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SCIENTIFIC NOTE

FIRST RECORDS OF *PSOROPHORA CILIPES* AND *CULEX THEOBALDI* IN QUINTANA ROO STATE, MEXICO

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ABSTRACT. Collections of mosquitoes were conducted for the surveillance of species of medical importance in the state of Quintana Roo, Mexico, in June of 2017. Species collected included *Psorophora* (*Psorophora*) *cilipes* and *Culex* (*Melanoconion*) *theobaldi*, both new records for the state. *Psorophora cilipes* was previously recorded in Mexico State and *Cx. theobaldi* in Chiapas State. With the addition of these species, the mosquito fauna of Quintana Roo State now includes 81 species. Quintana Roo and Tamaulipas State with 82 species are the most mosquito-rich states in Mexico, based on currently available records. The specimens collected in this study were deposited in the Culicidae collection of the Universidad Autónoma Agraria Antonio Narro Unidad Laguna.

KEY WORDS *Culex theobaldi,* Mexico, mosquitoes, new records, *Psorophora cilipes*, Quintana Roo

The genus *Psorophora* Robineau-Desvoidy includes 49 species classified in three subgenera: *Grabhamia* Theobald (3 species), *Janthinosoma* Lynch Arribálzaga (23 species), and *Psorophora* Robineau-Desvoidy (10 species) (Harbach 2013a). Most species of *Psorophora* are distributed in countries of the Neotropical Region where environmental conditions are favorable for their development; however, some species are found in warm regions of North America (Darsie and Ward 2005). The immature stages of *Psorophora* species are usually found in temporary ponds, animal tracks flooded with rainwater, irrigation channels, and other natural aquatic sites at ground level. The adult stages are diurnal, and the females of many species avidly bite humans (Harbach 2013a). Some species of *Psorophora* have been involved in the transmission of arboviruses that cause diseases in animals and humans, such as Venezuelan equine encephalitis, eastern and western equine encephalitis, and West Nile, Ilheus, and Mayaro viruses (Mitchell et al. 1987, Chow et al. 2002, Mocayo et al. 2008).

Whereas 24 species of *Psorophora* have been recorded in Mexico, only 8 have been recorded previously in Quintana Roo State: *Ps*. (*Gra*.) *confinnis* (Lynch Arribálzaga), *Ps*. (*Jan*.) *albipes* (Theobald), *Ps*. (*Jan*.) *champerico* (Dyar and Knab), *Ps*. (*Jan*.) *cyanescens* (Coquillett), *Ps*. (*Jan*.) *ferox* (von Humboldt), *Ps*. (*Jan*.) *lutzii* (Theobald), *Ps*. (*Pso*.) *ciliata* (Fabricius), and *Ps*. (*Pso*.) *lineata* (von Humboldt) (Chan-Chable et al. 2016). In this paper, we report a 9th species: *Ps*. (*Pso*.) *cilipes* (Fabricius).

On June 12, 2017, while one of us (M.C.M.) was collecting mosquitoes for the surveillance of species of medical importance, 4th-stage larvae were collected from a temporary rainwater pool in the archaeological zone of Oxtankah, Othón P. Blanco, Quintana Roo (18°36′32.74″N, 88°13′56.18″W) (Fig.1) The larvae were placed in bags with water from the original collection site, labeled, and transported to the Regional Center of Public Health Research (CRISP) in Tapachula, Chiapas. The larvae were reared to adults, which were mounted on insect pins and identified as *Ps. cilipes* and *Ps. lineata* using the keys of Clark-Gil and Darsie (1983). The females of *Ps. cilipes* are readily recognized among the species of the subgenus *Psorophora* by the entirely dark-scaled tarsomeres and by the thoracic pleura, which are extensively covered with broad, white scales and a patch on the middle of the proepisternum that is continuous with a patch covering the dorsal three-fourths of the mesokatepisternum and almost the entire mesanepimeron (Darsie 1984). The immature stages of *Ps. cilipes* have been collected from shallow temporary ground pools in a forested area where cattle were grazing and small temporary ground pools among tree roots in a forested area in Guatemala and Panama, respectively (Darsie 1984; Heinemann and Belkin 1977, 1978a). Adult females have been collected while attempting to bite humans (Heinemann and Belkin 1977a) and are attracted to light traps (Heinemann and Belkin 1978b). *Psorophora cilipes* has been found in Argentina, Belize, Bolivia, Brazil, Costa Rica, Ecuador, El Salvador, French Guiana, Guatemala, Guyana, Honduras, Mexico, Nicaragua, Panama, Suriname, Trinidad

