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The World Academy
of Sciences

ANNUAL REPORT 2023

THE WORLD ACADEMY OF SCIENCES

for the advancement of science in developing countries



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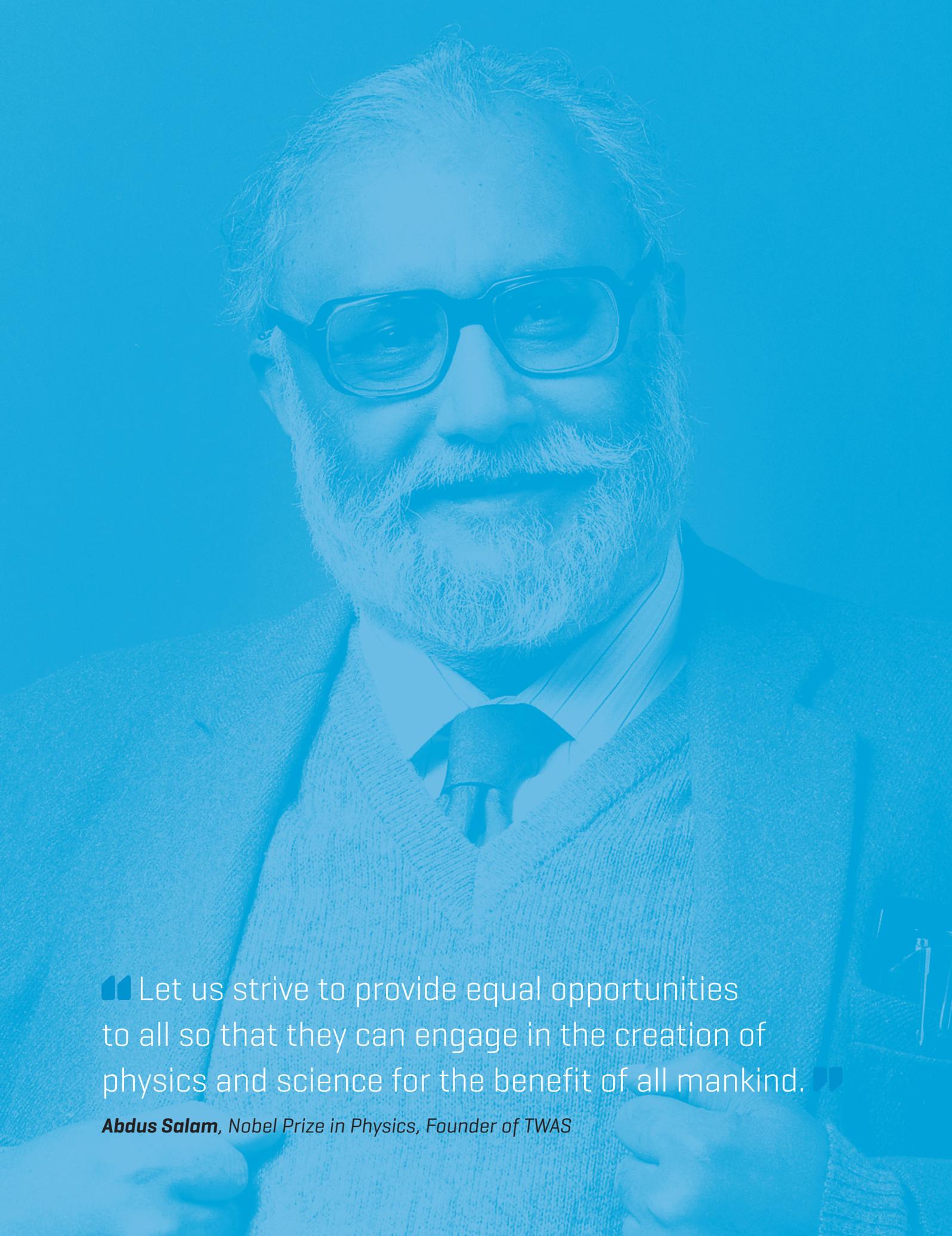
The World Academy
of Sciences

A world map composed of a grid of small dots, rendered in a light blue color, serves as a background for the title text.

A N N U A L R E P O R T
2023

THE WORLD ACADEMY OF SCIENCES

for the advancement of science in developing countries



“ Let us strive to provide equal opportunities to all so that they can engage in the creation of physics and science for the benefit of all mankind. ”

Abdus Salam, Nobel Prize in Physics, Founder of TWAS



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▲ TWAS launched the celebrations for its 40th Anniversary with a special event in 2023. [Photo: G. Ortolani/TWAS]

Cover photo: From left, Nazma Ashrafi of Bangladesh, Gisselle Esther Guerra Saval of Panama, and Noor Shaila Sarmin of Bangladesh, at the 10th AAAS-TWAS Course on Science Diplomacy in Trieste, Italy, in June 2023. [Photo: G. Ortolani/TWAS]

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TWAS COUNCIL

The TWAS Council, elected by the membership every four years, is responsible for supervising all of the Academy's affairs. The Council assumed office in January 2023 and will serve until the end of 2026.

President

Quarraisha Abdool Karim [South Africa]

Immediate Past President

Mohamed H.A. Hassan [the Sudan]

Vice-Presidents

Africa:

Olubukola O. Babalola [Nigeria]

Arab Region:

Sabah AlMomin [Kuwait]

Central and South Asia:

Muhammad Iqbal Choudhary [Pakistan]

East and South-East Asia:

Hou Jianguo [China]

Latin America and the Caribbean:

Helena B. Nader [Brazil]

North:

Mohamed Jamal Deen [Canada]

Secretary General

Lilliam Alvarez Diaz [Cuba]

Treasurer

Lee Young Hee [Republic of Korea]

Council Members

Africa:

Rose Leke Gana Fomban [Cameroon]

Arab Region:

Najoua Turki Kamoun [Tunisia]

Central and South Asia:

Anil Kumar Gupta [India]

East and South-East Asia:

Lê Tuân Hoa [Viet Nam]

Latin America and the Caribbean:

Sandra Myrna Díaz [Argentina]

North:

Markku Tapio Kulmala [Finland]

Ex-officio Council Member

Atish Dabholkar [India]

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

TWAS MISSION

The World Academy of Sciences for the advancement of science in developing countries (TWAS) supports 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 laureate. By the end of 2023, TWAS had 1,416 elected Fellows—13 of them Nobel laureates—representing 112 countries. The Academy is based in Trieste, Italy, on the campus of the Abdus Salam International Centre for Theoretical Physics (ICTP). TWAS is a programme unit of the United Nations Educational, Scientific and Cultural Organization (UNESCO), and receives its core funding from the Italian Ministry of Foreign Affairs and International Cooperation (MAECI). The Swedish International Development Cooperation Agency (Sida) also provides essential funding for TWAS programmes. Through four decades, the TWAS 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, and
- Encourage scientific research and sharing of experiences in solving major challenges faced by developing countries.

2023: SCIENCE IS KEY TO SUSTAINABLE DEVELOPMENT



by **Quarraisha Abdool Karim,**
TWAS President

As we progress toward the Sustainable Development Goals [SDGs], science in the global South finds itself at a critical juncture. Since the 2030 agenda's inception in 2015, we are now more than halfway to the deadline, and the urgency is palpable. Achieving the SDGs is crucial for securing a stable and prosperous future for humanity, and requires concerted and sustained commitment and effort.

Science is undeniably at the core of this mission. We face global challenges such as the climate crisis, biodiversity loss, pandemics and epidemics, involuntary displacement of over 110 million people due to conflicts and natural disasters, and rising inequality. Our response demands precise, empirical knowledge, as well as synergistic partnerships and collaborations for effective solutions. And the geographical diversity of these challenges demands a granular understanding of key drivers, with specialized skillsets and local brains trusts to identify and address local and regional challenges for the present and the future. The complexity, magnitude, and intersection of the challenges underscore that an inclusive, all-of-society approach is required—so that every voice is heard, appropriate priorities are set, and success is possible.

This TWAS Annual Report highlights the vital role TWAS continues to play in recognising the best scientists in the global South and science- and technology-lagging countries [STLCs]—and in further enhancing the science capacity and leadership in these countries. TWAS programmes bridge gaps in the scientific landscape, providing essential support, and empowering researchers and institutions to set priorities while always striving for excellence, innovation, and service to humanity.

This past year also saw the launch of the Academy's 40th Anniversary celebrations. In May 2023, I had the honour of participating in these festivities in Trieste—which included a series of workshops and courses, and coincided with the TWAS Governing Council meeting—highlighting our dynamic interactions with the global scientific community.

In light of this milestone, we can all be proud in our Academy's continuing contributions to science in the developing world. In 2023, graduate training for over 60 scientists from developing nations was initiated, 26 science diplomats were convened for specialised training on the science-policy interface, 95 scientific cooperation visits were facilitated, and 26 research grants and seven project grants were awarded. Scientific excellence was recognised through four prestigious awards.

The vision of TWAS founder Nobel Laureate Abdus Salam of a world where science drives global development remains as relevant today as ever. Our over 1,400 TWAS Fellows and 400-plus Young Affiliates worldwide across nine subject disciplines form the backbone of this vision.

The progress and achievements of TWAS are possible through support from many sponsors and partners. Our very-long standing partners are the Italian Ministry of Foreign Affairs and International Cooperation [MAECI], whose support has remained unwavering and generous; the Friuli Venezia Giulia Region; and the Abdus Salam International Centre for Theoretical Physics [ICTP], which not only hosts our Academy on its campus in Trieste since its inception, but also continues to provide us with essential support and partnership.

Our partnerships with the Swedish International Development Cooperation Agency [Sida], the

German Federal Ministry of Education and Research [BMBF], the Islamic Development Bank, the Packard Foundation, and the Elsevier Foundation are also deeply appreciated. In addition, TWAS hosts and works in collaboration with two international organizations on the ICTP campus, each dedicated to serving the scientific needs of developing nations: the Organization for Women in Science for the Developing World [OWSD] and the InterAcademy Partnership [IAP]. Furthermore, TWAS collaborates with many other partners, including the International Science Council [ISC] and many academies around the world. Also worth highlighting is the commitment, dedication and consistent partnership of institutions in China, India, and Brazil to realising our mission. We look forward to growing support from many more countries who have benefitted from investments in science capacity building efforts.

As a unique academy supporting scientific research across the global South, TWAS actively engaged in numerous high-level international dialogues including, among others: the Fifth United Nations Conference on the Least Developed Countries [LDC5] held in Doha, Qatar; the World Science Forum, in Cape Town, South Africa; the STS Forum in Kyoto, Japan; the CBAS conference on Big Data for SDGs in Beijing, China; the International Conference of Young Scientists and the African Continental Conference on Basic Sciences for Transformation in Kigali, Rwanda; and the forum Science in French in Quebec and Around the World – Between Wealth and Influence in Montreal, Canada.

The past year was also a celebration of the 10th annual AAAS-TWAS Course on Science Diplomacy. Over the past decade, we've trained over 300 emerging leaders from more than 70 countries, equipping them to address science diplomacy from both global and regional perspectives. These discussions underscored shared themes: science must be inclusive, technology policies need to address inequalities and discrimination, and science must impact humanity positively.

Generating knowledge alone is not enough. We must disseminate it widely, ensuring its application for societal betterment. Abdus

Salam's vision, alive 40 years later, remains at the core of TWAS's tireless efforts to make science accessible and impactful worldwide.

It has been my privilege to lead the first TWAS Governing Council with equal gender and regional representation, ensuring inclusivity and strengthening regional science capacity and science leadership. I would like to thank the many TWAS Fellows who generously and unstintingly give their time to participate in the selection of new Fellows and lead important committees on priority issues such as addressing gender equality, pandemic preparedness, climate change, and mentoring and supporting the next generation of scientists.

The contributions of our Young Affiliates through the TWAS Young Affiliates Network [TYAN] is also exemplary and inspiring. They underscore that continued investments in young scientists from the global South will always be an indispensable way to bolster visionary scientific leadership that can shape the future.

I must also acknowledge that the TWAS Executive Director, Romain Murenzi, retired in November 2023, and while we wish him well in the next chapter of his life we continue to tap into his wisdom and expertise as a TWAS Fellow. The search for a new Executive Director is in progress, and in the interim Atish Dabholkar has kindly stepped in with support from TWAS Fellow Seifallah Randjbar-Daemi, and they have been doing a sterling job of ensuring that TWAS activities continue seamlessly. Our dedicated and committed secretariat have continued to ensure that the strategic priorities are implemented, and TWAS continues to maintain its momentum. Finally, we continue to draw on the institutional memory, experience and expertise of Immediate Past President Mohamed Hassan, who remains generous with his time and ongoing and steadfast commitment to TWAS.

Let us continue to champion science, collaboration, and progress for the betterment of planet and people. Together, we can continue to strive for a better and brighter future for all.

