



 **unesco**  **FONDATION
L'OREAL**

2022 INTERNATIONAL AWARDS

SUMMARY

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ABOUT THE
Fondation L'Oréal

The Fondation L'Oréal supports and empowers women to shape their future and make a difference in society, focusing on three major areas: scientific research, inclusive beauty and climate action.

Since 1998, the L'Oréal-UNESCO *For Women in Science* program has worked to empower more women scientists to overcome barriers to progression and participate in solving the great challenges of our time, for the benefit of all. For 24 years, it has supported more than 3,900 women researchers from over 110 countries, rewarding scientific excellence and inspiring younger generations of women to pursue science as a career.

Convinced that beauty contributes to the process of rebuilding lives, the Fondation L'Oréal helps vulnerable women to improve their self-esteem through free beauty and wellness treatments. It also enables underprivileged women to gain access to employment with dedicated vocational beauty training. On average, around 21,000 people have access to these free treatments every year and more than 27,000 people have taken part in professional beauty training since the beginning of the program.

Finally, women are affected by persistent gender-based discrimination and inequalities, exacerbated by climate change. While they are on the frontline of the crisis, they remain underrepresented in climate decision-making. The *Women and Climate* program of the Fondation L'Oréal supports, in particular, women who are developing climate action projects addressing the urgent climate crisis and raises awareness of the importance of gender-sensitive climate solutions.

ABOUT
UNESCO

Since its creation in 1945, UNESCO, the United Nations Educational, Scientific and Cultural Organization, has worked to create the conditions for dialogue among civilizations, cultures and peoples, based on respect for common values. UNESCO's mission is to contribute to the building of peace, the eradication of poverty, sustainable development and intercultural dialogue through its unique expertise in education, science, culture, communication and information. The Organization has two global priorities: Africa and gender equality.

UNESCO is the only UN specialized agency with a specific mandate in the sciences, symbolized by the «S» in its acronym. Through its science-related programs, UNESCO contributes to the implementation of the United Nations Sustainable Development Goals, helps developing countries build their scientific and technological capacities, and supports Member States in their efforts to develop science policies and programs. It also supports Member States in their efforts to develop effective public policies that integrate local and indigenous knowledge systems.

UNESCO promotes scientific research and expertise in developing countries. The Organization leads several intergovernmental programs on sustainable management of freshwater, ocean and terrestrial resources, biodiversity conservation, and the use of science to address climate change and disaster risk reduction.



A word from Jean-Paul Agon

CHAIRMAN OF L'ORÉAL,
PRESIDENT OF THE FONDATION L'ORÉAL

Today, in the world of science, having a talent is sometimes still not enough for women to fully express their potential and be recognised for their true value.

Too many historical obstacles – cultural, academic, or institutional – affect their choices, impact their careers, and minimise their contribution.

Yet despite these constant constraints, there are many women who are right at the forefront of fundamental, often vital, contributions to addressing the great challenges facing humanity and the planet. These exceptional women are demonstrating that scientific progress will not be made without them.

In the world of science, successive lockdowns have significantly disrupted their research projects. Supporting women in science, as the Fondation L'Oréal and UNESCO do, is therefore more important than ever.

This year, we are particularly pleased to celebrate not only the 2022 laureates, but also those of the two previous L'Oréal-UNESCO *For Women in Science Awards* at a unique edition of the International Ceremony in Paris. The first of its kind in our history, it will be a wonderful occasion to unite an impressive number of eminent women scientists who exemplify both diversity and excellence. Representing every continent, they are at the cutting edge of all disciplines. The three editions of the *For Women in Science Awards*, which you'll discover through this media kit, offer once more the opportunity to take stock of the truly remarkable character of their

scientific work. Each of them is making major pioneering discoveries that will change the lives of millions of people, uncovering solutions for our planet and our ecosystem. Giving women in science the visibility and recognition they deserve is only a fair return.

Since 1998, we have supported and raised the profile of almost 4,000 women. Together, they form a community of ambassadors which is growing every year and which in turn enables women to dream, inspiring them to commit to and follow their scientific vision.

Because we need everyone involved to win this fight for equality and change the game. Science must be inclusive to be truly relevant and universal. Real progress has been made, but there is still a long way to go. We will continue to deliver this fight, with the exemplary and precious support of UNESCO. And as always since the first day of our partnership, we will relentlessly pursue our ambition with strong determination.

In this world, each day more complex and uncertain than the last, science is the key that will unlock our collective future - provided it is truly inclusive and sustainable. This will inevitably take place through a profound evolution of mentalities in every sphere of society, throughout the world. So, now more than ever, we are determined to spare no effort to play our part in this, and act as an accelerating force to create a real change that will benefit everyone.

The world needs science, and science needs women.



A word from Audrey Azoulay

DIRECTOR-GENERAL OF UNESCO

For the last two years, the world has been facing an unprecedented global health crisis. Caused by a microscopic virus, the COVID-19 pandemic has amplified macro-level inequalities and injustices worldwide.

Women scientists have been on the frontlines of the global fight against COVID-19, showing once again that the world needs science and science needs women. Yet far too many women face barriers to reaching their full potential in the scientific field¹.

According to UNESCO's 2021 Science Report, this is true of science itself, where only one in three researchers is a woman. However, it is also true of the science-related professions of tomorrow – in the fields of digital information technology, physics, mathematics and engineering – where women continue to be underrepresented, despite labour shortages.

This gender gap arises early on, in the classroom, depriving science of promising profiles. In higher education, for instance, women represent only 30 per cent of all students enrolled in STEM-related fields.

Now more than ever, the world cannot afford to lose a generation of female scientists, entrepreneurs and inventors. Women need to believe they can succeed in the science field, and we need to create an environment that allows them to do so. This means implementing gender-transformative policies and initiatives, to empower women and girls to lead and innovate, to give visibility to talented female scientists as role models, and to attract more girls and young women to scientific careers.

By adopting gender equality as one of its two global priorities fifteen years ago, UNESCO signalled that it is in for the long haul when it comes to empowering women in education, science and culture. And, to realize our ambitions in these fields, we are fortunate to be able to count on the unwavering support of partners like the Fondation L'Oréal.

Over the past 24 years, the L'Oréal-UNESCO *For Women in Science* program has shown what can be achieved when a United Nations agency and a multinational foundation sharing the same vision join forces. Since 1998, the L'Oréal-UNESCO *For Women in Science* International Awards have championed over 120 exceptional researchers, and 3,800 Young Talents.

By celebrating and supporting some of the world's most inspiring female leaders in science, technology, engineering and mathematics, UNESCO and the Fondation L'Oréal have given more visibility to their pioneering work and the benefits that it brings society, while improving the representation of women in these fields.

We are grateful to the Fondation L'Oréal and proud of what we have accomplished so far. We look forward to further developing this partnership in the coming years. Together, we can ensure that exceptional women scientists fully play their role in solving the daunting challenges of our times. We can show girls and women across the globe that they too can dream of being scientists – and make their dreams reality. Science needs women, and women need science.

¹ UNESCO: "Boosting gender equality in science and technology: a challenge for TVET programmes and careers" (2020), p 8. Available at: <https://unesdoc.unesco.org/ark:/48223/pf0000374888.locale=en>

24 YEARS OF COMMITMENT



Over the last

24 YEARS,

more than

3,900

women scientists have been recognized.



52

national and regional programs covering

116 COUNTRIES.



122

Laureates honored for their excellence in science, including

5 who have gone on to win a scientific Nobel Prize.



Over

50

high-level scientific institutions involved worldwide.



3,800

Young Talents, PhD candidates and post-doctorates, were supported through financial support and leadership training.



Over

500

scientists involved in the selection process for the national and regional programs.

INTERNATIONAL AWARDS

The outstanding contribution of women to science

Each year since 1998, the Fondation L'Oréal and UNESCO honour five brilliant female scientists, promote their work globally and empower them to act as role models for aspiring women scientists and future generations. The Laureates are recognized for their scientific achievements and remarkable contribution to advancing research on a global scale. To support women-led scientific excellence in addressing societal needs worldwide, one Laureate from each of the five major regions of the world is awarded: Africa and the Arab States, Asia and the Pacific, Europe, Latin America and the Caribbean, and North America.

2022 LAUREATES



LAUREATE FOR AFRICA AND THE ARAB STATES

Professor Agnès Binagwaho

Professor of Pediatrics and Vice-Chancellor of Global Health Equity University, Kigali, Rwanda

Awarded for her critical role in establishing, advocating for, and creating a new model of equitable public health care for the most vulnerable in Rwanda, Africa, and the world. Her work and her unwavering commitment to public health are driving access to HIV, malaria and tuberculosis, and under five health services, and universal health coverage more broadly.



LAUREATE FOR ASIA AND THE PACIFIC

Professor Hailan Hu

Professor and Executive Director of the Neuroscience Center of Zhejiang University School of Medicine, China

Awarded for her pioneering discoveries in neurobiology that have revolutionized our understanding of social emotional behavior and mental disorders. Her groundbreaking work has deciphered the mechanism of depression and informed the development of next-generation antidepressants.



LAUREATE FOR EUROPE

Professor Ángela Nieto

Professor at the Institute of Neuroscience (CSIC-UMH), San Juan de Alicante, Spain

Awarded for her fundamental discoveries on how cells change identity during embryonic development to disseminate and form different tissues. Her work has paved the way for the understanding of how cancer spreads to other organs and forms metastasis.



LAUREATE FOR LATIN AMERICA AND THE CARIBBEAN

Professor Maria Guzmán

Director of the Research Center of the Pedro Kouri Institute (IPK) Institute of Tropical Medicine, Havana, Cuba

Awarded for her pioneering work on the devastating human infections caused by the dengue virus, one of the world's most important diseases in terms of morbidity and mortality. Her research has led to a better understanding of its pathogenesis, diagnostic, surveillance and prevention.



LAUREATE FOR NORTH AMERICA

Professor Katalin Karikó

Adjunct Professor at the Perelman School of Medicine, University of Pennsylvania, United States of America, and Senior Vice President at BioNTech RNA Pharmaceuticals, Philadelphia, United States

Awarded for her groundbreaking development of a non-inflammatory mRNA, which can be a potent vaccine and is essential for recently producing effective COVID-19 vaccines. Her work has paved the way for future therapies in complex diseases such as cancer, heart failure, stroke, anemia and autoimmune diseases.

Professor Agnès Binagwaho

PUBLIC HEALTH AND PEDIATRICS



*Professor of Pediatrics and Vice-Chancellor of the
University of Global Health Equity, Kigali, Rwanda*

Professor Binagwaho is awarded for her central role in expanding access to public healthcare for the most vulnerable communities in Rwanda, Africa and beyond, helping reduce the global burden of disease and improving lives. In particular, she focuses on best practices in building resilient health systems and improving the quality, availability, and affordability of healthcare services for people suffering with diseases including HIV, malaria, and tuberculosis. This has never been more important than now as overwhelmed healthcare systems across the world struggle to build back stronger in the wake of the Covid-19 pandemic.

“As global health professionals, we have a duty to ensure that obstacles to quality healthcare are removed or minimised, especially for the vulnerable,” she says. “By providing more accurate data and evidence-based strategies for change to policymakers, the health education sector, and implementers, I hope to support better health for all.”

Her dream is for science to solve malaria, particularly given that 94% of malaria cases and deaths occur in Africa. She also has a keen focus on major non-communicable diseases such as cancer, diabetes, and mental health illnesses. Conscious that depression is the fourth major cause of illness among adolescents in Africa, and that few services are available for support, she co-developed a free, open-source and easy-to-use child depression screening tool in 2017 that can be adapted to all settings.

By focusing on implementation science research – the study of methods to help apply research results – and health policy, Professor Binagwaho is fulfilling her childhood dream of becoming a healer and a teacher. She grew up in Belgium, and pursued medicine and paediatrics studies in Belgium and France. She decided to return to Rwanda in 1996 to work in public hospitals, following the 1994 genocide against the Tutsi that had destroyed the country. Determined to make a meaningful contribution, she became actively involved in rebuilding and strengthening the healthcare system, with a focus on supporting the most vulnerable, particularly children affected by the conflict and who were suffering from HIV and similar diseases. From 2011 to 2016, she served as Minister of Health in Rwanda.

As she pursued her career, Professor Binagwaho faced obstacles both in proving her merit as a woman scientist, and in gaining the trust of the scientific community, particularly at the global level, as an African. She highlights that while there are more women than men studying global health, only 25% of leadership positions in the field

are held by women, and with this disproportionate representation comes too little focus on women-related health issues and insufficient funding going to female researchers.

In her daily work in Rwanda, however, she feels privileged not to have experienced gender discrimination, which she attributes to the country’s emphasis on gender equity. Indeed, women in Rwanda hold the highest percentage of seats (61%) of any parliament in the world, while 55% of ministers are female.

“I have made it my life’s mission to change the status quo, to help people get what they deserve wherever they are from, and without gender discrimination,” she says. “I always advocate for social justice. I am fighting for myself and my peers and contributing to improving the playing ground for the female scientists who follow.”

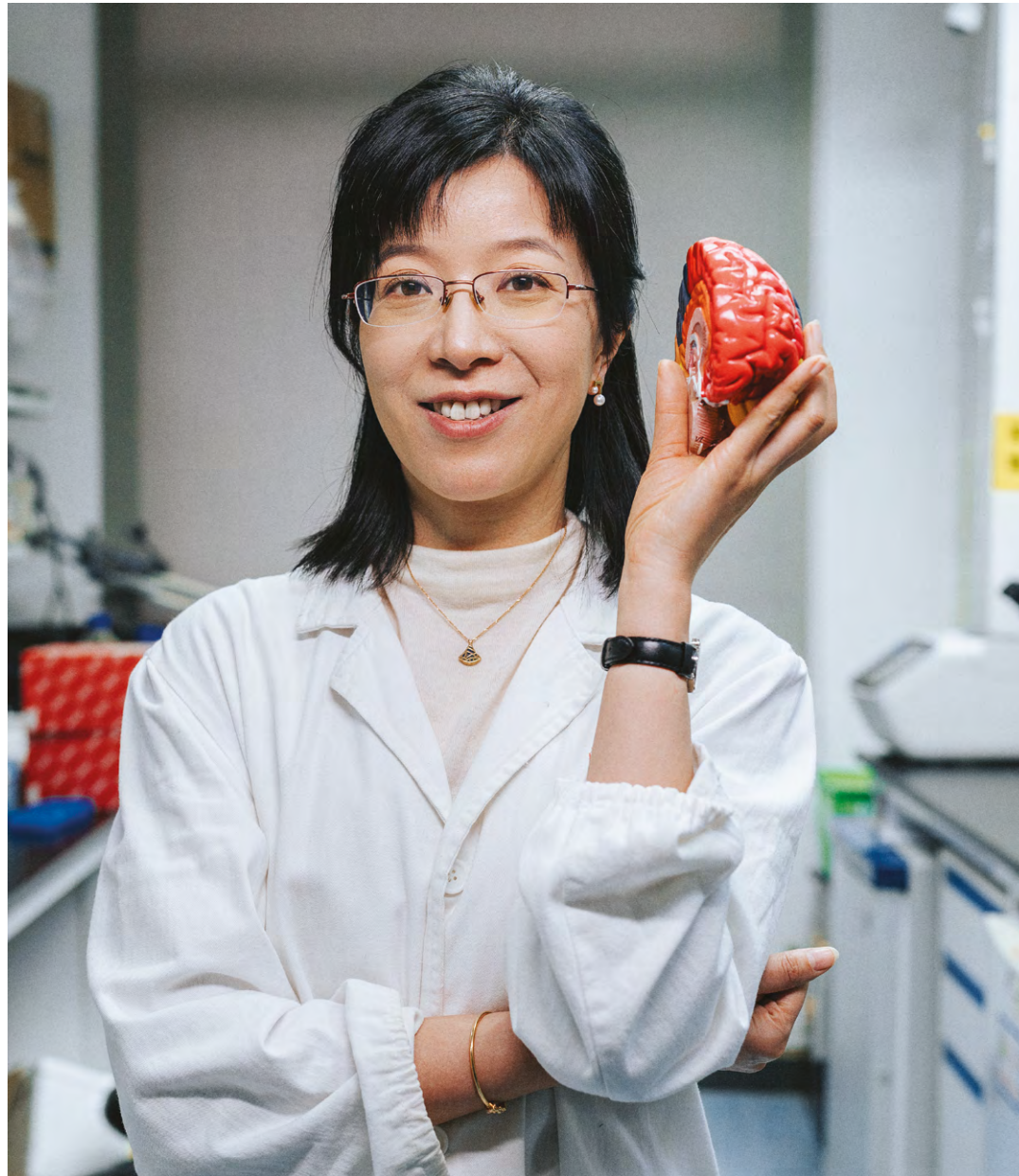
She believes that having more women in research would result in more inclusivity, collaboration, and innovation, to improve the quality of research and health outcomes and advance gender equality. This is particularly relevant in Sub-Saharan Africa, where scientists from the continent contribute just 2.5% of the research in the world.

She is actively helping to turn the tide in her roles as co-founder and Vice Chancellor of the University of Global Health Equity, teaching her students to focus on the most vulnerable so that they deliver equitable health services that leave no one behind. With only 28% female doctors in Africa, she also ensures that a minimum of 70% of students in the institution’s medical program are women.

“Increasing women’s representation in the research ecosystem will empower them to apply their skills and produce more transformational research,” she says. “I advise them to stand up for their rights, choose their battles carefully and confront individuals who undermine their capacity, their work or their research just because they are female.”

