L’ORÉAL-UNESCO FOR WOMEN IN SCIENCE

Changing the face of science
Founded in 1998, the L’Oréal-UNESCO For Women in Science partnership was created to recognize and promote women in science. Its programs reward established women scientists whose outstanding achievements have contributed to the advancement of scientific knowledge and of its benefits to society, and provide support to promising young women scientists with worthy, viable projects. Over the past 15 years For Women in Science has expanded internationally to become truly global and has supported more than 1700 women from 108 countries.
The partnership between the L’Oréal Foundation and UNESCO is a match that is both innovative and natural. L’Oréal, founded by a scientist and whose products are based on scientific research, has helped women develop self-esteem for over a century, and has always sought to give back to the global community, particularly to the world’s women. UNESCO, the United Nations Educational Scientific and Cultural Organization, promotes the creation and sharing of knowledge, particularly scientific knowledge, for a fairer, more inclusive and equitable world. This joining of forces between a multinational corporation and a UN agency points the way forward in our globalized world.
THE WORLD NEEDS SCIENCE,
Science needs Women
Science is key, perhaps the key, to meeting the enormous challenges facing the world today. Science is crucial to solving our ecological, economic and humanitarian problems. Our continued existence will depend on discovering ways to preserve our planet’s fragile eco-systems. The list of challenges to overcome is long and varied, and science is essential to overcoming them.

With so much at stake, all of our planet’s intellectual resources must be available to the scientific community – and women make up half of those resources. Traditionally women, if they were encouraged to study at all, were rarely oriented toward science. Great strides have been made in recent decades, yet still today far fewer women than men go on to obtain doctorates in science and to occupy leading positions in laboratories, universities and research institutions.
By supporting young women researchers and promoting science as a career, the program aims to help ensure that innovative minds will provide the steady stream of talent essential to resolving the critical issues confronting humanity. In celebrating the achievements of accomplished women researchers, the L’Oréal-UNESCO For Women in Science program endeavors to help give them a public forum to speak out and reach out for science.
TELLING STATISTICS

Under 30% of the physicists, engineers and computer scientists in the world’s knowledge-based economies are women.¹

Only about 12% of science decision-making positions in universities and the private sector in the world’s knowledge-based economies are held by women.²

¹ EU, USA, Brazil, South Africa, India, Korea and Indonesia
Ada Yonath (Israel)
L’Oréal-UNESCO Awards Laureate in 2008
Nobel Prize in Chemistry 2009
The L’Oréal-UNESCO partnership was formed to focus attention on the male/female imbalance in science not only by providing recognition and support to women researchers, but also to ensure that these same women are visible as role models to girls in their formative years. Gender stereotypes are formed early in life. By giving science a female face, the L’Oréal-UNESCO For Women in Science program strives to inspire today’s young women to become tomorrow’s researchers.
ADVANCING WOMEN
who advance Science
Since the beginning of the program, L’Oréal-UNESCO For Women in Science has honored 77 Laureates, including two who went on to win the Nobel Prize, and supported more than 1,652 Fellows who have made contributions in every field of scientific research. By the end of 2013, a total of 1,729 women scientists from over 100 countries will have benefitted from the program.

From conserving biodiversity to unlocking the secrets of genes, from finding cures for disease to investigating our physical world to exploring the cosmos, these remarkable women from every continent and working at every level of science are dedicating their lives to the advancement of knowledge and the betterment of humanity.
An aging population is one of the most crucial issues facing the developed world and several Laureates have made outstanding contributions to addressing this challenge. As ever greater numbers of people live longer and longer, science and medicine are faced with finding solutions to ensure that they remain as healthy and able as possible with a dignified quality of life.

Professor Elizabeth Blackburn, 2008 Laureate for North America, and Professor Christine Van Broeckhoven, 2006 Laureate for Europe, are among those whose findings have been of the highest significance. Professor Blackburn, who went on to win the Nobel Prize in Medicine, was recognized for her discovery of how chromosomes age. Professor Van Broeckhoven was honored for her groundbreaking research on Alzheimer’s disease. The program is proud to have celebrated women whose pioneering investigations are laying the foundations for prolonging and improving lives.

With the survival of our species at risk, science is called upon to find ways for us to live in harmony with nature and reduce our ecological footprint. Over the years the program has recognized Laureates and supported Fellows whose research has led to innovations in producing more eco-friendly energy, in cleaning up oil and chemical spills, in sustainable farming and in wildlife conservation.

To name just four, Professor Johanna Levelt Sengers, 2003 Laureate for North America, was honored for her distinguished career in the study of environmentally safe hydro-electric power. Professor Vivian Yam, 2011 Laureate for Asia/Pacific, was recognized for her pioneering research on materials with unique light absorption properties that may one day be used for harnessing solar energy. 2004 Fellow Ghawra Naja of Lebanon was supported in her research on microorganisms capable of eliminating pollution-causing heavy metals. Namibia’s Gladys Kahaka, 2012 Fellow, is using the latest techniques in biotechnology to study which genes are most important to the growth of certain endangered species in order to enable them to thrive in difficult conditions.
Some of the most pioneering work in advancing our knowledge of the human body includes key discoveries by two L’Oréal-UNESCO For Women in Science Laureates, Professor Tuneko Okazaki, 2000 Laureate for Asia and Professor Shirley Tilghman, 2002 Laureate for North America. Professor Okazaki was honored for her work in understanding how DNA replicates itself via her discovery of what is now known as the Okazaki fragment. Her name has entered scientific history for her remarkable achievement.

