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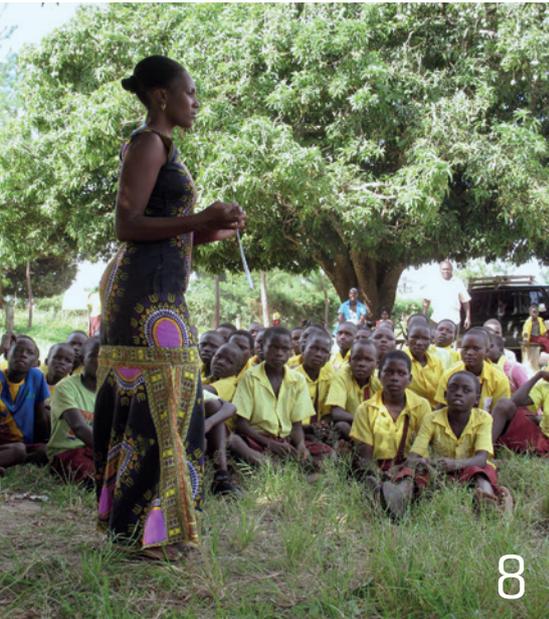


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▲ [top] Victor Alberto Ramos [first left], 2017 TWAS-Lenovo Science prize winner, during outdoors research in Nepal; [below] Ugandan veterinarian Caroline Asimwe educating students on wildlife conservation.

Cover picture: The icy Andes peak of Cerro Torre, on the border of Chile and Argentina. [Photo: Alex Proimos, Sydney, Australia]

▼ Cameroonian chemist Rémy Bertrand Teponno, winner of the 2017 TWAS-Atta-ur-Rahman Prize.



CONTENTS

2 Editorial: At TWAS, a commitment to excellence

The Academy understands that to advance science, it must honour excellence.

3 In the News

The Himalayan glaciers are receding at an alarming rate.

4 Unearthing the Andes' complex history

Argentine scientist and TWAS Fellow Victor Alberto Ramos wins the 2017 TWAS-Lenovo Science Prize for work on the ancient mountain range.

6 HIV: Better knowledge, better care

Epidemiologist Barbara Burmen changes HIV and tuberculosis management and wins the 2017 TWAS-Abdool Karim Prize.

8 Protecting wildlife for the common good

Ugandan veterinary scientist Caroline Asimwe protects chimpanzees and wins the 2017 TWAS-Samira Omar Prize.

10 Research for a war-torn country

TWAS-AI-Kharafi Prize winner Fathiah Zakham of Yemen seeks effective tuberculosis tests.

12 Testing herbal traditions with science

TWAS-C.N.R. Rao Prize winner Kalulu Taba of the Democratic Republic of Congo confirmed that some plants have uses in water purification and medicine.

14 Seeking cures in Cameroon's plants

Chemist Rémy Bertrand Teponno wins the TWAS-Atta-ur-Rahman Prize.

16 How people strategize, together

Economist Arunava Sen of India wins the TWAS-Siwei Cheng Prize for his work on the collective, strategic behaviour

18 Women honoured with OWSD-Elsevier Awards

The 2017 prize went to early-career researchers from Bangladesh, Ecuador, Ghana, Indonesia and Sudan.

20 TWAS Prize winners

A full list of those honoured in the last two years the prize was awarded.

22 Murenzi returns as TWAS executive director

After 14 months at UNESCO, the former executive director returns to the Academy.

23 People, Places and Events



EDITORIAL

AT TWAS, A COMMITMENT TO EXCELLENCE



▲ TWAS President
Bai Chunli

TWAS is well-known globally for the opportunities it provides to scientists in the developing world: PhD and postdoctoral fellowships, research grants and scientific exchange programmes. But there is another TWAS initiative that must not be overlooked: a regime of prizes and awards that recognizes excellence in science, often in countries not well-known for research accomplishments.

It has long been central to the Academy's philosophy: honouring excellence is a powerful way to encourage the advance of science. In this issue of the TWAS Newsletter, we profile some scientists who recently have won our honours.

Clearly, the impact of their work does not end when they claim the prize. Arguably, it's just beginning: The scientist returns home to her university, or to his research centre. Their success is recognised, and this raises their visibility, and their credibility. They may find new research opportunities at home, or new opportunities to work with international partners. Often they take on a mantle of leadership.

From 1985 through the end of 2017, TWAS has bestowed 1,140 prizes and awards to scientists at every level, from early-career researchers to senior colleagues.

Today, the annual TWAS-Lenovo Prize is a symbol of our commitment to excellence. With the generous support of Lenovo, the global leader in the field of hardware for business and personal computing, it has become one of the most elite honours given to scientists in developing and emerging countries.

The Lenovo winners have come from Latin America, Asia and Africa, and they are typically scientists at the peak of their careers. But TWAS also honours top mid-career scientists – and we see how the prizes contribute to scientific advancement.

Ibrokhim Abdurakhmonov, a specialist in cotton genomics and breeding, won the 2010 TWAS Prize in agricultural sciences, then was

elected to the Academy in 2014. In 2017 he served as vice president of the Academy of Sciences of Uzbekistan, and at year's end was appointed to lead the country's new Ministry of Innovative Development.

Ethiopian Segenet Kelemu won the TWAS Prize in agricultural sciences in 2011 for her discovery of beneficial endophytic fungi and bacteria in tropical forage grass. In 2013, she was named director general of the International Centre of Insect Physiology and Ecology in Kenya, and in 2015 elected to TWAS. Kelemu today is known as one of the most influential women in African science.

Linxiu Zhang, a Chinese social scientist, conducted powerful research into the causes of poverty in rural regions; in 2013, she won the TWAS Celso Furtado Prize in Social Sciences, and was elected to TWAS the next year. In early 2018, she was named director of the UN Environment-International Ecosystem Management Partnership.

We also play an essential role in identifying excellent young scientists. Since 2013, we have awarded more than 150 TWAS Prizes for young scientists in developing countries. And we have supported the annual awards for early-career women scientists organised by The Elsevier Foundation and the Organization for Women in Science for the Developing World (OWSD).

At TWAS, we constantly work to discover and encourage top talent. This is where you, too, can play a direct role: If you know an accomplished scientist, please nominate him or her for one of our prizes and awards. It may seem a modest act, but it may prove to be an important contribution to scientific progress.

Bai Chunli, *president, TWAS*

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ICTP Campus
Strada Costiera 11
34151 Trieste, Italy
tel: +39 040 2240327
fax: +39 040 224559
e-mail: info@twas.org
website: www.twas.org

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Editor

Edward W. Lempinen

Assistant editors

Francesca Pettoello
Cristina Serra
Sean Treacy

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IN THE NEWS

Himalayan glaciers are receding faster

While the residents of Komik, the world's highest village in the Himalayas, understand little about climate science, they are now trying to realign their lives around a new reality—less and less snow, receding glaciers and an arid landscape. Several studies suggest that the Himalayan range is among the most sensitive regions to climate change. The Chocho Khanyilda glacier, the lone water source to Komik, has been shrinking over the past 15 years. In the past five years, rainfall in the Lahaul and Spiti district has been so erratic that it indicates an average decline of over 50% in annual rainfall.

Down to Earth:

<http://bit.do/ThinIce>

Africa, Mideast push animal health research

Animal experts have prioritised areas for animal research in Africa and the Middle East as part of a global strategy to reduce the burden of animal diseases. The experts at a conference in Nigeria prioritised opportunities for African countries to collaborate with their counterparts in the Middle East on research and funding opportunities. The priorities include access to samples or strains of organisms, specialised facilities and expertise, and identification of international funding opportunities.

SciDev.Net:

<http://bit.do/AnimalHealth>

Deforestation is starving São Paulo of water

São Paulo could face more devastating water shortages if farmers continue to clear the Amazon forest, warns the utility chief who recently steered the biggest city in the Americas from the edge of drought catastrophe. Jerson Kelman, president of water company Sabesp, said he felt a duty to speak out because

he was a citizen and the head of a company that has seen how close this metropolis of 21 millions had come to a breakdown.

The Guardian:

<http://bit.do/SaoPaoloWater>



South Africa faces hunger and obesity crises

Many South Africans are going hungry. At the same time obesity rates are rising. This is unsurprising – both are forms of malnutrition and tend to go together. The coexistence of poverty and obesity is a global phenomenon. In 2014, over 10 million South African, 19.7% of the country's population, reported having inadequate food access. Factors such as accessibility, affordability, and quality of available food are part of the reason why over 3 million South Africans people (6.5%) reported they had severely inadequate food access.

