

Scientists take aim at disease-carrying 'kissing bug'

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An international research team, including scientists from Simon Fraser University, hopes its study of the vector *Rhodnius prolixus*—also known as the "kissing bug" and a major contributor to Chagas disease —will further the development of innovative insect control methods to curb its impact on humans.

Their report, published in *PNAS*, provides new information about the kissing bug's evolution and molecular biology. Researchers describe large and unique expansions of different gene families that are related to chemoreception (how they detect chemicals), feeding and digestion. Each of these expansions may have facilitated the insect's adaptation to a blood-feeding lifestyle.

"These are nocturnal, blood-sucking insects that feed on animals and people's faces at night, while we're sleeping," says SFU biology professor Carl Lowenberger, one of the paper's authors.

The feces of infected bugs contains the Chagas-causing parasite, *Trypanosoma cruzi*. Once feces are deposited, the parasites enter the body cavity through the puncture wounds in the skin. Chagas disease can also be transmitted through blood transfusion, ingesting infected insects or crushing them in fruit juice. Ingestion by wild animals is likely a major route by which the hundreds of reservoir species become infected.

The researchers identified unexpected modifications of important immune pathways and an absence of several components of the IMD

pathway. "It seems that *R. prolixus* has a significantly modified immune system, that may have evolved to prevent the elimination of obligate microbial symbionts on which the insect depends on for its survival," says Lowenberger.

The parasite that causes Chagas disease is transmitted through fecal contamination rather than through the more efficient salivary gland transmission that occurs for other diseases, such as malaria and dengue, which are transmitted by mosquitoes.

An understanding of how the immune factors of *R. prolixus* potentially retain or eliminate parasites in the insect's [body cavity](#) may lead to novel approaches to control or eliminate the disease.

Lowenberger adds understanding the genome may allow researchers to identify kissing bug-specific genes or processes that can serve as targets for new transmission reducing drugs or insecticides.

The research was funded by government agencies from each author's country, including the Natural Sciences and Engineering Research Council of Canada (NSERC). The sequencing was funded by the National Institutes of Health, which approved the research proposal.

Fast Facts:

More than 100 species of kissing bugs can transmit Chagas disease. *Rhodnius prolixus* was selected for sequencing because it is a major cause of morbidity and mortality in the Western Hemisphere, and has served as an important model for the study of insect physiology.

The consortium of researchers includes scientists from Canada, USA, Mexico, Guatemala, Colombia, Brazil and Argentina. Researchers hope that the data generated could help alleviate the burden of Chagas disease

that traditionally affects the most impoverished people of Latin America.

Chagas disease affects approximately 7-10 million people worldwide. The CDC estimates that 300,000 people are infected with the illness in the United States alone. In Canada, estimates range from 5,000-10,000 infected people, most of whom are immigrants from Mexico, Central America and South America.

Initial symptoms disappear within a few months. However, in approximately 30 per cent of infected people, the parasite causes damage to the heart muscles, resulting in heart attacks in relatively young and otherwise healthy adults.

Chagas disease is a major cause of mortality in Latin America and the leading cause of cardiac disease in South and Central America.

More information: Genome of *Rhodnius prolixus*, an insect vector of Chagas disease, reveals unique adaptations to hematophagy and parasite infection, *PNAS*, www.pnas.org/cgi/doi/10.1073/pnas.1506226112

Provided by Simon Fraser University

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