html)