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EDITORIAL

A MAJOR ANNIVERSARY IS A NATURAL TIME TO PAUSE FOR REFLECTION. THIS YEAR, AS TWAS CELEBRATES ITS 30TH ANNIVERSARY, WE ARE CONSTANTLY AWARE OF HOW THE VISION AND HARD WORK OF ABDUS SALAM, THE FOUNDING MEMBERS AND HUNDREDS OF OTHER TWAS LEADERS AND FRIENDS HAVE MADE OUR ACADEMY A FORCE FOR GLOBAL SCIENCE. AT THE SAME TIME, WE ARE RENEWING OUR COMMITMENT, SETTING OUR GOALS AND CHARTING A COURSE INTO THE FUTURE.

Honouring the past, focused on the future

Certainly the world has been transformed since TWAS's founding ceremony in Trieste. Italy. In 1983, the world population was 4.7 billion. Hundreds of millions of people were trapped in a paralysing and often deadly poverty. Salam and Mohamed Hassan were in a small international group talking about the transformative power of science and technology, but in those early years, the topic had scant visibility on the world agenda.

Eight years later, the end of the Cold War gave way to a global transformation. In ensuing years, new political and economic freedoms opened across much of the world; human mobility increased. The personal computer, the Internet and smart phones allowed access to information – to knowledge *– unprecedented in human history.*

We know well how China, India and Brazil seized the opportunities of a new era. Smaller nations, too, are using science and technology to drive development: Bangladesh, Rwanda, Tunisia and Chile are among the successes cited in the 2013 Human Development Report *published by the United Nations Development Programme.*

And yet, even with so much progress, profound challenges await us. The world population now is 7.1 billion, and according to some estimates it could pass 9 billion in 2043, as TWAS celebrates its 60th anniversary.

Globally, 81 nations are lagging in science and technology (S&T), more than half of them in Africa. Poverty itself keeps many of these countries from building research capacity; civil conflict, climate disruptions, poor governance and other factors too often compound the challenges.

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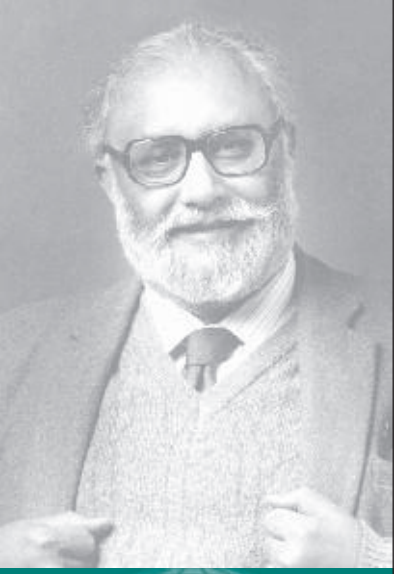
Snowflake viewed in an optical microscope (Flickr/simply innocuous)



Still, I am hopeful. A number of new developments augur well for TWAS's work in the years ahead.

Leadership: *With the start of 2013, we welcome Bai Chunli, an accomplished scholar in chemistry and nanotechnology, as the new TWAS president. Prof. Bai also serves as president of the Chinese Academy of Sciences (CAS), and his essay in this issue shows his ambitious vision and high standards for TWAS.*

Education: *Early 2013 brought two major PhD Fellowship agreements: Up to 140 early-career scientists per year from the developing world will travel to China for PhD study under the new CAS-TWAS President's Fellowship Programme. And the World Meteorological Organization (WMO) and TWAS will support up to 10 PhD fellowships a year focused on weather, climate and water-related hazards. TWAS now offers more than 500 fellowships per year.*

Science Diplomacy: *Nearly 50 high-level science and policy leaders from 12 nations convened recently in Budapest to explore the renewal of long-standing education and research networks linking Central Europe and the Southern Mediterranean. TWAS organized the roundtable with the Hungarian Academy of Sciences in collaboration with the Italian Ministry of Foreign Affairs and UNESCO.*

Fund-raising: *TWAS has begun an important new fund-raising effort, reaching out to members, governments, businesses, private foundations and others to support our programmes and endowment. This is a critically important moment for our work, and these new resources have a direct impact on building S&T capacity.*

Communication: *The TWAS Public Information Office has a new director: Edward Lempinen, a senior journalist and science communicator, who has strong experience in international science and science diplomacy. Cristina Serra, a veteran science journalist, has joined the PIO staff as a writer and liaison to the Italian news media.*

Finally, as you may know, a measure approved at our General Meeting in China last year changed the Academy's name. We have begun the transition and henceforth we will be known as 'The World Academy of Sciences, for the advancement of science in developing countries'. Our mission will not change – we will continue to build science capacity and excellence in developing nations – but the new name reflects the ambitious global scope of our work.

New leadership, new ideas, new initiatives – this is the best way to honour our founders. As we celebrate our 30th anniversary, we're committed to continuing their work, matching the dedication and creativity that have helped TWAS to change the world. ■

Romain Murenzi
TWAS Executive Director

(from top) TWAS Founder Abdus Salam; speakers at the 1983 meeting at the University of Trieste at which TWAS was founded as the Third World Academy of Sciences; founding ceremony, from left: Mohamed H.A. Hassan, Antonino Zichichi, Paolo Budinich; TWAS founding members at the University of Trieste ceremony.

BAI CHUNLI: A FUTURE VISION FOR TWAS

EARLY IN HIS TERM, THE NEW TWAS PRESIDENT DETAILS THE ACADEMY'S ROLE IN PROMOTING SCIENCE FOR SUSTAINABILITY IN A CHANGING WORLD.

As the new president of TWAS, I am writing to share with you my "food for thought" about the future of the Academy. I take up this position at a time when the world is facing unprecedented challenges, the developing world in particular, and this requires bold steps and innovative solutions. TWAS must stand ready to support governments and peoples of the developing world to find science-based alternatives to support economic development and global sustainability.

1. PAST EFFORTS HAVE ALREADY LAID A SOLID FOUNDATION

Abdus Salam and his supporters started the idea of building an "association of scientists" for the developing world even before the end of the Cold War. This far-sighted initiative laid the foundation for the establishment of an academy in which scientists from the South could contribute in a collective manner to the excellence of science and scientific capacity-building in the developing world. Thanks to the financial support from the government of Italy and other developed countries and the political support of the United Nations, TWAS was founded in 1983 in Trieste, Italy, and officially launched soon after.

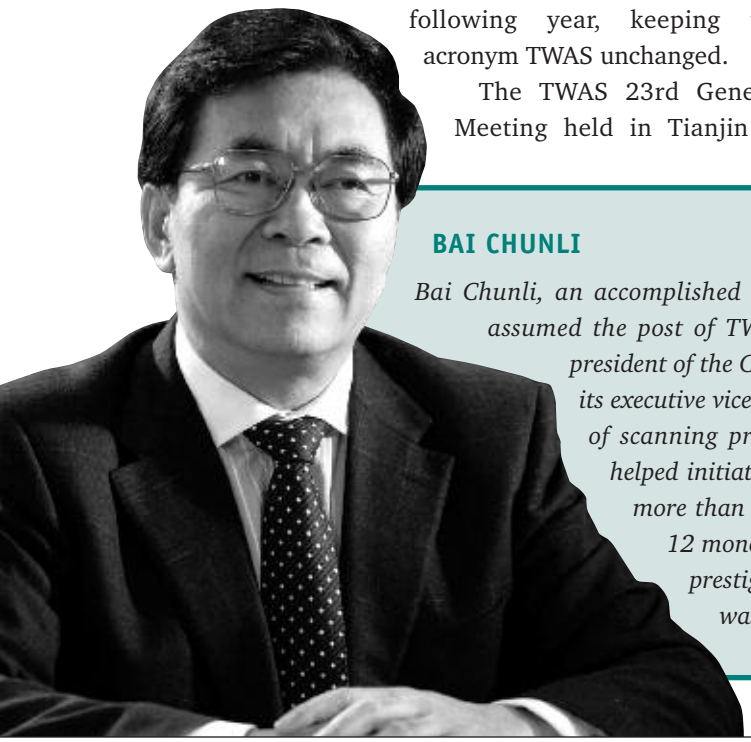
In the years leading up to its 30th anniversary, TWAS has achieved remarkable progress and success. It has increased its membership dramatically, from a few dozen to more than 1,000 worldwide now; it has launched various awards, grants, fellowships and regional initiatives for capacity-building and the training of young scientists of the developing world.

Among various milestone achievements and developments it has made, I want to particularly highlight those achieved in 2003 and 2004. In 2004, the Italian parliament passed a law ensuring "permanent funding" for the operation of the Academy. A year earlier

saw the establishment of the Academy's five regional offices. And no less importantly, TWAS held its 14th General Meeting in Beijing in 2003 in which a 'Beijing Declaration' was endorsed, calling for the further expansion of TWAS as the "voice of science in the South". The Beijing meeting resulted in changing the name of the organization from the 'Third World Academy of Sciences' to 'TWAS, the academy of sciences for the developing world' in the following year, keeping the acronym TWAS unchanged.

The TWAS 23rd General Meeting held in Tianjin in 2012 was another milestone success. Chinese president Hu Jintao attended and made an important speech, encouraging the developing world to further develop their science and technology (S&T) capability and to join hands with the developed world to address various urgent challenges they face. An important consensus reached at the TWAS General Meeting in Tianjin was to change the Academy's name to 'The World Academy of Sciences, for the advancement of science in developing countries'. This name surely reflects the strong interests and urgent call of the TWAS community to count on all the possible science merits and resources from both the South

TWAS should shoulder more responsibility in providing some practical solutions to global challenges.



BAI CHUNLI

Bai Chunli, an accomplished and influential scholar in chemistry and nanotechnology, assumed the post of TWAS president on 1 January 2013. He also has served as president of the Chinese Academy of Sciences since 2011, after having served as its executive vice-president for about eight years. Bai is one of China's pioneers of scanning probe microscopy, nanoscience and nanotechnology, and he helped initiate and coordinate a range of key projects in this field. He has more than 350 scientific publications in refereed journals and authored 12 monographs and several book chapters. He has won more than 20 prestigious awards and prizes for his academic achievements. He was elected a TWAS Fellow in 1997.



and North to advance the TWAS mandates for the developing world and for global sustainability.