A YEAR 0

The year 2023 was a milestone year for TWAS. Marking the end of its fourth decade, the Academy and its partners continued to build science in the global South through its traditional fellowships, grant, exchange, and science diplomacy programmes. Special events highlighted the vital contribution of TWAS, centring the all-important role of universal access to education and training in science. Among the most notable accomplishments in 2023 were:

1 TWAS celebrates 40 years

TWAS launched celebrations for its 40th Anniversary with numerous events in Italy. Newly elected TWAS President Quarraisha Abdool Karim marked the occasion with a discussion on public health issues during an anniversary event in May held with representatives from the Italian Ministry of Foreign Affairs and International Cooperation (MAECI) in the Academy's home city of Trieste. TWAS Council members also took part in a high-level panel on pressing global issues in the popular science event Trieste Next. The Academy also participated in MAECI's #TogetherfortheSDGs campaign. [For more on TWAS activities in Italy, see page 32]



2 Science diplomacy training

Twenty-six science diplomats, half with a scientific background, half with a focus in policy or diplomacy, took part in the 10th annual AAAS-TWAS Course on Science Diplomacy in June 2023. It was the first time it had been held in-person since the COVID-19 pandemic, and they received a thorough education on how science and diplomacy intertwine. [For more on science diplomacy, see page 22.]

F IMPACT



3 Project grants for women and climate

The Academy has partnered with the Elsevier Foundation to provide unique catalyst grants to all-women research teams in the global South to take concrete action in response to climate change. In April 2023, the programme's first group of winners from 2022 gathered in Trieste for a hybrid workshop to gain essential training. Later in the year, the programme also selected its next slate of grantees. [For more on women in science, see page 24]



4 New fellowships programme

In October 2023, TWAS announced a brand new South-South fellowship programme. Up to 175 researchers from Least Developed Countries (LDCs) will have the opportunity to carry out research in the State of São Paulo, Brazil, through a new collaboration between UNESCO-TWAS and the São Paulo Research Foundation (FAPESP). Through this agreement, up to 20 researchers per year from LDCs will receive the opportunity to carry out postdoctoral research in Brazil. [For more on fellowships, see page 16]



5 LDC5 participation

As a leader in developing world science, TWAS participated in high-level international discussions at the Fifth United Nations Conference on the Least Developed Countries (LDC5), in Qatar in March 2023. It was a key opportunity for decision-makers and leading experts to shape a better future for the world's most vulnerable nations through global partnerships. TWAS contributed expert panellists, as well as an exhibition booth at the conference centre. [For more on science policy, see page 20]

WHO W

As a global, merit-based science academy, TWAS represents 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 on 1 January of the following year. The charts below represent TWAS membership as of 31 December 2023 (including TWAS Fellows elected in 2023 but officially inducted in 2024).

Total TWAS Fellows, by region



TWAS Fellows elected in 2023, by region



Fellows



TWAS Fellows elected in 2023 by country of residence

- 7** BRAZIL, CHINA
- 5** INDIA
- 4** MALAYSIA
- 2** BANGLADESH²; MOROCCO³; PAKISTAN; SOUTH AFRICA
- 1** ARGENTINA; AUSTRALIA; BOLIVIA (PLURINATIONAL STATE OF); CAMEROON²; IRAN (ISLAMIC REPUBLIC OF); ITALY; JAMAICA³; KENYA²; MEXICO; NEPAL^{1,2}; SRI LANKA²; TAIWAN, CHINA; UKRAINE⁴; UNITED KINGDOM OF GREAT BRITAIN AND NORTHERN IRELAND (THE); UNITED STATES OF AMERICA (THE); YEMEN^{1,2}

¹ UN-identified Least Developed Country (LDC)

² TWAS-identified Science-and-Technology Lagging Country (STLC)

³ Global South country considered to be underrepresented by TWAS

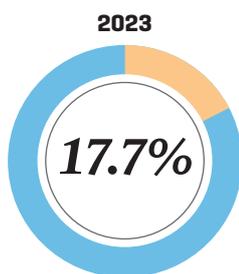
⁴ First ever TWAS Fellow from Ukraine

For a full list of Fellows elected in 2023, please see page 42

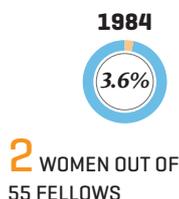
E A R E

TWAS FELLOWS AND YOUNG AFFILIATES

Women Fellows

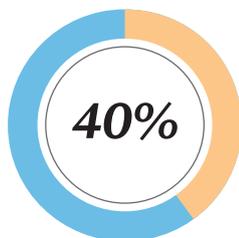


250 WOMEN OUT OF 1,416 FELLOWS



2 WOMEN OUT OF 55 FELLOWS

New Fellows



20 OUT OF **50** TWAS FELLOWS ELECTED IN 2023 WERE WOMEN

For a list of Fellows elected in 2023, please see page 42.

Young Affiliates

122 TOTAL YOUNG AFFILIATES

Four long-time supporters make the work of TWAS possible:

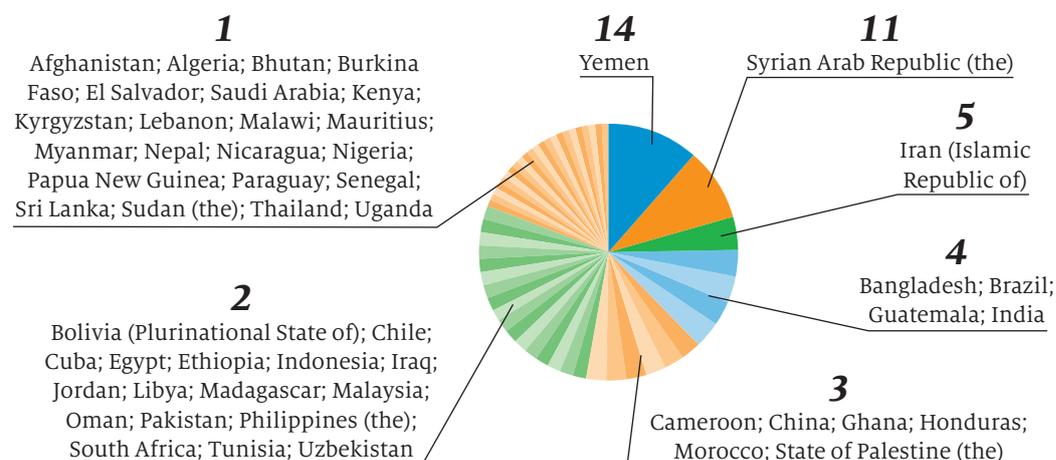
- **The Government of Italy, through the Ministry of Foreign Affairs and International Cooperation (MAECI)**, provides core funding;
- **The Swedish International Development Cooperation Agency (Sida)** supports TWAS research grants, science diplomacy and communications initiatives;
- **The United Nations 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 administrative support.

Countries with TWAS Fellows

More info: www.twas.org/directory/overview

Algeria	China	Gambia [the]	Lebanon	Philippines [the]	State of Palestine [the]	Uruguay
Argentina	Taiwan, China	Georgia	Libya	Puerto Rico	Sudan [the]	United Kingdom and Northern Ireland [the]
Australia	Colombia	Germany	Madagascar	Qatar	Sweden	United States of America [the]
Austria	Congo [the]	Guatemala	Malawi	Republic of Korea [the]	Switzerland	Uzbekistan
Azerbaijan	Côte d'Ivoire	Hungary	Malaysia	Russian Federation [the]	Tajikistan	Venezuela [Bolivarian Republic of]
Bahrain	Cuba	India	Mali	Rwanda	Thailand	Viet Nam
Bangladesh	Democratic Republic of Congo [the]	Iran [Islamic Republic of]	Mauritius	Saudi Arabia	Togo	Yemen
Barbados	Republic of Korea [the]	Iraq	Mexico	Senegal	Trinidad and Tobago	Zambia
Belgium	Democratic Republic of Congo [the]	Italy	Mongolia	Serbia	Tunisia	Zimbabwe
Benin	Republic of the Congo [the]	Jamaica	Morocco	Sierra Leone	Türkiye	
Bolivia [Plurinational State of]	Japan	Jordan	Nepal	Singapore	Uganda	
Botswana	Ecuador	Kazakhstan	New Zealand	Slovenia	United Arab Emirates [the]	
Brazil	Egypt	Kenya	Nicaragua	South Africa	United Republic of Tanzania [the]	
Burundi	El Salvador	Kuwait	Nigeria	Ukraine		
Cameroon	Ethiopia	Lao People's Democratic Republic [the]	Norway			
Canada	Finland		Oman			
Chile	France		Pakistan			
			Panama			
			Peru			

TWAS Young Affiliates in 2023 by country of residence*



* Scientists selected under the Islamic Development Bank-TWAS Refugee and Displaced Young Scientists Programme are classified by country of origin.

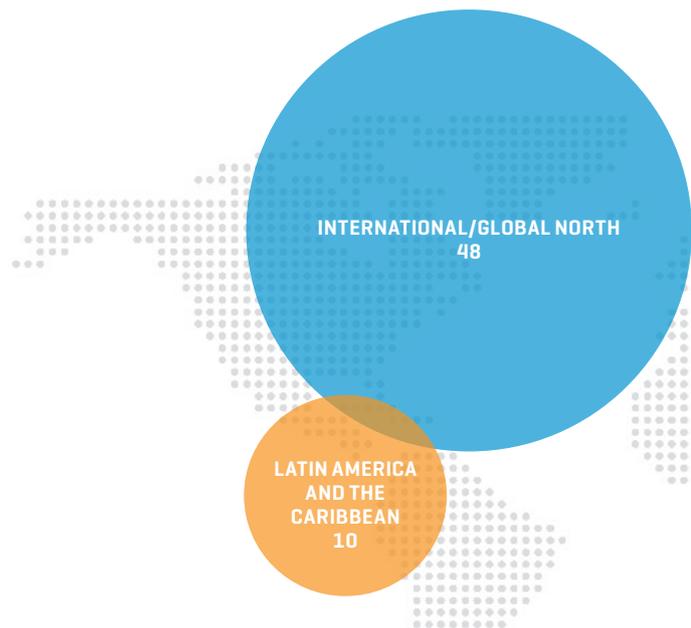
TWAS PA

INTERNATIONAL/GLOBAL NORTH

- [Abdus Salam International Centre for Theoretical Physics \(ICTP\)](#), Italy
- [Accademia Nazionale dei Lincei](#), Italy
- [American Association for the Advancement of Science \(AAAS\)](#), United States of America
- [Area Science Park](#), Italy
- [Autonomous Region of Friuli Venezia Giulia \(FVG\)](#), Italy
- [Council for At-Risk Academics \(CARA\)](#), United Kingdom of Great Britain and Northern Ireland
- [David and Lucile Packard Foundation](#), United States of America
- [Elettra Synchrotron Trieste](#), Italy
- [Elsevier Foundation](#), Kingdom of the Netherlands
- [Ernesto Illy Foundation](#), Italy
- [Federal Ministry of Education and Research \(BMBF\)](#), Germany
- [German Research Foundation \(DFG\)](#), Germany
- [Global Young Academy \(GYA\)](#), Germany
- [Institute for International Education, Scholar Rescue Fund \(IIE-SRF\)](#), United States of America
- [InterAcademy Partnership \(IAP\)](#), Italy
- [Intergovernmental Panel on Climate Change \(IPCC\)](#), Switzerland
- [International Centre for Genetic Engineering and Biotechnology \(ICGEB\)](#), Italy
- [International Development Research Centre \(IDRC\)](#), Canada
- [International Institute for Applied Systems Analysis \(IIASA\)](#), Austria
- [International Mathematical Union \(IMU\)](#), Germany
- [International Network for Government Science Advice \(INGSA\)](#), New Zealand
- [International School for Advanced Studies \(SISSA\)](#), Italy
- [International Science Council \(ISC\)](#), France
- [Islamic Development Bank \(IsDB\)](#), Saudi Arabia
- [Italian Agency for Development Cooperation \(AICS\)](#), Italy
- [Italian National Agency for New Technologies, Energy and Sustainable Economic Development \(ENEA\)](#), Italy
- [Joint Research Centre, European Commission](#), Belgium
- [Ministry of Foreign Affairs and International Cooperation \(MAECI\)](#), Italy
- [Lindau Nobel Laureate Meetings](#), Germany
- [Materials Foundry, National Research Council](#), Italy
- [National Academies of Sciences, Engineering and Medicine](#), United States of America
- [National Institute of Oceanography and Applied Geophysics \(OGS\)](#), Italy
- [National Institute for Nuclear Physics \(INFN\)](#), Italy
- [OPEC Fund for International Development \(OFID\)](#), Austria
- [Organization for Women in Science for the Developing World \(OWSD\)](#), Italy
- [Royal Society](#), United Kingdom of Great Britain and Northern Ireland
- [Scholars at Risk \(SAR\)](#), United States of America

