History of Chagas Disease

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PINTO, J. Carlos Chagas in his laboratory at the Manguinhos Institute. Rio de Janeiro, [19--]. Location of the Document: Fundação Oswaldo Cruz – Casa de Oswaldo Cruz - Biblioteca

Carlos Chagas was born in 1879 in a small town in Brazil, the eldest son of coffee plantation owners. His father died when Carlos was four; a physician-uncle became a paternal figure and stimulated Carlos's lifelong interest in medicine.

In 1902 Chagas studied medicine in Rio de Janeiro under Oswaldo Cruz at the Manguinhos Institute (later renamed the Oswaldo Cruz Institute, now the Fiocruz Institute). Cruz was only seven years older than Chagas, but by the turn of the century was already a prodigy in the fields of parasitology and public health: he had studied at the Pasteur Institute, and brought a sophisticated understanding of germ theory to bear on outbreaks of yellow fever and malaria. Cruz identified Chagas as a promising student, and encouraged him during the writing of his medical student thesis on the "hematological aspects of malaria." He also offered Chagas a junior faculty research position after graduation. But Chagas chose to enter family practice. Perhaps the financial choices faced by today's medical school graduates were present then, too.

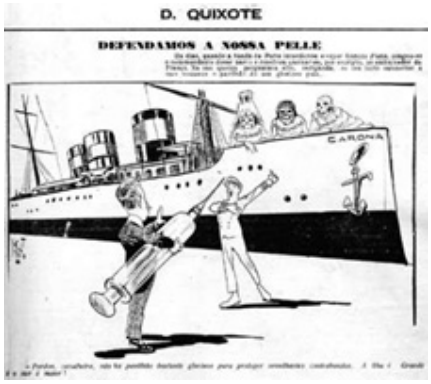
Two years later, however, Chagas left his private practice to work for the shipping industry. The burgeoning city of Sao Paulo needed better access to sea freight, and the nearby port of Santos was poised to fill this role. Unfortunately, Santos was so overrun with malaria that ship captains were reluctant to dock there, so the port owners hired Chagas to reduce disease transmission. He succeeded through a coordinated program of vector control and patient treatment that resembled a modern-day outbreak response. He clearly enjoyed this work, and subsequently relented to Cruz's pressure by becoming an associate professor at Manguinhos Institute.

In 1908 he faced a similar challenge on behalf of the railroad industry. Connecting Rio to the heart of the Amazon basin by rail was another lucrative opportunity stymied by infectious disease. Untold numbers of slaves and laborers died in this pursuit, succumbing to malaria, yellow fever and other undiagnosed illnesses. So Chagas moved to the rough-and-tumble town of Lassance, at the end of the rail line in the sweltering Brazilian interior. Working from a clinic in a railway car, he encountered "A population complaining about irregular heartbeats and atypical arrhythmias, [with] indications of cardiac insufficiencies, frequently leading to sudden death… inexplicable!"

Chagas astutely surmised a link between the endemicity of myocardial failure and the triatomine bug. Called "barbieros" or "barber bugs" because of their predilection for drawing human blood, these large black insects were unheard of along the more civilized Brazilian coast. But the workers in the interior knew them well, and described to Chagas their nocturnal encounters with the creatures that would emerge from cracks in the mud walls and thatch roofs to feed upon their blood. Patients sometimes developed swollen bite sites near the eyelids and lips, and for this reason they called the insects "kissing bugs." To discover whether they could serve as vectors for a novel infectious agent, Chagas dissected insects and inspected their gut flora with a simple light microscope.

He ultimately discovered a eukaryotic, flagellated protozoan, similar to the agent of African sleeping sickness—*Trypanosoma brucei*—described by Forde only six years earlier. Chagas named the protozoan after his mentor (*Schizotrypanum cruzi*, later renamed *Trypanosoma cruzi*). Next, he set out to prove his hypothesis that this organism was indeed passed to humans as a pathogen during feeding, presumably via the bug's stool. He first demonstrated *T.cruzi* in the remains of a badly-bitten cat. Later, a little girl in the same household was bitten repeatedly by barbieros, and developed fever, generalized lymphadenopathy, hepatosplenomegaly, and right-sided heart failure. When she died, Chagas found *T.cruzi* in her bloodstream. This three-year-old child became the first microbiologically-documented case of American Trypanosomiasis. Subsequently, he infected monkeys with triatomine droppings: they developed the same clinical syndrome, establishing a link between trypanosomes and disease.

This work earned Chagas international fame, and the disease soon bore his name. At home he was revered as a hero. The score of *Don Quixote* was adapted with him as the protagonist, tilting at windmills of disease with his hypodermic syringe. His likeness even graced the national currency: the 10,000 Cruzado note depicted him and the life cycle of *T.cruzi*. It is ironic that his mentor, Oswaldo Cruz, figured on a note worth only 50 Cruzados.



References

1. Bastien JW. *The Kiss of Death: Chagas' Disease in the Americas*. University of Utah Press, Salt Lake City, 1998. An excellent review of the discovery and quest to eradicate Chagas' disease, including scientific, cultural, and economic perspectives.

2. Kropf SK, et al. *Carlos Chagas Virtual Library* (www4.prossiga.br/ Chagas/centro.html). Many of the images herein are copied from this extensive and handsome website, a publication of the Fiocruz Institute.