L'ORÉAL-UNESCO FOR WOMEN IN SCIENCE

2015

For Women in Science

FONDATION L'ORÉAL

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The *L'Oréal-UNESCO For Women in Science* initiative began 17 years ago. Since that inaugural year, the L'Oréal Foundation and UNESCO (the United Nations Educational, Scientific and Cultural Organization) have strived to support and recognize accomplished women researchers, to encourage more young women to enter the profession and to assist them once their careers are in progress.

The solutions to attracting more women to science appear so obvious that few would disagree with them. We should, in particular, instill confidence in girls from an early age by showing them their own potential. More women scientists should also be able to obtain positions of responsibility, just like their male counterparts, so that future generations will have role models to inspire them.

The current situation, however, indicates that, well into the third millennium, a considerable discrepancy exists between what society professes to believe and what we actually do. Much remains to be done with regard to gender balance in science. Most tellingly, women account for only 30% of the world's researchers.* There are still great barriers that discourage women from entering the profession and obstacles continue to block progress for those already in the field. For this reason, in addition to its annual Awards, the L'Oréal-UNESCO partnership has established the International Rising Talents program, which is designed to accelerate the advancement of young women in science globally. The International Rising Talents are chosen from among the doctoral and post-doctoral researchers who have received fellowships from *L'Oréal-UNESCO For Women in Science*'s national and regional programs.

**UNESCO Institute for Statistics, 2014*

L'Oréal-UNESCO For Women in Science *program, since 1998 more than:*

2250 women recognized in more than 110 countries

87 Awards Laureates honored for excellence in science, including two who went on to win the Nobel Prize

2170 talented young women scientists granted Fellowships to pursue promising research projects

L'ORÉAL-UNESCO
FOR WOMEN IN SCIENCE
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WOMEN CASTING A LIGHT
on the scientific agenda

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Fittingly, this edition of the *L'Oréal-UNESCO For Women in Science* Awards coincides with the United Nations' International Year of Light, led by UNESCO. A metaphor for knowledge, wisdom and intelligence, light symbolizes science itself, the progress that it brings and the attitude with which it is approached. The 2015 Award Laureates and International Rising Talents are indeed illuminating our path to a better world. Giving more women access to science will not only benefit research, it will also contribute to a fairer and more democratic society.*

**The Norwegian Government Committee for Gender Balance in Research (2010-2013)*

L'ORÉAL-UNESCO
FOR WOMEN IN SCIENCE
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GENDER DIVERSITY
for greater relevance

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In a world of finite resources for scientific research – limited funding, infrastructure and human capital – several key questions of science must be considered: To what topics should research resources be dedicated? What are our most urgent challenges? Which paths should be taken to overcome those challenges? Which types of research are most likely to increase well-being? At a deeper level, the questions become more specific. For example: Which diseases are the most threatening? What are the most effective methods for reducing pollution? For saving energy? Needless to say, these decisions are not made by scientists alone, but they nevertheless have great influence over choices made.

Of course, science itself knows no borders and no discrimination – it is gender-neutral and color-blind. In order to ensure that science serves the interests of all, the scientific community should be as diverse as society itself. The voices of women, who make up one half of humanity, must be heard if research is to remain relevant to all and to solve our most pressing problems.

Furthermore, numerous studies suggest that the greater the range of diversity in a research team, the greater the quality of the research. To provide a concrete example, how often a research team's work is cited by other scientists is an important indicator of how the scientific community perceives the quality of the team's work. In one of the most recent studies, it was found that gender-diverse research teams received 34% more citations by peers.* It has been posited that a greater variety of viewpoints and approaches can create the conditions for better-quality research. More diverse input can produce more efficient ways of finding answers and more creative ways of using such answers to go on to the next step.

** Campbell LG, Mehtani S, Dozier ME, Rinehart J (2013) Gender-Heterogeneous Working Groups Produce Higher Quality Science*

L'ORÉAL-UNESCO
FOR WOMEN IN SCIENCE
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DECISION MAKERS
and inspiring role models

LESS THAN 3% OF NOBEL PRIZES IN SCIENCE ARE AWARDED TO WOMEN.