Professor Tilghman, one of the foremost geneticists of her generation who went on to become the first woman president of Princeton University, discovered how certain genes express themselves differently in the embryo depending on which parent transmitted them, a mechanism whose proper functioning is essential to normal embryonic development. Professor Bonnie Basler was named 2012 Laureate for North America for discovering how bacteria use chemicals to communicate with one another, thus opening new doors for treating infections.

Saving lives is one of the most noble goals of science and one of its greatest gifts to humanity has been the alleviation of pain, suffering and early death. The program has lauded many women whose work has helped prevent, treat or cure disease. 2008 Laureate for Europe, Professor Ada Yonath, who later won the Nobel Prize in Chemistry, was named for pioneering research that led to a better understanding of how antibiotics function. Professors Philippa Marrack and Pamela Bjorkman, respectively 2004 and 2006 Laureates for North America, both made important advances in our understanding of the HIV virus. 2002 Laureate for Europe, Professor Mary Osborne’s work on immunofluorescence microscopy has led to numerous applications such as advanced diagnostic techniques for tumors.

The investigation of plants and traditional techniques has played an essential role in recent developments in accessible medicines. Professor Ameenah Gurib-Fakim, 2007 Laureate for Africa, was recognized for launching the monumental task of cataloguing medicinal plant species in her home country of Mauritius.

Numerous Fellows have also been supported in their quest for finding sustainable medicines. 2005 Fellow Reema Fayez Tayyem of Jordan was aided in her study of turmeric as a preventive treatment for colon cancer. 2009 Fellow Nonhlanhla Dlamani of South Africa is exploring the use of traditional African medicines in the treatment of Kaposi’s sarcoma and 2011 Fellow Nilufar Mamadalieva of Uzbekistan is testing compounds extracted from plants native to Central Asia for their ability to inhibit cancer cell proliferation.
Many Laureates and Fellows are committed to finding solutions to feeding the world’s ever-increasing population. Professor Jill Farrant, 2012 Laureate for Africa, was honored for her discovery of how plants survive in extremely dry conditions and her work will contribute to developing food crops that can survive in drought-ridden climates. Professor Jennifer Thomson, 2004 Laureate for Africa, was recognized for her development of plants resistant to viral infections, droughts and other risks. Her team notably developed an experimental variety of corn that is resistant to a disease which has devastated crops in certain regions of Africa.

Khady Nani Dramé, a 2007 Fellow from Senegal, was awarded a fellowship for her research into drought-resistant strains of rice that can be grown in Africa in order to increase food reserves, help local farmers by providing a viable crop and reduce expensive grain imports from outside the continent. 2012 Fellow Sidrotum Naim of Indonesia is investigating the genetic make-up of a newly discovered virus that can kill up to 70% of a shrimp population, with devastating effects on food supplies and local economies. Jamaica’s Marcia Roye, 2000 Fellow and, in 2011, the first winner of a new Special Fellowship given to a past winner one decade after her original award, made her reputation with her research on the gemini virus, an insect-borne virus that attacks food crops throughout the world.
L’Oréal-UNESCO For Women in Science Laureates have made major contributions to our knowledge of the physical world—from studying the behavior of atomic particles to studying the composition of distant stars at the far reaches of the universe.

Professor Dame Athene Donald, 2009 Laureate for Europe, was honored for her breakthroughs in the physics of soft matter, discoveries essential to both fundamental research and applied technology. 2009 Laureate for Latin America, astrophysicist Professor Beatriz Barbuy, has made a key advance in understanding the chemical composition of the distant stars and their implications in galaxy formation.

2011 Laureate for Europe, Professor Anne L’Huillier’s research led to the development of an ultra-fast camera that can record the movement of electrons in attoseconds (a billionth of a billionth of a second), an unprecedented advance in our ability to study ultra-rapid atomic phenomena.

Working in a field which has significant applications for numerous industries including water treatment and energy production, the 2011 Laureate for Africa and the Arab States, Professor Faiza Al-Kharafi, has spent her distinguished career investigating the mechanisms underlying how and why metals corrode.

ADVANCING WOMEN who advance Science
Christine Van Broeckhoven (Belgium), Molecular Biology
L'Oréal-UNESCO Awards Laureate in 2006
L'ORÉAL-UNESCO
FOR WOMEN IN SCIENCE AWARDS
2013 Laureates

PROFESSOR MARCIA BARBOSA
Federal University of Rio Grande do Sul,
Porto Alegre, Brazil

For discovering the functional importance of the difference between left handed and right handed molecules which has wide applications including research on neurodegenerative diseases such as Alzheimer’s.

PROFESSOR PRATIBHA L. GAI
University of York,
United Kingdom

For her significant contributions to the understanding of daily variations of the ion currents in the upper atmosphere which may further our understanding of climate change.

PROFESSOR DEBORAH S. JIN
JILA, National Institute of Standards and Technology, and University of Colorado, Boulder, USA

For ingeniously modifying her electron microscope so that she was able to observe chemical reactions occurring at surface atoms of catalysts which will help scientists in their development of new medicines or new energy sources.