It has indeed been a paramount success for TWAS to have evolved from an association of scientists in the South to the voice of science of the developing world, to The World Academy of Sciences. With the name change, TWAS will be an academy that will get wider support across the world in advancing its mandates. I must thank all of those individuals who have made what TWAS is today, in particular, the founder, Abdus Salam, Nobel laureate of Pakistan; his successors, José I. Vargas, C.N.R. Rao and Jacob Palis; and the long-term executive director, Mohamed H.A. Hassan. I would also like to thank the government of Italy and many others both in the North and South, and the United Nations system, UNESCO in particular, for their sustained and increasing support to TWAS. Without that joint support and dedication of many individuals, TWAS would not have been able to advance to its current level, ready to meet the increasing demands of developing countries, in pursuit of advancement of science and sustainable development goals. The rapidly changing world presents TWAS both unparalleled challenges and great opportunities.

2. TWAS IS AT THE DAWN OF A PARADIGM SHIFT TO MEET UNPRECEDENTED AND INCREASING NEEDS OF DEVELOPING COUNTRIES

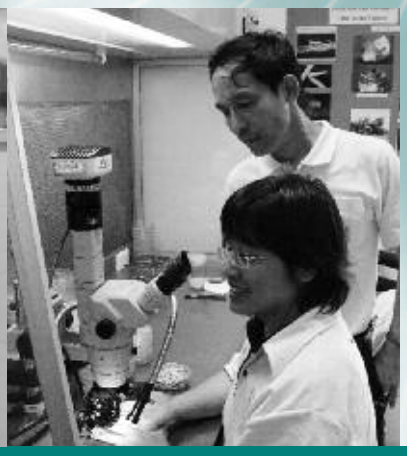
Our world faces many unprecedented challenges such as poverty, hunger, climate change, biodiversity loss and environmental pollution. There are 1.2 billion people still living on less than a dollar a day, 1 billion lacking access to safe drinking water, 1.5 billion having no access to electricity and 2 billion facing food insecurity – including 300 million children who go to bed hungry every night!

The population-carrying capacity of the Earth's ecosystem has exceeded its thresholds in many dimensions, including aspects such as climate, biodiversity, cycling of nitrogen and phosphorous (J. Rockström *et al.,* 2009). It is projected that our Earth will have to welcome an additional 700 million people in the next 10 years and witness 1 billion becoming new middle-class consumers with global economic growth increasing by 50% (N. Ishii, 2012).

To address these challenges, we must rely on innovative actions and find various alternatives. TWAS, composed of some of the best minds in the developing world, should shoulder more responsibility in identifying various alternatives and providing some practical solutions.

2.1 The pull – Rio+20 called for "enhanced collaboration with scientific and technological communities in the developing world"

Confronting these challenges, the world leaders at the World Summit on Sustainable Development (Rio+20) in 2012 produced the report *The Future We Want*, stating their "commitment to sustainable development, and to ensure the promotion of economically, socially and environmentally sustainable future for our planet and for present and future generations."



TWAS is positioned to help strengthen scientific cooperation.

Of particular importance, the world leaders recognized "the important contribution of the scientific and technological community to sustainable development". They also recognized the importance of collaboration among academic, scientific and technological communities in developing countries to close the technological gap between developing and developed countries, and the importance of strengthening the science-policy interface and fostering international research collaboration on sustainable development (paragraph 48, *The Future We Want*).

Of the 283 paragraphs in *The Future We Want*, a big portion of them focuses on science and technology and their various contributions to sustainable development such as green economy, institutional framework, the environmental pillar, capacity-building and technology transfer, placing significant importance on science and technology for global sustainability. The TWAS community should actively respond.

"Strengthening science and policy interface" has been most topical in the discussions of the post Rio+20 institutional framework (paragraphs 76, 85, 88). TWAS has every reason to contribute to this important process and help science-based policy setting for sustainable development of developing countries.

The Rio+20 declaration also called for "the strengthening of technical and scientific cooperation, including North-South, South-South and triangular cooperation" (paragraph 277) and encouraged "the participation and representation of men and women scientists and researchers from developing and developed countries" (paragraph 279). TWAS is also in the best position to contribute to this call.

TWAS must adapt itself to the changing world science landscape to meet the increasing needs of developing countries.

2.2 The push – the rapidly changing landscape of world science

With the role of science and technology in support of the global economy being increasingly acknowledged worldwide, the world scientific landscape has experienced a rapid change. This landscape has not only seen the rise of major emerging economies such as China, India, Brazil and South Africa, but also the taking off of science in many other countries such as Turkey and Tunisia.

The *UNESCO Science Report* 2010, the Royal Society report titled *Knowledge, Networks and Nations: Global Scientific Collaboration in the 21st Century* in 2011, and the United States National Science Board's *Science and Engineering Indicators 2012* all provide clear statistics on this progress as measured by the increasing share of gross expenditure of research and development (GERD) and the increased number of researchers and publications from developing countries. Developing countries contributed more than 30% of world publications in 2008, 26.9% of world R&D expenditure and 35.5% of world researchers in 2009 (statistics from UNESCO website).

Should this trend continue in the next 20 years, there must be dramatic changes in terms of the role of scientists from the South both in their respective countries and in the whole world. In spite of the big change in the world scientific landscape, it should be noted that science progress is very much unevenly distributed. Huge disparities in scientific capacity exist not only between the North and South, but also within the South itself. Africa, for example, only accounts for 0.7% of the world total R&D performance (US *Science and Engineering Indicators 2012*). Nevertheless, the general enhanced capacity-building in the South and


the developing world's increasing contributions to global science have created a much better enabling environment for TWAS to execute its mission to advance the science agenda and promote further capacity-building. This progress has further paved the way for TWAS to respond to the urgent needs of developing countries in the pursuit of sustainable development goals. TWAS has more capacity than ever before to contribute to the advancement of the global science and development agenda with the backing of the emerging economies.

Of course, in delivering various services, TWAS needs to cooperate with other important players in the world science landscape, such as the International Council for Science (ICSU); the United Nations Educational, Scientific and Cultural Organization (UNESCO); IAP, the global network of science academies; the Inter-Academy Council (IAC); the Commission on Science and Technology for Sustainable Development in the South (COMSATS); and the developed nations.

3. DEFINING THE NICHE OF TWAS

As analysed above, TWAS can expect to contribute much more than it is currently doing. TWAS members are all excellent scientists, many of them world-renowned. They are in the best position to influence government policy in their respective countries. This great potential has yet to be further tapped to: help shape the global science agenda; help define science-based development pathways; and help mobilize resources worldwide to increase the capacity-building of science in the least developed countries (LDCs) and science-lagging countries.

TWAS must adapt itself to the changing world science landscape to meet the increasing needs of developing countries in science and science-based development.

Looking ahead, TWAS may define its niche as follows: A world-leading academic institution that plays an important role in shaping the science agenda, in promoting science for sustainability, and in facilitating capacity-building in developing countries.

The comparative advantage of TWAS lies not only in its more than 1,000 members in different countries and scientific disciplines, but also in their ability and potential to influence science policy and development pathways in developing countries on science, technology and development. The main clients of TWAS include the science community; ministers of science and technology; ministers of finance, planning and other sectoral ministries and parliamentarians in developing countries; multilateral and bilateral development and conservation agencies and foundations; intergovernmental organizations such as the United Nations system; other international and regional organizations; and the private sector.

4. THREE PILLARS TO SUPPORT THE NICHE

The niche defined above can be very well supported by three pillars, namely: shaping the science agenda; promoting science for sustainability; and building capacity in the developing world.



4.1 Shaping the science agenda in the developing world

This would include providing advisory services to national governments for the formulation of science and technology policy and strategy, in particular promoting public investment in science and technology; initiating and supporting key international and regional science programmes; promoting science through raising awareness; awarding excellence; and forging task forces to advance frontiers of science and to address issues that are most relevant to the alleviation of poverty, the improvement of livelihoods and conservation of the environment.

4.2 Promoting science for sustainability

This would involve synthesizing cutting-edge science for decision-making on key issues that would otherwise compromise global sustainability such as adequate supply of food, water and energy; identifying possible science-based solutions to minimise environmental risks such as climate change, biodiversity loss, land degradation and natural disasters; providing policy support as a contribution to Rio+20 and other important initiatives; and providing advisory services to national governments and inter-governmental regional and global bodies, including multi-lateral environment agreements to enhance science-based decisionmaking on issues of sustainable development.

4.3 Facilitating capacity-building

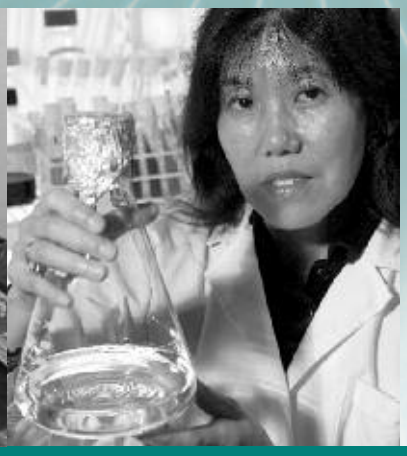
Capacity-building is one of the core mandates of TWAS. The ultimate goal of this pillar is to build essential capacity of scientists in all developing countries to achieve their respective sustainable development goals. This would not only include building capacity of young and middle-career scientists, but also decision-makers of key government agencies. In terms of regional efforts, Africa needs to be given priority. Initiatives under this pillar include fellowships for outstanding young students and scientists, research grants, essential facilities and instruments, training of trainers, various training courses, and science education, among others.

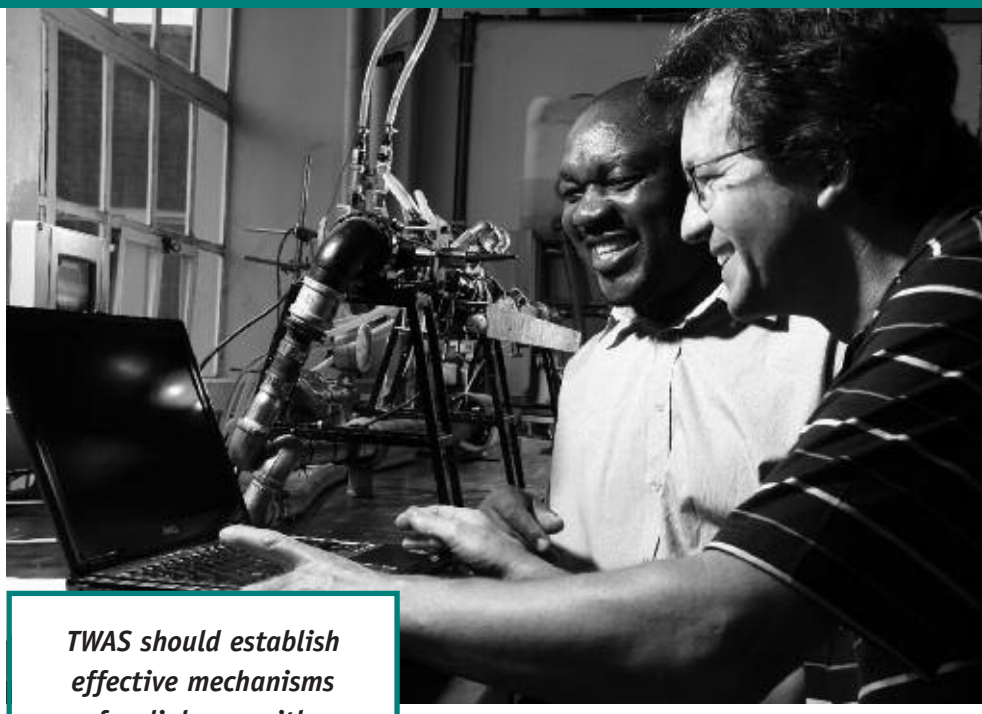
5. THE WAY FORWARD

We need bold and solid actions to turn vision into reality. On the way forward, TWAS should continue to adapt itself to the changing world, build on its strength, take on new opportunities, forge key partnerships and develop its advantages.