DECISION MAKERS
and inspiring role models

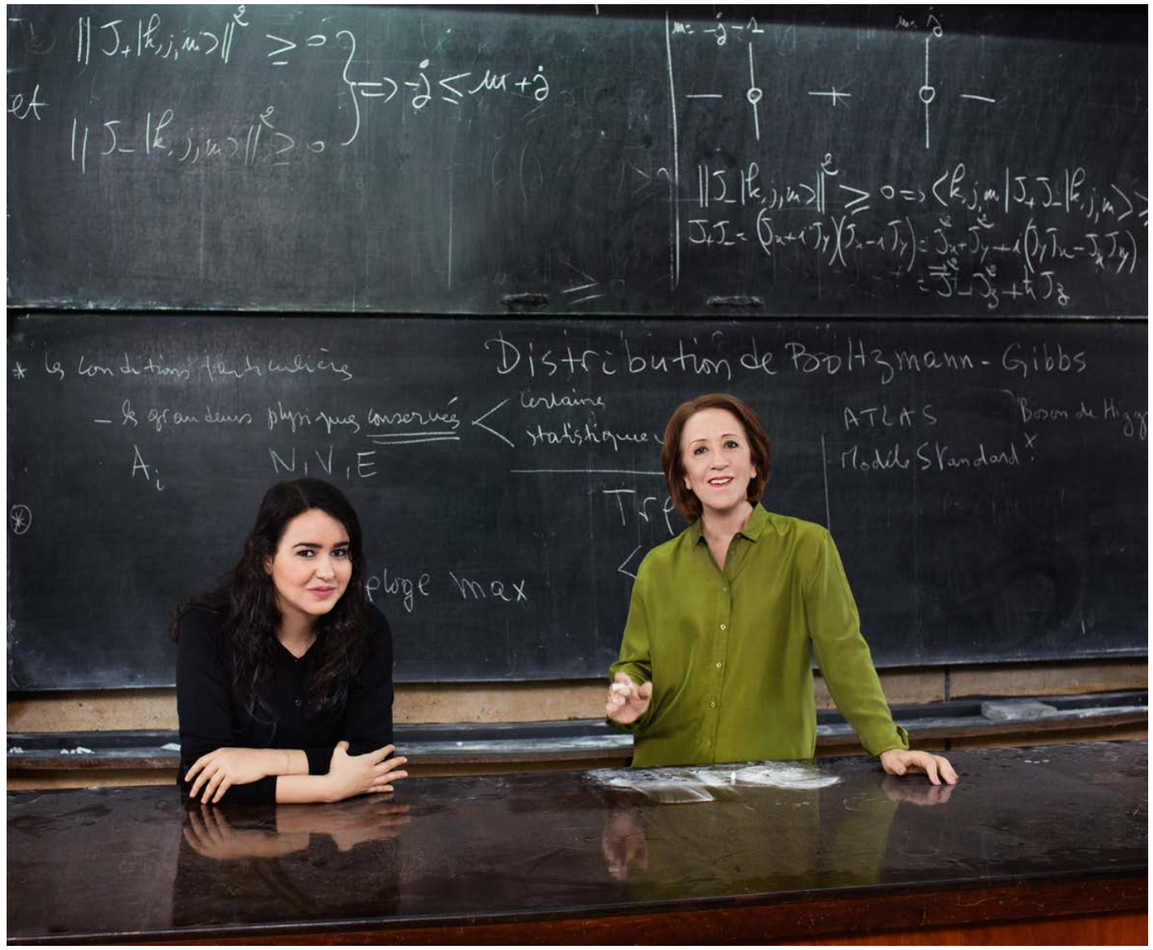
Nowhere is the gender imbalance in science more glaring than in the profession's highest echelons. Women hold only 10% of the field's top academic positions, and the majority of science awards are won by men.* Of the 575 individuals awarded a Nobel Prize in Medicine, Chemistry and Physics, only 16 were women.

Science is key in the modern world, and its significance and impact are destined to grow by leaps and bounds. More scientific leaders will be needed and more leadership positions will have to be filled. Women are already suffering from a power deficit in the research arena and they must be given the chance to catch up quickly.

This year's Award Laureates illustrate precisely what high-ranking women can achieve: Fundamental breakthroughs in nuclear physics, astronomy, energy technology, life-saving medical techniques and mass spectrometry.

**Data from 14 countries compiled by the Boston Consulting Group in 2013: France, Germany, Spain, UK, US, Japan, China, Brazil, Argentina, South Africa, Morocco, Egypt, India and Indonesia. Averages calculated from statistics in 7 countries: France, Germany, Spain, UK, US, Japan, China (urban). Main sources: UNESCO, OECD and national statistics institutions.*

DECISION MAKERS
and inspiring role models



Scientific research has much to gain from greater diversity and gender parity at the highest administrative and academic levels. The women occupying these posts will be seen as role models for coming generations. Their presence will provide positive encouragement to scientifically-gifted young women who might otherwise hesitate to choose this career path due to cultural stereotypes. When all is said and done, more women at the pinnacle could mean more women in science.

2015 FOR WOMEN IN SCIENCE AWARDS LAUREATES

Stellar achievements

AWARDS JURY IN PHYSICAL SCIENCES

The members of the International Awards Jury in the Physical Sciences are prominent scientists from around the world, all representative of excellence in their respective fields. Members were personally selected by the jury president, Professor Ahmed Zewail, winner of the 1999 Nobel Prize in Chemistry. Due to personal circumstances, Professor Zewail was unable to chair the 2015 jury. Professor Christian Amatore of the French Academy of Sciences kindly accepted our request to replace him as this year's acting president.

PRESIDENT OF THE JURY

Professor Ahmed ZEWAIL
Nobel Prize in Chemistry 1999,
California Institute of Technology, USA

ACTING PRESIDENT

Professor Christian AMATORE
Chemistry Department,
École Normale Supérieure de Paris, FRANCE

Professor Beatriz BARBUY
Institute of Astronomy, Geophysics and Atmospheric Sciences,
University of São Paulo, BRAZIL
L'Oréal-UNESCO Awards Laureate 2009

Professor Margaret BRIMBLE
Chair of Organic and Medicinal Chemistry, *University of Auckland, NEW ZEALAND*
L'Oréal-UNESCO Awards Laureate 2007

Professor Sylvio CANUTO
Institute of Physics,
University of São Paulo, BRAZIL

Professor Majed CHERGUI
Professor of Physics and Chemistry,
Swiss Federal Institute of Technology,
Honorary Professor, *University of Lausanne, SWITZERLAND*

Doctor Laurent GILBERT
Director, Worldwide Raw Materials, and Director Advanced Research, Physical and Chemical Sciences, *L'Oréal, FRANCE*

Professor Malik MAAZA
iThemba LABS, *National Research Foundation of South Africa, SOUTH AFRICA*

Professor Jehane RAGAI
Department of Chemistry, School of Sciences and Engineering,
The American University in Cairo, EGYPT

Professor H. Eugene STANLEY
Professor and Director, Centre for Polymer Studies, *Boston University, USA*

Professor Mitchell WINNIK
Professor of Chemistry, Faculty of Arts and Sciences, *University of Toronto, CANADA*

Professor Dongping ZHONG
Robert Smith Professor, Department of Physics, Professor, Department of Chemistry and Biochemistry,
Ohio State University, USA

Professor Tebello NYOKONG
Director of DST/Mintek Nanotechnology Innovation Centre, Department of Chemistry,
Rhodes University, SOUTH AFRICA

Professor Vivian WING-WAH YAM
Philip Wong Wilson Wong Professor in Chemistry and Energy, Chair Professor of Chemistry, Department of Chemistry,
The University of Hong Kong, CHINA

2015 FOR WOMEN IN SCIENCE AWARDS LAUREATES
Stellar achievements

Each of the five 2015 *L'Oréal-UNESCO For Women in Science* Awards Laureates has cast her own brilliant light on the physical sciences, and each has attained great distinction in her particular field. From the infinitely large to the infinitely small, from discoveries that illuminate our understanding of the origins of the universe to inventing new devices and methods for treating diseases, from deciphering protein function to creating innovative materials for transmitting energy, their contributions to science are of the highest order. The gender imbalance in the physical sciences is even greater than in science overall. For example, in the United States, in one major field of the physical sciences, physics, women account for only 20% of doctorates.* Each Laureate is a shining example not only of what women can achieve in the physical sciences, but of female excellence in general. Each is a role model to inspire future generations.