The Conversation:

<http://bit.do/HungerObesity>

Nanoscientists make more colors printable

Scientists from Singapore have found a way to expand the printable color spectrum with a novel nanostructure system. Their research, published in Nano Letters, expands the range of printable colors by 121%. The current color range for computers and printers is based on the standard Red Green Blue color space, developed in 1996 by Microsoft and Hewlett-Packard. But the hues in this system only encompass a subset of colours that the eye can see. Instead, researchers have turned to silicon.

Asian Scientist:

<http://bit.do/SiliconSpectrum>



UNEARTHING THE ANDES' COMPLEX HISTORY

TWAS Fellow Victor Alberto Ramos wins the 2017 TWAS-Lenovo Prize for shedding light on one of the world's most prolific mountain ranges.

 by Sean Treacy

Argentine geoscientist Victor Alberto Ramos won the 2017 TWAS-Lenovo Science Prize for his work on the formation of the Andes, both shedding light on the story behind his home continent and studying the cause of strong earthquakes along the mountain range.

Ramos is a 1998 TWAS Fellow and an Earth scientist at the University of Buenos Aires in Argentina. He was honoured for work which has contributed enormously to the understanding of how the Andes and the underlying landmasses formed hundreds of millions of years ago.

The TWAS-Lenovo Science Prize is one of the most prestigious honours given to scientists from the developing world. The annual prize includes an award of USD100,000 provided by the Chinese technology company Lenovo, the global leader in consumer, commercial, and enterprise technology and the largest PC company in the world.

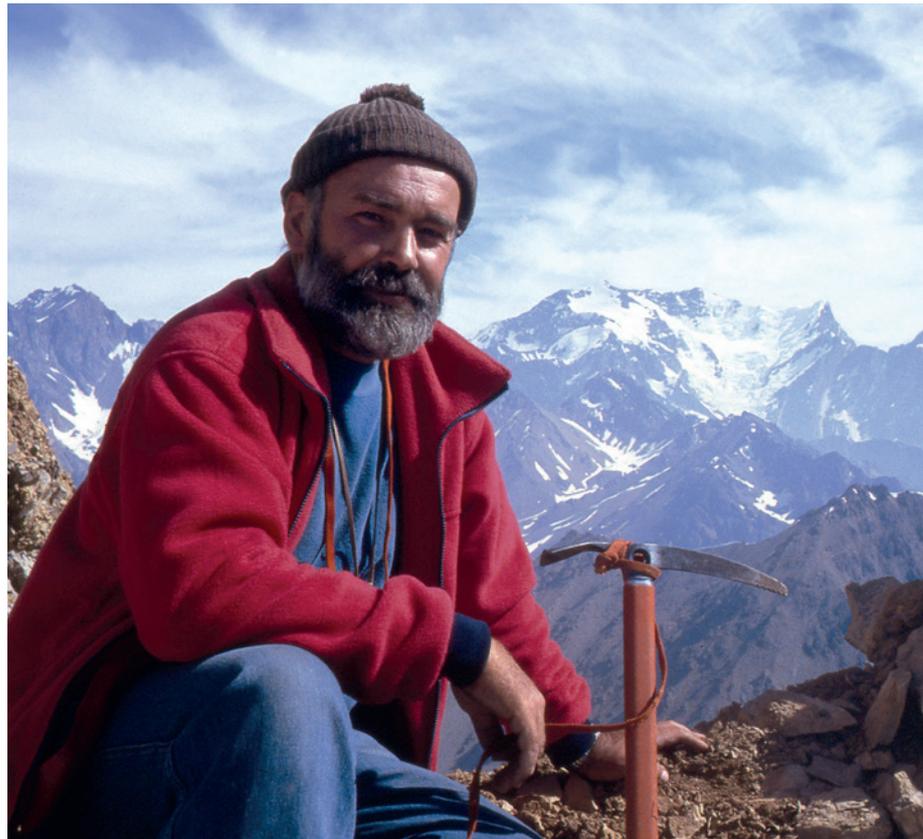
"We are excited to congratulate professor Ramos for his great achievement as an influential geologist in the world," said Lenovo senior vice president George He. "His research on South American geology and his practice of applying his research into educating younger scientists has been quite phenomenal. It's our honour to present this year's TWAS-Lenovo Science Prize to Professor Ramos, and we look forward to more fruitful years from Professor Ramos in the future."

"Professor Ramos has for many years distinguished himself with pioneering basic science," said TWAS President Bai Chunli. "But his work has valuable practical applications in

fields ranging from mining and oil exploration to earthquake preparedness. And it underpins progress on several of the UN Sustainable Development Goals – by protecting the poor from earthquakes, for example, and building resilient infrastructure."

Ramos has dedicated more than 50 years of his life to understanding the geological evolution of the Andes. He worked almost 20 years in the Argentine Geological Survey,

▼ Argentine geoscientist Victor Alberto Ramos during field exploration in the Himalayas. [Photo provided]



mapping different sectors of the Argentine-Chilean Andes, and since 1984 has been teaching tectonics at the University of Buenos Aires.

THE RISE OF THE ANDES

In his first years as a scientist, in the 1960s, Ramos did field work in the Southern Andes of Argentina and Chile. He made a number of important discoveries about the geologic history of the mountain range.

He and his colleagues were the first to determine that, in a long stretch along the mountains, the tectonic plates were locked in what's called "flat slab subduction". The plates were sliding almost directly horizontal against each other for a stretch that went on for hundreds of kilometres.

The process causes some of the most destructive quakes possible, because for large stretches of land the bottom plate is literally sliding along under the top plate before sinking into the Earth's mantle. This horizontal slide creates intense friction, which in turn causes the top plate to warp, deform and break more dramatically, pushing the mountains more quickly into the sky every time they shift.

After that, he and his team worked on what's called the Basement of the Andes – the Earth's crust that the Andes mountains evolved on top. The crust underneath part of the mountains is special, because it's actually not from South America. It's from Laurentia, the name Earth scientists have for the landmass of North America as it existed hundreds of millions of years ago.

About 500 million years ago, the land that is today South America was combined with Africa and much of Asia in a primeval supercontinent called Gondwana. Most South American bedrock originated there. The idea that the bedrock under part of the Andes was from Laurentia instead was controversial at the time, but nonetheless Ramos and his team spent years looking for evidence to support the hypothesis – mostly by identifying trilobite fossils unique to Laurentia underneath the mountains.

The result of their findings was what Ramos called his most important contribution: learning that a block of terrain detached from Laurentia

and migrated through the oceanic crust over millions of years until finally colliding with Gondwana, giving birth to what we know as part of the Andes today.

That foreign block of bedrock is now in central Chile and the western part of Argentina. Establishing this gave rise to a better understanding of the region and its deep history. Still, it took years of discussion and debate until the data was confirmed and Ramos's findings became the scientific consensus.

"NOBODY BELIEVED IT"

"We proposed that back in 1985, and at the time nobody believed it," said Ramos. "There was terrific discussion at the time, but 25 years later they invited me to become a member of the Chilean Academy of Science, accepting that a big chunk of Chile had collided against Gondwana."

“ We proposed a new theory in 1985, and at the time nobody believed it. ”

Victor Alberto Ramos

This is the fifth year of the TWAS-Lenovo Science Prize, the successor to the Ernesto Illy Trieste Science Prize that previously ran for eight years. During its first four-year cycle (2013-2016), the TWAS-Lenovo Prize focused on recognizing outstanding work in the basic sciences, with the subject area changing each year: physics and astronomy in 2013; biological sciences in 2014; mathematics in 2015; chemical sciences in 2016.

Its second four-year cycle began this year with competition in the field of Earth sciences. The prize will continue for three more years, honouring work in engineering in 2018, agricultural science in 2019 and social science in 2020. ■

Learn more: <https://twas.org/node/12487/>





HIV: BETTER KNOWLEDGE, BETTER CARE

Through innovative approaches, epidemiologist Barbara Burmen changes HIV and tuberculosis management – and wins the 2017 TWAS-Abdool Karim Prize.

 by Cristina Serra

Kenya is among the countries most heavily affected by HIV, with an average of 62,000 new infections per year and about 1.6 million people living with AIDS. Despite the success of HIV programmes delivered in the last two decades, there is still much left to do.

Barbara Burmen is a Kenyan epidemiologist working in HIV and tuberculosis (TB) operations research. She was the recipient of the first edition (2017) of the TWAS-Abdool Karim Prize, which honours women scientists in low-income African countries for their achievements in biological sciences. She received the prize for her research on people with TB, but also for her personal and professional mentorship activity with younger colleagues.

