



FONDATION
L'OREAL

2020 INTERNATIONAL AWARDS

SUMMARY

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ABOUT THE

Fondation L'Oréal



The Fondation L'Oréal works to support women across the world, helping them to fulfil their potential in two major areas that sit at the heart of the Group's DNA: scientific research and inclusive beauty.

Established in 1998 and managed by the Fondation L'Oréal in partnership with UNESCO, the *For Women in Science* programme seeks to improve the representation of women in scientific careers, strong in the conviction that the world needs science, and science needs women. Over the past 22 years, the programme has supported and raised the profile of more than 3,400 researchers from 118 countries.

Convinced that beauty is at the core of the process of reconstructing lives and an important element of social inclusion, the Fondation L'Oréal also develops outstanding free training in beauty professions for people from vulnerable backgrounds. The Fondation also provides access to beauty and wellness treatments in medical and social settings, supporting people undergoing physical, psychological or social suffering, as well as reconstructive surgery.



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 upon respect for commonly shared values. UNESCO's mission is to contribute to the building of peace, poverty reduction, sustainable development and intercultural dialogue through its unique competencies in education, the sciences, culture, communication and information. The Organization focuses, in particular, on two global priorities: Africa and Gender Equality.

UNESCO is the only United Nations specialized agency with a specific mandate for Science, symbolized by the 'S' in the acronym. Through its natural sciences programmes, UNESCO contributes to the overall implementation of the United Nations Sustainable Development Goals by providing policy assistance to support developing countries in strengthening their scientific and technological capacity, and to help Member States design effective policies including local and indigenous knowledge systems. UNESCO is a driving force to advance scientific research and expertise in the developing world, and leads several intergovernmental programmes for the sustainable management of freshwater, ocean and terrestrial resources, for biodiversity protection, and to promote science's role in combatting climate change and in disaster risk reduction.

Together with its national and regional offices around the world, UNESCO supports international scientific cooperation and works with a wide range of partners at global, regional and national levels. By joining forces with its partners, UNESCO can leverage resources, expertise and competencies to promote all its ideals and values and to strengthen the visibility and impact of its action in all areas where the Organization has leadership, recognized expertise and comparative advantage.



Gender diversity leads to new and better quality science

At a global level, we collectively face major challenges – climate change, biodiversity loss, health risks... These challenges facing humanity are unprecedented in scale. It is clear that science is and will be one of the keys that enable us to address them, as it always has been at important moments in history. However, while it seems just as clear that we must act collectively to resolve them, women continue to experience considerable obstacles, which prevent them from contributing fully to creating solutions. Now, there is no time to lose.

For 22 years, L'Oréal has affirmed loud and clear – the world needs science, and science needs women. This certitude forms the soul of the *For Women in Science* programme, which we established in 1998 in partnership with UNESCO. Together, we share one conviction – giving women the place they deserve in research means contributing to scientific progress and a better world.

This fight for science and the women's cause is directly linked to our history and our values.

L'Oréal was founded by a chemist, and therefore science occupies a fundamental place for us. Our mission is offer the best of beauty for everyone, so we count on male and female talents to reflect the diversity of the world and its perspectives.

But in science, equality is far from a reality. The figures speak for themselves, with statistics that advance a little, and far too slowly. Women represent hardly 30% of researchers. And this percentage falls by more than half when it comes to senior posts.



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Our ambition is to contribute to the emergence of a more inclusive science, for the service of all women and men. Achieving this will require a profound evolution in mentalities in the academic sphere, in universities and at the heart of our societies, across the world. And that's why in this fight for real equality, we have adopted a holistic, pragmatic approach that covers all fronts.

Firstly, we seek to recognise and highlight female role models in science. We put the reputation and international reach of UNESCO and L'Oréal at the service of outstanding women researchers who are too often in the shadows. We tell the world they exist, publically praise their work and inspire young generations to embrace scientific careers. Through the *For Women in Science* programme, we are proud to have highlighted more than 3,400 researchers.

EDITORIALS

By advancing the cause of women, we can drive progress in science

Every year, we celebrate five exceptional women from the major areas of the world, honouring them with an international award for excellence. In parallel, we support more than 260 doctoral and post-doctoral candidates with research grants in 118 countries. This support is often decisive in enabling them to complete their research, particularly in regions impacted by a lack of funding and insufficient resources.