The year 2013 marks the 30th anniversary of TWAS. As an old Chinese saying goes, a man is steadfast at the age of 30, which also applies to TWAS. We need to look ahead for a new strategy to effectively build on what we have already achieved in the past three decades. This strategy must respond to the changing world and to the increasing need for science-based solutions to the social and economic challenges faced by the developing countries.

The growing scale and complexity of the challenges in sustainability call for collective wisdom from all stakeholders. No one is all-powerful, and TWAS is no excep-





tion. We need to build wider and closer strategic partnerships with stakeholders. TWAS should establish effective mechanisms for dialogue with governments and decision-makers in developing countries. We should spare no efforts in expanding our joint programmes, fellowships and initiatives in cooperation with organizations from both the South and the North.

As an elite group of scientists in the developing world, TWAS has a unique strength in the South. Yet, due to limited capacity in execution, it is still difficult for TWAS to fully respond to the increasing and diversified demands from the South. To this end, TWAS must enhance the role of its regional offices to ensure timely delivery of critical services to countries in their respective regions. TWAS's regional offices need to play a bigger, more effective role in networking TWAS Members, in TWAS's outreach in the regions and in coordinating major programmes and activities. Closer interaction and coordination between and among TWAS regional offices are greatly needed. The Academy's regional offices should be seen as effective executive arms of the TWAS secretariat in Trieste.

TWAS should establish effective mechanisms for dialogue with governments and decision-makers in developing countries.

The birth of TWAS was a result of the successful cooperation between the North and South, and most of the financial support to TWAS in the last three decades has been from the North. Though the support from the South has been on the increase, the North-South cooperation will remain the main channel of funding for TWAS in the years to come, and we need to spare no efforts in enhancing the North-South partnership in initiating programmes and projects in the South. Due to the economic growth of emerging economies and

their political will, South-South partnerships are emerging as a new source of funding to TWAS. Yet in absolute terms, South-South cooperation cannot – and should not – be a substitute of North-South cooperation in this regard. A triangular partnership in a complementary manner is needed to use TWAS's limited resources more efficiently.

The South and the North also need to work more closely in offering talent-training and capacity-building for the South. Special efforts should be made to help scientifically lagging countries. We also need to further facilitate interaction and cooperation between the young scientists of the North and the South. Efforts in this context will lead to better understanding and fruitful cooperation among the younger generations of scientists for the benefit of science and humanity.

Last but not least, TWAS needs to further improve its international visibility and expand its regional outreach. We need to make more governments and people in the world aware of TWAS, its achievements and activities. A continuous geographical expansion of the TWAS membership will help enhance TWAS's impacts, and we should pay due attention in nominating qualified scientists from developing countries where there currently are no TWAS members. We should take all measures in encouraging and supporting women scientists to take part in TWAS activities, and increase the number of women among TWAS members.

We need to make more governments and people in the world aware of TWAS, its achievements and activities.

The Future We Want presents TWAS not only unparalleled challenges but also rare opportunities. In addition to the report's 20 paragraphs addressing topics that are TWAS's core business, the majority of its total 283 paragraphs are related to issues of sustainability and developing countries. In brief, the central theme of this document resonates well with the mandate of TWAS. TWAS has more than enough space to execute its comparative advantages in a manner that is truly complementary to the mandates of our key partners. ■

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A MILESTONE FOR PHD FELLOWSHIPS

AFTER A SERIES OF NEW AGREEMENTS WITH THE CHINESE ACADEMY OF SCIENCES AND OTHER PARTNERS, TWAS HAS MORE THAN DOUBLED ITS PHD FELLOWSHIPS FOR STUDY IN SEVEN COUNTRIES.

For developing countries working to build their strength in science and engineering, one basic factor is among the most important: a strong corps of PhD scientists. Not only do they conduct research that solves human problems and drives economic growth, but they also become teachers and mentors, provide advice to policymakers and build international networks.

Now, under new agreements with the Chinese Academy of Sciences (CAS) and other partners, TWAS has doubled the number of PhD fellowships it offers to more than 300 per year. The growth represents a significant expansion of PhD opportunities offered by TWAS for early-career scientists from the developing world.

• The agreement with CAS, reached early this year, creates the biggest single PhD fellowship programme in TWAS's portfolio. Up to 140 early-career scientists per year from the developing world will travel to China for PhD study and research at University of Chinese Academy of Sciences (UCAS) and CAS institutes.

• Under a new programme starting this year, up to 30 students annually from the developing world will be able to pursue full-time or 'sandwich' programme PhD studies at the COMSATS Institute of Information Technology (CIIT) in Pakistan. In addition, the COMSATS

agreement provides for 30 post-doctoral fellowships and 30 visiting scholar posts per year at CIIT institutions and laboratories.

• An agreement between the World Meteorological Organization (WMO) and TWAS will support up to 10 PhD fellowships per year focused on weather, climate and water-related hazards.

"The TWAS PhD fellowships programme will serve the needs of developing countries in bringing up their own scientific capabilities, especially in those areas which are crucial to social and economic development", said Bai Chunli, president of both CAS and TWAS.

"Our goal is to build science capacity in the developing world, and every scientist and engineer with a PhD is a part of the foundation", said Romain Murenzi, the Academy's executive director. "With these agreements, we are creating a new generation of researchers and college professors with excellent training. Some will go on to become policymakers and science diplomats. Certainly, these fellowships will contribute to the long-term prosperity and health of millions of people in many nations."

TWAS currently has PhD programme partners in Brazil, China, India, Kenya, Malaysia, Mexico and Pakistan. In addition, it has programmes for postdoctoral researchers and visiting scholars in Iran and Thailand. TWAS also has struck recent agreements for postdoctoral research and visiting scholars with Universiti Putra Malaysia and Pakistan's National Centre for Physics. Currently, TWAS offers more than 500 fellowships of all sorts per year.

Bai announced the new CAS-TWAS President's Fellowship Programme shortly after assuming the TWAS presidency, during a 6 February visit to the Academy's headquarters in Trieste, Italy.

"In the next five years, up to 700 young, talented students from Africa, South America and Asia will be provided with new opportunities to start their academic career training in the CAS universities and institutes," he said. "On return to their home countries, those young researchers will be fulfilling their ambitious scientific pursuits and contributing to their home countries and people."

Added Murenzi: "We are excited and deeply gratified by this expanded partnership with the Chinese Academy of Sciences, and we look forward to working together on a programme that will bring benefits to young scientists today and long into the future."

The new President's Fellowship is open to students in natural sciences for PhD study at UCAS. TWAS will provide travel and visa expenses for up to 50 students, while their tuition and a monthly payment for housing and living expenses will be covered by CAS.

The new agreement with COMSATS will allow up to 30 students each year to pursue their PhD at one of CIIT's seven campus-

TWAS Executive Director Romain Murenzi (seated left) and Tan Tieniu, CAS's deputy secretary-general and director-general of its Bureau of International Cooperation, shake hands after signing the new fellowship agreement. Bai Chunli, president of both CAS and TWAS, stands directly behind them, surrounded by TWAS staff.

es in Pakistan, either full-time or in a 'sandwich programme' with the student's PhD programme based at another university. CIIT will provide the tuition fee and a monthly payment for living expenses, while TWAS will cover international travel and visa costs.

"We see these fellowships as our contribution to the TWAS objective of development of human resources for building up science capacity in developing countries", said CIIT Rector S.M. Junaid Zaidi. "We value our partnership with TWAS in this endeavour and would like to share our resources with other developing countries in the spirit of South-South cooperation. Interaction of our scientists with researchers from other developing countries through these, as well as the postdoctoral and senior research fellowships, will generate mutually beneficial cross-fertilization of ideas and sharing of experiences."

The agreement with the WMO, a United Nations specialized agency, creates a venture to build science capacity in least-developed and developing nations that are more vulnerable to weather-related risks and the effects of climate variability and change.

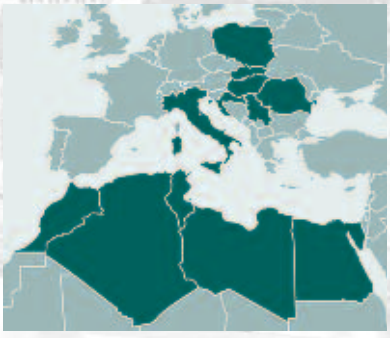
"The ever-evolving need for expertise in weather-, climate- and water-related sciences requires more resources and broader partnerships to nurture young scientists", said WMO Secretary-General Michel Jarraud. "The agreement between WMO and TWAS will help build capacity in the human resources we need to face current and future global challenges."

For more than a half-century WMO has, through its fellowships programme, cooperated with partners in building and sustaining a critical mass of experts in national meteorological and hydrological services and mitigation of natural disasters in developing countries. ■

Edward W. Lempinen

TIME-TESTED NETWORKS FOR A NEW SCIENCE ERA

TOP SCIENCE LEADERS MEETING ALONG THE DANUBE EXPLORED HOW THE SCIENTISTS OF CENTRAL EUROPE AND THE NORTHERN MEDITERRANEAN COULD RENEW OLD BONDS TO ADDRESS REGIONAL CHALLENGES.