“The TWAS award is truly an honour in my career: it’s a chance to be internationally recognized as an early-career female scientist already making a significant contribution to the advancement of my field,” said Burmen, who has over ten years experience in HIV programmes, both in the public and private sectors.

Quarraisha Abdool Karim is an infectious diseases epidemiologist and the associate scientific director of CAPRISA [Centre for the AIDS Programme of Research in South Africa]. For her life-saving research against HIV and AIDS and her scientific achievements, she received the TWAS-Lenovo Science Prize (2014).

Burmen is a senior research officer and HIV & TB implementation science leader at the Kenya Medical Research Institute, Center for Global Health Research, in Kisumu, Kenya.

Clinical trials, she explained, offer evidence-based information on the right patients who need health interventions. However, they do not operate in real world settings. “This is where operations research comes in, to identify factors under managerial control that could help make better decisions in scaling up evidence-based health interventions,” Burmen explained.

“Operations research does this by testing service delivery innovations or comparing different practices, in order to identify a best practice, or review routinely collected data to provide empirical evidence to support managerial decisions.”

Testing services still do not reach everyone in need: according to some estimates, 53% of the 1.6 million people living with HIV in Kenya are unaware of their status.

That’s why Burmen conducted studies and evaluations at the Jaramogi Oginga Odinga Teaching and Referral Hospital (JOOTRH) HIV Clinic, to increase access to HIV knowledge and optimize health services.

She proposed to offer HIV interviews and testing to grieving persons visiting the funeral home after loved ones passed away. This improved people’s knowledge of their HIV status, and provided the government with more awareness of their needs. At JOOTRH, she introduced important innovations, for example an “express nursing desk” to reduce the time that patients wait at hospital for simple things such as a prescription refill.

Tuberculosis is another health challenge

▶ TWAS-Abdool Karim Prize winner Barbara Burmen from Kenya has introduced innovative clinical procedures in HIV and TB management. [Photo provided]

004 trial, to identify potential strategies to increase the
of cellular immune mediators (platelets and natural killer
of HIV assigned to either tenofovir or placebo gel in the
1 use, women who acquired HIV had significantly higher
ion than women who remained uninfected. Activation of
immune mediators were associated with HIV acquisition. Indi-
cator activation suppressant could be added to tenofovir gel
giving the next generation of higher efficacy antiretroviral

Results from pre-exposure prophylaxis (PrEP) studies
of both oral and topical formulations of antiretroviral
drugs signal new hope for preventing sexual transmis-
sion in young women (4). Notwithstanding the 2 oral
PrEP trials (5, 6) that have been stopped for futility,
the 3 positive trials involving women (7, 8) demon-
strate partial protection that ranges from 39% to 73%.
New technologies that further enhance the efficacy of
antiretroviral agents are therefore needed.

The CAPRISA 004 study was a phase IIB, random-
ized, placebo-controlled clinical trial to assess the safety
and effectiveness of 1% tenofovir gel in preventing HIV
infection in women (9, 10). The trial showed a 39% re-
duction in HIV infections. Even in the most adherent
women, protection was no higher than 54%. Thus, the
occurrence of infections even in women using tenofovir
gel highlights the need to identify strategies to en-
hance the effectiveness of tenofovir gel.

Some recent studies have suggested that higher levels
of systemic immune activation are associated with the
risk of HIV acquisition and concluded that a "quietest
immune activation reduces HIV acquisition" (11 October) • 991

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Jinal N Bhiman^{1,2}, Melati Nony
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“ The TWAS award is truly an honour in my career: it’s a chance to be internationally recognized as an early-career female scientist already making a significant contribution to the advancement of my field. ” *Barbara Burmen*

for Kenyans and the nation’s medical system. Kenya is one of the 22 TB high-burden countries, and it has been given the highest priority at the global level: all together these countries accounted for 83% of the TB incident cases in 2014. [The incidence is the number of new cases of active TB disease in a population during a year.]

In 2015, about 82,000 people were diagnosed with TB, while about 20% of cases are still undetected and remain untreated. Quite often people who are HIV-positive are also TB-

positive, even if they show no symptoms. In these cases, patients should be screened and receive TB preventative therapy with a drug called isoniazid.

Here too, Burmen has reviewed past procedures and introduced different screening methods to determine the eligibility of people to receive costly treatments, the so-called Tuberculosis Preventative Therapy.

Her ability to coordinate projects is incredibly high. She has provided oversight for a study on paediatric HIV care in more than 50 health facilities in Kenya, acting also as a principal investigator and study coordinator on tuberculosis screening among people living with HIV, in 15 HIV treatment sites and on 800 HIV infected people.

Her mentorship activity is equally worth noting. She volunteered as a mentor on AuthorAID, an international network of scientific publications, where she assisted in data analysis and in preparing publications.

In addition, she has acted as a personal and professional mentor to improve the scientific productivity and outputs of many colleagues. A number of them have later obtained higher-level positions and more advanced assignments at the national level.

Burmen’s commitment to serving local and international communities has brought significant improvements at the interface between clinics and laboratory, with an impact on the development of innovative lab policies. “The TWAS-Abdoool Karim Prize,” she said, “is an inspiration to continue working diligently to improve population health in the developing world through health operations research.” ■

Learn more: <https://twas.org/node/12474/>



PROTECTING WILDLIFE FOR THE COMMON GOOD

Ugandan veterinary physician Caroline Asiimwe, focusing on education and cooperation, protects chimpanzees and engages ex-poachers in wildlife protection.

 by Cristina Serra

Chimpanzees are beloved wild animals and are an important attraction in Uganda, which hosts a colony of about 5,000 individuals. Unfortunately they are also an endangered species, a common target for poachers who kill them for their meat.

Ugandan conservation veterinary surgeon Caroline Asiimwe is working to preserve wildlife from illegal activities and ensure healthy ecosystems in her country, by engaging the local population in a cooperative approach. For her influential work and strategy to protect wildlife, she was named the first winner of the TWAS-Samira Omar Innovation for Sustainability Prize.

"This prize from TWAS is a great motivation for me, in my career," said Asiimwe. "There is a great feeling you get when you are recognised and your efforts appreciated ... Receiving an international award is something that not only puts me on a global map, but also encourages my fellow women in conservation that our efforts are not all in vain. It is a great honour."

The new award is named after Kuwaiti conservation researcher and TWAS Fellow Samira Omar Asem, and honours scientists from Least Developed Countries for their achievements in the field of conservation and management of natural resources.

The dream of having a positive impact on wildlife emerged when Caroline Asiimwe was in secondary school, in the 2000s. She knew she wanted to save animals, but the idea of becoming a veterinarian had not come to her mind.



▲ Caroline Asiimwe

Later, when she was attending courses at Makerere University in Uganda's capital city, Kampala, her determination grew stronger. Today, Asiimwe holds a master's degree in veterinary science from the University of Edinburgh in Scotland.

THE VALUE OF LOCAL PARTNERSHIPS

Now, she has been working for seven years as a resident veterinarian and conservation coordinator at the Budongo Conservation Field Station in Uganda. At Budongo, she directs interventions to rescue mutilated chimpanzees and other animals suffering from injuries caused by humans, collecting and organising data to ensure sustainable conservation of Ugandan resources.

In addition, she works with vulnerable communities on the forest's edge to reduce their dependency on forest resources, also engaging ex-poachers to serve as eco-guards and in other conservation activities. This strategy has fostered an unprecedented exchange of knowledge between scientists and indigenous people.

Asiimwe realized that stand-alone strategies are a dead-end. That's why she opted for team-building with refugees who live around Budongo Forest, because of their long-standing presence in the area and their adaptation to the culture of the indigenous people.

They had moved to Masindi, in Western Uganda, from Northern Uganda and the Democratic Republic of the Congo (DRC), during the rebellion triggered by the Lord's Resistance Army.

▼ Caroline Asimwe is ready to save chimpanzees from a snare injury. [Photo provided]

Today the refugees are among the most vulnerable people in Uganda: economically deprived, uneducated and insecure. It took a lot of effort to convince them that Asimwe and colleagues were not enemies.

A DECLINE IN HUNTING AND POACHING

For these people, the forest's plants and animals are essential resources. And at the beginning, it was difficult to convince them to make a change. They kill elephants for the

ivory, rhinos for the horn, and pangolins for the scales that are perceived to have curative qualities. If they were not targeting endangered chimpanzees, they wondered, then what was the problem?

