



María G. Guzmán  
Cuba

“ I dreamed of becoming an astronomer or astronaut, under the influence of the novels of Jules Verne... ”

Interview by Iramis Alonso\*



Gustavo, her inspiration, and Pedrito, their son, who has also chosen to study medicine. (Photograph: courtesy of Dr. Guzmán).

### Enterprising by nature

The scientist María Guadalupe Guzmán Tirado cannot picture her life without the dengue virus she has fought so bravely. In her opinion, a good virologist must be persistent, passionate and methodical.

As persistent and tireless as a miner pursuing an elusive gold seam, Doctor of Science and Professor María Guadalupe Guzmán Tirado

has been studying the dengue virus for over three decades - half her life.

Lupe, as she is known by colleagues and friends, has directed the virology department at the Pedro Kouri Tropical Medicine Institute (IPK) since 1987, as well as the Collaborative Center of the Pan-American Health Organization-WHO for the study of dengue and its vector.

In both organizations she has worked assiduously to characterize the various dengue epidemics in Cuba, identify the risk factors of the hemorrhagic form and create an advanced work group for research into this disease, with the aim of obtaining a potential preventive vaccine.

Her contributions to the knowledge of this virus include participating in the complete clinical description of hemorrhagic dengue in adults and in children with a different genetic origin to those of South East Asia and the Pacific.

Before she directed this research, not all the scientific community accepted the hypothesis that a second infection by another dengue serotype was a risk factor for developing the hemorrhagic form of the disease. IPK confirmed this, removing all doubts.

Another mistaken idea was that the danger of hemorrhagic dengue invariably only lasted for four or five years after the initial event. Guzmán and her team demonstrated that the eventuality exists even 24 years after the first infection. This finding was crucial for the development of any potential vaccine, as it forced researchers to provide protective immunity for a long period.

As a result of these contributions she was designated by Science magazine as one of the 12 most influential figures in science worldwide, who were asked to write their

scientific biographies as part of its 125th anniversary celebrations.

In the 1980s Dr. Guzmán's career was marked by an unprecedented unfortunate event. An epidemic of the hemorrhagic form of the disease, the first on the American continent, struck the Cuban archipelago. In four months it caused sickness in 300,000 persons, including 10,000 serious cases, and claimed the lives of 158 people, 101 of whom were under 15 years old.

The memories of this disaster were tangible during our conversation, which lasted an hour despite the doctor's obvious tiredness. After 12 hours in the laboratory she could be excused for calling off the interview, but she willingly proffered her memories, declaring that "there are events that are lessons for later generations of scientists."

"It may seem paradoxical, but I have both suffered and learned a great deal. I was afraid, because I was young and was confronted with an event in which I had so much responsibility. Any epidemic is harmful, but we only knew about this one from books and publications of cases in South East Asia and in the Pacific. The most distressing aspect was that children were the most severely affected group. They quickly became very ill and died.

"I can remember one day in particular, late at night, when the cases were only just beginning and we were in the diagnostic phase. I was

creating a serological technique to detect the antibody titer, and they produced such large amounts that I thought that I had made a mistake. I repeated the tests three times until the presence of secondary dengue was beyond question.

“Finally, the work group, around ten people, directed by Dr. Gustavo Kouri - my late husband and the director of the IPK - managed to finish the diagnosis, classify the strain (of the serotype 2) and establish a laboratory monitoring system, which we have been perfecting to the present. Within four months, transmission of the disease had stopped, quite a feat and only possible by combining research, epidemiological work, control of the vector, decisive political will and popular participation, because the mosquito *Aedes* had a high infection rate while there was a perception that the risk was low.

“The truth is that those dramatic moments, during which it was difficult to predict what would happen and how the epidemic would evolve, were ultimately a crucial lesson, which motivated and reinforced my career as a scientist.”

However, her vocation for virology was a matter of chance.