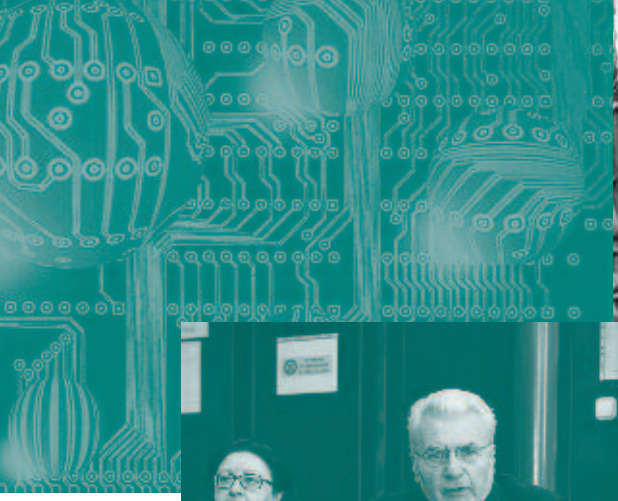


In the years of the Cold War, thousands of young scientists from North Africa and the developing world left home and travelled great distances to study in Central and Eastern Europe. Some universities and laboratories behind the Iron Curtain were among the world's best, but as the Cold War ended and the Soviet Union broke apart, those networks faded into irrelevance.

Today, however, the old networks may have new purpose. At a gathering convened by the Hungarian Academy of Sciences and TWAS, high-ranking science leaders, educators and diplomats explored whether bonds that linked the nations of Northern Africa and Central Europe during the Cold War could be retooled for the 21st century.

Speakers at the event suggested that there is a natural foundation for strong relations between the regions. They share common interests in science and engineering, and they face common, high-stakes challenges. Collaboration could bring broad potential benefits.

"Both in the Mediterranean region and in parts of Europe, we are going through serious challenges related to climate change as well as food crisis and scarcity," said Adel ElSayed Tawfik El-Beltagy, chair of the International Dryland Development Commission and president of *Centre International des Hautes Etudes Agronomiques Méditerranéennes* in Egypt. "We are going through a financial tsunami, which is hitting both Europe and the rest of the Mediterranean, along with political and socio-economic changes that emerged following the Arab Spring. All of this is creating a complex and dynamic landscape where the problems are tightly coupled.



Left: (from left) Maria Asunta Accili, Italy's ambassador to Hungary; József Pálinkás, president of the Hungarian Academy of Sciences; and AAAS President Alan I. Leshner spoke to journalists who attended the roundtable. Above: The roundtable drew nearly 50 science, policy, and diplomatic leaders from 13 countries. [photos by Mariann Őrdőg, Hungarian Academy of Sciences]

"If we don't recognize that, for Europe, the prosperity on the southern side of the Mediterranean is very important for its own security – if we don't see the 'we' – the future is bleak."

Romain Murenzi, executive director of TWAS, noted that a core of countries worldwide, including some in the Southern Mediterranean, are being left behind as other developing nations begin to prosper.

"Central and Eastern Europe have a role to play," Murenzi told a news conference during the roundtable. "They have a historical reputation for scientific excellence. During the Cold War era, they received many science students from developing countries. I would like to see if there's a possibility to develop North-South networks, just as many of us are building South-South networks."

During the Cold War, Eastern Europe featured numerous centres of excellence in science.

The roundtable – 'Science & Diplomacy: Central Europe and Southern Mediterranean' – was organized under the auspices of the 2013 Italo-Hungarian International Year of Culture and Science and held on 8 April at the Italian Institute of Culture in Budapest.

Nearly 50 science and policy leaders attended from 13 countries: Algeria, Croatia, Hungary, Egypt, Italy, Libya, Morocco, Poland, Romania, Serbia, Slovakia, Tunisia, and the United States. Important support was provided by the Italian Embassy; the Italian Ministry of Foreign Affairs; the United Nations Educational, Scientific and Cultural Organization (UNESCO); and the Swedish International Development Cooperation Agency (SIDA). IAP, the global network of science academies, was represented at the roundtable by its co-chairman, Mohamed H.A. Hassan, who also serves as treasurer of TWAS.

The day-long roundtable generated extensive news coverage in Italy and Hungary. Discussions at the event ranged broadly, from the challenges confronting women in science and engineering and the role of science academies in building research strength, to weak governance and other obstacles encountered by less developed countries as they seek to build research capacity.

For UNESCO, the focus on Africa and on women are top priorities, said Katalin Bogyay, president of the UNESCO General Conference. "We feel the empowerment of women is a very important possibility for everyone in humanity", she said. "We need to strengthen the rights of women because there are many places where they have to fight to go to school to study, to take part in a deeper sense in science and in science diplomacy as well."

Above: A press conference at the roundtable contributed to extensive news coverage in both Hungary and Italy. [Photo by Mariann Ördög, Hungarian Academy of Sciences]. Right: Valéria Csépe, deputy secretary general, Hungarian Academy of Sciences; Adel El Sayed Tawfik El-Beltagy, chair, International Dryland Development Commission (IDDC), and president, Centre International des Hautes Etudes Agronomiques Méditerranéennes (CIHEAM), *Egypt; Katalin Bogyay, president, UNESCO General Conference; and Omaima Mohamed Sawan, co-head, Agricultural and Biological Division, National Research Center, Egypt.*

BUILDING A NETWORK OF PARTNERS

Maria Assunta Accili, Italy's ambassador to Hungary, said in her welcoming remarks that the role of Trieste as an Italian – and international – centre of science is paralleled by the ambitious international role played by the Hungarian Academy of Sciences.

Trieste is "a melting pot for scientists all over the world", Accili said. "Hungary has a very, very open and extremely developed scientific research system. If we would like to enhance cooperation, which is the goal of my government, we would like to have Hungary more and more involved in the types of activities we are leading in Trieste."

Gergely Prőhle, deputy state secretary for European bilateral relations and cultural diplomacy in Hungary's Ministry of Foreign Affairs, also cited important bonds between the two nations, both historically and in contemporary times. Today, he added, his country is increasingly turning East – to the Far East, and the Middle East. For Hungary, "science and higher education play a very important role" in diplomacy, Prőhle said.

Immacolata Pannone, of the Italian Ministry of Foreign Affairs' Bilateral and Multilateral Scientific and Technological Unit, predicted that the discussions could help align the efforts of many nations.

The roundtable was planned "to improve the coordination of existing academies and organizations and to develop new partnerships by focusing on scientific research", she said. "As a result of the discussion, it will be clear that our universities, our academies and institutions, and even our industrial systems may share the same proposals and work together."

SCIENCE DIPLOMACY: CREATING NEW POSSIBILITIES

In the day's opening session, leaders in international science described the powerful potential of science diplomacy. Bogyay cited the World Science Forum, organized every two years by the Hungarian Academy of Sciences, as a compelling example of science cooperation and diplomacy. (The next Forum will be held in Rio de Janeiro, Brazil, from 24 to 27 November.)

The day's keynote speaker was Alan I. Leshner, chief executive officer of the American Association for the Advancement of Science (AAAS) and executive publisher of the journal *Science*. AAAS founded its influential Center for Science Diplomacy *(diplomacy.aaas.org)* five years ago. Leshner called TWAS "one of the most important organizations" in the world for advancing science diplomacy.

Science diplomacy is a potentially powerful tool for knitting together regional and global science communities, Leshner said. However, he added:

"If we want to build a global science community, we have to bring the emerging scientific nations into that community, and that's a very difficult issue. The reason we want diversity is not because of equity. We want diversity because we want novel ideas. Novel ideas come from people who don't come out of the long-standing traditions, but come from different traditions.

"We have to help build the capacity that we've all been talking about in a way that allows people to be full, valued partners in the global scientific enterprise."

József Pálinkás, president of the Hungarian Academy of Sciences, struck a similar note.

"Talent is spread in the world much more evenly than the output of scientific performance would have you believe," Pálinkás said. "It is our task to provide this talent with a fertile ground to flourish and make it produce outstanding results in the field of science."

He noted that Central and Eastern Europe, despite their historic strength in research, today face challenges similar to those of developing countries. "It is not a simple exercise to fight brain-drain or to ensure access to state-of-the-art research infrastructure", he acknowledged. "But it is far from impossible. The example of the Hungarian Academy of Sciences proves that by focusing existing resources in the service of excellence, it is also possible for less developed countries to make significant progress."

SCIENCE IN A POST-REVOLUTIONARY LANDSCAPE

During the years of the Cold War, Eastern Europe featured several centres of excellence in science, mathematics and related fields. And it was through science that the region maintained access to new ideas and international networks. Piotr Salwa, director of the Scientific Centre of the Polish Academy of Sciences in Rome, suggested that the experience reinforced a deeply important relationship between science and society.

> ***The hopes of the Arab Spring are giving way to economic and social instability and fears of political repression.***

"For many years, the academic world of Poland has profited from the openness that science cooperation has given us just to maintain contact with the Western world", Salwa said. "And these contacts also guaranteed circulation of ideas. I think that all the academic researchers of my age, or a bit older or a bit younger, remember very well how important this openness has been to us."

Today, a number of countries in the Southern Mediterranean region are dealing with the aftermath of revolution. But following years of autocratic governments, the hopes of the Arab Spring are giving way to economic and social instability and fears about a new generation of political repression.

Naeem Abdurrahman, a nuclear scientist and engi-

Left: (from left) Maria Assunta Accili, Italy's ambassador to Hungary; Gergely Prőhle, deputy state secretary in Hungary's Ministry of Foreign Affairs; Immacolata Pannone, of the Italian Ministry of Foreign Affairs; and Gina Giannotti, director of the Italian Institute of Culture in Budapest. Centre: Assia Harbi, research director and leader, North African Group for Earthquake and Tsunami Studies, Algeria. Right: Lidia Brito, director of UNESCO's Science Policy and Sustainable Development Division, and TWAS Executive Director Romain Murenzi at the press conference.



Above: Leshner, El-Beltagy and Bogyay delivered opening remarks at the roundtable. Right: Pannone, Accili and TWAS special adviser Giusto Sciarabba

neer who served as the Minister of Higher Education and Scientific Research in the Libyan Transitional Government, described the underfunding and neglect of education and scientific research in his country and some of its neighbours.

After many years of working in the United States, Abdurrahman returned to Libya after the fall of Muammar Gaddafi and was "surprised at the magnitude of damage that has been done to the science education and infrastructure." At a time of profound economic crisis, he added, it "is very difficult to convince public officials of the importance of science and to commit sufficient resources to education and scientific research."

At a time of crisis, it is difficult to convince lawmakers to invest in science.

NETWORKS FOR THE FUTURE

Education is critically important for addressing challenges in developing nations. So too with fellowship and exchange programmes that expose scientists to new ways of thinking. Those are some of the values defining TWAS's networks that span the South, and it's why networks extending to Central and Eastern Europe could be valuable.

