

The buzz on mosquito, malaria genetic codes

In October announcements, two international teams of scientists reported sequencing the entire genomes of the malaria-carrying mosquito, and the malarial parasite itself. These breakthroughs will provide powerful tools to scientists struggling against malaria, which afflicts 500 million people worldwide and causes up to 2.7 million deaths annually (more than 90% in sub-Saharan Africa).

The simultaneous publications included a *Science* article detailing the genome of the mosquito *Anopheles gambiae* and a *Nature* article detailing the genome of the parasite *Plasmodium falciparum*. The *Science* article listed 123 authors, including three at UC Riverside; the *Nature* article listed 44 authors.

"The economic cost to affected nations is immense," says Peter Atkinson, co-author and UC Riverside associate professor of entomology. "No vaccine has been developed for malaria. Understanding the genetic makeup of the mosquito that transmits malaria will help with the design of new strategies to fight this disease."

In addition to Atkinson, postdoctoral researcher Peter Arensburger and graduate student Lisa Friedli are co-authors of the *Science* paper, analyzing the genome for one class of transposable elements.

In the same issue of *Science*, UC Davis medical entomologist Thomas Scott and

colleagues called upon the scientific community to use caution in applying this new knowledge to genetic modification of mosquitoes. With the release of the genetic sequences, they noted, scientists are now better able to explore the use of genetically modified, disease-resistant mosquitoes. Such mosquitoes could be used to breed with, and largely replace, their disease-causing counterparts in the wild.

If this new strategy is to succeed, however, the very basic ecology and population biology of mosquitoes needs to be better understood, Scott and colleagues wrote.

The October disclosures also came on the heels of a September announcement that the National Institutes of Health had awarded a 10-year, \$4.3 million research grant to Alexander Raikhel, UC Riverside entomology professor. The grant will support continuing investigation into the genetic and molecular mechanisms regulating egg devel-

opment and maturation in mosquitoes. The research has implications for the prevention of deadly, mosquito-transmitted diseases, including malaria, West Nile virus and dengue fever.

Centers to combat "agro-terror"

UC Davis recently received two major grant awards to help combat "agro-terror" by protecting crop plants and food from contamination, disease, pests or pathogens, whether introduced accidentally or by terrorist acts.

A \$900,000 homeland security grant from the U.S. Department of Agriculture (USDA) will provide the initial funding for a new Western Center for Plant Disease and Pest Surveillance and Detection at UC Davis, coordinated by the College of Agricultural and Environmental Sciences. "Establishing an effective network for monitoring, detecting and diagnosing plant pests and diseases will be a challenging but vital task," says center director Richard Bostock, chair of the UC Davis plant pathology department.

And a new \$5 million center located at UC Davis, the Western Institute for Food Safety and Security, will facilitate a partnership between UC, the California Department of Food and Agriculture and the California Department of Health Services. "Our food supply is increasingly subject to contamination from both biological and chemical sources; and now we have the new threat of intentional contamination of food through bioterrorism," says Jerry Gillespie, institute director and UC Davis veterinary pathologist.

In September, a National Research Council report concluded that the United States is vulnerable to agricultural bioterrorism and needs a comprehensive defense plan. "Biological agents that could be used to harm crops or livestock are widely available and pose a major threat to U.S. agriculture," NRC committee chair Harley Moon of Iowa State University said. (The committee began its study prior to the September 11 attacks and the subsequent anthrax outbreak.) Over the past year, the federal government has allocated an additional \$328 million to USDA for homeland security programs to protect the food supply, including \$43 million for research to states and land-grant universities.

The plant-disease and pest network will concentrate on linking personnel, information systems and databases at diagnostic laboratories throughout the western region to better track the health of crops or the progression of a disease or insect outbreak.

The food safety institute's mission will be to develop the capability to identify food-borne hazards

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Sequencing of the mosquito genome could help to prevent malaria, which kills 2.7 million people annually. However, the scientific community was urged to use caution when pursuing genetic modification of insects.