"We had to show them that their snares are indiscriminate and that many chimpanzees are dying or getting maimed," Asimwe explained. "Pictures did the magic and that's when they understood the damage they were causing to the endangered chimpanzees that they never intended to hurt."

In her conservation efforts, Asimwe also engaged hunters and poachers. They were among the poorest people in the forest communities. To support their families, they relied on forest resources they considered free.

🗨️ Receiving an international award ... not only puts me on a global map, but encourages my fellow women in conservation that our efforts are not all in vain. 🗨️

Caroline Asimwe



"Because they were among the poorest," she recalled, "they could not support their children's education, and thus children were recruited and trained on how to hunt at an early age." Today, a growing number of them are ex-hunters and ex-poachers.

With her background in veterinary medicine, public health and conservation, Asimwe plans to explore all avenues in those research lines. "One of the most amazing aspects of my work," she said, "is collaboration and information-exchange between us academicians and ex-poachers with their indigenous knowledge. I guess any research in ecosystem health will suit me well in the future." 🗨️

Learn more: <https://twas.org/node/12475/>



RESEARCH FOR A WAR-TORN COUNTRY

Yemeni microbiologist and TWAS-Al-Kharafi Prize winner Fathiah Zakham aims at finding fast and effective tests for drug-resistant tuberculosis bacteria.

 by Sean Treacy

Yemeni microbiologist Fathiah Zakham's work is something her home country deeply needs: research focused on controlling the spread of deadly drug-resistant tuberculosis (TB). But with Yemen troubled by war, it was difficult for her to carry out her work as a researcher at the School of Medicine and Health Science in Hodeidah University, Hodeida, Yemen.

Zakham, the winner of 2017's TWAS-Fayzah M. Al-Kharafi Prize, is currently in Switzerland, working in a postdoctoral position at the University Hospital of Lausanne through a fellowship. But she remains focused on conditions at home, researching ways to improve tuberculosis prevention efforts in the Middle East. The need is acute today, and will remain important after the Yemeni war ends.

"The incidence of tuberculosis is high in Yemen – the highest in the Arabian Peninsula," Zakham said. "During the Yemeni civil war, we stopped growing samples of the bacteria due to electricity outages. So we should find efficient solutions."

The annual Al-Kharafi Prize, now in its second year, recognizes exceptional women scientists from scientifically and technologically lagging countries. Zakham was recognised for her contributions to improving tuberculosis diagnoses to help prevent the spread of drug-resistant strains of the disease.

The prize is named for 2004 TWAS Fellow Fayzah M. Al-Kharafi from Kuwait, who generously provides the USD4,000 award. Al-Kharafi, the former president of Kuwait University, was the first woman to head a major

university in the Middle East. She is also a former TWAS vice president for the Arab Region.

LIFE DURING WARTIME

Since the war began in 2015, Zakham found that daily life meant living with the possibility of battle. That year, while working at her primary institute, the Faculty of Medicine and Health Sciences of Hodeidah University, she and her colleagues frequently heard the sound of nearby airstrikes.

"Once I was with my students and the airstrikes began," she said. "I asked my students to leave but they refused. I continued and then there was a very strong airstrike close to the faculty of education, and the students went screaming and running down the hall."

▶ TWAS-Al-Kharafi Prize winner Fathiah Zakham working at her computer. [Photo provided]

▼ Fathiah Zakham with her students. [Photo provided]





“To find drug-resistant TB strains, genomic analysis is the best solution, but the lack of sophisticated equipment is an obstacle in developing countries.” *Fathiah Zakham*



Then, on 27 May 2015, the institution was destroyed in an air attack. Four of her colleagues were killed. Hardly anything remained of the building but rubble.

Zakham tried to stay in Yemen, even though the war and the constant power outages rendered it nearly impossible to grow bacteria for experiments. She finally accepted a Swiss Excellence Fellowship at University Hospital of Lausanne from the Swiss Federal Commission for Scholarships for Foreign Students. But she still wants to return to her home country someday, where microbial and infectious disease research is more relevant than ever.

A third of the global population is infected with latent tuberculosis and nine million cases of the illness become active every year. It is infectious and contagious, and a major threat in many developing countries. According to the World Bank, the incidence in Yemen in 2016 was 48 cases of active tuberculosis per 100,000 people.

And the war has only made things worse for disease control of all kinds.

“The situation is so horrible now in Yemen. We

do not have access to clean water,” she said. “In 1977, the Ministry of Health in Yemen declared the eradication of cholera in Yemen. And now? We have a cholera crisis.”

EMERGING VIRAL DISEASES

Tuberculosis cases in particular are difficult to research, because the microbe takes as much as two months to grow in a laboratory. Meanwhile, resistant strains of tuberculosis are very dangerous, and are able to ward off as many as 16 antibiotics.

Zakham is trying to develop a way to speed up tuberculosis research. First they collect pulmonary samples from patients and try to cultivate them on special culture media, and at the same time they can hunt for mutations in the bacteria’s DNA. A tuberculosis bacterium becomes drug-resistant when its genes mutate, so scientists use genomic sequencers to explore the genomes of the bacteria in pieces and look for mutated genes one piece at a time.

Once they have enough information on mutation, they can then identify which patients have drug-resistant versions of the disease. The researchers then analyze those patients’ lives, who they interact with and how the disease is spreading, to keep it from spreading more.

The process Zakham is working on is called “next-generation sequencing,” a technique that would allow them to explore more parts of the DNA all at once, thus making diagnoses faster. The whole process then becomes more efficient, and they can respond to an outbreak of a drug-resistant strain of tuberculosis more quickly to limit its spread.

“Traditional methods are not efficient,” she said. “Genomic analysis is the best solution. However, the lack of sophisticated equipment is still an obstacle in developing countries.”

Zakham has also written a review article – which serves as an overarching assessment of the state of the field – on viral hemorrhagic fever and will soon write a second review specific to these fevers in the Middle East. “We have new emerging viral diseases in the region,” she said, “especially in Yemen and Saudi Arabia.”

Learn more: <https://twas.org/node/12486/>



TESTING HERBAL TRADITIONS WITH SCIENCE

Congolese chemist and TWAS-C.N.R Rao Prize winner Kalulu Taba confirmed that some plants from Democratic Republic of the Congo are effective to purify water and treat malaria.

 by Sean Treacy

In rural, poor parts of the Democratic Republic of the Congo, where it's common to live on as little as a single U.S. dollar per day, roughly 80% of people use plants to cure diseases. They simply can't afford anything more expensive.

Enter the work of Kalulu Taba, a 2015 TWAS Fellow and organic chemist at the University of Kinshasa in the Democratic Republic of the Congo (DRC). His research helps people use these herbal remedies more effectively – and for his work, he received the 2017 TWAS-C.N.R. Rao Prize for scientific research.

Taba was honoured for his outstanding work testing local herbal medicine traditions to scientifically demonstrate their effectiveness so that they can be more broadly used throughout the DRC. The results made important contributions to the understanding that natural products found there can help treat malaria and disinfect water.

"We did a survey of the plant remedies used by the population of Congolese traditional healers to treat their malaria," he said. "We came up with eight plants most used, and then we took these remedies to clinical trial."

The TWAS-C.N.R. Rao prize includes a USD5,000 award, generously contributed by TWAS Founding Fellow and former Academy President C.N.R. Rao of India. The prize is a

recognition bestowed to scientists from Least Developed Countries whose scientific research has a high impact. Taba is the ninth winner of the prize since it was established in 2006.

Taba gained his doctorate in 1979 at Northwestern University in the United States. He has worked at numerous prestigious research institutions, including the Max Planck Institute for Coal Research in Germany, the National Centre for Scientific Research in France, and the Institute of Tropical Medicine in Belgium. He returned to the DRC in the late 1980s and is now an organic chemistry professor at the University of Kinshasa.

Taba said he came back because he wanted to help the nation's poor people. He is also the only TWAS Fellow in the DRC, and is a member of the committee working to establish the country's academy of sciences.

While knowledge from traditional healers is useful, Taba said, it's sometimes not enough, and standardizing treatments helps bring death rates down. They had particular success with several plants used to treat malaria. "Malaria can go to the brain," he said. "You need official treatment, and we made sure that the plants work and that they're safe."

Malaria kills hundreds of thousands of people every year worldwide, mostly children and pregnant women. In his research, he and his



team tracked the level of the malaria parasite in the blood of patients; they then determined that the molecules they isolated from local plants made the parasites' numbers drop – and sometimes even disappear.

