



twas

ANNUAL REPORT 2019

THE WORLD ACADEMY OF SCIENCES
for the advancement of science in developing countries



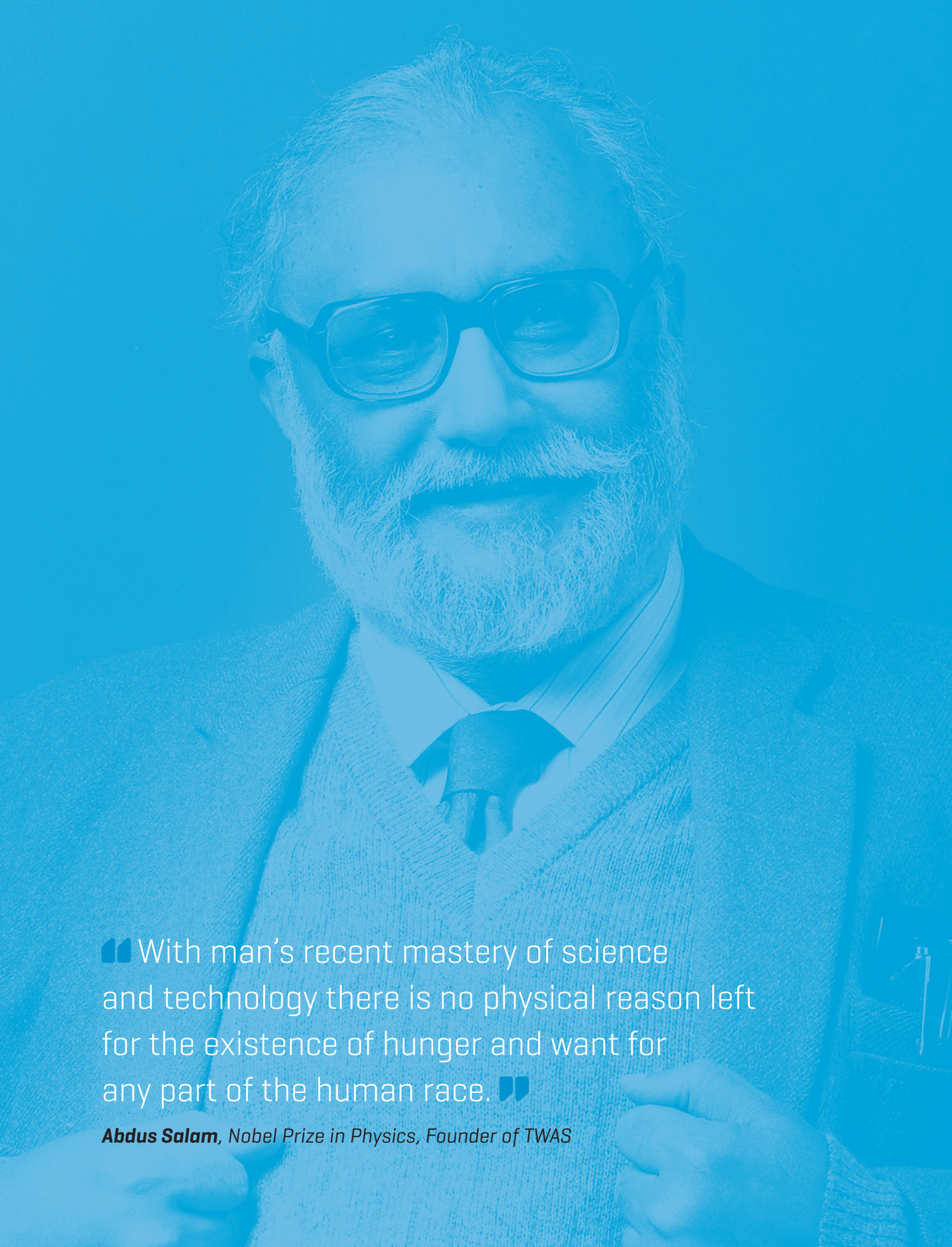
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THE WORLD ACADEMY OF SCIENCES

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A portrait of Abdus Salam, an elderly man with a full white beard and glasses, wearing a suit and tie. The image is overlaid with a solid blue color.

“With man’s recent mastery of science and technology there is no physical reason left for the existence of hunger and want for any part of the human race.”

Abdus Salam, Nobel Prize in Physics, Founder of TWAS



▲ TWAS-Fayzah Al-Kharafi
Award Winner for 2019
Antonethe Castaneda, second
from right, on a technical visit
with students to a biogas plant
in Guatemala. [Photo provided]

Cover photo: Shown are
participants in an international
workshop on cancer research,
organised by TYAN, the TWAS
Young Affiliates Network.
[Courtesy photo]

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THE TWAS COUNCIL

The TWAS Council, elected by members every four years, is responsible for supervising all Academy affairs. The current Council was elected in January 2019 to serve until the end of 2022.

President

Mohamed H.A. Hassan [Sudan]

Immediate Past President

Bai Chunli [China]

Vice-Presidents

Africa:

Moctar Toure [Senegal]

Arab Region:

Mohammed Hamdan [Jordan]

Central and South Asia:

Dorairajan Balasubramanian [India]

East and Southeast Asia:

Khatijah M. Yusoff [Malaysia]

Latin America and Caribbean:

Manuel Limonta-Vidal [Cuba]

Secretary General

Luiz Davidovich [Brazil]

Treasurer

Yang Wei [China]

Council Members

Africa:

Roseanne Diab [South Africa]

Arab Region:

Abdel Nasser Tawfik [Egypt]

Central and South Asia:

Mohammad Shamsheer Ali [Bangladesh]

East and Southeast Asia:

Bishal Nath Upreti [Nepal]

Latin America and Caribbean:

Mahabir Prashad Gupta [Panama]

Ex-officio Council Member

Atish Dabholkar [India]

Director, Abdus Salam International Centre
for Theoretical Physics [ICTP]

THE TWAS MISSION

TWAS – The World Academy of Sciences for the advancement of science in developing countries – works to advance sustainable prosperity through research, education, policy and diplomacy.

TWAS was founded in 1983 by a distinguished group of scientists from the developing world, under the leadership of Abdus Salam, the Pakistani physicist and Nobel Prize winner. By the end of 2019, TWAS had about 1,270 elected Fellows from 104 countries; 14 of them are Nobel laureates. The Academy is based in Trieste, Italy, on the campus of the Abdus Salam International Centre for Theoretical Physics (ICTP). It receives core funding from the government of Italy. The Swedish International Development Cooperation Agency – Sida – provides essential programmatic funding. The United Nations Educational, Scientific and Cultural Organization (UNESCO) administers TWAS funds and personnel.

Through more than three decades, TWAS's mission has remained consistent:

- Recognize, support and promote excellence in scientific research in the developing world;
- Respond to the needs of young scientists in countries that are lagging in science and technology;
- Promote South-South and South-North cooperation in science, technology and innovation;
- Encourage scientific research and sharing of experiences in solving major problems facing developing countries.

2019:

STRIDING TOWARD A SUSTAINABLE FUTURE



by **Mohamed
H.A. Hassan**
TWAS President

When TWAS was first founded in 1983, it was a modest operation, with a small office in Trieste, Italy, and only 42 Founding Members – 41 men and one woman.

Now, as we reflect on its 36th year, TWAS membership numbers 1,273 members, including 1096 men and 177 women. And through its vast network of critical partners and its reputation as an influential voice of developing world science, the Academy in 2019 showed many of the signs of advancement one could hope for.

As we approach a new decade, the time is now to focus on several important projects. One key challenge is to advance the diversity in our membership, our committees, and our award winners.

To achieve this task, TWAS has developed a strategy to bolster our number of scientists who are from low-income countries, as well as the number who are women. Part of this strategy has been our implementation of several awards that focus largely or exclusively on women of science in countries where support for scientific research is most critically needed.

These include the TWAS-Abdool Karim Award for women scientists in low-income African countries; the TWAS-Samira Omar Innovation for Sustainability Award, dedicated to scientists from Least Developed Countries; and the Fayzah M. Al-Kharafi Award, an annual award that recognizes exceptional women scientists from science- and technology-lagging countries.

In the realm of science policy and science diplomacy, we are proud to be a leading force in the application of science, technology and innovation to the Sustainable Development Goals [SDGs]. This is seen in several arenas.

TWAS is currently participating in discussions with the U.N. Technology Bank for the LDCs, which in 2019 completed its first full year of work helping LDCs form technology policy agendas. The missions of both TWAS and the Technology Bank coincide strongly, and we have been deeply involved with the Technology



▲ TWAS Young Affiliate Nudrat Aisha Akram, from the Government College University Faisalabad, Pakistan, is working to improve Pakistani agriculture, making crops more resistant to environmental stress.

Bank since its earliest stages. I expect that our longtime role as a supporter of LDCs will lead us to continue our significant involvement in the Bank's work, which is crucial in LDCs like Timor-Leste to advancing the 2030 Sustainable Development Agenda.

It's also worth noting that TYAN, the fast-growing TWAS Young Affiliates Network, is already an impressive force in building capacity to support technological advancement for low-income countries. TYAN is bringing many of the developing world's most promising scientific minds together and holding numerous events throughout Africa in 2019. This includes a successful workshop in Akure, Nigeria, on big data and artificial intelligence in Africa, co-organised by our friends with the Elsevier Foundation, with an eye toward making progress on the SDGs.

Our many partners make this work possible, and as always, the government of Italy and the Swedish International Development Agency [Sida] remain our core contributors. TWAS

also has taken great strides at diversifying and increasing its revenue sources through its 2019 fundraising strategy. New agreements with the Islamic Development Bank, Department of Science and Technology of India, and European Commission have led to programmes launched in 2019 that are helping to advance sustainable development and science diplomacy in the global South.

Further kind contributions made this year include support from Fondazione Ernesto Illy, the foundation of the major coffee producing company Illycaffè S.p.A. based in Trieste, which will sponsor five conferences organized by TWAS in the field of coffee research. Finally, the Kuwait Foundation for the Advancement of Sciences [KFAS], now a long-standing TWAS partner, has doubled its contribution to help fund our publications and dissemination activities, as well as scientific capacity building for developing countries in the Arab Region. We owe a great deal of thanks to all of them for their support.

A YEAR 0

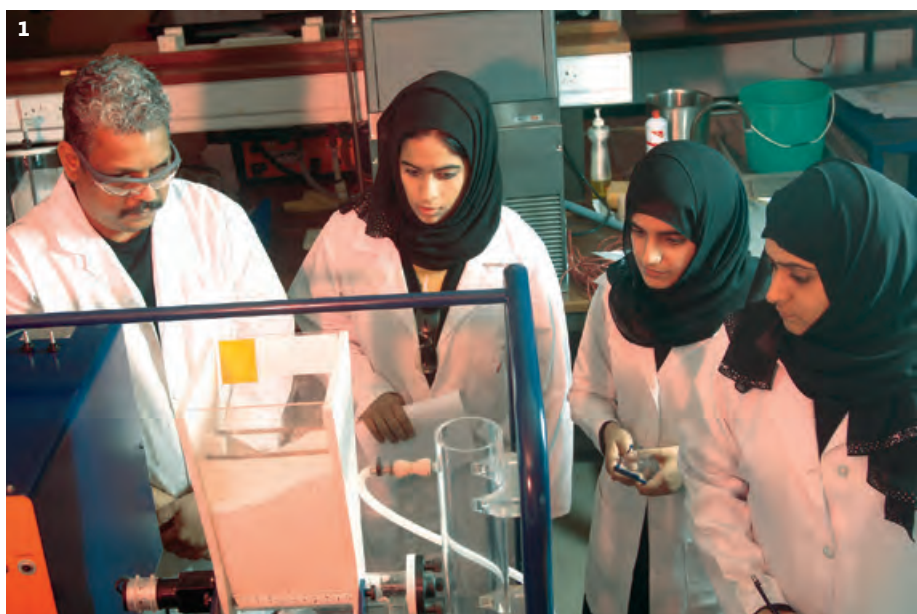
For TWAS, 2019 was a year of significant expansion in programmes, networks and the reach of its communication. The Academy continues to provide important opportunities to researchers from the developing world, and it is increasingly influential globally as a centre for science policy and diplomacy. Among the Academy's central accomplishments:

1 New IsDB initiatives take wing

Together with the Islamic Development Bank (IsDB), TWAS launched ambitious new grants and fellowships programmes, tailored for IsDB member countries. The goal is to advance research in the fields of sustainability science, with a special focus on the Bank's Least Developed Member Countries, as well as scientific research needed to support the achievement of the U.N. Sustainable Development Goals. [For more on grants, see page 18. For more on fellowship opportunities, see page 16.]