PROFESSOR REIKO KURODA
Tokyo University of Science,
Japan

For discovering one of the peculiarities of water which may lead to better understanding of how earthquakes occur and how proteins fold which is important for the treatment of diseases.

PROFESSOR FRANCISCA NNEKA OKEKE
University of Nigeria, Nsukka,
Nigeria

For having been the first to cool down molecules so much that she can observe chemical reactions in slow motion which may help further understanding of molecular processes which are important for medicine and new energy sources.

The Awards jury was chaired by Professor Ahmed Zewail, 1999 Nobel Prize in Chemistry, and Linus Pauling Chair Professor of Chemistry and Professor of Physics, California Institute of Technology.
L’ORÉAL-UNESCO FOR WOMEN IN SCIENCE

Laureates & Fellows 2013
The 2013 L’Oréal-UNESCO For Women in Science Awards Laureates and Fellows embody the conviction that science and women bring hope and foster discovery, innovation and excellence. Their commitment can inspire countless others in the quest to unlock the secrets of science, to cure disease, to explore the cosmos, and to conserve biodiversity. These advances in research are increasingly important in today’s climate of economic uncertainty, as science can play an essential role in accelerating development and driving approaches that inspire progress.

On the following pages you will discover the profiles of these remarkable women in science.
Created in 1998, the L’Oréal-UNESCO Awards are presented every year to five women, one from each region (Africa and the Arab States, Asia-Pacific, Europe, Latin America, North America), in recognition to their contribution to the advancement of science. Scientists around the world are invited to submit candidates, and an international jury of eminent scientists presided in 2013 by Nobel Prize winner Ahmed Zewail makes the final selection.

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<tr>
<th>Award in Physical Sciences</th>
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<tr>
<td>Professor Christian AMATOIRE</td>
<td>Chemistry Department, University of São Paulo, Brazil</td>
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<td>Professor Beatriz BARBUY</td>
<td>Geophysics and Atmospheric Sciences, University of São Paulo, Brazil</td>
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<td>Professor Margaret BRIMBLE</td>
<td>Chair of Organic and Medicinal Chemistry, University of Auckland, New Zealand</td>
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<td>Professor Sylvio CANUTO</td>
<td>Institute of Physics, University of São Paulo, Brazil</td>
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<td>Professor Majed CHERGUI</td>
<td>Professor of Physics and Chemistry, Swiss Federal Institute of Technology, Lausanne, Switzerland</td>
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<td>Professor Mohamed CHERRI</td>
<td>Department of Chemistry, School of Sciences and Engineering, The American University in Cairo, Egypt</td>
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<td>Professor H. Eugene STANLEY</td>
<td>University Professor and Director, Centre for Polymer Studies, Boston University, USA</td>
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<td>Professor Mitchell WINNIK</td>
<td>University Professor, Chemistry Department, Faculty of Arts and Science, University of Toronto, Canada</td>
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<td>Professor Dongping ZHONG</td>
<td>Robert Smith Professor, The Ohio State University, USA</td>
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AWARDS JURY IN PHYSICAL SCIENCES

President of the Jury
Professor Ahmed Zewail
Nobel Prize in Chemistry 1999
California Institute of Technology, USA

Founding President of the Awards
Professor Christian de Duve
Nobel Prize in Medicine 1974
Institut de Pathologie Cellulaire, Belgium

Professor Laurent Gilbert
Director, Worldwide Raw Materials 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

Doctor Laurent GILBERT
Director, Worldwide Raw Materials Research, Physical and Chemical Sciences, L’Oréal, France

Professor Beatriz BARBUY
Institute of Astronomy, University of São Paulo, Brazil

Professor Margaret BRIMBLE
Chair of Organic and Medicinal Chemistry, University of Auckland, New Zealand

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

Professor Majed CHERGUI
Professor of Physics and Chemistry, Swiss Federal Institute of Technology, Lausanne, Switzerland

Professor Mohamed CHERRI
Department of Chemistry, School of Sciences and Engineering, The American University in Cairo, Egypt

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

Professor Mitchell WINNIK
University Professor, Chemistry Department, Faculty of Arts and Science, University of Toronto, Canada

Professor Dongping ZHONG
Robert Smith Professor, The Ohio State University, USA
2013 Laureates
High above the Earth’s surface – between 50km to 1,000km – is the ionosphere. The ionosphere is a very thick layer of charged particles, where free electrons exist in number sufficient to influence the transmission of electromagnetic waves at radio frequency. When these ions move in the Earth’s magnetic field, current is induced as dynamo, which produces changes in the magnetic field on Earth’s surface that affect the planet in a host of ways. Professor Francisca Okeke’s research has resulted in new discoveries about the part of the ionosphere located above the equator.

Professor Francisca Nneka Okeke
Professor of Physics, University of Nigeria, Nsukka, Nigeria

GAZING SKYWARD
Childhood curiosity is at the root of Francisca Okeke’s remarkable achievements and her passion for studying the heavens began long before she became a physicist. “As a little girl I was fascinated by the sky, why it was sometimes white and sometimes blue, why airplanes could fly instead of falling back to the Earth. Later, once I was in school, I found my vocation when I learned that the answers to these questions could be found in physics.”