“We found the remedies were efficient in treating an uncomplicated case of malaria,” he added. “We made standard all the preparations and wrote a book on it for distribution, and we’re starting to teach people how to take care of these uncomplicated cases of malaria.”

Taba is also known for having confirmed that *Aframomum alboviolaceum*, a leafy plant with purple flowers that grows where water pollution is rampant, is useful to purify water and make it drinkable.

▼ TWAS-C.N.R. Rao Prize winner Kalulu Taba in his laboratory. [Photo provided]



“I did a lot of research in Europe, but then I came home. The problems are very different – they’re basic problems. And you need to do research to help these people, help them move forward with basic things.”

Kalulu Taba

A key part of Taba’s work is outreach, and he and his team directly contact community leaders to teach them how to use the herbal medicines so that scientifically proven practices become more widespread.

That is why he’s dedicating himself to establish networks of scientists and cross-border collaborations. He’s hoping the Rao Prize will help. While the DRC is more stable now than at the time of his return, Congolese researchers still struggle. The nation, he said, simply doesn’t have much money for science. Taba needs roughly \$15,000 a year for his lab that he often can’t quite obtain.

“I did a lot of research in Europe, but then I came home,” he said. “The problems are very different – they’re basic problems. And you need to do research to help these people, help them move forward with basic things.”

Learn more: <https://twas.org/node/12477/>



SEEKING CURES IN CAMEROON'S PLANTS

Chemist Rémy Bertrand Teponno wins the TWAS-Atta-ur-Rahman Prize for studies of plant compounds with potential antibacterial properties that could have medical uses.

 by Cristina Serra

Plant biodiversity in Cameroon is astonishing: more than 8,000 varieties are currently known, residents of the country use a number of them to cure diseases, according to orally transmitted traditional medicine.

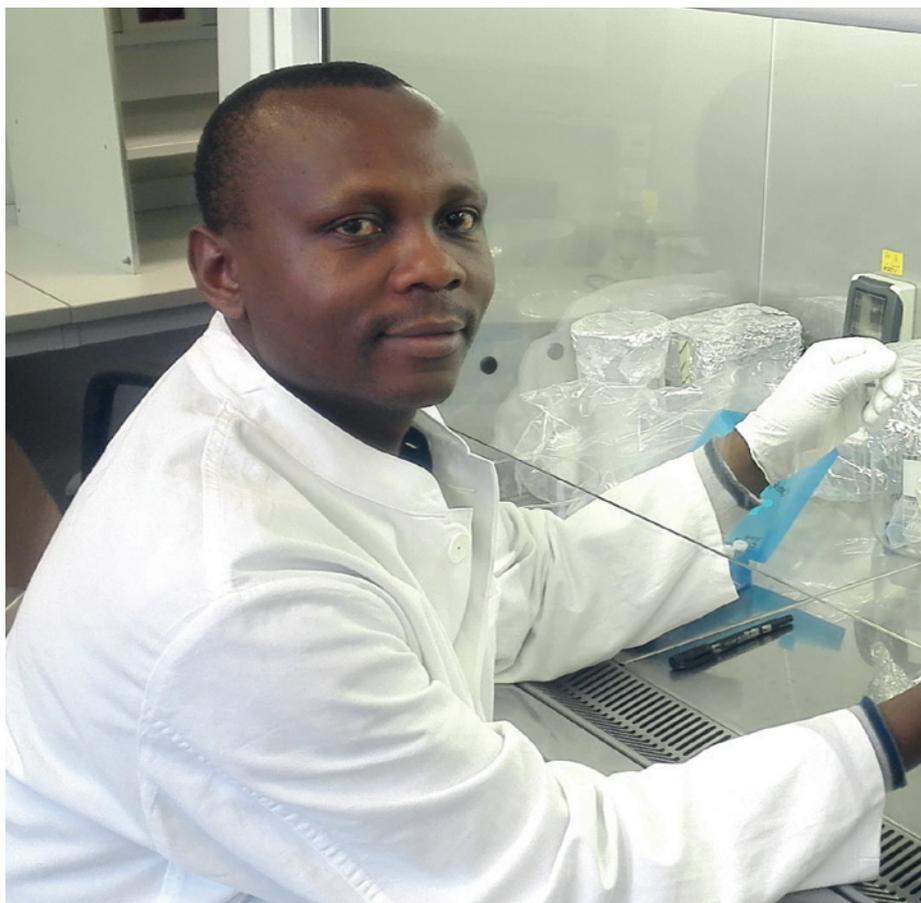
Rémy Bertrand Teponno, an early-career Cameroonian chemist, has isolated some plants that produce compounds with potentially far-reaching value in the global battle against antibiotic resistance. For his discovery of new natural compounds with potential antibacterial properties that could be useful in medical applications, Teponno earned the 2017 TWAS-Atta-ur-Rahman Prize.

"I am really grateful and honoured to receive this prestigious prize," said Teponno, a senior lecturer-researcher in the department of chemistry at the University of Dschang (UDS) in Cameroon. "It is very important for a scientist like me to know that people are appreciating my work. This prize will enable me to be more productive, and it will be a source of motivation for my future career."

The prize is named for Atta-ur-Rahman, a Pakistani chemist and a 1985 TWAS Fellow who also has been an influential advocate for advanced education in developing countries. The award is given annually to acknowledge the scientific achievements of a chemist under the age of 40 who has been living and working in one of the 66 TWAS science- and technology-lagging countries. It is worth USD5,000, generously offered by the Dawood Foundation.

Teponno is a skilled organic chemist with extensive experience in extraction and characterisation of chemicals from plants. He obtained his bachelor's degree in 2001 and his postgraduate diploma in organic chemistry in 2003. After receiving his master's degree

▼ Rémy Bertrand Teponno showing bacterial dishes in his lab. (Photo provided)



in 2005 at the University of Yaoundé 1 in Cameroon, he returned to UDS to complete a PhD in organic chemistry/natural products chemistry.

INDIGENOUS KNOWLEDGE, MODERN SCIENCE

During his PhD research, Teponno worked on a plant used in traditional medicine to cure microbial infections and typhoid fever, called *Dioscorea bulbifera*. From *Dioscorea*, he isolated some compounds and tested them against microorganisms causing typhoid fever [*Salmonella typhi* and *Salmonella paratyphi*]. The isolated compounds showed an important antimicrobial activity.

“More than 80% of the Cameroonian population uses medicinal plants to cure diseases, using their power according to traditional medicine,” explained Teponno. But since that knowledge is often informal, it needs to be evaluated and confirmed through rigorous research.

In 2010 Teponno was awarded a TWAS research grant that led to an important result: it allowed isolation, structure elucidation of specific chemicals, and evaluation of antimicrobial properties of many Cameroonian medicinal plants of the *Agavaceae* family, which includes agave, yucca and other desert plants.

Two years later he was selected for a cooperation visit, offered by TWAS and the German Research Foundation (DFG), which gives postdoctoral researchers from sub-Saharan Africa a three-month posting to work with scientists at a German institute.

“During my stay there, I established important scientific collaborations,” Teponno said, “and even today we are sending our samples there for chemical and spectroscopic analysis.”

“Now I’m able to isolate bacteria from plants, to culture them, and to extract and separate the substances they generate. As a final step, I solve their chemical structure through spectroscopic analysis. I’m learning many modern techniques now.”

OPENING A WHOLE NEW WORLD

Back home, he started seeking a direct correlation between the use of local plants in traditional medicine and their chemical

composition/chemical action on bacteria.

Discovering antimicrobial and cytotoxic activities in several natural compounds has disclosed a whole new world to him and his country.

“Cameroonian plants are full of new compounds that have never been analysed before,” Teponno explained. “These chemicals could reveal promising therapeutic agents, and they could also break bacterial resistance.”

“Cameroonian plants are full of new compounds never analysed before. They could break bacterial resistance.”

Rémy Bertrand Teponno

However, facilities in Cameroon are scarce, and Teponno observes that it often is difficult to do research in developing countries. This is why he keeps building collaborations with Japan, Germany and Italy. But living and working in Cameroon is important: in the UDS Laboratory of Environmental and Applied Chemistry, where he is carrying out his research, Teponno is supervising four PhD students. Teaching is a central part of his work.

“This honour from TWAS is a source of motivation: I will use the money to buy some lab consumables for my students, because now I have several young scientists whom I’m supervising. Their careers depend on me.”