2 Major event brings big data science to Africa

TWAS partnered with the TWAS Young Affiliates Network (TYAN), and co-organised with the Elsevier Foundation a special event in Akure,



Nigeria, on big data. It's already well-known that big data and artificial intelligence techniques, such as machine learning, are changing the very nature of science, making it possible for scientists to glean deep insights from massive volumes of data. The event sought to answer the question: How can these new techniques help Africans? [For more on TYAN, see page 26]

F IMPACT



3 A distinguished speaker on science diplomacy

Lassina Zerbo, the executive secretary of the Comprehensive Nuclear-Test-Ban Treaty Organization [CTBTO], delivered the annual TWAS Paolo Budinich Science Diplomacy Lecture. Zerbo described how he has used science diplomacy skills to promote the Treaty, even while the current international security context is not always conducive to that goal. He also detailed how their monitoring system is an investment in both science and diplomacy. [For more on science diplomacy, see page 22]



4 A new film on TWAS Awards

The Academy released an up tempo promotional film exploring how its prizes and awards have a positive impact on research and careers in the Global South. The awards have been a core part of the TWAS strategy almost since its founding, the goal being to encourage scientific excellence while bringing global recognition to researchers from the developing world. In the film, recent winners describe how the honours heightened their visibility and created new opportunities. [For more on TWAS communication, see page 34]



5 The U.N. Technology Bank

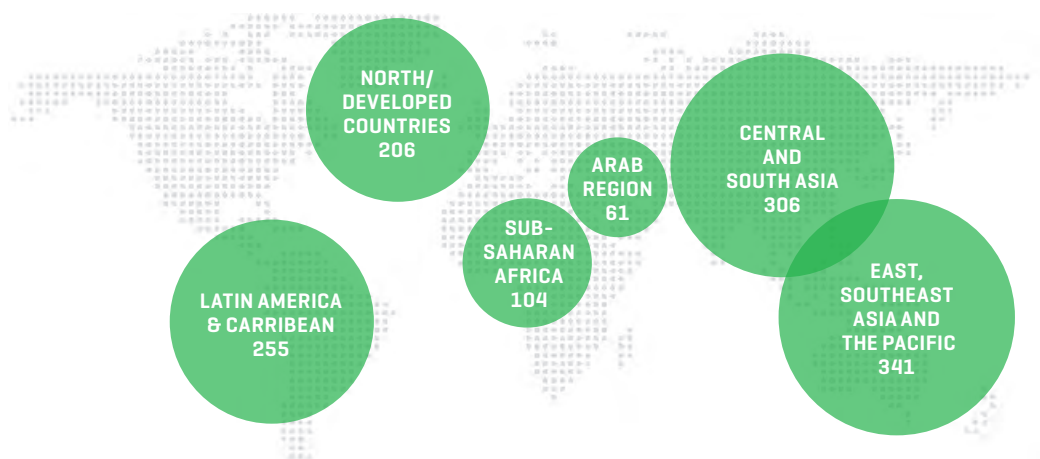
The Academy featured the early work of the U.N. Technology Bank, which began its activity in 2019, in an edition of the TWAS Newsletter. TWAS is a long-time supporter of scientific development in LDCs, featuring its early work in Timor-Leste helping the country draw up plans for its information and communications infrastructure as a pilot for a programme aiming to help out countries similarly across the world. [For more on science policy, see page 20]

WHO W

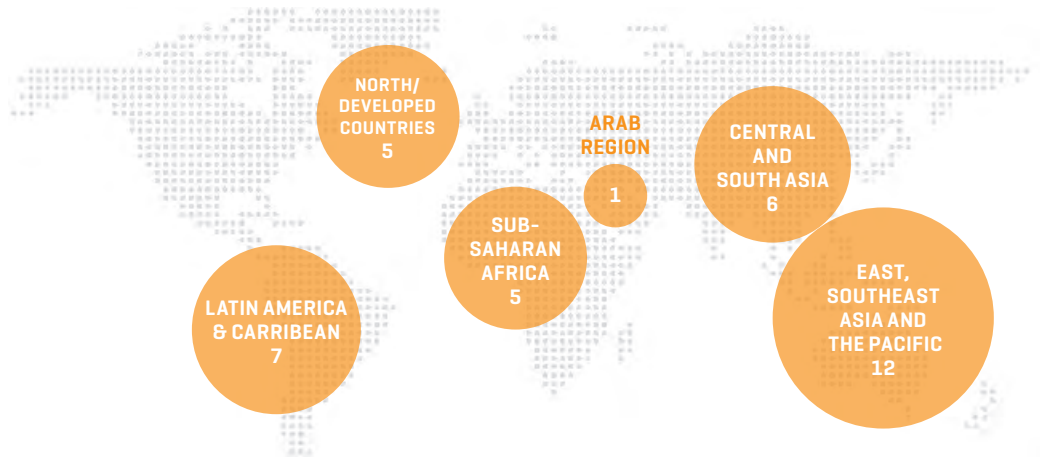
TWAS is a global, merit-based science academy, representing the elite of scientific accomplishment in or related to the developing world. Only those scientists who have achieved the highest level of international standards and have made significant contributions to the advancement of science can be elected as lifetime Fellows.

In 2017, the TWAS Council decided that Fellows elected in December of one year would be inducted 1 January of the following year. The charts below represent the membership including those elected in 2019 but inducted for 2020.

Total TWAS Fellows, by region



TWAS Fellows elected in 2019, by region




For a full list of fellows inducted in 2019, please see page 42

Fellows

 **1,273**
TOTAL FELLOWS

 **104**
COUNTRIES

 **84%**
LIVE AND WORK
IN DEVELOPING
COUNTRIES

 **14**
NOBEL PRIZE
LAUREATES

TWAS Fellows elected in 2019 by country:

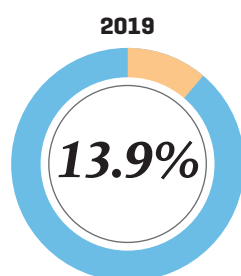
9 CHINA
5 BRAZIL
3 INDIA; SOUTH AFRICA; TAIWAN, CHINA
2 ARGENTINA
1 BANGLADESH;
CANADA; EGYPT;
IRAN; JAPAN; KENYA;
REPUBLIC OF KOREA;
NEPAL*; NORWAY*;
SINGAPORE; UGANDA

* New fellows from underrepresented countries.

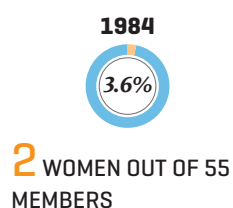
E ARE

FELLOWS AND YOUNG AFFILIATES

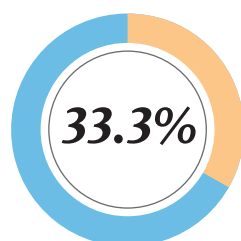
Women Fellows



177 WOMEN OUT
OF 1,273 MEMBERS



New Fellows



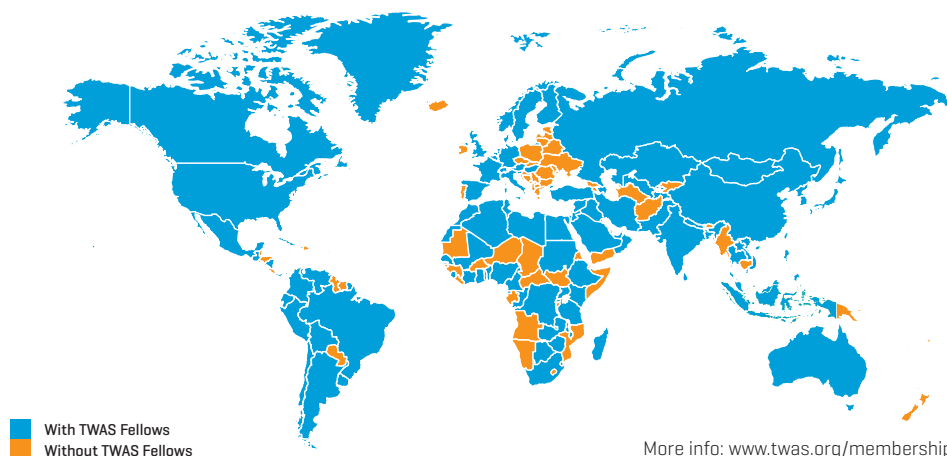
12 OUT OF **36**
TWAS FELLOWS
ELECTED IN 2019
WERE WOMEN

For a list of Fellows elected in 2019,
please see page 42.

Four long-time allies provide indispensable support that makes the work of TWAS possible:

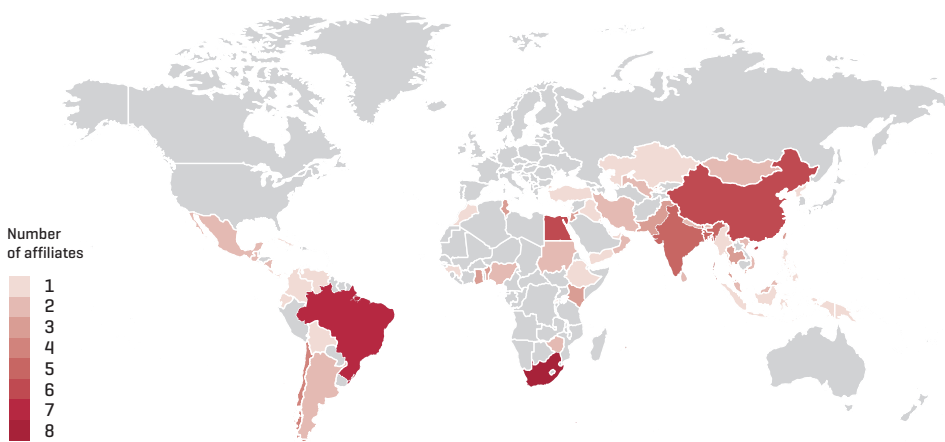
- **The government of Italy** provides core funding.
- **The Swedish International Development Cooperation Agency (Sida)** supports TWAS research grants, science diplomacy and communication initiatives, and provides support to the Organization for Women in Science for the Developing World [OWSD].
- **The United Nations Educational, Scientific and Cultural Organization (UNESCO)** administers TWAS funds and personnel.
- **The Abdus Salam International Centre for Theoretical Physics (ICTP)** hosts TWAS on its campus in Trieste, Italy, and provides valuable administrative support.

Countries with and without TWAS Fellows



More info: www.twas.org/membership-overview

TWAS Young Affiliates in 2019 by country of residence



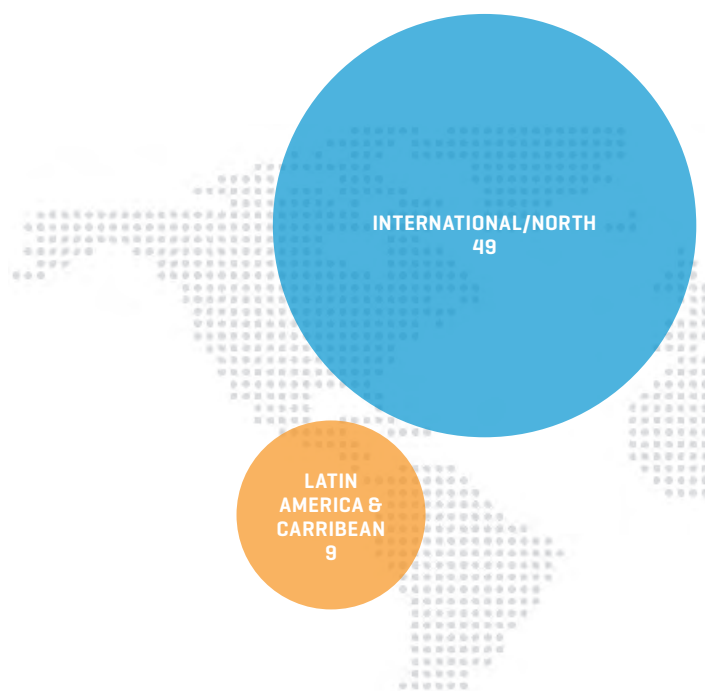
TWAS PA

INTERNATIONAL/NORTH

- Abdus Salam International Centre for Theoretical Physics [ICTP]
- Accademia dei Lincei, Italy
- Al-Fanar Media of Alexandria Trust
- Alexander von Humboldt Foundation [AvH], Germany
- American Association for the Advancement of Science [AAAS]
- Biovision, France
- Council for At-Risk Academics [CARA]
- Elsevier Foundation, The Netherlands
- Environmental Defense Fund [EDF], U.S.
- Euro-Mediterranean University [EMUNI], Slovenia
- EuroScience Open Forum [ESOF], France
- Fondazione Internazionale Trieste [FIT]
- French Foundation for Rare Diseases
- GenderInSITE
- German Research Foundation [DFG]
- Global Research Council [GRC]
- Global Young Academy [GYA]
- Institute for International Education - Scholar Rescue Fund
- The InterAcademy Partnership [IAP]
- International Centre for Genetic Engineering and Biotechnology [ICGEB]
- International Development Research Centre [IDRC], Canada
- International Institute for Applied Systems Analysis, Austria
- International Mathematical Union [IMU], Germany
- International Network of Government Science Advice [INGSA]
- International Science Council [ISC], France
- Islamic Development Bank [IsDB]
- Italian National Agency for New Technologies, Energy and Sustainable Economic Development [ENEA]
- International School for Advanced Studies [SISSA]
- Italian Ministry of Foreign Affairs and International Cooperation [MAECI]
- Japan Science and Technology Agency [JST]
- Joint Research Centre [European Commission]
- Lindau Nobel Laureate Meetings, Germany
- Ministry of Education and Research, Germany
- National Institute of Oceanography and Applied Geophysics [OGS], Italy
- New York Academy of Sciences [NYAS]
- Organization for Women in Science for the Developing World [OWSD]
- Regione Autonoma Friuli Venezia Giulia [FVG], Italy
- The Royal Society, U.K.