Professor Hailan Hu

NEUROSCIENCE



*Professor and Executive Director of the Neuroscience Center
of Zhejiang University School of Medicine, China*

Professor Hailan Hu is awarded for her major discoveries in social and emotional neuroscience. Her ground-breaking work has revolutionized scientific understanding of mental health and, deciphered the mechanism of depression to inform innovative treatment strategies and new medicines. These breakthroughs are vital in the wake of the mental health crisis sparked by the Covid-19 pandemic, with nearly 30% of the global population suffering from depression according to Lancet. Professor Hailan Hu is passionate about raising awareness and illuminating pathways to high impact solutions, particularly given that in many parts of the world, the illness remains largely underdiagnosed and still taboo.

"The brain is arguably the most complex system in the universe," she says. "Billions of nerve cells connect with each other, forming trillions of connections and executing some of the most fascinating functions such as thoughts, emotion, and learning. I foresee that one day our understanding of the neurological mechanisms behind psychiatric diseases will be advanced to the level that enables us to create a cure to help people suffering from these illnesses."

At her eponymous laboratory at the Zhejiang University School of Medicine, one of China's most revered and historic medical schools, she and her team research how emotional and social behaviours are encoded in the brain and how they are shaped by experience through changes in the relevant neural circuits. Notably, she has made significant advances in understanding the rapid and effective impact of ketamine on a small area of the brain called the habenula, an area that becomes highly activated during depression. It transpires that ketamine is distinctly more efficient than traditional anti-depressants. Identifying this direct connection has therefore shed new light on the evolution of the illness and represents one of the most important major discoveries in mental health in recent years.

As a young child, inspired by stories and films, Professor Hailan Hu told her father that she wanted to either become a writer or a scientist, which she envisioned as glorious careers. While pursuing her school studies, she realized she was far stronger in mathematics and science, and thus began her journey to be a scientist. She was supported by her parents and encouraged by her physics and biology teachers, who cultivated her ability in logical thinking and interest in natural science.

During college, while studying biochemistry, she determined that she would dedicate her career to neuroscience, when she became absorbed by the

ideas expressed in the book *From Neuron to Brain* by Steve Kuffler and John Nicholls. She was also fascinated by experiments in class. *"The idea that it is possible to measure and probe the function of electrical pulses sent by the brain was an eye-opener for me,"* she recalls.

Professor Hailan Hu completed her PhD and postdoctoral training in the United States and returned to China to develop her independent research group. In 2015, her achievement was already recognized by the national L'Oréal-UNESCO *For Women in Science* Young Talents program. While she is encouraged by the advances made in China in science and its leadership in some areas, she would like to ensure that the next generation of scientists can thrive, including by building a critical mass of mentors. She is grateful for her own role models, noting the transformational impact of her PhD mentor and neuronal development expert Corey Goodman, whom she describes as a powerhouse and a textbook example of high achiever, and the sophisticated problem-solving approach of leading neuroscientist Roberto Malinow.

As a woman in science, she has perceived subtle, subconscious forms of gender discrimination and witnessed the barriers to women advancing in science, such as limited opportunities to build networks and generate trust among scientific peers. As a member of the ALBA network, which strives to promote equality and diversity in neuroscience, Professor Hailan Hu is actively involved in turning the tide on these trends. Recognition is needed of this fundamental gender imbalance, and action taken to facilitate greater communication, particularly in empowering women to present their findings in a way that will be accepted as convincing by their male counterparts.

Finally, she encourages up-and-coming women scientists to overlook the objectification of women scientists by the media, which she believes overshadows their achievements and sets them apart from their peers. *"It's important to value your research and derive self-esteem purely from scientific achievement,"* she says. *"You never know what will be the new social favorite three months later, but there are reliables and dependables in science for years to come. So, if you love science, do not be afraid to become a scientist!"*

Professor Ángela Nieto

EMBRYOLOGY AND BIOMEDICINE



*Professor at the Institute of Neuroscience
(CSIC-UMH), San Juan de Alicante, Spain*

Professor Nieto is awarded for her fundamental discoveries in embryonic development, which have paved the way for understanding how cancer extends to other organs and forms metastases, the secondary tumours that cause more than 90% of cancer-related deaths. In particular, she explores how cells change identity in the embryo to disseminate and form different tissues. This in turn stands to illuminate how cancer spreads and inform better therapeutic strategies.

"I hope that together we can make cancer a fully treatable disease," she says. "We must remember that cancer means hundreds of different diseases, some of which already have a far better prognosis than they did two decades ago, but there is still a long journey ahead. Beyond this, I dream of science enabling us to maintain our planet as a place to live and grow old in good health."

As a child, Professor Nieto always wanted to be a scientist. She loved experimenting with chemistry and was fascinated by outer space and the first moon landing in 1969, even dreaming of becoming an astronaut. Her parents, who taught her honesty, integrity, and resilience, fully supported her wish to pursue science. At secondary school, her primary interest moved from chemistry to biology, inspired by a wonderful biology teacher. *"She made me see the beauty of understanding life and how it works," she recalls. "I decided I wanted to study biochemistry and molecular biology, and I never looked back."*

Professor Nieto began her scientific career exploring how DNA and proteins interact. This sparked her interest in understanding the interaction between cells, and she later progressed to studying how embryos develop in different animal models to form tissues and organs. Among her first Eureka moments, she describes dreaming of overcoming an artifact in her PhD experiment data that was clouding the way to progress. She raced to the laboratory at 4am and successfully implemented her idea. Importantly, Professor Nieto is proud of her breakthrough in discovering a connection between embryonic genetic programs and the progression of cancer, a revelation that changed the course of her scientific life and brought hope to those affected by the disease.

Collaboration has always formed a central part of her work, with international partnerships helping to advance collective knowledge and accelerate the path to new discoveries. Her post-doctoral research in developmental biology in London at the National Institute for Medical Research was particularly important in this respect. Now, she is the president of the International Society

of Developmental Biology, an institution that helps promote this field worldwide. In this role, she will also raise awareness of the need for more investment to fund basic science.

"Teamwork is essential in science and I would like to thank all the members of my lab with whom I've worked over the years, for their unwavering determination, creativity and hard work" she says.

Professor Nieto has consistently proved herself as a successful scientist, remaining positive while working hard to fulfil her dreams and striving for the highest standards. As a senior scientist and a member of Spain's prestigious Royal Academy of Sciences - the sixth woman to be elected in more than 170 years - she is clear that women should hold more positions of responsibility in science and play a greater part in decision-making. In particular, the benefits of greater female involvement in the highest echelons of science would lead to more inclusive decisions, she believes.

Professor Nieto is also passionate about encouraging girls and young women to pursue science as a career, particularly as engineering and technological innovation stand to contribute ever more to society. *"It's vital that we go to schools and encourage girls to believe in themselves and develop the confidence to become scientists," she says. "We must convey that science at the highest level is fulfilling and fun."*

"There should be no limits to achieving our dreams," she concludes. "I hope that in the future, gender equality in science will be the norm, with both talented women and men scientists addressing global health and environmental challenges. We should make this journey with determination and passion. Science gives us the freedom to explore with rigour and generosity, meet extraordinary people and feel part of an international community working for a better world."

Professor Maria Guzmán

INFECTIOUS DISEASES AND VIROLOGY



Director of the Center for Research, Diagnostic and Reference activity of the Institute of Tropical Medicine, Pedro Kouri (IPK), Havana, Cuba

Professor Guzmán is awarded for her pioneering work to address the devastating human infections caused by the dengue virus, one of the world's most serious diseases in terms of morbidity and mortality, causing 390 million dengue virus infections annually. Her research has led to a better understanding of its pathogenesis and risk factors, the origin of several epidemics of dengue haemorrhagic fever, the development of diagnosis and monitoring, and the search for potential new vaccines. It will also strengthen training for medical students and personnel, helping to ensure the next generations are better equipped to fight these viruses.

"My research in infectious diseases is an important and challenging area as viruses are constantly evolving and represent the main causes of emerging and re-emerging diseases and global emergencies," she says. "I remain determined to investigate and develop new knowledge to control dengue fever using all the tools available, providing scientific answers to the many questions raised by current medicine."

Professor Guzmán is proud of her contribution to bringing new hypotheses to the international scientific community on the causes and conditions favouring haemorrhagic dengue epidemics, in the wake of the 1981 epidemic in Cuba and the various other epidemics that emerged later on.

Amid the Covid-19 pandemic, she worked on the front line of national research, developing molecular diagnosis, conducting laboratory surveillance, taking part in the development of the Cuban laboratory network for the diagnosis of SARS CoV-2, and supporting the genomic surveillance of SARS CoV-2 variants and the evaluation of Cuban vaccine candidates.

As a child, Professor Guzmán was naturally curious about the world around her, always wanting to explore further for explanations of diverse phenomena. She initially wanted to study astronomy before settling on medicine and pursuing research in the field of virology. Today, she is happy to have achieved her dream of dedicating herself entirely to science, encouraged and supported by her mother and her partner and scientific mentor, Professor Gustavo Kouri.

She has conducted all her research in her native country of Cuba, where she has thrived despite resource and technological challenges, working in two centers (the CENIC and the IPK), and participating in prestigious national and international collaborations, including with the World Health Organization and the Panamerican

Health Organization. While Cuba is a developing country with few natural resources, embargoed by the US, and where scientists face difficulties in gaining access to reagents and advanced technologies, Professor Maria Guzmán believes anyone can study science there. In fact, many biomedical scientists in Cuba are women and they have all opportunities to study and to evolve in science studies.

"In Cuba, there is a strong understanding that study and scientific advances are everyone's right and are fundamental to the development of the country," she explains. "Biomedical sciences are among the principal priorities." Indeed, the country hosts more than 86,000 people dedicated to Science Technology and Innovation activities with an indicator of more than 1.6 professionals dedicated to research/development for every 1,000 inhabitants. Since the pandemic, Cuba is particularly focused on scientific research, building networks in science and integrating a wider variety of institutions.

The main obstacles she has faced are balancing family life with scientific research, although this has been partially overcome by unconditional support from her close relatives. She feels strongly that women scientists globally still face discrimination and unequal pay and are often marginalised when it comes to decision-making roles or obtaining funding for their scientific work. "There is a long way to go to achieving gender equality in science and society," she concludes. *"But making this journey is integral to the future of humanity."*

"Women have great strength and a lot to give to science." In Cuba, more than 45,000 women are working in various scientific fields and represent more than 70% of doctors, paving the way for younger women to pursue careers in science and become scientific leaders.

"My message to women scientists everywhere is don't stop, don't give up."

Professor Katalin Karikó

BIOCHEMISTRY



*Adjunct Professor at the Perelman School of Medicine,
University of Pennsylvania, and Senior Vice President
at BioNTech RNA Pharmaceuticals, Philadelphia, United States*

Professor Katalin Karikó is awarded for her groundbreaking development of a non-inflammatory mRNA, as a potent vaccine to prevent viral and parasitic infections. Her research has contributed to the development of the COVID-19 vaccines by Pfizer-BioNTech and Moderna.

She has been conducting years of research which led to a solution for one of the basic problems of RNA, namely the low and short-lived protein production. Professor Karikó discovered that nucleoside-modified mRNA – compared to unmodified and non-optimized mRNA – had a better tolerability and could be administered at higher doses.

Her research has paved the way for future therapies in complex diseases such as cancer, heart failure, stroke, anaemia, and autoimmune diseases.

Messenger RNA is effectively a copy of 'production' plans or information contained in our DNA, which enables the production of proteins within our cells, needed to fight diseases and viruses. It decomposes naturally once its role has been accomplished. Her key achievement lies in overcoming the strong inflammatory reaction by generating a nucleoside-modified form of mRNA.

Through incorporating naturally occurring modified nucleosides into the mRNA during synthesis, Professor Karikó together with Drew Weissman achieved this breakthrough in 2005. In 2013, Karikó joined BioNTech as Senior Vice President RNA Therapeutics where she together with Ugur Sahin and Özlem Türeci continued to research and develop mRNA-based vaccines. In 2020 BioNTech developed the first mRNA vaccine to fight the Covid-19 pandemic.

"Biochemistry can explain most of the phenomena in our bodies, yet there is still so much to discover," she says. "We need the next generation of scientists to join us so we can continue to discover therapies to treat serious illnesses with unmet medical needs. This starts with unravelling the molecular mechanism of these diseases, and it's critical to finding cures for all those who are suffering today."

"This starts with unravelling the molecular mechanism of these diseases, and it's critical to finding cures for all those who are suffering today."

As a child in Hungary, she lived in a rural community with a large garden where she nurtured flowers from seeds and looked after farm animals. She was captivated by the natural phenomena around her. *"I was surprised to learn that the iridescence in duck*

feathers arises from light interacting with structures in the feather, and experienced wonder witnessing the neighbour's cow giving birth," she says. "That innate curiosity has stayed with me for life."

At 16, she was certain she wanted to be a scientist, although as she recalls, *"I had never even seen one."* Her biology and chemistry teachers guided her early journey with an enthusiastic, hands-on approach and extra-curricular activities. Her biology teacher was an important role model, helping her to learn the fundamental life lesson of converting negative stress into positive energy, inspiration, and encouragement.

After her PhD and post-doctoral studies, her laboratory lost its funding, and in 1985, her career path led her to the USA, initially to Temple University in Pennsylvania. In 1990, she moved to University of Pennsylvania, where she submitted a request for funding to study the use of RNA messengers for genetic therapy. Yet even in the US and beyond, Professor Karikó believes more funding is needed to create the enabling conditions for more revolutionary discoveries, and senior scientists must be able to truly apply their time and energy to exploring unconventional ideas and breaking new ground.

As a woman in science, she has fought battles over harassment several times. In 1995, she faced demotion from faculty position to the simple title of senior researcher which prevented her from gaining a professorship, even as an internationally recognised scientist. *"I tried to stand up for myself, but not knowing my rights in a foreign country, my bosses were always victorious," she says. "We need women to speak up and play important roles. They mustn't settle for less, but learn to believe in themselves, lead research and know that they are just as capable of delivering ground-breaking science as any man."*

"Women scientists have great vision, they are bold and practical, while also passionate and empathetic," she strongly believes. "They have a no-nonsense attitude and are good problem solvers, great team players."

Her advice to younger scientists is to choose a supportive partner, aim high, develop strong self-belief, stand up for themselves and focus on where they can make a real impact without being afraid of trying and failing.

"It is vital to the future of science and our ability to solve the world's health and environmental challenges that we continue to highlight female scientific excellence and inspire the next generation of women scientists," she concludes.

2021 LAUREATES



LAUREATE FOR AFRICA AND THE ARAB STATES

Professor Catherine Ngila

Acting Executive Director of the African Academy of Sciences, Former Deputy Vice Chancellor in charge of Academic and Student Affairs (DVC-AA) at Riara University, Kenya, and Visiting Professor of Applied Chemistry at the University of Johannesburg, South Africa

Awarded for introducing and developing nanotechnology-based analytical methods for the monitoring of water pollutants, and applying them in heavily polluted countries. Her innovative work is of vital importance for the development of water resource management in an environmentally sustainable way.

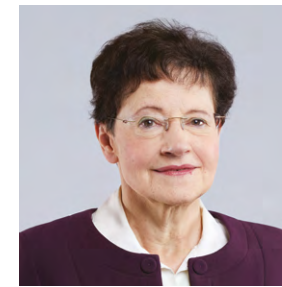


LAUREATE FOR ASIA AND THE PACIFIC

Professor Kyoko Nozaki

Professor of Chemistry at the University of Tokyo, Japan

Awarded for her pioneering, creative contributions within the field of synthetic chemistry, and their importance to industrial innovation. Her research has led to new, highly effective and environmentally friendly production processes to manufacture molecules useful for medicine and sustainable agriculture.



LAUREATE FOR EUROPE

Professor Françoise Combes

Professor and Galaxies and Cosmology Chair at the Collège de France in Paris, and Astrophysicist at the Paris Observatory - PSL, France

Awarded for her outstanding legacy in astrophysics which ranges from the discovery of molecules in the interstellar space to supercomputer simulations of galaxy formation. Her work has been crucial in our understanding of the birth and evolution of stars and galaxies, including the role played by supermassive black holes at galactic centers.



LAUREATE FOR LATIN AMERICA AND THE CARIBBEAN

Professor Alicia Dickenstein

Professor of Mathematics at the University of Buenos Aires, Argentina

Awarded for her outstanding contributions at the forefront of mathematical innovation by leveraging algebraic geometry in the field of molecular biology. Her research enables scientists to understand the precise structures and behavior of cells and molecules, even at a microscopic scale. Operating at the frontier between pure and applied mathematics, she has forged important links to physics and chemistry, and enabled biologists to gain an in-depth structural understanding of biochemical reactions and enzymatic networks.



LAUREATE FOR NORTH AMERICA

Professor Shafi Goldwasser

Director of the Simons Institute for the Theory of Computing, Professor in Electrical Engineering and Computer Sciences at University of California Berkeley, RSA Professor of Electrical Engineering and Computer Science at MIT, United States of America and Professor of Computer Science and Applied Mathematics at Weizmann Institute, Israel

Awarded for her pioneering and fundamental work in computer science and cryptography, essential for secure communication over the internet as well as for shared computation on private data. Her research has a significant impact on our understanding of large classes of problems for which computers cannot efficiently find approximate solutions.

