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Chagas observes Rita, the child from Lassance, one of the first identified cases of the disease. In the background is the train that was both lodging and laboratory

Chagas

100 years ago, a Brazilian physician discovered the full cycle of the disease named after him

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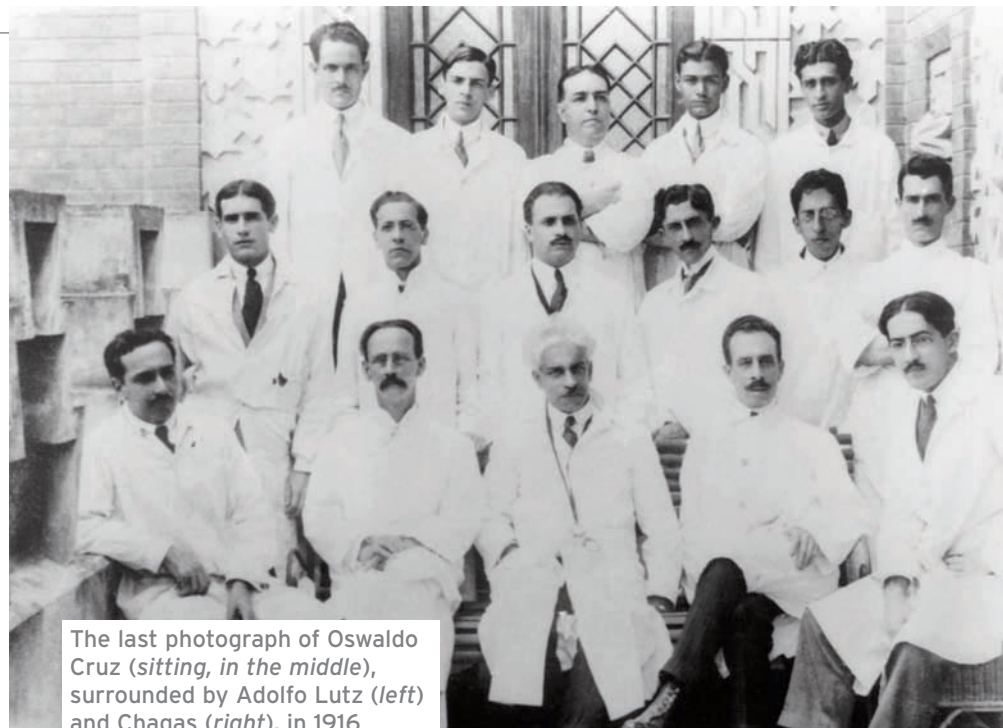
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Doctor Carlos Ribeiro Justiniano Chagas arrived in Lassance in June 1907, with a mission to battle an outbreak of malaria that had interrupted the work on the extension of the Central do Brasil Railway in the northern part of the State of Minas Gerais. This was a very poor region, where most of the people lived in houses made of wattle and daub. While spending time there, Chagas would live in a train carriage parked near the train station. The carriage was also used as a doctor's office and a laboratory. The doctor was interested not only in the prophylaxis but also in disease-causing insects and parasites. He would collect specimens of animals and investigate patients that apparently had symptoms that were not related to malaria. The results of his research work were published in the form of a note in the periodical *Brazil Medico* on April 14, 1909. In the article, he announced the discovery of an unknown disease, the parasite that causes it and the insect that transmits it. Ever since then, this finding has been considered as a unique feat in the history of medicine – because it described the full cycle of the malady, Chagas Disease – and the finding was the result of one person's work.

Carlos Chagas, a native of the town of Oliveira, State of Minas Gerais, had always been interested in malaria. The

disease was the object of his doctorate thesis, the advisor of which was Oswaldo Cruz, at the then Instituto Soroterápico de Manguinhos (renamed Instituto Oswaldo Cruz) institute in Rio de Janeiro. In 1905, a malaria epidemic occurred in the city of Itatinga, State of São Paulo. Cruz, who was also the head of the Diretoria Geral de Saúde Pública, Public Health Department, recruited Chagas to battle the disease. “This was the first anti-malaria campaign conducted in Brazil, based on the knowledge of the role of the mosquitoes as transmitters of the disease,” says Simone Petraglia Kropf, a professor and researcher in the history of health and science at the Casa de Oswaldo Cruz institute at the Fiocruz foundation.