Secondly, we accompany Laureates and young researchers to help them break the glass ceiling, establish their names in the field as exceptional scientists and join forces to make their voices heard. This is why we are training these women, particularly those in the early stages of their career, on topics including communication, personal development and negotiation. They all agree that this support helps to accelerate their careers and boost their confidence. We are also engaging eminent men scientists in the fight, encouraging them to work with us to eliminate discrimination and prejudice, at the heart of the academic system.

But none of this is enough. We therefore wish to speak out even more strongly to outline the brakes and obstacles faced by women scientists throughout their careers, in order to prompt an awareness, which,

I hope, will reinforce our collective aim to fight against the often invisible discrimination experienced by women researchers. We are convinced – gender diversity leads to new and better quality science. Beyond the question of equality, this is about giving ourselves all the opportunities we can for scientific innovation that benefits all women and men.

Those who join our fight with UNESCO in the fight for real equality between women and men scientists will advance the frontiers of human knowledge, accelerate scientific progress and amplify its positive impact on the challenges facing our world.

The world needs science, and science needs women.

JEAN-PAUL AGON

Chairman and Chief Executive Officer of the L'Oréal Group
President of the Fondation L'Oréal

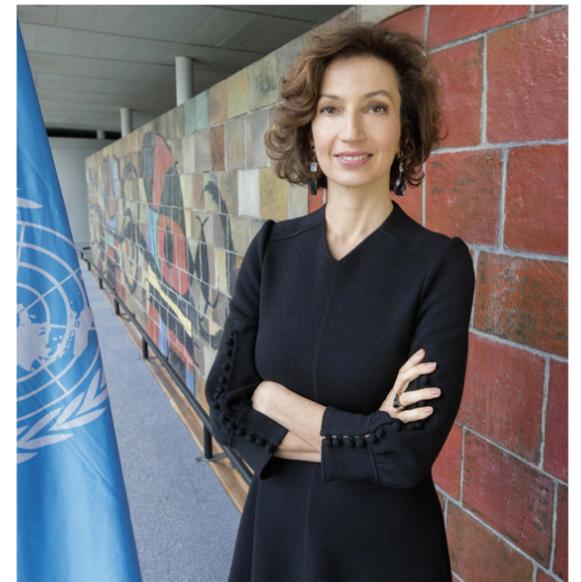
The world is burning. In the past year, fires have blazed across the Amazon, Australia, Indonesia and Central Africa, taking a devastating toll on human societies and biodiversity.

Climate change is here, and we must act now to deal with it. In this situation, the world needs science. Through science, we can reinvent our relationship to the natural world. Through science, we can make the transition to clean energy. Through science, we can find ways to make agriculture and industry more sustainable and productive.

But to succeed in this combat for sustainability, we must unlock the whole potential of science. We must tap into all available talent and harness all knowledge, innovation and creativity. We must open this field up to all women, who represent half of our collective intelligence. The world needs science, and science needs women.

And yet today women represent less than 30% of all scientists around the world.

This percentage is even lower in disciplines such as computer science, information and communication technology, engineering, mathematics, and physics.



© Christelle ALIX - UNESCO

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We must open this field up to all women, who represent half of our collective intelligence.
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This is why UNESCO aims to build the capacities of women in science, technology, engineering and mathematics (STEM), as well as support the contributions of women to the generation and dissemination of scientific knowledge. By advancing the cause of women, we can drive progress in science.

This goal is reflected in the partnership between UNESCO and L'Oréal.

For the past 22 years, the Fondation L'Oréal and UNESCO have run the *For Women in Science* Programme, to highlight the excellence of outstanding women scientists while encouraging and supporting a new generation of women researchers through networking, mentoring and fellowship opportunities. In 2020, the L'Oréal-UNESCO International Awards recognize five brilliant women researchers from Bangladesh, Europe, Lebanon, Mexico and the United States.

The work of these five researchers has led to significant breakthroughs in their respective fields, particularly with regard to the ecological transition and more sustainable industry. I salute the Laureates and Young Talents of this programme, and welcome their invaluable contribution to the sustainable wellbeing of our planet and all its inhabitants.