Learn more: <https://twas.org/node/12484/>



HOW PEOPLE STRATEGIZE, TOGETHER

Indian economist Arunava Sen won the TWAS-Siwei Cheng Prize for his work on the collective, strategic behaviour of people as they try to get what they want from rule-based institutions.

 by Sean Treacy

When citizens step into a voting booth, they may be presented with an array of choices. Do they select the candidate who aligns with their ideal vision of the world, even though they are unpopular? Do they select a very popular but difficult-to-stomach candidate who isn't the worst? Or do they compromise and support someone in between?

And after they've made their choice, a question remains: what strategy drove the decision?

These are the sort of questions explored by Indian social scientist and economist Arunava Sen. In 2017, Sen was named the winner of the first-ever TWAS-Siwei Cheng Prize in economic sciences for his innovative research into human political and economic behaviour.

Sen is well-known for his study of how institutions function, and how people both governing and operating within those institutions strategize to get the outcomes they desire. Sen's work has had influence on the design of voting systems, systems for providing public services and even auctions.

"I am delighted and deeply honoured to receive the Siwei Cheng Prize from The World Academy of Sciences," Sen said in an email. "I have known of TWAS all of my academic life as an institution of the highest quality and the noblest goals. It is therefore extremely gratifying and humbling to receive recognition from them."

The TWAS-Siwei Cheng Prize is funded by the Siwei Cheng Foundation of the Education

Foundation of the University of Chinese Academy of Sciences. The award recognizes economic scientists who have been living and working in a developing country for at least 10 years, and includes a prize of USD10,000. Sen's honour was approved at the annual TWAS Council Meeting in Trieste, Italy, on Wednesday, 13 December 2017.

Human beings often interact to make decisions that require collective behaviour, or at least cooperation – from voting to trading. To get the outcome they want, they may act strategically in an attempt to influence the outcome in their favor. Voters might not vote for their ideal candidate, but for their second-most preferred candidate instead, in order to have



▲ Professor Arunava Sen, from the Economics and Planning Unit, Indian Statistical Institute, New Delhi.





“ I have known of TWAS all of my academic life as an institution of the highest quality and noblest goals. It is gratifying and humbling to receive recognition from them. ” Arunava Sen

▲ A queue of Indian voters.
[Photo: Al Jazeera English/
Wikimedia Commons]

a greater chance at winning. In an auction, a buyer will bid while weighing the price against the probability of winning the auction.

The design of the governing institution – the laws of a democracy or the rules of an auction – profoundly determines the strategic behaviour of these individuals. Sen studies how differently designed institutions induce people to set different strategies, and develops theories to explain peoples’ collective strategic behaviour.

FOLLOWING – AND BREAKING – THE RULES

His most well-known work specifically focuses on “mechanism design,” a field that emerged roughly 50 years ago as a new way to analyze political and economic organisations. It explores the tradeoffs people make between efficiency, fairness and incentives when making decisions within an institution that has rules participants must operate by.

◀ Women at a farmers’ rally in Bhopal, India in November 2005.
[Photo: Ekta Parishad/
Wikimedia Commons]

Sen has established a reputation as one of the leading scholars in this field. He has also built an understanding of what happens when institutions are able – or refuse – to change, how much information people have about others, the effects of collusion between individuals, and the relative ineffectiveness of truth-telling for individuals attempting to achieve their goals.

Sen made the decision to return to India following his doctoral work in Princeton and has since become a significant presence in Indian economics. He also has been instrumental in kickstarting the careers of many young economists in India by supervising and guiding them through research work. Sen came to the Delhi centre of the Indian Statistical Institute in the late 1980s and has remained there ever since. More than 10 students have completed their PhDs under his supervision.

This topic lies at the heart of much of modern economics and Sen’s work was heavily cited by the winners of the 2007 Nobel Prize in Economic Science. He has also been published in leading economics journals like *Econometrica*, *Journal of Economic Theory*, *Theoretical Economics*, and *the Review of Economic Studies*. ◼



DEDICATION, ENTHUSIASM – AND HARD WORK

Women from Bangladesh, Ecuador, Ghana, Indonesia and Sudan exemplify the skill and leadership needed to win the OWSD-Elsevier Foundation Awards.

 by Sean Treacy

Each is a woman early in her career, conducting research in uncommonly difficult conditions: carrying a complex load of responsibilities, but with limited resources and scant recognition. But each of them, through the force of commitment, have risen above the challenges to achieve high-impact work.

For this work, five scientists were honoured with the 2017 OWSD-Elsevier Foundation Awards for early-career women scientists in the developing world for their accomplishments in chemical engineering, energy and minerals engineering, environmental engineering and computer science. They are also recognised for mentoring young women scientists in their countries – Bangladesh, Ecuador, Ghana, Indonesia and Sudan.

The five researchers are: Dr. Tanzima Hashem of the Bangladesh University of Engineering and Technology; Dr. María Fernanda Rivera Velásquez of the Universidad Nacional de Chimborazo in Ecuador; Dr. Felycia Edi Soetaredjo of the Widya Mandala Catholic University Surabaya in Indonesia; Dr. Grace Ofori-Sarpong of the University of Mines and Technology in Ghana; and Dr. Rania Mokhtar of the Sudan University of Science and Technology.

“The determination, commitment and enthusiasm of these five women are an inspiration to us all, and especially to other

women undertaking scientific research in developing countries. This award celebrates their excellent science and demonstrates that their hard work has had an impact both regionally and internationally, despite the difficult local conditions,” said Jennifer Thomson, president of the Organization for Women in Science for the Developing World [OWSD].

“Each of these winners is working in emerging fields tackling some of the toughest challenges out there – from cyber-security to decontamination of our most precious resources,” added Ylann Schemm, director of the Elsevier Foundation. “By celebrating their achievements...our goal is to open doors and connect them with their global research peers.”

The awards represent a longstanding partnership between OWSD and the Elsevier Foundation. The five winners were honored during a ceremony at the 2017 American Association for the Advancement of Science [AAAS] Annual Meeting in Boston.

A panel of eminent scientists selected the winners, who each received USD5,000 and all-expenses-paid trip to attend the meeting.

“We are celebrating the exceptional achievements of five truly outstanding women scientists”, said interim TWAS Executive Director Mohamed Hassan, who is also special adviser



▲ The winners of the 2017 OWSD-Elsevier Awards, from left: Felycia Edi Soetaredjo of Indonesia; María Fernanda Rivera Velásquez of Ecuador; Tanzima Hashem of Bangladesh; Grace Ofori-Sarpong of Ghana; and, by video in the background, Rania Mokhtar of Sudan. Mokhtar was unable to attend the 2017 AAAS Annual Meeting in Boston, U.S. [Photo: Alison Bert/Elsevier Foundation]



“ Each of these winners is working in emerging fields tackling some of the toughest challenges out there. ”

Ylann Schemm, director of the Elsevier Foundation

to OWSD. “Their work will be widely recognized and appreciated for the benefits it can bring to developing countries and the entire world. Just as important, they will serve as inspiring role models to future generations of women science leaders.”

The 2017 winners were:

- **Dr. Tanzima Hashem, Bangladesh University of Engineering and Technology, Bangladesh** [Central and South Asia Region]

Computer science and engineering: For her work in developing computational approaches to protect the privacy of people accessing location-based services. Specifically, for her new and innovative solutions which allow

citizens to have control over their personal and sensitive data on health, habits and whereabouts.

- **María Fernanda Rivera Velásquez, Universidad Nacional de Chimborazo, Ecuador** [Latin America and the Caribbean Region]

Environmental engineering: For her work using the fibre of a native Ecuadorian plant [cabuya] and reactive minerals [zeolites] taken from the region to reduce contamination in industrial areas. Through her geological research into the availability of mineral resources in Ecuador, Rivera Velásquez has contributed to expanding Ecuador’s capacity to exploit minerals and improving working conditions.

- **Felycia Edi Soetaredjo, Widya Mandala Catholic University Surabaya, Indonesia** [East and South-East Asia and the Pacific]

Chemical engineering: For her research on using biomass for environmental remediation and renewable energy. Soetaredjo utilizes biomass and clay material to produce biosorbents, adsorbents and composites, which remove hazardous compounds such as antibiotics, heavy metals and dyes from wastewater.

- **Grace Ofori-Sarpong, University of Mines and Technology, Ghana** [Sub-Saharan-Africa]

Energy and minerals engineering: For her research work in microbial-mineral interaction, recovery of precious metals, water-quality monitoring and acid mine drainage. Ofori-Sarpong’s research focuses on making the extraction of gold-bearing minerals and free gold particles possible and more efficient. She also is the founder of the Association of Women in Mining and Allied Professions in Ghana.