In February 1907, the young doctor was once again summoned to deal with an outbreak of



The last photograph of Oswaldo Cruz (sitting, in the middle), surrounded by Adolfo Lutz (left) and Chagas (right), in 1916

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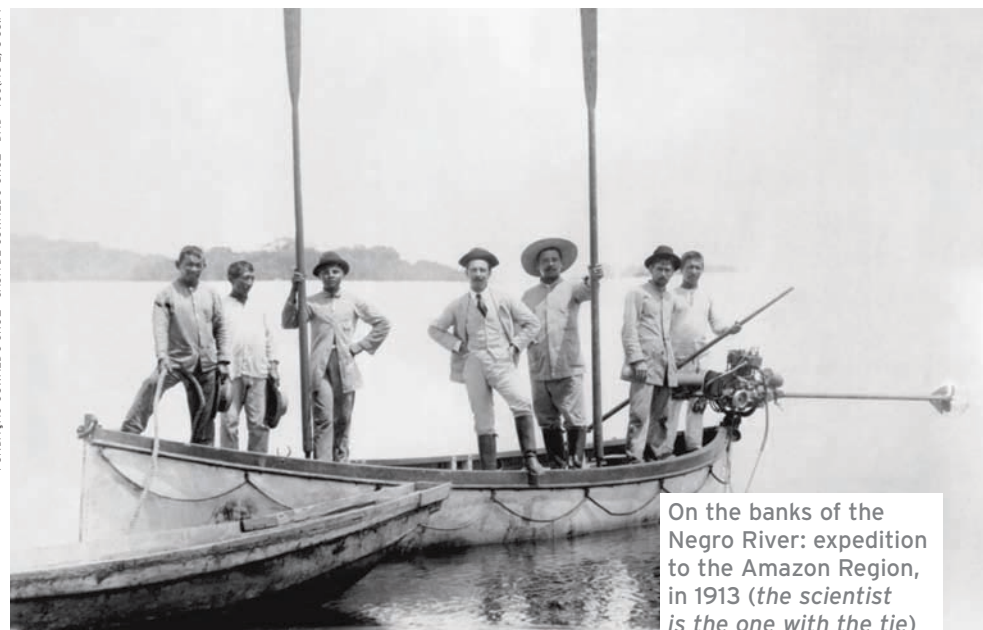
malaria in the Baixada Fluminense region, together with entomologist Arthur Neiva. In June, he went to the north of Minas Gerais with the same objective. This time he went with Belisário Penna, a physician from the Diretoria Geral de Saúde Pública, Public Health

Department. The two physicians set up base in Lassance and started to work. An enthusiastic student of tropical diseases, Chagas would analyze the blood of local animal species during his free time. In one of these tests, he identified a new protozoa of the

Trypanosoma genus in a marmoset. He named this protozoan *Trypanosoma minasense*. The species was not pathogenic.

The chief railway engineer, Cantarino Motta, introduced the researchers to a blood-sucking bug commonly found in the region. As the nights in that region are cold, the face is the only uncovered part of the body, and prone to being bitten by the insect. Hence the nickname “barbeiro” (barber); this insect hides in the cracks of the walls of the wattle and daub houses during the day and roams at night to feed. Chagas knew the importance of blood-sucking insects as transmitters of parasitic diseases and started dissecting the “barbeiros”. He found a protozoa that could either be the insect’s natural parasite or the evolutionary phase of a disease-causing trypanosoma.

There was no good laboratory available in Lassance to clarify



On the banks of the Negro River: expedition to the Amazon Region, in 1913 (the scientist is the one with the tie)

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Chagas, Penna and Motta (seated, from right to left): this is the house where the doctor first became acquainted with the “barbeiro,” in 1908

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the doubt, so Chagas sent some insects to Manguinhos for experiments. Oswaldo Cruz performed an experimental infection on lab animals and told Chagas that he had found forms of the trypanosoma in one of the animals that had gotten sick. Chagas went back to the institute and confirmed his suspicions: the protozoa was unknown, with a different morphology than that of the *T. minasense*. The parasite was named *Trypanosoma cruzi* in honor of Cruz.

But the sick people still had to be found. Chagas went back to Lassance and discovered the trypanosoma in the blood of a two-year old girl called Berenice, who was sick with a fever. The child’s illness led the doctor to describe the clinical symptoms of the disease for the first time: acute anemia, general edemas, swollen lymph nodes, among others. This work resulted in the note published in *Brazil Medico* in April and soon thereafter in Germany’s *Archiv für Schiff und Tropenhygiene*, and in

France’s *Bulletin de la Société de Pathologie Exotique*.