AUDREY AZOULAY

Director-General of the United Nations Educational, Scientific and Cultural Organization

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Building momentum on gender equality in science

Overcoming the significant obstacles preventing women scientists from breaking the glass ceiling is vital to finding solutions to humanity's greatest challenges.

As a new decade begins, the world of science still prevents women scientists from fulfilling their potential, depriving humanity of talents that could help solve the world's most pressing challenges. And no-where is this more evident than at the pinnacle of academic institutions. Only 17% of the world's top 200 universities are led by a woman,¹ with even fewer leading scientific departments, particularly in the fundamental sciences. In Europe, just 11%² of scientific senior research posts are occupied by women. We must empower more women scientists to break the glass ceiling if we are to thrive in the future.

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I have been an adjunct professor for over 20 years... in spite of having positive evaluations and recommendations for promotion

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ALUMNA OF THE
FOR WOMEN IN SCIENCE PROGRAMME

Since 1998, the L'Oréal-UNESCO *For Women in Science* programme has supported more than 3,400 women scientists worldwide. To understand the impact of gender discrimination on their careers, the **Fondation L'Oréal commissioned a unique, independent study of *For Women in Science alumnae* from 65 countries, across multiple disciplines and ages.**³ Their testimonies of 327 senior *alumnae* shine a light on the stark realities facing women in science – from the lack of opportunities for career progression to the challenges of work-life balance and sexual harassment – while providing compelling insights for pathways for change. **Around 60% of respondents agree that conventional scientific career paths and workplace cultures exclude women, slowing women scientists' career progression or even prompting them to leave science.** In particular, **55% said they faced gender bias in hiring, promotion and funding decisions,** with women receiving smaller grants, lower salaries and less start-up funding than men. *"I have been an adjunct professor for over 20 years... in spite of having positive evaluations and recommendations for promotion,"* one *alumna* said. Women starting research groups also have comparatively less access to the facilities, mentorship and teams they need to succeed.⁴

55% of the alumnae said they faced gender bias in hiring

Over half (54%) of *alumnae* have experienced steep challenges in building a reputation and gaining visibility for their work, with fewer opportunities to participate in committees, juries, editorial boards and events. **Meanwhile, 61% have struggled to maintain ownership of projects and publications,** with one *alumna* being encouraged to sign her paper with

initials to avoid revealing her gender, for example. *"This was unacceptable for me and, of course, I signed using my full name,"* she says. *"The paper was finally accepted. But the prejudice was installed."*

One *For Women in Science alumna* was congratulated by a man scientist with the words *"I liked your talk, you think like a man"*, revealing that people too often visualise successful scientists as men.

The problem is not limited to perceptions. **The whole system has been designed not for women, but by men, for men.**

60% of the *For Women in Science alumnae* interrogated by the Fondation L'Oréal's independent study reported that their career timing and goals had an influence on when and whether to become a parent. *"[Family and caregiving factors] have made me think strategically about when to have children and [affected] my decision about which institutions to join,"* one *alumna* said. Additionally, **67% agreed that having a child was guaranteed to affect a woman's career in science.**

The lack of progressive parental and childcare policies is symptomatic of a broader exclusion of women from the system, according to *For Women in Science alumnae* study.

Scientific careers now require longer ladders, with fewer permanent positions available,⁴ and more competition for each.

Challenges faced by *For Women in Science alumnae* have included **low pay, lengthy studies and job insecurity, all of which pose a risk to both career progress and work-life balance.** In particular, any young researcher whose social or economic situation prevents her from moving country or accepting insecure, poorly paid or short-term contracts is likely to experience obstacles to advancing in science. Among respondents aged 25-34, 41% considered length of study and low pay without employment security as major challenges. Financial insecurity (cited by 41% of those

25-34 and 47% of those 35-44) and contract insecurity (39% of the youngest group) were also among the most challenging career hurdles. But this is more than a question of gender bias: **53% of respondents to our survey confirming they had witnessed sexual harassment over the course of their career, and 47% experiencing it at least once.** *Alumnae* testimonies suggest that harassment begins with multiple acts of 'micro-aggression', small daily comments, behaviours or scenarios that become normalised and if unchecked, create a 'toxic' atmosphere for women scientists, and can escalate to gender-based hostility and even serious offences. **Some 24% had experienced a sexist joke and 22% had experienced a hostile remark about women at least once in the past 12 months,** while 21% of senior *alumnae* had seen staff or students leave due to harassment. Women scientists without children tend to experience aggression relating to their gender more frequently than those with children, our survey suggests. Women's experiences in academia are improving, and men are joining the fight for equality. However, only 25% of *alumnae* believe their institutions' sexual harassment measures are adequate and only 45% think their institutions comprehend the extent of the gender issue, despite **76% confirming their employers could do more to advance women leaders.** The change required is systemic and transformational, encompassing a radical shift in mind-sets and attitudes.