“My family was not inclined towards the sciences, though my stepfather was an obstetrician, an excellent doctor at the time,

and my mother insisted that I study and become independent. So I dreamed of being an astronaut or a cosmonaut, influenced by Jules Verne novels and the science fiction movies that were so popular in the late 1960s.

“That interest then evolved towards mathematics. But a month after starting my mathematics degree, in October 1969, I felt a twinge of anxiety - or perhaps intuition - that this was not the way to achieve my professional ambitions.

“After leaving the mathematics degree I did not want to waste that academic year, so after applying for ocean sciences and even language courses, I discovered that the only specialization with open enrolment was medicine. So I immediately applied there. I had never been interested in health care management, and was fortunate that certain new courses designed to identify students interested in science opened up, and I was one of the first to sign up. So I did my internship in basic science at the National Scientific Research Center, where many leading Cuban scientists were trained. There I had my first contact with virology, then in 1980 I moved to the IPK, where I have been ever since.

[Why are you so interested in that specific specialization?](#)

Because it is the world that one does not see at first sight.



Her studies focus on the characterization of the various dengue epidemics in Cuba, the identification of the risk factors of the hemorrhagic variant and the creation of a cutting-edge work group for research on this disease, in order to obtain a possible preventive vaccine.



At only 14 years old, graduating from a piano course.  
(Photograph: courtesy of Dr. Guzmán)

### What are the qualities of a good virologist?

They must enjoy science, be curious and not tire of studying, because the information changes so rapidly that it is almost impossible to keep up to date. They must be disciplined and constantly write and publish. I cannot conceive of a scientist not publishing her

results. Publishing is a measure of one's impact, and allows one to advance knowledge.

### What were the circumstances for the collaboration with the Pan-American Health Organization?

After 1981 there was a reinforcement of the national dengue monitoring system, in regard to case management, vector control and diagnosis. A significant amount of Cuban research and results were published while the disease was spreading in the American continent, and it was not yet known how to manage it. From that moment a systematic link was created between researchers from different countries. Some requested our direct collaboration while others did so through the Pan-American Health Association (PAHO), which benefitted from Cuba's focus on dengue.

### How did the project to develop a vaccine against dengue in Cuba emerge, and at what stage is it now?

The project emerged between 1992 and 1993, as a result of the IPK's experience with dengue and the Genetic Engineering and Biotechnology Center of Cuba's experience with biotechnology and vaccine production. We knew that it was difficult but today we have one of the most advanced candidates in the world. The preclinical tests are encouraging and the process has increased our knowledge and trained many researchers.

What does it involve to be an Academic of Merit at the Cuban Science Academy?

It is a great recognition and an opportunity to promote the best scientific results and share our views on the development of research in Cuba.

Your work group is mainly composed of women. Is there any particular reason for this?

No. There were simply more applications from female scientists. I would rather not get involved in that debate on the advantages or disadvantages of being a woman. I believe that we are neither better nor worse than men. We are perhaps more perseverant. But in general, we are a good group and get on with each other, and each member has her own opinion. We view that positively, because what is the use of everyone agreeing with you? They help me keep learning.

There are many women working in science but not many running research centers.

That is an important subject, as gender perception is a very relevant issue today. I do not believe that ability has anything to do with it, as I have many very capable female colleagues, but in the social sphere men and women have still not reached complete equality.



In her office, lively, talkative and always wearing a touch of purple. (Photograph: Luis Pérez/JT)

How did you manage to combine maternity, work and marriage?

Being happy in all aspects of one's life depends on family support, and the type of family. My mother moved in with me when my son Pedrito was young. My husband was very understanding. He recognized that I needed to work and did not mind if I came home late. That may have been because we were both scientists working on dengue... Though not all scientist husbands are like that.

Did Professor Kouri, being a researcher as well, have any influence on your career?

Gustavo did have a lot of influence on me. I remember my first trip as an advisor, to help the Nicaraguan laboratory diagnose dengue, to prevent the virus from spreading to that country. I was terrified. I was young and did not feel prepared. But Gustavo gave me confidence. I became less shy and learnt to speak in public and at congresses. When he did not agree with my ideas he would tell me so, but without losing that sense of collaboration.

