

Young Women Scientists

A bright future for the Americas

Discover why and how these young women decided to become scientists

You can be one of them!!!



IANAS is the Inter-American Network of Academies of Sciences, created to support co-operation in order to strengthen science and technology as tools for advancing research and development, prosperity and equity in the Americas.

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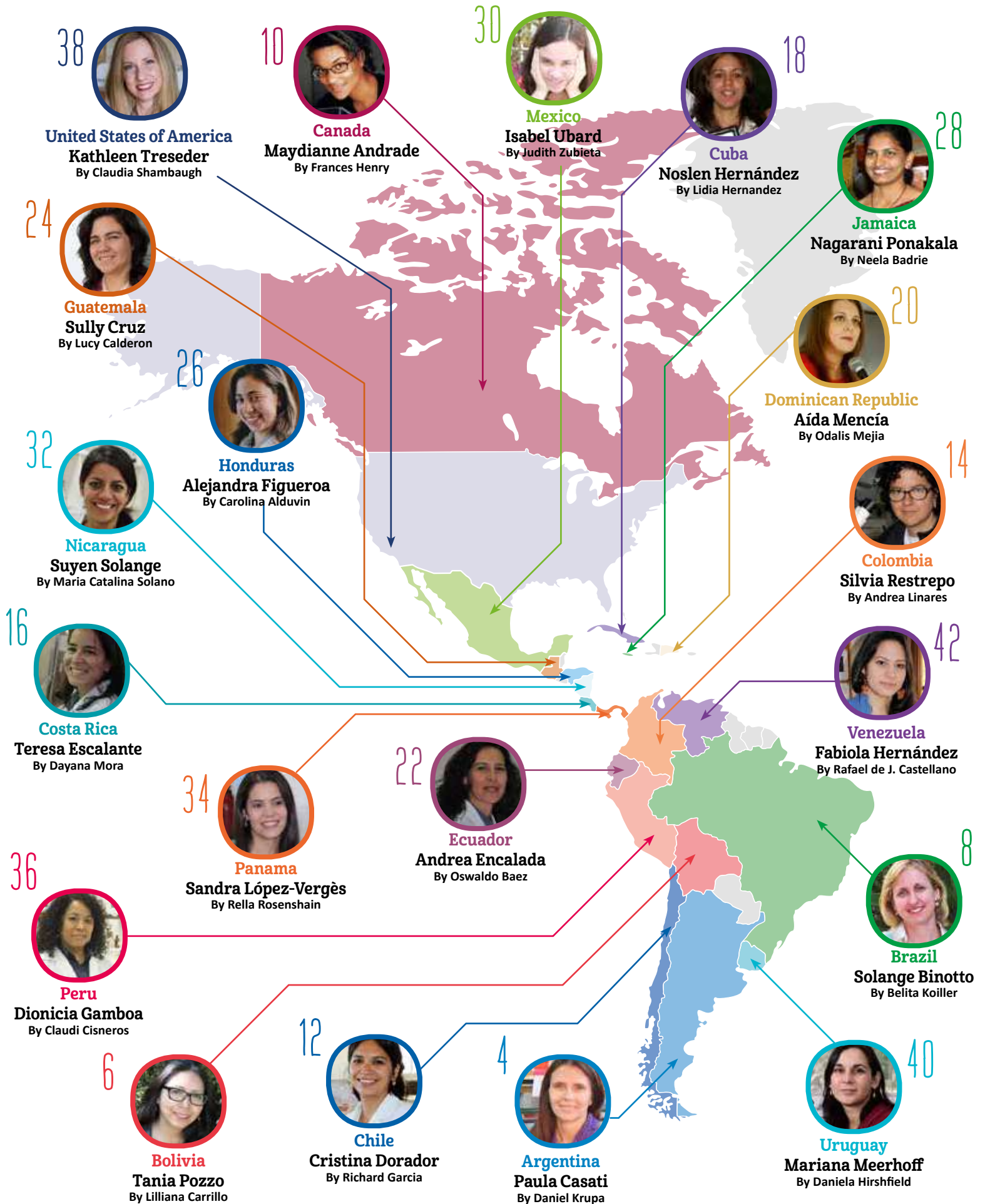
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Young Women Scientists: A bright future for the Americas



Foreword

Young women scientists wanted: Think about a job where going to work everyday is exciting, you get to pursue your own ideas and you are surrounded by stimulating young people. The rewards are great, a secure income and the respect of your colleagues and community. The only catch is that it requires commitment and years of preparation. You have to be determined to succeed and to have a deep belief in your own abilities. Success requires perseverance, but also the ability to adapt quickly to new approaches to your work. If this appeals to you, then pursue a career in science. Nothing can be more rewarding than participating in a new discovery and being the first person to see a certain aspect of the world for the first time. And nothing is more satisfying than gaining a deeper understanding of our world and thereby enriching your understanding of life.

The mock advertisement above describes the qualities and experiences of the women profiled in this magazine. These women represent the spirit of science and they summarize our hopes for the future. But women are still seriously underrepresented in science careers and society is failing to realize the full potential of our greatest resource – human talent and the creativity of women and men.

So this magazine has been produced in the hope that the careers profiled will encourage more young women to consider a career in science. Some may feel that it is an impossible dream, that the obstacles are too overwhelming and that too much must be sacrificed to achieve a career in science. But consider the stories of the bright and vital women profiled here. They have blazed a path that you too can follow. The ultimate reward is a rich and fulfilling life.

Read any of the stories in this publication, talk to your friends and teachers, find out more information about the scientist using the bar code below each interview, check out the Internet or go to the library and read more about the different horizons in science in the world and in your country, do not be afraid, YOU CAN DO IT, after all, you are going to be the new generation of young women and men who will be leading this world. You have this amazing power in your hands.

**Sincerely,
The IANAS * Scientists**

*IANAS is short for Inter-American Network of Academies of Sciences and represents the Academies of Sciences of all of the Americas, from Canada all the way down to Chile, including the Caribbean. We have various interests but one is to encourage young girls and women to think of Science and Technology as a fantastic option for the future.

www.ianas.org



*The important thing is not to stop questioning.
Curiosity has its own reason for existing.
Albert Einstein*



Paula Casati

Interview by
Daniel Krupa*



Being a successful scientist
and simultaneously having a family
is difficult but can be accomplished
with effort and desire



Dr. Paula Casati studies the effects of ultraviolet radiation on plants, a line of research that has made her a leading figure in the Argentinean scientific community. As it had done for her mother, science became a way of life.

Born in 1971 in Rosario, in the province of Santa Fe, Argentina, married and with a daughter called Lara, Casati explains that her parents, both biochemists, were vital when it came to choosing a profession. Her mother, for example, who decided to pursue a scientific career to dedicate herself to research, influenced her profoundly as regards her chosen path. “As a child, I remember visiting her laboratory, which was full of rats. She worked in the Department of Physiology, first, and then in Pharmacology. I also remember spending many weekends with my oldest brother and my dad in cinemas, parks and theaters, as my mother would shut herself away at home to write her doctoral dissertation, which was done on a typewriter at the time. Luckily, my mom got a lot of help from my dad and his mother—my grandmother Lula— so she would leave everything ready in the morning for us (lunch, things for school and other activities) and we wouldn’t see her again until the afternoon when she came back from the laboratory.”

*Person responsible
for corporate
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of Exact, Physical
and Natural Sciences
of Argentina.

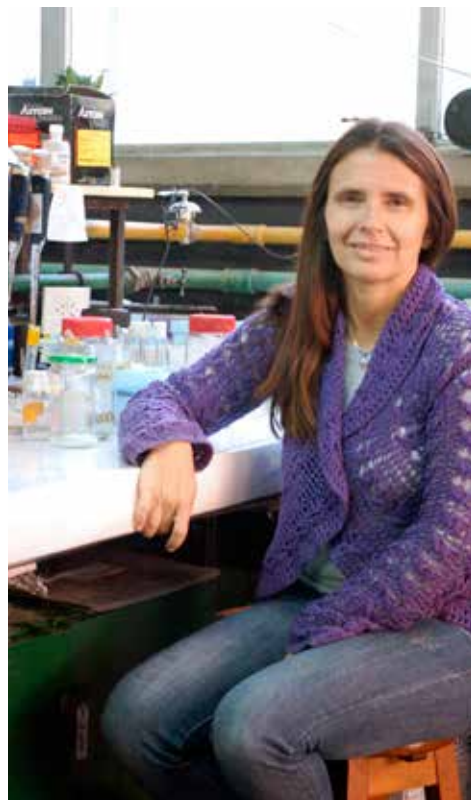


Paula and her daughter Lara

Casati is working on the response to radiation of plants such as maize and sorghum.



Casati is not sure whether it was because her mother was always so busy, but as a child, she always suspected she would choose another occupation such as a lawyer or a physical education teacher until, in the third year of high school, she had a biology teacher who introduced her to the world of genes, heredity, and the basic principles of molecular biology, which made her change her mind and decide to study for a degree in biotechnology at the same faculty where her parents had studied.



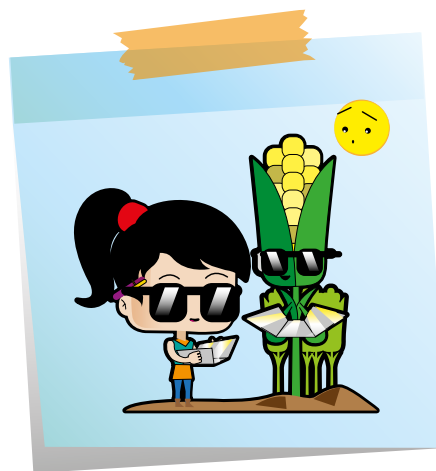
Dr. Casati in her lab.

Once at university, I never doubted that what I really liked was research, and it seems that years of watching my mom and seeing her work so hard had an effect, because she was always my role model, and although unfortunately I never told her so directly, I'm sure she always knew," says Dr. Casati.

With regard to the experience she has had as a woman in the field of scientific research, she believes that since her first inspiration in science was her mother, who, despite always working in a male environment, managed to be successful, have her own in-

dependent research group, be the head of a teaching department and dean of the faculty, she always knew that through hard work, anything was possible. Her postdoctoral director is also a very successful woman in the field of science and research.

Dr. Casati admits that today, in the 21st century, there are still obstacles for women who choose to dedicate their lives to science. "As we all know, many of the senior positions are still mainly occupied by men." However, she recommends young women interested in pursuing a career in science strive to achieve their goals. "I think trying to be a successful scientist and simultaneously having a family is difficult but it can be done."



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Discover more:





Tania Pozzo

Interview by
Liliana Carrillo*

Women have played an important part in science, throughout the history of humanity. Women such as Marie Curie used to be the exception; today they are the norm



*Liliana Valenzuela Carrillo graduated in social communication sciences from the Universidad Católica Boliviana and holds a degree in Latin American literature from the Universidad Mayor de San Andrés. She is a journalist, editor and writer. She is currently the editor of the La Paz newspaper *Página Siete*.

Tania Pozzo, from Bolivia, discovered her love for science in her father's laboratory and by reading science fiction novels as a child. Today she has a doctorate in Biotechnology and won the scholarship for Women in Science 2014, awarded by UNESCO and L'Oréal, as well as the Marie Curie Prize in 2014, from the National Academy of Sciences of Bolivia. She develops new environmentally-friendly processes to produce chemicals, using renewable raw materials and reducing toxic waste generation. This is her story.



Childhood

While Tania was growing up, there were so many science fiction novels in her house that she grew up dreaming of creating formulas and inventions that would change the world. As her father was a geologist, she and her sister learned to use a microscope and feel entirely at home in a laboratory. At the age of 12, she was convinced she was going to become a molecular biologist. "We loved to spend time watching my father analyze samples, and he would explain the biological changes in Nature. That's how I developed a growing interest in science," she explains.

Passion for Biotechnology

"At the end of my degree in biochemistry, at the Universidad Mayor de San Andrés in La Paz, I felt I needed to acquire more in-depth knowledge to understand the



molecular mechanisms of various processes applied in biotechnology. I therefore decided to continue my studies, through a master's in food engineering and biotechnology. I believed that those two topics had a promising future to develop new technologies that were beneficial to human beings and their environment."



newable raw materials such as agricultural and forestry waste. Biotechnology is currently studying the positive interactions between microorganisms and plants. It seeks to decipher molecular mechanisms to create plants that do not require fertilizers to grow.

Advice for girls

They should discover their passion for science, take on the new challenges of science and technology and pursue a scientific career. "Women have played an important part in science, throughout the history of humanity. Women such as Marie Curie used to be the exception; today they are the norm" Tania argues. She adds, "Lastly, and though this may seem obvious, the efforts one makes in studying and training will pave the way for future success. Learn as much as you can, discover through knowledge and never stop being curious is the motto of a real scientist."