We must reinvent the very fabric of scientific career paths and workplaces, and re-imagine the definition of academic success. Importantly, institutions – and their predominantly male leaders – have a major responsibility to act and address gender-based discrimination. This could start with acknowledging and measuring gender gaps, and proceed to constructive policies that empower women, fight bias and create a level playing field for everyone in science. Many remarkable women scientists, including our *For Women in Science alumnae*, have persisted with courage and

passion in a world designed by and for men. Now, more than ever, **we must unleash women's potential and harness the diverse perspectives and talents of women** – and all marginalised groups – to help create a brighter future. With the freedom to advance and flourish, women will play a major role in creating science-led solutions that benefit everyone equally.

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We must unleash women's potential and harness the diverse perspectives and talents of women

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1 - World University Rankings 2019.

2 - UNESCO Science report toward 2030 (2015).

3 - This study was conducted from January 29th to February 11th 2019 with *For Women in Science alumnae*. It comprised both an online survey and five qualitative telephone interviews. It was further informed by and extensive review of relevant academic and professional literature.

4 - Acton, S. E., Bell, A., Toseland, C. P. & Twelvetrees, A. Preprint at *BioRxiv* <https://doi.org/10.1101/571935> (2019)

5 - Kaplan, K. (2010). *Academia: the changing face of tenure.* *Nature*, 468(7320), 123-125

5 outstanding female scientists



LAUREATE FOR AFRICA AND THE ARAB STATES

Professor Abla Mehio Sibai

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-PACIFIC

Doctor Firdausi Qadri

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

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

Professor Esperanza Martínez-Romero

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

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.

LAUREATES

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 Awards, 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 afloat across the world."*

Doctor Firdausi Qadri



BIOLOGICAL SCIENCES

*Senior Scientist, Head Mucosal Immunology and Vaccinology Unit,
Infectious Diseases Division, International Centre 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.¹

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 peoples' 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.

1 - World Health Organization: https://www.who.int/maternal_child_adolescent/documents/9789241598415/en/

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*

“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 fertilisers, 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's 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, Tison 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."*

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 International rising talents programme 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* programme. These young women are the very future of science and recognising their excellence will help ensure that they reach their full potential.



*Scientific excellence
and innovation requires
both women and men,
I'm highly motivated
to continue my research
and make a positive impact
in society.*



DR NOUF MAHMOUD





Dr Laura-Joy Boulos

YOUNG TALENTS AWARDS - LEVANT

*Institut des NeuroSciences Appliquées et humaines (INSAN),
Saint-Joseph University, Beirut, Lebanon*

NEUROSCIENCE

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 programme, 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

YOUNG TALENTS AWARDS -
SUB-SAHARAN AFRICA

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

BIOMEDICINE

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

YOUNG TALENTS AWARDS - LEVANT

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

HEALTH SCIENCES

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."*



Georgina Nyawo

YOUNG TALENTS AWARDS -
SUB-SAHARAN AFRICA

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

MOLECULAR BIOLOGY, MEDICAL MICROBIOLOGY

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."*

ASIA PACIFIC



Dr Rui Bai

YOUNG TALENTS AWARDS - CHINA

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

BIOLOGICAL SCIENCES

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."*

ASIA PACIFIC



Dr Huanqian Loh

YOUNG TALENTS AWARDS - SINGAPORE

Centre for Quantum Technologies, National University of Singapore, Singapore

PHYSICS

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."*

ASIA PACIFIC



Dr Mikyung Shin

YOUNG TALENTS AWARDS - REPUBLIC OF KOREA

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

BIOMATERIALS

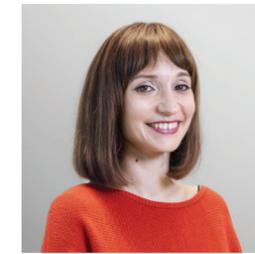
Dr Mikyung Shin is designing adhesive biomaterials for tissue regeneration and therapy. Inspired by the adhesive properties of ocean creatures, such as mussels and tunicates, and the astringent taste of plants, including fruit peel, nuts, and cacao, she is engineering a new type of adhesive polymer that 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.