HELping To Understand CLimate Change
Professor Francisca Okeke has dedicated much of her career to studying the ionosphere and the “equatorial electrojet phenomenon.” Energized by the sun, the electrojet is a river of electrical current that traverses the globe eastward around the dip equator and causes the magnetic field at the dip equator to vary almost five time more than anywhere else on the planet. (The dip or magnetic equator differs from the equator by a few degrees, as the Earth’s magnetic north pole is different from what we generally think of as the north pole.)

Professor Okeke’s research on how such solar activity in the ionosphere affects the Earth’s magnetic field could lead to a better understanding of climate change and help pinpoint sources of dramatic phenomena like tsunamis and earthquakes.

OF MEN AND MENTORS
When asked about entering and subsequently thriving in a field which remains dominated by men, Professor Okeke indicates that her own personal experience has been better than that of most women. “My late father, a mathematician and educator, was a great mentor and he began teaching me higher mathematics at a young age. When I graduated in 1980 there were thirty undergrads in physics and only two of us were women. Fortunately my astrophysicist husband also gave me lots of inspiration and encouragement, too.”

Others of her generation did not fare as well. “At the time, society approved of women who possessed what were thought of as typically female characteristics – among others, passivity, emotionality, intuition and receptiveness.”

Little wonder, then, that she considers this award “a challenge that encourages me to work harder, particularly in providing the leadership to young women scientists I need to encourage them to forge ahead.”

For her significant contributions to the understanding of daily variations of the ion currents in the upper atmosphere which may further our understanding of climate change.
Professor Deborah Jin studies what happens when molecules are cooled to near absolute zero, the lowest possible temperature. First, however, she and her team at the University of Colorado had to invent a method for performing this very difficult task. The point of cooling molecules to such low temperatures is that the colder they are, the slower they move. In fact, they slow down enough for researchers to actually see what goes on during chemical reactions.

By succeeding in cooling molecules to the point where she could observe their behavior, Professor Jin made a major discovery and solved a problem that had challenged scientists for years.

The potential to transform society
As Professor Jin notes, the possible future applications for her work are legion. “Finding ways to use new knowledge coming from this field could potentially transform society. The study of ultra-cold molecules could lead to new precision-measurement tools, new methods for quantum computing and help us better understand materials that are essential to technology.”

Growing up with science
Professor Jin’s childhood would seem tailor-made for a budding scientist. “I was surrounded by science. I grew up in Florida in an area called the ‘Space Coast’ because of its proximity to the Kennedy Space Center. And both of my parents were scientists!”

Professor Jin says that, since her mother was an engineer with a Master’s degree in physics, she never saw anything unusual about a woman scientist.

She notes that today’s women scientists face a problem that has grown since the days when there were few women in the profession: “Being married to another scientist, one challenge is finding jobs in the same location. In my case, this was resolved by luck, as well as a willingness to make compromises. We were fortunate to find jobs at JILA, where there was a desire to address the ‘two-body problem’.”

The thrill — and the fun — of science
A summer spent working in a physics lab at NASA’s Goddard Space Flight Center was the tipping point for her choice of career. The experience allowed her to see the connections between physics and everyday life and, as she explains, “Being in the lab was great because you got to play with all sorts of fun toys.”

Despite all of the hard work and long hours that led to her outstanding achievements, it is easy to see that the fun is still there.

“It’s so exciting when you first observe something or when things come together in the experiment and you realize that you’re on the brink of creating something really new.”
On the microscopic level, water can behave in unusual and unexpected ways—scientists call these strange behaviors anomalies. As water covers nearly three-quarters of the Earth’s surface and makes up over half of the human body, pinpointing exactly what happens and why when it does the unexpected is key to advancing knowledge in nearly every field of science.

Professor Marcia Barbosa discovered one of the ways in which water behaves peculiarly and her findings could have an enormous impact on our understanding of a host of natural phenomena, ranging from earthquakes to human proteins.

Identifying the anomalous behavior of water under different pressures and temperatures is a fundamental step toward understanding how biological systems work, in other words, understanding life itself. Proteins are the building blocks of all living things and the way they are shaped is determined by the behavior of the water that surrounds them. Learning more about this protein shaping process is essential to knowing how to manipulate them, with medicine to cure disease for example.

**MORE ENERGY, CLEANER ENERGY**

Among an extremely wide range of other potential applications, the work being done in Professor Barbosa’s group could also help solve what she considers the world’s most pressing problem: energy. “The increasing numbers of people with access to industrial products and technologies will lead to vastly greater energy consumption. New resources for energy and new ways to obtain traditional forms of energy are urgent,” she says. In particular, the study of water anomalies could lead to advances in the production of biofuels, particularly from crops.

**AN ACTIVIST FOR GENDER EQUALITY**

Passionate about the need for more women in science, Professor Barbosa has been involved with gender issues for nearly twenty years. “As a minority in science, we have to make ourselves visible, identify obstacles, and work together to overcome them,” she notes. She served as the chairperson of the International Union of Pure and Applied Physics Working Group on Women in Physics and in 2009 she was awarded the American Physical Society’s Nicholson Medal for her work on behalf of women in science.