Tania finished her master's at the University of Lund in Sweden, then received her doctorate in biotechnology from the same institution in 2012. She is currently carrying out post-doctorate studies at UC Davis at the University of California, in the United States. In March 2014, Pozzo received the international scholarship for excellence awarded by UNESCO-L'Oréal for Women working in Science. And she has obviously continued researching.

Building a "green society"

"The greatest satisfaction scientific research gives me is the ability to contribute new knowledge that helps to improve processes applied to biotechnology", says Tania. Proof of this are the two interdisciplinary projects she carried out during her doctorate to develop new technologies in the production of chemical compounds with minimal environmental pollution: "technologies that help build and achieve a green society."

The first project, GreenChem, produced chemical substances (such as coatings, lubricants and surfactants), using biocatalyzers (catalysis using enzymes). "This concept is helpful because using biocatalyzers is an efficient method that uses fewer toxic compounds and is therefore more ecological than conventional chemical processes." The second project is called SureTech and obtained antioxidants, high value compounds, from re-



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Solange Binotto

Interview by
Belita Koiller*

Being a researcher involves being creative, learning through teamwork, and contributing by ethical means to the advancing frontiers of knowledge in science and technology



My research is based on simulations of carbon nanomaterials to determine the properties of these systems, with the aim of contributing to new applications in nanotechnology. I am also an educator and publish scientific articles; one in particular has been cited by more than 180 researchers as a key reference in the field: “Ab Initio Calculations towards a Hypothetical Material: Silicone Nanotubes”, published in *Physical Review*. This makes me very proud, as does the creation of the new training program for researchers in the field of nanoscience –currently unique in Brazil.

My name is Solange Binotto Fagan and I have a doctorate in physics. I was born in Brazil, the daughter of agricultural workers, who were the descendants of Italians who arrived to colonize Southern Brazil, and didn’t even finish elementary school. They fought for their four children to be able to study whatever we wanted. I chose physics. I now work as Assistant Dean of the Postgraduate and Research Center at the Franciscan University, a teaching and research institution in the State of Rio Grande do Sul, Brazil. The support I’ve received from the Center has been crucial to my scientific and academic achievements, which have put me in a prominent position as a researcher.

When I was a child I enjoyed playing at being a teacher, since I was always looking for new knowledge. Making the most of my curiosity, I took apart whatever toys I had to see how they worked. I was born and grew up on a farm in a small town with fewer than three thousand inhabitants. I always used my creativity to make up games that usually had to do with nature. My dream was to be an astronaut. I often played sports, especially volleyball, and my favourite subjects were mathematics and physics, which I found easy, meaning that my classmates all wanted to study with me.

My secondary school teachers encouraged me to apply for a degree in natural or exact sciences; however, it was my maths teacher, Leonidas Belinaso, who had a decisive influence on me. He showed me the opportunities I’d have if I engaged in

*Belita Koiller is a professor of physics at the Federal University of Rio de Janeiro.

research. So I began a degree in physics. Although I had to work while at secondary school, I had the support of Brazilian funding agencies throughout my undergraduate, master's and doctoral degrees. So I understand the situation of the students who participate in my research group.

I got married in 2003 and have a two-year-old son. At the moment I don't participate in many of the events I used to attend, as motherhood has completely shifted my priorities. The support of my family is and has been total. They have always encouraged me in my professional choices and understood the absences that are part and parcel of a scientific career. The family will always be the foundation of everything, including science, so the preservation of these bonds is essential to a researcher's training.

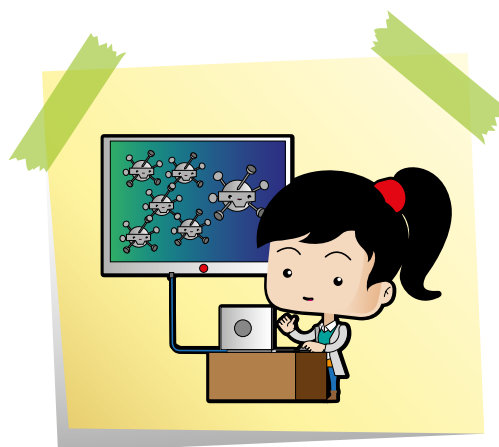
I love teaching. For me it's a moment of real professional accomplishment, as it is when we can apply our research in other contexts such as the classroom. I also love guiding students in their research activities. I supervise students from undergraduate through to postgraduate level, and try to encourage them to take advantage of opportunities offered by researchers in academic environments.

Regardless of their gender, we must encourage young people with high intellectual potential to pursue a scientific career. Young people should be made aware that being a researcher involves being questioned every day, being creative, learning through teamwork, and contributing by ethical means to advancing the frontiers of knowledge in science and technology. Being a woman hasn't made me a better or worse researcher, as in my area I've always been respected for my work and that has encouraged other young women to see physics as a real opportunity, while it was previously thought to be the preserve of men. Many young women researchers don't have the support of their families, friends and colleagues to continue their professional careers because it's believed they can't compete with men, which is a preconceived notion and a myth.

Pursuing research means having a profession like many others that requires a high level of commitment, dedication, global vision and, as a result of this, a place in the job market. I consider myself a happy person and my professional choice contributes hugely to this. Any unfulfilled desires? In the coming years I'd like to do a postdoc abroad and establish new lines of research in nanobioscience simulations.



Research reaches the scientific community through publications and conferences, as you can see in the picture. The results benefit society through the advance of science and eventually lead to the development of novel applications.



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Maydianne Andrade

Interview by
Frances Henry*

The best advice I can give young women
is for them to love their work, because that
way, it will never feel like work



I am professor of biological sciences and the Canada Research Chair at the University of Toronto, Canada, and my name is Maydianne Andrade. In the area of Evolutionary Biology, I research sexual cannibalism in black widow spiders and I have proved that this is adaptive evolutionarily for males offering themselves to be devoured by females after copulation, not because the male provides a nutritional value that produces stronger offspring, as some people thought, but because it gives him a competitive edge to convince females to mate for longer, giving the cannibalized male an advantage over other males: the possibility of fertilizing more eggs. My theory was published in the journal *Science* and I am very proud of my contribution. I am currently investigating the function of genes that underlay the development of behavior.



Redback Spider.



I have been interested in science ever since I was a little girl. My family emigrated to Canada from Jamaica and settled in the suburbs of British Columbia. I had a very good science teacher at school who taught me that the role of science is to find mechanisms to explain natural events and thereby understand them. I decided to study biology as a result of another excellent teacher, who inspired me to do so. My parents supported my decision. I was fascinated by invertebrates, insects, especially spiders, as well as the fundamental theory of evolutionary biology. I did my undergraduate degree at the University of British Columbia, my master's at the University of Toronto and my PhD at Cornell University in the US.

My first and only job has been in the Department of Biological Sciences at the University of Toronto, for the past 15 years. Getting the job was fairly straightforward thanks to a special Women-in-Science program, sponsored by the Canadian government. Comments from certain col-



Maydianne and graduate student.

*Dr. Frances Henry
is IANAS Focal Point
at the Royal Society
from Canada.

leagues, however, reflect their assumption that if the position had been open to both men and women, I would not have been hired. I have had a couple of difficult interactions with my colleagues, including a few sexist or racist comments or incidents, which, although they did involve me directly, make it clear how prejudices affect interpersonal dynamics and show how they see me. In the back of my mind, I'm never sure what lies behind their criticism: Is it because I did not make a good point or because I am a woman? Or is it because I'm a black...? and that introduces an element of doubt.

In general, I have not been held back in my desire to become a scientist. I was supported by my family and my mentors, which gave me the confidence I needed to achieve

my goals. Being not only a woman but a “woman of color,” my path was smoother than many others’ because my parents taught my brothers and me that, as a visible minority, we had to work twice as hard as others to achieve what we wanted. This was not said as an excuse for failing but because they anticipated that we would encounter people who would not give us the same kind of recognition they gave whites. The positive effect of this teaching was that, although racism obviously exists, there are ways to get around it and knowing that from the outset has been very useful.

I am married, my husband works in the same department as I do, but in a different area of research, and we have two children. The subject of maternity leave and the alleged privilege it confers on women posed a great problem for me, because certain senior colleagues thought I could use the time to “churn out several articles.” The main challenge of being a woman is being able to balance a family and the time demands of an academic career.

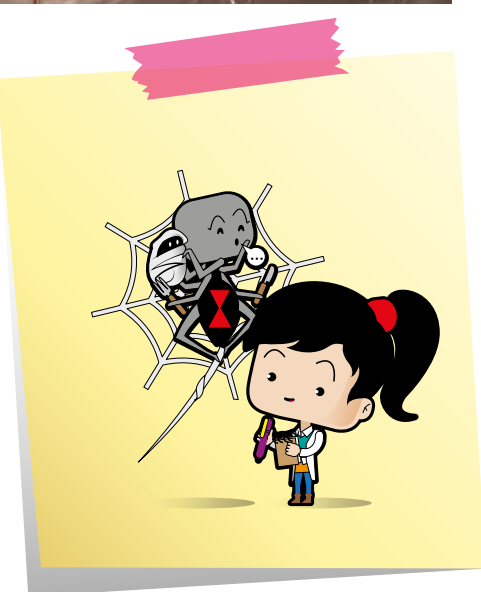
There are obviously more women scientists today than in the past and it is inspiring and wonderful that they are doing important research on climate change and certain challenges in medical science.

Nowadays, there is more freedom for women to have the full breadth of the kind of research that men do. Being able to devote ourselves to basic science even if it does not have an immediately practical application is also very important because it is an area from which we were previously excluded. Young women scientists should know everything that is available.

The best advice I can give young women is for them to love their work, because that way, it will never feel like work. Your passion makes you think about it all the time. I also advise them and racialized people to be aware of the unconscious biases of those around them, which may lead to a change in behavior that will empower women and visible minorities in the future.



Maydianne and her family.



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i love science



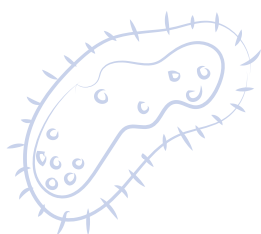
Cristina Dorador

Interview by
Richard García*

The more we know about microbial life on Earth, the more we open our eyes to the relationship that could exist with extraterrestrial environments



Cristina and part of her family



*Richard García has contributed to *El Mercurio* newspaper in Chile since 1988. He has written several articles on biodiversity, climate change, energy, astronomy, archeology and paleontology. He began writing about science with a story on abalone farms in Chile.

This scientist roams the isolated wetlands of the Atacama desert in pursuit of microbial life that can help explain the world's past and future. Each of these is an enigma whose knowledge could eventually help discover a cure for cancer, develop ultra-powerful detergents that do not require hot water, and even understand life on other planets. This scientist is Cristina Dorador, a native of Antofagasta, who was interested in science from a very young age. "Back in elementary school, I was fascinated by the teachers' experiments. The first one I carried out was extracting chlorophyll," she recalls.

"The first time I was really drawn to microbiology was in high school, when I read a report on prions and the subject really appealed to me, though I was also interested in paleontology. That was why I studied a bachelor's degree in biology at the Faculty of Sciences of the Universidad de Chile in Santiago. I believe the turning point was when I began to work in a research laboratory when I was 19, analyzing *pocha* - small freshwater fish that live in the center and south of Chile - with Professor Irma Vila."

Cristina has always been interested in salt flat systems, and when she was 23 she received a scholarship to study for a doctorate in Germany. She took samples of the high plateau salt flats and wetlands to analyze their microbial diversity. She explains her fascination with bacteria and microorganisms, saying that until recently "people immediately associated them with diseases, but now we know these microorganisms are everywhere. They are present in every natural environment on Earth. This diminutive diversity supports everything, and life itself. Without microorganisms we would not be here."

In her opinion, conserving microorganisms depends on conserving ecosystems. An issue that has emerged in recent years is ecosystem services based on microorganisms. For example, in the field of climate change, it is not yet known how

Near Salar de Tara in the high plateau of the Antofagasta region, with the Cerro Zapaleri in the background.



Pampa Lirima, a thermal water site, Tarapacá Region.



microorganisms contribute to the production of greenhouse gases in salares.¹ Yet since humans are an ecosystem composed mainly of bacterial cells, what happens to bacteria will affect us too.

Cristina likes to compare the microbial universe to the cosmos. She considers that “the more we know about microbial life on Earth, the more we open our eyes to the relationship that could exist with extraterrestrial environments.” For this reason, she collaborates with the NASA Ames Research Center, in the area of microbiology. In her opinion, many questions about space could be resolved in the Atacama desert. Indeed, certain changes in the world’s environmental conditions that are visible from space could have a microbial explanation. “I have no doubt that there is life on other planets. What is interesting is discovering whether this microbial life is similar to ours. It would be very interesting to prove this.”