“ We welcome you to join us on this endeavor to build a world where science and its benefits are available to all. ”

Romain Murenzi, TWAS executive director



- Scholars at Risk
- SciDev.Net
- Science Initiative Group [SIG]
- The Scientific and Technological Research Council of Turkey [TUBITAK]
- The Solar Radiation Management Governance Initiative [SRMGI]
- Swedish International Development Cooperation Agency [Sida]
- TWAS Young Affiliates Network [TYAN]
- World Meteorological Organization [WMO]
- United Nations Educational, Scientific and Cultural Organization [UNESCO]
- The United Nations Technology Bank for Least Developed Countries [UNTB]
- U.S. National Academies of Sciences, Engineering and Medicine

RTNERS

EAST AND SOUTHEAST ASIA AND THE PACIFIC

- Academia Sinica, Taiwan, China
- Center for Genetic Engineering and Biotechnology (BIOTEC), Thailand
- China Association for Science and Technology
- Chinese Academy of Sciences (CAS)
- International Science, Technology and Innovation Centre for South-South Cooperation (ISTIC), Malaysia
- Lenovo Group Ltd., China
- Ministry of Science and Technology, China
- Universiti Putra Malaysia (UPM)
- Universiti Sains Malaysia (USM)

CENTRAL AND SOUTH ASIA

- Centre of Excellence in Molecular Biology (CEMB), Pakistan
- Commission on Science and Technology for Sustainable Development in the South (COMSATS), Pakistan
- COMSATS University Islamabad (CUI)
- Standing Committee on Scientific and Technological Cooperation of the Organisation of Islamic Cooperation (COMSTECH), Pakistan
- Council of Scientific and Industrial Research (CSIR), India
- Dawood Foundation, Pakistan
- Department of Biotechnology (DBT), India
- Department of Science and Technology (DST), India
- Indian Association for the Cultivation of Science (IACS)
- International Center for Chemical and Biological Sciences (ICCBS), Pakistan
- Iranian Research Organization for Science and Technology (IROST)
- Jawaharlal Nehru Centre for Advanced Scientific Research (JNCASR)
- National Centre for Physics (NCP), Pakistan
- S.N. Bose National Centre for Basic Sciences (SNBNCBS)

ARAB REGION

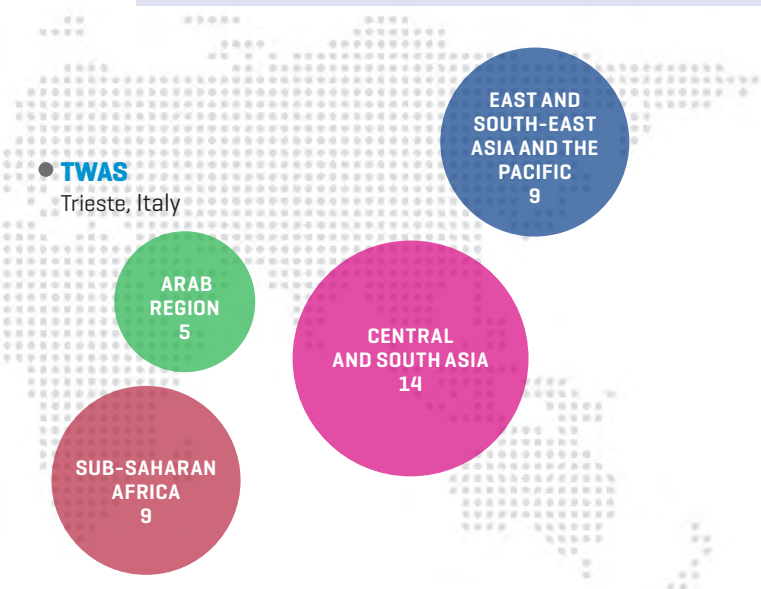
- Bibliotheca Alexandrina, Egypt
- Kuwait Foundation for the Advancement of Sciences (KFAS)
- Lebanese Association for Scientific Research (LASer)
- OPEC Fund for International Development (OFID)
- The Royal Scientific Society of Jordan

LATIN AMERICA & THE CARIBBEAN

- Academia Chilena de Ciencias, Chile
- Academy of Sciences of Ecuador (ACE)
- Brazilian Academy of Sciences (ABC)
- Brazilian Council for Scientific and Technological Development (CNPq)
- Ministry of Science, Technology and Innovation, Brazil
- The Caribbean Community (CARICOM)
- Ministry of Science and Technology of Argentina
- National Council for S&T Research (CONICET), Argentina
- National Council on Science and Technology (CONACYT), Mexico

SUB-SAHARAN AFRICA

- Academy of Science of South Africa (ASSAf)
- African Academy of Sciences (AAS)
- African Union (AU)
- Angolan Ministry of Higher Education, Science, Technology and Innovation
- Department of Science and Technology, South Africa (DST)
- International Centre of Insect Physiology and Ecology (icipe), Kenya
- National Research Foundation (NRF), South Africa
- Sudanese National Academy of Sciences (SNAS)
- Tanzania Academy of Sciences (TAAS)



HONOURING SCIENTIFIC EXCELLENCE

TWAS's awards provide an incentive for scientists to excel on new levels, while bringing global recognition to discoveries achieved by researchers in the developing world.

The Academy has a series of awards, established in recent years, focused on women from the developing world.

The **2019 TWAS-Abdool Karim Award** for women scientists in low-income African countries for achievements in biology went to Kenyan molecular biologist **Fathiya M. Khamis** from Kenya, for research on native and invasive pests that devour fruits and vegetables, and for her promotion of sustainable management of agriculture in Africa.

Learn more: www.twas.org/node/14967/

The **2019 TWAS-Samira Omar Innovation for Sustainability Award**, dedicated to scientists from Least Developed Countries, was awarded to Beninese ecologist **Etotépé A. Sogbohossou**, who is developing wildlife projects to help large carnivores survive and promote understanding of the importance of natural resources within local communities.

Learn more: www.twas.org/node/14965/

Thirteen **TWAS Award Winners** were named in 2019 to receive the honour in 2020. They include a Malaysian researcher who has made advancements in nanotechnology for desalination and wastewater treatment, and an Argentinian researcher with work relevant to managed ecosystems of the South American plains. For a full list, see page 43.





▲ Top to bottom: Tanzanian geologist Evelyn I. Mbete, Guatemalan science diplomat and political scientist Antonethe Castaneda, and Nepalese chemist Achyut Adhikari.

◀ Fathiya M. Khamis from Kenya is the 2019 TWAS-Abdool Karim Award winner for research on native and invasive pests that devour fruits and vegetables.



...
For a list
of all who won
2019 TWAS awards,
see page 43
...

“I did not imagine I would win this award, but I already know how I will use it. I would like to focus on education and use research results to raise awareness among policy makers and decision makers.”

Etotépé A. Sogbohossou, winner of the 2019 TWAS-Samira Omar Innovation for Sustainability Award

The **2019 Fayzah M. Al-Kharafi Award**, an annual award that recognizes exceptional women scientists from science- and technology-lagging countries, honoured an alumna of TWAS's science diplomacy programme, **Antonethe Castaneda**. She is working to bringing communities in Latin America together to plan for a future of renewable energy and sustainable development. [Learn more: www.twas.org/node/14968/](http://www.twas.org/node/14968/)

The **2019 C.N.R. Rao Award** went to Tanzanian geologist **Evelyn I. Mbete**. She is being honoured for her studies on volcanoes and

seismicity in a region of geological importance – the exposed outcrops of the East African Rift. [Learn more: www.twas.org/node/14972/](http://www.twas.org/node/14972/)

The **2019 Atta-ur-Rahman Award** went to Nepalese chemist **Achyut Adhikari** who won for his work using natural products chemistry in Nepal isolating compounds in regional plants that can be put to use in medicine or commercial products. [Learn more: www.twas.org/node/14961/](http://www.twas.org/node/14961/)

No **TWAS-Lenovo Award** was given in 2019, but the US\$100,000 honour will return in 2020.

EDUCATION & TRAINING

TWAS manages the world's largest South-South PhD and postdoctoral research fellowship programme. Through the Academy, its associated organizations and partners, early-career researchers can get education and experience at world-class science institutions in China, India, Pakistan, Thailand, South Africa.

Under the IMU Breakout Graduate Fellowships in Mathematics in collaboration with TWAS, awardees can remain at their home countries such as South Africa, Ukraine and Vietnam,

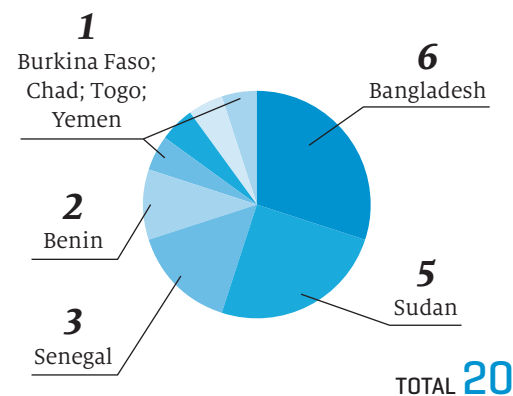
and complete their PhDs at their home institutions.

In 2019, a record 1,294 scholars were pursuing their PhDs in TWAS programmes; the third year in a row with over 1,000. So far, 96 PhD scholars are confirmed to have graduated in 2019.

Also, TWAS worked with the Islamic Development Bank (IsDB) to develop a new programme for postdoctoral fellowships underwritten by funding from the Bank. The new programme launched in 2019, with 20 awardees.



Awardees of the new IsDB-TWAS Postdoctoral Fellowship Programme:



PhD fellowships

 **310**
OFFERED

 **8** PARTNERS

 **4** COUNTRIES

Postdoctoral fellowships

 **93**
OFFERED

 **6** PARTNERS

 **3** COUNTRIES

◀ Abass Toba Anifowoshe, a Nigerian PhD research scholar evaluates the toxic potential of polluted water bodies in and around Bangalore, India.

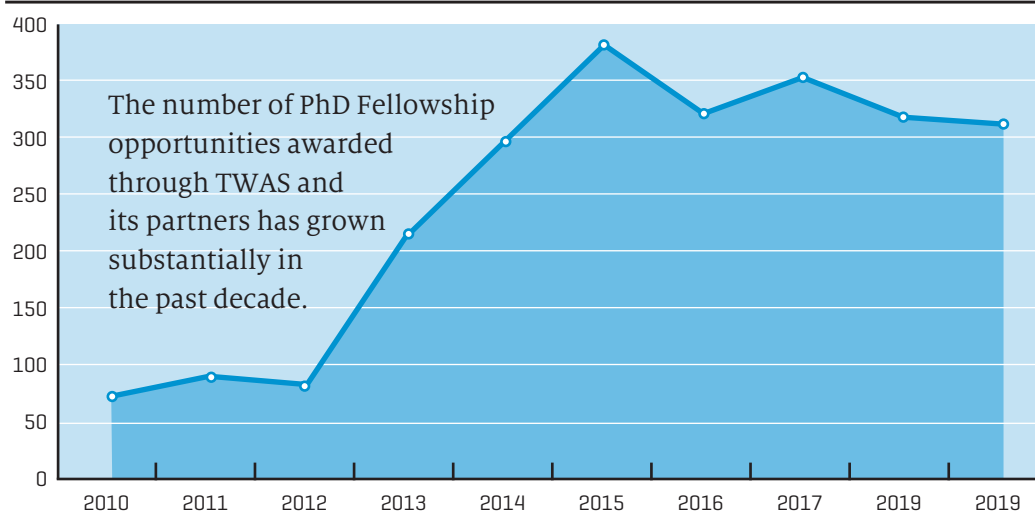
PhD fellows in 2019



1,294

TWAS PHD FELLOWS WERE ON-SITE AND WORKING TOWARD THEIR DEGREES.