Murenzi said that during his student years in East Africa, many young people from Rwanda and Burundi studied in Eastern Europe. The quality of the region's science was strong and the students were well-educated. Today, China, India, Brazil, Malaysia and South Africa are receiving students from developing counties; if Central European nations have underutilized research capacity, they might be another very valuable education destination.

Science and science education have undergone considerable changes since the end of the Cold War, speakers said. Financial pressures on former Soviet block countries are significant; many researchers have left the region to live and work in the United States or other parts of Europe.

Still, Salwa agreed, a constructive renewal of the old ties should be considered.

"My general knowledge makes me believe that there is a research potential in Poland that could be committed to projects in common with the Southern Mediterranean", he said. While nations of Eastern and Central Europe are often dealing with financial constraints and brain drain, exploring those issues and finding valuable joint projects could aid both regions.

For Poland, "there is a tradition of exchange with developing nations", he explained. "For these researchers, living and working in Poland could be interesting and constructive". For example, he suggested, some renowned Polish centres might hold great appeal for students from developing nations.

Salwa's conclusion: "I think it's major now, or within one or two years, to enter this international cooperation." ■

Edward W. Lempinen

2014 international year of crystallography

INTERNATIONAL YEAR OF CRYSTALLOGRAPHY

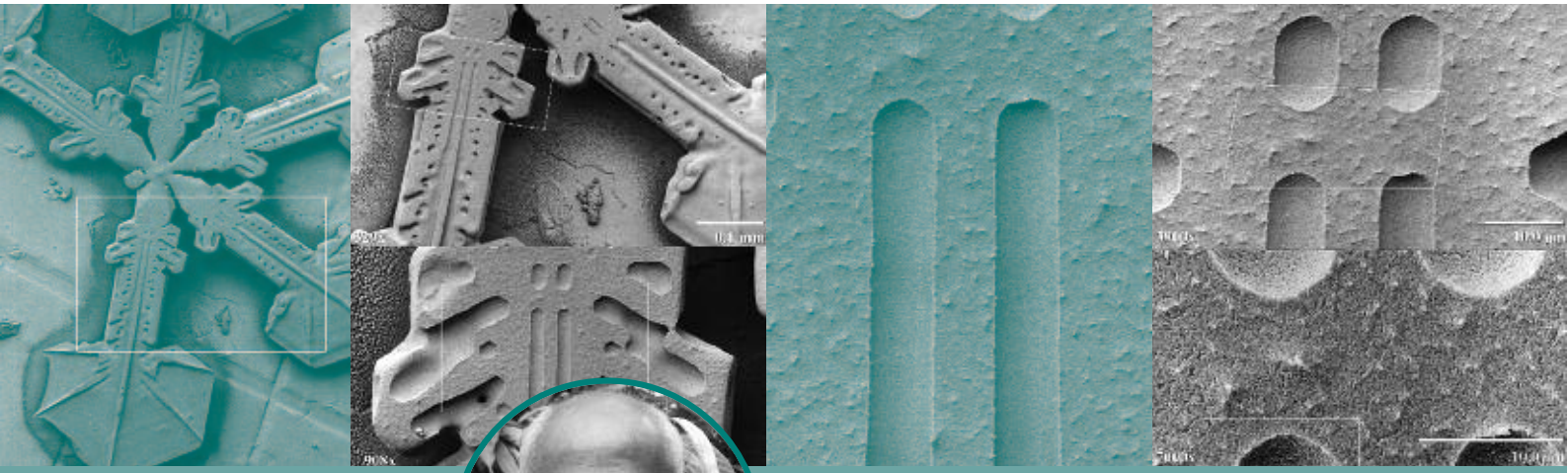
CRYSTALLOGRAPHY REVEALS THE SUBLIME BEAUTY OF NATURE, AND IT DRIVES INNOVATION IN FIELDS FROM MINING TO AGRICULTURE AND HEALTH. TODAY, IT IS CRITICALLY IMPORTANT FOR SCIENTIFIC PROGRESS IN THE DEVELOPING WORLD.

Sixty years ago, the researchers James Watson and Francis Crick earned scientific immortality with a publication detailing, for the first time, the structure of DNA. The discovery would help unlock the elemental secrets of life, and their work would later be honoured with a Nobel Prize. But the story has another, less well-known, dimension: Watson and Crick drew much from X-ray crystallographic images of DNA captured by Rosalind Franklin.

Even today, impassioned debate continues in some quarters on whether Franklin has received due credit for one of the defining discoveries of human history. But that may be emblematic for the field of crystallography: It has been an immensely powerful force over the past century, driving research that has advanced knowledge while generating countless billions of dollars in economic growth. And yet it is rarely a priority for governments and it is scarcely known by the public.

That is likely to change in the months ahead. Last year, responding to a proposal by Morocco, the United Nations declared 2014 as the International Year of Crystallography. UNESCO and the International Union of Crystallography (IUCr) are planning a range of scientific and public engagement events that seek to bring more visibility to this influential field. And many of the events will be focused on the developing world, said IUCr President G.R. Desiraju.

Crystallography "is easy to do, relatively inexpensive, extremely accurate, and generally independent of sophisticated infrastructure," Desiraju said in a recent

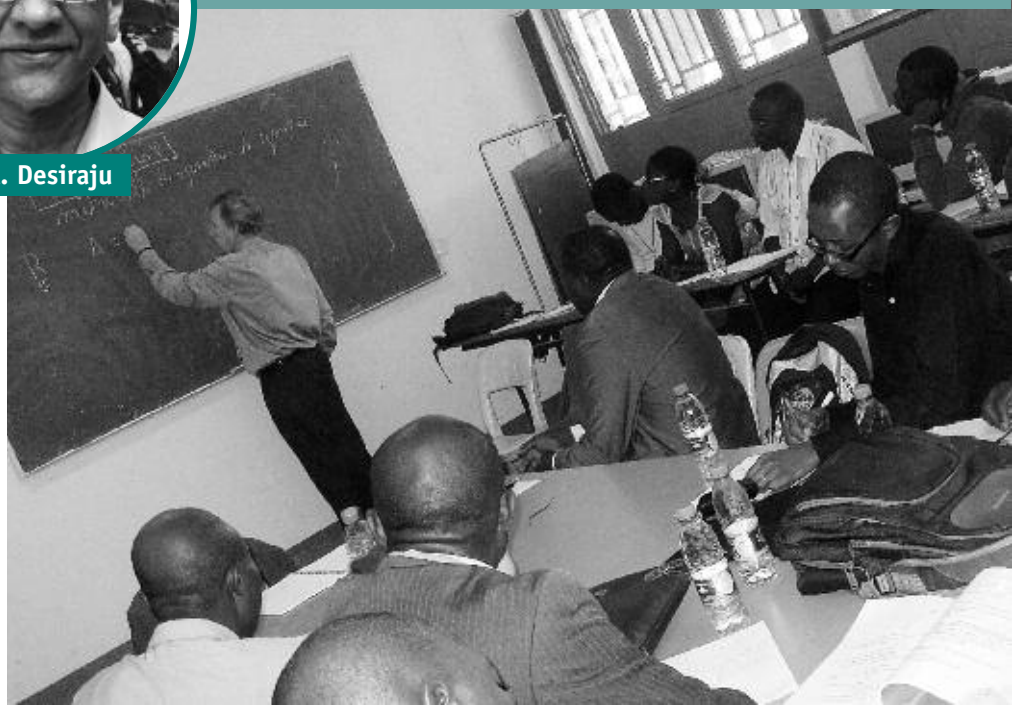


G.R. Desiraju

email interview. "Thus, in the developing world, it is the single most important technique that has led to a rapid increase in the number of quality publications in respected international journals.

"It provides training that fine-tunes desirable qualities such as precision and accuracy in scientific research, and encourages a quantitative bent of mind."

As a field of research, crystallography is a natural extension of human fascination with the symmetry seen throughout nature – in snowflakes, in minerals, and, with more powerful instruments, in the arrangement of atoms in a molecule.

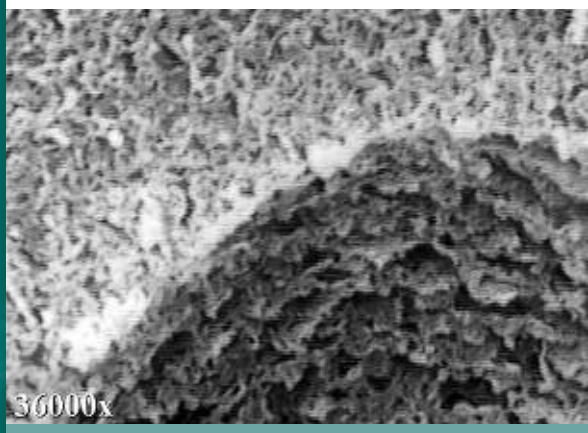


IUCr vice president Claude Lecomte (at the blackboard) teaching a crystallography workshop in Cameroon.

Next year marks the 100th anniversary of Max von Laue's Nobel Prize for the discovery of X-ray diffraction by crystals. In this process, X-ray beams can be fired at a crystalline material; by studying images of the diffraction patterns, researchers can "quickly get to the internal structure of matter", explained Desiraju, a 2002 TWAS Fellow. In 1953, Watson and Crick used Franklin's X-ray diffraction images to establish that DNA is a double-helix. Franklin, independently, had arrived at the same conclusion.

In contemporary applications, crystallography studies diffraction at an increasingly small scale, sometimes using X-rays generated by powerful synchrotron sources. Crystallography is essential in materials science; analysis of crystalline structures allows scientists and engineers to create new materials – pharmaceuticals, aerospace components, computer memory – that have considerable value in everyday life.

Though crystallography is not well known by the



Claude Lecomte

public, the Nobel Prizes are a clear reflection of its importance: Since 1900, 28 Nobels have involved crystallography, with six in the last 10 years – and in each of the last three years.

An IUCr delegation visited TWAS in March to discuss the Academy's support for the International Year of Crystallography. The delegation was headed by IUCr Vice President Claude Lecomte and also included Luc Van Meervelt, secretary general and treasurer of the IUCr; Michele Zema, project manager for the international year; and Jean-Paul Ngome Abiaga, assistant programme specialist with UNESCO's International Basic Sciences Programme in the Division of Science Policy and Capacity-Building.

Crystallography is essential in materials science, allowing scientists and engineers to create new materials.

"Crystallography should be a prime field for focus and investment by policymakers and educators in developing nations", TWAS Executive Director Romain Murenzi said after the meeting. "Nations that develop skill in this field create their own power – the power to address challenges in food production, clean water and health. That makes the International Year of Crystallography very important, and we look forward to working with Prof. Desiraju and his colleagues."

