

IMPACT

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IMPACT is a series of publications highlighting how UC Davis' College of Agricultural and Environmental Sciences makes a difference in the lives of Californians. Through research, teaching, and outreach programs, UC Davis research touches almost all aspects of Californian life. Today, millions of people eat safer foods, breathe cleaner air, and drink healthier water with the help of our researchers. We're making discovery work -- for California and the world.

REDUCING MOSQUITO-BORNE DISEASES

THE ISSUE

Mosquitoes transmit the causative agents for several infectious diseases that can be deadly to humans. The rapid evolution of mosquitoes and their quick response to changing conditions make mosquitoes one of the most difficult insects to counteract. Researchers in the College of Agricultural and Environmental Sciences, the School of Medicine, and the School of Veterinary Medicine at UC Davis are actively researching mosquitoes to reduce the incidence of mosquito-borne diseases throughout the world.

Malaria. Malaria is the most deadly parasitic disease spread by mosquitoes. Malaria is transmitted to humans through the bites of infected female *Anopheles* mosquitoes. The lethal parasite, *Plasmodium falciparum*, which is transmitted to humans by the mosquito, can cause death within a few hours of noticeable symptoms which include high fevers, severe headaches, delirium, and confusion.

The UC Malaria Research and Control Group (www.mrcg.ucdavis.edu) reports that malaria kills an African child every 10 to 15 seconds. More than 1 million people die annually from malaria, and malaria continues to spread in more than 100 countries of the world as mosquitoes develop resistance to insecticides and as the parasites mutate to resist medical treatments.



Photo: Rory McAbee

West Nile Virus. The West Nile virus, transmitted by female *Culex* mosquitoes, is spreading throughout California. In 2005, West Nile virus caused the deaths of 18 Californians, infected more than 900 residents, infected many horses, and killed countless wild birds. People older than 50 and those with compromised immune systems are more at risk for developing more serious and possibly neuro-invasive diseases that can lead to death.

WHAT WE'RE DOING

Malaria. The UC Malaria Research and Control Group, with 21 faculty and professional members, includes leading UC researchers in mosquito vector biology and mosquito abatement. Simply stated, their goal is to defeat malaria in Africa.

During the next five years, Gregory Lanzaro and Anthony Cornel, Department of Entomology, Shirley Luckhart, Department of Medical Microbiology and Immunology, and their colleagues will train scientists at the University of Bamako in the West African country of Mali on strategies to combat malaria. This federally funded project will take place on both campuses.

Researchers will provide their Mali counterparts with a solid background in insecticide resistance monitoring and other management methodologies, mosquito population genetics, and advanced technologies to study mosquito-malaria parasite interactions. The team plans to institute a program involving the release of genetically modified mosquitoes for population suppression or replacement.

West Nile Virus. As part of a five-year, \$3.7 million grant from the National Institutes of Health, researchers from the UC Mosquito Research Program (www.ucmrp.ucdavis.edu) are implementing strategies to increase the effectiveness of West Nile virus management in California.

Led by Lanzaro, the 16-member team is developing options to slow the spread of West Nile virus and to control the mosquito species that transmit the virus. The research team is exploring new methods to safely apply chemical insecticides, developing new methods for tracking mosquito resistance to insecticides, and improving procedures for trapping female *Culex* mosquitoes.

At the same time, many researchers and educators at UC Davis are working with local agencies and community groups to educate the public on West Nile virus and mosquito control. Providing science-based information helps local communities develop sound public policies for effective mosquito control.

A SHARED VISION

Though not immediately evident, there are parallels between the mosquito-borne diseases of California and Africa. Each population is combating a deadly disease that is presently impossible to prevent or cure. Malaria has ravaged certain areas of Africa; Africans have endured unprecedented health problems and deaths from this mosquito-transmitted disease.

Californians are recently beginning to grapple with West Nile virus, another mosquito-borne disease that continues to spread in California. The future of West Nile virus is uncertain in California, but researchers are working quickly to combat the severity and impact of the disease.

To reduce the transmission of mosquito-borne diseases such as malaria and West Nile virus, researchers in the College of Agricultural and Environmental Sciences, in collaboration with medical science and veterinary science researchers at the University of California, Davis, are studying the interactions of mosquito biology, mosquito control, and disease transmission.

That's impact – UC Davis researchers helping our communities and helping the world.

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