- **Rania Mokhtar, Sudan University of Science and Technology, Sudan** [Arab Region]

Computer engineering: For her research into the knowledge, methods, theory and application of advanced security systems for mobile devices. Mokhtar is involved in research projects funded by national bodies in the field of wireless communications, agriculture automation, sensor networks and security systems. ■



THE TWAS PRIZE: WORLD INNOVATION LEADERS

TWAS's honours are not the end of research process. They ease new beginnings for leading scientists.

From TWAS's earliest years, Academy founder Abdus Salam and other leaders recognized the central importance of awarding honours to create global awareness of the excellent research being done in the developing world, and to encourage continued world-class work.

The TWAS Prizes were the Academy's earliest honours – the first were issued in 1985. Today, the TWAS Prizes remain a recognition of elite work being done in developing countries, in basic sciences and for contributions to the application of science and technology for sustainable development.

The TWAS Prizes are awarded to individual scientists from developing countries for work done in nine fields: agricultural sciences; biology; chemistry; earth, astronomy and space sciences; engineering sciences; mathematics; medical sciences; physics; and social sciences. Each TWAS Prize carries a cash award of USD15,000.

In 2016 there were 10 prize winners: one from Chile, Mexico, Pakistan and Turkey, and two each from Brazil, China and India.

The winners will lecture about their research at TWAS's 28th General Meeting in 2018.

AGRICULTURAL SCIENCES

- **Ismail CAKMAK** of Turkey, for his incisive work on cereal biofortification and stress-mitigating effects of zinc in crop plants.

BIOLOGY [Shared]

- **Amitabha CHATTOPADHYAY** of India, for his seminal contribution in understanding the role

of membrane cholesterol in the organization and function in healthy and diseased conditions.

- **ZHOU Qi** of China, for his outstanding contributions to the understanding of stem cell pluripotency regulation and to both basic research and translational application of stem cells.

CHEMISTRY

- **ZHAO Yuliang** of China, for his pioneering work on nanosafety analysis and nanomedical chemistry leading to new-concept cancer nanomedicine.

EARTH, ASTRONOMY AND SPACE SCIENCES

- **Mario HAMUY** of Chile, for his essential work on Type Ia supernovae, leading to the calibration of its luminosities and the discovery of cosmic acceleration.

ENGINEERING SCIENCES

- **Carlos Artemio COELLO COELLO** of Mexico, for his pioneering contributions to the development of new algorithms based on bio-inspired metaheuristics for solving single- and multi-objective optimization problems.

MATHEMATICS

- **Lorenzo Justiniano DÍAZ CASADO** of Brazil, for his fundamental contributions to the theory of Dynamical Systems.

MEDICAL SCIENCES

- **Zulfiqar Ahmed BHUTTA** of Pakistan, for his incisive work on academic paediatrics and

public health in Pakistan, which has contributed to shape global child health & policy.

PHYSICS

- **Shiraz MINWALLA** of India, for his seminal and influential contributions to theoretical physics and the discovery of new terms in the equations of charged relativistic hydrodynamics.

SOCIAL SCIENCES

- **Marilda SOTOMAYOR** of Brazil, for her extraordinary contribution and innovative research in the field of matching markets.

The winners of the 2018 TWAS Prizes were announced in December 2017 in Trieste, Italy.

There were 13 winners from nine fields: one from Argentina, Kenya, Mexico, South Africa and Turkey, and two each from Brazil, China and India. Four of them are women.

The winners will lecture about their research at TWAS's 28th General Meeting in 2018.

AGRICULTURAL SCIENCES

- **ZHANG Dabing** of China, for his fundamental contribution to our understanding of the molecular mechanisms underlying the morphogenesis of the inflorescence, flowers, and anthers in higher plants, particularly in rice.

BIOLOGY

- **Luisa Lina VILLA** of Brazil, for her outstanding contribution to the prevention of human papillomavirus (HPV) infections in women and men through development of HPV vaccines and cervical cancer screening in Brazil.

CHEMISTRY

- **Thalappil PRADEEP** of India, for his discovery of novel nanomaterials and development of products using such materials, leading to applications which support a clean environment, affordable clean water and ultrasensitive devices.

EARTH, ASTRONOMY AND SPACE SCIENCES [Shared]

- **ZHAO Guochun** of China, for his contribution to our understanding of continental collisional tectonics in the early history of Earth and the

assembly of supercontinent Columbia ~1.8 billion years ago.

- **Alejandro RAGA** of Mexico, for his outstanding contribution to the theoretical understanding of outflows from young stars, and of star formation in general.

ENGINEERING SCIENCES [Shared]

- **TSENG Yu-Chee** of Taiwan, China, for his significant contributions to wireless and mobile networks.
- **Sanghamitra BANDYOPADHYAY** of India, for her outstanding contributions in computational biology, multiobjective optimization and genetic algorithm-based classification and clustering techniques.

MATHEMATICS

- **Ricardo Guillermo DURÁN** of Argentina, for his contribution to the development and understanding of mixed and non-conforming finite element methods for partial differential equations.

MEDICAL SCIENCES [Shared]

- **Lynn MORRIS** of South Africa, for her pioneering studies on the neutralizing antibody response to HIV infection that has provided fundamental insights for HIV vaccine development.
- **Seza ÖZEN** of Turkey, for her contribution to the understanding of autoinflammatory diseases and Familial Mediterranean Fever.

PHYSICS

- **Daniel Mario UGARTE** of Brazil, for his pioneering work in characterising electronic and structural properties of nanosystems, including seminal contributions to the study of carbon nanostructures and atomic-size metal wires.

SOCIAL SCIENCES [Shared]

- **Alex Chika EZEH** of Kenya, for his vitally important demographic studies of African population, health and education, which provide essential insights into sustainable development.
- **LIU Yansui** of China, for his contribution to improve government policies for rural development through innovation in rural land-use and targeted poverty-alleviation strategies in China. 



MURENZI RETURNS AS EXECUTIVE DIRECTOR

 by Edward W. Lempinen

After 14 months at UNESCO, Romain Murenzi returns to his former post as TWAS executive director.

Rwandan physicist Romain Murenzi returned in September 2017 to the post of executive director at The World Academy of Sciences, a position he held for five years from 2011 to 2016. He spent the previous 14 months at UNESCO headquarters in Paris, directing the Division of Science Policy and Capacity Building in the Natural Sciences sector.

As TWAS seeks to expand its role in addressing the UN Sustainable Development Goals (SDGs) and related challenges, Murenzi brings extensive experience in international science policy, diplomacy and education. He previously served as the minister of education and minister of science under Rwandan President Paul Kagame, helping to design and implement respected science-for-development policies. He was elected a TWAS Fellow in 2005.

Murenzi replaces TWAS founding Executive Director Mohamed Hassan, who had resumed the position on an interim basis.

"During 14 months in Paris, Romain Murenzi has further strengthened his knowledge of the United Nations system, and of UNESCO's science mandate," said Flavia Schlegel,

UNESCO's assistant director general for the natural sciences. "I am confident that this will be of great value as he returns to guide TWAS in its important mission of advancing science in the developing world. I would also like to express my sincere thanks to Mohamed Hassan for his leadership at TWAS during the interim."

TWAS is a programme unit of UNESCO.

"I am honoured to return to TWAS and to Trieste, Italy, which is an international capital of science with a strong focus on the developing world," Murenzi said. "Working with the government of Italy, UNESCO and many other partners, I believe TWAS can continue – and expand – its historic impact on scientific development, especially in the world's poorest nations."

Hassan, a Sudanese mathematician, played an historic role in the Academy's development and growth for more than 25 years. He also served in a range of top-level positions in Sudan, at the African Academy of Sciences, and at the international level.

After Hassan's retirement in 2011, Murenzi was appointed TWAS executive director. He served until the end of June 2016.

During Murenzi's first tenure at TWAS, the Academy's education and training programmes grew significantly. It began a new initiative in science diplomacy. A new digital communication platform dramatically increased its global audience.

In addition to directing the day-to-



▲ Romain Murenzi returned to his post as TWAS executive director.

day operations of TWAS, he will oversee the Organization for Women in Science for the Developing World, which has more than 6,000 members worldwide; the InterAcademy Partnership, which serves as the unified voice for over 130 national and regional science academies worldwide; and the GenderInSITE project.