“ [TWAS] brings together people all through the North and through the South, and that partnership and collaboration is so important if we want to change things for the better. ”

Quarraisha Abdool Karim, TWAS President



- [SciDev.Net](#), United Kingdom of Great Britain and Northern Ireland
- [Swedish International Development Cooperation Agency \(Sida\)](#), Sweden
- [The Scientific and Technological Research Council of Türkiye \(TÜBİTAK\)](#), Türkiye
- [Trieste International Foundation for the Progress and Freedom of Science \(FIT\)](#), Italy
- [TWAS Young Affiliates Network \(TYAN\)](#), Italy
- [United Nations Educational, Scientific and Cultural Organization \(UNESCO\)](#), France
- [United Nations Technology Bank for the Least Developed Countries \(UNTB\)](#), Türkiye
- [University of Trieste](#), Italy
- [University of Udine](#), Italy
- [Using Science For/In Diplomacy For Addressing Global Challenges \(S4D4C\)](#), European Union
- [World Meteorological Organization \(WMO\)](#), Switzerland

RTNERS

EAST AND SOUTH-EAST ASIA, AND THE PACIFIC

- Academia Sinica, Taiwan, China
- Academy of Sciences Malaysia, Malaysia
- Alliance of International Science Organization (ANSO), China
- China Association for Science and Technology (CAST), China
- Chinese Academy of Sciences (CAS), China
- International Science, Technology and Innovation Centre for South-South Cooperation (ISTIC), Malaysia
- Lenovo Group Limited, China
- Ministry of Science and Technology, China
- National Center for Genetic Engineering and Biotechnology (BIOTEC), Thailand
- Science University of Malaysia (USM), Malaysia
- Siwei Cheng Foundation, China
- University of Putra Malaysia (UPM), Malaysia

CENTRAL AND SOUTH ASIA

- Centre of Excellence in Molecular Biology (CEMB), University of the Punjab, Pakistan
- Commission on Science and Technology for Sustainable Development in the South (COMSATS), Pakistan
- COMSATS University Islamabad (CUI), Pakistan
- Council of Scientific and Industrial Research (CSIR), Ministry of Science and Technology, Government of India, India
- Department of Biotechnology, Ministry of Science and Technology, Government of India, India
- Department of Science and Technology (DST), Ministry of Science and Technology, India
- Indian Association for the Cultivation of Science (IACS), India
- International Center for Chemical and Biological Sciences (ICCBS), Pakistan
- Ministry of Science, Research and Technology, Islamic Republic of Iran
- Jawaharlal Nehru Centre for Advanced Scientific Research (JNCASR), India
- Lahore University of Management Sciences (LUMS), Pakistan
- Organization of Islamic Cooperation Standing Committee on Scientific and Technological Cooperation (COMSTech), Pakistan
- National Centre for Physics (NCP), Pakistan
- Searle Pakistan Limited, Pakistan
- S.N. Bose National Centre for Basic Sciences (SNBNCBS), India
- The Dawood Foundation (TDF), Pakistan

● **TWAS**
Trieste, Italy

ARAB REGION
2

SUB-SAHARAN AFRICA
8

EAST AND SOUTH-EAST ASIA, AND THE PACIFIC
12

CENTRAL AND SOUTH ASIA
16

LATIN AMERICA AND THE CARIBBEAN

- Brazilian Academy of Sciences, Brazil
- Caribbean Community (CARICOM), Guyana
- Chilean Academy of Sciences, Institute of Chile, Chile
- Ministry of Science, Technology and Innovation, Brazil
- Ministry of Science, Technology and Innovation, Argentina
- National Council for Scientific and Technological Development (CNPq), Brazil
- National Agency for Research and Development (ANID), Chile
- National Council of Science and Technology (CONACYT), Mexico
- National Scientific and Technical Research Council (CONICET), Argentina
- São Paulo Research Foundation (FAPESP), Brazil

ARAB REGION

- Bibliotheca Alexandrina (BA), Egypt
- King Abdullah University of Science and Technology (KAUST), Saudi Arabia

SUB-SAHARAN AFRICA

- Academy of Science of South Africa (ASSAf), South Africa
- African Academy of Sciences (AAS), Kenya
- African Union (AU), Ethiopia
- Department of Science and Innovation (DSI), South Africa
- International Centre of Insect Physiology and Ecology (icipe), Kenya
- Ministry of Higher Education, Science, Technology and Innovation, Angola
- National Research Foundation (NRF), South Africa
- Sudanese National Academy of Sciences (SNAS), the Sudan

HONOURING SCIENTIFIC EXCELLENCE

TWAS Awards provide a powerful incentive for scientists to excel on new levels, while bringing global recognition to the achievements of researchers from the developing world.

The Academy administers numerous awards—some of them annual, others conferred every two years. These awards are often named after generous and highly accomplished TWAS Fellows.

• The **2023 TWAS-Abdool Karim Award** winner was Sanata Bamba-Pakotogo, a parasitologist with the Higher Institute of Health Sciences in Burkina Faso. Her body of research focuses on the diagnosis and management of fungal infections in Africa. She was honoured for her scientific contribution to the diagnosis and management of chronic pulmonary aspergillosis—a lung infection caused by mold—

▼ Left: TWAS-CAS Young Scientist winner Neena Gupta of India. [Photo provided]

Right: TWAS-Fayzah M. Al-Kharafi Award winner Nyovani Janet Madise of Malawi. [Photo provided]



...
For a complete list of all 2023 TWAS Awards, see p. 43
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▲ TWAS-Atta-ur-Rahman Award winner was Imalka Munaweera of Sri Lanka working in her laboratory. [Photo provided]

► TWAS-Abdool Karim Award winner Sanata Bamba-Pakotogo of Burkina Faso giving a presentation. [Photo provided]

following infection by tuberculosis bacteria. The condition is a common problem in Burkina Faso, where tuberculosis is endemic.

- The **2023 TWAS-Atta-ur-Rahman Award** winner was Imalka Munaweera of Sri Lanka, a materials scientist with the University of Sri Jayewardenepura. She was recognized for contributing to the development of engineered inorganic nanostructures and nanofiber composites that may have multidisciplinary applications. Her materials have had applications in drug delivery, pharmaceutical product development, agricultural product development, and water purification systems.

- The **2023 TWAS-Fayzah M. Al-Kharafi Award** winner was Nyovani Janet Madise of Malawi, for her pioneering research in Kenya on the lack of access to health care for pregnant women living in slums, leading to the construction of maternity facilities for them. She is currently the director of development policy and head of the Malawi office of the African Institute for Development Policy—a pan-African research and policy institute with a mission to generate and promote the use of evidence among African decision-makers, and accelerate the achievement of the Sustainable Development Goals.

- The **2023 TWAS-CAS Young Scientist Award in Mathematics and/or Artificial Intelligence** went to Indian mathematician Neena Gupta of the Indian Statistical Institute in Kolkata, India. She was honoured for her outstanding discoveries on fundamental questions in ‘affine’ algebraic geometry, which are derived from polynomial equations. She also found the solution to a longstanding problem in algebraic geometry called the Zariski Cancellation Problem. She had previously been elected a TWAS Young Affiliate in 2020.



EDUCATION AND TRAINING

TWAS manages the world's largest programme for **South-South PhD and postdoctoral research fellowships**. Through the Academy, associated organizations, and partners, early-career researchers can continue their education and gain experience at world-class science institutions in the developing world. In 2023, this included Brazil, China, India, Pakistan, and Türkiye through its traditional programmes.

By the end of 2023, a grand total of 2,400 scholars had accepted PhD opportunities from TWAS, with 416 actively pursuing their South-South PhDs on-site at their host institutions. A total of 1,150 participants were confirmed to have graduated by the end of the year.

Also in 2023, TWAS initiated four new South-South fellowship programmes. Two are with the **Lahore University of Management Sciences** in Pakistan—one for PhD students and the other postdoctoral researchers. TWAS also signed a new agreement with the **São Paulo Research Foundation (FAPESP)** which will give **20 researchers per year** from the UN-identified Least Developed Countries (LDCs) the opportunity to carry out

postdoctoral research in the State of São Paulo, Brazil.

In 2023, TWAS also began a special programme through a partnership with the Swedish International Development Cooperation Agency (Sida), that is both South-South and South-North. The **TWAS-Sida PhD Scholarships for Climate Research for Students from Least Developed Countries (LDCs)** was awarded to 13 young climate scientists, who will be hosted by institutions in 12 countries throughout the developing world, and will also receive mentorship from scientists who are part of the Intergovernmental Panel on Climate Change.

▼ Afonso Filipe João, an electrochemist of Mozambique, is refining 3D-printing technology to produce low-cost sensors and analytical equipment for the detection of environmental and food contaminants. He received his PhD through a TWAS fellowship in Brazil with the Brazilian National Council for Scientific and Technological Development (CNPq), a long-standing TWAS partner and fellowship supporter. [Photo provided]

“ This PhD fellowship truly allowed me to evolve as a scientist, and use my skills to benefit the environment, and my people. ”

Afonso Filipe João, TWAS fellowship recipient



PhD fellowships

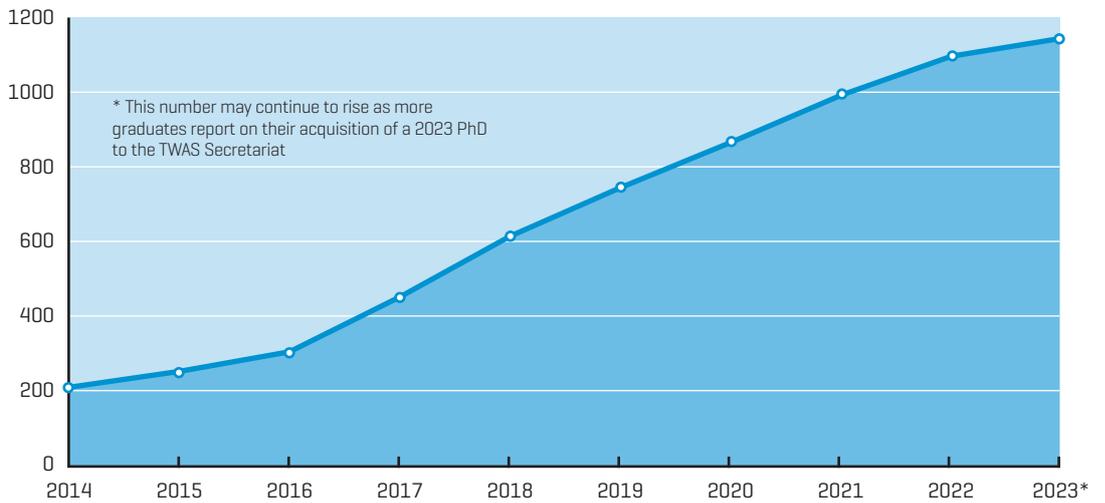
-  **118** AWARDS AVAILABLE
-  **62** AWARDED
-  **4** PARTNERS
-  **16** HOST COUNTRIES

Postdoctoral fellowships

-  **88** AWARDS AVAILABLE
-  **14** AWARDED*
-  **8** PARTNERS
-  **4** HOST COUNTRIES

* This number will increase, as awards from 2023 are still being processed. Traditionally calls for fellowship applications have opened in the spring or summer, but because programmes are increasingly seeking applications late in the calendar year, from this point forward we are showing both awards available and awards granted.