Her work at the Universidad de Antofagasta, since 2008 has enabled her to have her direct interaction with students and form her own work group. Several of her students participated in the early days of her laboratory, and a number of them still collaborate with her. She still has numerous projects with Germany, from which doctoral students come to carry out internships at her laboratory, and she helps students do their doctorates in Germany.

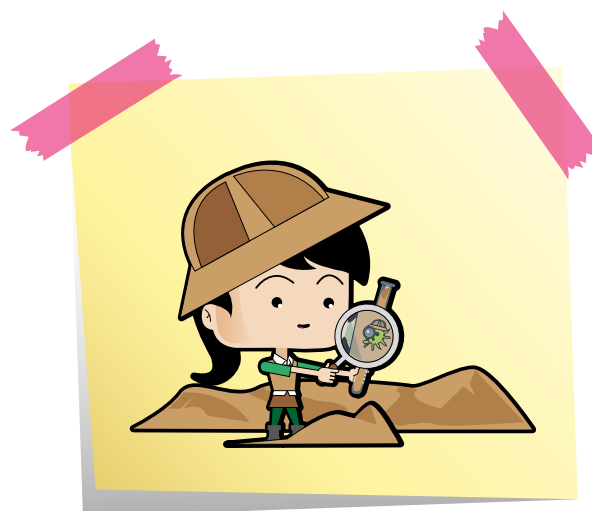
As for her status as a woman working in a such a peculiar scientific area, Cristina says that she has never tried to make differences, though when she started to work at the university, she noticed certain differences due to being a woman and, above all, young.

Reconciling science and family is a difficult task, Cristina admits. She is married to a British scientist, with whom she has two children, and though her husband understands her and supports her professionally, since her first child was born she has had to change the pace of her work to get home earlier. She waits until her children are asleep before returning to work for a while, then going to bed. “My priorities have changed enormously, though I still have to fulfil my commitments.” However, Cristina says that her family is the most important thing for her.

1. http://www.altiplanosur.cl/salar_atacama.php



Sampling sediments in Salar de Huasco, Tarapacá Region.



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Silvia Restrepo

Interview by
Andrea Linares Gómez*

Science is beautiful and creative, and I am a creative person. Pure science involves imagination, affection, and spending hours persevering in the laboratory



Silvia's every gesture and word show that she was born to be a scientist. With a broad smile on her face, this biologist and expert in phytopathology (plant diseases) declares that science was a clear choice for her, and illustrates her fondness for it. As a child, she was allowed out with her siblings and cousins in a plantation in Tuluá (in the province of Valle del Cauca) and would roam happily over the mountain with her dogs. "I was the wildest of us all," she recalls mischievously. This ingenuous exploration of bugs that she found along her way led her to taste a slug one day; had her mother not appeared in time the slimy creature could have become a poisonous snack.

"I have always wanted to study something related to animals, such as veterinary or zootechnical science. But on my last day at high school, I decided to become a biologist," she recalls. Though her numeracy skills made her teachers think that she would become a physicist or mathematician, Silvia regarded those fields as too sterile for her scientific objectives. "With apologies to my colleagues in those areas, I did not find it appealing to work with pure knowledge without going beyond that. I wanted to produce it, but also make it applicable", she explains. Silvia holds a master's in molecular and cellular biology and a doctorate in phytopathology from the University of Paris VI, in France.

One of her greatest scientific achievements was creating varieties of yucca that are resistant to bacterial destruction, which forced dozens of farmers to burn their crops year after year. Silvia is now focusing on the pathogens infecting the potato, the epitomic tuber of the Colombian diet. They not only kill the leaves and stalk of the plant that produces it, but also destroy an entire



*Andrea Linares is a Journalist in the lifeStyle section of the *EL TIEMPO* newspaper in Colombia, which covers education, health and science issues. For the past 16 years, she has worked in newspapers, radio, television and the Ministry of Education in her country.

crop in four weeks. Silvia is working on creating a warning system in the Bogotá savannah, to identify the climatic conditions that produce the disease that attacks potatoes.

She has two objectives that keep her working until late: ensuring that potato growers are protected from fungicides when they apply them to their crops, and improving the diet of the farmers who grow potatoes, practically the only food present in their three meals a day.

Though she defends women's abilities, Silvia could not be described as a feminist. "If I receive two resumes, one from a man and the other from a woman, I do not focus on whether they are male and female, but rather on their professional capacities, which is standard practice in the faculty I direct. Of course, it is important for women to be present in science, but I do not believe they are different from men in this field", she explains.

Alongside her love for science, Silvia was a skilled tennis player in her childhood and youth. Though she no longer has the time to play - in addition to her work as dean of the Faculty of Sciences at the Universidad de los Andes and her research projects, she has a nine-year-old son. She plays squash in her spare time to keep fit.

Through the hustle and bustle of her scientific career, Silvia keeps one thing in mind: her family is her priority. Though she efficiently combines both roles, the university dean knows that she cannot begin work at 7am or stay after 5pm. "Every day I drop off my son on the way to work, then rush out after work to be with him. I want to enjoy him while he is young. I spend my weekends with my son and my husband," says Silvia, who is now 43 and married to a Venezuelan phytopathologist, whom she met during her postdoctoral work at the Cornell University in the United States.

However, sometimes love is not enough to succeed in science. One also needs financial support to undertake projects, and Silvia, like hundreds of other scientists, has to struggle every day to obtain funding for her work.

Silvia is keen to offer advice to young women hoping to follow in her footsteps. They should not impose limits on themselves, she says; they should work energetically and prove that they can excel in any field, including engineering and hard sciences, which are mistakenly described as careers for men. Studying these subjects is another challenge to show that society is wrong to believe this. "Self-belief is more powerful than the hatred and obstacles women sometimes encounter. Science is beautiful and creative, and I am a creative person. Pure science involves imagination, affection, and spending hours persevering in the laboratory. It is all about motivating oneself and others. We are good mothers and we translate this ability in our work," she says.

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Teresa Escalante



Interview by
Dayana Mora*

A career in science is very demanding, but also fun and stimulating, as it strengthens the mind and poses endless challenges that need to be solved creatively



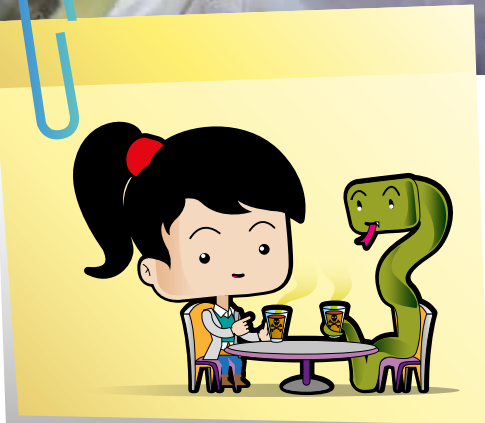
Teresa Escalante working in the cell cultivation laboratory of the Clodomiro Picado Institute in Costa Rica.

My name is Teresa Escalante, and I am a scientist.. I have devoted my career to toxinology, and I am delighted with my work at the world-famous Clodomiro Picado Institute at the Universidad de Costa Rica. I belong to the Academic Division of the Institute, and I am professor of Immunology in the Department of Microbiology of the Microbiology School.

My research focuses on local and systemic pathology of disease caused by snake venom. I am particularly interested in the effects caused by hemorrhagic metalloproteinases, a type of toxins from the venom of a group of snakes called Viperidae, which destroys the blood capillaries. I have used natural and synthetic ways of inhibiting these toxins, to discover alternatives that complement the therapy with antio-
phydian serum. In the future, I would like to work in more multidisciplinary projects on a number of topics in health sciences, especially those which include a social dimension.

I really enjoy teaching. I have taught at the Universidad de Costa Rica for 15 years, and I appreciate the contact with the students, as it is a mutual learning process, and very enriching to observe their different visions of the problems.

I grew up in a rural village called Santa Ana in the province of San José, Costa Rica. I remember that I always liked animals. I wanted to be a vet, as I was attracted by the sciences of biology, chemistry and mathematics, but I eventually decided to study Microbiology. My father was very interested in Nature, and he instilled in me his keenness for natural sciences. During my childhood, I also played with dolls, toy cars and pets, and enjoyed catching insects in my backyard.



*Dayana Mora has a master's in Project Management, Executive Director of the Academia Nacional de Ciencias, director of the area of Communication and Assistant Professor at the Universidad de Costa Rica.

When I enrolled at the Universidad de Costa Rica, I chose nutrition, but my interest in scientific research and microbiology was fostered by Professor Yamileth Angulo, who recommended me for an internship at the Clodomiro Picado Institute, where I worked with Dr. Gutiérrez and Dr. Rucavado, whose influence was decisive in my vocation.

Throughout my scientific career, I have discovered that one of the greatest difficulties when working in a developing country is learning to manage the frustration, as the administrative bureaucracy sometimes makes processes rather slow, and it is more difficult to develop projects. At the same time, working on topics that are less appealing to international agencies, such as ophidism, makes it more difficult to obtain resources. However, we should not perceive this as a limitation, but rather as an opportunity to improve.

I have managed to combine my family life and scientific activity. I met my husband, who is also a scientist-a biologist-, at the institute where I work. We have two children: a nine-year-old son and a one-year-old daughter. It has been difficult and full of sacrifices, but very satisfying. I have received a great deal of support from my family, particularly from my husband, in taking care of my children. As a mother I cannot return home in the evening and read articles,

or stay late in the laboratory carrying out experiments as I used to. However, I have managed to cope with it all and continue developing as a professional woman.

It is important that women be included in science, so I would like to tell young women that the most important thing is to know themselves, their interests and where their skills lie. To work in science, as in any other discipline, you need a genuine interest in the subject, and to keep an open, critical mind, to constantly criticize the surrounding phenomena. A career in science is very demanding, but also fun and stimulating, as it strengthens the mind and poses endless challenges that need to be solved creatively. It is also an extremely rewarding job, as it enables us to resolve problems in our societies and enrich knowledge in one particular field.

Women who are drawn to science currently have numerous opportunities to develop in this field, and should not limit themselves to the roles that culture has imposed on society. Likewise, one should not believe that working in science necessarily involves sacrificing development in other personal spheres, since it is always possible to devote time to other activities that enrich the way we see life and address scientific issues.



Photo with colleagues and students.



Teresa's work, together with that of other researchers, has permitted a better understanding of snake venom in order to improve the production of snake serum. In addition to her work as a researcher, Teresa teaches at the University of Costa Rica, which she greatly enjoys and which has enabled her to be in constant contact with students. Teresa, like many young women of her generation, has managed to combine her scientific work and teaching with her other favorite job: her family.

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Noslen Hernández

Interview by
Lidia Hernández Tapia*

If I could transmit something to young scientists, it would be a balanced combination of three aspects that I consider key when working in science: motivation, dedication and ethics



The young Cuban scientist with her colleagues at a congress on her area of expertise.



*Lidia Hernández Tapia holds a degree in journalism from the Communication Faculty at the Universidad de la Habana. She works at the National Information Agency (AIN) and has contributed to various Cuban publications, such as the journals *Alma Mater* and *Juventud Técnica*. She authored a volume of interviews with contemporary Cuban photographic artists entitled *Isla interior. Paisajes de profetas*, currently in press.

My name is Noslen Hernández González and I am a 32-year-old Cuban and a doctor in mathematical sciences. I work in chemometrics, a discipline that applies mathematical and statistical methods to chemical data, to discover patterns or extract relevant information from them, using computing. I have worked as a researcher at the Advanced Technology Application Center (CENATAV) in Havana, Cuba since 2005. There I develop new statistical methods for what is known as calibration of chemical data.

As a child, I was always drawn to games that challenged my perception of reality, and I read the books on recreational mathematics belonging to my father, who is a mathematician. As a teenager, I felt uncomfortable about the rituals to celebrate 15-year-old girls. All I wanted was to have a computer, which I did eventually receive in my second year at university. My passion for mathematics led me to become part of the national mathematics pre-selection. I represented my country at the international Olympiads in South Korea, Venezuela and Cuba. I studied Computer Engineering at the José Antonio Echevarría Superior Polytechnical Institute (ISPAJE), but it was not until I was admitted to CENATAV, where I studied for my doctorate, that I defined my vocation.

In addition to the influence of my father, Nelson Hernández, eminent professors such as Raúl Ochoa Rojas, Enech García and Fausto and Carlos González introduced me to the world of research, and other leading researchers, such as Isneri Talavera, Rolando Biscay, Francisco José Silva, María Cruz Ortiz and Luis Sarabia (from Spain),



Marcia Castro Ferreira (from Brazil) and Nathalie Villa-Vialaneix (from France), helped me consolidate my career. I consider that the time devoted to research is crucial, because more than just a profession it is an audacious way of life. Throughout history, intellectuals, artists, philosophers and scientists have had one thing in common: a certain capacity for sacrifice. Spending nights as well as long days working, they defined their priorities differently to most human beings, to create something that would benefit people.