TWAS PhD fellowships

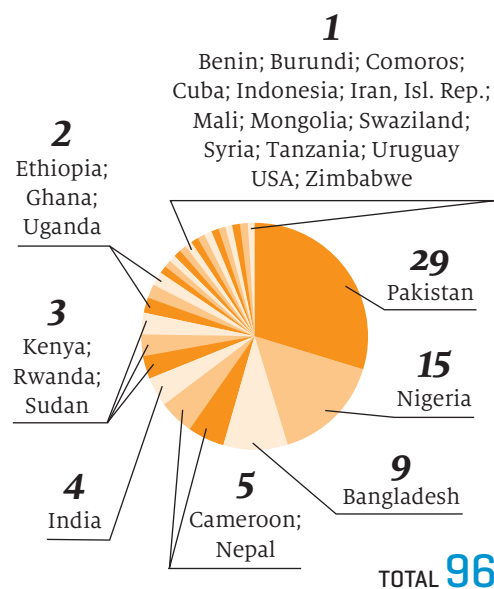


VISITING SCIENTISTS

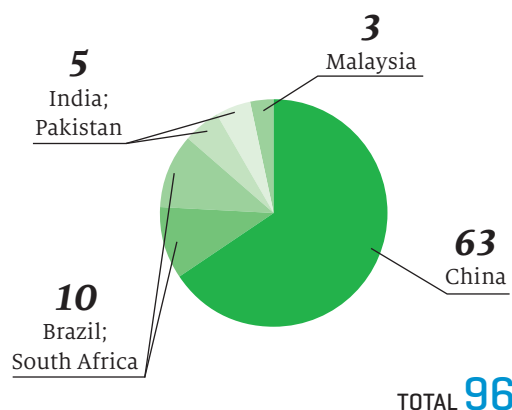
TWAS also provides opportunities to established researchers from the South to pursue collaborative research and education or provide needed expertise in a country other than their own. In 2019, the programmes included:

- **TWAS-DFG Cooperation Visits Programme:** 50 new early-career African scientists from 12 countries doing three-month postdoctoral research visits in Germany through Deutsche Forschungsgemeinschaft (DFG, or German Research Foundation)
- **TWAS-UNESCO Associateship:** Five developing-world scientists from four countries
- **TWAS Research and Advanced Training Fellowship Programme:** Nine developing-world scientists from nine countries
- **TWAS Research Professors in LDCs:** Three awardees from three countries
- **Visiting Expert Programme:** Six experts from five countries aiding scientific development in the Global South

Home country for new 2019 PhD recipients



Country of training for new PhDs



“Pursuing my PhD through the DBT-TWAS Fellowship Programme at the Indian Institute of Technology Bombay helped me a lot in the development of my independent thinking.”

Molecular parasitologist **Vishaka Dey** from Dhaka, Bangladesh

PROGRESS THROUGH RESEARCH

TWAS provides grants to researchers in targeted developing countries for specialized equipment, consumable supplies, scientific publications and the training of master's degree students. These grants help to lay a foundation for research in countries with scarce resources.

In 2019, the Academy launched a new research grant programme as part of its new partnership with the Islamic Development Bank [IsDB], called the 2019 IsDB-TWAS Grants for Research Collaboration in Sustainability Sciences. It split US\$100,000 between two researchers, one in Nigeria and the other in

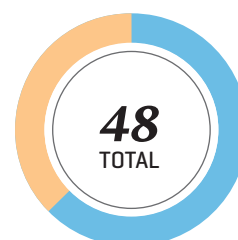
Total number of research grants



2,494

RESEARCH
GRANTS
SINCE THE
PROGRAMME
BEGAN

Research grants awarded in 2019



30 INDIVIDUAL
GRANTS [62.5%]

18 GROUP GRANTS
[37.5%]



“I received a TWAS Research Grant at a time when my research was very difficult to carry out. I used this grant to convince the Board of Founders of Ma Chung University that my research was unique and distinctive internationally.”

Indonesian photochemist **Tatas Brotosudarmo**, a 2012 TWAS Research Grant recipient and attendee of 2019's TWAS Research Grant conference in Nepal



▲ Participants at the TWAS Research Grants workshop in Nepal.

Research grants awarded in 2019

35 GRANTS TO LDCS
(72.9% OF 48 TOTAL)

17 GRANTS TO
WOMEN (35.4%)

Field of research

23 BIOLOGY

16 CHEMISTRY

5 PHYSICS

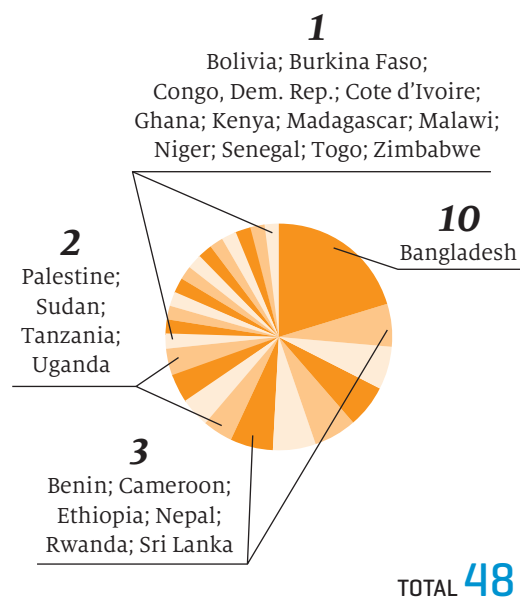
4 MATHEMATICS

Benin, working on an ambitious research project in the field of water and hygiene.

Apart from that, there were two categories of TWAS Research Grants in 2019, a programme that has been operational since 1986. TWAS Research Grants for Individuals provided up to USD15,000 to early-career researchers in 66 developing countries identified as lagging in science and technology. TWAS Research Grants for Groups provided up to USD30,000 to small research groups in those same countries. Sida supports both grant programmes, totalling over USD850,000.

Furthermore, a conference of grant awardees was organised by TWAS in Kathmandu, Nepal, in June 2019. The conference, "Building Skills for Scientific Research", brought together more than 40 participants from 11 developing countries to explore a range of critically important skills. This was the second conference of this kind, the first being held in Tanzania in 2018.

Where did TWAS research grants go in 2019?



SUPPORTING SCIENCE POLICY

With an elite network of over 1,200 scientists from 100-plus countries and 35 years of experience in the global science community, TWAS is ideally positioned to provide advice on science policy for the developing world and support for the United Nations Sustainable Development Goals.

A new technology bank: A project that TWAS was deeply involved with, the U.N. Technology Bank for Least-Developed Countries (UNTB), launched its operations in 2019.

The Bank's work includes policy advice, connecting LDCs to experts in countries that have overcome similar struggles, promoting women in science, building science academies and providing training on digital resources for scientists. TWAS is currently participating in discussions with the Bank about potential collaborative projects to help on many of these fronts.

TWAS was deeply involved in the process of conceiving the Bank. The plan for it emerged from a study by an 11-member high-level panel of experts in 2015, which included five TWAS Fellows: Academy Executive Director Romain Murenzi, who chaired the panel; current TWAS

President Mohamed H.A. Hassan; Firdausi Qadri of Bangladesh; Fang Xin of China; and Tebello Nyokong of South Africa. The panel's recommendations were then presented to then-U.N. Secretary-General Ban Ki-moon, and the U.N. General Assembly adopted a resolution for the Bank's establishment directly under the Assembly in 2016.

[Learn more: www.twas.org/node/14964/](http://www.twas.org/node/14964/)

Key support for sustainable development:

TWAS participated in several initiatives designed to support sustainability science in the





▲ Participants in the planning workshop for Timor-Leste with the U.N. Technology Bank. [Photo provided]

“Least-Developed Countries have fallen through the cracks. And there’s real danger for them unless a deliberate effort is made to address their structural challenges to fully exploiting technology.”

Joshua Setipa, managing director of the U.N. Technology Bank on what the bank is attempting to address

developing world and to advance progress toward the Sustainable Development Goals (SDGs).

TWAS joined with The Islamic Development Bank (IsDB) to establish a \$2.5 million investment in scientific capability for Bank’s member countries, launched in 2019. The programme includes postdoctoral fellowships for early-career scientists from IsDB’s least-development member countries and new grants for joint research and technology transfer projects in IsDB member countries, focused on the SDGs.

[Learn more: www.bit.do/IsDBFund](http://www.bit.do/IsDBFund)

A commitment to collaboration: At a series of high-level meetings, TWAS Executive Director Romain Murenzi held talks with Chinese Minister

of Science and Technology Wang Zhigang and other top Chinese science and education leaders to explore joint efforts to advance science in the Global South.

At the China Association for Science and Technology (CAST), Murenzi met with a group led by Huai Jinpeng, executive vice president and chief executive secretary, and including Liu Yang, director-general of the CAST Department of International Affairs. Huai and Murenzi discussed improving scientific exchanges and cooperation with the Academy. Huai said CAST and TWAS can carry out in-depth collaboration on academic exchanges, science communication, international cooperation, science education and talent cultivation.

[Learn more: www.twas.org/node/14795/](http://www.twas.org/node/14795/)

◀ Joshua Setipa, left, speaks at the U.N. Technology Bank’s assessment workshop in Timor-Leste. [Photo provided]

SCIENCE DIPLOMACY

To address regional and global challenges, the world requires effective partnerships between scientists, policymakers and diplomats. TWAS, based in Italy and with networks that span the world, is uniquely positioned to help bring these communities together.

Key partners of the science diplomacy programme include the American Association for the Advancement of Science [AAAS], which collaborates with TWAS on an annual summer course, and the Swedish International Development Cooperation Agency [Sida], which provides essential financial support.

The programme's activities in 2019 were:

Paolo Budinich Science Diplomacy Lecture

– **Lassina Zerbo**: The executive secretary of the Comprehensive Nuclear-Test-Ban Treaty Organization [CTBTO], delivered the latest in this series of prestigious lectures. Zerbo described how he has used science diplomacy skills to promote the Treaty, even while the current international security context is not always conducive to that goal. He also detailed how the CTBTO monitoring system is an investment in both science and diplomacy.

Learn more: www.twas.org/node/14820

Science diplomacy workshops: TWAS and its partners organize training workshops on science diplomacy in various locations throughout the world.

In 2019, this included the **BA-TWAS-AAAS Regional Workshop on Science Diplomacy**, Alexandria, Egypt, 12–16 June 2019. It was organized at the Bibliotheca Alexandrina [BA] through its Center for Special Studies and Programs [CSSP] with the collaboration of The World Academy of Sciences for the Advancement of Science in Developing Countries' Arab Regional Partner [TWAS-AREP] and AAAS.

It included 25 speakers from 11 countries, with participants including TWAS science diplomacy ambassadors from Egypt and Yemen and 21 young scientists from nine countries. Of these 13 women, 12 from Africa, and 5 from science-and-technology-lagging countries.

From 26–28 August was the **AAAS-TWAS Train the Trainers Course** on Science Diplomacy, held in Trieste, Italy. It was a new type of course, in which alumni of the previously science diplomacy courses sought to actualize their training.

Learn more: www.twas.org/node/14823



▲ Participants discuss science diplomacy at the AAAS-TWAS Train the Trainers Course in Science Diplomacy. (Photo: Paola Di Bella)



With the Organisation for the Prohibition of Chemical Weapons and the InterAcademy Partnership, TWAS co-organised the **OPCW-TWAS-IAP Policy and Diplomacy for Scientists: Introduction to Responsible Research Practices in Chemical and Biochemical Sciences**, in Trieste in September. This event included 19 participants from 18 countries. Of these 8 women, 7 from Africa, and 5 from science- and technology-lagging countries. [Learn more: www.twas.org/node/14824](http://www.twas.org/node/14824)

The Academy participated in two **S4D4C Science Diplomacy Workshops**, held in Trieste, Italy, in October and in Vienna, Austria, in November. S4D4C – which stands for Using Science for/in Diplomacy for Addressing Societal Challenges – works to support European science diplomacy, European Union foreign policy goals and especially the

development of solutions for global challenges. The Trieste workshop, hosted by TWAS, drew over 30 speakers and participants from over a dozen countries.

[Learn more: www.twas.org/node/14861/](http://www.twas.org/node/14861/)

TWAS also joined **The BRIDGES Network**, [Big Research Infrastructures for Diplomacy and Global Engagement through Science]. This is an informal network of people who deal with science diplomacy and international relations in international research organisations.



