

Biological control of Chagas' disease

A species of mite could control the disease, but housing is a problem

by Jeanne Bockel

Chagas' disease—also known as American trypanosomiasis has devastated populations in certain areas of Central and South America. Statistics compiled by the Pan American Health Organization estimate that about 10 million people are afflicted with the disease.

The organism—*Trypanosoma cruzi*—is transmitted by way of the feces of a variety of blood-sucking bugs, causing both myocarditis, or enlarged heart, and intestinal complications. A chronic condition, the disease eventually consumes the patient by one means or another and is the leading cause of heart failure in Central and South America.

Effective therapeutics for general use are lacking, although one promising drug, a derivative of nitrofurfurylidene, is available on an investigational basis from the National Communicable Disease Center in Atlanta, Ga. Currently, the only means of controlling the disease is to attack the symptoms.

Insecticides are widely used to try to control the carriers, but many vectors resist common pesticides.

So efforts are being made to develop some form of biological control by promoting insect parasites which would prey on the carriers. One such program is being experimentally tried in Costa Rica, where Dr. Rodrigo Zeledón and his associates at the Louisiana State University Medical Center offshore base have identified two possible candidates. Working under a Project Themis grant monitored by the U.S. Army Medical Research and Development Command, the LSU team has identified two insects which might halt development of *Triatoma dimidiata*, a major insect carrier of Chagas' disease.

One control parasite is a mite, *Telenomus fariai*, which parasitizes *T. dimidiata* eggs. When 5,000 to 7,000 *Telenomus* were released monthly in two infested houses, the propagation proc-

ess was inhibited before the second introduction. Natural parasitism occurred in as high as 22.6 percent of the eggs in a single household.

The U.S. Army plans field trials in Costa Rica with *Telenomus* to determine whether triatomid can be eliminated by this technique.

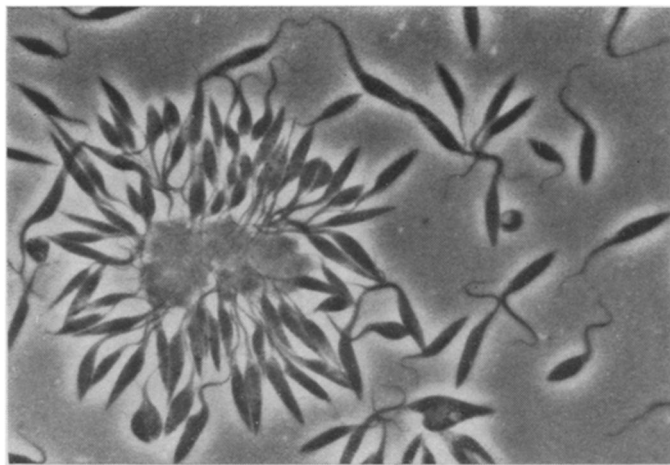
Another kind of mite, *Pimeliaphilus*, sucks the body fluids of the *T. dimidiata* and thereby inhibits its development. This species would be valuable where the *T. dimidiata* is the principal carrier. But in areas where other triatomid species are the carriers, researchers say the mite would have limited usefulness.

One of the difficulties with the mite-control system is the question of housing. The researchers observed that *T. dimidiata* employ a camouflage technique whereby in their mobile stages they kick dust on their bodies to obscure themselves from animal predators. According to Dr. Zeledón, this phenomenon is critical in areas where dwellings have dirt floors. This dust-covering protective measure is used by other species of the triatomide as well.

Because of such problems, international health authorities are skeptical about the usefulness of biological control. As one official of the Pan American Health Organization asserts, improved housing in general—not just eliminating dirt floors—would eradicate the bugs, since they live in cracks in walls as well.

And Dr. Louis Olivier, adviser on parasitic diseases to the PAHO, contends that improved insecticides would be the most practical means of controlling the disease. "Biological control is one more possibility," he says, "but in the long run better pesticides, improved housing conditions, interruption of transmission and improved standards of living will all be decisive in the struggle against the disease."

In the meantime, the effort is also being aimed at pinning down the extent



NCDC

Trypanosoma cruzi, the causative organism of Chagas.



Olivier

Dirt floor houses, a major factor.

of the disease and studying its effects in more detail. Dr. Olivier estimates that about a quarter of the people in areas where it is endemic contract the disease. And in Venezuela there are said to be one million cases, amounting to a tenth of the population.

Because Chagas' disease is a national problem in Venezuela, medical research, centered at the Caracas headquarters of Dr. Humberto Garcia Barrios, who directs the cardiovascular disease division in the Ministry of Health, keeps an itemized listing of all cases.

Dr. Felix Pifano, director of the Institute of Tropical Diseases, is attempting to interrupt transmission of the disease. To determine under what conditions the insect—in Venezuela the major carrier is *Rhodnius prolixus*, an insect of the same family as *T. dimidiata*—becomes a parasite carrier, insects not carrying the parasite are placed in contact with persons affected by the disease and whose blood contains antibodies to the parasite. If the insects take up the antibodies they might develop resistance to the parasites and not become carriers even if exposed. □