The organizers recognize the importance of crystallography for the developing world and will have a range of special programmes next year. The IUCr already funds the successful 'Crystallography in Africa' education and training programme; ambitious outreach is planned for Latin America and Asia as well.

"The generic pharmaceutical industry in India is a very good example as to how crystallography is being applied in the developing world, where there is much benefit for the common man", said Desiraju.

An opening ceremony for the International Year of Crystallography is scheduled for 20-21 January 2014 at UNESCO headquarters in Paris. Organizers are developing plans for crystallography labs situated in a hub country of different regions; students and young researchers from neighboring nations will be invited there to attend tutorials, hands-on experiments and workshops. The IUCr also will be holding summit meetings in Asia, Africa and Latin America, convening educators, industry researchers, policymakers, science administrators and others.

Desiraju is expected to discuss the plans in a speech to the TWAS General Meeting on 2 October in Buenos Aires. ■

Edward W. Lempinen

Learn more about the International Year of Crystallography at www.iycr2014.org.

PURSUING THEIR HIGHEST AMBITIONS

THE ELSEVIER FOUNDATION, THE ORGANIZATION FOR WOMEN IN SCIENCE FOR THE DEVELOPING WORLD AND TWAS HONOUR FIVE EARLY-CAREER WOMEN RESEARCHERS FOR WORK THAT CAN SAVE LIVES AND INSPIRE A NEW GENERATION.

Shyampur is a small, impoverished village of about 20,000 people in north-eastern Bangladesh, and for up to five months every year, its lowland plains are covered in floodwaters. When Nasima Akhter was growing up, she would join fellow students on a boat to school during the rainy season, and because the science teachers had only limited experience, she would return home in the afternoon and put in long hours studying on her own.

With that extra effort, Akhter won a place in a secondary school where she could study science, but it was at least a six-hour trip by train, bus or boat from Shyampur, so she had to stay with a relative instead. "It was a great challenge for me to go far away from my parents to study science at higher secondary level and then in medical college", she says now. "Each step was new and challenging for me, up to my doctoral study in Japan."

Dr. Akhter is one of five researchers in the medical and life sciences who received the 2012 Elsevier Foundation Award for Early Career Women Scientists in the Developing World. The winners come from different regions, but all share a remarkable commitment.

Joining Akhter as winners were Namjil Erdenechimeg of Mongolia; Dionicia Gamboa of Peru; Huda Omer Basaleem of Yemen; and Adediwura Fred-Jaiyesimi of Nigeria. The awards were announced in February in recognition of research that has the potential to save lives.

The honour emerged from the efforts of The Elsevier Foundation, the Organization for Women in Science for the Developing World (OWSD), TWAS and TWAS's five regional offices. It included USD 5,000 and an all-expenses paid trip to the annual meeting of the American Association for the Advancement of Science (AAAS) in Boston. The winners received their prizes at the annual Women & Minority Scientists and Engineers

The award winners (holding certificates, from left): Nasima Akhter of Bangladesh; Huda Omer Basaleem of Yemen; Adediwura Fred-Jaiyesimi of Nigeria; Namjil Erdenechimeg of Mongolia; and Dionicia Gamboa of Peru. Surrounding them are, from back left, Shirley Malcom, head of education and human resources for AAAS; David Ruth, executive director, Elsevier Foundation; Mayra de la Torre, vice president, Latin American branch of OWSD; and Romain Murenzi, executive director, TWAS. [Photo courtesy of Elsevier Foundation]

Networking Breakfast organized by AAAS Education and Human Resources.

The winners said that the prize advanced their work and gave them the confidence and public visibility to encourage other young women to pursue work in scientific fields.

Erdenechimeg, of the Mongolian Academy of Sciences, won in the East and South-East Asia and Pacific region for her work on antibodies from the serum of rat blood. "In Mongolia, there are so many women scientists coming up, so there is a chance for women to achieve success if they have a passion", she said in an interview with *Elsevier Connect*. "This award is inspiring and gives me a chance to be a role model for the young women who want to be scientists."

Winners said the prize gave them the confidence to encourage other young women to pursue scientific careers.

The award for the Arab Region went to Dr. Huda Omer Basaleem of Aden University in Yemen for her work in the fight against cancer and for the health of women and children. Basaleem said the award gave her a chance to form new networks with other scientists and advance her ability to act as a role model for other women in her field. "I'm focusing on mentoring young scientists, especially females, to enroll more actively in scientific research", she said.

Dr. Adediwura Fred-Jaiyesimi of Olabisi Onabanjo University in Nigeria won in the Sub-Saharan Africa region for her research on the effects of plant extracts on blood sugar content and alpha-amylase. In work focused especially on two plants with fermented seeds that are used to spice soups and stews in West Africa, she determined that they block enzymes that digest starch and slow the rate at which blood sugar rises. "The award is going to help me a lot", she told *Elsevier Connect*, "because what I get from the award I'm going to reinvest in my research."

Dr. Dionicia Gamboa of the Universidad Peruana Cayetano Heredia in Lima, Peru, won the award in the Latin America and Caribbean region for her molecular research on the widespread diseases malaria and leishmaniasis. Gamboa has dedicated her career to researching how to better control diseases and understand the parasites that are circulating in tropical regions. Being a scientist in a developing country like Peru is difficult, Gamboa said; science is not a priority for the government, and that means local funding is scarce. However, the award has been a boon for her career, and she's been invited to several conferences to give presentations on tropical

The award winners (from left): Nasima Akhter of Bangladesh; Dionicia Gamboa of Peru; Huda Omer Basaleem of Yemen; Namjil Erdenechimeg of Mongolia; Adediwura Fred-Jaiyesimi of Nigeria.

medicine, including a AAAS conference in South America.

"It has had a huge impact for me", Gamboa said. "I had a big interview printed in the most important newspaper in my country. People in my hometown and in the Amazon read it and sent me messages."

At Kanazawa University Graduate School of Medical Science in Japan, Akhter did molecular research on Alzheimer's disease using brain imaging on small animals. She was inspired to pursue a research career and managed to get her work published in journals such as *Nuclear Medicine and Biology* and the *European Journal of Nuclear Medicine*. Now she works at Dhaka Medical College Campus in Dhaka, Bangladesh, where she practices ultrasonography and nuclear medicine. Her job doesn't leave much time for research, but she makes time where she can. Her award, reserved for a researcher from Central and South Asia, was given for advances in detecting fetal anomalities in early pregnancy and introducing a new method for treating hyperthyroid patients.

Akhter is currently also looking for ways to screen for fetal congenital disease using blood tests and ultrasounds, also looking for opportunities to conduct research in dementia. She called the award a great life achievement. "It has inspired me to keep my spirit up to contribute more in science, to continue my struggle to remain on the track to be a good researcher", she explained. Since receiving the award, she also has felt empowered to encourage other women to become scientists.

"These five women are pioneers", said Fang Xin, president of OWSD and head of the award's selection committee. "They come from different regions and different cultures, but all of them are doing highly advanced medical and life-science research. Their creativity and achievements will contribute to saving lives around the world, and that is sure to inspire a new generation of young women to pursue their highest ambitions in science and other fields."

"If we hope to solve the challenges that confront developing nations, we must help young women in science to fully develop their skills and energy", said Romain Murenzi, executive director of TWAS. "The winners of this prize will be an inspiration not only to other young women, but to all scientists of every generation."

"The Elsevier Foundation recognizes how important professional visibility is to developing high-profile international scientific careers", said David Ruth, the foundation's executive director. "Through our New Scholars grant programmes, we strive to support early-career women scholars with mentoring, research retreats, professional visibility, child care, work-life integration and recognition programmes. The awards for these impressive women scientists represent a cooperative effort supported by Elsevier, OWSD, AAAS and TWAS to build research capacity and advance scientific knowledge throughout the developing world – and what better place than the annual AAAS conference to raise awareness among scientists, policymakers, journalists and the public about the need to retain and celebrate top women scientists." ■

Sean Treacy

The Elsevier Foundation produced a video featuring the 2013 prize winners [tinyurl.com/2013-elsevier-prize-video]. *The 2014 awards will celebrate accomplishments in chemistry. The deadline for applications is 15 September 2013.*

IAP: FIVE ACTIONS TO CUT POVERTY

THE GLOBAL NETWORK OF SCIENCE ACADEMIES, MEETING IN RIO DE JANEIRO, URGES SCIENTISTS TO TAKE THE LEAD IN EXPLORING SOLUTIONS TO THE WORLD'S GRAND CHALLENGES.

Poverty eradication and economic growth are profound long-term problems, and the world's science academies have a powerful role to play. Academy leaders, at the IAP meeting in Rio de Janeiro, urged their organizations to work together and to coordinate their strategies with United Nations agencies in a common effort to solve key challenges in health, food, water, energy, disaster management, education, and other areas. They also called for engaging with engineering and specialized academies and with the private sector.

Those were among the overarching conclusions at the 7th IAP Conference, 'Grand Challenges and Innovations: Science for Poverty Eradication and Sustainable Development', hosted by the Brazilian Academy of Sciences (BAS), from 24 to 26 February 2013. IAP is a global network of 106 merit-based science academies, with its secretariat hosted by TWAS in Trieste, Italy. It was launched in 1993 and now operates as an advisory body to governments and the public on science-related global issues.

During the IAP meeting, which hosted 160 representatives from 51 countries, academy members completed the 'Letter from Rio-2013 on the Role of Science Academies in Grand Challenges and Integrated Innovations for Sustainable Development and Poverty Eradication'. This IAP strategic document contains five specific actions that scientific academies should put in place to shape a better future for all: addressing grand challenges; opting for integrated innovation; taking leadership; mobilizing the best minds worldwide; and affirming the academies' responsibility to society.

According to the 'Letter from Rio-2013', addressing key grand challenges in sustainability, health and education is the first step. Science becomes an incisive tool to shape this process, especially when it is coupled to integrated innovation, that is, the capacity to coordinate the application of scientific, technological, social and business innovation.

"Academies may – indeed should – advocate their leadership in the often slow-motion process that identifies solutions to complex challenges", said Mohamed H.A. Hassan, who was re-elected as IAP's co-chair at the general assembly. "Such leadership is not theoretical", he added, "because science academies are in the position to mobilize the best brains ever, creating groups of experts with diverse competencies and from different countries, who represent the added value when it comes to spotting and solving problems of common interest." Strengthening the role of science academies as governments' advisors means that these bodies hold a responsibility towards society.

Science academies are in the position to mobilize the best brains to solve problems of common interest.