The *L'Oréal-UNESCO For Women in Science* Awards are presented every year to five women, one from each world region (Africa and the Arab States, Asia-Pacific, Europe, Latin America and North America) in recognition of their scientific accomplishments. Scientists around the world are invited to submit candidates, and an independent international jury of eminent scientists makes the final selection.

**American Physical Society http://www.aps.org/programs/education/statistics/womenphysics.cfm*

2015 LAUREATE
Africa and the Arab States

Professor Rajaâ Cherkaoui El Moursli

High Energy Physics and Nuclear Physics

Professor, Mohammed V University, Rabat, Morocco

For her key contribution to the effort that led to the detection of the Higgs Boson, the particle responsible for the creation of mass in the universe.

Professor Rajaâ Cherkaoui El Moursli contributed to one of the greatest discoveries in physics: proof of the existence of a subatomic particle called the Higgs Boson. It had long been theorized that neutrons and electrons could not exist unless there was another, even smaller particle that enabled them to take on mass. However, unlike other atomic components, the Higgs Boson—if, in fact, it existed—could not be observed in natural conditions. Protons would have to be forced to collide at ultra-high speed and a detector would have to record exactly what happened. In 2012, two marvels of modern science developed by a worldwide consortium of nations, the Large Hadron Collider at CERN and the ATLAS experiment, created just such conditions. ATLAS focuses on the basic forces that have shaped our Universe since the beginning of time, the forces that will also determine its ultimate fate. Professor Cherkaoui El Moursli contributed significantly to the construction, simulation, test and launch of the Electromagnetic Calorimeter, one of the sub-detectors of the ATLAS experiment. To great fanfare and thanks partly to her contribution to the ATLAS detector, the existence of the Higgs Boson was indeed proven. And, along with it, new pathways for exploring the nature of matter and energy.

A TRUE PIONEER

A true pioneer, Professor Cherkaoui El Moursli had to overcome a number of daunting obstacles to pursue a career in science. "The first challenge was to convince my father to allow me to go to France for graduate studies. At that time, Moroccan society was still quite conservative, and most girls didn't leave home until they got married." Fortunately for science, two factors fueled her determination to follow her dream: a dedicated high school teacher who encouraged her and Neil Armstrong's first steps on the moon, a scientific wonder, which filled her with awe.

"RESEARCH ACTIVIST"

As active locally as she is internationally, Professor Cherkaoui El Moursli dedicates much of her time and energy to ensuring that science in her country is world class. Among other achievements, she organized her country's participation in international scientific networks on the web, ensuring that Moroccan researchers have access to the latest developments in their fields as well as enabling them to publish their own findings. She was also instrumental in improving local healthcare by establishing a program for a master's degree in medical physics, the first one in Morocco. The head of her university's R&D, Collaboration and Partnership team, a member of Hassan II Academy of Science and Technology and a member of many academic associations, Professor Rajaâ Cherkaoui El Moursli is indeed—in the words of one Moroccan magazine—a "research activist".

2015 LAUREATE
Asia-Pacific

Professor Yi Xie

Inorganic Chemistry

Professor, University of Science & Technology of China, Hefei, China

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For her significant contributions to creating new materials a few atoms thick with promising applications in conversion of heat or sunlight into electricity.

Professor Yi Xie's research is on the cutting edge of one of our planet's most crucial issues: harnessing materials for energy conversion. She is working with new unconventional materials only a few atoms thick, known as two-dimensional nanomaterials, in order to maximize the use of electrons to convert energy more efficiently. Her work will contribute to reducing our dependence on ever-scarcer fossil fuels, lessening pollution and boosting energy utilization efficiency.

EMERGING CONCEPT FOR NEW ENERGY CONVERSION MATERIALS

The materials currently used to produce or transfer energy, such as the semiconductors that harvest solar energy to generate electricity, are surprisingly inefficient. Much of the energy—carried by the electrons—is lost along the way: rather than traveling directly to reach reaction molecules or device electrodes, the electrons "bump into each other or onto material." This causes energy carriers to be destroyed, and unnecessary and destructive heat to be generated. The new ultra-thin materials that Professor Xie's team is experimenting with are designed to reduce such energy loss via surface structure optimization. They are also far more efficient in harvesting and converting energy sources than conventional materials, pushing energy utilization to the limit.

TEACHING FOR THE FUTURE OF OUR PLANET

Acutely aware that the future of our planet will depend enormously on advances in her field of study, Professor Xie is deeply committed to passing on her knowledge and passion to a new generation. Her reputation as a professor and mentor is on par with her reputation as a researcher, and she has won nearly as many prizes for excellence as an educator as she has for her scientific achievements. Among many other honors, she received the Hok Ying Tung Young Teachers Award at the beginning of her career and was more recently the recipient of the Chinese Academy of Sciences Graduate Advisor Award for several consecutive years. Her attitude is certainly best conveyed by a pithy sentence she addresses to prospective new applicants on her laboratory's website: "Enthusiasm for science is the one prerequisite."

2015 LAUREATE
Europe

Professor Dame Carol Robinson

Physical Chemistry & Mass Spectrometry

Professor of Chemistry, Oxford University, United Kingdom

For creating a revolutionary method for studying how proteins function, particularly membrane proteins, which play a vital role in many life processes.

