



AVIAN ECOLOGY

The Wild World of West Nile

by Sean Griffing, Terrestrial Animal Ecology Lab

While West Nile virus is relatively new to North Americans, doctors have known about the virus for almost 70 years. A woman from the West Nile District of Uganda holds the dubious honor of being the first known human host in 1937. Since then, the virus has been found in Oceania (places like Fiji and the Marshall islands), Africa, west and central Asia, the Middle East, and, since 1999, North America. Last year, SERC scientists discovered West Nile virus in the tropics on the island of Jamaica. Many scientists predict this will be the year that West Nile virus takes root on the west coast of the United States. The virus effects humans, predominantly the very young and very old, but, perhaps not as well known, also has serious consequences for wildlife.

From February 5-7, over 100 scientists met at the Smithsonian Environmental Research Center to

discuss the potential impact of West Nile on wildlife such as birds, horses, and even alligators.

"The conference provided a critical opportunity for scientists from a number of different fields, like remote sensing, molecular biology, virology, and ecology to share their areas of expertise," said Peter Marra, terrestrial animal ecologist at SERC. "I learned a great deal and I think other participants returned to their organizations with fresh perspectives and new ideas."

The "West Nile Virus and Wildlife Health Workshop" summarized West Nile virus's dispersal through North America's wildlife and organized future research into its impact on wildlife. It was co-chaired by Marra and Robert McLean of the National Wildlife Research Center at the U.S. Department of Agriculture (USDA). Scientists from organizations including the U.S. Geological Survey, the USDA, Canadian Wildlife Services, National Audubon Society, Oxford Univer-



The Wild Word of West Nile 1
From the Director's Office 2
Open House on May 10 3
Evening Lectures 5
News and Announcements 6
Blue Crabs: Loving & Gentle?.. 8



Mark Your Calendar!

May 10: Open House (more info on page 3)

May 13 + 15: Electronic Field Trip to Belize, a live satellite broadcast about SERC mangrove research and sea turtles (Visit www.serc.si.edu/education/dl to learn how you can see it live)

sity, and the Center for Disease Control (CDC) took part in three days of presentations and discussions. Science magazine, a major research publication, covered the meeting in its February 21 issue.

Complex Virus Ecology

West Nile virus is an arthropod-borne virus or arbovirus. In order to reproduce, arboviruses require arthropods – creatures like ticks, mosquitoes, fleas, and spiders – and vertebrate hosts such as

"Wild World of West Nile," continued on Page 4

birds. West Nile virus's main arthropod host appears to be the mosquito. In the case of West Nile virus, infected mosquitoes infect birds, which then infect other mosquitoes. Like the "which came first, the chicken or the egg" conundrum, it's difficult to say where an arbovirus's reproductive cycle begins, and this simple little story doesn't even capture the complexity of the virus and its ecology.

While not all have been proven to infect vertebrate hosts, 37 mosquito species in North America are now known to carry West Nile virus. Based on reports given at the conference at SERC, the virus has thus far infected 157 bird species, alligators, people, horses, and 16 other mammals. The virus may be using any number of these animals for currently unknown reproductive cycles and that makes understanding how it works much harder. Even if one removed birds and mosquitoes from the equation, West Nile virus might still be able to survive in North America. As a participant pointed out, infected ticks might protect the virus from winters that kill off mosquito hosts. Or the virus could be reproducing itself through a cycle between some arthropod and a small rodent or reptile, from where the virus could still infect humans and horses as long as the arthropod, the tick or mosquito for example, didn't mind a little variety in its meals. This isn't very far fetched as mosquito-borne infections of horses and humans appear to be caused by indiscrimi-



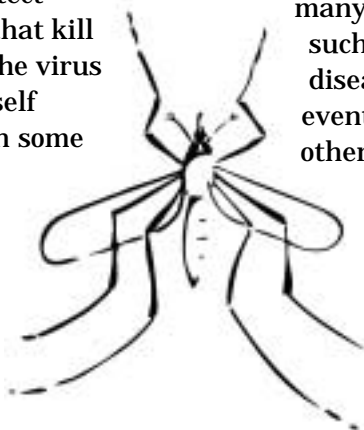
Horses are also at risk from West Nile virus. Last year, at least 12,038 horses died from the virus. Picture courtesy of CalPhotos/John White.

nate mosquitoes that simply go for simplest and closest meal.

