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SCIENTIFIC NOTE

FIRST RECORD OF INVASIVE MOSQUITO *AEDES ALBOPICTUS* IN TABASCO AND YUCATAN, MEXICO

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ABSTRACT. The invasive mosquito *Aedes albopictus* is currently distributed in most of the southern Mexican region. Since the species was first recorded in the state of Tamaulipas, in northeastern Mexico in 1988, it has expanded its distribution throughout the Sierra Madre Oriental and Gulf of Mexico to the Neotropical region of the country. Currently the species occurs in the states of Tamaulipas, Coahuila, Nuevo Leon, Veracruz, Chiapas, Morelos, Quintana Roo, Sinaloa, San Luis Potosi, and Hidalgo. This is the first report of the mosquito in the states of Tabasco and Yucatan and the confirmation of its presence in Quintana Roo state. *Aedes albopictus* has been incriminated as a secondary vector of diseases such as those caused by dengue, chikungunya, and Zika viruses, which have caused epidemic outbreaks in most tropical and subtropical regions of Mexico; therefore, surveillance for the detection of *Ae. albopictus* is paramount so that targeted control strategies can be implemented for its control throughout Mexico.

KEY WORDS *Aedes albopictus*, first record, Mexico, Quintana Roo, Tabasco, Yucatan

The Asian tiger mosquito, *Aedes* (*Stegomyia*) *albopictus* (Skuse), is the most invasive mosquito species worldwide (GISD 2017). *Aedes albopictus* has a Pantropical distribution and has been reported in 81 countries (WRBU 2005). The introduction of *Ae. albopictus* into the American continent occurred in the 20th century, where it was detected for the first time in the USA in Harris County, Texas, breeding in discarded tires imported from northern Asia (Sprenger and Wuithiranyagool 1986, Hawley et al. 1987, Reiter and Sprenger 1987, Craven et al. 1988), and it rapidly adapted to the Nearctic environmental conditions of the southern United States. This species was detected for first time in Mexico in the northeastern state of Tamaulipas in 1988 (Francy et al. 1990) and since then has had a rapid and successful dispersion in almost all tropical and subtropical regions of the country. Currently *Ae. albopictus* has been reported in the states of Tamaulipas (Francy et al. 1990, Ibáñez-Bernal et al. 1997, Reyes-Villanueva et al. 2013, Ortega-Morales et al. 2015), Coahuila (Ibáñez-Bernal and Martínez-Campos 1994, Rodríguez and Ortega 1994), Nuevo Leon (Pesina et al. 2001, Orta-Pesina et al. 2005, Reyes-Villanueva et al. 2013), Veracruz (Flisser et al. 2002), Chiapas (Casas-Martínez and Torres-Estrada 2003), Quintana Roo (Salomón-Grajales et al. 2012), Morelos (Villegas-Trejo et al. 2010), Sinaloa (Torres et al. 2015), San Luis Potosí (Ortega-Morales and Siller-Rodríguez 2016), and Hidalgo (Ortega-Morales et al. 2016) (Fig. 1).

In Mexico, *Aedes aegypti* (L.) and *Ae. albopictus* are the most important mosquitoes responsible for the transmission of arboviruses such as dengue (DENV), chikungunya (CHIKV), and Zika (ZIKV). Consequently the distribution and colonization of those species in new regions are systematically monitored by personnel from the Mexican vector-borne disease surveillance and control programs (SEGOB 2015) and many other research groups. To update the checklist of mosquito species in the southeastern states of Mexico, which include the Yucatan Peninsula region (states of Campeche, Yucatan, and Quintana Roo) and Tabasco state, mosquitoes in their different stages of life (larvae, pupae, and adults) were collected during the dry and rainy seasons of 2015–17. The collecting methodology consisted of the search for immature stages of mosquitoes in all available breeding sites, such as artificial containers (vases, bottles, buckets, discarded tires) and natural containers (bamboo internodes, tree holes, axils of plants). In addition, ovitraps (a black plastic container of 1-liter capacity filled with potable water with germination paper strips on the inner edge of the water, where gravid females lay eggs) were also used in the study areas together with Centers for Disease Control and Prevention (CDC) light traps, a BDV tent trap, and landing/biting catches. All collected