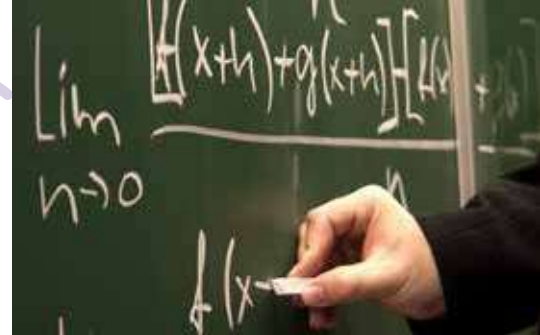
Scientific research in Cuba encounters significant obstacles on a daily basis, such as access to Internet and an updated bibliography, the availability of computing resources and inputs, the socialization of knowledge at national and international events, exchanges and collaboration projects with prestigious experts, mobility and income. However, despite the economic embargo imposed by one of the hegemonic powers, its scientific development is undeniable and it has made outstanding contributions to various internationally recognized branches, such as biotechnology. I was fortunate to have completed my doctorate at CENATAV, though it did involve considerable personal effort. I understood that you have to enjoy your profession and feel passion for science, to the point of it becoming your main priority. In that regard, time seems short, all obstacles can be overcome and any finding is a constant incentive to pursue other discoveries, because this is not a profession, a job, but essentially a way of life.

I have not experienced any kind of discrimination due to being a woman in either the professional or the personal sphere. I have always received unconditional support from my family, and have been able to take on all the research projects offered to me, though I must admit that I do not yet have my own home, husband or children. When I reach that stage, I am aware that it will be a challenge to perform well in both spheres, because despite being a liberated Cuban woman and working under the same conditions as men, our Latin idiosyncrasies comprise macho elements that force women to prioritize the domestic sphere to the detriment of professional achievements.

If I could transmit something to young scientists, it would be a balanced combination of three aspects that I consider key when working in science: motivation, dedication and ethics. Science must be practiced with a vocation of service, and scientists must have the humility to know that they hold the destiny of mankind in their hands. In the case of women, they must demand their rights and not allow their condition to place them at a disadvantage or disadvantage before any decision in the professional and work sphere. In the private sphere, family dynamics must be created that do not underestimate their role as professionals, make them the victims of double shifts, or renounce the possibility of a successful scientific career and a harmonious family.



Noslen with her two doctoral dissertation supervisors.



In 2011, Noslen Hernández was awarded the Annual Award for the most Outstanding Doctoral Dissertation in Science by the National Commission of Scientific Degrees, the "Annual Prize of the Academy of Science", and she was appointed Young Associate of the Cuban Academy of Sciences. In 2012, she obtained two international prizes: the "D.L. Massart Award in Chemometrics", from the Belgian Society of Chemometrics, in Ghent, Belgium, and the "TWAS-ROLAC Prize for Young Scientists in Engineering Science", from the Third World Academy of Sciences (TWAS).

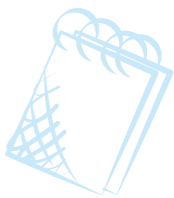


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Dominican
Republic



Aída Mencía

Interview by
Odalís Mejía*

The nature of science is to
benefit human beings



In Qutb Minar (Delhi, India)

*Odalís Mejía is a journalist who contributes to HOY newspaper, where she covers various environmental issues. She is also an elementary school natural sciences and Spanish language teacher for over-age youth and adults.

Aída Mencía Ripley is a passionate woman who loves studying human behavior and constantly searching for answers because, as she says, she is eternally restless and believes that being a scientist is equivalent to never being satisfied with the way things are. Her field of expertise is on Psychology and Clinical Psychology.

She holds a PhD in clinical psychology from St. John's University in the United States, and has trained at various hospitals. Her doctoral dissertation broke new ground and took on an enormous challenge by examining a little explored area. When she presented her theory, some people were surprised and one person even laughed. "I thought I was presenting something fabulous and that everyone who heard it was going to say, "Wow!" But she persevered. And managed to have her hypothesis on gender identity and its effect on ambulatory blood pressure accepted.

Today, at the age of 35, this young married woman with a five-year-old daughter leads an interesting life, because although it has been said that having a family conflicts with a scientific career, she disagrees. "In that respect, I am very atypical as regards traditional gender roles. I don't think you have to choose between being a mom and a scientist... Being a scientist is a way of seeing life and I go on being a scientist at home. My advice would be never to see it as a conflict, or as two competing issues and in any case, science itself is wonderful."



Perseverance is key, says Aida, when asked about her advice for young women thinking about pursuing a scientific career. “Your most ridiculous idea may end up being a great contribution.” Obviously though, she notes, this determination must be accompanied by an extensive scientific background and a lot of reading and innovation.

On the subject of obstacles to young scientists, she thinks they start to crop up the moment you start doing your own research, in other words, when you become independent from your mentors.

In the case of women scientists, she acknowledges that obstacles persist because their participation is still restricted because of discrimination and sexist attitudes. She says that at certain congresses, what a woman says is undervalued or in certain situations, people focus more on their appearance than what they say.

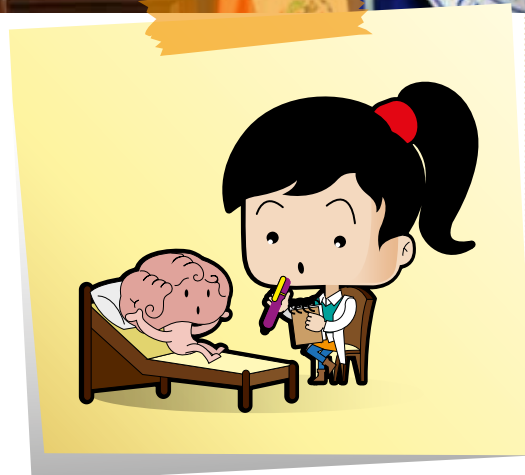
But Aida believes that women should not give up and should continue to work in science despite the hurdles, because above all, it is a question of rights.

As for teaching scientific research, Dr. Aida Mencía Ripley believes it is very difficult to do science without having contact with students. “First of all, there is no point having findings, doing science and not having anyone to share it with.” And second, sometimes you learn more from the other side. The student has a unique life experience that he contributes, which is very enriching.”

Mencía is currently Dean of Research at the Universidad Iberoamericana (UNIBE) and director of the UNESCO Chair on Assistance and Social and Academic Inclusion for Persons with Disabilities and Special Education Needs, based in that institution. She finds both tasks a challenge and a passion, because the fact of having to create a platform of support for researchers from different specialties makes her learn a lot more. “This has been the best position to satisfy my eternal curiosity and my eternal restlessness,” she says, smiling excitedly.

As for inclusive education, she says it gives her great satisfaction, because beyond doing science from a clinical psychology perspective, it involves protecting the legal status of people with disabilities.

In the immediate future, Aida will work on various projects at the university to promote reading in children, on the subject of gender, violence reduction and attention to diversity. In the long run, she will go back to working on mental illness in women. Because this young scientist strongly emphasizes that science must have very practical purposes for the benefit of those who need them most. “The nature of science is to benefit human beings”, she concludes.



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Andrea Encalada

Interview by
Oswaldo Báez Tobar*

Plunging into a life of research is fascinating, as it involves continuous, sustained learning. There is nothing more gratifying than a profession that constantly enables one to learn new things



Suárez-Encalada family: Esteban Suárez, Juan Esteban Suárez-Encalada & Andrea C. Encalada during a hiking trip in Ecuador and Andrea at her lab.



*Oswaldo Báez Tobar is a biologist and scientific journalist, main professor at the Universidad Central and Universidad Católica from Ecuador, member of the Charles Darwin Foundation for the Galapagos Island

I am a specialist in the ecology of freshwater ecosystems, riverbanks and mountain rivers, hydrobiology, aquatic invertebrates, aquatic entomology and the restoration of water courses. I work as a professor and director of the Laboratory of Aquatic Ecology at the Universidad de San Francisco de Quito (USFQ), in Ecuador. I received my bachelors' degree in biology from the Pontificia Universidad Católica del Ecuador in 1997 and my doctorate from the Entomology Department of Cornell University (United States) in 2005. My name is Andrea C. Encalada.

During my last year at high school, I volunteered on weekends in the Pas-ochoa Wildlife Reserve. My parents then treated me to a trip to the Galapagos islands when I was 17. When I returned I was keen to learn about the functioning of Nature; I wanted to study biology. At home, my sisters and I were always surrounded by books. My father is a very academic man, whereas my mother is very sociable and hardworking... a nice combination. We lived in an intellectual home, and were always encouraged to learn more and to discover. However, one of the key moments that defined my interest in biology was that journey to the Galapagos. After learning about Darwin and his journey on the *Beagle*, his descriptions of species and his research, I wanted to understand life and evolution.

Biology opened a fascinating door for me, to find out about biologists' achievements and current projects. I have learned a great deal from my teachers. It was my undergraduate thesis that really changed my view of how to carry out research, apply scientific methods, go into the field and collect data. My thesis was on the ecology of high-altitude tropical streams. After my thesis I wanted to do a Ph.D. in river ecology, to understand how these ecosystems work and try to protect them.

Women think differently, and see scientific problems from a variety of angles. Research carried out by women is not intrinsically superior or inferior to that by men. However our societies should be more evenly shared out and egalitarian, and reflect this equality in science.

I am sure this would make us richer and more complete. My current working conditions are excellent. I am fortunate enough to work at the USFQ, a liberal arts university, which fosters research, growth, equality and critical thinking. In this way, I have always felt supported by the authorities and my colleagues, but there is always room for growth. I have a laboratory that began as a small empty room and now contains sophisticated equipment I use to conduct research.

My husband is Esteban Suárez, and we have a 20-year-old son, Juan Esteban. Esteban is also a biologist, an ecologist of terrestrial ecosystems. His passion for Nature and conservation have always inspired me. My son is studying liberal arts, philosophy and cinema. He is an example of creativity, with a curious and inquisitive mind. I have learned a lot from them, and I am very proud to be part of this family. We are a young family, we have grown together and we have always supported each other. My family has always encouraged my scientific work.

In the scientific field, I learnt a great deal from my doctoral advisor and her work group. One of my most satisfying achievements is having contributed to knowledge about rivers, through my research and publications. That is what being a scientist involves: contributing to knowledge! On the other hand, having created an Aquatic Ecology laboratory to learn about ecology and river management in tropical regions is a dream come true.

Freshwater ecology is a very recent discipline in Ecuador, and there is a small group of us carrying out research in this field. In this regard, teaching and supervising thesis students studying this topic is the best way of increasing knowledge about it. I love teaching in the field and in the laboratory. Those are special moments, because there are always curious and brilliant students who transmit their energy and make us think differently. Some of my students are already working as university professors, others are in postgraduate study and the youngest have just finished their undergraduate degrees.

I would like to tell young female students that being a scientist is an excellent career. Plunging into a life of research is fascinating, as it involves continuous, sustained learning. There is nothing more gratifying than a profession that constantly enables one to learn new things. On the other hand, we must debunk the myth that being a scientist or a professional in another area is incompatible with having a family. It can be difficult or time-consuming, but it is feasible and can be highly rewarding.

I recommend female students in particular to be brave. There are obstacles, but with creativity and extra effort they can develop a scientific career to the highest level. Curiosity is a powerful force in the pursuit of knowledge. Wherever we go we must continue to cultivate this curiosity, with our children, with students, with ourselves. Being a scientist include reading about discoveries, observing, exploring, asking questions, criticizing, formulating hypotheses, experimenting, discussing and writing. It's fun, rewarding and there is so much to learn and discover!

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Encalada doing aquatic invertebrate sampling in a high-altitude stream in Ecuador.



Encalada with a group of students, teaching about water pollution in Ecuadorian rivers.



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Sully Cruz

Interview by
Lucy Calderón*

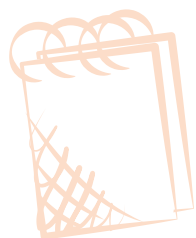
Fight to achieve their dreams, be decisive and not limit themselves. There are obstacles along the way, but if they believe in what they do and are passionate about it, that will guarantee them success



I am fascinated by natural products and their potential medicinal applications. Moreover, Guatemalan culture greatly appreciates plants, and we have the advantage that they are commonly used. My grandmother, for example, would buy her herbs in the market, cook them and make me teas... traditional medicine and medicinal plants are in our roots.