“He was actually just as kind to everyone, in particular young people, despite his serious demeanor that commanded a great deal of respect. He had a long-term vision; he insisted on training and on engaging in debate with colleagues to keep learning and detect knowledge gaps and errors. He encouraged us to listen to others’ good experiences, whether to incorporate or discard them. He believed that developing science and scientific exchange was crucial to resolving everyday problems.

Are you aware of the links between your work and that of Carlos J. Finlay, the only Cuban to be nominated for the Nobel Prize?

About eight years ago I was asked to prepare the Finlay Address, a kind of eulogy that is dedicated every year to the man who discovered the transmitting agent of yellow

fever. I examined his studies and realized that he was, if not the first, then one of the first to study the arbovirus, the virus transmitted by arthropods. The yellow fever one is the prototype virus of the *flaviviridae* family, to which dengue belongs. Dengue is also transmitted by the *Aedes aegypti* mosquito. So there is indeed continuity, and the method he proposed to control that disease is still valid. All the hygienic methods he recommended are being employed in response to current health challenges.

How do you manage to participate in so many projects?

By working methodically. I get up before 6 AM, have breakfast then an hour later another hectic day begins, and I work for approximately twelve hours. I work until around 8 PM, though sometimes later as the night is my best moment for writing and thinking. It is when I am alone in the laboratory and there are no telephone calls. At home I chat to my son for a while, and then watch whichever soap opera is on. It is the hour and a half when I have a break and just switch off. During the weekend I work a lot on the computer, and that is it really: a little music on the way to and from work, an occasional meal out and a quick catch up on the news. The thing is I have so much to read for work!





With some members of her research team. The IPK has proposed a comprehensive hypothesis on dengue, which demonstrates that in addition to the risk factor of secondary infection, susceptibility depends on the individual. Indeed, in equal conditions, one person can have a form of hemorrhagic dengue and even die, while another will display no symptoms. (Photograph: courtesy of Dr. Guzmán).

### Academic profile

María Guadalupe Guzmán is a Doctor of Science, virologist, Tenured Professor and Merit Researcher. She has been the Head of the Virology Department at the “Pedro Kouri” Tropical Medicine Institute in Havana, Cuba since 1987 and the Director of the

Collaborative Center of the Pan-American Health Organization-WHO, for the study of dengue and its vector. She is an Academician of Merit at the Cuban Science Academy. She directs the Cuban Microbiology and Parasitology Society and is the Coordinator

of the National Reference Laboratory for Dengue in the Americas, NRLDA/PAHO. She is a member of the Dengue Prevention Board of the Americas, the Dengue Work Group (GT/Dengue) of PAHO and the Advisory Group of the WHO Tropical Disease Program.

She has participated in over 90 congresses and other scientific meetings with over 200 works, conferences and posters. She has delivered keynote addresses at prominent scientific institutions in Cuba, Europe, the United States, South East Asia, Latin America and the Caribbean.

She has written over 300 publications and short reports in scientific journals, principally on the subject of dengue and its hemorrhagic form. She has co-authored books and written chapters in books published in the Dominican Republic, Colombia, Cuba, Brazil, Germany, the United Kingdom and the United States and TDR-WHO. She is the author of four patents and a chapter in the Public Health Encyclopedia and the WHO Dengue Guides, 2010.

Guadalupe Guzmán was one of 12 figures chosen by the North American journal *Science* to write her scientific biography for its 125th Anniversary celebrations.

## Distinctions and prizes

Dr. Guzmán has received many prizes and decorations, including several prizes from the Cuban Health Department and the Cuban National Science and Technology Forum, the Medal at the 30th Anniversary of the Cuban Science Academy and the “*Carlos J. Finlay*” National Order of the State Council of the Republic of Cuba, for her contributions to Cuban science in 2003. She became a fellow of the *Academy of Science for the Developing World*, (Twas). ■

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