Cumulative total of all TWAS PhDs graduated over the last 10 years



South-South PhD fellowships programme, a full history:

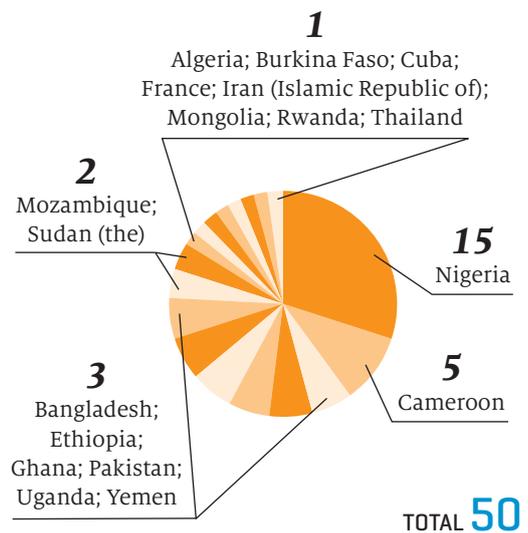
2,905 PHD FELLOWSHIP OPPORTUNITIES AWARDED SINCE THE INCEPTION OF THE PROGRAMME

2,400 FELLOWSHIPS ACCEPTED AND BEGUN BY DEVELOPING WORLD SCIENTISTS

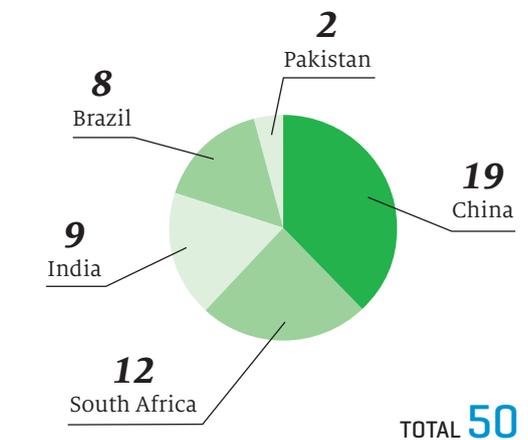
1,150 PHDs CONFIRMED TO HAVE BEEN GRADUATED BY THE END OF 2023

416 PHD FELLOWSHIP HOLDERS ONSITE WORKING TOWARD THEIR DEGREES DURING 2023

Home country for new 2023 PhD recipients



Country of training for new PhDs



VISITING SCIENTISTS

TWAS also provides opportunities to established researchers from the South to pursue collaborations and education, or to gather experience in a country other than their own. In 2023, the programmes included:

- **TWAS-UNESCO Associateship Scheme:** 11 developing-world scientists from 7 countries
- **TWAS-DFG Cooperation Visits Programme:** 50 scientists from 15 sub-Saharan African countries
- **TWAS Fellowships for Research and Advanced Training:** 13 developing-world scientists from 9 countries
- **TWAS-SISSA-Lincei Research Cooperation Visits Programme:** 10 developing world scientists from 10 LDCs
- **TWAS Visiting Expert Programme:** 9 experts from 7 countries contributing to science in the global South
- **TWAS Research Professors in LDCs:** 2 Research Professors (one TWAS Fellow and one TWAS Young Alumnus) from 2 countries.

PROGRESS THROUGH RESEARCH

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

In 2023, TWAS continued its **Seed Grants for New African Principal Investigators (SG-NAPI)** with its third call for applications. With key support from the **German Federal Ministry of Education and Research (BMBF)**, the programme awards up to \$67,700 per grant

◀ Ghanaian chemist and 2023 project grantee Trinity Tagbor with samples of cooking stoves for testing. [Photo provided]



WINNERS OF THE TWAS - ELSEVIER FOUNDATION PROJECT GRANTS FOR GENDER EQUITY AND CLIMATE ACTION

- Environmental scientist **Albertina Alage of Mozambique**, leading a project on community-based reforestation
- Industrial engineer **Zviemurwi Johnny Chihambakwe of Zimbabwe**, leading a project to build climate resilience
- Agricultural scientist **Gisele Koupamba Sinasson Sanni of Benin**, leading an environmental restoration project
- Social scientist **Emelder M. Tagutanazvo of Zimbabwe**, leading a project on integrating land management and natural ecosystems
- Chemist **Trinity Tagbor of Ghana**, leading a project on biomass as an alternative fuel source
- Ecologist **Vania Wendy Torrez Flores of the Plurinational State of Bolivia**, leading a project on land-use planning and climate adaptation training for women's empowerment
- Disaster risk management specialist **Chipo Mudavanhu of Zimbabwe**, leading a project on women in leadership, climate change adaptation, and food security

► SG-NAPI grantee Kadege Goodluck Fue posing with the Red Rover at Sokoine University of Agriculture, United Republic of Tanzania, where he is developing an autonomous spraying machine for Tanzanian farmers. [Photo: EPA Lab]



“ The SG-NAPI grant allowed me to purchase the equipment I needed to set up my precision agriculture laboratory. Now I have the capability to build site-specific technology such as robotics systems and automated devices to help Tanzanian farmers. ”

Kadege Goodluck Fue, 2021–2023 SG-NAPI grant awardee and Tanzanian engineer

TWAS Research Grants awarded

 **2,763**
SINCE 1986

SG-NAPI Grants awarded

 **84**
SINCE 2021

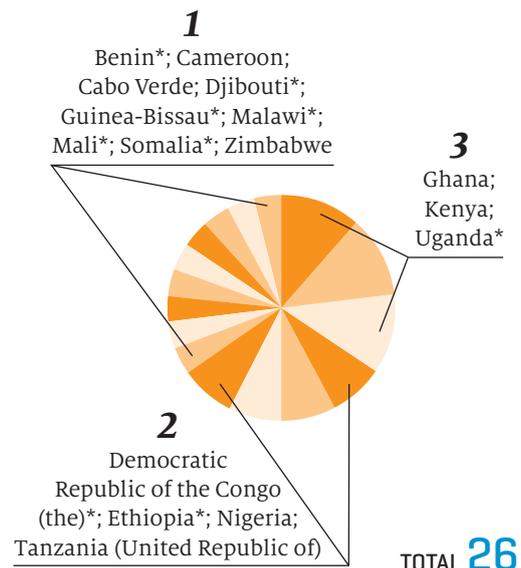
Field of research of 2023 SG-NAPI Grants

- 4** AGRICULTURE;
BIOLOGY; CHEMISTRY;
EARTH SCIENCES;
MEDICAL SCIENCES
- 2** ENGINEERING;
INFORMATION
COMPUTER
TECHNOLOGY; PHYSICS

to projects in sub-Saharan Africa, and seeks to facilitate the return of young scientists who obtained their PhD outside of their home country to Africa, and help local researchers to establish their own laboratories.

Another grant programme was sponsored by the **Elsevier Foundation** for its second year: **TWAS - Elsevier Foundation Project Grants for Gender Equity and Climate Action**. They were focused on projects, rather than research, and awarded to seven all-women teams for scientific projects related to climate change with the potential to produce tangible improvements. The leader of each project

Where did SG-NAPI Grants go in 2023?



* LDC

is a woman scientist, holding a PhD, living and conducting scientific work in one of the science-and-technology-lagging countries [STLCs] identified by TWAS.

The Academy also usually provides **TWAS Research Grants** to researchers in STLCs. Though none were provided in 2023, the Academy and its core funder the **Swedish International Development Cooperation Agency (Sida)** prepared its usual array of grants for the next year, including grants for individuals, research groups, equipment maintenance and collaborative for interdisciplinary research.

SUPPORTING SCIENCE POLICY

With a network of over 1,400 eminent scientists representing 112 countries and 40 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.

TWAS at LDC5: The participation of TWAS in the Fifth United Nations Conference on the Least Developed Countries (LDC5), which took place in Doha, Qatar, from 5–9 March 2023, marked the Academy’s role in building scientific strength where it is needed most. At the event, TWAS participated in three panels and contributed with an exhibition booth at the conference centre.

One panel, a side-event organised by the United Nations Technology Bank for the Least Developed Countries (UNTB), emphasised the importance of partnerships promoting sustainable development in LDCs.

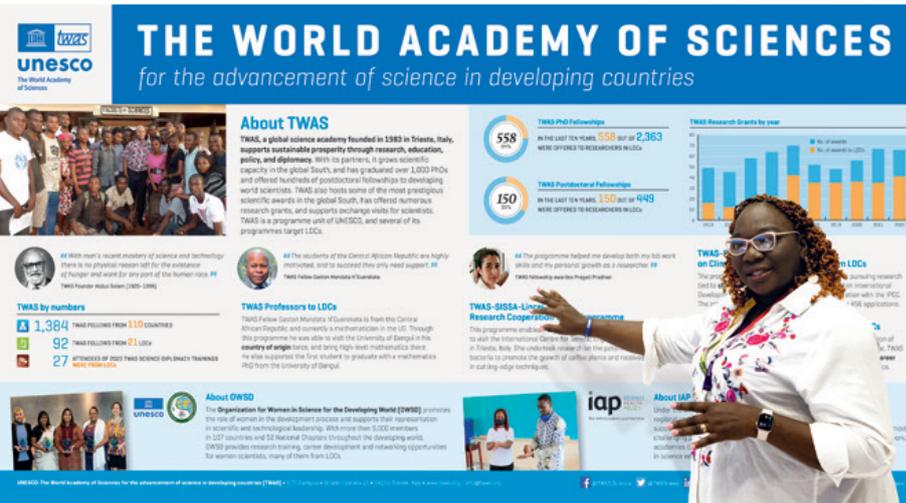
Then-Executive Director Romain Murenzi urged for greater support for online higher education, called partnerships “paramount”, and said that TWAS responds to the needs of young scientists in countries that are still

developing their research infrastructure. He credited the Academy’s global partners and the strong science network based in Trieste, Italy, and the Friuli Venezia Giulia Region, with making the Academy’s work in these areas possible.

Murenzi also joined a high-level side-event that attempted to address a target in the Doha Programme of Action for the Least Developed Countries for the Decade 2022–2031, which was endorsed by the UN General Assembly in 2022. This target was to undertake feasibility studies to explore establishing new platforms to assist Least Developed Countries, including

▼ The Qatar National Convention Centre.
[Photo: G. Ortolani/TWAS]

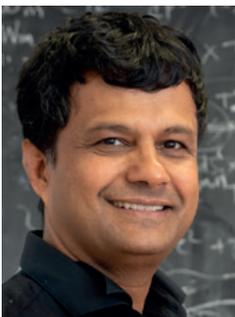




▲ Above: Olubukola O. Babalola, TWAS vice-president, stands by the informational display at the TWAS booth at the 5th United Nations Conference on the Least Developed Countries (LDC5) in Doha, Qatar, in March 2023. (Photo: G. Ortolani/TWAS)

Top right photo: Romain Murenzi (left) and Xing Qu, UNESCO Deputy Director-General, at the TWAS booth. (Photo: G. Ortolani/TWAS)

▼ Atish Dabholkar, Director of the Abdus Salam International Centre for Theoretical Physics (ICTP), and TWAS Executive Director ad interim.



an online university. The side-event was jointly co-organized by the United Nations Office of the High Representative for the Least Developed Countries, Landlocked Developing Countries and Small Island Developing States (UN-OHRLLS); [Education Above All](#); the [Commonwealth](#); and [UNESCO](#).

TWAS also cooperated on a panel with the Organization for Women in Science for the Developing World (OWSD) in which women scientists from LDCs shared their stories on becoming leaders in their fields.

Call to action in ‘Science’: In a 2023 *Science* editorial called ‘[Commit to the Global South](#)’, TWAS President [Quarraisha Abdoool Karim](#) said science organizations from around the world must more actively support improvements to people’s lives globally, especially in the global South. The editorial also stresses that “global North-South and South-South partnerships that harness science and technology” are key for empowering LDCs.

Science policy education in Italy: Academy leaders were involved in numerous events relevant to science policy in Italy in 2023. TWAS President Quarraisha Abdoool Karim spoke on ground-breaking medical research at both the launch of the Academy’s 40th Anniversary celebrations and on the importance of science worldwide during an event for Trieste schoolchildren at the science festival Trieste Next. Trieste Next also featured a



high-level panel of TWAS Council members on pressing issues of the time. Finally, TWAS participated in an event in Trieste that was part of the Italian Ministry of Foreign Affairs and International Cooperation’s multi-year campaign launched in 2020 to urge vital progress toward the UN Sustainable Development Goals. (For more on TWAS activities in Italy, see pages 32–33)

It is important to consider not only who does the science but also who receives the fruits of science if the global South is to leapfrog into an equitable present and future.

TWAS President Quarraisha Abdoool Karim in ‘Commit to the Global South’ in the journal Science

Leadership transition: After serving as TWAS Executive Director for more than a decade, Romain Murenzi retired in November 2023. The Director-General of UNESCO has appointed Atish Dabholkar, Director of the Abdus Salam International Centre for Theoretical Physics (ICTP), as the Executive Director ad interim.

SCIENCE DIPLOMACY

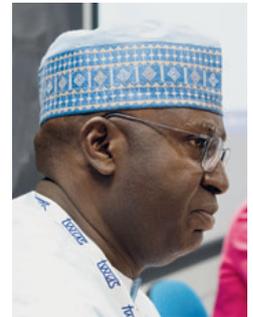
To address regional and global challenges, the world requires effective partnerships between scientists, policymakers and diplomats. TWAS, based in Italy and with networks that span the world, is uniquely positioned to help bring these communities together.

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 has provided essential financial support to date.