Validating popular knowledge on medicinal plants gives me great satisfaction, but we need to go one step further and make this information a phytopharmaceutical product, in other words, give it added value, as a capsule, gel or syrup, to position natural Guatemalan products on the local and international market. All we make are teas but our industry faces the challenge of strengthening the productive chain, through the identification, production, validation, and use of plants through phytotherapy. We also need proper training for doctors on natural therapies and how to prescribe them.

This is why I decided to study a bachelor's degree in pharmaceutical chemistry at the Universidad de San Carlos in Guatemala (USAC), as it is a subject that includes all the aspects I was interested in: health, environment and chemistry. Afterwards, I obtained a multidisciplinary masters' in the use and production of medicinal plants, and I now spend my time evaluating natural products and their medicinal applications.



*Lucy Calderón Pineda is a journalist who obtained her bachelor's degree in science communication. Since June 2011, she has been a member of the Executive Board of the World Federation of Science Journalists (WFSJ). In 2013 she was elected Vice President of the WFSJ until June 2015. Her website: Ecocienciagti.com

My name is Sully Margot Cruz Velásquez, and I have a doctorate in natural sciences for development. I am currently the director of the Natural Products Research Laboratory (LIPRONAT) of the School of Pharmaceutical Chemistry at USAC, where I also teach. Since 2002, I have been the Technical Director of the Farmacias de la Comunidad and Farmacias Guatemaltecas companies.

At the beginning of my career, I focused on the *Piper* genus, aromatic species with essential oils that have proven antioxidant, anti-cancer and antibacterial properties. Professor Armando Cáceres gave me the opportunity to participate in research projects seeking active ingredients in regional flora, which I still do today. In general, phytotherapeutical medicine has fewer side effects, and can be used in the long term without harming the body.

The disadvantage of these products is that since they contain up to 20 molecules, unlike synthetic chemical medicines, which only contain one, they are expensive, as their quality control has to



be more rigorous. Nonetheless, raising awareness about the benefits of this type of product would help make them self-sustainable, and their accessibility would improve, as people could grow the plants in their own gardens, and learn to make preparations which, although “rural”, are effective. I am also interested in studying mangroves and their sustainable management, as they have valuable medicinal properties. My career and my research have been influenced by financial difficulties, but I believe that it is not impossible to achieve the goals you set. In a country with limited resources such as Guatemala, it is important to form strategic alliances, prioritize what is most important and use the available resources to fulfil your aims.

It is important for women to participate in science, as they are disciplined, orderly, hard-working, creative, and passionate about their commitments. Women also have a vocation for service, all of which is essential in a society such as Guatemala’s. Science is not an easy choice, because being mothers and wives is also demanding. However, we have to be extremely organized to be able to perform these roles as successfully as possible.

I am married to an agricultural engineer, whom I met while I was studying my doctorate. We have a beautiful 21-month-old daughter, and I try to combine my career with my family as effectively as possible, telling them about my achievements and devoting the necessary time to each aspect of my life.

I would certainly encourage girls interested in science to study it. It is a wonderful career, which will answer many of their questions and they will discover fascinating things. It is unlimited, and you never stop learning, so if they like to observe, know, discover and read, then they should become scientists. There is a world of possibilities in science, so it provides countless opportunities. Other important pieces of advice are for them to learn to listen, because as women, we tend to talk more than we listen. They should be humble, learn from their mistakes and not perceive them as failures, particularly in science, because we are constantly experimenting. They should also try to interact with people who add value to their life, and seek mentors who will support them.

I would recommend young women scientists with families to give them the care and time they need. Their work is important and gives them personal satisfaction but the family should be part of these successes. They must be disciplined and effective in the way they use their time. It is a challenge to combine your activities without neglecting them, but it is important to strike a balance. If you decide to have a family, then this should not hamper your success as a professional, or frustrate your dreams. On the contrary, it should encourage you to fight more tenaciously.

I would advise young women to fight to achieve their dreams, be decisive and not limit themselves. There are obstacles along the way, but if they believe in what they do and are passionate about it, that will guarantee them success. Science is a fascinating career, full of satisfactions. You can help provide solutions to many problems in the area of health, nutrition, cosmetics and the environment, so if you are attracted to science and choose a scientific career, it could be one of the best decisions you ever make.



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Alejandra Figueroa

Interview by
Carolina Alduvín*

When you work in something you are passionate about and add dedication and perseverance, that opens the doors for you to achieve your dreams



I managed to identify a molecule secreted by malignant tumors, which is responsible for inducing cachexi—a progressive, profound organic constitutional disorder—which produces extreme wasting of the muscle and adipose tissue and in most cases is lethal, in order to find pharmacological therapies to counteract its effects. That is the main topic of interest in my current research.

My name is Alejandra Figueroa Clarevega. I was born in Tegucigalpa, Honduras, in 1985 and obtained a high school certificate in arts and sciences in 2003, in which I was the valedictorian and won the Gold Cord in my class. I began studying biology at the Loyola University, Chicago and won the Women in Science Enabling Research Fellowship, which allowed me to conduct research on nitrogen-fixing bacteria. Subsequently, at Washington University in St. Louis, I completed a bachelor's degree in biology and biomedical sciences in 2007. Thanks to a grant from the Howard Hughes Medical Institute Foundation (HHMI), I was able to begin my doctoral studies at the University of California, Berkeley in 2009.



Drosophila melanogaster ovary affected by cancer.

I worked with Dr. Norbert Perrimon at the Harvard University School of Medicine, where I studied the signal sequence to help guide the growth and development of the *Drosophila melanogaster* fruit fly. In Dr. Sarah Elgin's laboratory, I studied how DNA packaging can influence gene expression in the *Drosophila*. I also did an internship at the Pan American Health Organization at the Neglected Infectious Diseases Unit, where I learned that many of these diseases are common in underdeveloped tropical countries such as Honduras, as well as the fact that, despite the dramatic impact they have on global health, they receive very little attention from researchers. In addition, I worked at the Stowers Institute for Medical Research in Dr. Matthew Gibson's laboratory, in Kansas City, where I was also a volunteer at a nearby hospital, where I played, taught crafts and conversed with pediatric patients and their families.



*Carolina Alduvín obtained a master's in genetics and developmental biology at West Virginia University; and is a tenured professor at UNAH. The founder of the National Biotechnology and Biosafety Committee, she is the Secretary of the National Academy of Sciences of Honduras and the IANAS focal point for the Women in Science Program.

I am fortunate enough to have trained in fertile ground for scientific research; I have had a lot of help and recognition. Rather than obstacles, I have experienced the challenge of innovating something without knowing whether it will work until it is tested. That uncertainty has been my daily challenge, but it is also what I love about science. In this field, what matters are facts, and you have to work as a team, without giving up when results are unexpected, and to have an open mind to accept the evidence yielded by our data.

Ever since I was a little girl, I was attracted to natural sciences at school and was intrigued by discoveries, which led to my career as a scientific researcher. My family is my source of inspiration. My parents instilled in me the value of hard work, integrity and respect. My inspiring mother taught me that a person is not known for what she starts but for what she finishes, which has led me to persevere and achieve all my goals. My father's example made me sensitive and attentive to the needs of others, which has been crucial to working as a team both inside and outside the laboratory. These are the values I would like to instill my own family.

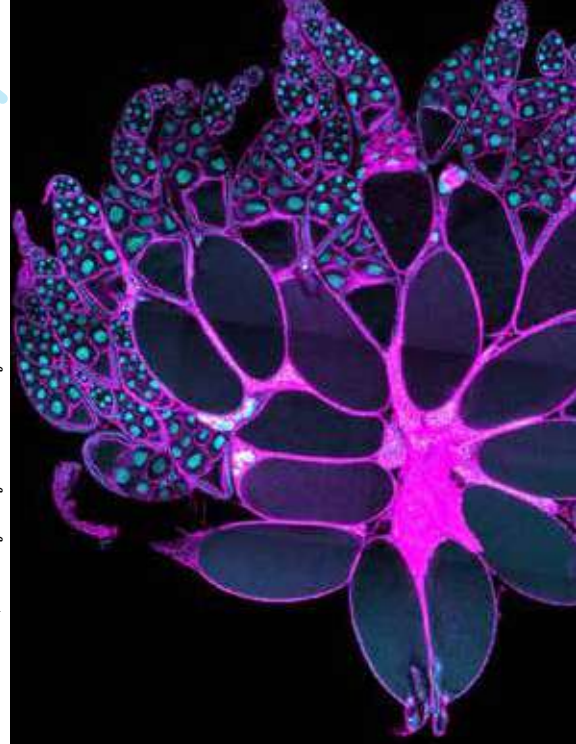
Creating original ideas requires a multitude of experiences and knowledge, which is why diversity in research teams is crucial. Female intuition, combined with reasoning, enables us to provide different perspectives to solve problems and achieve incredible scientific discoveries. With proper training and above all with passion, we can all make science, but this is reserved solely for those willing to engage in rigorous, disciplined study, experimentation and reflection on the results obtained.

I long to share my knowledge and experiences with other young Hondurans interested in scientific research, and inspire them to not sacrifice their goals. I think research is an incredible opportunity to learn from our world through our own discoveries; I would like everyone to have the opportunity to experience this.

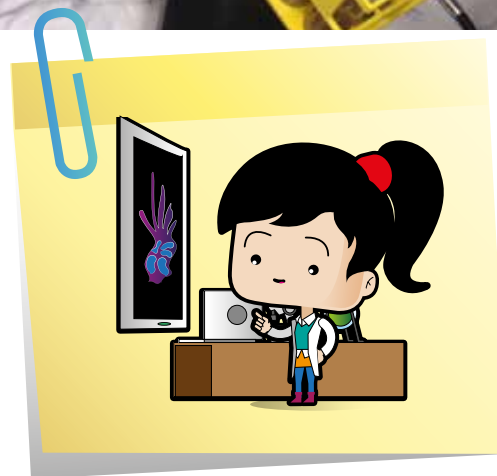
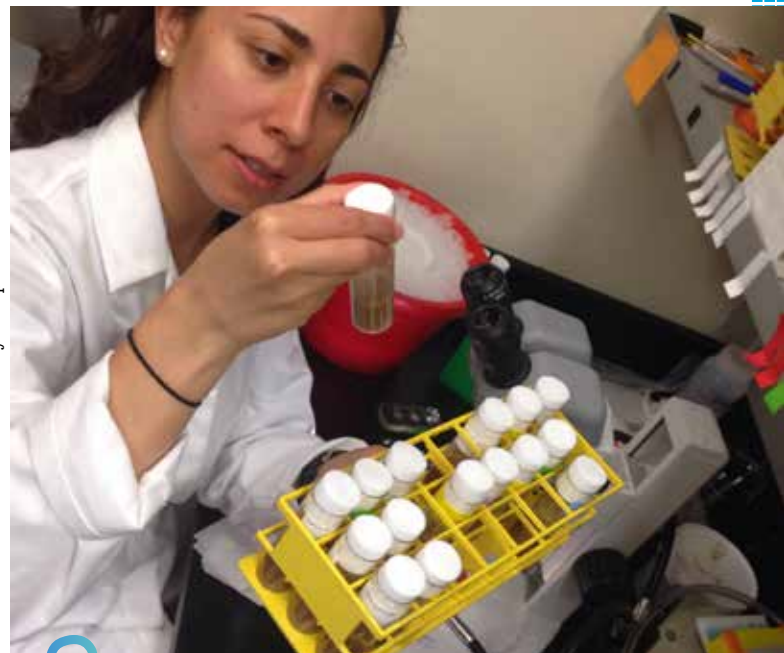
My advice, then, to young women wishing to venture into science is to follow your passion; when you work in something you are passionate about and add dedication and perseverance, that opens the doors for you to achieve your dreams. In science, we have to work hard, have a flexible attitude toward various possibilities and carry on looking for key factors for the nth time. The important thing is never to give up and to use creativity to continue advancing.



In contrast, a healthy ovary not affected by cancer.



Alejandra joined Genentech labor force this fall, earning four times as much as she did in Academia in an entry-level position.



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Nagarani Ponakala

Interview by
Neela Badrie*

Do what you are interested with commitment and sincerity and have zeal to learn new things. Don't be afraid of questioning if you find something going wrong around you



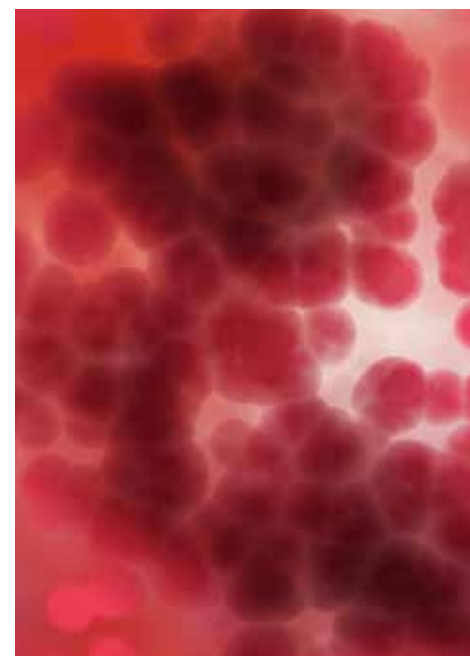
Nagarani Ponakala with her husband Dr. Lakshminarayana Jampany at Niagara Falls, Canada.



