

## UA ENTOMOLOGIST WINS GRANT TO DEVELOP MALARIA-RESISTANT MOSQUITO

*Michael Riehle is among scientists from Africa, Europe and the United States selected for their unconventional projects to accelerate the eradication of infectious diseases*

*By Lori Stiles, University Communications*

University of Arizona assistant professor of entomology Michael A. Riehle was awarded a Grand Challenges Explorations grant from the Bill & Melinda Gates Foundation in fall 2009 for research that has the potential to help eradicate malaria and other mosquito-borne diseases.

Riehle will use the one-year \$100,000 grant to expand his work on a novel approach to controlling mosquitoes that transmit malaria, dengue, West Nile encephalitis and other infections.

Riehle's project, "Manipulating the Mosquito's Lifespan and Reproduction to Control Malaria," was among 76 that were awarded grants last week by the Gates Foundation in the third-round funding of Grand Challenges Explorations, an initiative to help



Scientist Michael A. Riehle watches *Anopheles stephensi* mosquitoes, a vector of malaria, feed on blood via an artificial membrane feeder. The artificial membrane eliminates the need for a vertebrate host, such as mice). Riehle's research could help eradicate malaria and other mosquito-borne infectious diseases that afflict millions of people, especially children in developing countries.

scientists around the world explore bold and largely unproven ways to improve health in developing countries. The grants were given to scientists in 16 countries on five continents.

Mosquito-borne diseases afflict billions worldwide.

“Malaria alone is probably second only to HIV/AIDS when it comes to deaths due to infectious disease,” Riehle said.

Malaria infects at least 300 million people annually, resulting in 1 to 3 million deaths. Most who die are children under the age of 6 because they haven’t developed immunity to the parasite, Riehle said.

Traditional mosquito control methods include spraying with insecticides. “The control strategy has been that you go in with insecticides and wipe them out,” Riehle said. “And that does a wonderful job – right until the money runs out, or until mosquitoes develop resistance to insecticide compounds. So it’s critical that we find new approaches to controlling these pests.”

Riehle’s approach is to genetically engineer malaria-resistant mosquitoes that reproduce so quickly that they’ll replace populations of infected mosquitoes in the wild.

The modified mosquitoes won’t live long enough for the parasite that causes malaria to develop.

“The incubation period for the parasite that causes malaria is 12

LORI STILES



Pupae of the malaria-carrying species of mosquito that Riehle raises for research in his UA lab. Adult female mosquitoes can be seen at the center of the glass. Only female mosquitoes take blood meals and spread malaria, Riehle noted.

to 14 days. So if we could shorten the mosquito’s lifespan to about 16 days or so, that would probably eliminate malaria transmission altogether,” Riehle said. “In the wild, only 1 percent of the mosquito population survives 14 days, so you just have to shorten the lifespan of the really long-lived mosquitoes to reduce malaria.”

Both lifespan and reproduction in mosquitoes – as well as other organisms, including flies, worms, mice and probably humans – is regulated by insulin signaling, Riehle said.

Riehle uses two different species of mosquitoes in his laboratory research. One is a malaria vector. The other is a species native to Tucson that carries dengue.

He will use the new grant “to generate different engineered

mosquitoes with increased or decreased insulin signaling to see what effect that has on lifespan and reproduction,” he said.

“Ultimately, we would also engineer mosquitoes with anti-malarial molecules for the best chance possible of completely eliminating malaria.”

Riehle will hire a full-time post-doctoral researcher to help conduct the research and perform the life span assays.

Riehle earned his doctorate in entomology from the University of Georgia in 2003 and joined the UA entomology department in January 2005. ☼

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