Regarding whether women bring something different to her profession, Marcia Barbosa says with a smile: “One characteristic that I do appreciate while working with other female scientists is the ease of contact, that sometimes by exploring a wide range of possibilities it is easier to identify the solution to a problem.”
The scientific word for Professor Reiko Kuroda’s specialty is chirality, a word that simply means handedness. All types of living and non-living things, even the smallest components of our bodies, exhibit chirality, in other words, they are either right-handed or left-handed.

HELPING TO UNDERSTAND THE ORIGIN OF LIFE

One of the foremost scientists in her field, Professor Kuroda invented several novel instruments for investigating the chirality of molecules — determining whether they are right-handed or left-handed or revealing the structures of chiral molecules — and the effects of such handedness on a variety of physical and biological systems. Notably, she was the first to invent a device for measuring chirality in solid matter at a time when existing instruments could only measure liquids.

Today she is using her inventions to study how certain proteins, including those implicated in Alzheimer’s disease, adopt a particular structure. Her basic research into chirality at the molecular level, whether biological or non-biological, has important implications for manufacturing drugs and agricultural chemicals, as well as for the study of gene-determining animal body asymmetry, such as snail coiling.

The ultimate reasons for such handedness still remain a mystery that, for very compelling reasons, Professor Kuroda hopes to help solve. “When, why and how the handedness of the biological world occurred is one of the essential keys to investigating the origin of life on this planet.”

BRIDGING THE GAP BETWEEN SCIENCE AND THE PUBLIC

In addition to her groundbreaking research, Reiko Kuroda is also an activist for science. During her term as Vice-President of the International Council for Science she helped launch a program entitled Future Earth and travelled the world to raise awareness of environmental issues and humanitarian concerns. In a related cause, she is deeply concerned by the public’s overall lack of scientific knowledge and awareness. At the University of Tokyo she set up the Science Interpreter Training Course, to “nurture citizens with scientific literacy and scientists with social literacy.”

CHALLENGING GENDER STEREOTYPES

With regard to the obstacles facing women in science that she herself encountered, Professor Kuroda takes a lighthearted view of what must have been a discouraging situation.

“My biggest challenge was quite simply to obtain a position that would enable me to carry out research. In my day it was almost impossible for a woman to be given a university post in Japan unless she was very well-connected or very lucky. Even my Ph.D. supervisor told me that the best thing for women is to get married. So I went to England!”

Luckily for science, Reiko Kuroda was a young woman who would not give up easily.

2013 LAUREATE
Asia-Pacific

Professor
Reiko Kuroda

For discovering the functional importance of the difference between left-handed and right-handed molecules which has wide applications including research on neurodegenerative diseases such as Alzheimer’s.
Finding ways to see what cannot be seen with the naked eye constitutes some of the most groundbreaking achievements in the annals of science. From 16th century optical microscopes to 21st century electron microscopes, advances in our ability to view previously invisible processes of nature have opened up floodgates of new knowledge.

Professor Pratibha Gai is among the relatively few scientists in history who can lay claim to such a key advancement. Thanks to her truly ingenious modifications to electron microscopes, her work enables us to actually see chemical processes at the atomic level that were once completely mysterious.

For ingeniously modifying her electron microscope so that she was able to observe chemical reactions occurring at surface atoms of catalysts which will help scientists in their development of new medicines or new energy sources.

Seeing the Future

Her fundamental research promises a plethora of potential applications for an immense range of scientific, technological and economic solutions. In a departure from usual practice, she also researches end-uses for her findings and has gone back and forth from universities to private industry on two continents. Currently working with both the public and private sectors, she is collaborating with firms that will transform her findings into technology and products ranging from eco-friendly paints to more efficient agriculture to new medicines, materials and energy sources.

“I WAS ACCEPTED AS A PROPER SCIENTIST.”

Originally from India, the young Pratibha Gai’s studies took her far from her family at a time when most women in her country led more sheltered lives and were encouraged to stay close to home. Determined to follow a different path, she worked hard in school and became such a brilliant student that she was eventually accepted at Cambridge University. There she fulfilled her long-cherished dream: a PhD in Physics from the university’s famed Cavendish Laboratory and became one of the first women from India to do so. The university still holds an important place in her heart. “Being thousands of miles away from home was daunting in many ways, but at Cambridge I was accepted as a proper scientist.”

More Science and More Women in Science

Professor Gai sees an urgent need to raise public awareness of the crucial role science can play in solving the challenges facing our planet. “Our society has not done enough to increase scientific literacy among the general public,” she states. “We don’t invest in the long-term scientific goals we need to because the public often doesn’t recognize the importance of them.”

She has given her time to increasing scientific literacy and she has also worked for another cause she champions: Bringing more women into science.

“I believe that women scientists bring new perspectives to science as well as to the workplace itself. And, after all, we make up 50% of the population and more women in science can only mean more benefits to the world.”
2013 UNESCO-L’ORÉAL International Fellowships
The UNESCO-L’Oréal International Fellowship program was created in 2000 to encourage promising women at the doctoral or postdoctoral level. Fifteen International Fellows, three from each UNESCO region, are chosen to continue their research in prestigious institutions outside their home country. The fellows gain important experience and build networks they can share with others on returning home.