*Neela Badrie is a professor at the Faculty of Food and Agriculture, the University of the West Indies, Trinidad and Tobago. She is a former Head of Department and Deputy Dean of Research and Innovation. She lectures and engages in research in microbiology, food safety and quality assurance, food product development and nutrition.

Nagarani Ponakala is a senior lecturer in Mathematics at The University of the West Indies (UWI), Mona Campus, Jamaica, and West Indies. Since childhood, her favorite subject was mathematics as it was easy for her to solve problems. Her school teachers observed her doing this subject and always encouraged her to do much more. She remembered an incident that occurred when she was in 7th Grade. The mathematics teacher had asked everyone in the class to solve some exercise problems. Nagarani finished them quickly and started to ask the teacher many questions on what were really advanced topics. In order to keep her quiet, the teacher made her explain to the students who were having problems with the particular topics. Of course, she knew that her teacher would explain the topics later, but she just could not wait until the next day. Her teachers motivated her to choose a career in mathematics as they felt she was so good at the subject.

She loves applying mathematics to solve problems. This naturally became her research focus. She and her group work on the development of mathematical models and their application to physiological fluid dynamics such as the flow of blood. Her work involves studying the transport of blood through the vessel, the way it branches and pulses through the arteries. Their results may potentially be used to guide future medical interventions.





Nagarani strongly believes that it is important for more women to be involved in science because girls and young women lack role models in this field. In her opinion, there is no difference in the capabilities between men and women. 'A woman can do anything just as a man can do'. 'Women tend to have a higher level of patience and persistence and women can manage multitasking with a greater ease than men'.

She came from India and from a family where it was very difficult for a girl to be encouraged to pursue studies due to social and financial issues. She had to struggle for everything. By the end of her education, her parents realized the importance of education and especially for girls.

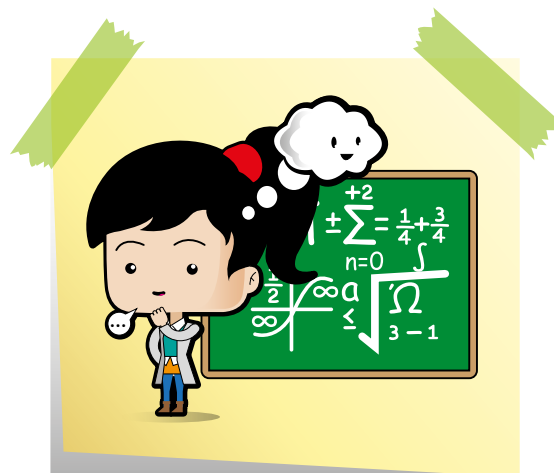
She is proud and fulfilled to be a teacher and in particular to know that her students are performing well in life. She is an active member in her school alumni group and provides

guidance to rural students on their higher education and career choices.

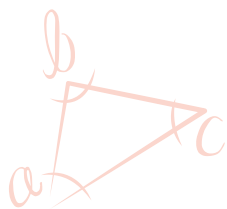
From her own experience she suggests that 'Nothing is impossible if you are determined' 'Do what you are interested in with commitment and sincerity and have the zeal to learn new things'. 'Don't be afraid of questioning if you find something going wrong around you'.



Nagarani Ponakala at a Mathematics workshop, UWI, Mona. And with her research students Binil Thomas -Sebastian and Andre Small.

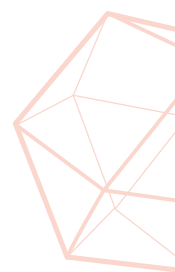


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Isabel Hubbard

Interview by
Judith Zubieta García*



Once we ensure that nobody or almost nobody is afraid of mathematics, just as no one is afraid of history, we will have overcome that hurdle



At the age of 18, I won the National Mathematics Olympiad, and in 2012 the L'Oréal-UNESCO-AMC Scholarship in Exact Sciences for my work on *Combinatorial Algebra and Geometry of Abstract Two-orbit Polytopes*. My name is Isabel Alicia Hubbard Escalera, and I graduated in mathematics from the UNAM Science Faculty and obtained a master's and a doctorate in mathematics from York University in Toronto, Canada. I work as a full-time researcher at the Institute of Mathematics in the National Autonomous University of Mexico (UNAM), teach at the Science Faculty and and serve as a delegate for Mexico City in the Mexican Mathematics Olympiad of the Mexican Mathematics Society.

As a child I wanted to become a bullfighter, and my parents even bought me a cape. I was sociable, a little shy but I had friends and liked music. My mother is an engineer and my father an accountant. My brother wanted to become a mathematician and my sister a physicist. I never thought that I would like math. I simply found it easy and fun, but nothing more. However, my mathematics teacher in junior high and high school, Óscar Chávez, inspired me. He was an excellent teacher, who could identify pupils with a talent for math, and would give us puzzles and place us in groups. He took me to the Olympiad, and helped me to train and find out what was involved.

What do I do? I study abstract polytopes. When I began my PhD, people used to study regular abstract polytopes, which are the most symmetrical ones. They are larger versions of polyhedra, a generalization of the familiar polyhedra we know from high school. But there are others called chiral polyhedra, which are less symmetrical. These chiral objects have rotational symmetry but no reflection. I went further and not only became interested in chiral polytopes, but also began to study abstract polytopes without symmetry. So

when I think of a polytope, before examining its symmetry, I look at its combinatorial properties; it is symmetry without geometry. No-one had ever done that before. Now there are a few researchers in the world who do this and we have managed to form an international network, yet one in which there are very few women.

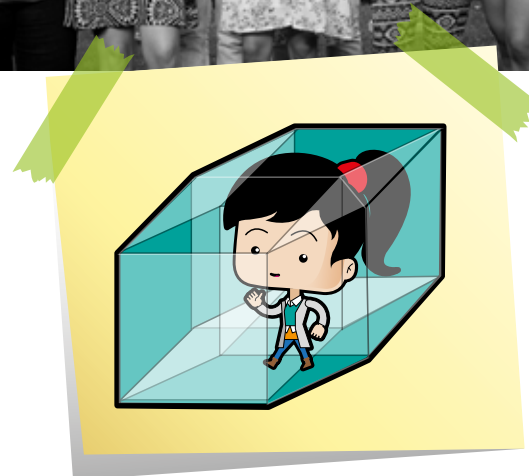
*Zubieta is a faculty member of UNAM and director of the Coordinación de Universidad Abierta y Educación a Distancia (CUAED <http://web.cuaed.unam.mx/>). One of her main professional interests has been the dissemination of science.

I had the honor of taking part in two Mathematics Olympiads, and being a girl made me stand out. The participants were a wonderful group and there was never any discrimination. I never felt that my fellow competitors were treating me differently. When I returned to school after the Olympiads, which I won, I had lots of privileges. One day I decided that I no longer wanted to take part in the international Olympiad, which was to be held in Argentina, because I wanted to focus on my emotional and social life. Since I had prepared so much during the training for the Olympiad, when I began my degree course I was already very familiar with all the subjects. Mathematics was more of a hobby than a degree subject for me. When I finished my doctorate, I almost dropped it all for tango dancing, something that gives me a lot of pleasure, before going back to do a postdoctoral course. However I decided not to, as my doctoral thesis advisor dissuaded me.

Men predominate in the sphere of mathematics, and there are very few women. Yet at university, there were more female than male students. Very few women work in this area; some of my classmates teach in schools, and some have had children. In my case, my partner is also a mathematician. I am very aware that if we have children, we need to share responsibilities equally, without any gender prejudice. It is very complicated for women to combine their professional and family life, as they generally sacrifice one of the two. Very few, if any, have managed to be very close to their children and husband and achieve a great deal professionally.

I am currently working in a team with my graduate and undergraduate students writing their theses, which is what I enjoy most. My greatest obstacle is that I want to do everything. I agree to work on projects because I feel enthusiastic about them, but then I do not have the time and feel frustrated. This is why I suggest my female students learn how to say no.

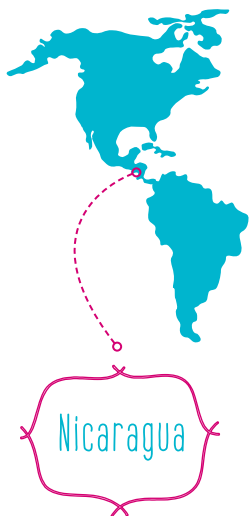
In order to make math more popular, we need to convince people that they do not need to fear it, that it is not difficult. Once we ensure that nobody or almost nobody is afraid of mathematics, just as no one is afraid of history, we will have overcome that hurdle. I try to encourage an appreciation for mathematics through the Olympiad project, in which I am involved. Many young people find it hard to fit in at school because of their love for mathematics, and the Olympiad offers them a different way of living, a different place and friends with the same interests. The basic level of the Olympiad should be promoted to foster creativity, imagination and effort. Young people are less and less used to thinking, and get tired very rapidly. Many people working out a Sudoku puzzle do not realize that it is math, that there is a process of logical thinking behind. Just because it does not involve sums does not mean that it is not math, which they think is difficult. That is a myth.



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Suyen Solange

Interview by
Maria Catalina Solano Uribe*

Women have to learn to stop
being pigeonholed and break away
from stereotypes



I am currently working on implementing a new model of molecular diagnostics for the Human Papilloma Virus (HPV) at the laboratory of the Center for Molecular Biology (CBM) of the Central American University (UCA) in Nicaragua. No other laboratory in the country carries out this type of molecular test. The Pap test alone does not determine the actual type of HPV. I want to contribute to creating a better and faster method to detect the virus. The idea is to detect HPV beforehand and tackle the disease.

My motto is to help people, and my goal is to find a cure for cancer. To achieve this, I

originally planned to study medicine and specialize in pediatrics. However, thanks to a full scholarship in biochemistry, I graduated from John Brown University in the U.S. I also did an internship at the Smithsonian Tropical Research Institute. My name is Suyen Espinoza, I am currently a researcher at the CBM, 23 years old and proud to be Nicaraguan.

At the CBM I am also working on cloning, expressing and purifying proteins for use in industry and/or medicine. And I am now studying plant breeding, which can be done by inducing mutations through gamma-ray radiation in rice for example. The growing cycle can be reduced allowing producers to have more production cycles. This benefits the consumer because rice will always be available in the market, and the producer benefits because he or she will receive more profits.



*Catalina Solano Uribe is a social communicator and journalist, who graduated with honors from the Universidad Centroamericana (UCA). She is affiliated to the Academy of Sciences of Nicaragua, where she promotes science dissemination and scientific education projects.



Since childhood I have felt a great attraction to natural sciences, chemistry, biology and research because of the challenges that these subjects provided. In high school I won the “The League of Knowledge” competition with several classmates. That was a great boost to my vocation. Reading and languages are my favorite pastime.

The unconditional support of my family was crucial. In fact, I won the scholarship to study in the US because my father found the opportunity in a local newspaper. From him I learned that the world is my oyster.

I returned to Nicaragua and found the CBM-UCA where I currently work and here I have grown a lot professionally. I published an article in a national journal and that motivated me even more to share knowledge; the teaching of scientific culture is an essential tool for the development of Nicaragua. A colleague and I created the “Advance Nicaragua” program in order to build a school for preschool and multi-grade classrooms, which more than 45 children attend.

For now I am thinking about doing a master’s degree in genetics or molecular biology outside Nicaragua, but I think my place and my goals are here; here I have opportunities rather than obstacles.

There are many scholarships out there of which people are often unaware. In Nicaragua there is no culture of science, and we have an invaluable treasure for the amount of research that can be done here. It is a virgin country in science, so we have to take advantage of this, especially women, because we can make changes.

The involvement of women in science is vital for humanity because we bring that extra effort that is needed. Women have to learn to stop landing in the same pigeonhole, to break away from stereotypes. In our countries, our culture has taught women not to pursue their dreams in research and science. The fact of wanting to excel in a scientific community that is dominated by men is very difficult and requires a lot of sacrifice.

I have encountered many obstacles on my way, but I overcame them because I see them as challenges and I never surrender, so I advise young people who are involved with science to not be afraid, to say, “I want to be a researcher.” Keep that goal and don’t give up. Overcome even the greatest obstacles that come your way and look for the support of your family. If science is your passion you must follow your dreams, sacrifice and succeed, and challenge yourselves to believe we can be researchers and scientists!