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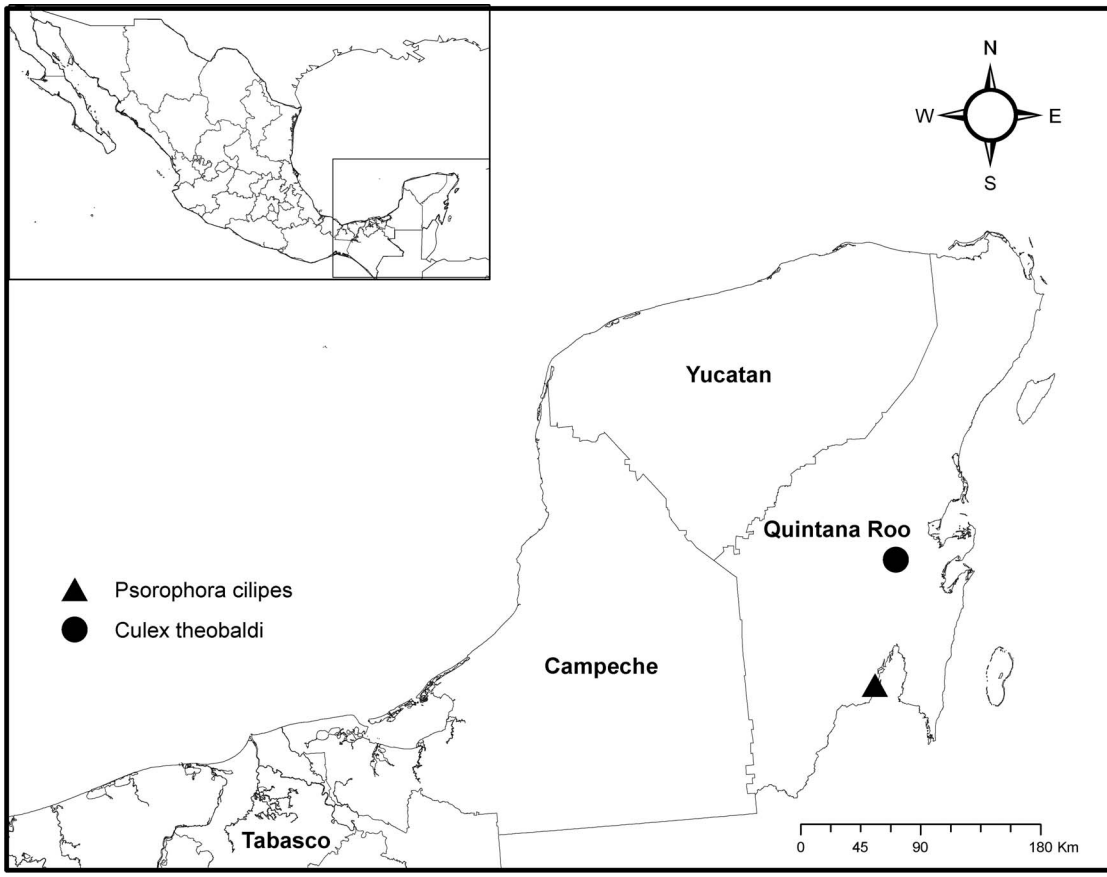

Fig. 1. Collection sites of *Psorophora cilipes* and *Culex theobaldi* in Quintana Roo State, Mexico.

and Tobago, and Venezuela (WRBU 2005). In Mexico, *Ps. cilipes* has been recorded in Mexico State (Vargas 1956) and Quintana Roo State (this study). The medical importance of *Ps. cilipes* is unknown, but since this species will bite humans, it is possible it could be involved in the transmission of pathogens.