Professor Dame Carol Robinson is distinguished for establishing a field known as gas phase structural biology, a discipline she continues to dominate. To do so, she transformed a machine called a mass spectrometer from a device for simply determining the atomic make-up of a substance into a spectacularly high-performance tool capable of maintaining protein interactions. Renowned for her adventurous approach to science, she once took a drill to a brand new and very expensive mass spectrometer in order to modify it to suit her purposes. Thanks to this audacious flair for the unorthodox, Professor Dame Carol Robinson devised, among other things, a ground-breaking method for studying how proteins function. In particular, she discovered a novel way to study the proteins that are a part of the cell membrane and which play a critical role in the human body. Her pioneering work has completely revolutionized structural biology, an arena with vast potential for medical research of all kinds.

AN UNCOMMON PATH TO THE TOP

Professor Dame Carol Robinson's career path was, to say the least, uncommon. The woman who would go on to become a Dame of the British Empire as well as the first female Professor of Chemistry at two of the world's most renowned universities, Oxford and Cambridge, actually left school at 16. She took a job as a lab technician with a pharmaceutical company and thus began her atypical journey to the top. Once at the lab she realized that she would "soon be bored stiff" unless she furthered her education. Naturally, however, she did things her own way. Not only did she obtain her undergraduate degree from a university for adult learners—diplomas frequently looked down upon by the scientific establishment—she also took eight years off to devote herself to her family.

"THE TWO THINGS THAT MATTERED MOST"

Professor Dame Carol Robinson has faced many challenges, but when asked which was the greatest her response is quick and definite. "Balancing family and career. Initially, I resolved this by giving up my scientific career for eight years. Later I managed to find the right balance between the two things that mattered most to me. I did it by working in the early hours of the morning—I wasn't missed at 5 o'clock in the morning!"

2015 LAUREATE
Latin America

Professor Thaisa Storchi Bergmann

Physics and Astronomy

Professor, Federal University of Rio Grande do Sul, Porto Alegre, Brazil

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For her outstanding work leading to the understanding of how massive black holes form in the centers of galaxies, evolve and shape them.

Professor Storchi Bergmann's worldwide reputation stems from her contributions to our understanding of supermassive black holes, those mysterious compact objects whose gravitational pull is so strong that not even light can escape from them. Among her groundbreaking discoveries, Professor Storchi-Bergmann was the first to discern the orbital movement of matter around a super-massive black hole at the center of a nearby galaxy, a major step in advancing our comprehension of their behavior. She has also shown how the black holes influence the evolution of the galaxies via the accretion and ejection of matter from its surroundings. Professor Storchi Bergmann's discoveries constitute essential additions to our knowledge of these enigmatic phenomena, which hold the secrets to one of the deepest mysteries of the Universe: how do black holes change the course of galaxy history?

OPENING MINDS FOR A BETTER WORLD

Emulating an older cousin she perceived as the ideal of an emancipated, intelligent woman making her own way in the world, Professor Storchi Bergmann originally planned to become an architect. Once at university, however, she realized that she was "following someone else's dream." Instead, she found herself fascinated by physics and astronomy and thrilled by labs filled with people "exploring the universe and asking questions about nature all day long." No doubt this opportunity to open up to new learning possibilities – which she feels is denied to so many, especially in developing countries – motivates her belief that providing an education for all is the world's greatest challenge. "From malnutrition to poverty to disrespect for the environment to extremist beliefs that lead to violence – education could go a long way in solving these problems. Teaching should be considered the most important job in our societies."

SCIENCE AND MOTHERHOOD? YES!

It's not surprising that a woman who took her infant son with her on a three-month mission to a foreign observatory, walking up and down a mountain several times a day to feed him, feels that a scientist can also be a good mother. Hence Professor Storchi Bergmann's wholehearted advice to girls considering a research career but wondering whether it is compatible with family life: "Go for it!"

2015 LAUREATE
North America

Professor Molly S. Shoichet

Polymer Chemistry

Chemistry and Biomaterials & Biomedical Engineering, University of Toronto, Canada

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For her pioneering approach to biomaterial development to regenerate damaged nerve tissue and for her development of a new method to deliver drugs to the spinal cord and brain.

Professor Molly S. Shoichet, a polymer scientist, is putting chemistry in service of medicine in spectacular new ways. She focuses particularly on promoting repair in diseases such as stroke, spinal cord injury and blindness, all of which involve "disconnections" in the pathways formed by brain and nerve cells. Her goal is to find ways to restore these lost connections. One strategy involves stem cell transplantation, and Professor Shoichet aims to overcome a major hurdle that could lead to truly miraculous cures: the difficulty of keeping transplanted stem cells alive long enough for them to integrate into the nervous system. To accomplish this she is engineering new materials that will enhance stem cell survival and integration. The other strategy involves finding ways to stimulate the stem cells that already exist in our brains so that they can mend damaged tissues. In this case, the challenge is to design new methods for delivering drugs directly to the brain. Both of these new strategies, for stem cell delivery and drug delivery, rely on the high-tech polymers that are Professor Shoichet's field of expertise. She and her team are also creating new materials that will selectively deliver drugs directly to cancer cells, thereby overcoming some of the terrible side effects of current treatments.

"SOLVING PROBLEMS TOGETHER"

According to friends and family, such dazzling advances in medical research can be attributed not only to Professor Shoichet's brilliant mind but also to her consummate people skills. Befitting the motto of her lab, "Solving Problems Together," she is also quick to praise others for their work and her approach is passionately multidisciplinary, bringing together scientists, clinicians, engineers and others in an effort to provide solutions to some of the biggest challenges in medicine.

NOT THE IVORY TOWER

Professor Shoichet is the only scientist – male or female – who has been elected to all three of her country's science academies, the Canadian Academy of Sciences of the Royal Society of Canada, the Canadian Academy of Engineering and the Canadian Academy of Health Sciences. Yet, along with her many accomplishments in the laboratory and her dedication to her family, she also finds time for a wide variety of activities ranging from participating in special athletic events for people with spinal cord injuries to helping anti-racism organizations, to a social media campaign, Research2Reality, designed to "connect today's research with tomorrow's reality."