AAAS-TWAS Course on Science Diplomacy:

The 10th edition of this globally recognised course was held 20-23 June, and for the first time since the COVID-19 pandemic was held almost entirely in-person, with only some speakers connecting remotely. And for the third time, attendees worked in 'participant



▲ Keynote speaker
Amb. Prof. Muhammadou
M.O. Kah. [Photo:
G. Ortolani/TWAS]



◀ Course participants
hear a welcome message
from TWAS President
Quarraisha Abdool Karim.
[Photo: G. Ortolani/TWAS]

► Participants and speakers in the 10th AAAS-TWAS Course on Science Diplomacy gathered together. [Photo: G. Ortolani/TWAS]

Below: Gisselle Guerra, a hydrologist at Technological University of Panama, delivers her breakout group's closing presentation. [Photo: G. Ortolani/TWAS]



AAAS-TWAS Science Diplomacy Course

26 PARTICIPANTS

12 REPRESENTED COUNTRIES

(ARGENTINA, BANGLADESH, BRAZIL, CAMBODIA, ESTONIA, ETHIOPIA, MOLDOVA [THE REPUBLIC OF], PANAMA, SERBIA, TANZANIA [UNITED REPUBLIC OF], THAILAND, UKRAINE)

Participants and speakers were divided as follows (gender and age):

17 WOMEN (65%)

8 FROM LDCs (31%)
BANGLADESH, CAMBODIA, ETHIOPIA, TANZANIA [UNITED REPUBLIC OF]

13 YOUNG SCIENTISTS (AGE 40 OR BELOW) (50%)

13 POLICYMAKERS (50%)

22 SPEAKERS (11 FROM THE GLOBAL SOUTH)

pairs': each early-career scientist collaborating with either a diplomat or a policymaker, to understand better the theory and practice of science diplomacy and to test the tools that are important in its application.

The course was attended by 26 participants. The pairs were challenged to play out roles in simulated negotiations on difficult topics—with international competing interests and thus requiring application of science diplomacy skills—such as the construction of a dam on a shared river, or the conservation of endangered species in a transboundary forest.

The event included eight sessions on topics of importance to science diplomacy. Panellists spoke on how scientific collaboration has built bonds between countries across borders during times of tension, how diplomats respond to emerging technological innovations, and the peculiar nature of careers in science diplomacy. These 'science diplomat' careers build international networks and operate professionally at the interface between science and policymaking.

Participants also heard a keynote speech from Amb. Prof. Muhammadou M.O. Kah, himself a pre-eminent science diplomat from the Gambia, a Least Developed Country, with extensive experience as Ambassador Extraordinary and Plenipotentiary of his country at the UN Office, the World Trade Organisation and other international organisations in Geneva. Kah discussed in detail the ways that emerging digital technologies are redefining geopolitics.

AAAS, the Organization for Women in Science for the Developing World ([OWSD](#)) and the InterAcademy Partnership ([IAP](#)) also contributed funding to the programme.

“It’s a great experience, where you have so many countries in just one place and you get to know them not from the science side, but personally how they are in a cultural way.”

Gisselle Guerra, a hydrologist at Technological University of Panama, reflecting on the AAAS-TWAS Course on Science Diplomacy



EMPOWERING WOMEN

Supporting women in research is a central part of the mission of TWAS. The Academy and its partners offer numerous opportunities to women in the developing world, which is not only valuable for the careers of individual researchers, but critical for activating developing nations' full scientific potential.

In 2023, a major new programme—the **TWAS - Elsevier Foundation Project Grants for**

Gender Equity and Climate Action—specifically designed to support women in science—entered its second year. Through this programme, seven winning teams were announced at an event at COP28, the 2023 United Nations Climate Change Conference.

This project stands out because it has three common themes: to **strengthen gender equity**, address the **climate-related needs of local**

▼ Congolese soil scientist Lydie-Stella Koutika takes part in a discussion during the TWAS-Elsevier Foundation Project Grants for Gender Equity and Climate Action workshop in Trieste. [Photos: G. Ortolani/TWAS]

“All the participants, and especially the keynote lectures, were wonderful. To say it shortly: It was positive and wholly inspiring. I am grateful to TWAS and the Elsevier Foundation for this workshop.”

*Congolese soil scientist and TWAS-Elsevier project grant awardee **Lydie-Stella Koutika** on the April workshop in Trieste*





▲ Early Career Awards to Women Scientists winner Gabriela Montenegro-Bethancourt. [Photo provided]

► From left: Early Career Awards to Women Scientists winners Munkhjarga Tserendorj of Mongolia, Eugenie Kayitesi of Rwanda, Yeyinou Laura Estelle Loko of Benin, Haneen Dwaib of the State of Palestine, Renuka Attanayake of Sri Lanka, and Carla Fabiana Crespo Melgar of the Plurinational State of Bolivia. [Courtesy: OWSD]

TWAS Awards



4

TOTAL IN 2023

100%
TO WOMEN

1281

TOTAL
1985-202318.7%
TO WOMEN

communities, and apply scientific knowledge to real-life scenarios.

The projects are entirely led and conducted by women researchers from Benin, the Plurinational State of Bolivia, Ghana, Mozambique, and Zimbabwe and will each receive approximately \$25,000. They are made possible by financial support from the Elsevier Foundation, a long-time TWAS partner on multiple projects.

TWAS also held a first-of-its-kind workshop in 2023 for the winners of the first edition of the award the previous year. Awardees, all of them women, gathered at TWAS headquarters in Trieste from 18–19 April for leadership training, and discourse on how to ensure that their work leads to tangible, real-world outcomes.

The two days of activities also included high-level speakers who explained how to achieve a key sustainable development agenda item: **climate action**. Among them was Lučka Kajfež Bogataj of the University of Ljubljana, Slovenia, who shared the 2007 Nobel Peace Prize as part of the Intergovernmental Panel on Climate Change (IPCC).

TWAS also hosts an influential partner building science capacity in the developing world at its offices in Trieste, Italy—its sister organization, the **Organization for Women in Science for the Developing World (OWSD)**.

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 with the objective of strengthening their roles in the development process and promoting their representation in science and technology leadership.

As of the end of 2023, OWSD had more than 10,000 members, over 95% of them women with Masters or Doctorate degrees in scientific subjects living and working in developing countries. OWSD members can network face to face through activities organised by their National Chapters, or through Regional and International conferences, as well as online.

OWSD also partners with the Elsevier Foundation to organize annual **Early Career Awards to Women Scientists**. The seven awardees for 2023 were **Renuka Attanayake** of Sri Lanka, plant and molecular biology; **Carla Fabiana Crespo Melgar** of the Plurinational State of Bolivia, biotechnology and microbiology; **Haneen Dwaib**, of the State of Palestine, nutrition and dietetics; **Eugenie Kayitesi** of South Africa, food science and technology; **Gabriela Montenegro-Bethancourt** of Guatemala, life sciences and nutrition; **Munkhjargal Tserendorj** of Mongolia, veterinary medicine; and **Yeyinou Laura Estelle Loko** of Benin, entomology and crop protection.

YOUNG SCIENTISTS

Every year, each of the Academy's Regional Partners selects up to five brilliant early-career scientists to become **TWAS Young Affiliates**. These young scientists join a growing network of some of the developing world's most promising talents, and provide TWAS with valuable energy and generational perspective. They also receive further opportunities to interact and learn from TWAS Fellows during their affiliateship, which lasts five years.

Those who complete their terms as Affiliates become **TWAS Alumni**. To date there are 122 current Young Affiliates and 297 Alumni, all of them key contributors to the acceleration of scientific strength in the global South.

In 2016, Young Affiliates took the initiative to found the **TWAS Young Affiliates Network (TYAN)**—at the TWAS General Conference that year in Kigali, Rwanda—to reinforce ties among the Academy's Young Affiliates. Through [TYAN](#),

TWAS Young Affiliates

122 TOTAL
CURRENT TWAS YOUNG
AFFILIATES

297 TWAS
YOUNG ALUMNI
(WOMEN: 31.6%)

419 TOTAL
NUMBER AFFILIATES
AND ALUMNI
COMBINED (WOMEN:
38.4%)



◀ A group photo taken from TYAN's inaugural summer school in the Plurinational State of Bolivia in March 2023. [Photo provided]



▲ Left: TYAN members in front of the National Academy of Sciences of Bolivia. From left: cell biologist Federico Brown of Brazil, chemist Franco Cabrerizo of Argentina, plant biologist Pablo Bolaños-Villegas of Costa Rica, biochemist Yraima Cordero of Brazil and food engineer Leslie Tejada of the Plurinational State of Bolivia. [Photo: M. Paoli/TWAS] Right: TYAN Chair Franco Cabrerizo teaches a lesson during the organization's inaugural summer school in the Plurinational State of Bolivia in March 2023. [Photo provided]

Affiliates and Alumni share their scientific expertise, skills, and ideas through workshops, networks, and public meetings. They gather together with other scientists, policymakers, entrepreneurs, journalists, and the public at large to safeguard the role of science in decision-making.

Since its founding, TYAN has blossomed into an active organization with a record of accomplishments. As it stands, TYAN organizes regional events to facilitate the success of early-career scientists in the global South. It also publishes reports, organizes outreach programmes, and provides perspectives from young developing-world scientists at international conferences. In recent years, it has also begun to weigh in on major science policy issues, such as open science.

In 2023 alone, TYAN organized:

- an **inaugural summer school** held 6–10 March in La Paz, Plurinational State of Bolivia, which brought together 120 students and researchers from across the country;
- a **workshop on the development of scientific partnerships** in Latin America and the Caribbean, held 13–17 November 2023 in La Paz, Plurinational State of Bolivia;
- a regional **conference on sustainable and innovative social development** from 9–11 October at University of Brasília in Brazil;
- a **mathematics workshop** from 2–6 October at the University of Brasília in Brazil.

The Network also provides opportunities through the TYAN Collaborative Grant Award, and for financial support to organize TYAN International Thematic Workshops on key topics in developing world science. Both programmes began in 2017.



“ Our South–South initiative equipped trainees with the tools to further their research. Now more investment in research is needed so that they can apply these tools effectively. ”

Franco Cabrerizo, TYAN chair, in a letter in Nature Correspondence published 11 April 2023 urges more scientific training in the global South

GLOBAL ACADEMY NETWORKS

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



The InterAcademy Partnership (IAP) is a long-time TWAS partner, with its secretariat hosted by TWAS in its offices in Trieste, Italy. IAP brings together 150 national, regional and global member academies, which 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 expertise of the world's leading scientific minds to advance sound policies, improve public health, promote excellence in science education, and achieve other development goals. Academy members constitute more than 30,000 leading scientists,

engineers and health professionals in over 100 countries.

Here are some major accomplishments of IAP in 2023:

- **The IAP Science Education Programme** held its triennial science education conference in Morocco on 16-17 March. The invited experts discussed the inquiry-based science education and progress in establishing science centres in Africa. IAP also issued three small grants to support the establishment of such centres

▼ Authors of climate change and health case studies, reviewers, and staff members of the IAP and Save the Children in Trieste, during a workshop on climate change and health in September 2023. [Photo: S. Nitti/IAP]





▲ The 2023 cohort of the IAP Young Physician Leaders programme in a group photo after receiving their participation certificate. [Photo: S. Nitti/IAP]

in Benin, Ethiopia and Ghana, while another earmarked for the Sudan has been placed on hold.

- The 2023 awardees of the **IAP Young Physician Leaders** programme, comprising 18 emerging leaders working in medicine and public health from 15 countries, convened in Berlin, Germany, at the World Health Summit in October. Following two days of leadership training, the young leaders prepared a session for presentation at the event. IAP now has 253 alumni of this programme.
- IAP Coordinator, Peter McGrath, was invited to the **Second Working Group Meeting on Science and Technology of the Biological and Toxin Weapons Convention** (BWC) in Geneva, Switzerland, in August 2023, where he gave two presentations to States Parties' delegates. On 14 November, IAP also hosted an online session, the start of an ongoing project, 'Proof of Concept on a BWC Scientific Advisory Body'.
- During COP28 in Dubai, IAP released the **science policy brief** 'Climate Change Adaptation for Health: Systems-based approaches to formulating solutions and guiding policy'. IAP also led a session at the event on **The Role of Academies in Climate Policy Advice**.

The Chinese Academy of Sciences (CAS) is the hub of China's ambitious research enterprise, and it has long-standing ties with TWAS. CAS collaborates with TWAS on the six CAS-TWAS Centres of Excellence, and on the TWAS-CAS Young Scientists Award for Frontier Science. CAS also participates in a key PhD fellowship

programme—the ANSO-CAS-TWAS/UNESCO PhD Scholarship—and hosts the TWAS Regional Partner for East and South-East Asia and the Pacific.



The Lincei Academy (Accademia Nazionale dei Lincei) was established in Italy in 1603. It is today a cultural body of the highest level in Italy. TWAS collaborates with Lincei, as well as the International School for Advanced Studies (SISSA) in Trieste, on a three-month cooperation visits programme hosting developing world scientists in Trieste or Udine, Italy, to promote collaborative work related to achieving the UN Sustainable Development Goals.

The Academy of Science of South Africa (ASSAf) is one of Africa's leading institutions advocating for science and technology, and hosts TWAS sub-Saharan Africa Regional Partner at its headquarters in Pretoria.

