

Taxonomy and systematics

## New records of biting midges (Diptera: Ceratopogonidae) from Tabasco, Mexico

### *Nuevos registros de jejenos picadores (Diptera: Ceratopogonidae) de Tabasco, México*

Herón Huerta <sup>a, \*</sup>, Luis Miguel Rodríguez-Martínez <sup>b</sup>, José Ismael Benitez-Alva <sup>c</sup>,  
Felipe Dzul-Manzanilla <sup>d</sup>, Pablo Manrique-Saide <sup>e</sup>

<sup>a</sup> Instituto de Diagnóstico y Referencia Epidemiológicos, Francisco de P. Miranda Núm. 177, Unidad Lomas Plateros, DT, 01480 Ciudad de México, Mexico

<sup>b</sup> Departamento de Control de Enfermedades Transmitidas por Vectores, Melchor Ocampo Núm. 113, Colonia Atasta de Serra, 86100 Villahermosa, Tabasco, Mexico

<sup>c</sup> Departamento de Control de Enfermedades Transmitidas por Vectores, 20 noviembre Núm. 707, Centro, 68000 Oaxaca de Juárez, Oaxaca, México

<sup>d</sup> Departamento de Control de Enfermedades Transmitidas por Vectores, Soconusco Núm. 31, Colonia Aguacatal, 91130 Xalapa, Veracruz, Mexico

<sup>e</sup> Universidad Autónoma de Yucatán, Campus Ciencias Biológicas y Agropecuarias, Unidad Colaborativa para Bioensayos Entomológicos, Campus Ciencias Biológicas y Agropecuarias, Km 15.5 Carretera Mérida-Xmatkuil s/n, 97315 Mérida, Yucatán, Mexico

\*Corresponding author: cerato\_2000@yahoo.com (H. Huerta)

Received: 23 June 2020; accepted: 20 April 2021

#### Abstract

The first record for 7 species of biting midges for the state of Tabasco (Diptera: Ceratopogonidae) is here presented. We collected 355 specimens using CDC light traps in rural areas, as part of the entomological surveillance by the local Ministry of Health in October 2019. New distribution records of the following species are included: *Forcipomyia stylifer* (Lutz, 1913), *Culicoides blantoni* Vargas & Wirth, 1955, *Culicoides foxi* Ortiz, 1950, *Culicoides leopoldoi* Ortiz, 1951, *Culicoides jamaicensis* Edwards, 1922, *Culicoides poikilonotus* Macfie, 1948 and *Stilobezzia coquilletti* Kieffer, 1917; and new locality records for *Culicoides gabaldoni* Ortiz, 1954, *Culicoides insignis* Lutz, 1913, *Culicoides paraensis* (Goeldi, 1905) and *Stilobezzia kiefferi* Lane, 1947. The distribution record of *Culicoides dicrourus* Wirth & Blanton, 1955 from Mexico is confirmed. A key and an updated list for the known species of *Culicoides* Latreille, 1809 from the state of Tabasco is also provided.

**Keywords:** *Culicoides*; *Stilobezzia*; *Forcipomyia*; Distribution; Neotropical region; Key

## Resumen

Se incluye el primer registro de 7 especies de jejenes picadores para el estado de Tabasco (Diptera: Ceratopogonidae). Se recolectaron 355 especímenes utilizando trampas CDC de luz en áreas rurales, como parte de la vigilancia entomológica realizada por la Secretaría de Salud local en octubre de 2019. Se incluyen nuevos registros de distribución de las siguientes especies: *Forcipomyia stylifer* (Lutz, 1913), *Culicoides blantoni* Vargas & Wirth, 1955, *Culicoides foxi* Ortiz, 1950, *Culicoides leopoldoi* Ortiz, 1951, *Culicoides jamaicensis* Edwards, 1922, *Culicoides poikilonotus* Macfie, 1948 y *Stilobezzia coquilletti* Kieffer, 1917; así mismo, se incluyen nuevas localidades registradas para *Culicoides gabaldoni* Ortiz, 1954, *Culicoides insignis* Lutz, 1913, *Culicoides paraensis* (Goeldi, 1905) y *Stilobezzia kiefferi* Lane, 1947. Confirmamos el registro de distribución para México de *Culicoides dicrourus* Wirth y Blanton, 1955. Se presenta una clave y una lista de las especies conocidas del género *Culicoides* Latreille, 1809 del estado de Tabasco.

*Palabras clave:* *Culicoides*; *Stilobezzia*; *Forcipomyia*; Distribución; Región neotropical; Clave

## Introduction

The genus *Culicoides* Latreille, 1809 (Diptera: Ceratopogonidae), known in Mexico as “jejenes or chaquistes”, comprises a large group with 1,347 species worldwide (Borkent & Dominiak, 2020) which is notorious because of its biological, ecological and taxonomic diversity, and is also well known because many species have blood-feeding habits and therefore, medical and veterinary importance (Borkent, 2005; Kettle, 1977; Linley et al., 1983).