Professor Catherine Ngila

CHEMISTRY



*Acting Executive Director of the African Academy of Sciences,
Former Deputy Vice Chancellor in charge of Academic
and Student Affairs (DVC-AA) at Riara University, Kenya,
and Visiting Professor of Applied Chemistry at the University
of Johannesburg, South Africa*

Professor Catherine Ngila is awarded for her groundbreaking contribution to water quality and water resource management in Africa. Her entrepreneurial flair and enquiring scientific mind have seen her pioneer nanotechnology-based analytical methods for monitoring and removing industrial water pollutants, creating a major positive impact by enabling millions of families to benefit from safer drinking water. Prof. Ngila's chief innovation lies in using electro-spun, nano-absorbent fibers and nano-composite membranes (derived from chemical resins and biomass materials) to detect and remove trace metals (such as lead, zinc and aluminum) and toxic chemical substances. And her team's modeling of wastewater treatment plants is helping wastewater treatment plant managers in Johannesburg, South Africa, to improve their effluent discharge. As Africa continues to industrialize, her work will become ever more important in protecting human health and aquatic life.

"Water research is close to my heart in that, water is life!" says Prof. Ngila. "Nanotechnology can play a vital role in water purification techniques. My dream is to produce a commercially viable water nano-filter that removes contaminants in one filtration cycle, enabling rural African families to install affordable water filters in their homes."

Girls and women throughout the country and across Sub-Saharan Africa often walk long distances to collect water and firewood to purify it through boiling, typically over smoky cookstoves or by using fabric to act as a water filter. By scaling up the production of household water filters – using cost-effective materials such as agricultural 'waste' including sugarcane bagasse, maize stalks and dried algae, to absorb contaminants – more families would gain access to safe water.

As a child growing up in Kenya's Kitui County, Prof. Ngila experienced these challenges firsthand and saw the impact of this heavy domestic burden on girls' education. *"Before going to primary school, I would walk up to 3km to fetch water, and as soon as lessons finished for the day, I would run home to fetch firewood and later pound maize to prepare food,"* she says. *"Boys were exempted from household chores, so from an early young age, I felt discriminated against for being a girl. I promised myself that education would be my way out of hardship."*

Prof. Ngila persevered with her studies, encouraged by her father, a former tribal chief (her mother passed away when she was a young child). She had the good fortune to study at an all-girls secondary school, free from gender stereotypes, and here, her interest in chemistry blossomed, inspired by her chemistry teacher. She later graduated as the top student at Kenyatta University's science faculty

in 1986, where she began pursuing her interest in water resource management.

With universities and laboratories in her native Kenya facing funding, resource and infrastructure challenges, Prof. Ngila continued her research in Australia, where she obtained her doctoral degree from UNSW in 1996 before returning to Kenya to lecture at Kenyatta University, and later in Botswana and South Africa. At the University of Johannesburg, she experienced a major 'Eureka' moment by using electro-spinning cellulose to extract individual nano-fibers. This had previously been thought impossible, as cellulose is restricted by its limited solubility in common solvents and inability to melt, preventing the separation of such fibers. Prof. Ngila and her doctoral student Stephen Musyoka overcame these challenges by applying a high-voltage electric field to a modified cellulose solution, producing biopolymer nano-fibers with diameters in the range of 100-500nm – and delivering a high-impact approach for water purification.

As a senior woman scientist in Kenya (where just five of the 31 public universities have women vice chancellors), Prof. Ngila has found it hard to break the glass ceiling, often finding herself sidelined by male counterparts in decision-making. The 'multi-tasking' burden faced by senior women scientists – conducting research while acting as role models and being the 'token woman' on multiple boards and councils – also undermines their ability to flourish personally and professionally. It may even result in reinforcing their sense of isolation and exclusion from laboratory working culture, which in turn limits their career opportunities. In some cases, it can leave women susceptible to harassment. Despite this, she remains undeterred in her conviction to fight gender discrimination.

"Excellent science and innovation require the talents of both women and men," she says. "We need the complementary skills and values of both genders to create a balanced, holistic approach to leadership." As the Acting Executive Director of the African Academy of Sciences (AAS) and former Chair of the AAS working group on education and gender, Prof. Ngila dreams of both influencing decision-making and STEM policy for women and girls, and mobilising research funding to establish a state-of-the-art laboratory for promising analytical chemists. When women scientists are able to form a "critical mass" in the workplace, they will be able to better advocate for themselves and build stronger support networks.

She considers that the L'Oréal-UNESCO *For Women in Science* International Awards will "enable [her] to continue [her] commitment to science with energy and passion, and act as a strong role model for women and girls in Africa".

Professor Kyoko Nozaki

CHEMISTRY



Professor of Chemistry at the University of Tokyo, Japan

Professor Kyoko Nozaki is awarded for her pioneering and transformative contribution to the field of synthetic chemistry. Her world-leading research in designing molecular catalysts for new types of organic and polymer synthesis has led to highly effective, sustainable production processes that help multiple industries to improve productivity and efficiency, while saving energy and reducing waste. In particular, through her focus on developing catalysts for polymerization¹, she is making significant advances in improving the performance and ecological credentials of polypropylene (PP), a plastic of great interest to industry.

Prof. Nozaki is currently leveraging her expertise to develop a high-performing PP - polar polypropylene - for car manufacturing, which can be made without the addition of harsh chemicals, is recyclable and improves fuel efficiency. She has also made an important contribution to synthesizing plastics from renewable resources, most notably from carbon dioxide.

"The sheer versatility of chemistry allows us to create new substances that stand to change the world by enabling new technologies," she says. "When I first applied the catalyst originally invented for drug synthesis to plastic synthesis, I was thoroughly impressed by the opportunities for its application in diverse fields."

At school, Prof. Nozaki liked physics and was encouraged by her teacher to continue her interest in science. But it was her undergraduate studies that really instilled in her a lifelong love of chemistry.

"I was thrilled by the fact that I was the first person ever to conduct these experiments and see the results," she says. "I planned experiments almost every day based on my own hypotheses. It was like asking questions to Mother Nature. For a short while, she kept answering 'No, you are wrong'. But she gave subtle hints occasionally, and one bright autumnal day, she answered 'Yes, correct'. Since then, I've stayed in the lab simply because I do not want to stop asking."

Prof. Nozaki's scientific dream is to make a microwave with which she could synthesize complicated organic molecules from CO₂ (carbon dioxide), H₂O (water), and N₂ (nitrogen) according to a programed recipe, helping to avoid the waste associated with building complex organic molecules step by step. *"It would be like building a monumental LEGO architecture by simply mixing the necessary LEGO pieces in a bag," she explains.*

Throughout her career, Prof. Nozaki has been encouraged and inspired by entrepreneurial chemists who *"never compromised and applied*

great determination to pursuing the truth". For example, she admires Prof. Yoshio Okamoto for creating a new field of research - asymmetric synthesis of helical polymers - which is now widely used in pharmaceutical companies. *"His style and continuous research from fundamental science to practical application is truly impressive,"* she says. Profs Reiko Kuroda and Maki Kawai, both former L'Oréal-UNESCO For Women in Science International Awards Laureates, have also been compelling role models for Prof. Nozaki since her student days.

Her own determination and pioneering journey have seen Prof. Nozaki become the first and only woman professor in Tokyo University's Engineering Department, and one of the rare women professors of science in the region. Since taking the post in Tokyo in 2002, her brilliance has been recognized by numerous international awards, including the 2019 Kuggie Vallee Distinguished Lecturer and the 2020 Chemical Society of Japan awards. She hopes that her publications and findings will inspire researchers in both academia and industry to further nurture her discoveries.

Prof. Nozaki remains disheartened by the disproportionately low number of women scientists in leadership roles, especially *"compared to their ability, flexibility and openness to new ideas."* An openness for which international collaboration is vital, she believes. *"When I began my professional career, I believed the number of women would naturally increase, but I now realize continuous efforts for change are indispensable."*

"It's partly a question of entrenched values," she says. "For example, in Japan, 'Kawaii' - which encompasses the idea of sweet-natured naivety - is too often considered the most favorable attribute for women. A 'non-Kawaii' woman may face difficulty in remaining true to her personality. Indeed, being competitive and aggressive is still considered as 'manly' in most cultures."

There should be no gender stereotyping in society or in science, she believes, and to overcome such perceptions, *"it is truly important to highlight the contributions of outstanding women scientists to the world."*

"I believe not only boys but also girls should enjoy the exciting world of science," she concludes. "Enjoy life and enjoy science - that's my message."

¹ - A chemical reaction in which two or more molecules combine to form larger molecules.

Professor Françoise Combes

ASTROPHYSICS



*Professor and Galaxies and Cosmology Chair
at the Collège de France in Paris, and Astrophysicist
at the Paris Observatory - PSL, France*

Professor Françoise Combes is awarded for her groundbreaking contribution to astrophysics, and in particular, the critical role she has played in informing our understanding of how stars and galaxies form and evolve. Her pioneering discoveries in galactic dynamics range from identifying numerous molecules in interstellar space to decoding the precise stages of galactic evolution – all the way back to the Big Bang.

She is notably leading research on an amino acid, glycine, molecular oxygen and water in very distant galaxies, in order to detect possible signs of life. Her research has also been instrumental in demonstrating that supermassive black holes at galactic centers slow the formation of stars within them.

“In fundamental astrophysics, our research helps to increase humanity’s knowledge of the universe, better understand our origins and consider the potential existence of other life forms,” says Professor Combes. *“The scientific community is leveraging imaginative models to pursue many unsolved puzzles, such as the existence of dark matter and dark energy – and the answers will certainly change the fundamental laws of the universe.”*

Prof. Combes first realized the incredible impact of scientific research for human life as a teenager, and knew she wanted to play a part in future discoveries. She marveled at Nicolas Copernic’s ‘controversial’ hypothesis that the Earth was not, in fact, at the center of the universe, and Louis Pasteur’s revolutionary medical breakthroughs.

But it was the first human landing in space that really captured her imagination. *“I was deeply impressed by the Apollo mission and completely glued to my grandmother’s small television screen as Neil Armstrong took his first steps on the moon,”* she recalls. *“It was like a fairy tale to see a person clad in a space suit walking and jumping on the moon, just like the adventures of Tintin!”*

Encouraged by her physics teacher at school, she pursued physics and later astrophysics and cosmology at university, where she was fortunate to learn from the dynamic and visionary Professor Evry Schatzman. During her early career, Prof. Combes made her name by discovering carbon monoxide molecules in the Andromeda galaxy, some 2.2 million light years from the Earth.

Among the many illuminative moments in her research to date, Prof. Combes recalls various serendipitous discoveries. *“I remember the exact moment at the telescope when we discovered molecules in absorption in front of a remote quasar¹ – this prompted a long and fruitful research project on electromagnetic absorption lines,”* she says. *“More recently, we discovered the spiral mechanism that drives interstellar gas at the center of a galaxy.”*

As an astrophysicist in France, Prof. Combes has benefitted from Europe’s comprehensive research and access to sophisticated telescopes, such as ESO’s large optical telescopes in Chile, or the millimeter-wave telescopes developed by NOEMA and ALMA. Together with telescopes in space, these ground-level instruments have provided her with a wealth of data for comparison with ever more advanced computer simulations.

And her decisive research has delivered great value, winning her both national and international accolades. She has been a member of the French Academy of Sciences since 2004 and counts among her numerous prizes the CNRS Gold Medal (French National Center for Scientific Research), one of France’s most prestigious scientific distinctions.

On her journey to becoming a senior woman scientist, Prof. Combes faced challenges in balancing her many research, teaching and family responsibilities, particularly when travelling to conduct observations from foreign telescopes. The *“long and uncertain path”* after PhD is also cited by Prof. Combes as a barrier for women’s progression in science. In those initial precarious years of her career, it was 14 years before she obtained her first permanent position at the Paris Observatory, a journey requiring immense fortitude and perseverance.

Encouraging more women to enter science starts with overturning societal stereotypes and prejudices, with girls, in particular, and boys encouraged to understand that they can do anything they want, she believes.

“Women scientists have so much to offer – they bring diversity and originality to a laboratory, and a practical, results-oriented approach,” she enthuses. Importantly, senior women scientists can act as compelling role models for girls and younger women, helping up-and-coming scientists to build their self-confidence.

Prof Combes’ words of advice are: *“If you feel it is your vocation, and you’re happy doing research, you should never be discouraged, but always persevere. And don’t feel afraid to step back from obstacles, renew your energy and return with a different perspective. The challenges will appear lighter and easier to solve.”*

¹ - The nucleus of a very distant galaxy that looks like a very bright star.

Professor Alicia Dickenstein

MATHEMATICS



*Professor of Mathematics at the University
of Buenos Aires, Argentina*

Professor Alicia Dickenstein is operating at the forefront of mathematical innovation by leveraging algebraic geometry in the realm of molecular biology to understand the precise structures and behaviors of molecules and cells, even at a microscopic scale. As an outstanding mathematician operating at the frontier between pure and applied mathematics, she has also forged important links to physics and chemistry. Her passion lies in helping biologists to build an in-depth structural understanding of biochemical reactions and enzymatic networks, and it's here that she has made the most impact. Unraveling these complex systems enables researchers to predict how concentrations of chemical elements within cells evolve over time. This could help determine the appropriate concentration of medicine to provide to a patient, for example.

In particular, Prof. Dickenstein specializes in identifying computational mathematical models to help biologists advance their research – models that can be applied even without knowing all the parameters that define what takes place within a cell. She has detected an underlying mathematical structure in many popular signaling pathways, which she named MESSI systems, as they describe Modifications of type Enzyme-Substrate or Swap with Intermediates. This allowed her and her collaborators to prove theorems about the behavior of diverse biological mechanisms.

Similarly, her research on discriminants – used to describe the singularities of geometric objects – has applications in mathematical modeling to detect when a surface has special points that are not smooth, with angles or cusps. It can also predict singular points that a robot manipulator has to avoid to due to potential breakage.

"I believe that science is a collective endeavor, and I am happy to have created bridges between different branches of mathematics and real-life scientific applications, helping researchers in diverse fields to make further discoveries," she says. "My dream is that science will enable us to prevent painful diseases and help to create a world where nature is no longer degraded and polluted."

A Professor at the University of Buenos Aires, Argentina, Prof. Dickenstein was elected a member of the Academy of Exact, Physical and Natural Sciences of Argentina in 2018 and the National Academy of Sciences of Argentina in 2020, and has previously held the post of Vice President of the International Mathematical Union, only the second woman to have done so. Among her many awards and recognitions, she won the TWAS¹ prize for Mathematics in 2015. She has also written and coordinated the production of numerous mathematical books, particularly for children.

Prof. Dickenstein had always enjoyed maths at school, and recalls the joy of looking at cells through a microscope. Her career has seen her make great strides since then, working directly on the biological applications of mathematics. But it almost began by chance. *"Mathematics is an exciting and creative subject," she says. "I was inspired to study maths by taking a vocational test at school to help determine my path at university. I had no idea I was destined for a mathematical future, but as soon as I began my studies at the University, I knew I had found my place."*

In a scientific field with a particularly low representation of female researchers, Prof. Dickenstein is driven by a longstanding conviction that women can do anything, a belief that was both nurtured by her school and her family. She remains keenly aware of the obstacles for women scientists in gaining equal research and career opportunities, and the subtle, yet persistent forms of gender discrimination that continue throughout society. *"One of the greatest challenges is ensuring that women scientists do not conform to the expected social behavior of women," she says. "But this is changing and I am very hopeful for the next generations."*

Among the promising signs of change, she notes the recent recognition of women at the highest echelons of science – through the Abel Prize in Mathematics in 2019 and the Nobel Prizes in Physics and Chemistry in 2020. Yet, there is still a way to go to achieve gender equality in science. And in 2020, women experienced further challenges in balancing their work-life responsibilities, when the Covid-19 pandemic prompted the closure of schools and nurseries.

