Enzyme characterization brings biochemists closer to mosquito drug targets

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(Phys.org) -- Researchers from Virginia Tech, the Brookhaven National Laboratory, and the University of Wisconsin Madison have identified key structural components of an enzyme that plays many roles in insects, including cuticle and melatonin synthesis and biogenic amine detoxification. This enzyme is especially active in the Aedes aegypti mosquito, a vector known for transmitting yellow fever and dengue fever.

The team's findings were recently published in the *Proceedings of the National Academy of Sciences*.

Jianyong Li, professor of biochemistry, Qian Han, research scientist in biochemistry, and Haizhen Ding, senior research specialist in biochemistry, all in the College of Agriculture and Life Sciences at Virginia Tech, partnered with Howard Robinson, a biologist at Brookhaven National Laboratory and Bruce Christensen, professor of pathobiological sciences at University of Wisconsin-Madison, to study the enzyme arylalkylamine N-acetyltransferases, or 'aaNAT' for short.

Li, Han, and Ding are members of Virginia Tech's Vector-Borne Disease Research Group and affiliated faculty members with the Fralin Life Science Institute.

The team used bioinformatics techniques to classify three clusters of aaNAT like sequences in insects. Using crystallography technologies, they also determined three crystal structures from each cluster, and

identified biochemical activities for proteins from two of the clusters.

Most notably, the team found that one cluster appears to be unique in mosquitoes. According to Li, the results from Aedes aegypti mosquitoes can be easily applied to characterize other mosquito aaNAT, including those from Anopheles gambiae, the vector responsible for transmission of malaria and which shares many traits with Aedes aegypti.

The next step for the research group is to determine the physiological function of the enzymes belonging to the unique mosquito cluster, Li said.

"Overall, our findings provide a fundamental basis for comprehensively establishing the biochemical functions of these unique mosquito enzymes and also for potential mosquitocide development," he said.

More information: www.pnas.org/content/early/201 … 828109.full.pdf+html

Provided by Virginia Tech