The discovery of the American trypanosomiasis, as Chagas called it, had an extraordinary impact on the doctor’s scientific, institutional and political life. In 1910, he was accepted as full member of the Academia Nacional de Medicina (ANM, National Academy of Medicine), and was the winner of the competitive selection, by

merit, for “head of service” at Manguinhos. In 1912, he was granted the Schaudinn Award, from the Tropical Medicine Institute in Hamburg, Germany. The Schaudinn Award was granted every four years for the most important contribution to protozoology.

When Oswaldo Cruz passed away in 1917, at the age of 54, Chagas was appointed as director of

Manguinhos three days later, a post he would hold until his death in November 1934, at the age of 56. In 1918, when the Spanish flu was assailing Brazil, he organized a special service to set up emergency hospitals and sent an appeal to doctors and medical students to aid the population of Rio de Janeiro. His action was one of the factors that led him to the position of director of the National Public Health Department (DNSP) in 1920.

“Chagas had already been talking about the poor sanitary conditions in

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Albert Einstein (middle) was hosted by Chagas in Manguinhos when visiting Rio de Janeiro in 1925

Brazil's hinterland since 1909, when he started studying the disease, and continued drawing attention to this issue during his entire life," says Simone Kropf, who recently launched the book *Doença de Chagas, doença do Brasil: ciência, saúde e nação (1909-1962)*, published by Editora Fiocruz. The scientist remained in this post until 1926. During his term in office, he prepared the extensive sanitary code that modernized the existing Brazilian sanitary laws, and launched a battle against endemic diseases in rural regions. "Other important actions included the opening of the first professional nursing school in Brazil and investments in the training of medical doctors specialized in public health, who were hired after concluding their training program." As a member of the Health Committee of the League of Nations, he suggested the creation of the International Leprology Center in 1922; the center was inaugurated in 1934, and was housed in the Instituto Oswaldo Cruz until 1939. In 1925, he became full professor of tropical medicine at the Medical School in Rio de Janeiro, on merit.

Chagas' scientific production and public health management were applauded. However, he was also greatly criticized. In 1919, researcher Henrique Aragão suggested that Chagas Disease was not as serious and widespread as had been announced, and

there were very few patients who had proved to be infected, unlike that which had been stated by the discoverer of the disease. In 1922, Afrânio Peixoto, writer and full professor of hygiene, said at a plenary session of the ANM that nobody knew those sick people and called the disease "Lassance disease." Deeply offended, Chagas asked the academy to set up a committee to evaluate his studies. In 1923, the scientist from Manguinhos obtained a favorable opinion.

Such issues could have caused less disappointment to Chagas if he had been awarded the Nobel Prize for Medicine. In 1999, Marília Coutinho, who was at the University of Florida at that time, Olival Freire Jr., from the Federal University of Bahia, and João Carlos Pinto Dias, from the Centro de Pesquisas René Rachou, a research center in Minas Gerais, published an article on the Nobel Prize nominees who were unknown in Brazil. The first formal nomination requested by the Nobel Prize committee, made in 1911, nominated Pirajá da Silva, a scientist who was widely respected in Europe. The nomination was valid for the award to be granted in 1913. However, the winner was France's Charles Richet. The second official nomination was in 1920 for the award in 1921, nominating Manoel Augusto Hilário de Gouvêa, from the ANM. Although Chagas had been the only scientific nominee that year, once again he



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With his sons Evandro (left) and Carlos. Both sons also became leading researchers

was disregarded and nobody was awarded the Nobel Prize for Medicine that year. Two other informal nominations were put forward, but there are no details on them.

Nobody knows why the Brazilian was not chosen. "Chagas achieved recognition and success very early on, held government positions that were sought by other people, and attracted a lot of bad feelings," says João Carlos Pinto Dias. There is an unproven hypothesis that the Nobel Prize commission had consulted the scientist's enemies and had been advised not to nominate him. In the opinion of biochemist Walter Colli, from the Chemistry Institute of the University of São Paulo, and a specialist on Chagas Disease, there is no

doubt that Chagas deserved the Nobel Prize. "I am convinced that he did not win because Brazil is on the sidelines. It would have been different if the same work had been conducted in the United States or in Europe," he believes.

"When I presented our article in Manguinhos in 1999, the most interesting fact was the surprise and emotion of Carlos Chagas Filho, who was 89 years old at the time, and of other very elderly researchers who knew nothing about the nominations," says Marília Coutinho. When she concluded her speech, she says she felt that the prize had been awarded. "Those old gentlemen were so happy when they learned this that it seemed as though Carlos Chagas had actually been awarded the Nobel Prize."

Scientific articles

All the papers by Carlos Chagas are available at the site <http://carloschagas.ibict.br/>