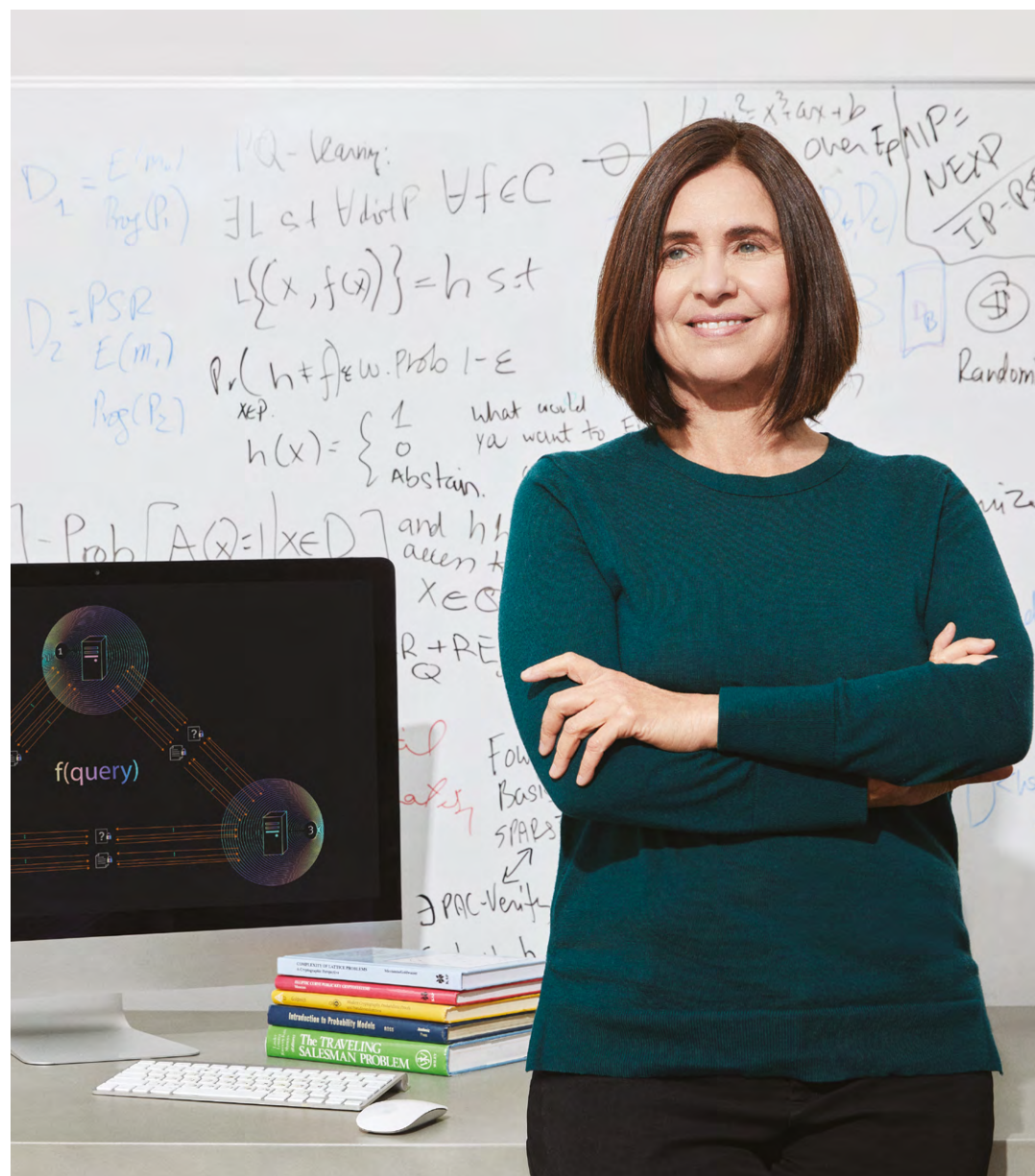
For Prof. Dickenstein, the benefits of gender equality in science are clear. *"If we make the natural assumption that talent is equally distributed, we are losing many talents if there is no balance between genders," she says. "Diverse points of view always enrich the understanding of any question... I would recommend that girls follow their dreams and disregard conventional stereotypes and perceptions of what they should do as women."*

And she hopes that the L'Oréal-UNESCO For Women in Science International Awards will continue to do much to inspire girls in Argentina and globally to study science. *"I'm very proud and honored to have been recognized among so many excellent women scientists in Latin America and the Caribbean," she concludes. "My journey to this moment has been fraught with challenges, yet consistently illuminated by discovery and the never-ending wonder of science."*

¹ - TWAS – The World Academy of Sciences for the advancement of Science in developing countries.

Professor Shafi Goldwasser

COMPUTER SCIENCE



Director of the Simons Institute for the Theory of Computing, Professor in Electrical Engineering and Computer Sciences at University of California Berkeley, RSA Professor of Electrical Engineering and Computer Science at MIT, United States of America and Professor of Computer Science and Applied Mathematics at Weizmann Institute, Israel

Professor Shafi Goldwasser is awarded for her pioneering work in theoretical computer science and cryptography, a rapidly expanding field exploring the myriad ways to protect digital information. Her outstanding contribution to ensuring the integrity, authenticity and confidentiality of digital information is of fundamental importance at a time of profound and growing concerns over cyberattacks and data privacy.

In particular, she has defined the full spectrum of potential attacks on any code and designed randomized codes to combat them. She has also developed new tools for verifying the properties of data without disclosing it, and conceived secure methods for partnerships among competing entities while protecting their individuals' data.

In addition to helping to preserve anonymity and privacy, and prevent financial crimes such as money laundering, her work will allow companies to benefit from secure cloud computing and machine learning on personal data, as well as enable safer worldwide collaborations between governments and health organizations. It will also finally preserve privacy at various tiers, the need for which has become critically apparent during the global fight against COVID-19.

"I hope that my work will contribute to improving the welfare of society by enabling us to collaborate and share data and algorithmic insights without compromising people's privacy, across sectors and geographical borders," says Prof. Goldwasser. *"Cryptography and security are central to our ability to use the digital communication platforms we currently rely upon for every aspect of our lives, from finance to medical discoveries, while respecting our privacy and rights."*

As a child growing up in Israel, Prof. Goldwasser was interested in becoming a fiction writer, but soon transitioned to science, inspired by her dynamic and encouraging physics and mathematics teachers, and the lure of scientific reasoning. Her passion for cryptography began during her years as a graduate student, when she was fascinated by the ability to leverage basic number theory to emulate fundamental paradigms - such as secrecy, simultaneity, unpredictability and fairness - in a digital context.

"I remember my thesis adviser posing the challenge of using computational mathematical modeling to determine how a contest between two distrustful people could be won fairly," she recalls. *"That was an 'aha' moment for me - the idea that mathematics could emulate such a simple, real-life scenario made me wonder how the same techniques could be applied to running secure protocols over the internet."*

"The exhilaration of solving problems such as this has been a driving force for me," she continues. *"I'm captivated by the beauty of a problem and its conceptual appeal. One of the many breakthroughs I experienced was realizing that the complexity of a problem known as 'quadratic residuosity' can enable sending a single bit securely, preventing cyber criminals from predicting it with more than 50-50 probability."*

Prof. Goldwasser won the Turing Award - the most prestigious global prize in computer science - in 2012, becoming one of just three women to have ever been honored in this way. Among her other numerous prizes, she has also won the Gödel Prize twice (in 1993 and 2001), and is a member of the United States' National Academy of Sciences.

Both the United States and her native Israel have helped shape her scientific development, and she recognizes the positive, galvanizing effect of international collaborators and encouraging, supportive colleagues.

As a woman in science, Prof. Goldwasser notes the difficulty of being taken seriously or perceived as equal at times, early in her career, but even later too. She made it clear to her peers and colleagues that she was *"someone to be listened to and reckoned with"*. She credits the leading women scientists of today with both tenacity and brilliance, praising their ability to rise above derogatory, discriminatory attitudes and harness intuition, integrity and collaboration to prevail in their fields.

The fundamental challenge of achieving work-life balance as a mother and scientist, and progressing as rapidly as male counterparts, remains a cause for concern for women in science, she believes.

"I was lucky to have a supportive family and friends, which was very important for my eventual success, but those first years as a mother can be isolating for women scientists," she says. *"We must keep raising this disparity throughout our scientific community to emphasize the need for change, supported by evidence. Achieving gender equality in science will lead to better science, a better workforce, and better educated children in future generations."*

Commenting on her L'Oréal-UNESCO For Women in Science International Award, she concludes: *"I am so proud to be part of a group of women who are changing the world."*

2020 LAUREATES



LAUREATE FOR AFRICA AND THE ARAB STATES

Professor Abla Mehio Sibai

Professor of Epidemiology, Faculty of Health Sciences, American University of Beirut, Lebanon

Awarded for her pioneering research and advocacy to improve healthy ageing in low- and middle-income countries and their impact on health and social policies and programmes.

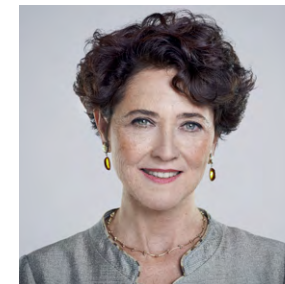


LAUREATE FOR ASIA AND THE PACIFIC

Doctor Firdausi Qadri

Senior Scientist, Head Mucosal Immunology and Vaccinology Unit, Infectious Diseases Division, International Center for Diarrhoeal Disease and Research, Dhaka, Bangladesh

Awarded for her outstanding work to understand and prevent infectious diseases affecting children in developing countries, and promote early diagnosis and vaccination with global health impact.

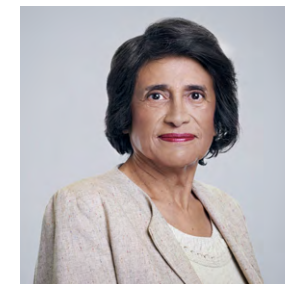


LAUREATE FOR EUROPE

Professor Edith Heard, FRS

Director General of the European Molecular Biology Laboratory, Heidelberg, Germany, Chair of Epigenetics and Cellular Memory at the Collège de France, Paris, France, and former Director of the Genetics and Developmental Biology Unit at the Institut Curie, Paris, France

Awarded for her fundamental discoveries of mechanisms governing epigenetic processes that allow mammals to regulate proper gene expression, which is essential for life.



LAUREATE FOR LATIN AMERICA AND THE CARIBBEAN

Professor Esperanza Martínez-Romero

Professor of Environmental Science at the Genomic Science Center, National University of Mexico, Mexico

Awarded for her pioneering work on the use of environmentally friendly bacteria to support plant growth for increased agricultural productivity while reducing the use of chemical fertilizers.



LAUREATE FOR NORTH AMERICA

Professor Kristi Anseth

Distinguished Professor, Tisone Professor and Associate Professor of Surgery at the University of Colorado, Boulder, United States

Awarded for her outstanding contribution in converging engineering with biology to develop innovative biomaterials that help promote tissue regeneration and more effective delivery of drugs.

Professor Abla Mehio Sibai

MEDICINE AND HEALTH SCIENCES



*Professor of Epidemiology, Faculty of Health Sciences,
American University of Beirut, Lebanon*

Population ageing is transforming the face of the 21st century society. People are now living 30 years longer than their ancestors just 100 years ago, and for the first time in human history, older adults over 65 have outnumbered children under 5, worldwide. This demographic phenomenon brings with it profound health, social, political and economic challenges, including a growing burden of chronic diseases and limited family resources available for elderly care. In a region where population ageing coincides with chronic political instabilities and economic turmoil, prospects for older Arab men and women to remain active and preserve quality of life as long as possible, is even more challenging.

Professor Abla Mehio Sibai is addressing these questions through interdisciplinary, collaborative research that aims to advance our understanding of the burden of non-communicable diseases (NCDs) among older adults in underprivileged and post-war communities. She also seeks to influence a shift in the way we view elderly people's right to enjoy a meaningful, fulfilling life. Through her globally recognised work, she has built an international reputation in the field of gerontology and the epidemiology of NCDs, including cardiovascular disease, cancer, diabetes and wellbeing across the life course.

"As a researcher and public health activist, my work aims at understanding the context and factors that delay the decline as we age and promoting initiatives that tap into the benefits we bring with longer life," explains Prof. Mehio Sibai. *"I hope to inspire a paradigm shift in the way we relate and act towards age and ageing."*

Referring to her L'Oréal-UNESCO For Women in Science Award, she says: *"This award is for all public health scholars working to make the world a better place for older people, especially those who are too often marginalised and 'left behind', whether they are women caregivers in India, smallholder farmers in Sub-Saharan Africa or older refugees in the Arab region."*

As a child, Prof. Mehio Sibai was inspired by mathematics. *"I enjoyed playing with numbers and riddles that required equations,"* she recalls. However, she initially studied pharmacy, and her ultimate research interests were shaped by witnessing the impact of the Lebanese civil war from 1975 to 1990 on relatives and friends, and above all on the vulnerable older population.

"My father was one of those severely affected when he lost a vibrant business and was forced into early retirement," she explains. *"I learnt from his resilience and ability to turn calamities into opportunities, but moreover, it was these experiences that instilled in me the passion for research on ageing and the importance of a human-centred approach to science."*

The violence in Lebanon had also brought an abrupt end to her nascent pharmacy career and saw her become a full-time housewife and mother for the next ten years. However, she knew in her heart that only scientific research would enable her to achieve fulfilment and contribute fully to society.

Prof. Mehio Sibai returned to her studies, leveraging her lifelong love of mathematics and commitment to social justice to pursue PhD studies in epidemiology.

Her early research focused on documenting the major demographic and epidemiologic transitions in Lebanon and was directed towards developing a better understanding of their respective implications on health and quality of life among older adults. It focused in particular on cardiovascular disease among the country's ageing post-war populations. She co-led the country's first 'Global Burden of Disease' project in 2001, and its first nation-wide World Health Organization 'Non-Communicable Disease and Risk Factors Survey', informing public health policy in Lebanon and globally. In a region that hosts one of the highest refugee populations in the world, she has also addressed challenges surrounding end of life care and clinical management of NCDs in primary care settings within refugee settlements.

Prof. Mehio Sibai's exploration of existing NCD research in Arab countries, where NCDs represent nearly 60% of the disease burden, highlighted the disconnect between research and policy, and the pressing need to optimise research in resource-scarce countries. This included examining and critiquing routine sources of data such as death certification processes and the overuse of cardiac catheterisation in her country. She also spearheaded the three mapping reviews of policies and programmes on 'Ageing in the Arab region' (2007, 2012, 2017), and is proud to be leading the development of the 'National Strategy for Older Persons' in Lebanon, for the country's Ministry of Social Affairs.

Beyond the comfort zone of her university setting, Prof Mehio Sibai is the director of Lebanon's 'Center for Studies on Aging', which she co-founded in 2008. The centre leverages scientific research in Lebanon and the Middle East and acts as a catalyst for policy, advocacy and positive change. In 2010, she co-founded the ground-breaking 'University for Seniors' (UfS) lifelong learning programme at the American University of Beirut, providing older adults with "opportunities to remain intellectually energised, physically active and socially connected," through education. UfS is run by seniors as lecturers and committee members on a voluntary basis, and now offers more than 100 lectures, courses and workshops to more than 550 members annually. It has achieved international recognition as "an innovative and empowering initiative" and is even 'prescribed' by health professionals for its contribution to delaying cognitive decline.

Prof. Mehio Sibai sees the socio-cultural barriers that prevent women from breaking the glass ceiling in research as very similar to those that combine to perpetuate ageism. *"It is first and foremost a question of justice,"* she says, asserting that *"we must speak up, advocate and act to challenge longstanding practices and stereotypes"*.

"And then it is a question of excellence," she continues. *"Science must harness the untapped energy of women, the other 50% of the population".* While women are gradually claiming their space in academic spheres and asserting their voices in public life, there is still much to do. She concludes: *"Every young female student has the right to pursue her passions and make the most of her talents. More funding and improved policies that promote a greater work-life balance are vital to keeping the talent of women scientists alight across the world."*

Doctor Firdausi Qadri

BIOLOGICAL SCIENCES



Senior Scientist, Head Mucosal Immunology and Vaccinology Unit, Infectious Diseases Division, International Center for Diarrhoeal Disease and Research, Dhaka, Bangladesh

Globally, over 800,000 children die of diarrhoea each year, and 56% of children in low-income countries do not receive the recommended treatment, according to the World Health Organization.

In Bangladesh, cholera and typhoid are both major causes of enteric diseases, yet many people lack the knowledge or means to prevent these debilitating, even life-threatening, conditions. Expanding access to vaccination and promoting early diagnosis are fundamental to decreasing the country's disease burden and helping to ensure that more children and adults lead longer, healthier lives.

Dr Firdausi Qadri is leading pioneering work to understand the microbiological and immunological basis of bacterial diseases and treat infectious enteric (gastro-intestinal) and diarrheagenic diseases affecting children in Bangladesh and beyond, optimising vaccines for young children suffering from malnutrition. Her scientific excellence and passion to help others have led to major studies of an oral cholera vaccine among nearly a million people at risk in vulnerable Bangladeshi communities – with a vaccine due to be launched imminently. To promote the rapid diagnosis of cholera and typhoid, she has also developed innovative diagnostic tools and successfully overseen their journey from the laboratory to a practical, commercially viable reality.

"The suffering of thousands of diarrhoea patients is due to poor living conditions and highly contagious, contaminated food and water," she says. "Staying close to my roots [in Bangladesh] has enabled me to better understand people's needs and find life-changing solutions."

As a scientist at the unique International Centre for Diarrhoeal Disease Research, Bangladesh (ICDDR,B) in Dhaka, Bangladesh, Dr Qadri has used biochemical, immunological and molecular approaches to research the bacteria behind cholera (*Vibrio cholerae*) and typhoid (*Salmonella typhi*), as well as enterotoxigenic *Escherichia coli* (ETEC). She explores the capacity of mucous membranes to protect themselves against these pathogens and investigates the respective bacteria at a genetic level to better understand their infectious characteristics. This builds on her longstanding interest in understanding *Vibrio cholerae* as well as ETEC and their potential to cause cholera epidemics in Bangladesh. *"I knew I wanted to find a diagnostic method and work towards a prevention mechanism,"* she recalls.

Dr Qadri's ground-breaking work on cholera vaccinations has had a positive ripple effect, advancing progress on vaccines against diseases including cholera, typhoid and ETEC diarrhoea. In particular, she is working on a typhoid vaccine in the urban slums of Dhaka, and both this and her cholera vaccine studies are being replicated in Asia, Africa and Haiti. *"I would like to see our work scaled up to treat many more people globally, as they struggle with the risk of disease linked to humanitarian crisis and climate change,"* she says.

In 2014, Dr Qadri founded the Institute for developing Science and Health initiatives (ideSHi) to help develop novel approaches to diagnosing genetic disorders and train biomedical scientists and clinicians in immunology and molecular biology-based research. Under her leadership, ideSHi also conducts humanitarian and research programmes to identify pragmatic solutions to public health challenges in Bangladesh, and participates in health discussions at a global level. Dr Qadri is active in fostering a supportive national culture for biotechnological innovations, and acts as an expert adviser nationally and internationally, working with the Bangladesh Ministry of Health and the World Health Organization, for example.