Launched in 2011, a Special Fellowship ‘...in the footsteps of Marie Curie’ is awarded annually to a former International Fellow who, since receiving her fellowship 10 years ago, has demonstrated excellence and determination in the pursuit of her career in research.
2013 SPECIAL FELLOWSHIP
“… in the footsteps of Marie Curie”
There’s so much beauty and diversity in nature—especially so many weird and wonderful colors!” Since her earliest childhood in Australia, Dr Devi Stuart-Fox has been captivated by the stunning array of hues and shades displayed in the fur, feathers and skins of the animal world. Visual pleasure, however, is not their primary purpose. Colors play a significant role in how species survive, adapt, evolve and split off—the very phenomenon which creates diversity—and in how animals communicate with one another.

Devi’s research has a two-fold purpose. The first is studying how and why the diversity of animal colors and behaviors evolved. The second is exploring animal cognition—how the brain reacts to information coming from the senses, such as color, and then commands the body to respond in the appropriate way. Her hope is that her work “will give people a greater appreciation of the wonders and richness of nature.”

Among Devi’s many major contributions to her field, perhaps one of the most well-known is her having overturned a long-held idea about chameleons. It had always been thought that their capacity to change color had evolved to facilitate camouflage. Devi and her team discovered that this ability to change color, although it does help them hide from predators, originally evolved to aid chameleons in communicating with one another. Indeed, color pattern complexity drives sexual rather than natural selection. Using highly sophisticated computer models that allow her to study the way animals actually see, as well as much time spent observing their behavior in their natural habitats, she has made a number of such discoveries and answered numerous questions that confounded previous generations of scientists.

Devi has travelled the world to observe all sorts of shade-shifting animals. By her own admission, her first love is lizards. She has been in awe of these reptiles as far back as she can remember. Hence her advice to her students: “I always tell them to study what they really love. It makes you a passionate researcher.” As proof that her counsel is wise, she goes on to add, “Who would have thought there was a career in studying lizard behavior?”
2013
International Fellows
Florencia Linero aims to develop an improved approach to preventing and curing Argentinean hemorrhagic fever, a serious health problem among agricultural workers caused by the Junin virus, which is transmitted by aerosolized body fluids or infected rodents. Current medicines have limited effectiveness and, if left untreated, the virus causes death in up to one in three cases. Florencia will conduct research to find a more efficient treatment for the virus via a novel form of nanobody medical technology, which makes use of antibody fragments rather than entire antibodies to fight diseases.

“One of the biggest issues for women in this profession is being a scientist and a mother at the same time. High-level science requires a great deal of time, effort and travel that make childcare quite a challenge.”

Florencia Linero
Postdoctoral researcher in virology; PhD in Biochemistry

FIELD OF RESEARCH:
Virology

CURRENT INSTITUTION:
Laboratory of Virology, University of Buenos Aires, Argentina

HOST INSTITUTION:
Department of Molecular Biomedical Research, University of Ghent, Belgium
More than a quarter of the Bangladeshi people are undernourished, yet much of the country’s fresh produce goes to waste because basic processing and preservation techniques are not available. Kanika Mitra’s research will initially focus on preserving the nutrients in the Arum plant during storage. Arum is cheap to grow, rich in calcium and iron and frequently used as a source of food during droughts. Subsequently she will attempt to apply her findings to preserving blueberries and strawberries in order to make them viable crops for farmers, as well as to ensure that these nutrient-rich fruits are more readily available to her country’s growing population.

Field of Research: Food Science
Current Institution: Institute of Food Science & Technology, Bangladesh Council of Scientific and Industrial Research, Dhaka, Bangladesh
Host Institution: Food Science and Technology Department, School of Chemical Engineering, University of New South Wales, Sydney, Australia.

Marie Florence Ngo Ngwe’s project is designed both to preserve biodiversity and to help ensure food security for her fellow West Africans. Yams are among the main sources of nutrition in the region and their extended storage capacity makes them invaluable in times of food scarcity. As indigenous forests—the habitats of wild yam species—are being destroyed to make space for crops, and farmers grow only a limited number of domestic species, genetic diversity is gradually being eroded. Marie Florence will first investigate the genetic make-up of a variety of wild and domestic yam species to determine which ones provide the best seed plants. Subsequently, she aims to create a seed bank that will preserve the DNA of species against risk of extinction and provide farmers with a source of genetically diverse seeds.

Field of Research: Plant Biotechnology
Current Institution: Institute of Agricultural Research for Development and University of Yaoundé, Cameroon
Host Institution: Institute of Plant Biology Research, University of Montreal, Canada

“More than a quarter of the Bangladeshi people are undernourished, yet much of the country’s fresh produce goes to waste because basic processing and preservation techniques are not available. Kanika Mitra’s research will initially focus on preserving the nutrients in the Arum plant during storage. Arum is cheap to grow, rich in calcium and iron and frequently used as a source of food during droughts. Subsequently she will attempt to apply her findings to preserving blueberries and strawberries in order to make them viable crops for farmers, as well as to ensure that these nutrient-rich fruits are more readily available to her country’s growing population.”