The Brazilian Academy of Sciences (ABC) is a longtime TWAS partner. It both hosts TWAS's regional partner for Latin America and the Caribbean and serves as a liaison between TWAS and the Brazilian government.

Academia Sinica of Taiwan, China, has for many years provided TWAS with financial support.

TWAS is also a member of the **International Science Council (ISC)**, an international non-governmental organization that brings together scientific institutions, including many science academies. In May 2023, the Academy joined the ISC 2023 Mid-term Meeting of ISC Members 'Capitalizing on Synergies in Science' in Paris, France.

REGIONAL PARTNERS

TWAS partners in five regions of the developing world perform vital Academy functions.

They nominate scientists for TWAS awards and select Young Affiliates. They also organize conferences and raise awareness of TWAS and its programmes among scientists of their region. Finally, they help to advance support globally for science among policymakers and with the general public.

In 2023, each regional partner organized at least one conference for young scientists, with a total of 11 events during the year, most held online, and reaching over 1,468 registered participants. Of the confirmed participants 341 [22%] were women, 130 were from LDCs [9%], and at least 508 [35%] were young scientists. The regional partners frequently collaborate with the **TWAS Young Affiliates Network [TYAN]** to advance the careers of young scientists in the regions.

...
The 2023 TWAS Regional Awards were given for Science Diplomacy.
...

RIO DE JANEIRO, Brazil ●

Brazilian Academy of Sciences

▼ 2023 TWAS Regional Award Winner:
Alejandra Irene Roldan Flores, Plurinational State of Bolivia



The **Latin America and the Caribbean Regional Partner [TWAS-LACREP]** held the TYAN Regional Conference for Latin America and Caribbean Region on 9–11 October at the University of Brasília in Brazil. It also hosted an online workshop for TWAS Young Affiliates. The two events combined had 121 participants, including 64 young scientists, 43 women, and three from Least Developed Countries.

► 2023 TWAS Regional Award Winner: **Tamègnon Victorien Dougnon**, Benin

▼ No award was selected for 2023

The **East and South-East Asia and the Pacific Regional Partner (TWAS-SAPREP)** held five events throughout the year. These included a symposium on earth system models, a conference on big data, a workshop on disaster-risk reduction, a science forum on carbon neutrality, and a panel discussion on the climate-health crisis. Combined, the events had 1,049 participants, including 239 young scientists, 155 women, and 84 from recognized Least Developed Countries.

▼ 2023 TWAS Regional Award Winner: **Mayssoon Dashash**, Syrian Arab Republic



The **Arab Regional Partner (TWAS-AREP)** organized the hybrid Regional Workshop on Science Diplomacy for the Arab Region, which took place on 24-26 October 2023 at Bibliotheca Alexandrina in Egypt. It also held an online lecture on the interplay of data sciences and Earth observation on the Arab Region's environmental challenges, hosted at Bibliotheca Alexandrina in Egypt on 27 November. Combined, the events had 171 participants, including 111 young scientists, 92 women, and 39 from Least Developed Countries.

● **TRIESTE, Italy**
ICTP 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

▼ 2023 TWAS Regional Award Winner: **Dakshitha Praneeth Wickramasinghe**, Sri Lanka



The **Central and South Asia Regional Partner (TWAS-CASAREP)** held an online conference celebrating the International Year of Basic Sciences for Sustainable Development from 19–20 January, with a focus on how chemistry and physics contribute to medicine and global health. It also held a young scientists conference from 1–3 November in Nepal. Combined the two events hosted 127 participants, including 94 young scientists and 51 women. Four were from Least Developed Countries.



The **sub-Saharan Africa Regional Partner (TWAS-SAREP)**, hosted a fully online Regional Symposium on One Health from 12–13 December 2023. The symposium focused on fostering interdisciplinary collaborations addressing how human, animal, plant, and environmental health research intersect.

TWAS & ITALY

Since its inception in 1983, TWAS has had a close partnership with Italy. Through the Italian Ministry of Foreign Affairs and International Cooperation [MAECI], Italy provides core funding to the Academy, thus making its work to advance science in the developing world possible and facilitating an innovation-friendly policy ecosystem. Together, Italy and TWAS have helped developing countries build critical skills. TWAS also cooperates closely with the Academy’s host region in north-eastern Italy, Friuli Venezia Giulia, as well as its host city, Trieste, which resides on the shore of the Adriatic Sea near the Italian border with Slovenia.

Here are highlights of the TWAS-Italy partnership in 2023:

TWAS 40th Anniversary Celebrations: To celebrate that the Academy had achieved four full decades of important accomplishments strengthening developing world science, TWAS president Quarraisha Abdool Karim of South Africa visited the organization’s headquarters in Trieste and met with representatives of other Trieste-based scientific organizations.

During an anniversary launch event, Abdool Karim delivered a public lecture at the Savoia



Excelsior Palace Hotel on 25 May on the African legacy of academic excellence in generating new knowledge for better health.

Abdool Karim’s lecture covered public health, academic excellence, and Africa’s past and future. She remarked that science, education and innovation have an important role in making the world a better place. Noting that this was her first visit to Trieste, she praised the city’s science ecosystem and the prevalence

▲ The TWAS booth at Trieste Next.
[Photo: G. Ortolani/TWAS]



“ We need not only to collaborate, but to reinforce our partnership. What the Italian government and TWAS are doing, and will keep on doing, is not to create barriers, but to let science grow. ”

Minister Plenipotentiary **Giuseppe Pastorelli**, Deputy Director General for the Promotion of Italy at the Italian Ministry of Foreign Affairs and International Cooperation (MAECI), at the TWAS 40th Anniversary Launch event

▲ TWAS President Quarraisha Abdool Karim (left) and Minister Plenipotentiary Giuseppe Pastorelli. [Photo: G. Ortolani/TWAS]

► Discussions at the TWAS round table. From left: TWAS Vice-President for the Arab Region Sabah AIMomin, TWAS President Quarraisha Abdool Karim, TWAS Vice-President for Central and South Asia Muhammad Iqbal Choudhary, and TWAS Vice-President for Latin America and the Caribbean Helena Nader. [Photo: G. Ortolani/TWAS]

of local science institutions’ international collaborations.

Then-TWAS Executive Director Romain Murenzi opened the anniversary event. He was followed by Stefano Fantoni, president of the Trieste International Foundation for the Progress and Freedom of Sciences; and Minister Plenipotentiary Giuseppe Pastorelli, director for integrated promotion and innovation at the Directorate General for Country Promotion of MAECI.

Additionally, TWAS also organized two events with its leadership at the **12th edition of Trieste Next**, a science festival held annually in Trieste, Italy, which took place on 22–24 September, with a broad agenda of more than 300 speakers and over 100 events, in both Italian and English. TWAS has been a participant since the festival’s first edition, in 2012.

At the festival, Abdool Karim delivered a presentation on the importance of science that was attended by 17 students from Deledda-Fabiani High School and 19 from Addobbati-Brunner Junior High School, both in Trieste. They were part of an audience of over 60.

Abdool Karim was also part of a roundtable with other TWAS Council members at Trieste Next. Joining her were TWAS Vice-President for the Arab Region, Sabah AIMomin of Kuwait, a senior research scientist at the Kuwait Institute for Scientific Research; TWAS Vice-President for Central and South Asia Muhammad Iqbal Choudhary of Pakistan, coordinator-general OIC-COMSTECH, Pakistan; and TWAS Vice-President for Latin America and the Caribbean Helena Nader of Brazil, head of the Institute of Pharmacology and Molecular Biology at the Federal University of São Paulo. The panellists were brought by TWAS to Trieste for the annual TWAS Council Meeting, and at Trieste Next they engaged with the public on some of the most pressing global issues that scientists are addressing today.

In September, TWAS joined the stand of the Scientific and Innovation System of Friuli Venezia Giulia [SIS FVG] at an event organized at Immaginario Scientifico, Trieste’s science museum, and presented on the Academy’s activities.

Finally, TWAS is a participant in the MAECI’s **#TogetherfortheSDGs campaign**, and participated in a Trieste event on 15 November titled **‘Trieste: Science for the 2030 Agenda’** alongside the other science institutions in the Trieste Science System, showcasing the strength of international science in Trieste and Italy as a whole.



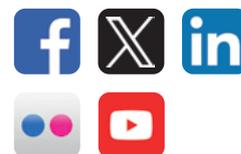
A STORY TO COMMUNICATE

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 general public.

The TWAS communications strategy in 2023 increasingly relied on digital tools. Its website, twas.org, features a mix of articles and announcements about the Academy's

activities. TWAS also increasingly made use of professionally crafted digital video interviews to promote its programmes and events to an audience on **social media**—including its 40th Anniversary activities and its flagship science diplomacy course with AAAS.

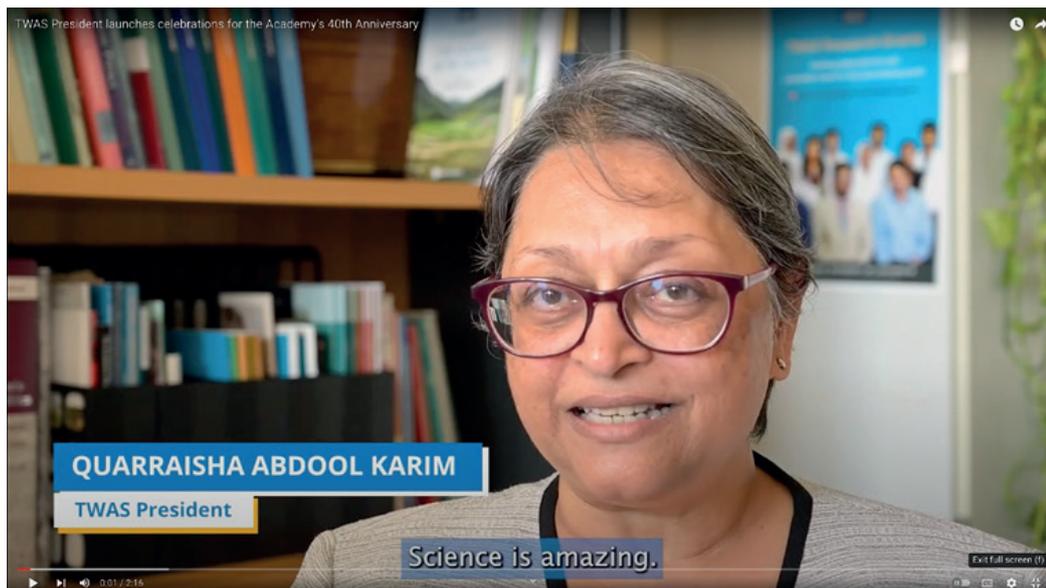
TWAS operates social media accounts on Twitter, Facebook, LinkedIn, Flickr, and YouTube, as well as an electronic bulletin **TWAS Plus**.



► Top right: Minister Plenipotentiary Giuseppe Pastorelli, Deputy Director General for the Promotion of Italy at the Italian Ministry of Foreign Affairs and International Cooperation (MAECI), is interviewed by the press at the TWAS 40th Anniversary Launch event. [photo: G. Ortolani/TWAS]

► Right: TWAS SISSA LINCEI awardee Adoukè Nadège Agbodjato from Benin onstage during MAECI's #TogetherfortheSDGs event in Trieste, Italy. [Photo: G. Ortolani/TWAS]

◀ Left: Image from a video on the launch of the Academy's 40th Anniversary celebrations published on YouTube and directly to the Academy's social media accounts.





Anyone interested can [subscribe](#) to TWAS Plus now for free.

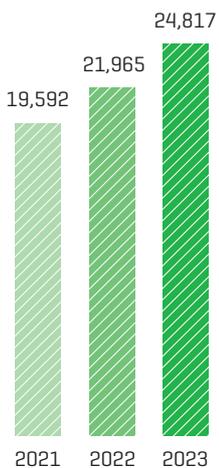
TWAS experienced particular success in 2023 on LinkedIn, the professional social network, where ambitious scientists often follow the TWAS account for notices on its various opportunities. Toward the end of 2023, the Academy had plans in place to begin using LinkedIn’s newsletter feature to promote its opportunities with the start of the next year.

The Academy also runs its own quarterly Newsletter, which communicates with TWAS membership and partners about its programmes and activities. In 2023, the **TWAS Newsletter** was made fully digital, directly reaching its audience’s email inboxes with a new and engaging format.

TWAS was also an active member of the communication group of the Scientific and Innovation System of Friuli Venezia Giulia [SIS FVG].

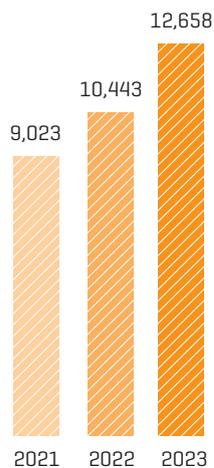
In 2023, the TWAS Public Information Unit also produced the **2022 Annual Report**.

