

## Cuba's Women of Science Of Glass Ceilings, Velvet Circles and Pink-Collar Ghettos: Lilliam Álvarez MS PhD Secretary, Cuban Academy of Sciences

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She was a country girl from the northeastern Cuban province of Holguín, her father a farmer, her mother a teacher. Fast forward a few decades: Dr Lilliam Álvarez mastered mathematics, physics and nuclear science, finally specializing in numeric solutions to differential equations. She spent 20 years at the Cybernetics and Physics Institute in Havana, half that time as deputy director. For another eight years, she served as director of science in the Ministry of Science, Technology and the Environment. Full professor and senior researcher at the University of Havana, she is a member of the national academic authority that awards doctoral degrees in math and is Cuba's ambassador to the International Mathematical Union. In 2000, she was inducted into the Caribbean Academy of Sciences, and in 2008, was elected a full member of the Third World Academy of Science (now The World Academy of Sciences).



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But over time, her rich bibliography, with titles the likes of *A numerical technique to solve linear and non-linear singularly perturbed problems* began to be peppered with other provocative gender-informed work: *Women doing hard sciences in the Caribbean*, *Are Women Good for Math?* and her 2011 book *Ser mujer científica o morir en el intento* (Be a Woman Scientist or Die Trying). Her focus on women in science—and their rights to belong in its leadership as well as its ranks—is also reflected in her activist approach internationally and in Cuba.

She is a member of the Organization for Women in Science for the Developing World and heads its Cuban chapter. After her designation as a Distinguished Member of the Cuban Academy of Sciences, she was elected Secretary in 2010 and also chairs its Commission on Women in Science.

The Cuban Academy of Sciences was the right place to hear her story and to explore the way she sees women scientists in today's Cuba—and the country she would like to see in the future.

### **MEDICC Review: Let's start from the beginning: what drew you to science, and to math and physics in particular, as a young girl in small-town Cuba?**

**Lilliam Álvarez:** Although my parents weren't highly educated, my mother was a teacher. She had 14 brothers and sisters and all of them were teachers! And one of them, an uncle, taught physics. So, studying was a way of life in our household and I also got exposed to the hard sciences through him, and became what they called a "class monitor" in the subject. Monitors were supposed to keep up their grades, and even to teach a class now and then.

Another person influenced me a lot: math professor Dr Matilde Camayd, who was an important role model. You can imagine that in those days, the 1960s, there weren't many women in

math and science. Then there was a chemistry teacher, and my own sisters, one of whom became a chemical engineer. I was literally surrounded by women university graduates. But my father wouldn't let me enroll in high school in the capital; I had to wait until 1967, when I took off to enroll in the University of Havana.

By that time, university education had become totally free to students, and they hadn't yet instituted the rigorous entrance requirements they have now: you simply had to show up, climb those tall stairs to the statue of the Alma Mater, and matriculate. You were also automatically given dormitory space if you were from the provinces. For the first time, you were seeing young people from the countryside, women, black and mestizo students, filling the halls of the university. It was quite something, and a little intimidating for me.

**MEDICC Review: How many students enrolled in math and physics your year, and how many finished?**

**Lilliam Álvarez:** About 100 enrolled with me that first year, only 15 or 20 of us were women; and only 25 ended up graduating, of whom only 6 or 7 were women. It was clear that the university was open to all, but to graduate you had to study very hard. And that was tough, because it was a time of enormous cultural activity, music festivals, folksinging, dancing . . . big temptations.

But that was when I also began to realize that without science, no country can develop. The industrialized nations have known that for a long time. You have to sow science to reap development: a critical mass of university-trained scientists is an important indicator of social and economic development for every country, a key factor for sustainability.

At that time, we weren't yet using words or concepts like "gender equality" or "social inclusion," but in fact, that's what was happening at universities and in the Cuban workforce as a whole. The potential was enormous: women constitute 50% of human potential, half the potential of societies worldwide, half the potential of our own country, and we certainly couldn't afford to lose it.