“Marie Florence Ngo Ngwe’s project is designed both to preserve biodiversity and to help ensure food security for her fellow West Africans. Yams are among the main sources of nutrition in the region and their extended storage capacity makes them invaluable in times of food scarcity. As indigenous forests—the habitats of wild yam species—are being destroyed to make space for crops, and farmers grow only a limited number of domestic species, genetic diversity is gradually being eroded. Marie Florence will first investigate the genetic make-up of a variety of wild and domestic yam species to determine which ones provide the best seed plants. Subsequently, she aims to create a seed bank that will preserve the DNA of species against risk of extinction and provide farmers with a source of genetically diverse seeds.”

““There are still barriers to women in science, but I believe that they can be overcome by confidence, a positive attitude and ensuring that you gain all the knowledge and learning possible in a specific field.””

“As mothers or potential mothers, women scientists may perhaps have a special sensitivity to problems that directly affect the quality of human life.””
Breast cancer accounts for some 30% of all cancers diagnosed in women in developed countries and about 16% of all cancer deaths. Yet breast cancer is not a single disease with a single treatment. There are four main forms of the disease each with a different genetic profile. Lina Gallego’s research is part of a major study designed to determine which types of treatment prior to surgery are the most effective for each type of breast cancer. Lina will investigate the distribution of these four profiles among Latin American breast cancer patients and then use the profiles as predictive and prognostic tools for treatment. Lina’s work will be particularly important to the study because the occurrence of breast cancer varies considerably between ethnic groups and Latin America’s diverse genetic ancestry offers particularly fertile ground for such research.

Autoimmune diseases—diseases that occur when the body “attacks” itself—include more than 80 chronic inflammatory illnesses that collectively affect 5% to 8% of the worldwide population, 78% of whom are women, and—for reasons unknown— their prevalence and incidence are rising. Ariana Barbera will investigate the role of T-cells in the body’s immune system in the hopes of finding new forms of treatment for these illnesses. Most current treatments have serious or even fatal side effects and leave patients unable to fight infection. Ariana’s work will focus on determining whether certain peptides can be used to enhance the performance of the immune system’s disease-fighting T-cells while selectively eliminating in disease-causing T-cells.

“Fighting for the inclusion of women in science and technology is crucial not only to attaining the highest standards of research, it is also essential for economic development.”

“My biggest challenge has been being a good mother to my son while at the same time pursuing a career in science. I’m fortunate to have a husband who is supportive and understanding.”

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Allison’s Louthan’s project addresses a critical aspect of conserving biodiversity in the face of climate change: How species will shift their distributional limits—the geographical ranges where they can survive—as climate change takes place. Science has made great progress in predicting how species will move in response to climate change, but still has a poor sense of how such moves might be affected by interactions with other plant and animal species. Allison’s work will explore where and when interactions with other species are critical drivers of geographic limits, and when these interactions are less critical for predicting territorial shifts. She hopes to increase our knowledge of where we need to conserve communities of species in concert and, conversely, where we can focus on conserving individual species.

Ghana, like many developing countries, faces the dual challenge of modernizing farming practices in order to provide adequate food supplies for a growing population while simultaneously ensuring that these new agricultural methods do not harm the environment. Anita Takura will conduct extensive research in northern Ghana to judge the effectiveness of new farming methods in terms of food productivity, especially with regard to small farmers, and to determine their impact on the surrounding eco-systems. Few rigorous studies have been done in this arena, and the information compiled and analyzed by Anita will be of vital importance in helping governments and donor organizations create conditions for sustainable, eco-friendly agriculture.

“Rather than simply integrating women scientists into the existing male-dominated environment, we should think about how the presence of more women could have a positive impact on science.”

“Where I come from, most people perceive a woman in science as someone who stays in school too long, wasting her time learning about things that have nothing to do with running a home and taking care of children!”
Sri Fatmawati’s postgraduate research has centered on the scientific analysis of plants that have been used for centuries in jamu, Indonesia’s traditional herbal medicine. She is now interested in exploring the medicinal possibilities of her home country’s rich marine diversity to extend her study to marine species from the Indo-Pacific Ocean. More specifically, she will look at sponges. Once she has isolated and purified the molecules in sponges that may have medicinal potential, she will test their biological activity in vitro to see if they demonstrate anti-microbial, anti-inflammatory or anti-tumor properties. Her work could open doors to new forms of treatment for diseases such as malaria, cancer and Alzheimer’s.

“Science is so important in our world today that the opportunity to learn science should be considered a human right for every girl and boy, everywhere on our planet.”

Marina Faiella’s project is focused on creating artificial proteins that could be used to produce hydrogen. If simple and efficient methods of production and utilization can be developed, hydrogen gas has the potential to become a limitless source of clean energy. One such method—which scientists hope one day to duplicate—is found in nature, in a class of proteins called hydrogenases. Although recent years have seen a variety of breakthroughs in comprehending the structure and function of these enzymes, fundamental questions about their mechanisms remain unanswered. Through her study, Marina hopes to answer some of these questions and make discoveries that can lead the way to the use of hydrogen as a plentiful, inexpensive, eco-friendly fuel source.