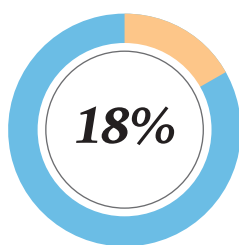
“ So you have 90% to 95% percent of the planet saying ‘no’ and ‘never’ to nuclear testing, and only eight states remain to join the overall majority. ... Our job is to build trust and confidence for the others to be comfortable with the signature and ratification of the CTBT. ”

Lassina Zerbo, Paolo Budinich lecturer on science diplomacy and nuclear proliferation

ADVANCING WOMEN

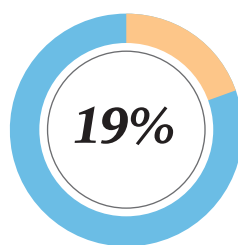
Supporting women in research is a central part of TWAS's mission. The Academy and its partners offer numerous opportunities to women in the developing world; they also help institutions learn how to support women researchers. This can be valuable for the careers of each individual researcher, but critical for activating a nation's full scientific potential.

PhDs created by TWAS in 2019



17 OUT OF **96**
PHDs CREATED BY
TWAS AND PARTNER
INSTITUTIONS IN 2019
ARE WOMEN

PhD fellowships to women



49 OUT OF **256**
PHD FELLOWSHIPS
AWARDED BY TWAS
IN 2019 WERE
RECEIVED BY WOMEN

TWAS hosts two influential partners at its offices in Trieste, Italy:

The Organization for Women in Science for the Developing World (OWSD) emerged from a conference organized by TWAS in 1988. It is the first international forum for women scientists from the developing and developed worlds to strengthen their roles in research and science leadership. At the end of 2019, OWSD had more than 9,000 members, over 90% of them women with scientific masters or doctorates who are living and working in developing countries.

OWSD also conducted its second year of the Early Career Women Scientists Fellowship. It's new class included 20 fellows, 11 of them from Least Developed Countries (LDCs). They are provided with up to USD50,000 over two years to establish high-level research centres at their institutions. The fellowship is supported by Canada's International Development Research Centre (IDRC).


Learn more: www.owsd.net/career-development/early-career-women-scientists-ecws-fellowships

That programme complements the OWSD PhD fellowships for women researchers,



OWSD PhD fellowships for women from sub-Saharan Africa, LDCs

 **453**
TOTAL

 **276** HAVE
GRADUATED
[61%]

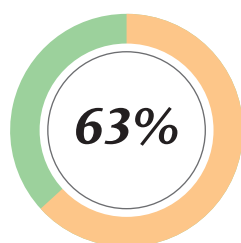
 **187** ARE
ONSITE [39%]

Fellowships awarded 1998-2019.

► The winners of the 2019 OWSD-Elsevier Foundation Award for Women Scientists in the Developing World receive their prizes. Pictured are, Narel Paniagua-Zambrana [Bolivia]; Uduak Okomo [Gambia]; Tabassum Mumtaz [Bangladesh]; Amira Shaheen [Palestine, West Bank and Gaza Strip] and Tista Prasai Joshi [Nepal].

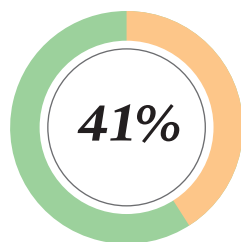


Scientists awarded PhD fellowships through OWSD in 2019



17 OUT OF **27**
WERE FROM
LEAST DEVELOPED
COUNTRIES (LDCs)

Women who received PhDs through OWSD in 2019



9 OUT OF **22**
WERE FROM
LEAST DEVELOPED
COUNTRIES (LDCs)

“ These scientists are performing ground-breaking international-level science, often in circumstances where the deck has been stacked against them. They deserve to be honored and celebrated for their dedication not only to their research, but to creating a better world for people to live in. ”

Jennifer Thomson, OWSD president, on the winners of the OWSD-Elsevier Foundation Awards

supported by the Swedish International Development Cooperation Agency [Sida].

[Learn more: www.owsd.net/career-development/phd-fellowship](http://www.owsd.net/career-development/phd-fellowship)

OWSD also partners with the Elsevier Foundation to organize annual Awards for Early Career Women Scientists in the Developing World. The 2019 winners were physical scientists and engineers from Bangladesh, Bolivia, The Gambia, Nepal and Palestine [West Bank and Gaza Strip], recognized for their work in environmental microbiology, ethnobotany, clinical pediatrics and epidemiology. [Learn more: www.owsd.net/career-development/awards](http://www.owsd.net/career-development/awards)

GenderInSITE (GIS) is an initiative dedicated to advancing science, technology, innovation and engineering policies and programmes focused on the importance of gender equality. GIS works to raise awareness among policymakers, institutional leaders and others. It's hosted by OWSD and TWAS and supported by Sida. In 2019, GIS launched a report on women in

scientific leadership, Pathways to Success, in Paris, followed by a regional launch at the Global Forum on Women in Scientific Research event in Dakar, Senegal, in July 2019. They also launched a Spanish language version in November, and finalized a policy brief summarizing the reports key findings and recommendations for women in global science leadership. GenderInSITE's Regional Focal Point for Latin America and the Caribbean co-organized a workshop with private tech company Capgemini, to raise awareness and provide guidelines to overcome gender stereotypes and biases in tech-sector work environments, and to share strategies to integrate a gender lens into technological production. Another project aimed at developing a digital literacy programme for indigenous women living in rural areas in northern Argentina trained 25 mentors. [Learn more: www.genderinsite.net](http://www.genderinsite.net)

GenderInSITE

YOUNG SCIENTISTS

Early-career scientists represent a proactive group of scientific experts in the developing world who can provide energy and fresh ideas about the major challenges in their regions. Any effort to build scientific capacity in the global South must focus on their development, so that future generations of science can continually flourish.

For this reason, TYAN — The TWAS Young Affiliates Network — was formed to reinforce ties among the Academy's Young Affiliates. TWAS, in collaboration with five TWAS Regional Partners, selects up to 25 outstanding young scientists under the age of 40 as TWAS Young Affiliates, for a period of five years. After five years, they become Alumni. To date, there are 241 TWAS Young Affiliates and Young Alumni, and TYAN organises them into a group where they can network and build on each other's careers and accomplishments.

By sharing their scientific expertise, skills and ideas, they can have an impact on developing countries through the organization of scientific workshops, networks and public meetings with policy makers, entrepreneurs, journalists and the public at large.

TYAN was founded in 2016, meeting for the

first time at the TWAS General Meeting in Kigali, Rwanda. And since then it has blossomed into an active organization, for which 2019 was a year of acceleration and accomplishment.

The organization held three **international thematic workshops** in different developing countries in 2019.

One, the "3rd TYAN International Thematic Workshop on Sustainable Agriculture, Food Security and Biotechnology: Best Strategies and Good Practices" took place in **Munastir, Tunisia**. It included discussions on topics such as agricultural biodiversity, food safety regulation and standards, and industrial biotechnology. Among the co-organisers was the Islamic Development Bank [IsDB].

The next major event, in **Akure, Nigeria**, was on big data and artificial intelligence in Africa. It was organised by TWAS, TYAN and the Elsevier Foundation, and designed to plant the seeds for critical data-analysis expertise on the continent. "The 4th TYAN International Thematic Workshop and 1st African Symposium on Big Data, Analytics and Machine Intelligence for Financial, Health and Environmental Inclusion in Developing Countries" brought together over



▲ From top: assistant professor of botany Nudrat Aisha Akram is an active TYAN member, and 2014 TWAS Young Affiliate Atunga Nychieo, a member of TYAN.



▲ Participants in an event on data science in Akure, Nigeria, organized by TYAN, the Elsevier Foundation, and TWAS.

70 new and established researchers in this field from 14 different countries – 8 of them African. [Learn more: twas.org/node/14745/](https://www.twas.org/node/14745/)

And the last was a thematic workshop on infectious diseases in Africa, held in **Durban, South Africa** and jointly hosted with an important TWAS partner, the Academy of Sciences of South Africa (ASSAf). The main aim was to increase knowledge and build capacity in infectious disease research among early career researchers in the Africa region. The main aim of convening this symposium from a One Health stance stems from the growing global threats

of epidemics and the need for realisation of a collective sense of responsibility towards a proactive public health regime.

In November 2019, TYAN held the first regional meeting of young scientists from Latin America and the Caribbean in Rio de Janeiro. This meeting brought together about 70 people from 18 different nations, assembling young scientists to discuss their scientific work, their regional constraints and challenges, and the science funding landscape for the region. A special session brought together journalists and scientists to discuss science communication.

TWAS also highlighted the work of two TYAN members who have made an impact in their fields. They include:

Atunga Nyachieo of Kenya, who is using bacterial parasites called bacteriophages, or phages, to overcome antibiotic resistance that poses a severe threat to public health. And **Nudrat Aisha Akram**, a Pakistani botanist, who is actively involved in improving Pakistani agriculture by devising new strategies to make crops more resistant to environmental stressors. [Read more about Nyachieo: www.twas.org/node/14630/](https://www.twas.org/node/14630/)
[Read more about Akram: www.twas.org/node/14727/](https://www.twas.org/node/14727/)

“The idea behind this event is to gather young scientists together and help them to increase their knowledge and amass their strength. This will help the developing world by providing a means to use this big data and find meaningful patterns [in the data] to solve some problems.”

Bolanle Ojokoh, a data scientist who serves on the TYAN Executive Committee and organised an event on artificial intelligence in Tanzania

GLOBAL ACADEMY NETWORKS

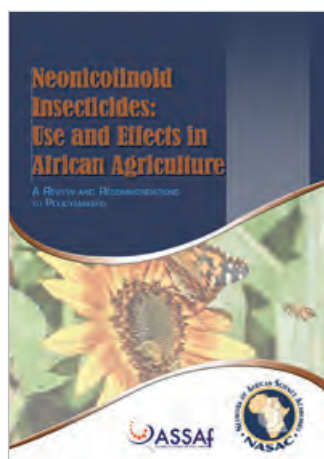
TWAS works in close association with several international science academies dedicated to advancing science in the developing world and promoting sustainable development.

The InterAcademy Partnership (IAP), brings together 140 national, regional and global member academies that collaborate to support the vital role of science in seeking evidence-based solutions to the world's most challenging problems. In particular, IAP harnesses the

READ THE IAP STATEMENTS

- A call for action to declare trauma as a disease:
www.tinyurl.com/TraumaStatement
- Neonicotinoid Insecticides: Use and Effects in African Agriculture. A Review and Recommendations to Policymakers:
www.tinyurl.com/InsecticideReport
- IAP Statement on Tropical Forests and Climate Change:
www.tinyurl.com/IAP-Forests
- Improving Scientific Input to Global Policymaking:
www.tinyurl.com/IAP-Improving





expertise of the world's scientific, medical and engineering leaders to advance sound policies, improve public health, promote excellence in science education, and achieve other critical development goals. IAP's secretariat is based at TWAS headquarters in Trieste, Italy, and at the U.S. National Academies of Science, Engineering and Medicine in Washington, D.C.

Among the major accomplishments of IAP in 2019 are:

- Released several reports, including: a statement encouraging countries to consider trauma a disease in their health agendas; a report concluding that urgent action is needed to prevent damage to African agriculture and biodiversity by neonicotinoid insecticides, which included a peer-reviewed study on the issue that IAP collaborated on with the Network of African Science Academies (NASAC); a report exploring pathways for feeding science into the Sustainable Development Goals and ways IAP and its members can contribute more; and a communique on tropical forests outlining measures to respond to deforestation and forest burning.



- Held its triennial General Assembly in Songdo, Korea, on 11 April 2019. The meeting, hosted by the Korean Academy of Science and Technology (KAST), brought together 74 representatives of science academies from some 50 countries as well as the four IAP regional networks and the Global Young Academy. The assembly followed a two-day conference 'Science and the Sustainable Development Goals: The Role of Academies', attended by nearly 200 leading scientists, policy practitioners and delegates from 54 science, medical and engineering academies from around the world.

[Learn more: www.interacademies.org](http://www.interacademies.org)

The Chinese Academy of Sciences (CAS) is the hub of China's ambitious research enterprise, and it has historically had close ties with

“ We are facing a global crisis: the Amazon forest fires have attracted intense global attention, but this catastrophe affects the rest of the world as well. Thousands of fires ravaged Bolivia, Indonesia, Malaysia, Singapore, India, not to mention many countries in Africa. ”

Masresha Fatene, IAP Policy co-chair, on the IAP communique on tropical forests

TWAS. Eminent researcher Bai Chunli, a former president of TWAS, is the current president of CAS. CAS collaborates with TWAS on the CAS-TWAS President's PhD Fellowship programme and the five CAS-TWAS Centres of Excellence, providing the majority of TWAS's PhD fellowships. CAS also joined with TWAS to hold the 17th CAS-TWAS-WMO Forum on Ecohydrology and Climate Change in Beijing, China. CAS hosts the TWAS Regional Office for East and South-East Asia and the Pacific.

[Learn more: english.cas.cn](http://english.cas.cn)

The Academy of Science of South Africa

(ASSAf) is one of Africa's leading advocates for science and technology, and hosts TWAS Sub-Saharan Africa Regional Partner at their headquarters in Pretoria.