Facebook



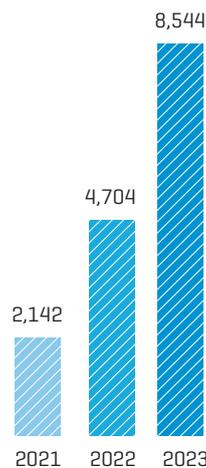
LIKES
+ 26.7%

X (Twitter)



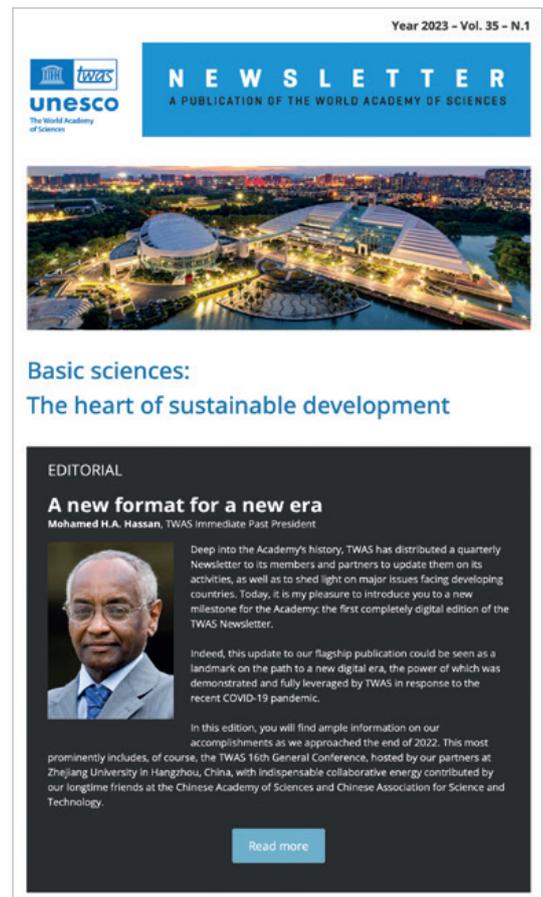
FOLLOWERS
+ 40.2%

LinkedIn



FOLLOWERS
+ 299%

From 1 January to 31 December each year.



FINANCIAL REPORT 2023

Starting in 2020, it was decided that the financial report for each odd-numbered year would cover two years, to bring it in line with UNESCO budget cycle.

From 2022–2023, TWAS received a total of \$12,011,829.95 in funding, including \$1,466 in individual contributions.

TWAS is grateful for the generous contributions from its numerous supporters. Their support helps make the Academy’s critical work in the developing world possible.

2023 FINANCIAL REPORT (IN USD)

INCOME¹ 2022-2023	
Balance brought forward 01.01.2022	728,086.73
1) Ministry of Foreign Affairs and International Cooperation [MAECI], Italy	3,627,042.56
2) Swedish International Development Cooperation Agency [Sida], Sweden	3,271,538.34
3) Federal Ministry of Education and Research [BMBF], Germany	2,029,077.60
4) David and Lucile Packard Foundation, United States of America	1,145,000.00
5) Elsevier Foundation, Kingdom of the Netherlands	345,000.00
6) Lenovo Group Limited, China	187,820.00
7) Ministry of Science, Technology and Innovation [MCTI], Brazil	165,913.27
8) Academia Sinica, Taiwan, China	100,000.00
9) American Association for the Advancement of Science, United States of America	29,000.00
10) Siwei Cheng Foundation, China	25,910.19
11) The Searle Company, Ltd., Pakistan	14,468.88
12) Quarraisha Abdool Karim, South Africa	14,000.00
13) F.M.A. Al-Kharafi, Kuwait	12,000.00
14) National Agency for Research and Development [ANID], Chile	10,000.00
15) Samira Omar Asem, Kuwait	5,970.00
16) Other miscellaneous income	4,824.32
17) Transfer to TWAS Reserve Fund	(150,000.00)
18) Interest income	446,974.00
19) Exchange difference	(785.94)
TOTAL INCOME	12,011,839.95

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 2022-2023	App. Budget	Rev. Budget	Expenditure
1) Prizes			
1.1) TWAS Science Award	112,150.00	112,098.30	112,098.30
1.1.1) Award cost	100,000.00	100,000.00	100,000.00
1.1.2) Other costs	12,150.00	12,098.30	12,098.30
1.2) TWAS Awards	102,000.00	101,827.87	101,827.87
1.2.1) Award cost	90,000.00	90,000.00	90,000.00
1.2.2) Other costs	12,000.00	11,827.87	11,827.87
1.3) Fellows Awards	67,450.00	72,258.96	72,232.55
1.3.1) Award costs	52,000.00	57,000.00	57,000.00
1.3.2) Other costs	15,450.00	15,258.96	15,232.55
1.4) TWAS - Siwei Cheng Award in Economic Sciences	12,149.00	12,149.00	10,000.00
1.5.1) Award costs	10,000.00	10,000.00	10,000.00
1.5.2) Other costs	2,149.00	2,149.00	
Sub-Total for [1]	293,749.00	298,334.13	296,158.72
2) Capacity Building in STLCs			
2.1) Research Grants	3,393,000.00	2,119,939.04	1,993,433.74
2.1.1) Activities	2,763,000.00	1,602,187.13	1,481,845.22
2.1.2) Implementation costs	630,000.00	517,751.91	511,588.52
2.2) Regional Partners	200,000.00	28,000.00	26,000.00
2.3) Science Diplomacy	106,000.00	46,000.00	45,363.79
2.4) Communication	30,000.00	5,000.00	3,690.57
2.5) PhD Fellowships for Climate Research in LDCs	1,794,000.00	2,096,788.25	909,970.51
2.5.1) Activities	1,500,000.00	865,000.00	619,500.00
2.5.2) Implementation costs	294,000.00	162,788.25	135,667.62
2.5.3) IPCC Climate Network		845,000.00	135,000.00
2.5.4) Additional implementation costs		224,000.00	19,802.89
Sub-Total for [2]	5,523,000.00	4,295,727.29	2,978,458.61
3) Fellowships, Associateships and Professorships			
3.1) Fellowship Programmes	600,000.00	309,509.22	307,149.14
3.2) Associateship, Professorship and Visiting Programmes	311,525.00	418,864.39	388,393.09
Sub-Total for [3]	911,525.00	728,373.61	695,542.23
4) Meetings			
4.1) Council and General Meetings	170,000.00	51,502.74	50,418.24
4.2) Steering Committee and other official meetings in Trieste	20,000.00	25,800.00	20,588.00
4.3) Activities to promote local sciences	20,000.00	10,000.00	8,730.45
4.4) Official visits to TWAS Executive Director in Trieste	20,000.00	11,198.75	7,640.97
Sub-Total for [4]	230,000.00	98,501.49	87,377.66
5) Publications			
5.1) Publications	70,000.00	47,875.33	21,162.95
5.2) Other costs	23,460.00	11,730.00	613.62
Sub-Total for [5]	93,460.00	59,605.33	21,776.57

Continue next page

EXPENDITURES 2023	App. Budget	Rev. Budget	Expenditure
6] Joint Projects			
6.1] TWAS Regional Partners	120,000.00	86,000.00	39,085.00
6.2] TWAS - Arab Regional Partner activities	93,460.00	64,730.00	18,000.00
6.2.1] <i>Regional Conference for Young Scientists</i>	46,000.00	25,000.00	2,000.00
6.2.2] <i>Other activities</i>	40,000.00	30,000.00	10,000.00
6.2.3] <i>Other costs</i>	7,460.00	9,730.00	6,000.00
6.3] Science Diplomacy Programme	20,000.00	19,500.00	19,429.43
6.4] Sustainability orientated activities	278,488.00	271,220.20	261,743.62
6.4.1] <i>Symposium, Fellowships and South-North Exchange Programme</i>	214,488.00	214,488.00	205,468.48
6.4.2] <i>Other costs</i>	64,000.00	56,732.20	56,275.14
6.5] Collaboration with ICTP Activities	100,000.00	68,000.00	67,930.00
6.6] Young Affiliates Network	242,880.00	134,929.48	95,835.47
6.6.1] <i>Activities</i>	222,880.00	94,958.79	75,864.78
6.6.2] <i>Other costs</i>	20,000.00	39,970.69	19,970.69
6.7] Coffee Research Conference	100,697.00	91,718.87	68,609.69
6.8] Additional funds for Research Grants	20,000.00	10,000.00	
6.9] Solar Radiation Management Governance Initiative	70,000.00	17,061.57	17,061.57
6.9.1] <i>Grants</i>	27,200.00	103.40	103.40
6.9.2] <i>Other activities</i>	30,000.00	5,000.00	5,000.00
6.9.3] <i>Staff costs</i>	12,800.00	11,958.17	11,958.17
Sub-Total for [6]	1,045,525.00	763,160.12	587,694.78
7] Operational Expenses			
7.1] Staff costs	3,000,000.00	2,460,024.80	2,410,289.75
7.2] ICTP services	300,000.00	204,443.62	204,149.51
7.3] Communications	30,000.00	17,672.92	13,480.97
7.4] Strategic communications	75,000.00	72,591.94	63,873.08
7.5] Travels	40,000.00	35,589.19	28,772.88
7.6] Fundraising activities	10,000.00	19,725.19	4,725.15
7.7] Library, office and other supplies	50,000.00	13,547.46	13,077.38
7.8] Other general operating expenses	50,000.00	20,530.80	19,872.47
Sub-Total for [7]	3,555,000.00	2,844,125.92	2,758,241.19
Management Costs	815,658.13	625,087.95	508,732.05
Total Expenditure	12,467,917.13	9,712,915.84	7,933,981.81
Savings on prior years' obligations			403,045.89
Excess of income over expenditure			4,480,904.03
Reserve Fund²			
Amount available at the beginning of period			1,781,439.20
Transfer from TWAS main account			150,000.00
End of service entitlements			-569,672.77
Reserve Fund balance end of period			1,361,766.43

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

TWAS ENDOWMENT FUND 1994-2023³ (IN USD)

ORGANIZATIONS	CONTRIBUTIONS RECEIVED
1] Ministry of Sciences and Technology, China	2,200,000
2] Ministry of Science and Technology, Brazil	1,933,107
3] Department of Science and Technology, India	1,000,000
4] National Science and Technology Council, Mexico	739,155
5] Academia Sinica, Taiwan, China	608,915
6] Ministry of Science and Technology, Nigeria	586,779
7] Kuwait Foundation for the Advancement of Sciences [KFAS], Kuwait	500,000
8] Ministry of Research, Science and Technology, Islamic Republic of Iran	269,183
9] Mohammad Ahmad Hamdan, Jordan	171,000
10] Ministry of Science, Technology and Innovation, Malaysia	100,000
11] Ministry of Science and Technology, Pakistan	100,000
12] Secretariat of Science, Technology and Production Innovation, Argentina	55,000
13] Ministry of Modernization and Technology, Senegal	52,887
14] Administrative Department of Science, Technology and Innovation [COLCIENCIAS], Colombia	50,000
15] Ministry of Higher Education and Scientific Research, Egypt	50,000
16] Atomic Energy Commission of Syria, Syrian Arab Republic	50,000
17] Ministry of Finance and Economic Planning, the Sudan	49,850
18] Vietnam Centre for Science and Technology Evaluation, Viet Nam	20,000
19] National Academy of Science and Technology, the Philippines	11,957
20] Ministry of Science and Technology, Bangladesh	10,000
21] Ministry of Education, Science and Technology, United Republic of Tanzania	4,529
22] Shui-Chin Lee Foundation for Basic Science, Taiwan, China	4,000
23] Swedish Council for Higher Education, Sweden	1,302
24] Office of the Prime Minister, Jamaica	1,000
25] Venezuelan Institute for Scientific Research [IVIC], Bolivarian Republic of Venezuela	300
<i>Subtotal</i>	8,568,964
<i>Plus other contributions⁴</i>	195,043
<i>Plus interest earned</i>	7,959,531
<i>Net transfer to TWAS Fund (2011-2023)</i>	-1,625,768
TOTAL	15,097,770

³ The aim of establishing this endowment fund was to build a capital of \$25 million to cover the secretariat costs and basic programmes.

