

## Meet Dr. Maria Elena Bottazzi, the other half of the Hotez dream team

Andrew Dansby

As a child growing up in Honduras and later as a graduate student studying microbiology, Dr. Maria Elena Bottazzi often found herself with a textbook in her lap and “Star Trek” in the background.

“The old ‘Star Trek,’” clarifies Bottazzi, 56, associate dean at the National School of Tropical Medicine at the Baylor College of Medicine and co-director at Texas Children’s Hospital Center for Vaccine Development. “With William Shatner. It was almost a religion. I just think of the fantasy of that bright futuristic world, with futuristic stuff. I’ve always loved the science fiction aspect of things, how we see the world.”

Bottazzi sees the world differently than most and not simply because she’s seen the world through a microscope. She’s a frontline asset in the battle against COVID-19 because she’s spent decades studying neglected infectious diseases, some of which affected people in Honduras, where she spent most of her youth. But Bottazzi possesses a mathematical mind to go with her interest in the living matter seen through a lens. For two decades she’s worked with Dr. Peter Hotez, among the most familiar faces in the United States’ battle against this coronavirus and misinformation about it, Bottazzi has also made efforts to contain a virus that has been startlingly deadly and disruptive. She loses her time in the lab, but also understands the mechanics of running that lab.

“She’s not only a brilliant scientist,” Hotez says. “She has what we say in Yiddish, *sechel*. It’s a wit in intelligence and expression. There’s no perfect translation, because it means those things and something more.”

Considering those youthful TV affinities, Bottazzi’s work makes sense. She admits to preferring “Star Trek” to “Star Wars.” A close look at both iconic enterprises isn’t required to understand why. “Star Wars” was set long ago, far away, and presented a hero’s journey through wartime. “Star Trek” was a serialized morality tale, and its characters were on a mission of exploration and discovery.

Like a one-woman version of Shatner’s coterie of exploratory colleagues, Bottazzi is from here and there. Her life and work and career have included extended time in Europe, the United States and Central America. And she still seems to regard her experience — which has made her conversational in four languages — as something more global. With Hotez, Bottazzi has worked to eradicate rare and neglected diseases.

Their body of work placed the two and their colleagues in a particularly helpful position with the arrival of COVID-19. The global pandemic has in many ways shrunk the size of the world, as variants continue to emerge in countries with limited or no vaccines and then spread across oceans. In the United States mRNA vaccines developed by Moderna, Pfizer and Johnson & Johnson were made widely available. The mRNA vaccines teach cells to make new proteins to prompt an immune response against viruses. Bottazzi and Hotez led efforts to develop India’s recently approved Corbevax, a patent-free vaccine that uses the spike protein from the coronavirus to prepare immune systems against the virus. There is a vaccine that could and should have global benefits, putting more vaccines in more arms.

Bottazzi’s colleague Hotez — instantly identifiable for both his bowties and the clarity of his commentary — has been among the more prominent faces offering information and combating misinformation in the United States. He’s always quick to loop in Bottazzi as his long-running colleague. Earlier this month the two were nominated by U.S. Rep. Lizzie Fletcher, D-Houston, for the Nobel Peace Prize.

Fletcher points out the Nobel Peace Prize’s stipulation that those considered “advance fellowship among nations.”

“To me, their work — trying to develop a vaccine that could eradicate this pandemic — it is designed to bring peace among nations,” she says. “It’s an international partnership that they’ve created through their altruism.”

“The fact that it’s the *peace prize*,” Bottazzi says. “I’m still surprised by that. It’s not for medicine. It’s boring medicine, what we do. It’s not Earth-shattering. But we’ve seen these clashes about medicine and with nationalism and people not taking care of each other. So if anything, I do feel like we’re trying to do morally good things.

“To be quite honest, even if this work had a patent,” she continues, laughing, “it would be a penniless patent.”



Dr Peter Hotez and Dr. Maria Elena Bottazzi pose for a portrait in the Debakey Library and Museum at Baylor College of Medicine Wednesday, Feb. 2, 2022

in Houston. Vaccine crusaders, Hotez and Dr. Bottazzi have been nominated for the 2022 Nobel Peace Prize by Rep. Lizzie Fletcher. The pair has spent the past two years creating Corbevax, an inexpensive and easy-to-produce COVID-19 vaccine that does not require refrigeration.

Brett Coomer, Houston Chronicle / Staff photographer

## Lab work and logistics

“¿Papi? ¿Esta bien?”, Bottazzi asks, taking a call from her father. After the conversation ends, she offers an “OK, ciao.”

Most of Bottazzi’s connections from youth come from Honduras. That said, the nature of her work means she gets messages these days from Italy.

“I got one recently: ‘Is this you? Are you the little girl I used to play with?’”

In fact she was. Bottazzi was born and spent her first nine years in Genova, along the Ligurian Sea in the northwestern part of the country. She points out the dialect there is close to Portuguese, which she speaks fluently. Her father was a diplomat of Italian descent born in Honduras, so she also grew up speaking Spanish. When her parents divorced, Bottazzi and her brother moved with her father to Tegucigalpa, the capital city of the Central American country.

“We are pretty much equally from both worlds,” she says. “Some people don’t understand, but it worked beautifully for us.”

Early on she was drawn more to biology and chemistry than Spanish literature, “which I now regret,” she says.

Many classmates in a small school considered a similar track. “Everybody wants to be a doctor,” she says. “Even nowadays.” Upon arrival at the National Autonomous University of Honduras in 1983, she was intrigued by microbiology.

