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SCIENTIFIC NOTE

NEW DISTRIBUTION RECORD OF *AEDES ALBOPICTUS* IN QUINTANA ROO, MEXICO, AND ITS IMPORTANCE TO PUBLIC HEALTH

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ABSTRACT. *Aedes albopictus* is an important vector of several arboviruses that affect human health worldwide; thus, knowledge of its distribution is a key factor for the implementation of disease control strategies. In Mexico, *Ae. albopictus* was recorded for the first time in 1988 in Tamaulipas State (northeast), but currently it has been recorded in 14 of the 32 states in the country. In 2012, it was recorded for the first time in a single locality in Quintana Roo (Cancún). In this study, we provide new distribution information for *Ae. albopictus* in the center and south of Quintana Roo State and comment on its medical importance.

KEY WORDS *Aedes albopictus*, arbovirus, distribution, Mexico

Arboviruses are a challenge for humankind because of their potential to cause large disease outbreaks (Betancourt-Cravioto and Falcón Lezama 2020). For example, it is estimated that 96 million human cases and 40,000 deaths are reported annually due to dengue virus (DENV) (WHO 2020). In addition, chikungunya virus (CHIKV) has been recorded in more than 60 countries in Asia, Africa, Europe, and the Americas (WHO 2020). Other arboviruses, such as the yellow fever virus, are endemic in tropical and subtropical areas of Africa and Latin America, while several strains of Japanese encephalitis virus cocirculate in Asia, where more than 3 billion people are at risk of infection (WHO 2020). In Mexico, there were 41,505 cases of DENV, 9 cases of CHIKV, and 138 cases of Zika virus (ZIKV) in 2019 (DGE 2020). For Quintana Roo, there were 1,950 cases of DENV and 2 cases of ZIKV in 2019.

The main vector of these pathogens are mosquitoes belonging to the genera *Aedes* and *Haemagogus*. In countries within the African and European continents, as well as in India, *Aedes albopictus* (Skuse) has been implicated as the main vector of DENV, CHIKV, and ZIKV (Paupy et al. 2012). In Latin America, *Ae. albopictus* is the secondary vector of DENV, CHIKV, and ZIKV (Medeiros et al. 2018). In Mexico, *Ae. aegypti* (L.) is the main vector of DENV, CHIKV, and ZIKV. However, *Ae. albopictus* has also been found to be infected with DENV and ZIKV in nature (Correa-Morales et al. 2019). Consequently, knowledge about the distribution of this species across the different states in Mexico is paramount for the public health authorities in order to establish the relevant control strategies. In Quintana Roo, *Ae. albopictus* was recorded for the first time in 2012 in the city of Cancún (Salomón-Grajales et al. 2012). More recently, it was found in Tulum City (130 km from Cancún) and Felipe Carrillo Puerto municipality (Ortega-Morales et al. 2018a). Based on morphological evidence, we report here new distribution records of *Ae. albopictus* in Quintana Roo State, southeastern Mexico (Fig. 1).

In June and July 2018, March and December 2019, and January 2020, 10 adult females of *Ae. albopictus* were collected with the use of Centers for Disease Control and Prevention light traps operating consecutively between 1800 h and 2400 h in 5 localities in the State of Quintana Roo: Dzulá, Chetumal, Petcacab, Nicolás Bravo, and Tihosuco (Table 1 and Fig. 1). All traps (2 traps per locality) were baited with CO_2 and hung at 40 cm above ground level. Specimens were killed using triethylamine vapors, labeled, and deposited in the Entomology Collection of the Zoology Museum of El Colegio de la Frontera Sur (ECOSUR), Chetumal Unit, Mexico, reference code ECO-CH-AR/DP_1698-1707. Morphological identification was performed using a stereomicroscope (Discovery V8; Zeiss, Jena, Germany), and the identification to species was done using the keys of Darsie and Ward (2005). *Aedes albopictus* specimens were collected in association

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Fig. 1. Distribution of *Aedes albopictus* in Quintana Roo, Mexico. The blue dots indicate previous records, and the red dots indicate records from the present study.

Table 1. Collection records of *Aedes albopictus* in Quintana Roo, Mexico.

Collection date	No. mosquitos	Location	County	Latitude (°N)	Longitude (°W)	Elevation (m.a.s.l.)[1]
July 11, 2018	2 females	Chetumal	Othón Pompeyo (P.) Blanco	18°31′17″N	88°18′13″W	14
June 01, 2018	2 female	Dzulá	Felipe Carrillo Puerto	19°36′27″N	88°24′48″W	27
March 01, 2019	1 female	Petcacab	Felipe Carrillo Puerto	19°17′23.4″N	88°13′27.6″W	25
December 14, 2019	3 females	Nicolás Bravo	Othón P. Blanco	18°25′12″N	88°55′14″W	150
January 07, 2020	2 females	Tihosuco	Felipe Carrillo Puerto	20°11′52.5″N	88°22′21″W	35

[1] m.a.s.l., meters above sea level.

with *Anopheles albimanus* Wiedemann, *Ae. euplocamus* Dyar and Knab, *Ae. fulvus* (Wiedemann), *Ae. taeniorhynchus* (Wiedemann), *Ae. aegypti*, *Haemagogus equinus* Theobald, and *Culex nigripalpus* Theobald.

Aedes albopictus was reported for the first time in Mexico in Tamaulipas State in 1988 (Francy et al. 1990), and since then, it rapidly has dispersed into almost all tropical and subtropical regions of the country (Ortega-Morales et al. 2018a). Currently, the distribution of *Ae. albopictus* extends over 14 states: Chiapas, Coahuila, Guerrero, Hidalgo, Mexico City, Morelos, Nuevo León, Quintana Roo, San Luis Potosi, Sinaloa, Tabasco, Tamaulipas, Veracruz, and Yucatán (Francy et al. 1990; Ibáñez-Bernal and Martínez-Campos 1994; Pesina et al. 2001; Flisser et al. 2002; Casas-Martínez and Torres-Estrada 2003; Villegas-Trejo et al. 2010; Salomón-Grajales et al. 2012; Torres-Avendaño et al. 2015; Ortega-Morales and Siller-Rodríguez 2016; Ortega-Morales et al. 2016, 2018a, 2018b; González-Acosta et al. 2019).

In Quintana Roo, *Ae. albopictus* was recorded for the first time in 2012 in the northern part of the state (Salomón-Grajales et al. 2012). Recently, it has been found in Tulum City and Felipe Carrillo Puerto municipality (Ortega-Morales et al. 2018a). In this study, *Ae. albopictus* individuals were collected in the rural localities of Dzulá, Petcacab, and Tihosuco, confirming the establishment of this species in Felipe Carrillo Puerto municipality. We report for the first time its distribution in the urban area of Chetumal and the suburban areas of Nicolás Bravo, all belonging to the Othón Pompeyo Blanco municipality, in the southern part of Quintana Roo (Fig. 1). Because of the proximity of the Nicolás Bravo locality to the border with Campeche State to the east (less than 30 km), it is likely that the species might be present in this state and along the whole Yucatán Peninsula. Moreover, the high adaptability of *Ae. albopictus* to rural, semi-urban, and urban areas, in combination with the presence of *Ae. aegypti*, represents a threat to public health, possibly leading to increased incidence of dengue and Zika fever or other mosquitoborne diseases in the region (González-Acosta et al. 2019).

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