弦誦園

L'ORÉAL-UNESCO
FOR WOMEN IN SCIENCE
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INTERNATIONAL RISING TALENTS
A luminous future

SELECTION COMMITTEE

The 2015 International Rising Talents Selection Committee is composed of 12 highly regarded scientists chosen from members of the *L'Oréal-UNESCO For Women in Science* national and regional jury.
They are from Brazil, Canada, Chile, China, France, Germany, India, Italy, Lebanon, Morocco, Poland and Russia.

Doctor Marie ABBOUD
Associate Professor and Former Director of the Physics Department, Faculty of Sciences, *Saint-Joseph University, LEBANON*

Professor Abdelaziz BENJOUAD
Vice President in charge of Research and Development, *International University of Rabat, MOROCCO*

Docteur Bruno BERNARD
Senior Research Fellow, *L'Oréal Research and Innovation, FRANCE*

Professor Nadia GHAZZALI
President of the *Université du Québec à Trois-Rivières (UQTR),* Natural Sciences and Engineering Research Council of Canada (NSERC) Chair for Women in Science and Engineering, *CANADA*

Ms Lucy HOAREAU
International Basic Sciences Program Section, *UNESCO, FRANCE*

Professor Aleksey KHOKHLOV
Vice-Rector of Moscow State University and Chair of Polymer and Crystal Physics, Physics Department, *Moscow State University,* Member of *Presidium of Russian Academy of Sciences, RUSSIA*

Doctor H. KRISHNAMURTHY
Director of the Central Imaging and Flow Cytometry Facility at the National Centre for Biological Sciences, *Tata Institute of Fundamental Research in Bangalore, INDIA*

Professor Ewa ŁOJKOWSKA
Head of Department of Biotechnology, Intercollegiate Faculty of Biotechnology, *University of Gdansk & Medical University of Gdansk,* Vice president of the Committee of Biotechnology at the *Polish Academy of Sciences, POLAND*

Professor Gloria MONTENEGRO
Professor of Biology and Natural Sciences of the *Pontificia Católica University from Chile,* Full member of the *Academy of Sciences for the Developing World, CHILE*

Professor Marcella MOTTA
Former Professor of Physiology, *Università degli Studi di Milano,* Former Scientific Director of *Milan University's* Centre of Oncological Endocrinology, past Director of the Institute of Endocrinology, *Università degli Studi di Milano,* Effective Member of the *Istituto Lombardo: Accademia di Scienze e Lettere, ITALY*

Professor Yan SHEN
Chinese Academy of Sciences,Vice President of China Association for Science and Technology, Deputy Director of *National Nature Science Foundation of China, CHINA*

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

Doctor Gerlind WALLON
Deputy director of the *European Molecular Biology Organization (EMBO),* Director at the *Christiane Nüsslein-Volhard Foundation, GERMANY*

INTERNATIONAL RISING TALENTS
A luminous future

Dedicated to both honoring distinguished women scientists and supporting promising young women researchers throughout their careers, the *L'Oréal-UNESCO For Women in Science* program has established the International Rising Talent Grants awarded annually to 15 PhD students and post-doctoral Fellows. Chosen from among the winners of the 236 fellowships awarded locally by L'Oréal subsidiaries and UNESCO around the world, these young researchers are indeed the future of science.

International Rising Talents are chosen from countries in each world region, Africa & Arab States, Asia-Pacific, Europe, Latin America and North America. This year's International Rising Talents are already making significant contributions in disciplines as varied as ecology and sustainable development, physics, pharmacology, epidemiology, medical research, neuroscience and evolutionary biology.

AUSTRALIA
Kathryn Holt

Research Fellow, Department of Biochemistry and Molecular Biology, Bio21 Institute, University of Melbourne

FIELD OF RESEARCH
Pathogen Genomic Epidemiology

For her project on tackling an emerging drug-resistant superbug.

Doctor Kathryn Holt is using a combination of genetics, math and supercomputers to study the genomes of disease-causing bacteria in order to understand how they spread. Breaking new scientific ground with her investigation of typhoid fever in Kathmandu, she discovered the disease does not spread as was previously thought. Her research is already changing the way public health officials respond to epidemics.

Dr. Holt will be using the same techniques to understand how "superbugs," deadly antibiotic-resistant bacteria, spread in hospitals. She aims to find out whether patients are catching these deadly diseases in the hospital or whether they are bringing the bacteria in with them. Her work will also help determine whether clinicians can be given early warning about drug-resistant bacteria spreading among their patients.

Concerned about the need to bring more women into science, Dr. Holt believes that society must "shift the expectations of family responsibilities to both parents equally. If both male and female scientists had to worry about picking up the kids from school or managing childcare while attending an international conference, then this would no longer disadvantage women (or men) who have families."

"Mentors have helped me immensely in my career. I'm now trying to pay it forward, by being generous with my time when it comes to offering advice to other young scientists."

BRAZIL
Carolina Andrade

Associate Professor, Laboratory for Molecular Modeling and Drug Design, Universidade Federal de Goias (Federal University of Goias), Goiania

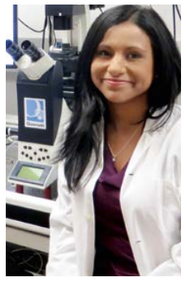
FIELD OF RESEARCH
Medicinal Chemistry

For her project on multi-target drug discovery for leishmaniasis using integrated strategies in Medicinal Chemistry.

Leishmaniasis is a disease caused by parasites that are mainly transmitted to humans by bites from infected sandflies. Endemic in 88 countries in Africa, South Asia, and Latin America, with an estimated 1.3 million new cases per year and 50,000 deaths annually, leishmaniasis is one of the three parasitic diseases with the highest mortality rates worldwide. The main treatments currently in use were discovered more than 50 years ago. These drugs are costly, their effectiveness is limited and they cause severe adverse effects.

Doctor Carolina Andrade aims to combat leishmaniasis by researching new multi-target drugs, meaning drugs that do double-or triple-duty. Instead of attacking only one of the parasite's vital functions, a multi-target drug attacks it in several places, which increases the chances of killing the parasite while decreasing its chances of becoming drug resistant. Dr. Andrade will focus on finding low-cost therapies affordable to patients in developing countries where the illness is most prevalent. Her work has the potential to change the lives of the millions of men, women and children suffering from this debilitating and often deadly disease.