Her interest in life sciences began at an early age. *"I felt that knowing the biochemical and immunological mechanisms of the living being was extremely important,"* she recalls. *"I've been amazed by the way microorganisms grow and help humans to live on this planet. But I'm also alarmed by their capacity to endanger people's lives."*

Dr Qadri's family was a real source of inspiration and support for the early stages of her scientific journey, encouraging her to reach ever higher in her ambitions. Yet life as a scientist in Bangladesh has not always been easy. To overcome the lack of funding, resources and researchers and fight entrenched cultural expectations and gender prejudice, she has leveraged courage and determination, and achieved excellence through rigorous multi-tasking and a superb team of scientists. *"I dream that in countries like ours, we will develop state-of-the-art, self-sustaining facilities to support the mentoring and capacity building of young people, especially women, in scientific research."*

Importantly, she sees international collaborations as *"the building blocks of my achievements."* These have included partnerships with leading researchers in the US, Sweden, France, the UK, Republic of Korea and India.

Balancing the demands of scientific research with family life remains the greatest challenge Dr Qadri perceives for women in science today. Ultimately, she believes that women scientists must play a dual role in the quest to further the cause of science – both succeeding in their field and serving as role model for future generations. Beyond this, achieving gender balance in science means instilling the wonder of science in girls and boys, and encouraging them to embrace its potential to change the world.

Professor Edith Heard, FRS¹

BIOLOGICAL SCIENCES



Director General of the European Molecular Biology Laboratory, Heidelberg, Germany, Chair of Epigenetics and Cellular Memory at the Collège de France, Paris, France, and former Director of the Genetics and Developmental Biology Unit at the Institut Curie, Paris, France

“Curiosity in research is fundamental to advancing life and science, and solving some of the great challenges we face as a society,” says Professor Edith Heard. This biologist has made fundamental discoveries surrounding the epigenetic mechanisms governing X-chromosome inactivation (whereby one of the two X chromosomes in females is silenced), a vital process for proper gene expression. In particular, her research could have relevance to diseases such as cancer, where epigenetic processes are disturbed, as well as autoimmune syndromes that are more prevalent among women. She is also profoundly influencing epigenetics as a whole and forging connections throughout the scientific world to uncover new, interrelated areas of research.

“Epigenetics seeks to explore how the blueprint of life, the genome, can be used in multiple ways during development, and how this leads to stable, memorable changes in gene expression,” Prof. Heard explains. *“I hope that our research on epigenetic regulation of X-chromosomal genes will enable further advances in health, including improved medical treatment for women in the future.”*

Prof. Heard attributes her most meaningful explorations into the genetic and epigenetic changes that occur in cancer to her 20 years at the Institut Curie in Paris, France, where she nurtured her research in a clinical setting. In particular, she explored the extent to which epigenetic changes – which are present in all cancerous cells – are influential in the development of the disease or can deactivate genes capable of suppressing tumours.

As Director General of the European Molecular Biology Laboratory (EMBL) in Heidelberg, Germany, she continues her own research, while working to ensure EMBL utilises its global reach to promote the precious nature of fundamental research and harness technologies to answer major questions, *“addressing biology on all scales, from atoms to ecosystems”*. This could include exploring how the microbiome reacts to drugs, how an embryo develops from a fertilised egg, or how a viral protein can be targeted by vaccines.

And importantly, her ambitions for the EMBL extend beyond humans to planetary health. *“In order to protect life, we must first understand it,”* she says. *“The molecular basis of life on earth is still a great mystery. It’s our duty as scientists to push the frontiers of research to support life in all its forms and help address pollution, climate change and biodiversity loss, catalysing a new era of research.”*

Indeed, Prof. Heard is passionate about European research remaining a beacon of scientific excellence and upholding the vital cross-border collaboration that enables major breakthroughs and attracts talented scientists. Researchers should also continue to play an increasingly important role in *“bridging the gap between science and society”*. She has been heartened by the support from across Europe for her goal to bring scientists across different disciplines together to tackle some of the world’s most important problems.

Already an avid scientist as a school pupil, Prof. Heard never imagined any barriers for women, only professional success. Encouraged to pursue her interest in science by both her women teachers and her family, she studied Natural Sciences at Cambridge University, where she experienced the first of many ‘Eureka’ moments, when she realised that biology was her true calling. *“It was the power of genetics, the elegance of development, the beauty of evolution that inspired me,”* she recalls.

Her quest to answer longstanding questions on X inactivation builds on the pioneering discoveries of the British geneticist Mary Lyon in 1961, and has contributed significantly to illuminating this important topic. For example, she and her team combined imaging techniques such as fluorescence in-situ hybridisation with molecular genetics techniques to follow the expression of the chromosome in individual cells through development. *“We went on to uncover the way the X chromosome is folded in 3D space and therefore how structure can influence the way it is expressed,”* she explains.

She was also the first to show that X inactivation is a highly dynamic process during embryogenesis (the process through which the embryo forms and develops), and involves multiple chromatin changes. Chromatin is a mass of genetic material composed of DNA and proteins within the nucleus of a cell. When cells divide, chromatin condenses to form chromosomes. In 2012, Prof. Heard led the discovery of a new level of chromosome organisation, known as Topologically Associating Domains, which tidy the DNA like woollen threads into many balls of wool, each of which plays a role in the regulation of gene expression and the X inactivation phenomenon.

Although Prof. Heard has not personally experienced gender prejudice, she says: *“I didn’t realise there was a glass ceiling until I’d slipped through it and noticed I was a rare specimen. I quickly realised that many women do have to try harder, speak louder, stay calmer and identify male allies”*. However, she remains confident in the power of novel results and scientific discovery to override gender, and feels humble following in the footsteps of iconic women scientists such as French-Polish physicist and chemist, Marie Curie, and Mary Lyon, whose power of conviction and intelligence enabled them to succeed against all the odds.

“Women and men should be equally represented at every level,” she says. *“Once we achieve a critical mass, it will be easier to attract more women and this will create a butterfly effect. Mentorship, support and identifying pathways to create a more balanced work-family life will be critical. More than anything, women should follow their heart and nurture their passion for science.”*

“I dream of the day when people won’t even notice how many women or men there are in a laboratory or in an institute,” she concludes. *“Science will be for any gender, nationality or culture.”*

¹ - Fellow of the Royal Society.

Professor Esperanza Martínez-Romero

ECOLOGY AND ENVIRONMENTAL SCIENCES



Professor of Environmental Science at the Genomic Science Center, National University of Mexico, Mexico

Empowering smallholder farmers to raise productivity by adopting sustainable practices sits at the heart of feeding the world's rapidly growing population. Professor Esperanza Martínez-Romero is addressing this challenge by harnessing the power of beneficial bacteria to promote plant health. Her significant discoveries in understanding the role of local nitrogen-fixing bacteria in increasing crop yields, particularly in cereal and legume crops, stand to support global food security and improve smallholders' livelihoods. They could even lead to a reduction in the use of synthetic fertilizers, helping to protect the environment and safeguard biodiversity.

"We all live in symbiosis with microbes, but they have typically been neglected in all ecosystems," explains Prof. Martínez-Romero. "It's only recently that the impact of microbiome research has changed."

Nitrogen is essential for healthy plant growth and abundant in the atmosphere, however, in order for plants to 'digest' it efficiently, this life-giving element needs to be transformed by nitrogen-fixing bacteria. The resulting partnership, or symbiosis, between plants and bacteria enables the plant to maximise the benefits of the nitrogen. With its wealth of plant diversity, Prof. Martínez-Romero's home country of Mexico has provided ample material for her studies. She has focused in particular on two of the country's most important crops: beans and maize, exploring the interaction between plants and bacteria at a molecular level. For example, she has shone a light on the symbiotic relationship between the bacteria Rhizobia and host legume plants, such as beans, whereby bacteria gain nourishment from the plants' roots, while delivering nitrogen via the root nodules. Prof. Martínez-Romero is intrigued by understanding the bacteria's genome expression, in order to gain a complete view of their genome. She also researches the evolutionary implications of the process of 'lateral transfer', whereby bacteria exchange genes.

In 1991, she discovered that the strain *Rizobium tropici* could deliver high levels of nitrogen to legumes, the most widely consumed plants globally, even under stress due to soil acidity, metal content, or high temperatures. Thanks to her research, *Rizobium tropici* has become the inoculant of choice among farmers in many countries. Indeed, during her distinguished career, Prof. Martínez-Romero has made significant efforts to help smallholder farmers adopt biofertilisers, including by publishing a practical manual and giving multiple lectures.

Prof. Martínez-Romero was inspired to become a scientist by her parents. Her mother, a director at an elementary school in Mexico City, propelled her daughter towards her studies, while her father shared his zoology books with her from an early age, instilling in her a love of nature. She determined to dedicate her academic studies to biomedical research and began her current journey at the National University of Mexico's Nitrogen Fixation Research Institute, becoming fascinated by the beneficial effects of bacteria on plants.

Her 'Eureka' moment came when she realised the parallels of human gut microbiota and

root microbiota. *"I realised that human and plant evolution has been driven by pathogens, that roots are a valuable food source for their associated microbes, and bacterial phenotypes are not good taxonomical markers," she recalls. "I was able to look beyond nitrogen fixation as an ecological service and consider how probiotic bacteria could be harnessed to promote plant and insect development."*

Prof. Martínez-Romero describes her scientific dream as *"finally obtaining bacteria that are successful in promoting plant growth and controlling insect or fungal pests in agricultural fields"*, noting the difficulties in successfully transferring laboratory experiments to the field. She has also extended her research interests to understanding the symbiotic relationships between certain bacteria and native Mexican insects such as the carmine cochineal, whereby the bacteria both fix nitrogen and enable their hosts to produce more vitamins and essential amino acids. Beyond this, *"I would love to see animals such as fish, fixing nitrogen," she says. "This would be a more cost-effective way to produce fish with higher levels of protein, beneficial for human health."*

Many collaborations have enriched her work, including her first collaboration with Leuven University in Belgium, which won her substantial funding and sparked a longstanding student exchange programme. She is currently working with researchers at the Universidad Agraria la Molina in Peru to help address rural poverty and raise yields in both countries through a collective journey to advance knowledge on mutually beneficial relationships between bacteria and host plants.

While gender prejudice in the workplace has not held Prof. Martínez-Romero back, she recognises the challenge of male-dominated conferences, decision-making groups and awards committees. *"Women in science are highly dedicated, intuitive and very bright," she says. "Whenever I am part of a steering committee for congresses, we always seek to create a gender balance among the speakers."*

She is keen to encourage more young women to build a career in science, highlighting that *"in the laboratory, there is no difference between women and men scientists whatsoever"*. In particular, she coordinated a university's undergraduate programme in Genomic Sciences for six years, supporting both her female and male students, and is proud of the outstanding successes of her women graduates, both in Mexico and internationally.

"The L'Oréal-UNESCO For Women in Science Awards renew my enthusiasm for research and I very much hope it will encourage more girls to enter science," she concludes. "Gender discrimination should no longer play a part in determining who progresses in scientific research. Science is wonderful and should be open to everyone."

Professor Kristi Anseth

BIOLOGICAL SCIENCES



Distinguished Professor, Tisone Professor and Associate Professor of Surgery at the University of Colorado, Boulder, United States

One of the United States' most distinguished engineers, Professor Kristi Anseth is leading the way in fusing engineering with biology to develop responsive biomaterials to stimulate tissue regeneration and drug delivery. She and her team are exploring materials and approaches to help regenerate cartilage, encourage bones to heal faster, and deepen understanding of cardiac disease. Beyond the laboratory, Prof. Anseth has also co-founded a business to produce materials that promote wound healing. In the future, she envisions engineering miniature organoids or complex tissues to further illuminate complex diseases and discover new treatment pathways. Her ultimate scientific dream is to alleviate, or even eliminate, the debilitating effects of ageing.

"We're increasingly optimising the design of biomaterials to direct healing, target cells or release drugs on demand," she explains. "I hope that some of the biomaterials we're developing will lead to better medical products that not only improve quality of life, but save people's lives."

Passionate about leveraging her engineering skills to impact human health, Prof. Anseth has made a profound contribution to advancing biomaterials by operating at the interface of cell biology, chemical engineering and medicine. Her work has reinforced the value of multi-disciplinary research in solving societal challenges, and seen her become one of few engineers to be elected to all three US National Academies of Engineering, Medicine, and Sciences.

Through her early research, Prof. Anseth used hydrogels to grow human tissues, cultivating and observing cells in these gels to help engineer biomaterials that can optimise the delivery and efficacy of a medicine within the body. Formed primarily of water, hydrogels are highly compatible with human bodies, non-toxic and offer a similar flexibility to our own natural tissues, enabling the body to better accept medicine 'hidden' within the gel.

She recalls an early moment of enlightenment when she began using light microscopy to explore cells in 3D biomaterials and track their functions in real time. *"I was struck by the unique opportunity to develop chemistries that could be conducted in the presence of living cells,"* she says. Today, she and her team harness a wide range of light wavelengths to create and modify their materials in 4D. *"It's amazing and insightful to watch how cells respond to changes in the surrounding biomaterials scaffold [a support made of hydrogel]. This helps us design better biomaterials to interface in the body."*

In the context of tissue regeneration, a patient's cells are fused together with a hydrogel support. As the cells multiply, they can be manipulated to form different types of tissues (from skin to bones to muscle or cartilage), before being placed at a precise point in the body. In 2003, Prof. Anseth and her team were the first to use light-activated chemistry to engineer an injectable, biodegradable material that could regenerate cartilage.

Her work in developing photopolymers (hydrogels that are sensitive to light) has been instrumental

in creating biomaterials with properties that can be changed on demand (so that they degrade or soften, for example), as tissues begin to regenerate naturally. It is also revealing new ways to help tissues heal more rapidly.

Prof. Anseth's pioneering journey has its roots in the "collaborative spirit" of the western United States, with its rich history of intrepid explorers, prospectors and frontier families in search of a brighter life. Descended from a family of Scandinavian settlers, she learnt the value of "hard work and education" from her grandparents and great grandmother, who homesteaded as a single woman in North Dakota in the early 20th century. It was here that Prof. Anseth witnessed the solar eclipse that first made her wonder at the universe. *"I have vivid memories of that moment,"* she recalls. *"It was amazing to have a front row seat... I was fascinated by the universe around me."*

Inspired by a school chemistry teacher to pursue science, and mentored by a university professor whose faith in her abilities strengthened her resolve to specialise in bioengineering, Prof. Anseth is convinced of the power of mentorship. She has a deep commitment to supporting the more than 300 students in her laboratory, more than half of whom are women, well above the 20% national average for engineering students. And she sees a key role for scientists in encouraging more girls to study science in the United States, particularly by highlighting its positive impacts in society. Popular culture, too, should raise awareness of leading women scientists, she believes, celebrating women such as her colleague Frances Arnold, the first US woman to win a Nobel Prize for Chemistry, and Margaret Hutchison Rousseau, the first woman to receive a PhD in chemical engineering.

"When asked to name a scientist or engineer, my goal is that any child or adult would first name and visualise a successful young woman," she says.

As a woman in science, Prof. Anseth was initially hesitant to pursue leadership positions, conscious of the perceived need to prove herself, regardless of her many awards and accolades. Despite this, she encountered relatively few obstacles as she rose through the ranks, and felt supported along the way by a "great network of friends and advocates".

With multiple studies confirming that diversity catalyses major discoveries, new ideas and superior solutions, Prof. Anseth is determined that there should be "a concerted effort to recruit, encourage, and assist women and underrepresented individuals to pursue careers in science and engineering." Importantly, empowering more women scientists to become leaders will help to ensure a more balanced approach to defining the value of research and advancing science that benefits men and women.

"Women are talented, brilliant, and exceptional community builders," she says. *"They're open to creative ideas, respectful, bold and decisive, quick to ensure that the right people receive recognition, and committed to purpose-led research. I look forward to playing a more visible role in advocating for the next generation of women scientists, and helping to ensure that girls see no limits to their future in science."*

A RIGOROUS SELECTION PROCESS

More than
300 nominations
from scientists
FROM OVER 60 COUNTRIES

|
10 shortlisted
nominees

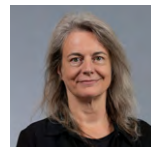
PER REGION

Evaluated by international juries
of eminent researchers

|
Selection of the
5 Laureates

1 from each region of the world





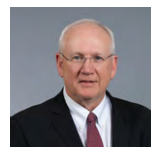
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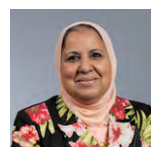
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Canada Research Chair in Advanced Polymer Materials, Department of Chemistry, University of Toronto, CANADA
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Professor at Institute of Astronomy National Autonomous University of Mexico, MEXICO
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Philip Wong Wilson Wong Professor in Chemistry and Energy and Chair Professor of Chemistry, Department of Chemistry, University of Hong-Kong, CHINA
2011 L'Oréal-UNESCO Laureate

THE 2021 JURY

INTERNATIONAL RISING TALENTS

The future of science

Since 2000, the L'Oréal-UNESCO *For Women in Science* programme has highlighted the achievements of younger women who are in the early stages of their scientific careers. Each year, the national and regional programs selects the 15 most promising women scientists among the almost 260 doctoral and post-doctoral researchers of the L'Oréal-UNESCO *For Women in Science* program. These young women are the very future of science and recognising their excellence will help ensure that they reach their full potential.



