US–Cuba Health and Science Cooperation: They Persisted

> The first truly universal society was the society of researchers. May the coming generation establish a political and economic society which will insure us against catastrophes.
> —Albert Einstein in Havana, December 19, 1930

Few may be aware of Einstein's 30 hours in Cuba, just as the world was plummeting into the Great Depression. He was received by the most illustrious academics of his day, leaving the entry above in the Golden Book of the Geographic Society of Cuba. He spoke before what was then the Academy of Medical, Physical and Natural Sciences of Havana—precursor of the Cuban Academy of Sciences. The chair he occupied still sits in the Academy's great hall.

But as his words indicate, he hoped that society would follow the steps of researchers, coming together in truly universal fashion to protect humanity from catastrophes—perhaps of its own making. Science in the public interest was no stranger to Albert Einstein, who also insisted upon visiting the city's poorest neighborhoods during his brief stay in Havana. In 1930, it was the capital of a country that had gone from being the "ripe fruit" destined to fall into the lap of the United States to being briefly occupied by the US military, all the while an economic appendage of its neighbor to the north. Over the decades, and despite tumultuous relations between the United States and Cuba—exacerbated after the Cuban revolution by US regime-change programs and a draconian embargo—experts in the sciences, public health and medicine from the two countries have managed to form alliances for the benefit of both their peoples.

Above all, this issue is a tribute to these scientists' dedication and their recognition that shared problems require a shared search for solutions, broad and respectful debate of hypotheses, and a willingness to put society before self. In the pages that follow, we publish lessons from their experiences, in the hope that these will inspire others to join forces to address the challenges faced by both countries, and in fact, by the entire planet.

Leading off the eight articles included in the section titled Lessons in International Cooperation, Jorge-Pastrana joins with US colleagues to offer a fascinating history of efforts by Cuban and US scientists to transcend political barriers through concerted engagement and joint work. Some of these efforts were heroic, representing the height of scientific ethics and sacrifice. Such a collaboration is illustrated on our cover: in one of the first successful attempts at "science diplomacy," Cuban physician Carlos J. Finlay shared with the US (occupying) Army's yellow Fever Commission the results of his experiments concluding that the mosquito was the vector of yellow fever. The disease had decimated US troops on the island, as well as the Cuban population, and was felling workers on the Panama Canal at an alarming rate. Finlay's generosity, coupled with the willingness of men like the young Johns Hopkins faculty member Jesse W. Lazear, who gave his life in the process of the experiments, made it possible to put an end to this scourge throughout the region.

Three other articles, jointly authored by Cuban and US researchers, address collaborations in communicable disease control, including:

- Arbovirus research, vector control strategies and epidemiological surveillance, reflecting the complementary strengths of Cuban and US institutions, such as the Pedro Kourí Tropical Medicine Institute, the NIH's National Institute of Allergy and Infectious Diseases and the CDC. The authors argue that rapidly emerging threats from arboviral illness, extension of vector habitats, and the two countries' proximity make US–Cuba collaboration not only mutually beneficial, but imperative. US citizens may see such collaboration as all the more urgent, now that it has been reported that conditions in over 75% of counties in the contiguous United States are suitable for reproduction of *Aedes aegypti* and *A. albopictus*, the main mosquito vectors for dengue, chikungunya, Zika and even yellow fever.

- Cuba's decades-long collaboration with WHO working toward global polio eradication, an initiative in which US scientists involved had to tread lightly, because of the US embargo. Cuban findings over two decades have influenced global policy decision-making on new strategies for polio eradication. As WHO's Director of Polio Eradication Michel Zaffran pointed out, an immunity gap anywhere in the world carries the risk of vaccine-derived type 2 poliovirus, and imperils chances of eradicating polio globally.

- Institutional scientific collaboration between the USA and Cuba to help the world move toward TB elimination by 2050. TB control is a priority for both countries, each having low incidence (pre-elimination levels) and robust research capacities. These make collaboration a logical path.

In other areas of joint public health research and results, we share:

- Work by Cuban, US, Barbadian and other scientists to identify biomarkers of long-term impact of early childhood malnutrition. Such biomarkers could help reduce malnutrition sequelae where their burden is highest, since they are detected through EEG, a less expensive and more readily available technology than that offered by more high-tech approaches.