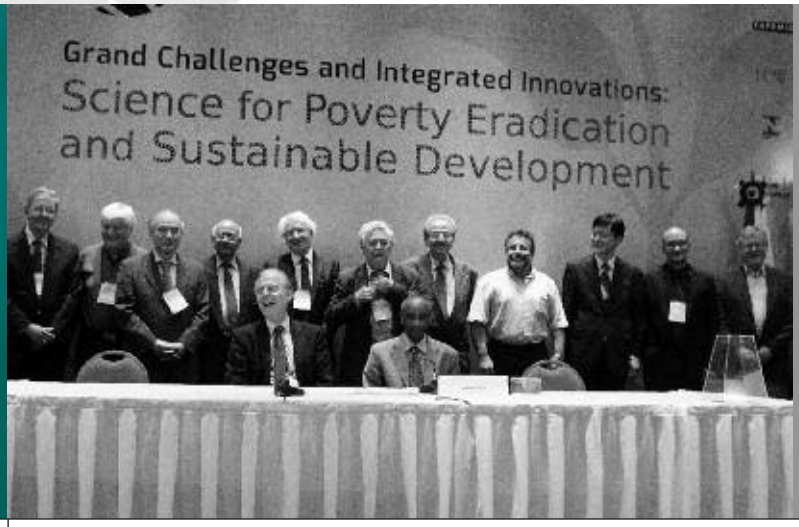
Therefore, academies' voices must remain independent with respect to governments; academies must keep their credibility; and their support to less-represented groups, such as young scientists and women scientists, has to be straightforward and assertive. For this reason, the 'Letter from Rio-2013' states, it is important that the international academies coordinate their actions, operating both at the international and local levels.

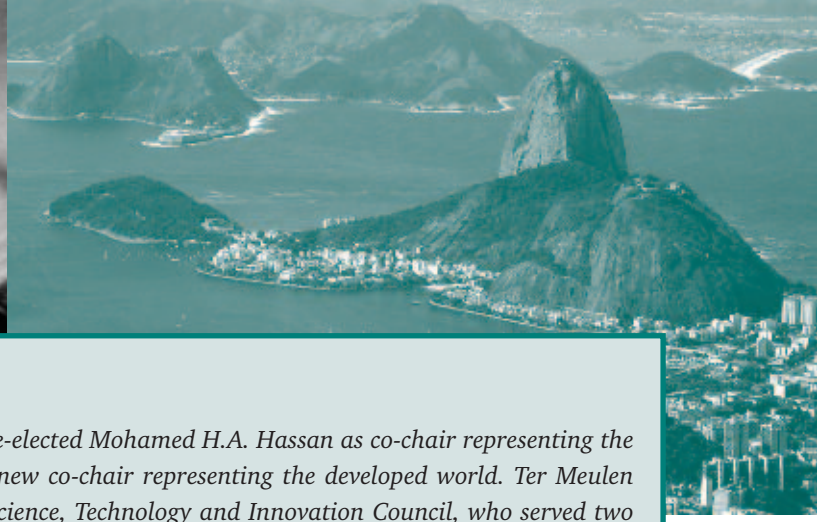
SUCCESS STORIES TO GUIDE POLICY

Acting on one grand challenge may have a domino effect, paving the way to successful outcomes in related fields. Zhang Linxiu, professor and deputy director at the Center for Chinese Agricultural Policy (Chinese Academy of Sciences), presented a case in point. She explained how improving health conditions positively reflects on school performances.

In China, she reported, there are 50 million school-aged children, 35% of them in poor rural areas. "Children of lower grade schools often underperform due to such conditions as anaemia, visual impairments and intestinal worm infections. That's why, when we move from grade 7 to 9, we observe a drop-out rate of about 38%", Zhang said. "In addition, the gap between students from big cities and students from rural areas increases with age. About 83% of students from larger cities go to high schools, compared to 40% from rural China who get educated." When it comes to higher education, the gap is even wider, with 70% of students from bigger cities going to a college, compared to 5% or less from rural areas. "This is a huge human capital that we don't want to lose", Zhang noted.

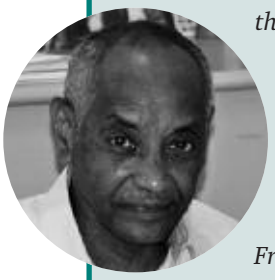
Volker ter Meulen and Mohamed H.A. Hassan (seated, from left) following the elections of the new IAP Executive Committee for the term 2013-2015 at the close of the IAP General Assembly in Rio de Janeiro, Brazil, on 27 February 2013.





IAP'S CO-CHAIRS

At its General Assembly on 27 February 2013, IAP re-elected Mohamed H.A. Hassan as co-chair representing the developing world and elected Volker ter Meulen as new co-chair representing the developed world. Ter Meulen replaces Howard Alper, chair of Canada's Science, Technology and Innovation Council, who served two three-year terms as IAP co-chair.



***Mohamed H.A. Hassan** is co-chair of IAP, and chairman of the council of the United Nations University (UNU). Born in Sudan, Hassan holds a PhD in plasma physics from the University of Oxford, UK (1974).*

He was professor and dean of the school of mathematical sciences at the University of Khartoum, Sudan.

From 1983 to 2011, Hassan was the executive director of TWAS, and he now serves as the Academy's treasurer. He is past president of the African Academy of Sciences, and serves on the Board of Trustees of Bibliotheca Alexandrina *in Egypt; the Council of the Science and Technology in Society forum in Japan; and the board of the International Science Programme in Sweden. He is also a member of several merit-based academies of science: TWAS; the African Academy of Sciences; the Islamic World Academy of Sciences;* Academia Colombiana de Ciencias Exactas *and others.*

***Volker ter Meulen** is a virologist who has held top academic and science policy posts in Germany and Europe. In 1966, he specialized in pediatrics, and in 1975 he became a full professor and chairman of the institute of virology and immunobiology at the University of Würzburg, Germany.*

From 2003 to 2010, ter Meulen was president of the German Academy of Sciences Leopoldina; from 2007 to 2010, he served as president of the European Academies of Science Advisory Council (EASAC); and from 1998 to 2002, he was dean of the faculty of medicine at the University of Würzburg.

In recognition of his scientific expertise, ter Meulen was called as political advisor on scientific issues to state and federal ministries of science in Germany.

"As a first step", she said, "we launched the Rural Education Action Project, a joint partnership with research institutions and non-governmental organizations, to increase the nutrition standards in schools of Shaanxi province, administering vitamins, iron and anti-anaemia drugs."

After four years of hard work, student performance was on the rise, and data were presented in three official policy briefs. "This helped us to launch (in October 2011) a new and more ambitious programme that allocated USD 2.5 billion per year, for ten years", said Zhang. "We secured better nutrition conditions for 680 poor western China counties. Leaders need to realize that such investments are important because today's children are tomorrow's professionals."

AN INTERNATIONAL COMMISSION ON POVERTY

The IAP conference was also the ideal setting to present new health and education initiatives, such as *Grand Challenge Brazil: Prevention and Management of Premature Birth*. This programme aims at reducing premature births, a severe public health problem for Brazil, affecting about 10% of births.

According to one announcement made at IAP's con-

Panel on 'The Future We Want: The Role of Science in Coping with the Grand Challenges Facing Humanity' moderated by Eduardo M. Krieger, Brazilian Academy of Sciences (centre). From left: Panellists Marie-Anne Van Sluys, University of São Paulo; Zhang Linxiu, Chinese Academy of Sciences; Jorge Chediek, United Nations Development Programme; and Philip Campbell, Nature Publishing Group.

ference, the global fund allocated for this purpose will count on USD 8 million to cover basic research, innovative medical products and education campaigns for the public. At least 20 high-impact research programmes will be funded through this initiative. The outcomes of this investigation should help decrease the risk and number of premature births, and also the related complications that, later, drive neo-natal and early childhood mortality.

Another grand challenge – waste management and energy production – was debated during one of the six Challenge Labs, dynamic group discussion formats where participants identified scientific or technological innovations to remove critical barriers and help solve important problems. Egyptian representative Sherien Elagroudy, an assistant professor at Ain Shams University in Cairo, said that Egypt would soon establish a Solid Waste Management Centre of Excellence in a public-private partnership. In parallel, three major objectives will be pursued: increasing innovative waste-to-energy technologies; educating people in the field; and creating public awareness on the importance of waste.

"Science, technology and innovation are certainly also one of Brazil's priorities", observed Marco Antonio Raupp, Brazilian minister of science, technology and innovation, in his welcome address. "But we are also aware that reducing poverty is a prerequisite for development." In the last ten years, 40 million Brazilians – 20% of the population – crossed the poverty

line and became middle-class. "But we can do better", said Raupp. He intends to ask the international scientific community and the UN to join forces to create an international scientific commission for poverty eradication.

LOOKING AHEAD

The IAP's General Assembly, on 27 February, marked the conclusion of the three-day conference. Key events were the election of Hassan and ter Meulen as IAP co-chairs (see box on p. 29) and of the members of the IAP Executive Committee. Of prominent importance was the presentation and approval of IAP's strategic plan, containing priorities for the three years to come. In addition, two major follow-up actions were formulated.

Tracey Elliott, on behalf of the Programmes and Strategic Planning Committee, summarized the key points of the strategic plan, which advocates the positioning of IAP and its members as independent providers of high-quality global science advice. "Not only must science academies champion science education," she said, "they shall also promote outreach activities and strengthen or establish new partnerships with other academies."

An important process that began during the previous three years was the decentralization of IAP activities at the regional level, through an established web of six Affiliated Regional Networks. This process will be further implemented to ensure support to local issues that need a local approach.

Science literacy, one of the follow-up actions in IAP's agenda, is an ambitious grand challenge that IAP wants to tackle exploiting its existing Global Science Education Programme and its linkages with the private sector.

On the same day, Jacob Palis, president of the Brazilian Academy of Sciences (ABC) and TWAS's past president, announced that ABC, through IAP, intends to propose the establishment of an *ad hoc* committee to examine how scientific academies could help eradicate poverty and promote sustainable development. In doing so, science academies will help shape the Sustainable Development Goals that will be implemented after the Millennium Development Goals expire in 2015. ■

Cristina Serra

The 'Letter from Rio-2013' and a post-conference statement signed by the two IAP co-chairs, Mohamed H.A. Hassan and Volker ter Meulen, can be found at tinyurl.com/qc58ox5 *and* tinyurl.com/pykf6fu *respectively.*

Below: A "challenge lab" at the IAP conference focused on improving science literacy. From left: Maggie Koerth Baker, columnist, The New York Times Magazine, and Martyn Poliakoff, foreign secretary, The Royal Society.