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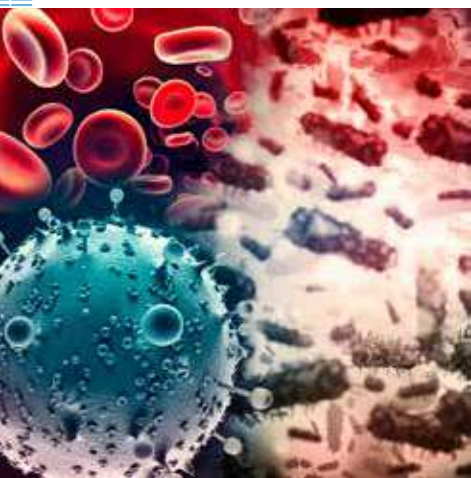
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Sandra López-Vergès

Interview by
Rella Rosenshain*

Follow their dreams and not let anyone stop them from advancing in their scientific careers if that's what makes them happy



As a child, Sandra López-Vergès dreamed of having a laboratory on the roof of her house. Today, this 35-year-old scientist holds a doctorate in virology and microbiology, and discovered the first cellular cofactor needed to produce new infectious HIV viruses: TIP47 protein. This cofactor is required for the HIV envelope protein-the protein necessary for infecting new cells-to be integrated into the new viruses emerging from already infected cells. The importance of this finding is that it makes it possible to identify the proteins and molecules that can be new targets for inhibiting the replication of HIV in infected people and thus design and create new therapeutic drugs.

Sandra currently works at the laboratories of the Gorgas Memorial Institute for Health Studies (ICGES) in Panama, where she conducts research on diseases that can be transmitted from animals to humans (zoonoses) and scientifically studies insects and other issues.

For this researcher, who was born in France and has lived in Panama since she was two, science is nothing more than the pursuit of understanding the world. In her words, "Science can participate in the increase of human knowledge, and working in research in biology also allows me to feel that in the future, some of our findings, although they seem small, will be able to help improve everyone's lives, especially in the area of health and ecology.

*Rella Rosenshain is a science journalist from "La Prensa" newspaper in Panama, with a degree in social communication sciences and has a Higher Diploma Certificate in public health journalism. She has won national and international news competitions.



She also believes that science can help people to become more humane, since the study of this branch helps us, “Realize that we are part of a whole, of a complex ecosystem, that humans should stop being so self-centered and that we should respect all other living beings.”

López-Vergès has always received the support of her family in her choice of profession, and her mother (a pediatric pulmonologist), her father (a pulmonologist) and her maternal aunt (a political science researcher) were her models and a source of inspiration. Her secondary school teachers were exceptional as were her university professors in France. In particular, she recalls Professor Sylvie van der Werf, who was responsible for her discovering virology during her degree. Then, in her virology courses in France, her teachers were leading European experts on each virus family, whose research projects and findings encouraged her to be a researcher like them.

Nowadays she divides her time between the lab and her family, since she is married to an architect and the mother of two girls. In her view, science is not a gender issue. On the contrary, “Being a woman has opened the doors to certain grants for which I have been able to apply, representing Panama, such as the UNESCO-L’Oréal International Fellowship for Young Women in Science, a prize to encourage young women scientists to continue in this field.”

She regards herself as a lucky person. “The challenges I have encountered are the same as those faced by anyone in science: a lot of information to understand and try to use, experiments to be conducted and performed several times before you obtain a result, long hours of work for salaries that are not that high, since it is universally accepted that scientists thrive on passion, competing with your peers for funding to get good jobs, and so on.”

On her journey through science, it has not all been a bed of roses, because it is an endurance run. “Like any researcher, I have had moments of intense frustration that are inherent to science, since it is common to undertake experiments that require an enormous amount of time and concentration yet fail to yield results. You have to be passionate about science so that every moment of every scientific discovery and every publication make up for the hours worked with negative results,” she declares.

Sandra López-Vergès encourages all young women interested in studying a scientific career, since those who engage in science have the power to contribute a great deal to the world. “I tell young women scientists to follow their dreams and not let anyone stop them from advancing in their scientific careers if that’s what makes them happy. When you combine work and passion, I think you can contribute much more to society.”



Dr. López-Vergès at her laboratory in the Gorgas Commemorative Institute for Health Studies.



Sandra with her husband and their two daughters. Support from her family has been key in her success as scientist.



Sandra with a group of researchers from Gorgas Commemorative Institute for Health Studies.



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Dionicia Gamboa

Interview by
Claudia Cisneros*

I wouldn't change my career for the world, despite all the difficulties and obstacles it involves, because of the satisfaction it's given me up to now

Dr. Gamboa with members of the teams she leads, at her university laboratory



Dionicia Gamboa surrounded by her colleagues and thesis director, Dr. Jean-Claude Dujardin (second from left) during the preparation of her doctoral dissertation in Belgium. Credit: Dionicia Gamboa.

*A CNN International journalist, she has worked for channels affiliated to Tele-mundo and Fox. In Peru, she contributed to Panorama, América Televisión, Primera Edición and 24 horas. She is currently a producer for Japan's Fuji TV and writes for La República newspaper.



Dr. Gamboa with the people who inspired her career: her parents and sister. Photo: Dionicia Gamboa.

Malaria is a disease that affects South America, particularly the Peruvian jungle region, and often means that entire families have to stop working when they contract the disease. Instead of undertaking the seven-day course of treatment, many only get as far as three; as soon as they start to feel better they want to return to work, since they have many children to support. Malaria, then, is more than just a parasite and a vector: it is a social problem. What I, Dionicia Gamboa, do is research the disease, thanks to a scholarship awarded by the Belgian Technical Cooperation through the Antwerp Institute of Tropical Medicine and the Alexander von Humboldt Institute of Tropical Medicine at the Cayetano Heredia University, Peru (UPCH).

From a very young age I wanted to be a doctor or a nurse; I knew I was captivated by science. I enjoyed healing chickens and guinea pigs. Perhaps it was the chemistry or maths classes at school, or the field trips I loved going on, or the beautiful books on animals and plants my father brought back for me from his many trips; the point is I decided to study biology. My father had barely been able to finish primary school and my mother was a primary and secondary school teacher, so I was the first real professional in the family.

Each step in my career has been difficult. When I finished school and had to start university, my only choice in Chiclayo was the public university, but in the 90s there was a problem with terrorism and university activities were often suspended. You would study for two or three months and then there would be strikes. Back then I wanted to study at the best university for medicine: the Cayetano Heredia University in Lima. The first time I applied I didn't get in, but I prepared better

and was accepted the second time round. I ended up leaning towards research in a country with significant obstacles to a career in science and in a male-dominated field. I did my master's degree in biochemistry in my native Peru, and a doctorate in cellular and molecular biology in Antwerp, Belgium, where I specialized in leishmaniasis research.

When I returned to Peru, I decided to undertake research on malaria. But doing research here is far from easy. Switching from the laboratory to the field changes your perspective: from working with molecules in a laboratory, you come to understand that a disease is not only the sample you work with and the experiments you do, but that there's a backstory, a person, a family and their problems. I began designing projects, the university hired me as a teacher, and, thanks to foreign sources of funding, the Faculty of Science at UPOCH gave me a laboratory with just two tables. I worked hard to equip the lab. In the beginning we were a team of just 4 or 5; now there are 20 of us in Lima and 30 in Iquitos. Our multidisciplinary group now has various publications in indexed journals.

Without timely treatment, a person infected with the malaria strain can die. Yet some patients are asymptomatic and we need certain tools to identify them. The aim of my laboratory is to develop diagnostic methods that are sensitive enough to detect low parasitemias but simple enough to use in the field. This would save a lot of lives.

As Principal Investigator, I interact with other national and foreign researchers, and the majority of them are men. Although being a woman in science has changed somewhat, there is still the assumption that we women are assistants or secretaries. I have dealt with some male doctors who think they're the boss. But you have to let them know you're at the same level, that your opinions, suggestions and ideas count. Fortunately, some doctors now call me to ask what they should do in certain cases.

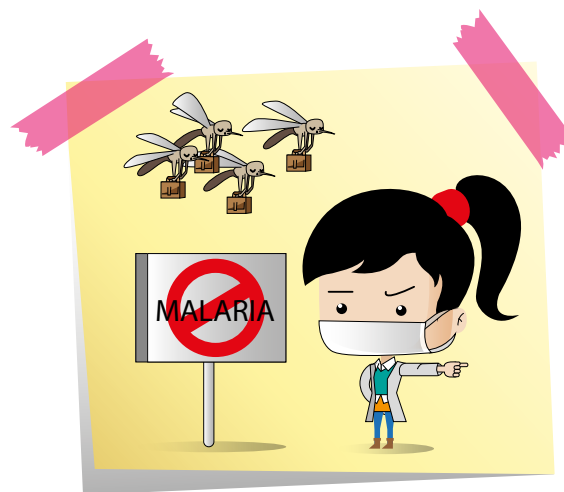
I want young women who are thinking of working in science to understand that being a researcher in Peru, pursuing a scientific career, isn't at all easy, whether you're a man or a woman. In fact a career in research isn't even recognized by the state. I have to complete my teaching hours and write projects to cover the time I devote to research; it's difficult, but not impossible. But I wouldn't change my career for the world, despite all the difficulties and obstacles it involves, because of the satisfaction it's given me up to now. I want to carry on researching and contributing to the well-being of my country. How far do I want to go with that? As far as the Nobel Prize.

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Dionicia received recognition as one of the world's most important young scientists from the Elsevier Foundation, through The World Academy of Sciences in 2013. Photo: Elsevier Foundation.

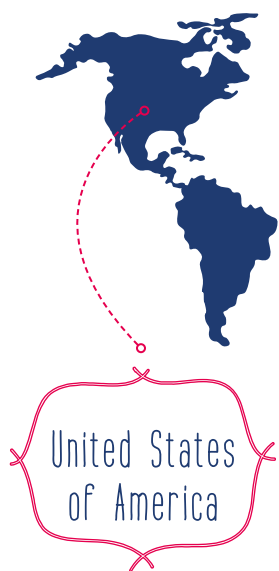
Dionicia won the "Women Scientists in Life Sciences" L'Oréal Prize with her doctoral dissertation. *Glamour* magazine in Spanish chose her as one of the continent's outstanding young female researchers. In 2013, she won the "Early Career Women Scientists" prize for the whole Latin American region, promoted by The World Academy of Sciences and the Elsevier Foundation.



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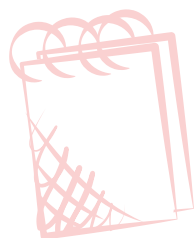
Kathleen Treseder

Interview by
Claudia Shambaugh*

Be broadly interested in many things and, above all, follow your passions, because if you do what you love, that makes it so much easier and helps you overcome any problems that arise



My name is Kathleen K. Treseder and I'm a 43-year-old field ecologist who uses molecular techniques, nanotechnology, isotopes and data synthesis to examine the role of fungi in ecosystems. My overarching goal is to improve predictions of future trajectories of global change by incorporating feedbacks governed by fungi. I am a Professor and Chancellor's Fellow at the Department of Ecology and Evolutionary Biology at the University of California Irvine, completed my doctorate at the Stanford University and have served as a postdoc researcher at the University of California, Riverside. My group's recent field sites include ecosystems in Alaska, Bavaria, California, Costa Rica, Guyana, Hawaii and Panama. I have published 80 peer-reviewed publications in journals such as *Nature*, *Science* and *Ecology Letters*.



*Claudia Shambaugh has hosted Ask A Leader on radio KUCI since 2010. In live interviews she covers politics, science, culture, religion, and education, and is solely responsible for the research, productions, and engineering of these over 280 shows. Her podcasts are available on www.askaleader.com or www.kuci.org.

When I was around 3 or so, I was very curious. I really, really enjoyed going out in my backyard and looking at bugs, playing with them and figuring out what they were doing. Later on, I would roam around with my brothers and friends, look into abandoned fields and go on hikes in the mountains. I grew up in Utah, so we spent a lot of time outdoors. In the summer, I used to love camping in the canyons and deserts right around Salt Lake City. It was like one big, long ecology field trip and they would tell us how the canyons had been formed by glaciers. When I was in high school, we'd camp out in groups of high-school girls. You had to be self-sufficient, a problem solver, and adventurous.



I wasn't sure I'd go into science until I was a senior in high school. Up until that point I liked art-photography-which has really helped me in my work now, because when you are a photographer or an artist, you're an observer and you're really looking at what's happening and documenting it, and that's very much like science as well. During my elementary years, I was given a lot of freedom to explore, and work on things on my own and to talk with others. I would read my own books about science and other things and my teachers gave me nothing but support even though I wasn't really following the curriculum. I was always different and independent, and wanted to find my own way. My parents made it clear that it was up to me to decide what to do and that they would support me no matter what. My dad, who was a mechanical contractor, gave me my own set of tools when I was five, and my three brothers, who were interested in engineering and science, always explained to me what they learned at school.