Current knowledge of the genus *Culicoides* in Mexico includes 84 species belonging to 14 subgenera, 9 species groups, and 4 species unplaced (Borkent & Spinelli, 2000, 2007; Huerta et al., 2012; Ibáñez-Bernal et al., 1996; Spinelli & Huerta, 2015). However, the diversity of *Culicoides* from many regions of Mexico is still poorly studied, and knowledge of the group is still fragmented. The pioneering work of Macfie (1948) described 9 new species from Mexico (Chiapas) and provided a key to species of the Caribbean region, in which at least 28 known species from Mexico can be distinguished. Other taxonomic reviews of *Culicoides* of the Neotropical region include part of the diversity of species in Mexico (Cf. Blanton & Wirth, 1979; Wirth & Blanton, 1959, 1974; Wirth & Hubert, 1960). Harrup et al. (2015) included identification references for the *Culicoides* fauna by biogeographical region.

A recent update of the genus *Stilobezzia* Kieffer, 1911, in Mexico, included a key for all the known species (Huerta & Grogan, 2017). Ronderos and Spinelli (1999) included a review of subgenus *Lasiohelea* Kieffer, 1921 (*Forcipomyia* Meigen, 1818) from the Neotropical region, with a key for species known in Mexico.

We report 7 new records from the state of Tabasco: *Forcipomyia stylifer* (Lutz, 1913), *Culicoides blantoni* Vargas & Wirth, 1955, *Culicoides foxi* Ortiz, 1950, *Culicoides leopoldoi* Ortiz, 1951, *Culicoides jamaicensis* Edwards, 1922, *Culicoides poikilonotus* Macfie, 1948, and *Stilobezzia coquilletti* Kieffer, 1917; as well as new locality records for *Culicoides gabaldoni* Ortiz, 1954, *Culicoides insignis* Lutz, 1913, *Culicoides paraensis* (Goeldi, 1905), and *Stilobezzia kiefferi* Lane, 1947. The distribution record of *Culicoides dicrourus* Wirth & Blanton, 1955, from Mexico is confirmed. We also include an updated list of known species of *Culicoides* for the state of Tabasco (Table 1) and a key to separate species from this state.

## Materials and methods

A total of 355 specimens of biting midges was collected as part of entomological surveillance of Leishmaniasis program, during the first week of October 2019. Collections were performed at peridomestic sites by the personnel of the Secretaría de Salud de Tabasco, Programa de control de vectores del Centro Nacional de Programas Preventivos y Control de Enfermedades (CENAPRECE), in the locality of Huimango (second section), Municipality of Cunduacán, Tabasco, Mexico. Samples of *Culicoides*, *Forcipomyia*, and *Stilobezzia* were collected during a 3-day period with Centers for Disease Control and Prevention (CDC) light traps, in 3 different locations of rural areas near the houses within plantations of *Theobroma cacao* L., cacao tree. Climate of this collection area is characteristic of the Tabasco plains, warm-humid with abundant summer rains, and an annual average temperature of 26.2 °C (INEGI, 2015).

Cunduacán is one of the main cocoa (chocolate) producing regions, with abundant cocoa plantations (cacaotales).

The collection sites were named as: site 1, 18°08'34.8" N, 93°08'66.4" W; site 2, 18°07'56.0" N, 93°10'46.1" W; and site 3, 18°07'97.5" N, 93°10'24.2" W (Fig. 1). Specimens of each species collected were preserved in ethanol and afterwards, separated, cleared, dissected, and mounted on microscope slides in Canada balsam using the technique described by Borkent and Spinelli (2007).

A set of remaining specimens was preserved directly in ethyl alcohol.

Morphological terminology here employed is based on Borkent (2017) and Borkent et al. (2009). Assignment of *Culicoides* species to subgenus and species groups follows the system proposed by Borkent and Dominiak (2020). All specimens are deposited in the Colección de Artrópodos con Importancia Médica (CAIM), Secretaría de Salud, México City.

