Scientists find chemical that causes 'kidney' failure in mosquitoes

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An Ohio State University researcher and his collaborators have discovered a chemical that causes "kidney" failure in mosquitoes, which may pave the way to the development of new insecticides to fight deadly mosquito-transmitted diseases such as malaria and dengue fever.

The discovery is reported in the May 29 issue of the online journal *PLOS ONE*.

"Our team has found a chemical that interferes with the function of a class of mosquito proteins, called potassium channels, and which compromises the ability of mosquitoes to excrete urine," said Peter Piermarini, an assistant professor of entomology based on the Wooster campus of Ohio State's Ohio Agricultural Research and Development Center (OARDC).

"In addition to blocking their 'kidney' function, the chemical leaves mosquitoes unable to fly and in some cases severely bloated, all of which would lead to a shorter lifespan for the mosquitoes."

The article is the result of a collaborative project between Piermarini's laboratory, Jerod Denton's laboratory at Vanderbilt University, and Klaus Beyenbach's laboratory at Cornell University.

Female mosquitoes rely on their "kidneys" (called Malpighian tubules) when consuming a human blood meal. They may ingest the equivalent of their body mass in blood, so they need to immediately get rid of the

excess water and salt they consume. They achieve that by urinating on their host while they are still feeding.

As a result, Piermarini said, mosquitoes with impaired "kidney" function would be less likely to escape the human host and survive the ingestion of blood.

"With this important proof-of-concept study completed, our team is now in search of similar chemicals that will show a high potency for perturbing potassium channels in mosquitoes, but not those in humans and other animals," he said.

"If we can accomplish this goal, then we may uncover a new generation of insecticides for controlling 'resistant' mosquitoes and the spread of mosquito-borne diseases."

New methods for mosquito control are urgently needed, Piermarini said. Mosquitoes are becoming resistant to the insecticides currently used to combat the spread of diseases such as malaria, which kills close to 1 million people every year, and dengue, which infects hundreds of millions of people annually.

Provided by The Ohio State University