1 – *Bai Chunli, president of TWAS and the Chinese Academy of Sciences, flanked by former TWAS President Jacob Palis (far left), Lidia Brito, director of UNESCO's Science Policy and Sustainable Development Division, and, at right, Immacolata Pannone, scientific expert, Bilateral and Multilateral Scientific and Technological Unit, Italian Ministry of Foreign Affairs.*

TWAS 2013 STEERING COMMITTEE MEETING

2 – *Minister Roberto Cantone, director, Bilateral and Multilateral Scientific and Technological Cooperation Unit, Italian Ministry of Foreign Affairs.* **3 –** *Alessandra Di Pippo, Scientific and Technological Cooperation Unit, Italian Ministry of Foreign Affairs.* **4 –** *Alessandro Romanello of the* Lincei *staff (left) gives a tour of historic collections to (from left): Fernando Quevedo, director, The Abdus Salam International Center for Theoretical Physics; Romain Murenzi, executive director, TWAS; Jacob Palis, former president, TWAS; Giusto Sciarabba, special adviser, TWAS; and Mohamed H.A. Hassan, treasurer and former executive director, TWAS.* **5 –** *Original, hand-written notes from Galileo Galilei regarding his research on sunspots in the early 17th century. Galileo's signature is visible on the left page, at the bottom. The notes are preserved at the* Accademia dei Lincei. **6 –** *From left: Sciarabba, Hassan, Romanello, Murenzi, Quevedo and Palis examine a page in the* Lincei*'s archive that was signed by Galileo.*

***Accademia dei Lincei* | Rome, Italy | 5 February 2013**

HONORARY DOCTORATE

• **Calyampudi R. Rao**, a pioneering scholar in statistics and the former director of the Indian Statistical Institute in Kolkata, received an honorary doctorate degree from the State University of New York. It was the latest in a series of almost 40 honours awarded from universities in 19 countries for his work during more than 70 years in the field.

Rao was one of the first people in the world to hold a master's degree in statistics, earning the degree from Calcutta University in 1943. Today, he is professor emeritus of statistics at Pennsylvania State University and serves as a volunteer at the University of Buffalo.

Rao has provided invaluable contributions to many fields. The American Statistical Association has called him "a living legend whose work has influenced not just statistics, but has had far-reaching implications for such fields as economics, genetics, anthropology, geology, national planning, demography, biometry and medicine". A member of the US National Academy of Sciences, the Indian National Science Academy and the Royal Society (UK), Rao has authored 14 books, 475 research papers and served as adviser to 50 PhD students.

2012 AAAS MENTOR AWARD

• **Cato T. Laurencin**, professor of chemical, materials and biomolecular engineering at the University of Connecticut, received the 2012 AAAS Mentor Award for his scientific contributions and passionate mentoring activity to underrepresented minority students, many of whom now hold tenured faculty positions in biomedical engineering.

Laurencin, elected a TWAS Fellow in 2006 for his accomplishments in biomaterials and tissue engineering, is a renowned expert in the field of biomedical engineering and a leader in the field of musculoskeletal tissue regeneration. At the University of Connecticut, Laurencin is the Albert and Wilda Van Dusen Distinguished Chair Professor of Orthopaedic Surgery; professor of chemical, materials, and biomolecular engineering; and director of both the Raymond and Beverly Sackler Center and the Institute for Regenerative Engineering.

During the last 22 years, Laurencin has mentored more than 90 minority students, promoting their most

original ideas and advancing their projects in science, technology, engineering and mathematics. The AAAS Mentor Award – established by the AAAS Board of Directors in 1996 – was presented to Laurencin on 15 February at the AAAS Annual Meeting in Boston, Massachusetts.

PRESIDENT OF NYU-POLY

• **Katepalli R. Sreenivasan**, former director of the Abdus Salam International Centre for Theoretical Physics (ICTP) in Trieste, Italy, has

been appointed president of one of the oldest engineering schools in the United States, the Polytechnic Institute of New York University (NYU). The Institute has been affiliated with New York University since 2008. In his new post, Sreenivasan is expected to guide its transition into NYU's School of Engineering and to propel it to new achievements in research, innovation, education and entrepreneurship.

Sreenivasan, an esteemed physicist in the field of fluid dynamics, was elected a TWAS Associate Fellow in 1998. He was educated in India, Australia and at Johns Hopkins University in the United States. He taught at Yale University for 22 years, beginning in 1979, and served as director of ICTP from 2003 to 2009. He has published some 240 papers and supervised more than 30 PhD students.

ABDURAKHMONOV HONOURED

• Remarkable work in cotton genomics, aimed at the genetic en-

hancement of the different cotton varieties grown in Uzbekistan, has earned Uzbek biotechnologist **Ibrokhim Y. Abdurakhmonov** the 'Researcher of the Year' award. This recognition is set up by the International Cotton Advisory Committee, which launched the initiative in 2009.

Abdurakhmonov, winner of the 2010 TWAS prize in agriculture, is the director of the Centre of Genomics and Bioinformatics at the Academy of Sciences of Uzbekistan in Tashkent. He graduated from the National University of Uzbekistan and was then selected to study at Texas A&M University in the United

States, where he completed his MSc degree in plant breeding. His scientific interests focused on improving the quality of Uzbekistan's cotton that was impoverished by inbreeding procedures (the continuous breeding of a plant variety with individuals having the same genetic features).

In Uzbekistan, Abdurakhmonov established one of the most advanced molecular biology and genomics laboratories of Central Asia, and set up an efficient system for high throughput cotton transformation and identification of genes underlying economically important cotton traits.

VISITING SCHOLAR AWARD

• **Farouk El-Baz**, director of the Center for Remote Sensing and research professor of archaeology, earth sciences and electrical and computer engineering at Boston University, was recently honoured with the 2013 Ireland Visiting Scholar Award.

El-Baz earned his PhD in geology at Missouri University (1964), received an honorary PhD from Mansoura University (Egypt) and an honorary DEng from Missouri University of Science and Technology. He is a 1985 TWAS Fellow and a Fellow of the Geological Society of America.

El-Baz participated in the Apollo programme of lunar exploration, launched by NASA in the 1960s, working as secretary of lunar landing site selection, and chair of astronaut-training in visual observations and photography (1967-72).

His research in geomorphology of deserts, archaeology and geography, where he applied for the first time some advanced space imaging techniques, remains of pivotal importance.

Following the Arab Spring, El-Baz has been a prominent and respected advocate for science and technology as an important field of opportunity for young people in the Middle East.

IN MEMORIAM

• **Padma Kant Shukla**, distinguished professor of physics at Ruhr University Bochum, Germany, and TWAS 2007 Associate Fellow, passed away on 26 January 2013 in New Delhi. The day before he had been honoured with the prestigious Hind Rattan (Jewel of India) Award, a recognition bestowed on illustrious non-resident persons of Indian origin for their outstanding services, achievements and contributions.

A native of Uttar Pradesh, Shukla earned his PhD in physics from Banas Hindu University, Varanasi, India. His second doctorate degree in theoretical plasma physics was from Umea University in Sweden. In January 1973, he moved to Ruhr University Bochum as a permanent faculty member in the physics and astronomy department and became professor of international affairs (an *ad hoc* position created to honour his international accomplishments).

His copious scientific production – 70 review papers and 1,500 papers in more than 60 journals, with more than 21,200 citations and an *h*-index

of 62, plus more than 30 years of experience in committee work both at national and international levels – reflects Shukla's profound commitment to science and society.

WHAT'S TWAS?

The World Academy of Sciences - for the advancement of science in developing countries (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 1,000 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 Italian government.

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.

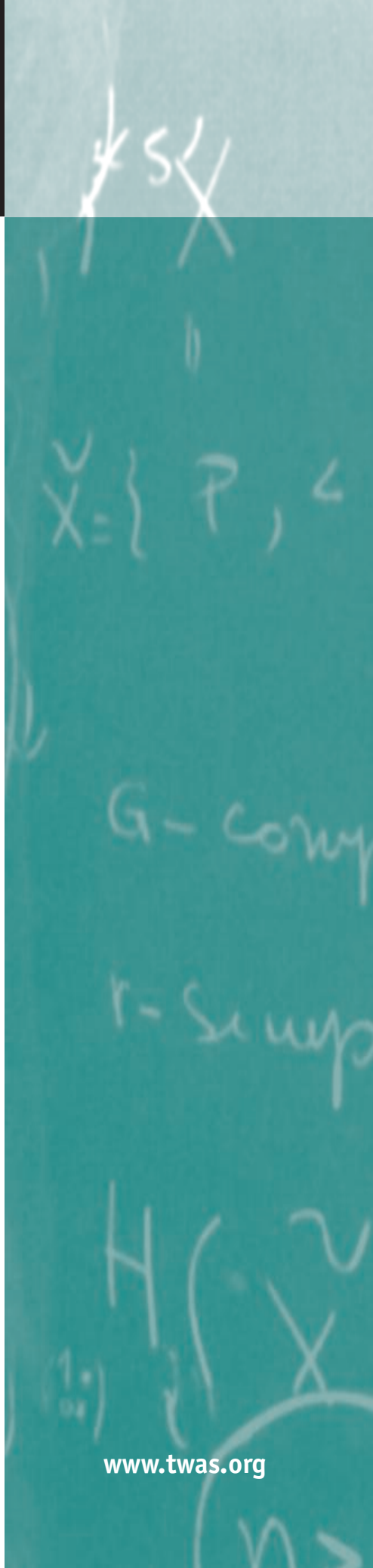
TWAS played a key role in the establishment, in 1993, of the Organization for Women in Science for the Developing World (OWSD, formerly the Third World Organization for Women in Science, TWOWS). More than 3,850 women scientists from 95 developing countries and 28 developed countries are members of OWSD, making it the largest organization of women scientists in the world. Membership also includes nearly 100 men from 31 developing countries and two developed countries. Its main objectives are to promote the leadership of women in science and technology in the South and to strengthen the participation of women in science-based development and decision-making. The secretariat of OWSD is hosted and assisted by TWAS.

www.owsdw.org

Since 2000 TWAS has provided the secretariat for IAP, the global network of science academies. IAP, established in 1993 as the 'InterAcademy Panel on international issues', unites more than 100 science academies worldwide; provides high-quality independent information and advice on science and development to policymakers and the public; supports programmes on scientific capacity building, education and communication; and leads efforts to expand international science cooperation.

www.interacademies.net

Since 2004 TWAS has also hosted the secretariat of the InterAcademy Medical Panel (IAMP), an association of the world's medical academies and medical divisions of science academies. IAMP is committed to improving human health worldwide through the coordinated action of its 70 members. **www.iamp-online.org**



www.twas.org