

REPRINTS AND REFLECTIONS

A new disease entity in man: a report on etiologic and clinical observations

Carlos Chagas

First, a quick review of the background: while working in a malaria control campaign in the northern section of the state of Minas Gerais, we came across a large bug locally called “bar-beiro,” which, like the bedbug, infests homes and attacks man at night, when the lights are out.

Since this was a blood sucking insect and such insects are of importance in human and animal pathology as vectors of disease, we examined “barbeiro” specimens and found in their hindguts a flagellate of crithidial morphology. The next step was to ascertain whether this flagellate was just a parasite of the insect or a stage in the life cycle of a parasite of vertebrates.

In almost all marmoset (*Callithrix penicillata*) specimens from the same region, we had found a parasitic trypanosome. We suspected that the “barbeiro” was the intermediate host, and the flagellate forms in its gut were stages in the life cycle of this parasite, *Trypanosoma minasense* Chagas. Because of this, we sent specimens of the bug to our director and teacher Dr. Oswaldo Cruz, who had them feed on a marmoset. Dr. Cruz succeeded in infecting this marmoset with a hemoflagellate which, being quite different in morphology from *Trypanosoma minasense*, we named *Trypanosoma cruzi*.

I studied the new parasite and found, through repeated experiments, that the insect was indeed the intermediate host, and that it took at least eight days after a bite for transmission to take place. I then made another trip to Minas Gerais for the purpose of establishing the definitive habitual host of the flagellate. The habits of the “barbeiro” suggested a situation of intradomiciliary infection; we were most impressed by the poor state of health of those who lived in infested houses. After conducting physical examinations, we found that the affected persons, especially the children, showed symptoms of a chronic disease unlike those already known and described.

These symptoms included some that occur in trypanosomiasis in man and household animals, such as generalized lymph node enlargement, edema, swollen face, etc. We then recalled many patients in that area who had sought me out earlier, sometimes with and

sometimes without fever, and these patients always presented the same intense morbid condition and symptoms for which I was then unable to diagnose the cause. Their fever did not yield to quinine, and no malaria parasites could be found in their blood.

Our first breakthrough was finding a cat with parasitic hemoflagellates in a house where “barbeiros” were abundant. The first examinations of fresh blood from chronic sufferers were without result. When we were later called to treat a child in grave condition, febrile, with very pronounced swelling in the face, many enlarged nodes in different regions, and thyroid hypotrophy, we found numerous flagellates in freshly drawn blood. By staining them I was able to identify them as the same parasite transmitted by the “barbeiro” to laboratory animals.

Examination of guinea pigs inoculated with blood from this first patient revealed a development of the same process previously observed, and in the lungs we found a schizogony of eight units identical to those observed in our studies of the life cycle of *Schizotrypanum cruzi*. We obtained more positive results by inoculating guinea pigs with blood from chronic patients. This procedure established the new human-disease entity produced by *Schizotrypanum cruzi*. We communicated the results of our work to Dr. Oswaldo Cruz, the director of the Manguinhos Institute, who sent a preliminary report to the National Academy of Medicine. Due to other commitments, we could not begin the detailed clinical study of the disease until ten months after these findings.

The transmitting insect is a heteropterous hemipteran, species *megistus*, genus *Conorhinus*, family Reduviidae (sic). Dr. Arthur Neiva has recently published a detailed study of its biology in the *Memorias do Instituto Oswaldo Cruz*. *Conorhinids* invade homes, where they actively multiply, becoming exceedingly numerous and troublesome to the occupants.

The many cracks in the mud walls of primitive, grass-thatched huts are the preferred habitat of the bug, where it greatly multiplies. Even better-built houses, if they offer suitable hiding places, are infested with the bug. The bug can find shelter in the cellars of houses, and enters occupied rooms at night through cracks in the floor. On small farms in the region, we found *Conorhinids* in different outbuildings such as carriage-houses, storerooms, stables, etc. The bug

Source: Carlos Chagas: *Coletânea de Trabalhos Científicos*. Brasília, Editora Universidade de Brasília, 1981. English version in *The Challenge of Epidemiology: issues and Selected Readings*. Pan American Health Organization, 1988.

frequently is found in chicken coops, where it feeds on chicken blood.

In the contaminated areas where we worked, we never found a bug-free hut among the rural population. New houses, built in remote spots far from other dwellings, are very quickly invaded by *Conorhinus*, despite the difficulty of infestation from another home.

In areas where the "barbeiro" is present, recently settled small towns are quickly infested. A case in point is Lassance, a village that came into being with the arrival of the railroad. In the first two years after it was established, infested houses were few and far between. Today, four years later, *Conorhinus* is found in almost every house of Lassance, and schizotrypanosis is rampant.

The bug bites only at night. In the dark, when the lights have been turned off, it leaves its hiding place and crawls down the walls in search of man. Adults can reach beds and mosquito nets in short flights. During the day, *Conorhinids* do not leave their hiding

places. However, if a person leans for some time against a wall, he is sometimes bitten, as happened in our presence to a companion on an excursion to an infested house. We report this as a warning against prolonged contact with the walls of suspect houses.

The bug's bite is almost painless and leaves no betraying mark at the site, nor is it followed by any inflammation whatever. I watched children sleeping undisturbed while about 20 nymphs and adults of *Conorhinus* sucked blood from their bodies.

Conorhinus megistus transmits the disease as a larva, as a nymph, and as a winged insect. A young larva is no larger than a bed bug and can be carried along in laundry, luggage, etc. This fact is very important for prophylaxis, and may account for the appearance of sporadic cases in homes where "barbeiros" are not present. We should also state the possibility of the disease being transported by larvae to other parts of the country when frequent communication has been established with infested regions.

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Commentary: The lucid reasoning of Carlos Chagas

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When Carlos Chagas was requested by Oswaldo Cruz in 1907 to investigate and control an outbreak of malaria in Lassance, Minas Gerais, he could not have imagined that this field of research was the beginning of one of the most notable examples of medical discoveries.

In fact, when reading his scientific reports^{1,2} written in a clear and elegant style, the reader perceives that the observations and precise conclusions are the fruit of a lucid reasoning.

At the age of 28, Chagas was a young doctor working as an assistant researcher at the Instituto Soroterápico de Manguinhos, founded by the Baron de Pedro Afonso in 1900 and directed by Oswaldo Cruz since 1902. Chagas was studying in primates a flagellate parasite isolated from triatomine insects

from the State of Minas Gerais. He named this parasite *Trypanosoma minasense*.³

In Lassance, he observed that these same triatomine insects were present in cracks of the mud walls of the rural dwellings whose inhabitants complained that at night they were bitten in the face by the insects known locally as 'barbeiros' ('barbers').

In addition, he also observed that a medical condition in that region was frequent in children. The clinical picture showed episodic fever, severe anaemia, palpable oedema, spleen enlargement and swollen lymph nodes. Most cases had a benign progression after a few weeks but a proportion of them developed severe cardiac lesions.

The complete description of this clinical picture was made in a 2-year-old girl, Berenice, from whose blood Chagas isolated the same parasites that he inoculated in laboratory animals. He later described the different phases of the biological cycle of the parasite and in the scientific report quoted above, he named it *Trypanosoma cruzi* in honour of Dr Oswaldo Cruz.

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