**MEDICC Review: If we look at the facts today, how are Cuban women represented in the sciences? How many are there? And where do you find them?**

**Lilliam Álvarez:** Women constitute over 40% of the labor force in Cuba. We are over 60% of university graduates and approximately 49% of the country's scientists (that is, those with higher academic degrees). Interestingly, Cuba's Academy of Sciences has the highest percentage of women of any academy in the world, revealed in a 2015 study by the InterAcademy Partnership (The Global Network of Science Academies): at that time it was 27% (as compared to the world average of 12%) and in 2018, it had climbed to 34% of our over 400 members. We have a commission that I chair, which works to promote women's leadership in the sciences, and right now half the leaders in the Academy are women. Every six years, we renew membership, add new members, and now are turning special attention to incorporating younger people as associate members as well. In order to become a member, you have to be nominated by the scientific council of the institution where you work, and then there is a formal and quite thorough process for final consideration.

I also work to attract young people to the sciences as career paths, particularly young women, through the Academy's Science Promotion team that goes to secondary and high schools, organizes science fairs, and is now participating in establishing the first interactive "scientific park" here in Havana.

Nevertheless, there are challenges: you asked where the women scientists can be found. The truth is that they are still located more at the bottom of the leadership pyramid than at the top. Today, we have the first woman rector at the University of Havana, an institution that is over 300 years old!

**MEDICC Review: What are the barriers? You mention several in your book . . . are these applicable to Cuba today?**

**Lilliam Álvarez:** Certainly. I think the most important barrier is imposed by the realities of daily life. We made lots of headway through the 1980s, both through efforts of government and the Federation of Cuban Women. Women began to study, to work, and this was supported by child care centers available to youngsters of working mothers, as well as school lunch programs and other facilities, and salaries that went a lot further than they do now.

However, then as well as now, the double and triple shift is a huge burden for working women, more so for women aspiring to career development and leadership. Studies show that Cuban women do 14 more hours of chores weekly than men. Economic crises complicated by the ever-tighter US economic sanctions on Cuba make daily life even more difficult today. And of course many households are home to multiple generations, with a tendency to replicate patriarchal divisions of labor and situate working women as caretakers of both the elderly and the children (we are the "sandwich generation"!).

As with issues of skin color and sexual orientation, changing consciousness is the key to battling inherited cultural biases and stereotypes. This has to be active, constant and vigilant. For example, I found myself replicating traditional gender roles with my own children: I had my son taking out the garbage, lugging home produce from the farmers' market, and my daughter helping me with the cleaning and dishwashing!

**MEDICC Review: You refer in your book to the glass ceiling, "velvet circles" and pink-collar ghettos. I'll include a graphic here on those subjects. But can you give us some examples that may be global but also pertain to Cuba?**

**Lilliam Álvarez:** Ah, yes. I borrowed some terms from the global movement for women's empowerment, and invented a few of my own, for example the "velvet circle." The basic idea behind the book was to compile results of gender-based studies, but not entirely focused on the social sciences. Why are there so few women mathematicians in the world? Physicists? What is happening with women of color, who research shows must work three to four times harder to make it into their professions, and even harder to be recognized for leadership?

First, there are the stereotypes. If women study science, the machista version goes, then they should stay in the social sciences, which are more attuned to their "vocation" for service. So we find women in the pink-collar ghettos of social sciences, health, teaching. In Cuba, it is also true that, historically, medicine has been a very prestigious calling, so that's another reason explaining women's choices. But take a look at the literature in math and physics: if you have any pictures in the textbooks, they're of old, bald white men with glasses, and the problem-solving always starts with "Pepe had five apples . . .", never "Lucy" or "María."

And here I have a criticism of scientific journals in general: the norm is to list only the first initial of an author in the references, making it almost impossible to carry out studies on the presence of women scientists in the literature. You need to help us change that!

