

DISCOVERY OF AN EXOTIC ASIAN MOSQUITO
(*OCHLEROTATUS JAPONICUS*, DIPTERA: CULICIDAE) IN
SOUTHERN INDIANA, USA

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ABSTRACT. Indiana University Southeast discovered the first specimens of *Ochlerotatus japonicus*, the Asian rock pool mosquito, in Indiana in July 2004. The Indiana State Health Laboratory and the Smithsonian Institution verified the specimens. This invading non-indigenous species is medically important because it is a known vector of several arboviruses including West Nile virus and St. Louis encephalitis.

Key Words: Discovery, *Ochlerotatus japonicus*, Indiana

INTRODUCTION

We report the discovery and first Indiana appearance of *Ochlerotatus (Oc.) japonicus*, the Asian rock pool mosquito, in Clark County, southern Indiana, USA, 2004. In July 2004, the first specimens of *Oc. japonicus* were discovered in mosquito nets set by Indiana University Southeast. Mr. Brad Foster and Mr. Adam Estes at the Indiana State Department of Health identified the specimens. In August 2004, Dr. Dina Fonseca of the Smithsonian Institution verified the identification using mitochondrial DNA sequencing techniques.

SITE DESCRIPTION

The species was first trapped in urban and rural areas characterized by the presence of water-filled artificial containers such as old tires and other receptacles, an existing active railway, small drainage systems with pooled water and older trees with tree holes. This corresponds well with published data from New Jersey, Connecticut and New York where *Oc. japonicus* were found in similar habitats (Andreadis et al. 2001)). A minimal number of specimens (1-3) were taken at each site. For the entire 2004 sampling period (May-November), we found *Oc. japonicus* at 13 of 81 sampling locations. All except three sites were near the southern Indiana railway system. Of the remaining locations, two were in Harrison County near a tire dump and used car parts dealer and an area of natural sinkholes. A Floyd County site was near an area of failing septic systems.

BACKGROUND INFORMATION

Ochlerotatus japonicus probably was introduced in shipments of used tires entering New York and New

Jersey from Asia (Peyton et al. 1999). Since the initial discovery in 1998, the mosquito has been moving westward (Fonseca et al. 2001). Since *Oc. japonicus* is a non-migratory species with a flight range of less than 1 mile, its distribution is facilitated by continental trade and transit (Fonseca et al. 2001). Studies have shown that another Asian mosquito, *Aedes* (*Ae.*) *albopictus*, may have arrived in Texas in a shipment of used tires and then spread across the country along the interstate highway system (Moore & Mitchell 1997). *Oc. japonicus* could be migrating in a similar fashion hitching a ride in tires and other containers found on barges, trains and trucks.

DISCUSSION

Travel and the rapid transcontinental movement of products are known to be potent forces in the emergence of disease (Wilson 1995). Invading non-indigenous species can cause public health

problems, and introductions are expected to rise (Fonseca 2001). In addition to used tires, *Ae. albopictus* and *Oc. japonicus* recently have been found in a variety of shipments including Lucky Bamboo an ornamental lily in the genus *Dracaena*, imported machinery, containers and in several airplanes (Linthicum et al. 2003).

Oc. japonicus is medically important from a public health perspective because it is capable of spreading the viruses responsible for West Nile Virus, St. Louis encephalitis, eastern equine encephalitis, and Japanese encephalitis (Sardelis & Turell 2001, Sardelis et al. 2002, Sardelis et al. 2003, Takashima & Rosen 1989, Turell et al. 2001). Although studies are needed to determine host preference in the United States, in Japan, the mosquito readily bites humans who venture into forested habitats (Peyton et al. 1999). Unlike many other mosquitoes, *Oc. japonicus* readily adapts to colder conditions and in Japan is capable of surviving snowy winters (Fonseca et al. 2001). Since *Oc. japonicus* mosquito pools testing positive

for West Nile virus have been found elsewhere, it is possible that the recorded incidence of the virus will be extended into late fall and early winter.

The discovery of *Oc. japonicus* in southern Indiana verifies the importance of existing mosquito control and monitoring programs. The selection of natural predators and competitors, elimination of mosquito habitat, and regulation of insects on trade vessels are a few of the many actions being taken to slow the introduction of foreign species. On a local level, public awareness and education are key factors; however, research into the spread of these vectors is of equal importance. Today's unprecedented swift transit of goods has set the stage for the spread and emergence of additional infectious diseases. It is essential, therefore, to research how these mosquitoes disperse and take action to protect our local environments.

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LITERATURE CITED

Andreadis, T.G., J.F. Anderson, L.E. Munstermann, R.J. Wolfe & D.A. Florin. 2001. Discovery, distribution and abundance of the newly introduced mosquito *Ochlerotatus japonicus* (Diptera: Culicidae) in Connecticut, USA. *Journal of Medical Entomology* 38 (6):774-779.

CDC. 2001. Embargo on importation of *Dracaena* shipped in standing water. Via the Internet. <http://www.cdc.gov/od/oc/media/pressrel/r010702.htm>

Fonseca, D.M., S. Campbell, W.J. Crans, M. Mogi, I. Miyagi, T. Toma, M. Bullians, T.G. Andreadis, R. L. Berry, B. Pagac, M.R. Sardelis & R. C. Wilkerson. 2001. *Aedes (Finlaya) japonicus* (Diptera: Culcidae), a newly recognized mosquito in the United States: Analyses of genetic variation in the United States and putative source populations. *Journal of Medical Entomology* 38(2):135-146.

Linticum, K.J., V.L. Kramer, M.B. Madon, K. Fujioka and Surveillance-Control Team. 2003. Introduction and potential establishment of *Aedes albopictus* in California in 2001. *Journal of the American Mosquito Control Association*. 19 (4): 301-308.

Moore, C.G. & C.J. Mitchell. 1997. *Aedes albopictus* in the United States: Ten-year presence and public health implications. *Emerging Infectious Diseases* 2 (3):329-334.

Peyton, E.L., S.R. Campbell, T.M. Candeletti, M. Romanowski, & W.J. Crans. 1999. *Aedes (Finlaya) japonicus japonicus* (Theobald), a new introduction to the United States. *Journal of the American Mosquito Control Association* 15 (2):238-241.

Sardelis, M.R & M.J. Turell. 2001. *Ochlerotatus j. japonicus* in Frederick County, Maryland: discovery, distribution, and vector competence for West Nile virus. *Journal of the American Mosquito Control Association*. 17 (2): 137-141.

Sardelis, M.R., D.J. Dohm, B. Pague, B. Andre & M.J. Turrell. 2002. Experimental transmission of eastern equine encephalitis virus by *Ochlerotatus j. japonicus* (Diptera: Culicidae). *Journal of Medical Entomology*. 39 (3): 480-484.

Sardelis, M.R., M.J. Turrell & R.G. Andre. 2003. Experimental transmission of St. Louis encephalitis virus by *Ochlerotatus j. japonicus*. *Journal of the American Mosquito Control Association*. 19 (2): 159-162.

Takashima, I. & L. Rosen. 1989. Horizontal and vertical transmission of Japanese encephalitis virus by *Aedes japonicus* (Diptera: Culicidae). *Journal of Medical Entomology*. 26 (5): 454-458.

Turell, M.J., M.L. O'Guinn, D.J. Dohm & J.W. Jones. 2001. Vector competence of North American mosquitoes (Diptera: Culicidae) for West Nile virus. *Journal of Medical Entomology*. 38 (2): 130-134.

Wilson, M.E. 1995. Travel and the emergence of infectious diseases. *Emerging Infectious Diseases*. 1 (2): 39-46.