At UNESCO, Murenzi directed the division that assists member states with science policy, capacity-building and engineering. ■

Learn more: <https://twas.org/node/12388/>

PEOPLE, PLACES & EVENTS

HASSAN ELECTED TO PONTIFICAL ACADEMY

TWAS founding Executive Director

Mohamed Hassan has been elected a lifetime member of the Pontifical Academy of Sciences, which includes 80 of the most accomplished scientists in the world.

Hassan, the current president of the Sudanese National Academy of Sciences,



receives this honour

for his seminal contributions to theoretical plasma physics and applied mathematics as well as for his efforts to advance science in developing countries and his influence in promoting international cooperation and science diplomacy. The award ceremony will take place 12-14 November 2018 in Rome, Italy during an official induction ceremony, which was celebrated at a solemn pontifical audience.

Hassan, a mathematician from the University of Oxford [UK] was professor and dean of the Faculty of mathematics at Khartoum University. During the years he served as TWAS's first executive director [1983-2011], he was instrumental in establishing South-South and South-North partnerships in higher education and sustainable development, making TWAS an authoritative voice for the growth of developing countries.

Hassan is chairman, Board of Trustees, Almashriq University [Sudan], and chairman of the Governing Council, United Nations Technology Bank for Least Developed Countries.

He served as president of the African Academy of Sciences and is a current

member of several merit-based international academies.

KELEMU HONOURED BY GATES

Segenet Kelemu, is the director general & CEO of the International Centre of Insect Physiology and Ecology [*icipe*] Nairobi, Kenya. She is the fourth chief executive officer, and the first woman to lead *icipe*. After more than 25 years in the United States of America and Latin America applying cutting-edge science that saw her garner numerous professional and state honours for an exceptional career as a scientist, Dr. Kelemu returned from the diaspora in 2007 to contribute to Africa's development.

Dr. Kelemu is a 2014 L'Oréal-UNESCO for Women in Science Awards Laureate, and one of the top 100 most influential

African women featured in the May 2014 Edition of Forbes Africa. She



was listed among the 10 most influential African women in agriculture by the *Journal of Gender, Agriculture and Food Security*. In January 2018, she was recognised by Bill Gates, as one of five 'Heroes in the Field' who are using their talents to fight poverty, hunger and disease, and providing opportunities for the next generation.

In April 2018, the Women Economic Forum awarded Dr. Kelemu their highest award "Woman of the Decade in Natural and Sustainable Ecosystems" for outstanding leadership. In 2018, she has been featured in The CEO Magazine, Australia, as one of the six exceptional leaders from around the world, breaking ground and shattering

the glass ceiling. She has received other awards and recognitions including the TWAS Prize for Agricultural Sciences [2011] and an Honorary Doctorate from Tel Aviv University for her professional contributions to society [2015]. She has been featured in "the Mind of the Universe", the BBC, CNN's African Voices, The EastAfrican among others.

ABDURAKHMONOV APPOINTED MINISTER OF INNOVATION

TWAS Fellow **Ibrokhim**

Abdurakhmonov, the former vice-president of the Academy of Sciences of Uzbekistan, has been appointed the country's Minister of Innovative



Development. The appointment follows a November 2017 decree by President Shavkat Mirziyoyev that created the Ministry of Innovative Development. The decree acknowledged the importance of science and technology for the development of the Central Asian nation.

Abdurakhmonov, elected to TWAS in 2014, is a leading global expert on cotton genomics and breeding. In 2012 he founded the Center of Genomics and Bioinformatics of Uzbekistan, which he is currently heading on a voluntary basis, and made outstanding contributions to cotton biotechnology, identifying genes that control fibre quality, flowering, leaf defoliation and resistance to stresses. Among the honours he has received are the government-issued 2010 chest badge, "Sign of Uzbekistan" and the 2010 TWAS Prize. In 2013 he was named the International Cotton Advisory Committee's researcher of the year.



PEOPLE, PLACES & EVENTS

ATTA-UR-RAHMAN ELECTED TO CHINESE ACADEMY OF SCIENCES

Pakistani chemist **Atta-ur-Rahman**, elected to TWAS in 1985, has been inducted as Academician of the Chinese Academy of Sciences (CAS). He is the first-ever Muslim scientist to win this honour. Rahman, who earned his PhD in organic chemistry from Cambridge University in 1968, was the first scientist from the Muslim world to receive the prestigious UNESCO Science Prize in 1999.



At present he is President of the Network of Academies of Science in Countries of the Organization of Islamic Conference (NASIC), and Professor Emeritus, International Centre for Chemical & Biological Sciences at the University of Karachi. In 2006, he was elected as a Fellow of the Royal Society (London) in the UK, and in 2007 he was elected honorary Life Fellow of Kings College, Cambridge University in the UK. The Austrian government has honored him with its high civil award ["Grosse Goldene Ehrenzeischen am Bande"] (2007) in recognition of his eminent contributions. In 2009, he received the TWAS Prize for Institution Building, which acknowledged his contributions and revolutionary changes to propel higher education in Pakistan. He has more than 1,142 publications, including 775 research publications, 43 international patents and 254 books.

ASHOK VIJH NAMED TO ORDRE DE MONTRÉAL

Indian-born electrochemist **Ashok Vijh** from the Institut de Recherche

d'Hydro-Quebec, and, *Institut national de la recherche scientifique (INRS)* in Canada was named a Knight of the Ordre de Montréal (May 2017). The honour recognizes women and men who have made exemplary contributions to the city's development and reputation.

Elected to TWAS in 1987, Vijh holds a doctorate in electrochemistry from the University of Ottawa and honorary doctorates from Concordia University and the University of Waterloo in Canada; Panjab University, Chandigarh, India; and the INRS, University of Quebec. Vijh is also an Officer of the Order of Canada, and an Officer of the Order of Québec. He has been also decorated by the Golden Jubilee Medal and the Diamond Jubilee Medal of Queen Elizabeth II, for Canadians who have made exceptional contributions. He is a founding member of the Institut de



Recherche d'Hydro-Quebec (IREQ), and a guest professor and thesis adviser at the INRS (Institut national de la recherche scientifique). Vijh was the first Canadian of non-European extraction to be elected president of the Academy of Science of the Royal Society of Canada, a position he held from 2005 to 2007. His scientific investigations resulted in breakthrough innovations in energy, the electric industry (he investigated the reaction mechanisms of lithium batteries) and cancer research.

SIVARAM WINS INTERNATIONAL PRIZE

Swaminathan Sivaram, a 2000 TWAS Fellow, has been awarded the 2018 international prize from the Society of

Polymer Science in Japan. Each year, only two to three scientists outside Japan receive this award. Sivaram, an honorary professor and Indian National Science Academy (INSA) senior scientist at the Indian Institute of Science, Education and Research in Pune, India, was selected for his outstanding contribution to polymer chemistry and technology. In particular, he has led research in controlled synthesis of polymers, biodegradable polymers and new chemicals/catalysts for high-performance polymers. Among his past honours: the Padma Shri, India's fourth-highest civilian award; the Professor M. Santappa Silver Jubilee Award; and the Silver Medal of the Chemical Research Society of India. He has authored more than 200 scientific papers and won over 100 patents. An active consultant with Indian industries, Sivaram is also an elected fellow of all the Indian Academies of Sciences and Engineering.



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The World Academy of Sciences for the advancement of science in developing countries – TWAS – works to support 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. Today, TWAS has about 1,220 elected Fellows from nearly 100 countries; 14 of them are Nobel laureates. It is based in Trieste, Italy, on the campus of the **Abdus Salam International Centre for Theoretical Physics [ICTP]**.

Through more than three decades, the Academy'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 and engineering research and sharing of experiences in solving major problems facing developing countries.

TWAS and its partners offer over 490 fellowships per year to scientists in the developing world for PhD studies and post-doctoral research. TWAS prizes and awards are among the most prestigious given for scientific work in the developing world. The Academy distributes more than USD1 million in research grants every year to individual scientists and research groups. It supports

visiting scientists and provides funding for regional and international science meetings.

TWAS hosts and works in association with two allied organizations on the ICTP campus:

The Organization for Women in Science for the Developing World [OWSD]. At its founding in 1989, OWSD was the first international forum uniting women scientists from the developing and developed worlds. Today, OWSD has more than 6,000 members. Their objective is to strengthen the role of women in the development process and promote their representation in scientific and technological leadership.

The InterAcademy Partnership [IAP] represents more than 130 academies worldwide. IAP provides high-quality analysis and advice on science, health and development to national and international policymakers and the public; supports programmes on scientific capacity-building, education and communication; leads efforts to expand international science cooperation; and promotes the involvement of women and young scientists in all its activities.

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