[Learn more: www.assaf.co.za](http://www.assaf.co.za)

[Regional Partner website: www.twas-rossa.org.za](http://www.twas-rossa.org.za)

The International Mathematical Union (IMU)

collaborates with TWAS to sponsor a fellowship that provides scholars from the South with the financial backing to pursue PhDs in maths, with a goal of building a strong corps of mathematicians in developing countries.

[Learn more: www.mathunion.org](http://www.mathunion.org)



REGIONAL PARTNERS

TWAS partners in five major regions of the developing world perform vital Academy functions: They nominate scientists for membership and prizes and select Young Affiliates. They organize conferences and, in the process, they raise awareness of TWAS and its programmes among scientists in each region. And they help to advance support globally for science among policymakers and the public.

...
The 2019 TWAS Regional
Awards were given for
Science Diplomacy.
...

RIO DE JANEIRO, Brazil ●
Brazilian Academy of Sciences

▼ 2019 TWAS Regional Award Winner: **Claudio Landim**, Brazil



LATIN AMERICAN AND THE CARIBBEAN (TWAS-LACREP)

Hosted, alongside the TWAS Young Affiliates Network (TYAN), and the International Science Council (ISC) the "22nd TWAS LACREP Young Scientist Conference" and the "1st TYAN Regional Conference for Latin America and Caribbean Region" in Rio de Janeiro, in November. It was a multidisciplinary meeting where young scientists discussed their scientific work, the constraints and the challenges for the development of Science in Latin America and the Caribbean.

► 2019 TWAS Regional
Award Winner: **Michael
Umale Adikwu**, Nigeria

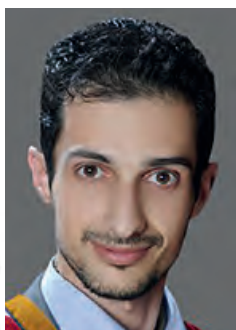
► 2019 TWAS Regional
Award Winner: **Thomas
Edison Dela Cruz**,
Philippines



EAST AND SOUTH-EAST ASIA AND THE PACIFIC (TWAS-SAPREP)

Supported TWAS and COMSATS in the organization of a workshop held in Gebze, Turkey, focused on raising awareness on the Sustainable Development Goals (SDGs) and the associated challenges in building capacity in least-developed and science- and technology-lagging countries. Organized a workshop held in Dakar, Senegal, aimed to establish a permanent mechanism of partnership to support the China-Africa cooperation in achieving the SDGs.

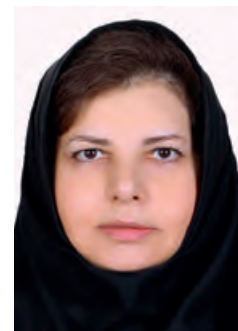
▼ 2019 TWAS Regional
Award Winner: **Murad
AlDamen**, Jordan



ARAB REGION (TWAS-AREP)

Held the BA-TWAS-AAAS Regional Workshop on Science Diplomacy, exposing 23 participants to key contemporary international and regional science policy issues while providing an overview of how science, technology and innovation contribute to policy development, global governance and conflict resolution. The event was held in June at Bibliotheca Alexandrina in Alexandria, Egypt.

▼ 2019 TWAS Regional
Award Winner: **Alizadeh
Anahita**, Iran



● **TRIESTE, Italy**
ITCP Campus

● **ALEXANDRIA, Egypt**
Bibliotheca Alexandrina

● **BEIJING, China**
Chinese Academy of Sciences

● **BANGALORE, India**
Jawaharlal Nehru Centre
for Advanced Scientific Research

● **PRETORIA, South Africa**
Academy of Science of South Africa

CENTRAL AND SOUTH ASIA (TWAS-CASAREP)

Organized a regional meeting of young scientists on the topic "Impact of Climate Change - A way forward" in September in Dhaka, Bangladesh, in association with Bangladesh Academy of Sciences, Dhaka. Of the 24 attendees from Bangladesh, Nepal, Bhutan, Kyrgyzstan, Maldives and Sri Lanka, 10 were women scientists. Topics included the impact of climate change on natural resources and bio-diversity and advocacy of policies related to climate change.

SUB-SAHARAN AFRICA (TWAS-SAREP)

Collaborated to hold four events of note, including the Young Scientists' Symposium "One-Health: A focus on Infectious Diseases in Africa" in Durban, South Africa; a Learning Collaborative on Science Diplomacy at AMASA 15 in Accra, Ghana; a transdisciplinary conference named Connecting Minds Africa at Minds Africa Conference in Nairobi, Kenya; and the TWAS-SAREP Regional Young Scientists' Conference in Nairobi, Kenya.



TWAS & ITALY

For over 35 years, TWAS has had a strong partnership with the Italian government, with the Italian Ministry of Foreign Affairs and International Cooperation [MAECI] serving as a focal point. Italy provides core funding to the Academy and makes possible its work to advance science in the developing world. Together, Italy and TWAS have helped developing countries build important skills, creating an environment that supports innovation.

Here are highlights of the TWAS-Italy partnership from 2019:

Screening of film on refugee scientists: At an event organised by the University of Trieste Department of Human Sciences and TWAS in Trieste, Italy, experts urged institutions and decision-makers to capitalize on the knowledge of refugee scientists.

This was part of a public event on displaced scientists at Stazione Rogers in Trieste on 10 April. The event featured local researchers, including one from Yemen, and offered an audience of scholars, students, and professors the opportunity to watch TWAS' documentary "Science in Exile", a 37-minute film about four scientists fleeing from war-torn nations,

and to discuss the scientific and social issues raised by the researchers' experiences.

Learn more: www.twas.org/node/14708

Trieste Next: The international science festival Trieste Next every year brings about 50,000 visitors to Trieste, Italy, including scientists,

▼ Trieste Next TWAS roundtable panelists stand outside the "Palazzo della Regione" in Piazza Unità, Trieste, Italy.





▲ Chairperson Alessandra Ressa (center) introducing the four panelists at the 2019 edition of Trieste Next. From left: Fernando Buarque, Bolanle Ojokoh, Laura Margheri and Tshilidzi Marwala.

journalists, professionals, policymakers, students and others interested in science and related issues. In 2019, the event's theme was "Big Data, Deep Science," and 2019's TWAS-organised roundtable there was about the benefits and potential risks of the Fourth Industrial Revolution, in particular for developing countries.

Held before an overflow crowd of 150 people, the roundtable featured TWAS Fellow Tshilidzi Marwala, vice chancellor and principal at University of Johannesburg, South Africa; Bolanle Ojokoh, an associate professor in the department of information systems, Federal University of Technology, Akure, Nigeria; Fernando Buarque, head of the Computational Intelligence Research Lab at the University

of Pernambuco, Brazil; and Laura Margheri, an expert in bioinspired robotics, and soft robotics research, with the Center for Micro-BioRobotics of the Istituto Italiano di Tecnologia in Pisa, Italy. TWAS Executive Director Romain Murenzi welcomed the audience, and Italian journalist Alessandra Ressa served as moderator.

[Learn more: www.twas.org/node/14868/](http://www.twas.org/node/14868/)

Night of Researchers: At an event titled Street Science, TWAS chaired a discussion with 12 scientists presenting their research in five minutes with three minutes of discussion of the audience. The event was held in Trieste, Italy's historic main square, Piazza Unità.



“AI is neither good nor bad. It is a very powerful tool that can offer guidance in various fields: to predict future wars, to make precise medical diagnosis and to enhance efficiency in trades.”

TWAS Fellow **Tshilidzi Marwala**, a panelist at the 2019 edition of Trieste Next

A STORY TO COMMUNICATE

To have an impact on global science and policy, TWAS must convey its ideas and work to an international audience that includes not just scientists, but policymakers, journalists, educators, students and the public. Building on its successful digital communication strategy, the Public Information Office (PIO) pursued several projects to support the Academy's initiatives.

The interactive **TWAS Online Directory** now encompasses the latest scientists to join the TWAS community, including researchers who have achieved elite status working in some of the world's least developed countries.

The directory, launched in 2018, is designed

to give unprecedented global visibility to TWAS Fellows and Young Affiliates. In 2019 TWAS expanded its roster, adding 46 new lifetime TWAS Fellows; 25 Young Affiliates – scientists aged 40 and under – were selected for five-year terms. Most come from developing countries; some among them are the first TWAS Fellows in their countries.

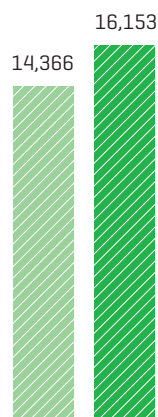
The directory, replacing the printed TWAS Yearbook, offers powerful search tools and infographics to show the work and impact of its worldwide community. At the same time, the digital directory lightens the Academy's environmental footprint and reduces costs. Development of the Online Directory was supported by the Swedish International

▼ A new TWAS video produced in 2019 features some of the Academy's prestigious award winners.





Facebook



LIKES
IN 2019

+ 12.4%



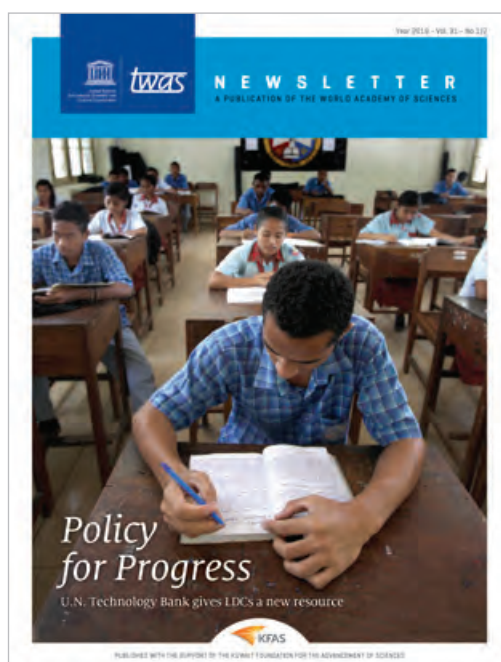
Twitter



FOLLOWERS
IN 2019

+ 25.1%

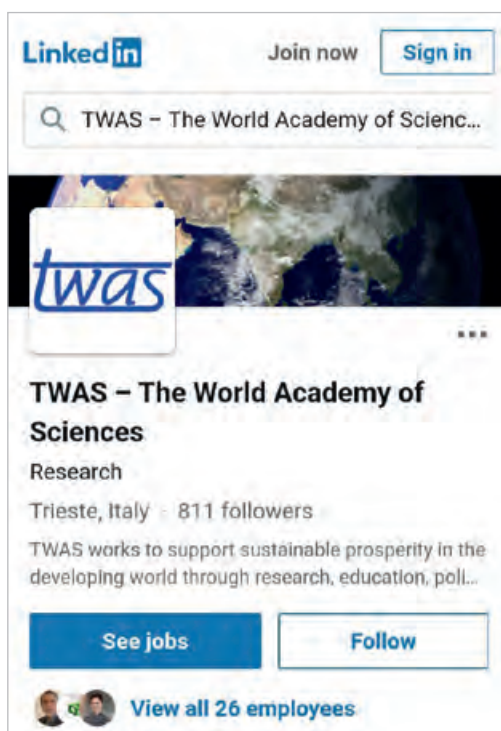
From 1 January to 31 December 2019.



Development Cooperation Agency [Sida] and the Kuwait Foundation for the Advancement of Sciences [KFAS].

Visit the Online Directory: www.twas.org/directory

TWAS launched its new **LinkedIn** page, the third social media platform that TWAS uses for outreach after Twitter and Facebook. Using



LinkedIn's unique role in the social media ecosystem as a career-building tool, TWAS's new page frequently shares information on its high-impact programmes and grants. Officially launched in September 2019, by the year's end, the new page had already collected 701 followers.

Visit the TWAS LinkedIn page: www.linkedin.com/company/twas-science/

New issues of the **TWAS Newsletter** focused on the early work of the newly launched U.N. Technology Bank, which TWAS had a deep role in developing. A feature article in the edition details much of technology-policy development work in Timor-Leste, the bank's first mission. Another issue featured winners of TWAS's various 2019 awards.

The Academy's bi-monthly e-bulletin, **TWAS Plus**, saw a 12.4% increase in subscribers, climbing from 37,419 in the beginning of 2019 to 42,050 at year's end.

twasPlus
News and Opportunities
from The World Academy of Sciences

FINANCIAL REPORT 2019

TWAS received a total of USD4,012,152.76 in funding for 2019, including USD12,690.62 in individual contributions. We are grateful for the generous contributions from our numerous supporters – some who have aided our work for many years, and others who have joined our team more recently. Their investments make possible our challenging and critical work in the developing world.