EUROPE



Dr Vida Engmann

YOUNG TALENTS AWARDS - DENMARK

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

MATERIAL ENGINEERING

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.

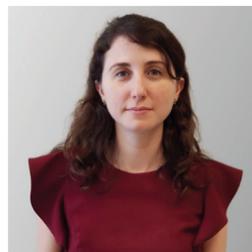
"These chemicals act in a similar way to those used in sun cream to block UV rays from harming our skin," she explains. *"I would love to contribute to stable, durable organic solar cells becoming available in the marketplace, and ultimately, creating a carbon neutral world."*

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 honoured to be part of this important task."*

EUROPE



Dr Serap Erkek

YOUNG TALENTS AWARDS - TURKEY

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

MOLECULAR BIOLOGY / EPIGENETICS

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."*

EUROPE



Dr Jennifer Garden

YOUNG TALENTS AWARDS - UNITED KINGDOM

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

CHEMISTRY

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. "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."

EUROPE



Dr Cristina Romera Castillo

YOUNG TALENTS AWARDS - SPAIN

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

MARINE SCIENCES

Some 8 million tonnes 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."

EUROPE



Dr Olena Vaneeva

YOUNG TALENTS AWARDS - UKRAINE

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

MATHEMATICS

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."

LATIN AMERICA



Dr Paula Giraldo-Gallo

YOUNG TALENTS AWARDS - COLOMBIA

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

PHYSICS

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."

LATIN AMERICA



Dr Patrícia Medeiros

YOUNG TALENTS AWARDS - BRAZIL

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

BIOLOGICAL SCIENCES

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."

NORTH AMERICA



Dr Elizabeth Trembath-Reichert

YOUNG TALENTS AWARDS - UNITED STATES OF AMERICA

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

EARTH SCIENCE / ENVIRONMENTAL SCIENCE

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."

A RIGOROUS SELECTION PROCESS

*255 nominations from
high level scientists*

FROM 62 COUNTRIES

Each nomination is reviewed
by 2 or 3 scientific experts
in the candidates' field
of research

*66 short-listed
candidatures*

FROM 15 COUNTRIES

Evaluated by a jury
of 12 eminent scientists

*Selection of the
5 Laureates*

1 from each of the world's regions



2020 International Jury

L'ORÉAL-UNESCO
FOR WOMEN IN SCIENCE AWARDS

To be considered for the International Awards and be recognised by the scientific community; each researcher had to be nominated by their peers: Presidents of universities, Academies of Sciences, Nobel Prize winners, or Laureates of a previous edition of the L'Oréal-UNESCO For Women in Science Awards. An international Jury composed of 12 eminent scientists selected the Award winners.

Professor Brigitte Lina Kieffer, PRESIDENT OF THE JURY

INSERM Research Director in Strasbourg France and member of the French Academy of Science

2014 L'Oréal-UNESCO Laureate

Professor Ana Belén Elgoyhen

Investigator at the Institute for Research on Genetic Engineering and Molecular Biology, National Scientific and Technical Research Council (CONICET), Buenos Aires, ARGENTINA

2008 L'Oréal-UNESCO Laureate

Professor Raymond N. Dubois MD, PHD

Dalton Professor of Biochemistry, Professor of Medicine; Mayo Clinic College of Medicine, Executive Director of the Biodesign Institute, Arizona State University, USA

Doctor Kanyawim Kirtikara

Office of the President, King Mongkut's University of Technology Thonburi, THAILAND

Professor Khaled Machaca

Professor of Physiology and Biophysics, Associate Dean for Research, Weill Cornell Medical College in Qatar, Doha, QATAR

Professor Boshra Salem

Emeritus Professor, Department of Environmental Sciences, Faculty of Science - Alexandria University, EGYPT
Adviser to the President of Pharos University in Alexandria for projects and International Relations

Doctor Peggy Oti-Boateng

Director, Division of Science Policy and Capacity-Building, Natural Sciences Sector, UNESCO, FRANCE

