

“The Kissing Bug”

BY TOMMY NEWTON



CHAGAS' DISEASE IS A CHRONIC PARASITIC INFECTION THAT AFFECTS MILLIONS OF PEOPLE IN LATIN AMERICA. NO VACCINE OR EFFECTIVE DRUG TREATMENT EXISTS AND AWARENESS IS LIMITED IN THE UNITED STATES.

But Western Kentucky University professor Cheryl Davis and her students want to change that. For the past 11 years at WKU, Davis and her students have focused their efforts on studies involving *Trypanosoma cruzi*, the parasite that causes Chagas' disease, and looking for ways to ease its impact.

“Chagas' disease is the leading cause of heart disease and heart failure in Latin America,” said Davis, who has been at Western since 1991. *Trypanosoma cruzi* infects 12 million to 14 million people in parts of Latin America.

Among those infected, 50,000 will die each year because of the lack of an effective form of drug treatment and the absence of a vaccine.

The parasite is carried by an insect called the “kissing bug.” The parasite isn't transmitted through the bug's saliva but through its feces, Davis said. When the person rubs or scratches the bite area, the parasite enters the wound. The parasite also can enter through the mucus membranes of the eye, nose or mouth. In the early stages of the disease while the parasite is in the bloodstream, the infected person will experience fever and swollen lymph nodes. The parasite then moves into the tissues where it can damage the heart and other organs.

The parasite occurs commonly from the Mexican border to Argentina but the bug and the parasite have been

found in the United States. “I feel there are more patients than we know of because physicians in this country are woefully unaware of *Trypanosoma cruzi* and other parasitic diseases because they just don't deal with them that much,” Davis said.

In recent years, a baby was infected in Tennessee. “It really was almost an accident that anyone knew about it,” Davis said, adding that luckily the baby's mother had seen a television show about the insect and the disease. Davis expects Chagas' disease will increase in the United States as more Latin American immigrants move into this country.

The potential for increased exposure and the potential to find a treatment are motivating Davis and her students to search for answers.

In the biology labs in Thompson Complex North Wing, studies on mice focus on supplementing their diets with antioxidants like vitamin E and selenium. “What we discovered is that it is very beneficial,” Davis said. The antioxidant supplements increased longevity, reduced the number of parasites in the blood, reduced weight loss during infection and decreased tissue damage. “The bottom line is that it greatly increases survival,” she said. Students are now investigating the

impact antioxidant supplementation has on cytokines, or the small proteins that function as chemical messengers to regulate immune response. Preliminary studies suggest that cytokine synthesis in supplemented mice shifted from a susceptible profile to a resistant profile.

Davis hopes the research on mice will provide the impetus for research on humans. “My mission here at West-

ern is to train master's and undergraduate students,” she said. “It's not very practical to think about doing human Chagas' disease research. But that certainly interests me.” The research could prove beneficial to colleagues working in Ecuador, Brazil and the Centers for Disease Control, Davis said. “We hope that when we publish our findings about the beneficial effects of antioxidants in mice that people who do human clinical research in the field will say ‘Wow, I wonder if antioxidants would also be beneficial to humans!’” she said. “It's very easy to tell people to take vitamin E supplements and selenium supplements. “It certainly warrants investigation in humans. That's what we hope. We hope it will spark interest and the attention of people who can do those studies in humans.”

Trypanosoma cruzi isn't the only parasite getting the attention of Davis and her students. They're doing similar research on *Toxoplasma gondii*, a human pathogen that causes toxoplasmosis. The parasitic disease, transmitted

through cat feces and undercooked meat, can cause health problems for pregnant women and for AIDS patients. In the Western lab, students have tested the antioxidant supplementation theory on mice infected with *Toxoplasma gondii*. “The results just really bowled us over,” Davis said.

Instead of seeing similar results, the students found results that were quite opposite. The supplement didn't work. Mice that received no antioxidants saw their weight and conditions improve. “That's been a fascinating thing to me as a biologist to look at parasite systems that behave in opposite ways and ask why,” Davis said.

That's the response Davis passes onto to her students in the lab and in the biology, microbiology, immunology and parasitology classes she teaches. “I knew from a very early age that I was interested in living things,” she said.



Cheryl Davis

When she took her first class in parasitology at Oklahoma University, “it opened my eyes in the same way I see my students' eyes being opened by this incredible world,” she said. At Western, Davis has spread her enthusiasm for immunology and parasitology and her knowledge of parasitic diseases. A large percentage of her undergraduate students have gone onto medical

school while master's level students have gone onto other research labs or pursued their doctorates. “When I reflect on the students I've had, most of them have stayed in the

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The “kissing bug,” also known as the conenose bug, reduviidae bug, or in Latin America, “vinchuca,” can feed on a sleeping victim's blood by painlessly piercing the lips, eyelids or ears.

field of medicine, scientific research or teaching,” she said. “That is very, very rewarding.”

After nearly 20 years of researching *Trypanosoma cruzi*, Davis continues to find her work rewarding. “That's the wonderful thing about science. The whole nature of inquiry is you may answer one question but by answering one question you usually end up generating a dozen more questions to pursue,” she said. “I have the intention to continue working with the *Trypanosoma cruzi* antioxidant system and who knows where that work may lead us.” Dr. Davis received her bachelor's and master's degrees from Oklahoma. She earned her doctorate at Wake Forest, where her research into *Trypanosoma cruzi* began in 1984.