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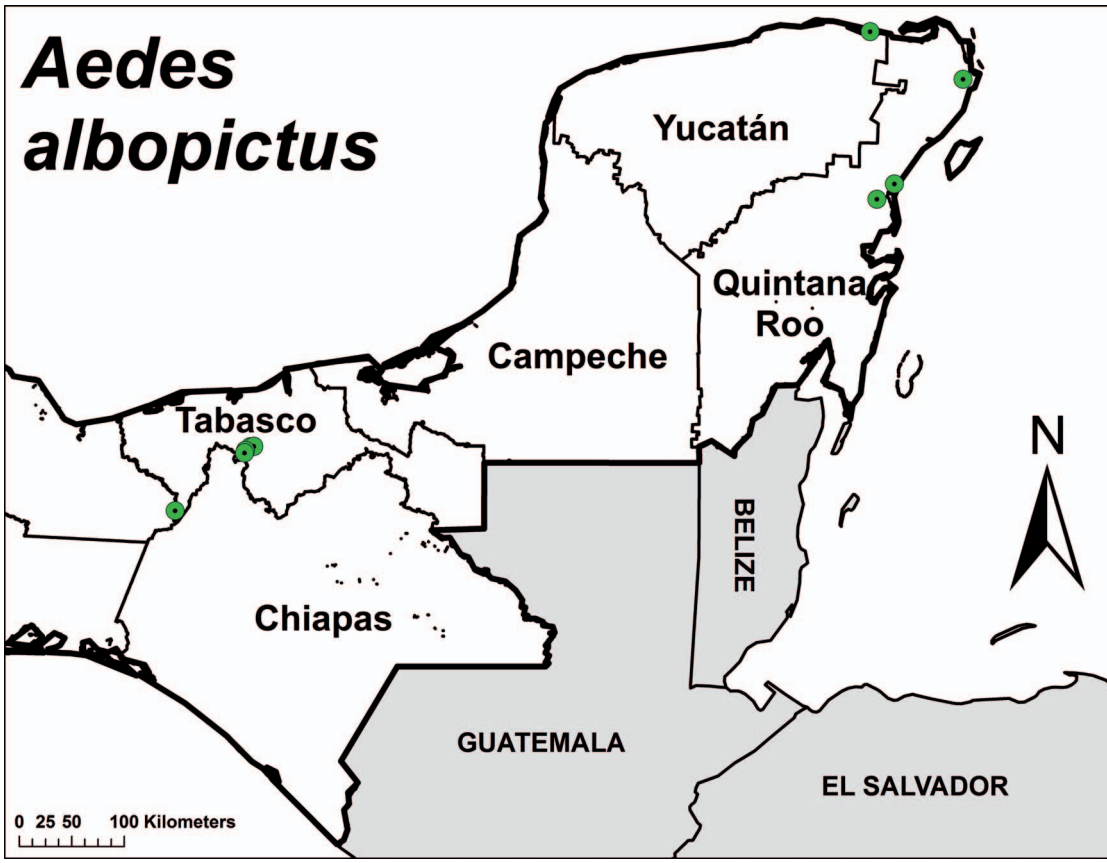

Fig. 1. Distribution of *Aedes albopictus* in Tabasco state and the Yucatan Peninsula.

specimens were transported alive to the Molecular Biology Laboratory of the Agrarian Autonomous University Antonio Narro Laguna Unit (UAAAN-UL). Adult mosquitoes were killed in lethal chambers and kept in nitrogen vapor until identification. Immature stages were reared individually to obtain larval and pupal skins. The ovitraps strips were transported to the Regional Center for Public Health Research (CIRSP-INSP) and placed in trays filled with water for emergence. All specimens were identified using available taxonomic keys. All material was deposited in the Culicidae Collection of UAAAN-UL (accession numbers CUA1414-B and CUAC1414-C) and in the Biological Collection of Mosquitoes of Medical Importance at CRISP-INSP.

The present study reports the presence of *Ae. albopictus* in 4 municipalities in Tabasco (Huimanguillo, Teapa, Tacotalpa, and Villahermosa), 3 in Quintana Roo (Cancun, Felipe Carrillo Puerto, and Tulum), and 1 in Yucatan (Tizimin) (Table 1). This is the first record of *Ae. albopictus* in the states of Tabasco and Yucatan; so far, it has not been detected in the state of Campeche. Since the discovery of the presence of *Ae. albopictus* in Mexico, the species has widened its distribution in Nearctic and Neotropical regions of the southeastern part of the country, and it is now established in many physiographic regions, such as the Sierra Madre Oriental, the coastal plain of the North and South Gulf, the Yucatan Peninsula, and the Sierra Madre of the South. In these regions, *Ae. albopictus* finds favorable environmental conditions for its development, such as abundant vegetation, a humid and warm climate, and great availability of natural and artificial breeding sites within human settlements. Some cities on the Yucatan Peninsula, such as Cancun, Tulum, Playa del Carmen, and Chichen-Itza, are some of the main tourist destinations in Mexico. Therefore, the probable presence of *Ae. albopictus* in these cities could represent an important risk of infection of DENV, CHIKV, and ZIKV for domestic and international travelers.