Professor Appolinaire Djikeng

Director, Centre for Tropical Livestock Genetics and Health (CTLGH) Chair, Tropical Agriculture & Sustainable Development, The Roslin Institute & Royal (Dick) School of Veterinary Studies, College of Medicine and Veterinary Medicine, The University of Edinburgh, SCOTLAND, UK

Professor Philip Hieter Fcahs, FRSC

Professor of Medical Genetics, Michael Smith Laboratories, University of British Columbia, CANADA

Doctor Jacques Leclaire

Scientific Director L'Oréal - Research & Innovation FRANCE

Professor Augusto Rojas-Martínez

Professor of Biochemistry and Molecular Biology, School of Medicine and Centro de Investigación y Desarrollo en Ciencias de la Salud, Universidad Autónoma de Nuevo León, MEXICO

Professor Anne Dejean-Assémat

Professor at the Institut Pasteur, INSERM Research Director, Institut Pasteur, Paris, FRANCE
Member of the French Academy of Science
2010 L'Oréal-UNESCO Laureate

Selection Committee

MEMBERS

*The 2020 International Rising talents
Selection Committee is composed of 14 highly regarded
scientists chosen from the L'Oréal-UNESCO
For Women in Science national and regional juries in Brazil,
Canada, Chile, China, France, India, Lebanon, Morocco,
Poland, Russia and the United States of America.*

Professor Caroline Robert

Head of the Dermatology Unit and Melanoma Team U981 at Gustave Roussy, Villejuif, Paris, FRANCE

Professor Marie Abboud

Director of the Physics Department, Faculty of Sciences, Saint-Joseph University, LEBANON
Member of the Levant and Egypt Regional Jury, and 2009 International Rising Talent

Professor Abdelaziz Benjouad

Vice President in charge of Research and Development, International University of Rabat, MOROCCO
President of the Maghreb Regional Jury

Doctor Bruno Bernard

L'Oréal Fellow, Scientific Directorate, L'Oréal Research & Innovation de Clichy, FRANCE

Professor Maria Vargas

Professor at the Department of Inorganic Chemistry, Federal University Fluminense (UFF), Member of the Brazilian Academy of Sciences and Commander of the National Order of Scientific Merit (2010), BRAZIL
Member of the Brazilian National Jury

Professor Nadia Ghazzali

Department of Mathematics and Computer Science, Université du Québec à Trois-Rivières (UQTR), Natural Sciences and Engineering Research Council of Canada (NSERC), Chair for Women in Science and Engineering, CANADA
Member of the Canadian National Jury

Professor Alexey Khokhlov

Vice-President and Member of Presidium of Russian Academy of Sciences, Head of Chair of Polymer and Crystal Physics, Physics Department, Lomonosov Moscow State University, RUSSIA
Chairman of the Russian National Jury

Doctor H Krishnamurthy

Scientist 'G'
Head, Research Facilities, National Centre for Biological Sciences, Tata Institute of Fundamental Research in Bengaluru, INDIA
Member of the Indian National Jury

Professor Ewa Lojkowska

Head of Department of Biotechnology, Intercollegiate Faculty of Biotechnology, University of Gdansk & Medical University Gdansk, Vice president of the Committee of Biotechnology at the Polish Academy of Sciences, President of the Polish National Jury, POLAND

Professor Gloria Montenegro

Professor of Biology and Natural Sciences of the Pontifical Catholic University of Chile, Full member of the Academy of Sciences for the Developing World, President of the Scientific Counsel Of Fundacion Copec PUC, CHILE
**President of the Chilean National Jury
1998 L'Oréal-UNESCO Laureate**

Doctor Shirley Malcom

Senior Advisor and Director, SEA Change American Association for the Advancement of Science, USA

Doctor Ai Sugiura

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

Professor Yan Shen

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

Professor Sabrina Stierwalt

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

The Fondation L'Oréal and UNESCO would like to express their gratitude to their partners Académie des Sciences, JCDecaux and Paris Aéroport for the support to the *For Women In Science* programme.

A powerful promotional display campaign raising awareness on the importance of women in science is running during March around the streets of Paris, as well as in nine major airports worldwide (Bangalore, Beijing, Dubai, Frankfurt, Johannesburg, London, Paris, New York, Sao Paulo and Shanghai).



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