Then there is the infamous glass ceiling, which goes along with the pyramid concept. Women become scientists, but they

### Barriers to Women in Science and Leadership

Descriptor	Meaning
The Scissor Effect, the Pipette or the Pyramid	Reduced percentages of women with higher academic degrees and promotions, as compared to male colleagues, even though more women may have started in university or become university graduates
Pink-collar Ghetto	Overrepresentation of women in health and education, the more service-oriented and social sciences; and underrepresentation in natural or “hard” sciences, considered the purview of men
Glass Ceilings and Walls	Limited empowerment to reach important decision-making levels of leadership, and horizontally, to explore fields in addition to those where a woman has achieved expertise
Sticky Floors	Women bound to the lower ranks of their professions by the burden of family: the good wife, mother, daughter, caretaker, homemaker, lacking enough time to advance or take on leadership
Slippery Stairs	Women undervalued by male supervisors, unwilling to recognize their potential for advancement in their fields or promotion to greater responsibilities
The Velvet Circle	Relegation of women to particular leadership roles to which patriarchy assumes them best “suited” so as not to “overburden” them: the director of communications, but never the director
The Good Girl	Gender stereotyping that begins in the home and schools, in which girls are to be exemplary in all things but never outspoken
Super Woman	Expectations held out by society of women who have earned leadership or distinction in their field, “liberated but overburdened, enslaved by daily second or third shifts”
Peak to Plains	The duty of women in the sciences and in leadership to pass on their experiences and learning, particularly about barriers to empowerment, to help transform society and ease the way for women at the base, “on the plains”

Source: Álvarez L. *Ser mujer científica o morir en el intento*. La Habana: Editorial Academia; 2010. 95p. Spanish.

simply aren't promoted at the same rate as men. That is a global phenomenon, perhaps less present in Cuba, but certainly present. And here it is also influenced by the household burden: not every capable woman professional wants to be a leader in her field or director of a program or institution, if it means taking her to the point of exhaustion.

There is also the concept of the “good girl,” which needs to be tackled in the schools. Girls are supposed to excel, get good grades, and be exemplary . . . but not to be outspoken or have the courage to defend their ideas. As a result, you get adult women who will say they don't really believe in “this thing” called gender roles, that all you have to be is good at what you do and you will succeed, be a “good girl.” I have heard this in Cuba quite a lot.

Finally, there is what I call “from the peak to the plains”, a reminder to all those women who have climbed to the top not to forget the women behind them, where they come from. As Dr Rosa Elena Simeón, an extraordinary Cuban scientist, once said, “when a woman plays a leadership role, she promotes other women in the process,” as an encouraging role model and inspiration. And she can also bring to that role different styles of leadership.

#### **MEDICC Review: The future for Cuba's women scientists? For Cuban science?**

**Lilliam Álvarez:** We need to build a future for the planet and for our country that is sustainable, in harmony with nature, that develops high standards of health and education, prevents vulnerabilities and above all does this by using the benefits of science. Through education and science, both governmental and nongovernmental actors can make better and more rational, informed decisions.

All of this requires a gender perspective, which has to be present in all spaces of society. In the schools, in workplaces, in neighborhoods. As activists, we have to promote debate on these

issues, from the ground up, across disciplines, geographies and in all contexts, including social media. We need to move to greater equity in our socialist context, further opening the doors for the new generation of women.

#### **MEDICC Review: You mentioned that you are working on a new book about Cuban women scientists, past and present. If there were one, now gone, whom you would have liked to meet, who would it be? And why?**

**Lilliam Álvarez:** Dr Laura Martínez Carvajal, Cuba's first woman physician. You know, she studied physics first, which took her to ophthalmology, through the study of lenses. She was an extraordinary thinker, woman and scientist. I discovered her story right here, in the Academy of Sciences. Why? Because she is the first one to come out of the shadows, out of anonymity. But there are so many, many more. 