Because of its medical importance, we recommend widening the surveillance of this species to other regions of Mexico, especially the Pacific coast (states of Guerrero and Oaxaca) and along the southern border.

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Table 1. Records of *Aedes albopictus* in Tabasco, Yucatan, and Quintana Roo states, Mexico

Collection Date	Location	State	Longitude N	Latitude W	Elevation	Habitat
July 18, 2015	Huimanguillo	Tabasco	17°34′11.6″	−93°21′27″	72 m	Flower vase
July 18, 2015	Huimanguillo	Tabasco	17°34′14″	−93°31′23″	72 m	Discarded tire
July 18, 2015	Huimanguillo	Tabasco	17°36′16″	−93°31′13″	68 m	Discarded tire
October 19, 2015	Huimanguillo	Tabasco	17°55′19″	−93°46′12″	17 m	Plastic bottle
October 20, 2015	Huimanguillo	Tabasco	17°50′14″	−93°55′12″	22 m	Plastic bottle
October 20, 2015	Huimanguillo	Tabasco	17°24′36″	−93°37′53″	59 m	Plastic drum
October 20, 2015	Huimanguillo	Tabasco	17°50′14″	−93°55′12″	22 m	Intradomiciliary
October 20, 2015	Huimanguillo	Tabasco	17°48′50″	−93°52′18″	10 m	Bamboo internode
October 20, 2015	Huimanguillo	Tabasco	17°45′5″	−93°42′27″	55 m	Discarded tire
October 20, 2015	Huimanguillo	Tabasco	17°45′55″	−93°4′9″	—	Tree hole
October 20, 2015	Huimanguillo	Tabasco	17°40′47″	−93°30′15″	68 m	Biting
October 20, 2015	Huimanguillo	Tabasco	17°46′38″	−93°38′21″	41 m	Biting
October 20, 2015	Huimanguillo	Tabasco	17°40′48″	−93°30′16″	—	Tree hole
October 20, 2015	Huimanguillo	Tabasco	17°40′1″	−93°28′53″	—	Biting
October 20, 2015	Huimanguillo	Tabasco	17°39′42″	−93°28′12″	54 m	Tree hole
October 21, 2015	Huimanguillo	Tabasco	17°20′47″	−93°35′33″	174 m	Discarded tire
October 21, 2015	Huimanguillo	Tabasco	17°23′29″	−93°36′39″	184 m	*Xanthosoma* axil
October 21, 2015	Huimanguillo	Tabasco	17°24′36″	−93°37′53″	59 m	CDC light trap
October 22, 2015	Huimanguillo	Tabasco	17°22′44″	−93°38′23″	515 m	Biting
October 27, 2015	Teapa	Tabasco	17°31′10″	−92°55′31″	79 m	Flower vase
October 27, 2015	Teapa	Tabasco	17°30′14″	−92°53′57″	117 m	Plastic bottle
October 29, 2015	Tacotalpa	Tabasco	17°30′14″	−92°46′53″	39 m	Metal can
October 30, 2015	Tacotalpa	Tabasco	17°26′17″	−92°44′1″	405 m	Coconut shell
October 8, 2016	Villahermosa	Tabasco	17°57′21″	−92°59′15″	8 m	Glass
October 9, 2016	Villahermosa	Tabasco	17°57′36″	−92°57′25″	14 m	Cement vase
November 7, 2016	Villahermosa	Tabasco	17°55′30″	−93°01′42″	20 m	Aluminum can
November 7, 2016	Villahermosa	Tabasco	17°54′19″	−93°02′12″	18 m	Discarded tire
February 1, 2017	Villahermosa	Tabasco	17°57′21″	−92°59′15″	8 m	Human biting
October 21, 2016	Cancun	Quintana Roo	20°08′33″	−86°52′49″	7 m	Variety of vases
February 10, 2017	Felipe Carrillo Puerto	Quintana Roo	20°04′35″	−87°37′05″	6 m	Rock hole
February 11, 2017	Felipe Carrillo Puerto	Quintana Roo	20°04′35″	−87°37′05″	6 m	Variety of vases
February 12, 2017	Tulum	Quintana Roo	20°12′25″	−87°28′08″	19 m	Disposable cup
February 13, 2017	Cancun	Quintana Roo	20°08′33″	−86°52′49″	7 m	Plastic bottle
June 19, 2017	Tizimin	Yucatan	21°30′51″	−87°41′58″	3 m	BDV tent trap
June 20, 2017	Tizimin	Yucatan	21°30′51″	−87°41′58″	3 m	Ovitrap

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