"Thousands of people die every day from preventable diseases only because current treatments are too expensive or are not effective. Science can change that."



CANADA
Vanessa D'Costa

Postdoctoral Fellow, Research Institute, The Hospital for Sick Children, Toronto

FIELD OF RESEARCH
Immunogenetics of Infectious Diseases

For her project on Salmonella Typhimurium Pathogenesis: Characterization of the Role of Bacterial Effectors in the Evasion of Host Innate Immunity.

Doctor Vanessa D'Costa's research focuses on Salmonella, one of the leading causes worldwide of food-borne gastroenteritis, commonly called food poisoning. Severe cases of salmonellosis can cause death as well as contribute to the development of reactive arthritis, an autoimmune disorder that develops in response to infection. Recent years have seen an increase in infections by drug-resistant Salmonella, resulting in an urgent need to develop new treatments.

It is known that Salmonella causes infection by evading the immune system with the "help" of toxin-like proteins called effectors, whose function is not fully understood by scientists. Dr. D'Costa's research aims to elucidate how these effectors manipulate host cells and enable the food-borne pathogen to bypass the body's disease-fighting systems. She also hopes that her findings will provide insight into the functioning of other drug-resistant bacteria and, more generally, our understanding of the immune system.

"I would tell young aspiring scientists to follow your passion and be dedicated in whatever path you choose."

DENMARK
Signe Normand

Assistant Professor, Ecoinformatics & Biodiversity, Department of Bioscience, Aarhus University

FIELD OF RESEARCH
Plant Ecology, Macroecology, Biogeography

For her project on tundra change at the dawn of drone ecology.

Doctor Signe Normand is researching one of the most crucial issues of our day: climate change and its impact on biodiversity. To do so, she is employing small remote-controlled flying objects that have been, until recently, associated more with warfare than with scientific research: drones. Dr. Normand is focusing her work on how vegetation patterns are being altered in Greenland, one of the world regions that will be most affected by global warming.
Current knowledge of changing vegetation patterns in Greenland is limited because data is either collected from satellites, which do not provide sufficient detail, or gathered in the field by observers who can only cover relatively small areas of the world's largest island. Dr. Normand's drones are set to fill what might be called the "observation gap" between these two methods in several regions in Greenland. Not only will her research tell us more about how climate change will impact the Arctic, the methods she develops using drones are also applicable to other regions of the world. The more we know about the effects of global warming, the greater the chances of mitigating its effects on the well-being of humans, animals and plants.

"It is all about fascination and time for freely wondering about the world around us. Boys can be boys and girls can be girls and both can be scientists. My two little daughters are just as fascinated by dinosaurs, insects, stars and planets as they are by princesses and fairies!"

CHILE
Ariela Vergara-Jaque

Postdoctoral Fellow, NINDS, National Institutes of Health, Bethesda, Maryland

FIELD OF RESEARCH
Computational Structural Biology

For her project on the exploration of the structural basis of membrane transporter mechanisms through computational methods: one step closer to understanding neuropathological conditions.

An expert in structural biology and bioinformatics, Doctor Ariela Vergara-Jaque uses sophisticated computational tools to study proteins, the building blocks of the human body, which work like tiny machines to keep us alive. Through computer simulations she can observe the virtual "proteins" from all sides, see their movements in three dimensions and manipulate them according to various hypothetical scenarios to observe how they might behave.
Dr. Vergara-Jaque's current focus is on a family of proteins located in cell membranes, whose dysfunction has been implicated in complex neurological disorders. These proteins act as gates, allowing certain substances to enter the cells and other substances to leave. She aims to understand how the proteins rearrange their internal structure to permit or block passage of specific substances. When vital substances are blocked from entering or when substances that should be eliminated are retained, the cells malfunction and cause disease. Dr. Vergara-Jaque's ultimate goal, along with unraveling this complex, but important process, is to identify which parts of the protein might be targeted by drugs in order to fight disease. Her work could result in lifesaving therapies for a variety of neurological disorders.

"Diversity of ideas will move science forward at a faster pace."

EGYPT
Nourtan Abdeltawab

Assistant Professor, Department of Microbiology and Immunology, Faculty of Pharmacy, Cairo University, Cairo

FIELD OF RESEARCH
Immunogenetics of Infectious Diseases

For her project on the pharmacogenetics of Hepatitis C virus: Study of the effects of host genetics on the outcomes of a new triple therapy in the Egyptian population.

The Hepatitis C virus (HCV) represents a major global public health problem and Egypt has the highest prevalence of the disease in the world. Over 10 million Egyptians are infected with the illness. Although a new treatment exists, scientists have observed that, while some patients respond very well to it, others remain infected with the virus. It is known that, along with other factors, a patient's individual genes affect these outcomes. Immunologist Doctor Nourtan Abdeltawab is setting up a study designed to determine precisely which genetic components in the Egyptian population influence the success or failure of the treatment.

Dr. Abdeltawab's ultimate goal is to create a genetic test that will determine whether the new Hepatitis C medicine is right for any given patient, rather than the trial and error approach that is, for the moment, the only choice available to doctors. Her research will lead to more in-depth knowledge of how a disease of epidemic proportions can be curbed and, most especially, enable more personalized treatments that, for many patients, can cure the illness with little or no suffering.

"Seeing the sparkle in my students' eyes when they grasp an idea is one of the many rewards of a career in science."

FRANCE
Aurore Avarguès-Weber

Postdoctoral Fellow, Centre de Recherche sur la Cognition Animale, CNRS, Université Toulouse 3

FIELD OF RESEARCH
Cognitive Neurosciences

For her project on cracking the neurobiological mechanisms of visual cognition in a miniature brain.