Dr. Lina Dahabiyeh

The University of Jordan, Jordan

Dr. Lina Dahabiyeh is recognized for her leading work in developing and applying cutting edge bioanalytical techniques to better understand conditions including Parkinson's disease and pre-eclampsia. This is particularly important given the lack of knowledge surrounding Parkinson's, the second most common progressive neurodegenerative disorder worldwide, for which there is still no cure or preventative therapy. Her research leverages approaches and strategies to discover potential biomarkers to promote more effective diagnosis and drug development and monitoring, while shedding light on underlying the condition's mechanisms.

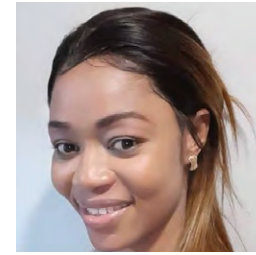
Dr. Lina Dahabiyeh decided to pursue a career in science to help solve global health challenges and protect human wellbeing. Naturally curious, she was determined to study diseases after a friend suffered serious consequences following a late diagnosis of pre-eclampsia, and later expanded her interest to other illnesses.

Determined to succeed and inspired by the senior woman scientist and mentor who led her UK PhD laboratory, Dr. Lina Dahabiyeh secured sufficient grants to establish her own laboratory in Jordan. And as a woman in science, she is vocal about the need to emphasize the achievements of women scientists and ensure equal opportunities.

"Women have great potential, and for centuries, their leadership and scientific discoveries have changed the world," she says. "Yet their invaluable advances are too often neglected by the history books. Every day, women scientists are making scientific breakthroughs, pushing the boundaries of scientific knowledge, and seeking solutions to complex global challenges."

Women scientists take a precise, systematic approach to research, managing funding effectively and engaging in research with societal benefit, she believes. Their diverse approach to problem solving enriches scientific understanding and must be further encouraged to achieve more innovative and gender-equal solutions.

"Competent women scientists must be acknowledged and treated equally in all aspects of scientific research," she concludes. "While this award will propel me forward to the next level of excellence, I hope it will inspire and motivate students and the younger generations to pursue a career in science."



Dr. Ndeye Maty Ndiaye

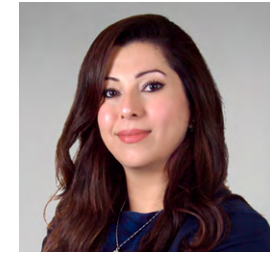
Cheikh Anta Diop University, Dakar, Senegal

Dr. Ndeye Maty Ndiaye is awarded for her contribution to advancing renewable energy in Senegal and helping to bridge the country's electricity production gap. Her research focuses on energy storage systems, such as supercapacitors, and could particularly benefit off-grid, rural communities, power devices such as mobile phones and wind turbines and enable more young women and men to pursue their studies.

"My dream is to become a world leader in the scientific field and a role model for young women, actively helping to support the United Nations 2030 Sustainable Development Goals," she says. "Coming from a developing country, I am continuously exploring how science can improve our daily lives."

From a young age, Dr. Ndeye Maty Ndiaye has always liked asking questions about the world. Science has enabled her to keep her curiosity alive. During her career, she has faced challenges in balancing her commitments as a wife and a scientist.

She is deeply committed to helping people, particularly young women, achieve their goals in life so they can continue the studies they need to build a career in science. She believes that action is required at a global level to promote women's empowerment and is actively involved in activities such as a repository for the identification of Senegalese women scientists' leadership training for women, and awareness-raising through webinars, workshops, and seminars for both the public and the scientific community.



Dr. Waad Saftly

Al-Baath University, Syria

Dr. Waad Saftly is awarded for her research on galaxy formation and evolution through the history of the universe. She is employing state-of-the-art, large scale cosmological numerical simulations to reproduce the observed properties of galaxies, comparing the simulated galaxies to real observations. Ultimately, she aims not only to better understand the physical processes that drive galaxy evolution, but also to create new benchmarks to improve the next generation of cosmological simulations.

"There is still too much suffering in the world, despite all our advances," she says. "In Syria, people face challenges in accessing energy, food and medicine. My dream is that science can help ensure a healthy life for humanity, and access to sustainable, affordable energy for all."

Dr. Waad Saftly grew up in a family with a great respect for science. Her mother was not able to achieve her dream of pursuing studies due to the Lebanese civil war and was determined to see her daughter continue her education. *"She always wanted me to have my own career, to be a strong, independent and successful woman,"* she recalls.

Returning to Syria after obtaining her PhD from Ghent University in Belgium, Dr. Waad Saftly continued her research. She is now working as a professor in two universities, playing her part in rebuilding the country and helping young people to maintain high levels of education, amid challenging circumstances.

She is excited about the voices of women being more represented in science. However, she wants to note that women scientists may face harassment from students and staff, and in developing countries, women may even be banned from studying abroad by their families. Additionally, public recognition will be essential in raising women scientists' profiles and letting them access more decision-making roles.

"The need for more women in science goes beyond issues of justice and fairness," she concludes. "Now is a critical time to support women in science. The pandemic has challenged everyone and shown us all the importance of workers in hospitals, laboratories and clinics, and women have also been at the forefront of developing safe, effective vaccines."



Dr. So Young Choi

Korea Advanced Institute of Science and Technology, South Korea

Dr. So Young Choi is awarded for developing microorganisms to produce biodegradable plastics from non-edible biomass such as wheat straw, hay, and bagasse (a byproduct of the sugar industry) - important alternatives to oil-based plastics. Her research is based on manipulating cellular metabolisms to efficiently produce chemicals of interest and integrates multiple tools and strategies. She is conducting genetic engineering of microorganisms, especially *Escherichia coli*, to maximize the performance of PHA production, and exploring ways to expand its use while also producing new types.

"I would like my technologies to be familiar to the general public, and I believe this research will contribute to reorganizing oil-based plastics into an environmentally conscious and sustainable bioplastics industry, helping to preserve the global environment and the health and prosperity of humanity," she says.

As her father was a mathematics teacher, she used to spend time studying math with him. This sparked her deeper interest in mathematics and science because she understood that these studies could help explain and interpret the many things in our lives in logical and clear ways. This realization inspired Dr. Choi to pursue scientific studies, attending Science High School and the Korea Advanced Institute of Science and Technology in South Korea, before forging a career in scientific research.

Learning to overcome failures in research has at times presented a challenge, prompting her to question the importance of her work. Sharing her experiences with her colleagues, friends, and family, and participating in women scientist forums, have all been important in cultivating different perspectives and maintaining the determination to continue towards a meaningful outcome.

Dr. Choi believes that things are changing as society evolves. *"People in my generation consider the gender gap as a more serious issue than the previous generations, so we're continuing the struggle, and hope that women will have plenty of opportunities in the near future."*

"Diversity is important in every facet of society, including science," she concludes. *"There's no doubt that different views and approaches are important to developing science, and I believe scientific research will be more accurate when there is gender balance."*



Dr. Van Thi Thanh Ho

Hochiminh City University of Natural Resources and Environment, Vietnam

Dr. Van Thi Thanh Ho is awarded for her research in hydrogen fuel cell technology, an important area of focus for the future of clean energy. In particular, she is optimizing the operation of fuel cells to improve performance and enable the production of sustainable hydrogen energy, avoiding the burning of fossil fuels and reducing carbon emissions.

"The success of my research will open a reliable pathway of transition to a circular economy, whereby renewable, sustainable fuel is used in a continuous cycle," she says. *"This approach will characterize the highly efficient engineering and energy technology choices of the 21st century."*

Her interest in science has grown as she discovered the potential of scientific research to improve lives and contribute to society on a greater level. Yet life as a woman scientist has meant balancing family expectations with the demands inherent to research, a common challenge for women deciding to pursue a career in science. To help her maneuver these challenges, mentorship has proven to be vital in advancing her career, with her parents providing the support she needed to succeed, and especially her father as a strong role model.

Women scientists have incredible potential, Dr. Van Thi Thanh Ho believes, and must be empowered and enabled to contribute equally to solving the great challenges facing society today. *"You simply need to look at the past to realize the significant contribution women scientists and innovators have made in improving our world, from treating serious diseases to furthering fields such as astrology and astrophysics,"* she concludes.



Dr. Pantana Tor-ngern

Chulalongkorn University, Thailand

Dr. Pantana Tor-ngern is awarded for her research into the impacts of climate variability and change on water and carbon cycles in the forests of Southeast Asia. Her work focuses on canopy transpiration and photosynthesis, essential factors to forests' ability to regulate the climate, and will prove invaluable in a region where rapidly occurring land-use changes have created a complex picture and triggered different responses to climate change.

In 2020, Dr. Pantana Tor-ngern and her team began monitoring water flows in trees and weather conditions at Khao Yai National Park, UNESCO World Heritage Site in Thailand. The project is set to provide the most comprehensive insight to date, with the findings leveraged to help maintain the active role of forests in climate change mitigation.

"My dream is to build a strong international network of forest water and carbon flows, monitor how this evolves, and enhance our collective capacity to model climate change impacts on global forests."

As a child, Dr. Pantana Tor-ngern has always sought logical, rational explanations for natural phenomena, developing a passion for science at school. In her current study, she combines her prowess in quantitative skills with a strong understanding of biological systems.

Having established a reputation for her area of specialism in the United States, Dr. Pantana Tor-ngern was keen to create a similar bank of research in Thailand. Returning in 2015, she was able to obtain international funding to begin her research and lay the foundation for long-term climate monitoring in her country. *"I would like to call for more similar opportunities for Southeast Asian countries, so we can fill in this missing jigsaw piece in the dynamics of the earth system modelling of global forests,"* she says.

She feels that women's capabilities are often underestimated, especially when it comes to scientific achievements. For Dr. Pantana Tor-ngern, her feat in installing two of Thailand's most well-equipped towers with weather and tree water flow sensors above the canopy in a densely forested area of national park is one such accomplishment.

She believes everyone can perform scientific research equally well. She hopes her award will attract more up-and-coming scientists to her field, which is quickly becoming one of the most important areas of environmental science worldwide. *"If someone can do science, shouldn't they be encouraged to achieve their full potential, regardless of gender?"* she concludes.



Dr. Natalia Bruno

National Institute of Optics of the National Research Council, Italy

Dr. Natalia Bruno is awarded for her research in quantum optics. Her studies of the interaction between particles of light (entangled photons) and matter are helping to pave the way for new quantum technologies for the next generation of quantum computers, networks, and enhanced sensors with superior levels of performance. This could help to boost progress in fields where significant computational power is needed (such as health and climate research) and enable the safe exchange of sensitive information.

"I dream that science will be able to show us how to take care of the Earth, to ensure better living conditions for everyone," she says. *"To achieve this, it is very important that we all trust and support the hard work of researchers and follow their advice."*

She discovered a real love for research thanks to her mother, a physics teacher and her first mentor, as well as professors and peers during her PhD.

During her career, she has worked in multiple countries and work environments, often in male-dominated teams. Facing gender discrimination, unconscious bias, and unequal pay in the laboratory, she and her colleagues formed a group in Florence to raise awareness of gender inequality in academia. *"The issue of gender discrimination in science is something I am determined to fight for,"* she says. *"It is mostly due to reasons which are deeply rooted in social and cultural norms - this is why our activities will help to create a better work environment for everyone."*

"The greatest accomplishments of women in science are represented by those women who showed that their gender was not, and should not, be a limitation to their job, and those who reacted to gender discrimination," she continues. *"A more equitable gender balance would transform the work environment and deliver higher quality and faster scientific results."*

As a woman scientist has recently become the first president of Italy's National Research Council, Dr. Natalia Bruno is optimistic. *"It gives me hope that, with time, equal opportunities will be available to all people with no distinction of any kind."*



Dr. Daphné Lemasquerier

The Institute for Non-Equilibrium Phenomena Research (IRPHE), CNRS, Aix-Marseille University; Ecole Centrale de Marseille ; University of Texas at Austin, United States

Dr. Daphné Lemasquerier is awarded for her research in geophysical fluid dynamics at the intersection of planetary sciences and fluid mechanics during her PhD in France at Aix-Marseille University. Leveraging rotating fluid mechanics experiments to complement spatial observations, she has helped to better understand key phenomena observed on gas giant planets, and in particular the bands and large vortices of Jupiter. Today, as a post-doctoral fellow at the University of Texas in Austin, she now focuses Jupiter's icy moon Europa, and models the circulation of the global ocean buried below its icy crust. Her findings also have relevance to the dynamics of our terrestrial oceans, atmospheres, or even deep liquid cores, where similar physical effects are at play.

"I would like to help reunite the multiple research fields that study planetary fluid processes more or less explicitly," she says. "Close collaboration between these fields is the key to an integrated and consistent comprehension of Earth and planetary systems."

Growing up on the tropical Reunion Island, surrounded by an exceptionally rich geological and biological environment, inspired her to understand the natural world better. The rigour, objectivity, and humility inherent in scientific methods also drew her interest, and she felt that a scientific career would be fulfilling. Her first internships confirmed her enthusiasm. *"I loved the way that natural phenomena could be mathematically and physically modelled to make them accessible to intellectual investigation,"* she says.

Dr. Daphné Lemasquerier has felt very supported and encouraged in her career so far, particularly by her PhD supervisors. For women to gain more senior roles in science, she sometimes feels that they must assert their position and role in the community more demonstratively than men. They could get involved in mentoring, provide positive role models, and participate in outreach to help break stereotypes and change the representation of scientists that prevails in society today. Importantly, we must overcome the sociocultural norms that influence young women's career choices.

"Research and science are both highly collaborative, and everyone brings their own experiences, perspectives and backgrounds with them to the workplace," she says. "I believe that a research environment can only be enriched by an increased diversity of approaches and personalities."



Dr. Karolina Mikulska-Ruminska

Nicolaus Copernicus University, Poland

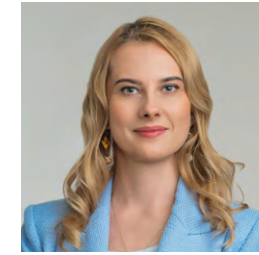
Dr Karolina Mikulska-Ruminska is awarded for her research on ferroptosis, an iron-dependent form of regulated cell death implicated in a broad range of diseases. Ferroptosis is correlated with cerebello-cortical atrophy, sepsis, bacterial and viral diseases, as well as with the degradation of tissue in brain trauma, kidney diseases, and asthma. Extensive studies shows that induction of ferroptosis has a great potential in cancer therapy, while its suppression may be used for inhibition of the neurodegenerative diseases (e.g., Alzheimer's disease, Parkinson's disease and Huntington's disease). Her research brought new knowledge about ferroptotic machinery at the molecular level which is essential for developing new drugs and helping to prevent asthma and other diseases.

After a particularly difficult loss, her desire to pursue scientific research grew even more. *"I lost my mother to cancer at a young age, therefore, my scientific dream would be the invention of an effective medication that could prevent different types of diseases, such as cancers, without severe consequences to our health or quality of life,"* she says.

Born into a family of researchers, Dr. Mikulska-Ruminska viewed life through the prism of science from a young age. Her passion for molecular biophysics appeared when she began to attend biophysics lectures, which she found interesting and inspiring. She has since resolved to leverage science to explain complex biomolecular mechanisms.

"During my scientific career, I've overcome many challenges with optimistic thinking, determination and the support of the people around me, especially my supervisors, who are not only great scientists but also very helpful individuals," she says. *"The greatest challenge remains combining motherhood and raising three children while continuing high-quality scientific research. Producing exceptional work while balancing domestic responsibilities is a great accomplishment for women scientists."*

Importantly, Dr. Mikulska-Ruminska considers that the growing number of women physicists is a great success. Workplaces are gradually changing, and people with passion and determination are likely to be successful and recognized by the scientific community. *"Talented scientists with a devotion to research studies should be treated equally,"* she concludes.



Dr. Ieva Plikusiene

Vilnius University, Lithuania

Dr. Ieva Plikusiene is awarded for her ground-breaking work in leveraging novel immunosensors to investigate the interaction of the structural proteins of the SARS-CoV-2 virus with specific antibodies. Her findings are vital to understand how spike and nucleocapsid proteins forms immune complexes with specific antibodies that are developed after vaccination or recovery from Covid-19, and ultimately to exploring how the virus can be neutralised.

"As a scientist and a mother, I dream that science will give us the opportunity to cure serious children's diseases," she says. *"Children are our future, and as scientists, we must use all our skills and knowledge to help protect them."*

Investigating the formation of immune complexes and the interaction of the structural proteins of the virus with specific antibodies has been one of the greatest research challenges of the pandemic. Through her research, Dr Plikusiene uses sensitive, reusable immunosensors, leveraging a method that combines spectroscopic ellipsometry and quartz crystal microbalance with dissipation. The results obtained will provide new insights and a deeper understanding of the thermodynamics of these complex formations.

Dr. Ieva Plikusiene has always been surrounded by science in her daily life. And with two academic parents – a physics professor and an English teacher – the value of science and education was an important part of her family upbringing. *"My parents both inspired me with their curiosity and passion for science,"* she says.

The greatest obstacle she has faced as a scientist is to combine effective scientific work with raising her daughter, a challenge that is still common for many women scientists today. Having the full support of her family and supervisors has helped her considerably in pursuing her scientific career.

Dr. Ieva Plikusiene notes that women are still too often appointed to job roles with less responsibility or seniority in science. Progress is needed to encourage more women into science, and for women's research to be treated equally, with equal opportunities for publication and leadership positions.