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

**CONTRIBUTIONS TO THE ENDOWMENT FUND FROM TWAS FELLOWS,
YOUNG AFFILIATES, AND OTHER MISCELLANEOUS (1994-2023)**

Wook Hyun Kwon, Republic of Korea	30,000	P. Ciarlet, France	985
Bai Chunli, China	21,770	Lee Yuan T., Taiwan, China	977
M.H.A. Hassan, the Sudan	13,104	Gaoqing [Max] Lu, United Kingdom of Great Britain and Northern Ireland	966
J. Palis, Brazil	10,079	M. Zhu, China	966
Science Initiative Group, United States of America	6,250	G. Agarwal, United States of America/India	963
J.I. Vargas, Brazil	5,287	E.K.A. Edee, Togo	900
S.S. Katiyar, India	4,100	Mei Hong, China	879
A.V. Rama Rao, India	3,000	J. Lehn, France	840
A. Hamoui, Syrian Arab Republic	2,500	M. Clegg, United States of America	830
M. Peimbert, Mexico	2,500	J. Döbereiner, Brazil	800
Lu Yong Xiang, China	2,300	M. Munasinghe, Sri Lanka	750
P. McGrath, United Kingdom of Great Britain and Northern Ireland	2,046	L. de la Pena Auerbach, Mexico	742
M. Iqbal Parker, South Africa	2,000	B.L. Deekshatulu, India	700
K. Namsrai, Mongolia	1,858	M. Akhtar, Pakistan	700
P.A. Griffiths, United States of America	1,750	Wu Yue-Liang, China	666
A. Paulraj, United States of America	1,736	D. Balasubramanian, India	650
H. Fuchs, Germany	1,703	Un-Chul Paek, United States of America	634
B.N. Upreti, Nepal	1,644	Zhao Jincai, China	621
Fuchu He, China	1,620	Dong Shaojun, China	600
A. Jain, United States of America	1,441	F.R.I. Kayanja, Uganda	600
R. Miledi, United States of America	1,320	L.F. Rodriguez, Mexico	600
L.N. Johnson, United Kingdom of Great Britain and Northern Ireland	1,281	Wang Erkang, China	600
J. Garidkhuu, Mongolia	1,221	Long Yiming, China	589
F. El-Baz, Egypt	1,200	C. Vieira, Brazil	500
C.N.R. Rao, India	1,131	D.T. Lê, Viet Nam	500
E.W. Thulstrup, Denmark	1,062	E.H.S. Diop, Senegal	500
A. Badran, Jordan	1,045	G. Thottappilly, India	500
Jih Ru Hwu, Taiwan, China	1,030	Huanming Yang, China	500
ANSTS, Senegal	1,029	J. Allende, Chile	500
A. Kornhauser, Slovenia	1,000	J. Jisnuson, Thailand	500
A.O. Kuku, Nigeria	1,000	Li Desheng, China	500
CAPRISA, South Africa	1,000	M.V. George, India	500
E.M. Essien, Nigeria	1,000	PV: U.G. Cordani, Brazil	500
G.S. Khush, the Philippines	1,000	Z.H. Zaidi, Pakistan	500
G.T. Prance, United Kingdom of Great Britain and Northern Ireland	1,000	R. Crewe, South Africa	496
H.E. Varmus, United States of America	1,000	S. Ayupov, Uzbekistan	495
I. Eltayeb, Oman	1,000	M. Limonta, Mexico	491
I. Serageldin, Egypt	1,000	Mohammad Jamshidi, United States of America	488
J. Huang, China	1,000	E. Ayupov, Uzbekistan	483
J.L. Moran Lopez, Mexico	1,000	P. Y. Kwok, Taiwan, China	483
K.E. Mshigeni, United Republic of Tanzania	1,000	Q. Abdool Karim, South Africa	483
Lee Wu Yan-Hwa, Taiwan, China	1,000	S. Atluri, United States of America	483
M. Klein, United States of America	1,000	Li Yiyi, China	465
P. Littlewood, United Kingdom of Great Britain and Northern Ireland	1,000	I. Saavedra, Chile	443
Pei Gang, China	1,000	A.H.O. Hajiyev, Azerbaijan	400
R. Murenzi, United States of America/Rwanda (KIST)	1,000	M. Tchuenta, Cameroon	400
S.Q. Mehdi, Pakistan	1,000	S. J. Jabbur, Lebanon	400
Sang-Dai Park, Republic of Korea	1,000	S.S. Hasnain, United Kingdom of Great Britain and Northern Ireland	400
Wong Henry Nai Ching, China	1,000	T. Obi, Nigeria	400
Y. Sobouti, Islamic Republic of Iran	1,000	N. Kumar, India	360
Y. Yuthavong, Thailand	1,000	Mr. and Mrs. Andriambololona, Madagascar	352
Yam Vivian Wing-Wah, China	1,000	M.P. Alpers, Australia	331
Nan Cewen, China	990	Mu Guoguang, China	330
Cheng, Hui-Ming, China	985	H. Van Ginkel, Kingdom of the Netherlands	327

A.C. Cerda, Chile	300	A.K. Sood, India	200
B. Tsetseg, Mongolia	300	Chen Sai-Juan, China	200
H. Chaimovich, Brazil	300	Chen Zhu, China	200
H. Ramkissoon, Trinidad and Tobago	300	E. Igbinosa, Nigeria	200
L. Davidovich, Brazil	300	E. Unuabonah, Nigeria	200
M.M. Peixoto, Brazil	300	R. Ramaswamy, India	200
Min Enze, China	300	S.I. Ola, Nigeria	200
R. Garruto, United States of America	300	T. Durrani, United Kingdom of Great Britain and Northern Ireland	200
R.P. Bambah, India	300	Ding Zhongli, China	193
S. Datta, India	300	C.F.M. Menck, Brazil	192
S. Sivaram, India	300	A.M. Cetto, Mexico	151
Sang Yup Lee, Republic of Korea	300	A. Bahri, Tunisia	143
Shi Changxu, China	300	H. Roesky, Germany	106
Su Zhao-Bin, China	300	M. Jakovljevic, Serbia	106
Yu Lu, China	300	H.K. Majumder, India	100
Zhai Mingguo, China	300	K. Basu, United States of America	100
Zhao Zhongxian, China	300	M.A.J. Mariscotti, Argentina	100
Li Jinghai, China	296	R. Zare, United States of America	100
F. Mayor Zaragoza, Spain	294	S.M. Muhongo, South Africa	100
Chao-Jun Li, China	292	U. Aswathanaray, India	100
L. Kamau, Kenya	290	P.E. Presiren, Italy	98
M. O’Kane, Australia	288	U. Colombo, Italy	97
J.S. Yadav, India	285	S. Banerjee, India	96
Zhang Ya-Ping, China	285	M. Mansour, Switzerland	95
Wang Fosong, China	280	A. Peeraly, Canada	86
B.M. Abegaz, Ethiopia	272	I. Daubechies, United States of America	48
A. Falodun, Nigeria	200	TOTAL	195,043

VOLUNTARY CONTRIBUTIONS RECEIVED FROM TWAS FELLOWS, YOUNG AFFILIATES, AND OTHERS (2023 ONLY)

Individual donations to the programme budget were received from:

Soroosh Sorooshian, United States of America
Michael Alpers, Australia
Yiming Long, China
Sabah AlMomin, Kuwait
Vanderlan Bolzani, Brazil

Individual donations to the Endowment Fund were received from:

Quarraisha Abdool Karim, South Africa
Arogyaswami Joseph Paulraj, United States of America
Anil Jain, United States of America

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

NEW TWAS FELLOWS AND YOUNG AFFILIATES

TWAS FELLOWS ELECTED IN 2023

Agriculture, Nutrition and Food Systems Sciences

- EKESI, Sunday [Kenya]
- FONTES, Elizabeth P. B. [Brazil]
- HASANUZZAMAN, Mirza [Bangladesh]
- SIDDIQUE, Kadambot [Australia]
- SINGHAL, Rekha S. [India]

Biological Sciences

- MOSYAKIN, Sergei [Ukraine]
- OKOH, Anthony Ifeanyi [South Africa]
- SEKARAN, Shamala Devi [Malaysia]
- TOLEDO, Marisol [Plurinational State of Bolivia]
- YAN, Xiyun [China]

Medical and Health Sciences

- ABDUL-GHANI, Rashad [Yemen]
- BANU, Sayera [Bangladesh]
- CHANDAK, Giriraj Ratan [India]
- JIA, Weiping [China]
- LOPES-CENDES, Iscia [Brazil]
- TORIMIRO, Judith Ndongo Embola [Cameroon]
- WONKAM, Ambroise [South Africa]

Chemical Sciences

- ABD RAHMAN, Noorsaadah [Malaysia]
- CHI, Lifeng [China]
- KHAN, Khalid Mohammed [Pakistan]
- KUBOTA, Lauro Tatsuo [Brazil]
- PANT, Hem Raj [Nepal]
- STRUMIA, Maria Cristina Del Milagro [Argentina]
- TYAGI, Avesh Kumar [India]

Engineering and Computer Sciences

- AGARWAL, Avinash Kumar [India]
- MA, Guanghui [China]

- SALIT, Mohd Sapuan [Malaysia]
- SIMCHI, Abdolreza [Islamic Republic of Iran]
- TOLEDO FILHO, Romildo Dias [Brazil]

Earth, Climate and Environmental Sciences

- CHANDRAJITH, Rohana [Sri Lanka]
- HEILBRON, Monica [Brazil]
- HUANG, Jianping [China]
- NAGENDRA, Harini [India]
- TAYLOR, Michael Alexander [Jamaica]

Mathematical Sciences

- ARAUJO-PARDO, Gabriela [Mexico]
- GUMEL, Abba B. [United States of America]
- NADEEM, Sohail [Pakistan]
- DUKNINE, Youssef [Morocco]
- TANG, Tao [China]

Physics, Astronomy and Space Sciences

- CHEN, Li-Chyong [Taiwan, China]
- PARISI, Giorgio [Italy]
- SOUZA FILHO, Antonio [Brazil]
- TAYALATI, Yahya [Morocco]

Social and Economic Sciences

- HAMID, Aizan [Malaysia]
- LEE, Tatia Mei Chun [China]
- OKEREKE, Chukwumerije [United Kingdom of Great Britain and Northern Ireland]
- RIOS-NETO, Eduardo [Brazil]

TWAS YOUNG AFFILIATES SELECTED IN 2023

Sub-Saharan Africa

- AMOAKO, Mary [Ghana]
- HAPPI MOUTHÉ, Gervais [Cameroon]
- NDONG, Abdourahmane [Senegal]
- RHYMAN, Lydia [Mauritius]
- TWABI, Halima Sumaya [Malawi]

Arab Region

- AHMED, Ayman [the Sudan]
- ALKILANI, Ahlam Zaid [Jordan]
- ARROUSSE, Nadia [Morocco]
- HORCHANI, Ridha [Tunisia]
- KADHOM, Mohammed [Iraq]

Latin America and Caribbean

- CABRERA CATALÁN, María Eugenia [Guatemala]
- CASANOVA MORALES, Nathalie Valeska [Chile]
- MARQUES FERREIRA, Diego [Brazil]
- ROMERO-RODRÍGUEZ, Maria Cristina [Paraguay]
- ZORTO AGUILERA, Fernando José [Honduras]

East and South-East Asia and Pacific

- FATMAWATI, Sri [Indonesia]
- KUMAN, Paul [Papua New Guinea]
- NEW, Siu Yee [Malaysia]
- PENJOR, Ugyen [Bhutan]
- XU, Jiajun [China]

Central and South Asia

- AKHTAR, Evana [Bangladesh]
- LIAQAT, Faroha [Pakistan]
- SATAEVA, Nargiza [Kyrgyzstan]
- SINGH, Prabhat Kumar [India]
- WIJESINGHE, Kaveesha Jayani [Sri Lanka]

AWARDS CONFERRED IN 2023

TWAS-Abdool Karim Award in Biological Sciences

- BAMBAPAKOTOGO, Sanata [Burkina Faso]

TWAS-Atta-ur-Rahman Award

- MUNAWEERA, Imalka [Sri Lanka]

TWAS-Fayzah M. Al-Kharafi Award in Chemistry

- MADISE, Nyovani Janet [Malawi]

TWAS-CAS Young Scientists Award for Frontier Science

- GUPTA, Neena [India]

TWAS Regional Awards in the Development of Scientific Educational Material

- DASHASH, Mayssoon [Syrian Arab Republic]
- WICKRAMASINGHE, Dakshitha Praneeth [Sri Lanka]
- ROLDAN FLORES, Alejandra Irene [Plurinational State of Bolivia]
- DOUGNON, Tamegnon Victorien [Benin]

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

- ATTANAYAKE, Renuka [Sri Lanka]
- CRESPO MELGAR, Carla Fabiana [Plurinational State of Bolivia]
- DWAIB, Haneen [State of Palestine]
- KAYITESI, Eugénie [South Africa]
- LOKO, Yeyinou Laura Estelle [Benin]
- MONTENEGRO-BETHANCOURT, Gabriela [Guatemala]
- TSERENDORJ, Munkhjargal [Mongolia]

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Coordinator: Tonya Blowers

Tanja Bole

Lucia Fanicchi [Until October]

Sena Galazzi

Erika Hrvatic

Erin Johnson

Marina Juricev

Zabeeh Ullah Sahil

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Sofia Nitti [From April]

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