“There were class openings,” Bottazzi says, laughing. “But I was also fascinated with it. Studying the actual bugs: how to detect them, treat them, prevent them. Helping doctors figure out how to do their job. It was fascinating to me. I got to interact with people in medicine, but it wasn’t diagnosing or providing health care. The concept of epidemiology and public health — that was my a-ha moment.”

Honduras proved a fascinating place to study with an indigenous population that saw its first settlers and colonization in the 16th century. She brings up the construction of the Panama Canal in the late 1800s as crucial to initiating her line of study.

“It brought great scientists but might also have influenced how these diseases spread and moved,” she says.

Bottazzi says most of her classmates volunteered for standard-of-care projects as part of their undergraduate theses. They threw themselves into communities for their work. She instead applied for a lab-based research project.

Her interests have always been split between lab work and logistics. So she earned a Ph.D. in molecular immunology and experimental pathology from the University of Florida. While in a post-doctorate program at the University of Pennsylvania, Bottazzi also cut out time to study business and economics in the evenings at Temple University.

“I felt like it enabled me to diversify my expertise,” she says. “Branding, management, people and programs.” Immersed in post-doctorate work at the University of Pennsylvania, she observed the pharmaceutical ecosystems. She learned aspects of running a lab that didn’t involve the white coat.

“It made sense, right?” she says. “What could I do with all this science beyond the cookie-cutter expectations. I wanted to do something that changed paradigms. To break the normality of things. If you want to develop interventions — drugs, vaccines, medicines, diagnostics — you have to understand the economics of it, the finances and legal ethics of these programmatic things.”



Maria Elena Bottazzi, Ph.d., poses for a portrait in the DeBakey Library and Museum at Baylor College of Medicine Wednesday, Feb. 2, 2022 in Houston. Bottazzi has also been a crucial a figure with Dr. Peter Hotez in developing a low-cost non mRNA vaccine to help halt the spread of Covid19 in Asia and Africa.

Brett Coomer, Houston Chronicle / Staff photographer

## A perfect partnership

Bottazzi was in Honduras when former Honduran first lady Mary Flake de Flores and her science advisor, Humberto Cosenza — a former mentor to Bottazzi — tried to connect her with Peter Hotez, another microbiologist who'd recently visited the country. Hotez heeded their advice and arranged a meeting.

"Clearly there was a spark to her," Hotez says. "Scientifically, and also in her organizational skills and business skills as well."

Hotez had just set up shop at George Washington University and was building a team to study neglected tropical diseases. Bottazzi applied for a grant to work with Hotez and got it. "And we just clicked," she says. "That was 21 years ago." Eleven years ago they relocated from the Washington, D.C., area to Houston.

"We are so well-positioned here," she says. "Go any direction — east, north, south, west — this is a powerhouse of a medical center that invites people from around the world to partner and collaborate."

Their work has been full of successes and frustrations. They presented areas of study in biodefense parallel to their study of illnesses caused by parasites.

"We love our tropical diseases," Bottazzi says, the sort of statement only someone comfortable in a lab coat can say. An increasingly interconnected world led the two to see how their work on neglected diseases could potentially scale globally should a pandemic take root. The National Institutes of Health had them create a SARS vaccine prototype in the mid-2010s. But as viral scares rose and receded, they found it difficult to keep those who provide funding engaged. They applied for a grant in 2018 for a universal vaccine prototype. "We heard things we've heard before," she says. "'Not a priority, no innovation, why do we need this vaccine?' We were used to people saying 'no' to us. So we continued to make difficult decisions. But that's why we were able to jump onto this COVID response."

Bottazzi and Hotez's work ran parallel to Operation Warp Speed, which was initiated in the summer of 2020 to develop a domestic vaccine. Both had spent their lives studying the regions where respiratory illnesses initially spread without intervention: MERS in the Middle East, SARS in China. She describes their process as being related to what she experienced in Honduras, an efficient one with minimal waste. "People here, if they have money, they use something and throw it away," Bottazzi says. "There, we reuse things. That gives us a sense of resilience. You learn to get by with less."

In contrast to the mRNA vaccines here, Bottazzi and Hotez pushed through with a protein sub-unit COVID-19 vaccine that late last year was approved for use in India.

These doctors and their teams spent years leading to the development of Corbevax, a low-cost vaccine that could help vaccinate nations with fewer financial resources, where variants continue to arise, flourish and spread.

"It's remarkable to me that they're not only giving away their research with no patent protection, but they're telling people how to use their research," Fletcher says. "They've given people in other countries a kit to start."

## A global task

For those who consume media in the United States, Hotez has largely been the face of their work at Baylor and Texas Children's. He's always quick to refer to the work as a partnership. The polylingual Bottazzi advocates and informs on two other continents.

"I think we have complementary skills," Hotez says. "And I think it's been the most productive partnership of my scientific career."

Both get plenty of pushback, which Bottazzi regards with measured empathy.

"It's human nature. We all react differently to stressful positions. So we try to keep our zen," she says. "Pushing, publishing, communicating."

The international affinity for their work at times contrasts that in the United States. "There's this joy and recognition around the world for Dr. Bottazzi and her work," Fletcher says. "It's exciting to see when people are doing things that are important for humanity."

Both scientists made sacrifices with their extended work days. "I haven't taken a full day off in two years," Hotez says.

Bottazzi makes similar admissions. "As the one who's single with no kids and no husband, I'm the one who can pick up and go, so I try to get to Italy and Honduras. I never lose touch with my family. I'm a little bit like the glue."

Viewing of anything — "Star Trek" or otherwise — is limited to short windows between work and spells of sleep.

"I start one," she says of her attempts at watching TV shows, "and then I have to start it again the next day. A whole week can pass before I get through 15 minutes."

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