FINANCIAL REPORT 2019 (IN USD)

INCOME ¹ 2019	
Balance brought forward 01.01.2019	771,460.55
1) Ministry of Foreign Affairs, Italy	1,723,858.12
2) Swedish International Development Cooperation (Sida)	1,344,418.34
3) Kuwait Foundation for the Advancement of Sciences (KFAS)	100,000.00
4) Ministry of Science, Technology and Innovation - MCTI, Brazil	92,696.92
5) Academia Sinica, Taiwan, China	50,000.00
6) Regione Autonoma Friuli Venezia Giulia, Italy	40,322.43
7) Lenovo Group Limited, China	40,000.00
8) International Mathematical Union, Germany	29,950.00
9) Fondazione Ernesto Illy, Italy	21,881.80
10) Siwei Cheng Foundation, China	13,043.48
11) American Association for the Advancement of Science, USA	10,700.00
12) Quarraisha Abdool Karim, South Africa	7,000.00
13) Searle, Pakistan	7,000.00
14) C.N.R. Rao, India	6,980.00
15) F.M.A. Al-Kharafi, Kuwait	6,000.00
16) Samira Omar Asem, Kuwait	6,000.00
17) Academia Chilena de Ciencias, Chile	5,274.72
18) Other Membership Fees	12,690.62
19) Other miscellaneous income	8,531.37
20) Interest income	114,855.00
21) Exchange difference	(510.59)
22) Transfer to Endowment Fund	(400,000.00)
TOTAL	4,012,152.76

¹ All contributions are expressed in US dollars and have been converted using the UN official rate of exchange in effect at the time the contributions were received.

EXPENDITURES 2019	App. Budget	Rev. Budget	Spent
1) Awards			
1.1) Twas Lenovo Science Award	112,150		
1.1.1) Award cost	100,000		
1.1.2) Other costs	12,150		
1.2) Twas Awards and Medals	63,000		
1.3) Fellows Awards	31,490	31,490	31,490.00
1.3.1) Award costs	23,000	23,000	23,000.00
1.3.2) Other costs	8,490	8,490	8,490.00
1.4) TWAS – Siwei Cheng Award in Economic Sciences		12,149	12,149.00
1.5.1) Award costs		10,000	10,000.00
1.5.2) Other costs		2,149	2,149.00
<i>Sub-total for [1]</i>	<i>206,640</i>	<i>43,639</i>	<i>43,639.00</i>
2) Research Grants			
2.1) Grants to Individual Scientists	309,800	305,849	305,848.00
2.2) Grants to Research Units	407,710	376,379	376,379.00
2.3) Support for MSc Students	136,850	129,250	129,240.00
2.4) Research Grants Meeting	29,460	35,740	21,275.17
2.5) Research Grants Network	2,000	1,923	1,287.00
2.6) Support for Inter Meeting	14,640	13,887	
2.7) Support for Open Access	14,640	13,887	13,825.00
2.8) Regional Conference Young Scientists	95,040	92,077	91,463.23
2.9) Selection Committee	2,000	2,458	1,826.39
2.10) Science Diplomacy	33,260	33,040	32,756.37
2.11) Communications	19,010	18,416	7,091.58
2.12) Monitoring	22,810	22,463	
2.13) Staff and office space	243,300	231,374	173,469.37
2.14) Additional Research Grants	113,834	113,834	100,938.74
2.14.1) Research Grants Meeting	2,140	2,140	
2.14.2) Research Grants Network	2,140	2,140	1,930.51
2.14.3) Support for Inter Meeting	15,480	15,480	8,117.65
2.14.4) Support for Open access	3,424	3,424	2,909.36
2.14.5) Regional Conference Young Scientists	21,590	21,590	18,921.23
2.14.6) Monitoring	51,570	51,570	51,570.00
2.14.7) Staff and office space	17,490	17,490	17,489.99
2.15) Sustainable Programme for Refugee and Displaced Scientists		80,835	
<i>Sub-total for [2]</i>	<i>1,444,354</i>	<i>1,471,412</i>	<i>1,255,399.85</i>
3) Fellowships, Associateships and Professorships			
3.1) Fellowship Programmes	330,000	290,000	129,487.07
3.2) Associateship, Professorship & Visiting Programmes	85,000	125,000	65,392.98
<i>Sub-total for [3]</i>	<i>415,000</i>	<i>415,000</i>	<i>194,880.05</i>
4) Meetings			
4.1) Council and General Meetings	15,000	15,000	2,631.13
4.2) Steering Committee and other Official Meetings in Trieste	15,000	25,000	18,170.39
4.3) Trieste Next 2019	2,500	2,500	2,497.65
4.4) Official Visits to TWAS Executive Director in Trieste	5,000	10,000	7,385.93
<i>Sub-total for [4]</i>	<i>37,500</i>	<i>52,500</i>	<i>30,685.10</i>
5) Publications			
5.1) Publications	35,000	35,000	34,429.99
5.2) Other costs	11,730	11,730	11,730.00
<i>Sub-total for [5]</i>	<i>46,730</i>	<i>46,730</i>	<i>46,159.99</i>

Continue next page

EXPENDITURES 2019	App. Budget	Rev. Budget	Spent
6] Joint Projects			
6.1] TWAS Regional Partners	60,000	61,924	54,441.70
6.2] TWAS - Arab Regional Partner Activities	46,730	46,730	29,730.00
6.2.1] Regional Conference for Young Scientists	25,000	25,000	11,000.00
6.2.2] Other activities	18,000	18,000	15,000.00
6.2.3] Other costs	3,730	3,730	3,730.00
6.3] TWAS/COMSTEC Research Grant	100,000		
6.4] Science Diplomacy Programme	9,345	10,000	9,507.63
6.5] Sustainability Oriented Activities	130,840	93,988	68,208.20
6.5.1] Symposium, Fellowships and South-North Exchange Programme	126,170	89,318	63,538.20
6.5.2] Other costs	4,670	4,670	4,670.00
6.6] Solar Radiation Management Governance Initiative Activities	311,332	331,265	160,376.94
6.6.1] Grants	50,563	65,000	28,111.01
6.6.2] Meetings	60,000	63,368	24,189.74
6.6.3] Other activities	30,000	30,000	10,000.00
6.6.4] Staff costs	140,000	140,153	75,278.56
6.6.5] Other costs	4,519	4,519	2,589.90
6.6.6] Additional new activities	26,250	28,225	20,207.73
6.7] Focused Mathematics Activities	28,000	28,000	28,000.00
6.7.1] Fellowships	24,600	24,600	24,600.00
6.7.2] Other costs	3,400	3,400	3,400.00
6.8] Collaboration with ICTP Activities	50,000	50,000	50,000.00
6.9] Young Affiliates Network	179,750	230,282	58,711.93
6.9.1] Fellowships	154,750	205,282	33,711.93
6.9.2] Other costs	25,000	25,000	25,000.00
6.10] Collaboration Activities with Local Authorities	60,000	35,000	33,901.03
6.11] Additional Funds for Research Grants		30,000	34,059.96
6.12] Collaboration Activities with Italian Research Institutions		14,256	14,256.00
6.13] Coffee Research Conference		20,470	135.00
Sub-Total for [6]	975,997	951,915	541,328.39
7] Operational Expenses			
7.1] Staff Costs	1,300,000	1,300,000	1,198,945.63
7.2] ICTP Services	45,000	95,000	80,000.00
7.3] Communications	25,000	25,000	7,670.83
7.4] Strategic Communications	30,000	30,000	14,682.59
7.5] Travels	30,000	30,000	20,476.62
7.6] Fundraising Activities	10,000	10,000	2,920.18
7.7] Library, office and other supplies	15,000	22,000	14,883.45
7.7.1] General supplies	10,000	13,500	9,954.02
7.7.2] Equipment	5,000	8,500	4,929.43
7.8] Other general operating expenses	25,000	25,000	18,153.00
Sub-total for [7]	1,480,000	1,537,000	1,357,732.30
Management costs	221,331	213,275	155,009.76
Total expenditure	4,827,552	4,731,471	3,624,834.44
Savings on prior years' obligations			440,280.08
Excess (shortfall) of income over expenditure			827,598.40
Reserve Fund²			
Amount available at the beginning of period			2,038,141.60
End of service entitlements			[248,305.06]
Reserve fund balance end of period			1,789,836.54

² The purpose of the Reserve Fund is to cover the end-of-service entitlements of TWAS staff

TWAS ENDOWMENT FUND 1994-2019³ (IN USD)

ORGANIZATIONS	CONTRIBUTIONS RECEIVED
1) Ministry of Sciences and Technology [China]	2,200,000
2) Ministry of Science & Technology [Brazil]	1,933,107
3) Department of Science & Technology [India]	1,000,000
4) National Science & Technology Council [Mexico]	739,155
5) Academia Sinica [Taiwan, China]	608,915
6) Ministry of Science & Technology [Nigeria]	586,779
7) Kuwait Foundation for the Advancement of Sciences, KFAS [Kuwait]	500,000
8) Ministry of Research, Science and Technology [Iran, I.R.]	269,183
9) Prof Mohammad Ahmad Hamdan, Jordan	170,000
10) Ministry of Science, Technology & the Environment [Malaysia]	100,000
11) Ministry of Science & Technology [Pakistan]	100,000
12) Secretariat of Science and Technology [Argentina]	55,000
13) Ministry of Modernization & Technology [Senegal]	52,887
14) Colombian Institute for the Development of Science & Technology – Colciencias [Colombia]	50,000
15) Ministry of State for Scientific Research [Egypt]	50,000
16) Atomic Energy Commission [Syria]	50,000
17) Ministry of Finance [Sudan]	49,850
18) National Centre for Science and Technology of Vietnam, [Vietnam]	20,000
19) National Academy of Science and Technology, [Philippines]	11,957
20) Ministry of Science & Technology, [Bangladesh]	10,000
21) Ministry of Science, Technology and Higher Education, [Tanzania]	4,529
22) Shui-Chin Lee Foundation	3,000
23) Swedish Council of Higher Education [Sweden]	1,302
24) Office of the Prime Minister, [Jamaica]	1,000
25) Instituto Venezolano de Investigaciones Científicas [IVIC], [Venezuela]	300
<i>Subtotal</i>	8,566,964
<i>Plus other contributions⁴</i>	183,316
<i>Plus interest earned</i>	6,765,777
<i>Net Transfer to TWAS Fund (2011-2019)</i>	-1,625,768
TOTAL	13,890,289

³ The aim of setting up this endowment fund was to build a fund of USD25 million, with interest earnings to cover costs of the secretariat and basic programmes.

⁴ This amount comprises donations from TWAS members, individuals and other organisations' contributions [see separate list, next page].

CONTRIBUTIONS TO THE ENDOWMENT FUND FROM TWAS MEMBERS, INDIVIDUALS AND OTHERS (1994-2019)