Effects on Wildlife

While you may know that West Nile virus has decimated crow populations, other species may also be at risk. Back in 1999, a bald eagle, snowy owl, flamingos, and a cormorant all died at the Bronx Zoo alone. What did these birds have in common? They were all native species and they all spent time outdoors, where mosquitoes could feed on them. The illnesses of these birds underscore that many types of North American birds are immunologically unprepared for

West Nile virus. Luckily, many birds are found in such great numbers that disease resistance may eventually develop, but others, such as endangered species, may not have large enough populations to adapt to the virus in this way. So far, West Nile virus hasn't reached



Hawaii, but to the Hawaiian crow, down to two birds in the wild, it may be a disaster waiting to happen. Closer to home for many Americans, other

endangered species, like the red-cockaded woodpecker, the prairie chicken, and Kirtland's warbler, are also at risk.

And it isn't just endangered species that are dealing with the virus. Horses have recently undergone a dramatic jump in infections, and four out of ten infected horses subsequently die, according to the CDC. Last year, the CDC reports, 12,038 horses died from West Nile virus, the majority of them living in the Midwestern states. And according to the CDC, several thousand more died last year and have yet to be reported by the USDA. To put these numbers in context, this is the largest outbreak of a neurological equine disease in the United States since the Venezuelan equine encephalitis outbreak of 1971 and 1972 in which more than 10,000 horses died in Texas. Another 18,000-20,000 died of that illness in Mexico.

Thankfully, excluding some wild horses, veterinarians can provide medical care to horses. There is even a West Nile vaccine available and it appears pretty effective. But horse lovers are sometimes reluctant to inoculate horses because of fears of potential side effects. Also, the vaccine doesn't appear that useful for birds, meeting participants reported.

More Questions to be Answered

West Nile virus has consistently surprised scientists since its introduction to North America four years ago. It now appears that infected birds can infect other birds, possibly through aerosols, though the exact mechanism is unclear. Also, birds of prey and scavengers may be able to become infected by eating victims of West Nile virus. Mosquitoes, and possi-

bly even birds, may be able to pass the virus on to their young. And in the last year, the CDC confirmed that the virus can be spread through a number of new transmission routes in humans including blood transfusions, organ transplants, breast milk, and the placenta.

Scientists at the conference appeared to agree that there needs to be much more research that focuses on the impacts of West Nile virus on wildlife. By learning more about West Nile virus and its wildlife ecology, scientists can provide policy makers with better information with which to make decisions and conduct management interventions. Such work also creates a better research and response infrastructure for the next exotic virus that visits our shores. In fact, keeping tabs on wildlife may even provide early warnings of bioterrorism.

The meeting is leading to a number of products. A detailed report is being developed to summarize the meeting's findings and will be made available to the public and members of Congress. Also, several summary papers will be submitted to scientific journals. But the most valuable product will never show up on paper. By bringing together scientists that study West Nile virus from different perspectives, we've encouraged new integrative ideas and research relationships that otherwise might never have occurred.

For more information about the West Nile Virus and Wildlife Health Workshop or the research of SERC's Terrestrial Animal Ecology lab, visit www.serc.si.edu/migratorybirds/migratorybirds_index.htm.

A new series of evening lectures is scheduled for the coming months! Join us at SERC in Edgewater, MD for exciting evening lectures that explore the ecology and culture of the Chesapeake Bay region, as well as research by experts who study other areas of the world.

Schmidt Center at SERC

*647 Contees Wharf Road, Edgewater, MD
Refreshments 6:30-7:00 Program 7:00-8:00
Informal discussion 8:00-8:30 pm*

April 16

Dr. Douglas Gill of the University of Maryland: *"Restoration of Native Coastal Prairies: a Successful Experiment at Chino Farms, MD."*

May 7

Dr. Valerie Paul, Head Scientist at the Smithsonian Marine Station at Fort Pierce, FL: *"Chemical Defenses in Marine Organisms: Ecological Studies and Potential Applications."*

June 18

Dr. Michael J. Paolisso of the Department of Anthropology, University of Maryland: *"Anthropology, Culture and Environment on the Chesapeake Bay."*



August 20

Marydele Donnelly of the Ocean Conservancy, Washington, DC: *"From Dinosaurs to Dredges: the Challenge of Conserving Sea Turtles in the 21st Century."*

September 17

Dr. J. Court Stevenson of the University of Maryland Horn Point Laboratory: *"Changes in the Landscape at Eltonhead Manor and its Surroundings at the Mouth of the Patuxent River from the 17th Century Onwards."*

October 15:

Film Showing



Hugh Drescher, Drescher Films, Inc., Washington, DC: *"Island Out of Time."*

July 16

Dr. Will Heyman, Senior Marine Scientist at The Nature Conservancy, Belize: *"Transforming Coral Reef Conservation in the Meso-American Reef."*

November 19

Dr. Michael Erwin of the U.S. Geological Survey and the University of Virginia: *"Sea-Level Rise, Marsh Dynamics and Waterbirds: How Vulnerable are Waterbirds along the Atlantic Coast?"*