Cognitive neuroscientist Dr. Aurore Avarguès-Weber specializes in studying the behavior of social insects, particularly bees. Her work has already disproven the idea that bees are simple creatures with pre-programmed brains operating on instinct alone. On the contrary, she has shown that these insects, whose brains are no bigger than a pinhead, have the ability to access cognitive levels comparable to mammals. Investigating their miniature yet high-performance brains opens up fascinating perspectives for numerous arenas in science.

Dr. Avarguès-Weber's current project focuses on understanding how these tiny brains carry out complex visual tasks. In other words, how do bees see? With so few neurons available to process the information received by their eyes and sent to their brains, how can they distinguish between different objects in their environment? Amazingly, not only do bees see quite well, they actually recognize faces. Using an ingenious experimental method she has developed, Dr. Avarguès-Weber is attempting to understand how this is possible. In addition to telling us more about how our own brains function, her findings will also have potentially major implications for fields as varied as artificial intelligence, device miniaturization and medicine.

"Doors open when you're really enthusiastic about your studies."

LEBANON
Sanaa Sharafeddine

Associate Professor, Department of Computer Science and Mathematics, Lebanese American University (LAU), Beirut

FIELD OF RESEARCH
Computer Science

For her project towards optimized smart grid network design and operation in developing countries.

A reliable supply of electricity is frequently a major problem in developing countries, with large-scale shortages that lead to regular power blackouts and severe electricity rationing. Power plants with limited capabilities and outdated equipment, transmission and distribution losses, and performance inefficiency are all too often the norm. At best, such limited access to power is inconvenient; at worst it is dangerous, highly detrimental to business and industry, and exacerbates poverty and its consequences.

A computer scientist and networking expert, Doctor Sanaa Sharafeddine is exploring ways communications infrastructure, networking technologies, and computing can improve the efficiency and quality of electric power grids in emerging nations while also saving energy. She is currently focusing on how digital technology could be utilized to enhance Lebanon's power grid at different stages from the generating plant to the customer's premises, in order to monitor, measure and control the flow of electricity as well as the flow of data and information. Dr. Sharafeddine's findings will contribute to enhancing economic performance and quality of life in her own country and throughout the developing world.

"Mentors—experienced people who can give you the right advice at the right time—are crucial to one's success."

MALAYSIA
Yoke-Fun Chan

Senior Lecturer, Department of Medical Microbiology, Faculty of Medicine, University Malaya, Kuala Lumpur

FIELD OF RESEARCH
Molecular Virology

For her project on the development of novel therapeutic peptides targeting host autophagy machinery against enterovirus A71 infection.

Doctor Yoke-Fun Chan's research centers on enterovirus A71, a virus that causes hand, foot and mouth disease in children. The virus is prevalent in Southeast Asia, especially in Dr. Chan's home country of Malaysia. By age 12, about 80% of Malaysian children have contracted the infection. An emerging global problem, Enterovirus A71 is rapidly evolving and recent outbreaks caused not only hand, foot and mouth disease but were also associated with brain infection, which can be fatal.

There are currently no anti-viral agents to treat the illness. Dr. Chan aims to develop a treatment that targets the body's autophagy mechanism, the process by which cells "eat" the virus and store it. The virus takes advantage of this mechanism to survive and multiply. Dr. Chan will attempt to use protein-based treatments to block the autophagy mechanism, which, in turn, will also block the virus. Her work may provide a cure for an emerging and potentially catastrophic infectious disease.

"I believe the three Ps are the secret to my success in science: Passion, Perseverance and Positive Thinking."

MAURITIUS
Bhama Ramkhelawon

Postdoctoral Fellow, New York University Langone Medical Center School of Medicine, New York

FIELD OF RESEARCH
Medicine (Diabetes and Obesity)

For her project on how Hypoxia sustains low-grade inflammation by inducing Netrin-1 expression in adipose tissue resident macrophages in obesity.

Obesity is one of the leading causes of preventable death worldwide. The World Health Organization (WHO) states that obesity could soon surpass issues such as inadequate nutrition and infectious diseases as the most prevalent cause of poor health. Doctor Bhama Ramkhelawon is researching one of the main consequences of obesity, chronic inflammation, which leads to a wide range of serious illnesses, notably diabetes.

Dr. Ramkhelawon and her team previously discovered that the body's "clean-up" cells, known as macrophages, secrete a substance called Netrin-1 when they are located in fatty tissues. Netrin-1 induces these clean-up cells to accumulate in adipose tissues while also preventing them from carrying away pathogens and unwanted fat cells. The result of this build-up of poorly performing cells is inflammation, which is quite harmful to the body. What is not understood, however, is precisely why these cells secrete Netrin-1. Dr. Ramkhelawon has hypothesized that the underlying problem may be hypoxia, a lack of oxygen in the fast-expanding fat. The blood vessels carrying oxygen cannot reach the increasing energy demand of the fat depots. If her idea proves correct, her research could open the door to new and more effective treatments for the numerous inflammation-related diseases associated with obesity.

"An idea I cherish: Perfection, although not attainable, can lead you to excellence. Learn the best from the best."

MEXICO
Matilde Jimenez Coello

Lecturer & Researcher, Centro de Investigaciones Regionales Dr. Hideyo Noguchi de la Universidad Autónoma de Yucatán

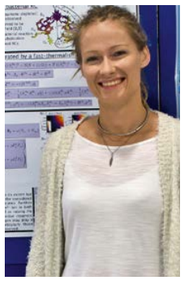
FIELD OF RESEARCH
Infectious Diseases

For her project on the expression and validation of potential cardiac biomarkers in an animal model infected with Trypanosoma cruzi (DTU I and VI) during acute and chronic phases of Chagas disease.

Chagas disease is a parasitic infection affecting approximately 7 to 8 million people in Latin America. Carried by the insect triatoma dimidiate, the illness is responsible for more than 15,000 deaths every year. Chagas disease is a three-phase condition with an acute phase, a 10-30 year inactive phase with no symptoms, and a chronic phase that concerns some 30% of those infected and causes serious damage to various organs, especially the heart and digestive system.