The genus *Culex* includes 769 species classified in 26 subgenera. Species of the genus occur in all areas of the world, except Antarctica and extreme northern latitudes (Harbach 2013b). Sixty-four species representing 9 subgenera, *Anoedioporpa* Dyar, *Carrollia* Lutz, *Culex* L., *Melanoconion* Theobald, *Micraedes* Coquillett, *Microculex* Theobald, *Neoculex* Dyar, and *Phenacomyia* Harbach and Peyton, have been recorded in Mexico. *Melanoconion* is the most diverse subgenus, with 25 species known to occur in the country (WRBU 2005). Species of the subgenus are found in areas from the southern USA to Brazil and Argentina. The immature stages inhabit a variety of groundwater sites, such as ponds, swamps, marshes, lakes, and crab holes. The adults are active at night, and some species bite humans (Heinemann and Belkin 1977, 1978a, 1978b). The medical importance of *Melanoconion* species is poorly known, but some species have been incriminated as vectors of viruses that cause diseases such as Venezuelan and western equine encephalitis, among others (Sallum and Forattini 1996, Deardorff and Weaver 2010, Bingham et al. 2016).

Eight species of the subgenus *Melanoconion* have been recorded in Quintana Roo State: *Cx. anips* Dyar, *Cx. conspirator* Dyar and Knab, *Cx. educator* Dyar and Knab, *Cx. erraticus* (Dyar and Knab), *Cx. iolambdis* Dyar, *Cx. mutator* Dyar and Knab, *Cx. peccator* Dyar and Knab, and *Cx. taeniopus* Dyar and Knab (Ortega-Morales et al. 2010, Ordóñez-Sánchez et al. 2013). Here we report a 9th species: *Cx*. (*Mel*.) *theobaldi* (Lutz).

On June 15, 2017, mosquitoes were collected using a tent trap (Casas-Martínez et al. 2013) baited with a human. The trap was placed in the shade in a tropical forest in Chan Cah Veracruz, Felipe Carrillo Puerto, Quintana Roo (19°29′30.6″N, 87°59′47.1″W) (Fig. 1). The mosquitoes were killed, put in boxes, and transported to the CRISP for mounting on insect pins. The mosquitoes were identified as *Cx. theobaldi* using the descriptions of Forattini and Sallum (1989). Associated species included *Aedes* (*Ochlerotatus*) *scapularis* (Rondani), *Ae*. (*Och*.) *taeniorhynchus*

(Wiedemann), *Ae*. (*Stegomyia*) *aegypti* (L.), and 2 indeterminate species of *Culex* (*Melanoconion*).

Culex theobaldi is recognized by having the hind tarsomeres entirely dark-scaled; the scutum with golden scales on the anterior 0.6 and the posterior part dark-brown-scaled; and the broad central area of the vertex predominantly covered with narrow linear scales (Clark-Gil and Darsie 1983). The immature stages of *Cx. theobaldi* have been found in a variety of aquatic sites, such as permanent and temporary ground pools with debris and aquatic vegetation, swamp margins, and artificial containers (Forattini and Sallum 1989). Adults have been collected in Shannon traps baited with horses and Centers for Disease Control and Prevention light traps (Heinemann and Belkin 1978a, as *Cx. chrysonotum* Dyar and Knab).

Culex theobaldi is recorded from localities in Argentina, Belize, Bolivia, Brazil, Colombia, Costa Rica, Ecuador, French Guiana, Guatemala, Guyana, Honduras, Mexico, Nicaragua, Panama, Paraguay, Peru, Suriname, Trinidad and Tobago, Uruguay, and Venezuela (WRBU 2005). In Mexico, *Cx. theobaldi* is recorded in the states of Chiapas (Martínez-Palacios 1952, Díaz-Nájera and Vargas 1973, Pecor et al. 1992) and Quintana Roo (this study). The medical importance of *Cx. theobaldi*, if any, is unknown.

Currently, 81 mosquito species are known to occur in Quintana Roo State (Ortega-Morales et al. 2010, Salomón-Grajales et al. 2012, Ordóñez-Sánchez et al. 2013, Chan-Cable et al. 2016, and this study), exceeded only by Tamaulipas State with 82 species (Ortega-Morales et al. 2015); both states have recorded more mosquito species than other states in Mexico.

All mosquitoes collected during the field study were deposited in the Culicidae Collection of the Parasitology Department of the Universidad Autónoma Agraria Antonio Narro Unidad Laguna under accession number LI040.

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