- Insights into the intensive international collaboration, in which PAHO/WHO and US scientists played a role in helping to bring Cuban epidemic neuropathy under control in the early 1990s, at the same time shedding light on other metabolic or mitochondrial optic neuropathies.

- A collaboration between eminent Cuban and US scientific institutions (the Molecular Immunology Center and Roswell Park Cancer Institute) to pursue cancer research and carry out the first US clinical trials for a promising therapeutic lung cancer vaccine developed in Cuba, and now perhaps within sight of US physicians and their patients.

Our Interview this issue is with Dr José Rubiera, the trusted meteorologist who has educated an entire population on weather science. He asserts that cooperation between Cuban and US meteorologists is the "most natural thing in the world" and vital to saving lives in both countries, situated as they are along "hurricane

alley." He also notes the importance of working together to mitigate the impact of climate change. Tragically, Cuba was turned down when it offered disaster-response expertise and capacity for New Orleans after Katrina and again when Puerto Rico was devastated by Hurricane María.

In a Roundtable, Cuban and US scientists—including chemistry Nobel laureate Peter Agre and Cuban dengue expert María Guadalupe Guzmán—make the case for US-Cuba scientific cooperation to overcome political divides to tackle urgent global and regional issues.

While we were in our final production stages, WHO marked World Health Day (April 7) by calling on world leaders to take concrete steps to ensure that "everyone, everywhere can access essential quality health services without facing financial hardship," that is, toward universal health coverage (UHC). At least half of the world's 7.3 billion people still lack full coverage with essential health services and some 100 million people in 2010 fell into extreme poverty (living on $ 1.90 or less a day) because of out-of-pocket health expenditures.

Of course, there can be no UHC without trained human resources, and Cuba is doing its part: its Latin American Medical School (ELAM) provides free education to students from low-income countries and underserved communities in higher-income countries. Some 28,500 MDs from 103 nations have graduated from ELAM since its first class of 2005, 172 of them from the USA. In our second Roundtable, senior editor Gorry shares personal and often moving accounts by several US grads concerning their ELAM experience and where the road is taking them now.

Our thanks to The Atlantic Philanthropies and the Ford Foundation for their generous support for this issue.

We at ***MEDICC Review*** are pleased to congratulate our colleague, Dr Lila Castellanos, on her election as Distinguished Member of the Cuban Academy of Sciences.

In this issue devoted to US–Cuba scientific cooperation, we cannot let Stephen Hawking's death go unremarked. We mourn the passing of a great intellect and a great man, one who trusted implicitly that science could answer the pressing questions critical to humanity's very survival.

We wish to thank our two Guest Editors: Drs Jon Kim Andrus and Pastor Castell-Florit Serrate. Dr Andrus is professor and Director of the Department of Vaccines and Immunization of the University of Colorado's Center for Global Health and Professor at George Washington University. Previously, he served as PAHO Deputy Director; Chief of PAHO's immunization program; and Director of polio eradication in WHO's Southeast Asia Region. Currently, Dr Andrus is co-Chair of the Global Polio Partners Group, and member of the International Monitoring Board for the Polio Transition, PAHO's Technical Advisory Group for Vaccine Preventable Diseases, WHO's South East Asia's Regional Verification Commission for Measles and Rubella Elimination, and WHO's Working Group on the Decade of Vaccines.

Dr Pastor Castell-Florit is Director of Cuba's National School of Public Health and Chair of Cuba's Council of Scientific Societies in Health. During his 45-year career in public health, he has held various posts vital to the development of Cuba's health system. In 2016, PAHO presented him its Award for Health Administration in the Americas, citing his life of service and excellence in the field and his "outstanding leadership and valuable contributions to the management and administration of the Cuban national health system." His two doctoral degrees explore intersectoral action to address social determinants of health. He co-chairs MEDICC's Joint Academic Council.

Today, the world faces immense environmental, economic, health and social challenges that are impossible for one nation—however wealthy or powerful—to tackle alone. The imperative for US-Cuba cooperation in health and science has never been clearer, despite political headwinds out of Washington. The past has important lessons: scientists from earlier generations indeed persisted, and today we reap the benefits of their perseverance. We are confident that the current generation of scientists will follow in their path.

The Editors