Doctor Matilde Jimenez Coello's research centers on biomarkers, substances in the body whose presence indicates a disease. In this case, she is studying and verifying potential cardiac biomarkers for Chagas disease as well as attempting to determine whether those biomarkers differ according to the particular strain of the disease. Dr. Jimenez Coello's work should lead to more effective diagnosis and treatment of the illness, a greater understanding of its effects on the body and possible avenues to a cure.

"The support I received from women mentors gave me the wings to fly."



SOUTH AFRICA
Adriana Marais

PhD Student, Quantum Research Group, University of KwaZulu-Natal, Durban

FIELD OF RESEARCH
Physics, Quantum Biology

For her project on the quantum origins of life: A description of the emergence of life from inanimate matter.

Quantum biology is a field that makes use of quantum physics, the study of the smallest particles in existence, to learn more about living things. For Ms. Marais, this discipline has led her to perhaps the most intriguing question of all in the minds of both scientists and non-scientists alike: What is life? More specifically, how did living matter originally emerge from the inanimate liquids, solids and gases that make up the universe?

It has been theorized that light must have played a part in the genesis of life, so Ms. Marais is employing quantum physics to investigate photosynthesis—the process through which plants transform light from the sun into energy to "feed" themselves. In other words, how they utilize light to create and sustain life. Ms. Marais's research will also contribute to answering less metaphysical questions: Understanding the energy transformation mechanisms of plants could lead to biomimetic technologies that imitate nature's effectiveness in using the sun to power complex systems.

"A society with only men doing science can do only half the science that could be done if women were more involved."

SPAIN
Eva Pellicer

Ramon y Cajal Researcher, Physics Department, Universitat Autònoma de Barcelona

FIELD OF RESEARCH
Materials Science, Nanotechnology

For her project on advanced nanoporous materials for high efficient hydrogen production.

Our world is faced with an urgent need for alternatives to the fossil fuels that are both harmful to the environment and being depleted at ever faster rates. Clean, green, renewable hydrogen is one of our best hopes. Yet, for the moment, hydrogen production methods are either ecologically unfriendly or require the use of very costly, scarce metals. Dr. Eva Pellicer's objective is to discover the means for creating an abundant supply of inexpensive, non-pollutant hydrogen for use as fuel.

To achieve this, Dr. Pellicer is working on ways to replace the rare metals currently used in the process with new synthetic, cost-effective materials. An expert in nanomaterials, she is focusing on nanoporous catalysts made of noble-metal-free alloys or semiconductors as possible substitutes. Not only are these materials far more economical, and therefore suitable for large-scale manufacture, they also have the potential to be just as effective in producing hydrogen. At the forefront of her field, Dr. Pellicer's project is of prime importance in the quest to solve to our current energy and environmental challenges.

"Discovering something new, no matter how small, gives you the wonderful feeling of contributing to the advancement of humankind."

UNITED STATES
Mary Caswell Stoddard

Junior Fellow in the Harvard Society of Fellows, Department of Organismic and Evolutionary Biology, Harvard University, Cambridge, Massachusetts

FIELD OF RESEARCH
Evolutionary Biology and Ornithology

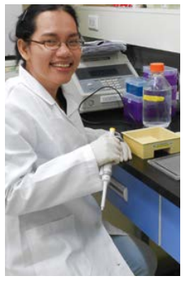
For her project on avian eggshell engineering: evolutionary innovations in color and structure.

Doctor Mary Caswell Stoddard is investigating one of the most fascinating but least well understood aspects of birds: their eggs. Over the past 150 million years, bird eggs have continued to evolve into dynamic life-support systems with crack-resistant shells that can be pigmented to provide camouflage in almost any habitat. How did birds accomplish this remarkable biological feat?

Dr. Stoddard's multidisciplinary research combines cutting-edge techniques from genomics, applied mathematics, and bioengineering to examine avian egg evolution in a dramatically new way. Along with increasing our knowledge of birds and their eggs, her findings could pave the way for numerous and highly valuable applications across a broad range of fields. Her discoveries will enhance our comprehension of the evolutionary process in general and may help us protect bird populations threatened by climate change. In addition, since eggshells have such impressive structural properties, Dr. Stoddard's work could enable engineers to replicate aspects of shell formation for improvements in materials, particularly ceramics, as well as lead to egg-inspired breakthroughs in human health, technology, and the environment.

"Women are essential in science because diverse perspectives lead to more opportunities for creative, innovative thinking."

INTERNATIONAL RISING TALENTS
A luminous future



VIETNAM
Phuong Ha-Lien Tran

Lecturer, Biomedical Engineering Department, Vietnam National University, Ho Chi Minh City

FIELD OF RESEARCH
Pharmaceutical Sciences, Cancer

For her project on the development of fucoidan-based polymeric micelles for cancer treatment and diagnostic.

Most existing cancer drugs disperse throughout the body, attacking healthy and unhealthy cells indiscriminately, rather than specifically targeting cancer cells. As well, the medium in which the drug is dissolved for injection, usually a polymer solution with no curative properties, is excreted by the body, which also results in rapid clearance of the drug from the blood system. Doctor Phuong Ha-Lien Tran is exploiting nanotechnology to develop a new therapy that will avoid such elimination and carry the cancer drug directly to the diseased cells.

Dr. Tran plans to explore the use of fucoidan, a substance extracted from seaweed that has recently been found to possess anti-cancer properties and which can also act as a polymer. Fucoidan will therefore serve a dual purpose as both a medium for the drug and a therapeutic agent in and of itself. When fucoidan, which attracts water, is combined with a cancer drug that repels water, self-assembled nanoparticles form. The nanoparticles also provide a tool to observe tumors during the therapy. Dr. Tran's project may result in less expensive, more effective cancer treatments with fewer side effects.

"We must try to create medicines that, along with being effective, are also affordable enough to benefit people in the developing world."

The photographs of the 2015 L'Oréal-UNESCO For Women in Science *Awards Laureates were taken by internationally-renowned photographer Brigitte Lacombe.*

One of the world's most sought-after visual artists, Brigitte Lacombe is especially admired for her portraits of actors, statesmen, athletes and personalities, as well as for her landscapes.

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