"Both genders are capable of high-quality science and must be involved in leading scientific research in order to ensure the successful application of scientific innovation in the lives of all within our society," she concludes.



Dr. Daria Smirnova

Institute of Applied Physics of the Russian Academy of Sciences, Russia

Dr. Daria Smirnova is awarded for her research in photonics, a field with a significant potential to revolutionize modern technologies, from optical data communications to biosensing. She is exploring innovations at the nexus of fundamental physics, material science and applied science, and dreams of generating real-life applications in superior photonic devices and quantum computing.

Her journey towards science was largely determined by obtaining a scholarship to pursue PhD research in Australia, which in turn brought opportunities for international collaboration and broadened her scientific outlook. She also recognises the importance of a supportive environment and the inspiration she derived from her family.

While the often fast-paced, hectic research environment brings its own challenges, Dr. Daria Smirnova recognizes the traditional lack of scientific career opportunities for women in Russia as real obstacle to becoming a leading researcher or running a laboratory.

While she is confident that all genders have the same capabilities when it comes to science, she mentions that biased perceptions and treatment of women's aptitudes for physics and mathematics still exist. Achieving a better gender balance will be fundamental to more innovative, meaningful discoveries.

"The For Women in Science award motivates me to strive for new levels of professional achievement and provides an essential funding base to further progress my research," she concludes.



Dr. Beatriz Villarroel

Stockholm University, Sweden

Dr. Beatriz Villarroel is recognized for her explorations in astrophysical phenomena, which are yielding intriguing findings that shed new light on the mysteries of the universe. She leads the Vanishing and Appearing Sources during a Century of Observations (VASCO) project, comparing historical sky catalogues with current images, searching for vanishing objects and other extraordinary events in the sky. Some of the astronomical events the project hopes to eventually find include gradually dimming quasars or a massive star that collapses directly into a black hole without emitting a bright supernova. Such stars could even be the signature of the advanced technology of an alien supercivilisation.

"Ever since I was a child, I've loved the idea of space, the huge distances to the stars, and I've always wondered whether there was life out there," she says. "My scientific dream is to find intelligent alien forms during my lifetime."

As a keen musician, Dr. Beatriz Villarroel had to make a choice between music and science, and while she maintains a passion for the arts, she has not looked back. She has maintained her self-belief, supported by friends and family, and encouraged by mentors. *"A good mentor is like gold,"* she says.

To help overcome some of the challenges inherent in the higher echelons of science, such as balancing a personal life with the demands of research and requirements to travel internationally, she believes remote postdoctoral positions are fundamental. More long-term, permanent contracts would help to bring greater stability, too.

Additionally, she believes women must have the right to their intellectual freedom. *"Women who choose their own path often face social setbacks in their research environment."* This can lead to few women pursuing high-risk projects, which in turn affects the number of official awards women can receive. *"With high-risk challenges such as the searches for other intelligent civilisations in the Universe - or SETI, Searches for Extra-terrestrial Intelligence - comes not only an overwhelming risk of failure, but great contributions to knowledge and humanity when astronomers finally succeed (if ever)."*

"Rather than focusing on numbers and statistics, I think it's important to create inspiring female role models for the younger generations, and supportive environments where women in science can develop their intellectual potential fully," she says.



Dr. Maria Florencia Cayrol

Institute of Biomedical Research - UCA - CONICET, Argentina

Dr. Maria Florencia Cayrol is awarded for her leading cancer research. In particular, she is exploring the action of thyroid hormones in diverse cancer models, such as different subtypes of T cell lymphomas which can be particularly aggressive, as no specific treatments are available. She is also expanding her studies in other solid tumors including melanoma, the most serious type of skin cancer, thus opening new opportunities to help develop more innovative, and better targeted treatments for cancer patients.

"I dream that my research findings will ultimately improve patients' quality of life," she says. "In addition to paving the way for new therapies or improve the existing therapeutic regimes, I'd be very happy if other scientists could use my research in other biomedical fields and make a positive difference to their patients."

Ever since she was a child, Dr. Cayrol has always wanted to know why and how everything around her worked. She was inspired by her parents, both doctors. And when her school biology teacher introduced her to molecular biology and explained that the study of genetics could help cure illnesses, she knew straight away that she wanted her studies to contribute to the development of medicines and cancer treatments. Settling on biotechnology, she determined to dedicate her life to academic scientific research in the oncology field.

Dr. Cayrol leveraged her creativity to overcome the limited funding resources she experienced, conducting her projects in a resource efficient way, without compromising the quality of her research. Achieving highly, she was also able to gain fellowships that enabled her to collaborate and travel internationally, broadening her knowledge and experience of molecular techniques to analyse different cancer models.

She is vocal about the universal challenges that women face, including receiving the necessary support during maternity leave and beyond, and the difficulties in reaching top academic and institutional positions in the scientific institutions where the most important decisions are made.

"Encouraging young women and creating more opportunities is vital to gender equality and the future of science," she says. "The glass ceiling can be broken with good mentorship, support, training, and initiatives to raise our profiles."



Dr. Irene del Real

Austral University, Chile

Dr. Irene del Real is awarded for her research on economic geology, and in particular on the formation of copper in the earth's crust, a vital metal for the transition to renewable energy and electromobility. Her work has particular importance for Chile, which provides more than 30% of the world's copper, and goes further to explore the larger questions regarding the country's tectonic evolution and pathways to more sustainable mining.

"My greatest scientific dream is that as a society, we successfully transition to renewable energy and understand the importance of conserving raw materials," she says. *"I want to help evolve the circular economy of metals and contribute to the transformation of the mining industry."*

Growing up in Chile, Dr. Irene del Real has experienced amazing and dramatic landscapes, from rainforests to some of the world's driest deserts to the Andes mountains. Her family always encouraged her and her siblings to spend time outside and enjoy nature. *"I wanted to know how these different landscapes formed, and that led me to geology, the science that helps us understand the evolution of the earth."*

One of the most significant challenges she has overcome is fighting preconceptions of what women should do to demonstrate that she could be a successful scientist. *"Going against gender stereotypes is a daily challenge, and my experience has inspired me to communicate these issues to my female students and raise awareness of the importance of opening new paths for young women in science."*

In general, Dr. Irene del Real considers that unconscious bias is still a real issue, and can be expressed in various ways, including questioning women's findings and difficulties in gaining promotion. *"But I firmly believe that we are on the way towards closing the gender gap. We now need more positive women role models, and to reconstruct the scientific workplace to include women."*

In her opinion, science needs diversity if we want to answer the big questions we face as a society. *"It's essential for more productive, innovative and creative research groups and it will deliver better science,"* she concludes.



Dr. Alison McAfee

University of British Columbia and North Carolina State University, Canada

Dr. Alison McAfee is awarded for her pioneering research on honeybee reproduction and fertility. Her work focuses on environmental risks to honeybees, including extreme temperatures and chemical pesticides, and in particular, explores how best to protect queen bees, so they can continue laying fertilized eggs and maintaining strong colonies.

"As a child, I was always curious about the natural world," she says. *"I enjoyed learning about biology and chemistry in school, so when I realized I could build a career on studying something like honeybees, I was hooked. I love that I get to continue learning and generating new knowledge about biological systems."* Inspiration also came from her great aunt, a leading biochemist with a dedication to deep-rooted social challenges. *"Thanks to pioneers like her, there are brighter futures for women in science, but there is still much to be done,"* she explains.

To achieve gender equality in science, Dr. Alison McAfee believes there is a real need for champions of change, actively working to overcome the challenges faced by women scientists in gaining senior roles. She also highlights the need to address the productivity gap that still arises as a result of inequity in the home. This in turn has real impacts on promotions, salary negotiations, and funding opportunities, further perpetuating inequality.

Yet greater diversity is needed to deliver innovative solutions, particularly in relation to gendered issues. *"Research needs creative thinkers, and sometimes a problem or research question benefits from being addressed and interpreted in many different ways,"* she says. *"Women are a huge untapped intellectual resource in science - their perspectives, ideas and interpretations stand to deliver great value."*

Despite the challenges, she feels it is an exciting time to be a woman in science, and "it would be hard not to feel empowered by the changes that are taking place." To help encourage more women to the forefront of science, good mentorship, robust support, and positive role models are critical.

Having grown up on a small island in British Columbia, living in a small, off-grid community, she reflects on joining the *For Women in Science* community: *"This sense of community amongst strong, successful women is something often lacking in the top tiers of science. It is humbling and empowering, knowing that I now stand in the ranks of these impressive women."*



Dr. Laura-Joy Boulos

*Institute of Applied and Human Neurosciences (INSAN),
Saint-Joseph University, Beirut, Lebanon*

Neuroscientist Dr. Laura-Joy Boulos is shining a light on the effect of prolonged post-war situations in Lebanon and across the Middle East on mental health and decision-making. By monitoring hundreds of people's decisions through a novel mobile application and combining the findings with further tests and investigations, she aims to co-create artificial intelligence (AI)-led solutions to help people navigate the perpetual uncertainty of modern times. In an increasingly uncertain and fast-paced world, her work could help to promote more effective decision-making in multiple life and business contexts.

"When I was seven, I remember visiting the desert in Jordan with my parents, and feeling so filled with the pure wonder of existence that I shouted 'J'existe!' ['I am alive'] in French," she says. "So my big dream is to understand life. It's this fundamental curiosity that drove me towards science – and it's that same need to keep exploring and digging deeper that propels me on to pursue my research today, even if it means uncovering a seemingly infinite scope of possibilities."

Beyond the challenge of proving the value of research in Lebanon, Dr. Boulos is also aware that as a woman leading a research project in a patriarchal society, she will have to "fight every step of the way". But she also feels a strong responsibility to engage in the broader fight to empower women in science and beyond. "We owe it to the next generations," she says. This will involve encouraging girls at school to pursue their dreams and creating compelling role models to help girls "internalise the image of successful women and make their goals seem more tangible."

With the increased visibility brought by the L'Oréal-UNESCO For Women in Science International Rising Talents program, Dr. Boulos aims to help establish neuroscience as a topic of interest for more people in Lebanon and the Middle East, while sparking new interdisciplinary partnerships to explore the mysteries of the brain.



Dr. Nowsheen Goonoo

*Biomaterials, Drug Delivery and Nanotechnology Unit,
Centre for Biomedical and Biomaterials Research,
University of Mauritius, Réduit, Mauritius*

In Mauritius, some 20.5% of adults suffer from type 2 diabetes. In particular, diabetic foot represents a major public health challenge, resulting in conditions such as foot ulcers and amputations. Dr. Nowsheen Goonoo is seeking to reduce the healing time of diabetic foot ulcers using nanofibres partially composed of polysaccharides (a type of carbohydrate consisting of interlinked sugar molecules) derived from plants including seaweeds and aloe vera derived from the rich, diverse Mauritian waters and landscape.

"My dream is to launch the first nanotech-based wound care product for diabetic patients in Mauritius using affordable, local and renewable resources," she says. "Accelerating the healing process will enable diabetic patients to recover more quickly, avoiding amputation and reducing the economic burden associated with hospital treatment."

As a child, Dr. Goonoo explored the abundant flora and fauna of her native country, Mauritius with her family, wondering at the effervescence and vitality of nature. "I still remember how fascinated I was to discover that the leaves of the mimosa plant folded up like dominoes when I touched them," she says. Inspired by her father's work as a nursing officer, she also developed a passion for medicine. Now, she is harnessing her scientific expertise, her longstanding connection to nature and desire to promote health in her drive to create novel biomedical products.

Aside from the ultimate challenge of balancing motherhood and senior scientific roles, Dr. Goonoo recognises that building self-confidence is a key strategy for women to succeed as scientists and make themselves heard in decision-making circles. Healthy debates between male and female colleagues are important, she believes, as well as mentorship, role models and strong networks of supportive women scientists.

"Gender equality in science fosters innovation and improves the quality of scientific research," she concludes. "I have faith in the future and it is now up to us to inspire young women to pursue science and keep pushing through the glass ceiling until it shatters completely."



Dr. Nouf Mahmoud

*Pharmaceutics and Pharmaceutical Technology Laboratory,
Al-Zaytoonah University of Jordan, Amman, Jordan*

Some 35 million people in the Middle East and Africa are living with diabetes. With many cases going undiagnosed, cases of diabetic foot and limb amputations are all too prevalent. Building on her experience in developing novel nano-therapies to address multiple diseases and health conditions, Dr. Nouf Mahmoud is designing gold nano-platforms to promote the enhanced healing of diabetic wounds. Coated with substances to help prevent inflammation and infection, the wound dressing both accelerates the healing process and reduces the risk of amputation.

"To me, science is the ability to explore nature, to learn more about the world and ourselves," she says. "My scientific dream is to succeed in developing a biomaterial patch to help solve the problem of diabetic wounds and revolutionise the experience of people suffering with diabetes."

Dr. Mahmoud enjoyed her school science lessons, and realising she could make a difference through science, embarked on her journey to become a scientist. "The fascinating and unexpected results I achieved through my PhD studies inspired me to innovate further," she says. "Today, science is not just a job for me, it is a passion. Put simply, science makes me happy."

While Dr. Mahmoud's family and colleagues have supported her in addressing the challenge of balancing research with motherhood, she recognises that women scientists in general must show more perseverance and persistence in their research due to their additional daily challenges and responsibilities.

To thrive in the scientific community, women scientists must overcome fear and self-doubt, and gain access to effective role models and strong mentors, she believes. Training and education to promote gender equity, together with greater efforts to help more women reach leadership roles are also vital.

"Scientific excellence and innovation requires both women and men," she concludes. "I'm honoured that my work has been recognised by L'Oréal and UNESCO, and highly motivated to continue my research and make a positive impact in society. I'll never give up."



Dr. Georgina Nyawo

Clinical Mycobacteriology & Epidemiology (CLIME), Stellenbosch University, Stellenbosch, South Africa

Tuberculosis (TB) is the leading infectious cause of death worldwide. In Africa, the burden of TB is exacerbated by HIV (which weakens the lungs, making people more vulnerable to pulmonary infection) and limited resources and funding for research. Enterprising Zimbabwean scientist Georgina Nyawo is addressing this challenge by exploring the relationship between diverse bacterial communities (the microbiome) in the human body, TB and people's resilience to TB. Her work will inform novel medical treatments, helping to rid the continent of this crippling disease.

"I've always wanted to contribute to improving health and fighting disease in Africa," says Ms Nyawo. "I would like scientific research to prosper in all corners of the continent and play a key role in expanding access to healthcare. My dream is to see TB and ultimately HIV and AIDS defeated in my lifetime."

Ms Nyawo's longstanding passion for science began at school, where she enjoyed maths and science. Inspired by her innate desire to conquer challenges, she was determined to pursue science at a higher level, and continues to persevere on her journey of scientific discovery.

She sees the L'Oréal-UNESCO *For Women in Science* International Rising Talents programme as a *"significant victory in fulfilling my PhD"*, helping her to overcome some of the challenges she has experienced in furthering her training and sharing her findings internationally.

She believes balancing a scientific career with family responsibilities remains the greatest challenge for women scientists in Africa, where cultural traditions place a heavy burden of household responsibility on women. Shifts in attitude are required, with men taking on a greater role in the home, as well as more mentorship for women and robust childcare policies.

"The presence of more women in science will act as a beacon of light, inspiring young girls to consider science and creating a positive ripple effect across the continent," she concludes. "And the more scientists we have – women and men – the greater chance we'll have to defeat infectious diseases, dethrone TB and enable African people to thrive."



Dr. Rui Bai

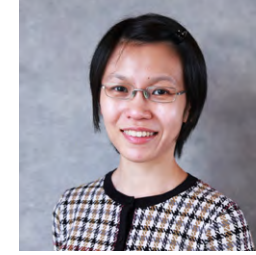
Structural Laboratory, Westlake University, Hangzhou, Zhejiang Province, China

At least 35% genetic disorders and numerous diseases (including many kinds of cancer) are linked to mis-splicing, a dysfunction in human cell development. Dr. Rui Bai's groundbreaking research on RNA splicing and the complex, dynamic molecular machinery in the nucleus known as the spliceosome, has shone a light on the molecular basis for the occurrence of splicing-related diseases, providing vital insights for potential drug development.

"Courage is for me more important than anything," says Dr Bai. "My team and I never failed to believe that we'd unlock the answer one day. It is my passion to reveal the origin of life, to decode the evolution of genome and ultimately, to pave the way to create therapeutic treatments to cure genetic diseases, especially cancer."

Dr. Bai's interest in science has its roots in her early childhood. *"I was curious to understand the mechanism of this world – how can birds fly in the sky? Why do flowers bloom in spring? Why do leaves fall in autumn?"* she recalls. Keen to find the answers to these questions, she was determined to develop an ever more granular understanding of genetics, electing to study Life Sciences at university.

Harnessing the strengths of female power can only advance the quest to unlock the secrets of life and survival on Earth, Dr. Bai believes. Nevertheless, few women pursue science as a career after completing their PhDs, with the challenge of balancing research and family priorities sitting firmly at the root of the problem. *"Women should be encouraged and supported to focus on their research career without fear of being judged by others," she says. "Everyone is unique and every scientist has great potential to make a huge difference in their field."*



Dr. Huanqian Loh

Center for Quantum Technologies, National University of Singapore, Singapore

Dr. Loh's research uses ultracold molecules – molecules at a millionth of a degree above absolute zero – as quantum 'lego' blocks that could be assembled to model complex systems involving superconductors and flexible solar cells, for example. An improved understanding of these advanced materials could help promote the global transition to clean, efficient energy.