“There is something we women in science still need to work on: Self-esteem. We must have the confidence to say ‘I can do it’ no matter what obstacles the world puts in our way.”
Autism is known to have a hereditary component but scientists have had difficulty identifying the precise genetic causes. Computational biologist Osnat Penn plans to tackle this challenge by analyzing massive quantities of data obtained through genome sequencing. She will use cutting-edge computer programs to compare the genomes of autism sufferers, their unaffected parents and thousands of unaffected people from populations around the world. The goal is to identify the specific areas where the autism variation occurs in the human genome. Her research is designed to help enable prenatal screening and early diagnosis of autism in children and could one day contribute to creating treatments for the disorder.

“I’m lucky to be working in an environment with accomplished women scientists who set very high targets. When faced with challenges, I can look at them and say to myself, ‘If they did it, I can do it, too!’”

Laure El Chamy
Researcher and assistant professor in Molecular Biology; PhD in Molecular Biology

A marvel of nature, the immune system recognizes illness-causing bacteria, viruses, damaged cells and other “enemies” and initiates a cascade of rapid responses that eliminates them with stunning effectiveness. Yet in some cases the immune system overreacts and also destroys “friendly” cells that the body needs to function properly, which can result in cancer or chronic inflammatory diseases such as lupus and arthritis. Using fruit flies, Laure El Chamy aims to pinpoint certain of the genes that are activated when the immune system deploys its cascade of responses. By deepening our understanding of the system’s precise mechanisms, Laure’s research is designed to shed light on how we might one day promote the immune response so that the body can combat disease without also attacking cells that are essential for its proper functioning.

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Enkhmaa Davaasambuu is a reproductive health specialist who will study why certain women have a greater risk of developing hypertension and preeclampsia during pregnancy than others. She will also investigate why women who develop these conditions during pregnancy are twice as likely to suffer from cardiovascular disease as they age. One aim of Enkhmaa’s research is to contribute to lowering the mortality rate for women and children during pregnancy and childbirth. The second is to gain a better understanding of the timing and nature of cardiovascular disease risk as it emerges after a hypertensive pregnancy in order to create new screening methods and preventive treatments.

“This fellowship will enable me to broaden my knowledge as a researcher and a clinician in a world-renowned medical center with state-of-the-art screening, diagnostic and treatment options.”

Leishmaniasis, a parasitic disease transmitted by sand flies, is endemic in 88 countries and nearly 2 million new cases are reported annually. One form of the illness causes disfiguring skin lesions and another attacks the liver and can be fatal if left untreated. The rural population of Naima Abattoy’s native Morocco is particularly affected by leishmaniasis, with women and children disproportionately afflicted and outbreaks becoming more numerous every year. Naima will study the sand fly carrier in the laboratory and conduct field research in her country to determine the environmental and lifestyle factors that facilitate the spread of the disease. Naima’s findings will be key to health authorities throughout the world and potentially protect millions from suffering and death.

“Female scientists are not only important for science. In traditional male-dominated societies, they provide living proof that women are just as capable as men.”

Enkhmaa Davaasambuu

MONGOLIA

Clinician and researcher; PhD in Reproductive Health

FIELD OF RESEARCH:
Maternal Health

CURRENT INSTITUTION:
National Centre for Maternal and Child Health, Ulaanbaatar, Mongolia

HOST INSTITUTION:
The Women’s Heart Center, Cedars-Sinai Heart Institute, Los Angeles, California, USA

Naima Abattoy

MOROCCO

Postdoctoral researcher; PhD in Biology

FIELD OF RESEARCH:
Biology

CURRENT INSTITUTION:
Abdelmalek Essaadi University, Faculty of Science, Tetouan, Morocco

HOST INSTITUTION:
Department of Parasitology, University of Granada, Spain
The Niger Delta region of Nigeria is threatened with severe pollution from petroleum and other industrial contamination that leaves precious agricultural land unfit for use. Highly toxic chemicals risk entering the food chain with subsequent catastrophic effects on human health. Eucharia Nwaichi will study the potential use of living plants in providing a viable solution to this problem. Plants can rid the soil of pollutants either by transforming them into less harmful substances or by binding them inside their own tissues. Eucharia will assess the suitability of two local plant species for cleaning up polluted land in the Niger Delta so that it can be used for much-needed food crops.

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“Along with access to facilities and equipment, this fellowship also exposes my research to constructive criticism that will increase my chances of a positive outcome.”

Losing a baby before birth is a heart-wrenching experience for over 3 million women across the world every year. This experience is even more traumatic when it is repeated with subsequent pregnancies. Such recurrent stillbirths are often linked to auto-immune conditions and Sahwa Adil Nourein hopes to shed light on this phenomenon by studying the link between stillbirth and Systemic Lupus Erythematosus (SLE), an autoimmune disease suspected to be among the possible causes. She aims to determine whether the high incidence of stillbirths in Sudan is directly linked to SLE and she will conduct a comparative study of Swedish and Sudanese women suffering from the same condition in order to determine whether ethnicity is a factor. The ultimate goal of Sahwa’s research is to find treatments for pregnant women that will improve their chances of having a healthy baby.

“Women in science face many of the same challenges faced by women in every field: Dedication is the only way to overcome these obstacles!”

Eucharia Oluchi Nwaichi
Lecturer and Postdoctoral researcher; PhD in Biochemistry
NIGERIA

Sahwa Adil Nourein
Medical doctor and PhD student in Immunology
SUDAN