Everything ecologists do is interdisciplinary and requires collaboration. Interestingly, there's a recent study that shows that in large collaborative groups, when there's a woman involved, then the science has a higher impact. In my lab, I would say that I have had roughly the same number of men as women. On the other hand, I'm very supportive about encouraging diversity in science, which sometimes involves promoting women and sometimes people from underrepresented groups. People from different backgrounds have different skill sets and perspectives that enhance life in the lab. For example, I have a student from Mexico who studied fungi in the oil spill in the Gulf of Mexico, and I'd have a hard time finding someone with that experience in the U.S.

I began researching fungi fairly late in my career. Towards the end of my graduate work in Stanford, although I was working mainly on plants, my main interest was always climate change. I realized, as I was going through my graduate work, that there was a very important component in the ecosystem, fungi, and that we knew very little about them. With the help of an amazing fungal ecologist, Mike Allen at UC Riverside, I began to study them and we now know that fungi are breaking down a lot of that old dead

material in the soil and that they release CO₂ as they do it. This means that they are contributing to global change in ways we did not expect because CO₂ is a greenhouse gas.

I would tell young women interested in science to go for it, to take their place in the world of science. You can do it. Don't be shy, there are lots of opportunities. Although science may seem very daunting and difficult to break into, there are many programs out there like Girls Inc. and Techtrek specifically to help bring girls and women into science. You can even just email a professor at a university to ask if you can come work in their laboratory.

As for the skills you need to work in science, I think there is only one: be curious. Be curious about everything that interests you. Be broadly interested in many things and, above all, follow your passions, because if you do what you love, that makes it so much easier and helps you overcome any problems that arise.



Kathleen Treseder



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Mariana Meerhoff

Interview by
Daniela Hirschfeld*

I would recommend young women scientists to work hard and be independent. They need to know how to change a tire, repair equipment or drive a boat



*Daniela Hirschfeld is a scientific journalist who studied at MIT and Harvard University; journalism professor; editor in chief of Galeria magazine, a publication of the newsweekly Búsqueda; and a correspondent for SciDev.Net in Latin America. E-mail address: daniela.hirschfeld@gmail.com

I research climate change and its impact on aquatic ecosystems, to find out, for example, its interaction with introduced invasive species or changes in land use. Together with my team, I study lakes, lagoons and streams, and we try to understand the functioning patterns of these ecosystems, which factors affect them and how they can be recovered in the event they deteriorate.

My name is Mariana Meerhoff, and I am a 40-year-old Uruguayan aquatic ecologist. I studied biology, though I was also interested in anthropology. Due to the influence of my grandmother and parents, who were very knowledgeable, I was attracted to a wide range of subjects, and found it hard to decide what subject to study at university. I enrolled at the faculties of both sciences and humanities, but ended up in the former. I then carried out a period of study in the United Kingdom, where I finished my master's degree thesis, and in Denmark, where I studied for my doctorate. My vocation became clear to me when I was on a boat in the middle of a lagoon, gazing at the horizon that contained so much mystery and realized that freshwater ecology was what I was about.

I met the Danish professor Erik Jeppesen, an eminent scientist in the field of shallow lake ecology, who encouraged me to apply for a scholarship, which I won. I was the first South American scientist to pursue a doctorate at the Environmental Institute of the University of Aarhus in Denmark, an institution that usually only receives European researchers. Jeppesen became my professional father. I was received very warmly in Denmark and spent three and a half years there. In 2007, I decided to return to Uruguay and began to coordinate a project studying the impact of the changes in land use and climate change on streams. This was fol-

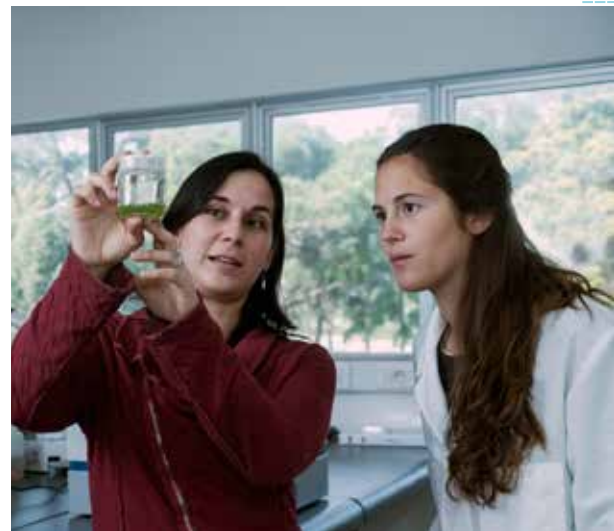
lowed by a research project at the Science Faculty, in cooperation with Denmark, and, together with several colleagues, I formed the Ecology and Continental Aquatic Systems Rehabilitation Group.

Academic life is usually very difficult. There is a great deal of pressure, competition for funds, permanent evaluation and criticism, and the publication process involves rejecting work that has taken years to produce. You have to be level-headed, and a lot of people can't stand the pressure. The need for funding is the dark side of research, as you are at the mercy of the funds you receive. Unlike countries where there is a set basic budget, in Uruguay, work depends entirely on competitive funds. This pressure is felt by both men and women scientists, yet we also have to deal with other problems.

There are times that require great dedication and have set deadlines, such as writing a doctoral dissertation or a research proposal for competitive funds, when it is difficult to balance your personal and professional life. It is not easy to explain to your partner, family and friends that academia involves a lot of pressure, and that this is part and parcel of being in this profession. In my case, I try to combine both aspects, by being very aware of this pressure and spending as much as possible "quality time" with the important people in my life.

The pressure in the scientific world makes women delay having children, more so than in other professional areas. In Denmark for example, women can include the number of children they have on their résumés and note the periods when they did not produce any scientific work because they were raising them. They are not penalized. The situation is very different in developing countries. This difficulty has a lot to do with the way the country is organized, the position women occupy in this territory and how much their work is valued. If the system does not offer alternatives or tools, it assumes that women will reduce or minimize their work to take care of the family. Like most women, women in science are responsible for taking care of their children and elderly or sick relatives at home. In science, because of the competitiveness and continuous evaluation, women have an extra burden.

I would recommend young women scientists to follow their vocation work hard and be independent. In my field they need to know how to change a tire, repair equipment or drive a boat. The new generations assume that everything is easier, probably because they see women from my generation, who are already established, and imagine a straightforward, obstacle-free path. I would recommend that they get used to exposure, publish their research, work as a team and build their own networks so that they can respond better to the competition and rejection that are common to the scientific process. In my case, I am a scientist because I belong to a generation that gambled on science to achieve cultural and social change, and I am still convinced of this.



Mariana Meerhoff won, in 2011, the L' Oreal-UNESCO Award for Women in Science.

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Fabiola Hernández

Interview by
Rafael de J. Castellano O.*

If you are naturally intrigued about the reasons behind things, and understanding the language of the universe, don't think too much about it: you're a born scientist



Some time ago I developed a model for the synthesis of stellar or star populations. It includes interacting binary stars, which are stars that are close together so that mass flows from one star to another. Although these are very common in nature, it's actually very difficult to model them as their properties can change over time due to their gravitational interaction. My aim is to achieve optimal development of this model and I'm working extremely hard on it. I want to make it easier to access and use for those who study the properties of stellar systems and need to know what the role of binary systems is in the prediction of these properties. This work requires a lot of dedication and commitment, but I'm proud to be one of the few people in the world who's pursuing it. Yes, I'm an astronomer.

My name is Fabiola Carolina Hernández Pérez, I have a doctorate in physics, I'm 32 years old and was born in Maracaibo, Zulia State, Venezuela. My parents are doctors and my four siblings are also professionals – in the fields of biology, chemistry, engineering and veterinary medicine. I work in the Scientific Department of the “Francisco J. Duarte” Centre for Research in Astronomy (CIDA) Foundation, and I work on extragalactic astronomy–on elliptical galaxies in particular–and models of stellar population synthesis.

When I was a child, I never really wanted to observe the sky as I was born in an industrialized and polluted city where it was quite difficult to see the stars. I only remember the lunar eclipses and, especially, the total eclipse of the sun in 1998. It was a sight I'll never forget and one I was lucky enough to have witnessed. It never occurred to me to be an astronomer, yet I was always intrigued about the reasons for things. I enjoyed finding out what there is behind what's visible to the naked eye, what seems imperceptible but that's right there in front of you.

At secondary school, I always enjoyed biology and physics. I leaned towards the latter and did my degree at the University of Zulia (LUZ), and my master's and

*Rafael de J. Castellano is a CIDA-trained journalist. He was part of the editorial team for the collection of Astronomy Leaflets for Kids “An Instant in the Universe”. He has contributed to various national and regional newspapers for the past 20 years.

doctorate at the University of the Andes in the city of Mérida, Venezuela. I've been drawn to astrophysics since the first course I took with Dr. Gustavo Bruzual, one of the most important and most cited astronomers in the world. Astrophysics as such really attracted me because it's based on the fundamental laws and theories of physics expressed in the wonderful language of mathematics. The knowledge and humane values of Dr. Bruzual have been pivotal in my activity as a scientist and I'm privileged enough to go on working with him.

I really enjoy teaching. Education is a very noble profession and must be undertaken with real dedication as the future of new generations is at stake. The main obstacle I've faced in my life as a scientist is the fact I've had to be apart from my family, first in order to study, and then from my husband. I'm married to Elvis Lacruz, a doctor in mathematics, who spent four years doing his doctorate in Madrid while I worked on mine in Venezuela. It was a tough time, in which we made use of technology so as not to feel so far apart, and where the most important thing was trust, respect and mutual support. Having a family doesn't limit life as a scientist, or vice versa. His unconditional support has been key in dealing with the difficult times I've faced and in accepting the consequences of the decisions I've made. Of course I'd like to have children at some point. All in good time; there's a right moment for everything.

I don't think science needs women in particular; instead it needs people regardless of their sex, ideology or race who truly want to make significant contributions and who understand why scientific development is essential for humanity. Historically, women have faced discrimination not only in science but in society at large, though some countries have made efforts to eradicate it. It's time we stepped forward as symbols of equality in science, in art, in literature and in other important sectors of society. Fortunately, in my own country, I've never faced discrimination for being a woman and, so far, it hasn't prevented me from achieving my goals and fulfilling my aspirations. I'd advise young women pursuing scientific careers or thinking about doing so, not to limit their aspirations and not to be afraid. Science is a career that's driven by passion.

If you are naturally intrigued about the reasons behind things and understanding the language of the universe, don't think too much about it: you're a born scientist. Fight to achieve your aims and don't neglect the day-to-day: family life, friendships and leisure activities. Think of life as a jigsaw with many pieces, in which you have to learn to fit them together to live a full and satisfying life. The most important thing: don't forget to be noble and to be humble, they are things that can't be taught; without them, a thousand doctorates are worth nothing.

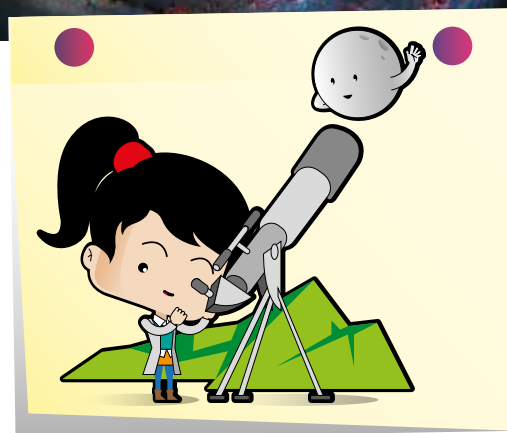
Dr. Fabiola Hernández and her husband Dr. Elvis Lacruz



With a group of colleagues and students at the National Observatory of Llano del Hato



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☞ <http://seigirlsconnect.org/page/en-espa-ol>

☞ <http://www.nationalgeographic.com/>

☞ <http://www.nasa.gov/audience/forchildren/kidsclub/flash/index.html#.VjqjCK6rSm0>

☞ <http://www.si.edu/>

Find here some educational resources:

☞ <http://scigirlsconnect.org/>

☞ <http://www.prettybrainy.com/>

☞ <http://www.pbs.org/parents/scigirls>

☞ <http://www.helix.conacyt.gob.mx/>

And take a look at these inspired videos:

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The Poetry of Reality (An Anthem for Science)

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For your teachers:

☞ <http://www.fondation-lamap.org/en/international-resources>

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☞ http://www.engineergirl.org/what_engineers_do/WhyBeAnEngineer.aspx

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