"I would like science to tackle climate change and help make the world a more sustainable place for all of humanity," she says. "As a quantum physicist, my dream is to use quantum simulators to guide the search for new materials that could help manage the world's rising energy needs."

Physics was not initially Dr. Loh's favourite subject at school. But in the process of applying herself to understanding physics concepts, she developed a life-long interest in solving physics problems. *"What a delicious adventure it was, to figure out nature bit by bit, atom by atom," she says, recalling her first experience of research laboratories. "From then on, I was hooked on research and decided I wanted to be a physicist."*

Dr. Loh's greatest challenge was juggling motherhood and my academic career as a young assistant professor. *"Raising two 'families' – one at home and one in the laboratory – wasn't easy," she recalls. "It was only possible with the support of my family, colleagues and students, and access to outstanding childcare options."*

While she has not personally encountered the 'glass ceiling', she recognises the importance of supportive mentors and colleagues, who ensured she received the credit she deserved, and spurred her on to reach ever greater heights. Empowering more women to enter science should start with encouraging school girls with an innate preference for science to follow their heart without judgement. Outreach to girls should emphasise the idea that women do not have to choose between a scientific career and motherhood, while institutions could help by expanding family-friendly efforts, such as ensuring good access to childcare.

"We must harness all the world's brains in using science to tackle humanity's greatest challenges," she concludes. "I hope I can serve as a role model to inspire the next generation of girls to pursue science as a career."



Dr. Mikyung Shin

Nature-inspired Biomaterial Engineering Laboratory, Sungkyunkwan University, Seoul, Republic of Korea

Dr. Mikyung Shin is designing adhesive biomaterials for tissue regeneration and therapy. Inspired by the adhesive properties of ocean creatures, such as mussels and tunicates, and the astringent taste of plants, including fruit peel, nuts, and cacao, she is engineering a new type of adhesive polymer that can be used to create artificial tissues by means of 3-D bioprinting. Implanted in the body, it encourages new tissues to grow for a long time and degrades naturally after tissue repair.

"Given that the majority of the human body is comprised of water, the materials we use to regenerate tissues must be able to bind themselves to biological tissues effectively in order to deliver optimal impact," she explains. "My scientific dream is to create unique biomaterials that could be used in cardiovascular repair, and ultimately, an artificial heart with the real dimensions of a human heart."

Dr. Shin's interest in science and engineering emerged during her undergraduate studies, when she first explored biodegradable polymers and pondered their bioactive potential in the human body. As a researcher, she is able to apply the full extent of her skills and imagination to designing extraordinary biomaterials. *"I channel my creativity and positive attitude to solving complex challenges and enjoy developing knowledge in a dynamic and evolving field," she says.*

Although more women are entering science, Dr. Shin believes a greater balance between men and women scientists would yield the kind of diverse, complementary approach that is vital to delivering scientific breakthroughs. Building on her own positive experiences of mentorship and in light of the L'Oréal-UNESCO *For Women in Science* International Rising Talents programme, she intends to share her story far and wide, and help inspire the next generation of women in science.



Dr. Vida Engmann

SDU NanoSYD, Mads Clausen Institute, University of Southern Denmark, Sønderborg, Denmark

Organic solar cells are a low cost complement to conventional silicon solar cells. In addition to being flexible, transparent and light weight, they also create the lowest environmental impact of all renewable energies. However, organic materials can easily degrade when exposed to air, light and heat, lowering their efficiency. Dr. Vida Engmann is working on the stabilisation of the active layer in organic solar cells (the component most vulnerable to degradation) by using combinations of chemical compounds to protect the cells from oxidation.

"These chemicals act in a similar way to those used in sun cream to block UV rays from harming our skin," she explains. "I would love to contribute to stable, durable organic solar cells becoming available in the marketplace, and ultimately, creating a carbon neutral world."

As a child, Dr Engmann was always fascinated by libraries and embraced the joy of learning, encouraged by her mother. *"Each book could take you to a different, exciting yet unknown universe, from mathematical riddles to Japanese letters, chemical reactions and Greek mythology,"* she recalls. *"As a scientist exploring the unusual world of polymers, I always come across a compelling new question I want to solve, and that's why I stay in science."*

For women scientists, finding a balance in life and work is made harder by social constructs that frame women as caretakers in the home and men as active workers and strategic thinkers, Dr Engmann believes. And despite evidence proving there is no difference between women and men in terms of cognitive or leadership abilities, gender bias still restricts women from fulfilling their potential in the world of science. This starts with limited opportunities for grant funding, journal reviewing and academic recruitment, and culminates with women losing confidence in their abilities, which can affect their career choices and lead them to settle for less ambitious roles.

"To create the next generation of women scientists, young girls must see women in science as a mainstream trend," she concludes. *"Only then will we be able to attract the best and brightest minds, of both genders, to solve the world's most pressing scientific challenges. I feel honored to be part of this important task."*



Dr. Serap Erkek

Cancer Epigenomics Laboratory, Biomedicine and Genome Center, Izmir, Turkey

Dr. Serap Erkek's research stands to make a difference to the lives of bladder cancer patients, and ultimately to help prevent them losing their life to this deadly disease. To do this, she is leveraging the field of epigenetics – the study of changes in a gene's activity that occur independently of the underlying DNA sequence. By studying the mutations in epigenetic factors frequently seen in bladder cancer patients and how they influence the development of bladder tumours, she aims to help identify signs that could improve the diagnosis and treatment of bladder cancer patients.

Since childhood, Dr. Erkek has always been interested in puzzles, codes and crosswords. While studying biology, she quickly realised that DNA, the code of life, was perhaps one of the greatest puzzles of all. It was with this determination to help uncover the mysteries of the human genome that she began her current path in molecular biology.

"One of the big questions I have is what will happen and what will change in our lives once the sequence of everyone's genome is known," she says.

Having worked in largely positive work environments, Dr. Erkek believes that the research atmosphere in which women scientists operate has a significant impact on their ability to succeed, along with their own passion and determination. Women should leverage their ability for detailed, multi-faceted thinking in science, and embrace the benefits of mentorship, which she believes has shaped her own scientific career. *"In history, many women scientists faced discrimination but ultimately made important discoveries through patience and wisdom,"* she concludes. *"I would like to see more women succeeding in science and for women scientists to progress in their careers on the basis of pure merit."*



Dr. Jennifer Garden

School of Chemistry, University of Edinburgh, Edinburgh, United Kingdom

To help address the global plastic crisis, Dr. Garden is developing sustainable alternatives to conventional, crude oil-based plastics, using renewable resources such as carbon dioxide and plants including sugar beet and sweet corn. In addition to avoiding the need for fossil fuels, these plastics are useful for a range of everyday applications and degrade more readily when the material reaches end of life, potentially reducing plastic pollution.

"My aim is to develop a new range of plastic materials designed from the outset to be re-used or able to degrade safely within a circular economy," she says. *"Chemistry is a crucial part of the solution, together with broader conversations to help transform the way we design, make and consume plastic."*

Dr. Garden's love of chemistry began at an early age. *"My best friend and I played 'potions' by locking ourselves in the bathroom and mixing toiletries together, which once included an expensive aftershave,"* she recalls. As an undergraduate, she created a chemical that had never been made before. *"It was an incredible feeling,"* she says. *"From that moment, I knew I wanted to pursue an academic career in chemistry, combining creativity and the joy of discovery to make a difference in society."*

Despite the fulfilling nature of her work, Dr. Garden has too often faced the 'imposter syndrome'. She has worked hard to improve her confidence and pursue ambitious opportunities, supported by fantastic mentors, as well as family and friends. *"I hope to offer the same encouragement to other early career scientists,"* she says.

While she has perceived some positive signs of increasing gender equality in the academic world, there is still more to do to create an environment where everyone can thrive and fulfil their potential. Progressive policies are required, and a change in research culture to help ensure that scientists of all genders participate equally in pastoral and administrative responsibilities that too often hold women back by reducing the time available for research.

"Diversity of thought brings an extra level of creativity and innovation to research," she concludes. *"When everyone has a voice, it leads to more innovative discoveries and better scientific solutions to tackle important challenges."*



Dr. Cristina Romera Castillo

Marine Biogeochemistry Laboratory, Instituto de Ciencias del Mar, Barcelona, Spain

Some 8 million tons of plastic enter the world's oceans each year, gradually breaking into small plastic particles forming a toxic 'soup' that harms animals and marine ecosystems. By exploring the leaching of organic compounds from plastic floating in the ocean and establishing which bacteria are able to thrive by consuming them, Dr. Cristina Romera Castillo aims to understand the impact of plastic on the marine carbon cycle and identify an alternative way for it to biodegrade.

"I want to study the impact of plastic on marine ecosystems and find potential solutions to the plastic waste challenge," she says. *"It's important that we see major progress in environmental science and society, so we're not just developing solutions but also reaching people's hearts and minds, and nurturing a greater respect for the environment."*

With an innate curiosity and desire to understand how the world works, Dr. Castillo was compelled to explore science from an early age. Her quest for learning and desire to make a difference have kept her strong throughout the rollercoaster of life as a scientific researcher. And as a woman scientist, she believes building confidence among women scientists is one of the key pathways to achieving gender balance in science.

Currently, the deep-rooted lack of confidence among many women scientists prevents them from contributing equally at conferences, promoting their work and applying for positions of responsibility, in her view. *"Women should make more noise and give more visibility to their work,"* she says.

"Any human being can have a brilliant mind, regardless of gender or race, but the opportunities they experience in life are crucial for its development," she concludes. *"The L'Oréal-UNESCO For Women in Science International Rising Talents programme will give me the platform I need to help motivate and inspire more girls and women who want to do science, and raise awareness of the environmental crisis."*



Dr. Olena Vaneeva

Department of Mathematical Physics, Institute of Mathematics of NAS of Ukraine, Kyiv, Ukraine

Dr. Olena Vaneeva's symmetry analysis research will enhance our ability to determine effective mathematical models for real world processes. In particular, developing new approaches for non-linear models in mathematical physics and biology provides invaluable information for use in fields as diverse as space and nanotechnology, nuclear physics, wildlife biology, genetics and investment finance.

"My scientific dream is to make symmetry analysis an even more powerful tool for studying real world processes," she says. "I also dream of scientific discoveries that will deepen our understanding of the universe, such as the identity of dark matter, whether hypothetical particles will be detected one day and if the ninth giant planet predicted recently really exists."

For Dr. Vaneeva, the joy of scientific discovery sparked her determination to be a scientist and remains the principal motivation in her career. *"I remember an early supervisor presenting me with a problem and no tips on how to solve it," she recalls. "Ever since finding the solution and tasting the essence of scientific enquiry for the first time, I've been inspired to pursue scientific research."*

Among the women scientists who have inspired her, she refers to the outstanding mathematician Emmy Noether, one of the first women to study at a German university, and a pioneer in abstract algebra and fundamental physics. *"The exclusion of women from higher education throughout history led directly to the underrepresentation of women in science and perpetuated gender stereotypes that still endure today," she says.*

The proportion of women researchers at her institute has risen sharply in the past few decades, however, there is still much progress to be made. With researchers re-confirming that there is no difference in girls' and boys' brains or mathematical abilities, now is the time to quash stereotypes forever and empower girls to pursue maths and science.

"As symmetry analysis researcher, I believe in the power of balance and symmetry, both in life and science," she concludes. "The L'Oréal-UNESCO For Women in Science International Rising Talents programme will help give women researchers in my country and beyond the strength to advance and excel in their careers."



Dr. Paula Giraldo-Gallo

Quantum Materials Laboratory, Universidad de Los Andes, Bogotá, Colombia

Condensed matter physicist Dr. Giraldo-Gallo is researching complex and strongly correlated materials to characterise and understand the origin and nature of their ground states (the lowest energy state of an atom, particle or system), and optimise their properties. She commonly encounters phenomena including superconductivity and thermoelectricity, which could pave the way to cleaner, more efficient power generation.

"I dream that the world will soon have ultra-efficient sources of clean energy so we no longer rely on fossil fuel," she says. "Superconducting materials could play an important role in this, and in particular, the creation of superconductors that operate in ambient conditions could one day transform our world."

Dr Giraldo-Gallo has been interested in science for as long as she can remember. She determined to pursue a research career during her final years at high school, inspired by a woman physics teacher who encouraged her to explore topics beyond the school curriculum. *"I started reading books by Carl Sagan and others, and was instantly captured by the 'mysteries of the universe,'" she says. "I initially wanted to dedicate my studies to cosmology, before settling on cool materials."*

However, her path to condensed matter physics has not been easy. *"One of the biggest challenges was convincing my parents, small family business owners, that physics was something you could live on," she recalls. "But I was determined to succeed, and they now understand that I chose the right path."*

Dr. Giraldo-Gallo believes that the underrepresentation of women in science is the result of pervasive gender stereotypes throughout life, with young boys and girls given different toys, for example, that prompt different skills and ways of thinking. Within the scientific world, the glass ceiling could have its origins in the way ambition is perceived negatively in women, and positively in men.

"We must overcome the stereotypes, and in particular, the image of a scientist as a socially awkward white man, locked in his labs doing crazy experiments or calculations," she concludes. "On the contrary, science is a collaborative discipline, and can only be enriched by people of different genders and backgrounds."



Dr. Patrícia Medeiros

Laboratory of Biocultural Ecology, Conservation and Evolution Institution: Federal University of Alagoas, Maceió, Brazil

Ethnobotanist Dr. Patrícia Medeiros is exploring the relationship between humans and plants, with a particular focus on understanding how people in urban Brazil could be encouraged to consume edible wild plants. Her research could help to bring more diversity to people's diets, promote biodiversity and improve food security by reducing society's reliance on a small number of food crops at risk from climate change and environmental degradation. *"Wild food plants may be better adjusted to local climatic conditions, strengthening the resilience of the food chain and avoiding the use of synthetic pesticides and fertilisers," she says. "Their popularisation could also generate additional income for local farmers and harvesters when mainstream, industrialised crops are depleted."*

Dr. Medeiros realised she wanted to become a scientific researcher during her undergraduate biology studies. *"The idea of proposing and testing hypotheses and making my own contributions to generate knowledge fascinated me," she recalls. "Ethnobotany enables me to make a positive impact by asking scientific questions that can only be answered by combining biological sciences with the humanities and social sciences."*

Despite recent advances in gender equality, women scientists still face multiple challenges, Dr. Medeiros believes, not least balancing their academic work with motherhood. Overcoming gender stereotypes in the workplace is also fundamental to empowering women in science - enabling women to have an equal voice, present their findings more positively, and achieve the recognition they deserve.

"Fortunately, I was lucky to spend most of my formative years in a research group where I never experienced gender discrimination," she says. "However, as an independent researcher, it was impossible to ignore the sexism that was directed towards me, and the loss of opportunities linked to perceptions that I might not be responsible for the quality of my ideas."

"Gender equality is important in science and throughout society," she concludes. "Science, and ultimately humanity, can only benefit from a diversity of opinions, approaches and interests."



Dr. Elizabeth Trembath-Reichert

School of Earth and Space Exploration, Arizona State University, Tempe, United States of America

As a pioneering earth scientist, Dr. Elizabeth Trembath-Reichert studies how life survives and even thrives in the little explored subsurface of our planet, where the number of cells is estimated to outnumber all the stars in the universe. In particular, she is exploring the capacity of tiny life forms to cope without sunlight and in extreme temperatures and pressures. Dr. Trembath-Reichert proposes to amplify the genomes in her rare subsurface samples to help uncover the limits of survival and where else life might exist in our solar system.

"I enjoy leveraging science to explore how amazing our planet is, with its vast diversity of life in all forms and places," she says.

Dr. Trembath-Reichert was initially going to study International Politics with a view to becoming a journalist. *"I started writing articles for the science section of our school newspaper and was drawn to stories of travel and exploration," she recalls. "I decided I wanted to be on the other side of the pen."* From there, she began working in a laboratory researching arsenic contamination in drinking water sources in Bangladesh, and became "hooked" on understanding how the activities of tiny microbes could so significantly affect human health.

As an assistant Professor exploring extreme and potentially alien forms of life, persevering in the face of the unknown characterises much of Dr. Trembath-Reichert's research. Yet there are still moments where persevering through prejudice and unconscious bias stands in the way of scientific progress. *"Given what I still have to deal with today, I am awed by the women who were able to make science happen when conditions were even harder," she says.*

"It's fundamental that science begins to reflect the composition of the general population, so we can maximise our ability to identify scientific solutions to global challenges and the climate crisis in particular," she concludes. "This is inextricably linked to forging a more diverse scientific community. I'm excited to see what we can achieve when more voices are heard."

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Doctor Ai Sugiura

Science Programme Specialist, Policy Capacity Building, UNESCO Office in Jakarta - Regional Bureau for Sciences in Asia and the Pacific, INDONESIA

Doctor Yan Shen

Member of the Chinese Academy of Science, Vice-President of China Association for Science and Technology, Deputy Director of National Nature Science Foundation of China, CHINA
Member of the Chinese National Jury

Doctor Sabrina Stierwalt

Professor of Physics at Occidental College, Los Angeles, USA
Member of the American National Jury

Doctor Bruno Bernard

PhD, Dr es Sci., Former L'Oréal Fellow, FRANCE

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A powerful promotional display campaign raising awareness on the importance of women in science is running during June around the streets of Paris, as well as in ten major airports worldwide (Boston, Dubai, Frankfurt, Johannesburg, London, Los Angeles, Paris Charles-de-Gaulle, Paris Orly, São Paulo, Miami).



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