Flightless mosquitoes developed to help control dengue fever

February 22 2010, b y Tom Vasich

Infected female Aedes aegypti mosquitoes transmit the virus causing dengue fever, but they are rendered flightless in a new strain genetically engineered by UCI and British scientists. Photo: James Gathany

(PhysOrg.com) -- A new strain of mosquitoes in which females cannot fly may help curb the transmission of dengue fever, according to UC Irvine and British scientists.

Dengue fever causes severe flulike symptoms and is among the world's most pressing public health issues. There are 50 million to 100 million cases per year, and nearly 40 percent of the global population is at risk. The dengue virus is spread through the bite of infected female Aedes aegypti mosquitoes, and there is no vaccine or treatment.

UCI researchers and colleagues from Oxitec Ltd. and the University of

Oxford created the new breed. Flightless females are expected to die quickly in the wild, curtailing the number of mosquitoes and reducing - or even eliminating - dengue transmission. Males of the strain can fly but do not bite or convey disease.

When genetically altered male mosquitoes mate with wild females and pass on their genes, females of the next generation are unable to fly. Scientists estimate that if released, the new breed could sustainably suppress the native mosquito population in six to nine months. The approach offers a safe, efficient alternative to harmful insecticides.

Study results appear in the early online edition of the Proceedings of the National Academy of Sciences for the week of Feb. 22. The research is receiving funding support from the Foundation for the National Institutes of Health through the Grand Challenges in Global Health initiative, which was launched to support breakthrough advances for health challenges in the developing world.

"Current dengue control methods are not sufficiently effective, and new ones are urgently needed," said Anthony James, Distinguished Professor of microbiology & molecular genetics and molecular biology & biochemistry at UCI and an internationally recognized vector biologist. "Controlling the mosquito that transmits this virus could significantly reduce human morbidity and mortality."

Using concepts developed by Oxitec's Luke Alphey, the study's senior author, researchers made a genetic alteration in the mosquitoes that disrupts wing muscle development in female offspring, rendering them incapable of flight. Males' ability to fly is unaffected, and they show no ill effects from carrying the gene.

"The technology is completely species-specific, as the released males will mate only with females of the same species," Alphey said. "It's far

more targeted and environmentally friendly than approaches dependent upon the use of chemical spray insecticides, which leave toxic residue."

"Another attractive feature of this method is that it's egalitarian: All people in the treated areas are equally protected, regardless of their wealth, power or education," he added.

James and Alphey have pioneered the creation of genetically altered mosquitoes to limit transmission of vector-borne illnesses. While their current work is focused on the dengue fever vector, they noted that this approach could be adapted to other mosquito species that spread such diseases as malaria and West Nile fever.

Provided by University of California - Irvine

Citation: Flightless mosquitoes developed to help control dengue fever (2010, February 22) retrieved 19 September 2024 from
https://phys.org/news/2010-02-flightless-mosquitoes-dengue-fever.html