Wook Hyun Kwon, Korea Rep.	30,000	P. Ciarlet, France	985	Shi Changxu, China	300
Bai Chunli, China	21,770	Cheng, Hui-Ming, China	985	Su Zhao-Bin, China	300
M.H.A. Hassan, Sudan	13,104	Lee Yuan T., Taiwan, China	977	Yu Lu, China	300
J. Palis, Brazil	10,079	E.K.A. Edee, Togo	900	R.P. Bambah, India	300
Science Initiative Group, USA	6,250	Mei Hong, China	879	Zhao Zhongxian, China	300
J.I. Vargas, Brazil	5,287	Jean-Marie Lehn, France	840	Zhai Mingguo, China	300
S.S. Katiyar, India	4,100	J. Döbereiner, Brazil	800	B. Tsetseg, Mongolia	300
A.V. Rama Rao, India	3,000	M. Munasinghe, Sri Lanka	750	S. Sivaram, India	300
Fuchu He, China	2,726	M. Akhtar, Pakistan	700	Long Yiming, China	300
A. Hamoui, Syria	2,500	B.L. Deekshatulu, India	700	R. Garruto, USA	300
M. Peimbert, Mexico	2,500	Wu Yue-Liang, China	666	Sang Yup Lee, Korea Rep.	300
Lu Yong Xiang, China	2,300	D. Balasubramanian, India	650	Li Jinghai, China	296
P. McGrath, UK	2,046	L. de la Pena Auerbach, Mexico	642	Chao-Jun Li, China	292
M. Iqbal Parker, South Africa	2,000	Un-Chul Paek, USA	634	Luna Kamau, Kenya	290
K. Namsrai, Mongolia	1,858	Zhao Jincai, China	621	M. O'Kane, Australia	288
M.V. Griffiths, USA	1,750	F.R.I. Kayanja, Uganda	600	J.S. Yadav, India	285
B.N. Upreti, Nepal	1,440	L.F. Rodriguez, Mexico	600	Zhang Ya-Ping, China	285
R. Miledi, USA	1,320	Dong Shaojun, China	600	Wang Fosong, China	280
L.N. Johnson, UK	1,281	Wang Erkang, China	600	B.M. Abegaz, Ethiopia	272
A. Paulraj, USA	1,236	J. Allende, Chile	500	A. Falodun, Nigeria	200
J. Garidkhuu, Mongolia	1,221	E.H.S. Diop, Senegal	500	E. Igbinosa, Nigeria	200
F. El-Baz, Egypt	1,200	M.V. George, India	500	S. I. Ola, Nigeria	200
C.N.R. Rao, India	1,131	D.T. Lê, Vietnam	500	E. Unuabonah, Nigeria	200
E.W. Thulstrup, Denmark	1,062	Li Desheng, China	500	T. Durrani, UK	200
A. Badran, Jordan	1,045	G. Thottappilly, India	500	A.K. Sood, India	200
ANSTS, Senegal	1,029	C. Vieira, Brazil	500	R. Ramaswamy, India	200
E.M. Essien, Nigeria	1,000	Z.H. Zaidi, Pakistan	500	Chen Sai-Juan, China	200
M. Klein, USA	1,000	R. Crewe, South Africa	496	Chen Zhu, China	200
A. Kornhauser, Slovenia	1,000	S. Ayupov, Uzbekistan	495	Ding, Zhongli, China	193
A.O. Kuku, Nigeria	1,000	M. Clegg, USA	494	A. Bahri, Tunisia	143
G.S. Khush, Philippines	1,000	M. Limonta, Mexico	491	H. Roesky, Germany	106
R. Murenzi, USA/Rwanda (KIST)	1,000	Girish Agrawal, USA	488	U. Aswathanaray, India	100
Sang-Dai Park, Korea Rep.	1,000	MOHAMMAD JAMSHIDI, USD	488	N. Kumar, India	100
G.T. Prance, UK	1,000	Li Yiyi, China	465	S.M. Muhongo, South Africa	100
I. Serageldin, Egypt	1,000	I. Saavedra, Chile	443	R. Zare, USA	100
Y. Sobouti, Iran, I.R.	1,000	A.H.O. Hajiyev, Azerbaijan	400	M.A.J. Mariscotti, Argentina	100
H.E. Varmus, USA	1,000	S. J. Jabbur, Lebanon	400	H.K. Majumder, India	100
Y. Yuthavong, Thailand	1,000	M. Tchente, Cameroon	400	K. Basu, USA	100
J.L. Moran Lopez, Mexico	1,000	T. Obi, Nigeria	400	U. Colombo, Italy	97
K.E. Mshigeni, Tanzania	1,000	S.S. Hasnain, UK	400	Carlos F M Menck, Brazil	96
Wong Henry Nai Ching, China	1,000	M.P. Alpers, Australia	331	Soumitro Banerjee, India	96
Yam Vivian Wing-Wah, China	1,000	Mu Guoguang, China	330	A. Peerally, Canada	86
M. Hamdan, Jordan	1,000	H. Van Ginkel, The Netherlands	327	A.M. Cetto, Mexico	51
S.Q. Mehdi, Pakistan	1,000	A.C. Cerda, Chile	300	Ingrid Daubechies	48
Shui-Chin Foundation, Taiwan, China	1,000	H. Chaimovich, Brazil	300	Total	183,316
Pei Gang, China	1,000	S. Datta, India	300		
P. Littlewood, UK	1,000	L. Davidovich, Brazil	300		
I. Eltayeb, Oman	1,000	Min Enze, China	300		
Lee Wu Yan-Hwa, Taiwan, China	1,000	M.M. Peixoto, Brazil	300		
CAPRISA, South Africa	1,000	H. Ramkissoon, Trinidad & Tobago	300		

VOLUNTARY CONTRIBUTIONS RECEIVED FROM TWAS MEMBERS, YOUNG AFFILIATES AND OTHER INDIVIDUALS (2019 ONLY)

Donations to the Programme Budget:

Dipendra PRASAD [India] recipient of TWAS 2019 Award	7,500.00
Chennupati JAGADISH [Australia]	965.70
Hyman BASS [USA]	487.70
Michael ALPERS [Australia]	482.70
Huadong GUO [China]	482.70
Jin-Pei CHENG [China]	434.40
Yiming LONG [China]	299.16
Chao-Jun LI [Canada]	243.70
Kalyan Bidhan SINHA [India]	200.00
Abdallah Salim Said DAAR [Canada]	97.30
Su-May YU [Taiwan, China]	96.30
Zhengtang GUO [China]	96.30
Glaucius OLIVA [Brazil]	96.30
Luis de la Peña [Mexico]	96.30
Angela T.S. WYSE [Brazil]	48.00
Cato Thomas LAURENCIN [USA]	24.10
From anonymous donors	1,039.96
Total	12,690.62

Donations to the Endowment Fund:

Shih-chang LEE through Shui-Chin Lee Foundation for Basic Science [Taiwan, Province of China]	3,000.00
Mohammad JAMSHIDI [USA]	487.70
Manuel LIMONTA-VIDAL [Cuba]	241.20
Zhongli DING [China]	192.90
Carlos Frederico Martins MENCK [Brazil]	96.30
From anonymous donors	725.80
Total	4,743.90

Total donations combined to both funds	17,434.52
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Every donation, large or small, directly supports the advancement of science, engineering and technology in developing nations and demonstrates commitment to the Academy's vital mission. To make a donation, please visit www.twas.org/support-twas

2019 TWAS FELLOWS AND YOUNG AFFILIATES

TWAS FELLOWS ELECTED IN 2019

Agricultural Sciences

FARAG, Mohamed Ali [Egypt]
JAHIRUDDIN, M [Bangladesh]
TRAN, Lam-Son [Japan]

Structural, Cell and Molecular Biology

BAHARVAND, Hossein [Iran, Islamic Republic]
CHEN, Ye-Guang [China]
CHUNG, Bon-Chu [Taiwan, China]
GARCIA, Celia Regina Da Silva [Brazil]
MAYOR, Satyajit [India]

Biological Systems and Organisms

CHAUDHARY, Ram Prasad [Nepal]
LIAO, James C. [Taiwan, China]
VILLA, Luisa Lina [Brazil]

Medical and Health Sciences incl.

Neurosciences

GRAY, Glenda Elisabeth [South Africa]
JIANG, Hualiang [China]
MORRIS, Lynn [South Africa]
SAVINO, Wilson [Brazil]
SERWADDA, David [Uganda]

Chemical Sciences

ERRA-BALSELLS, Rosa [Argentina]
NGILA, Jane Catherine [Kenya]
SRINIVASAN, Sampath [India]
TANG, Ben Zhong [China]
TICIANELLI, Edson Antonio [Brazil]

Engineering Sciences

BANDYOPADHYAY, Sanghamitra [India]
DEEN, Mohamed Jamal [Canada]
HUANG, Ru [China]
LU, Chih-Yuan [C. Y.] [Taiwan, China]
WU, Zhaohui [China]
ZARITZKY, Noemí Elisabet [Argentina]

Astronomy, Space and Earth Sciences

HOU, Zengqian [China]
WU, Lixin [China]

Mathematical Sciences

HOLDEN, Helge [Norway]
SHEN, Zuwei [Singapore]

Physics

BERNARDES BARBOSA, Marcia Cristina [Brazil]
CHEN, Xianhui [China]
LEE, Young Hee [Korea, Rep.]

Social and Economic Sciences

BIEKPE, Nicholas Budeo [South Africa]
YANG, Yufang [China]

NEW TWAS YOUNG AFFILIATES IN 2019

Sub-Saharan Africa:

- DALU, Tatenda [Zimbabwe]
- DU TOIT, Lisa [South Africa]
- GOONOO, Nowsheen [Mauritius]
- KABA, Mamadou [Guinea]
- NGUNJIRI, Josephine [Kenya]

Arab Region:

- ABUALBASHER, Hamdan [Sudan]
- AL-HAJJ, Lamya [Oman]
- EL HAJJ, Hiba [Lebanon]
- FAKHRALDEEN, Saja [Kuwait]
- SHOKRY, Hassan [Egypt]

Latin America & Caribbean:

- BRAEUNER, Gabriela María Fuentes [Guatemala]
- BURBANO, María-José Endara [Ecuador]
- REILY-ROCHA, Alexandre [Brazil]
- RIVERA AYALA, Jacqueline Y. [El Salvador]
- UBAU, Allan Xavier Pernudy [Nicaragua]

East and Southeast Asia and Pacific:

- LI, Wei [China]
- LWIN, Phyu Phyu [Myanmar]
- TENZIN, Jigme [Bhutan]
- TSEDNEE, Munkhtsetseg [Mongolia]

Central and South Asia:

- AKBAR, Noreen Sher [Pakistan]
- CHOUDHURY, Tasrina Rabia [Bangladesh]
- POURGHASEMI, Hamid Reza [Iran, Islamic Republic]
- RAJANI, M. B. [India]
- RANASINGHE, Priyanga [Sri Lanka]

AWARDS CONFERRED IN 2019

TWAS Awards

- Esteban Gabriel Jobbagy [Argentina], agricultural sciences
- Hossein Baharvand [Iran Isl. Rep.], biology
- Tang Zhiyong [China], chemistry
- Cao Junji [China], Earth, astronomy and space sciences
- Ahmad Fauzi Ismail [Malaysia], engineering
- Noemi Elisabet Zaritzky [Argentina], engineering
- Tang Zizhou [China], mathematics
- Dipendra Prasad [India], mathematics
- Alejandro Fabian Schinder [Argentina], medical sciences
- Robert Peter Millar [South Africa], medical sciences
- Chen Xianhui [China], physics
- Juan Chi-Hung [Taiwan, China], social sciences
- Ayodele Samuel Jedge [Nigeria], social sciences

C.N.R. Rao Award for scientific research

- Evelyne Isaack Mbede [Tanzania]

Atta-ur-Rahman Award in Chemistry

- Achyut Adhikari [Nepal]

Fayzah M. Al-Kharafi Award

- Antonethe Castaneda [Guatemala]

TWAS-Samira Omar Innovation for Sustainability Award

- Etotépé A. Sogbohossou [Benin]

TWAS-Abdool Karim Award

- Fathiya M. Khamis [Kenya]

TWAS Regional Awards in Science Diplomacy

- Claudio Landim [Brazil]
- Alizadeh Anahita, [Iran]
- Murad AlDamen [Jordan]
- Michael Umale Adikwu [Nigeria]
- Thomas Edison Dela Cruz [Philippines]

2019 OWSD-Elsevier Foundation Awards for Early-Career Women Scientists in the Developing World

- Narel Paniagua-Zambrana [Bolivia]
- Uduak Okomo [Gambia]
- Tabassum Mumtaz [Bangladesh]
- Tista Prasai Joshi [Nepal]
- Amira Shaheen [Palestine, West Bank and Gaza Strip]

THE TWAS SECRETARIAT

Executive Director's Office

Executive Director: Romain Murenzi

Special Adviser: Giusto Sciarabba

Sandra Ravalico

Vanessa Varnier

Programmes and Activities

Programme Coordinator: Massimo Paoli

Marco Beltramini

Sara Dalafi

Sena Galazzi (from August 2019)

Helen Martin

Antonella Mastrolia

Fabrizia Niscio

Payal Patel

Sheila Perosa (from January 2019)

Manuela Schipizza

Cristina Simoes

Public Information Office

Public Information Officer: Edward W. Lempinen

(until November 2019)

Francesca Pettoello

Cristina Serra

Sean Treacy

Finance and Administration

Administrative Officer: Ulrich Singe

Chiara Cesareo

Antonino Coppola

Patricia Presiren

Paola Vespa

Ezio Vuck

The Organization for Women in Science for the Developing World (OWSD)

Coordinator: Tonya Blowers

Tanja Bole

Lucia Fanicchi

Erika Hrvatic

Erin Johnson

Marina Juricev

Evgenia Markvardt

Zabeeh Ullah Sahil

GenderInSITE

Director: Roseanne Diab

Fiona Dakin

The InterAcademy Partnership (IAP)

Coordinator: Peter McGrath

Sabina Caris

Muthoni Kareithi

Giovanni Ortolani (from March 2019)

For specific contact details, see:

www.twas.org/contacts

TWAS ANNUAL REPORT 2019

TWAS Executive Director

Romain Murenzi

Coordinator

Sean Treacy

Contributors

Marco Beltramini

Tonya Blowers

Fiona Dakin

Sara Dalafi

Lucia Fanicchi

Marina Juricev

Erin Johnson

Muthoni Kareithi

Evgenia Markvardt

Antonella Mastrolia

Peter McGrath

Fabrizia Niscio

Giovanni Ortolani

Massimo Paoli

Payal Patel

Francesca Pettoello

Patricia Presiren

Sandra Ravalico

Zabeeh Ullah Sahil

Manuela Schipizza

Cristina Serra

Cristina Simoes

Vanessa Varnier

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