Table 1

List records of *Culicoides* from Tabasco, Mexico

Species	Locality	Records
<i>Culicoides blantoni</i>	Huimango	in the present
<i>Culicoides dicrourus</i>	Huimango	in the present
<i>Culicoides foxi</i>	Huimango	in the present
<i>Culicoides furens</i>	Ceibas	Huerta et al. (2012)
Synonymy: <i>maculithorax</i> (Williston), 1896: 227 ( <i>Ceratopogon</i> ) (St. Vicent). <i>birabeni</i> Cavalieri, 1966: 59 (Venezuela)		
<i>Culicoides gabaldoni</i>	no data of locality no data of locality Huimango	Wirth et al. (1988) Borkent and Spinelli (2007) in the present
<i>Culicoides insignis</i>	Villahermosa	Spinelli et al. (1993)
Synonymy: <i>inamollae</i> Fox and Hoffman, 1944: 110 (Puerto Rico). <i>painteri</i> Fox, 1946: 257 (Honduras)	Villahermosa Huimango	Huerta et al. (2012) in the present
<i>Culicoides jamaicensis</i>	Huimango	in the present
<i>Culicoides leopoldoi</i>	Huimango	in the present
<i>Culicoides ocumarensis</i>	Villahermosa no data of locality	Spinelli et al. (1993) Borkent and Spinelli (2007)
<i>Culicoides paraensis</i>	Villahermosa	Wirth and Felipe-Bauer (1989)
Synonymy: <i>undecimpunctatus</i> Kieffer, 1917: 307 (Argentina)	Huimango	in the present
<i>Culicoides poikilonotus</i>	Huimango	in the present
Synonymy: <i>cacozelus</i> Macfie, 1948: 85 (Mexico) <i>hertigi</i> Wirth and Blanton, 1953: 229 (Panama).		
<i>Culicoides pusillus</i>	Villahermosa Villahermosa	Wirth et al. (1988) Huerta et al. (2012)

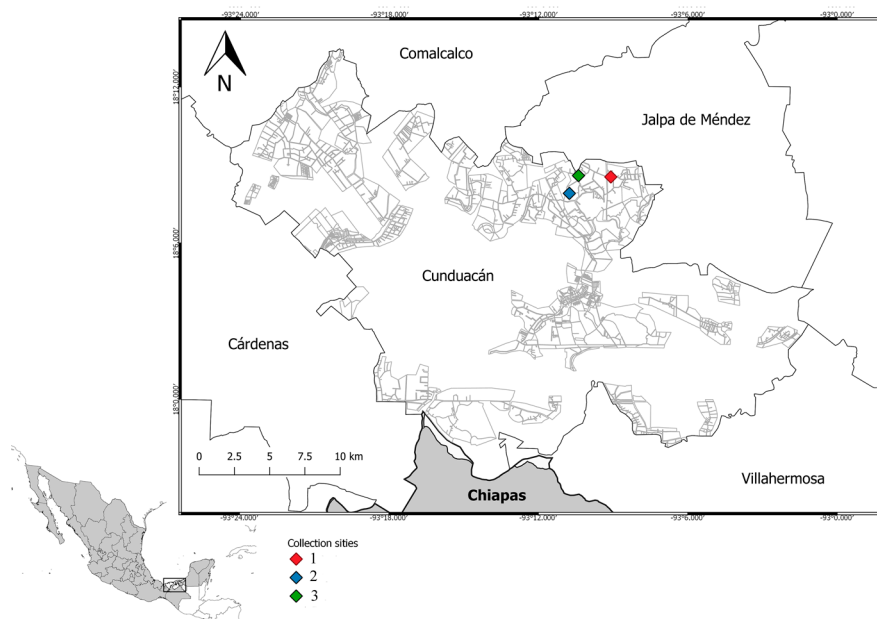


Figure 1. Collection sites from Cunduacán, State of Tabasco, Mexico.

## Results

Key to the *Culicoides* species from Tabasco, Mexico (primarily for females).

- |  |                                    |
|--|------------------------------------|
| 1. Second radial cell wholly or mainly included in a pale spot (Figs. 2E-F).....   | 2                                  |
| - . Second radial cell wholly included in a dark spot (Figs. 2A-D, G, 3A-B).....   | 4                                  |
| 2(1) Crossvein r-m pale; pale area straddling middle of vein $M_2$ discontinuous; male ninth tergite with mesal cleft, apicolateral process very close together..... | <i>C. ocumarensis</i> Ortiz        |
| - . Crossvein r-m dark; area straddling middle of vein $M_2$ continuous; male ninth tergite without mesal cleft, apicolateral process not closed.....                | 3                                  |
| 3(2) Cell $m_1$ with a distal pale spot; vein $R_3$ dark up to the point where it turns abruptly forward to meet costa (Fig. 2F).....                                | <i>C. insignis</i> Lutz            |
| - . Cell $m_1$ with 2 distal pale spots; vein $R_3$ pale with small blackish spot behind apex (Fig. 2E).....   | <i>C. foxi</i> Ortiz               |
| 4(1) Wing with contrasting pattern of dark and pale spot; cell $r_2$ usually longer than cell $r_1$ (Fig. 2A-D).....   | 5                                  |
| - . Wing without contrasting pattern, very faint spot; second radial cell shorter than cell $r_1$ .....  | <i>C. pusillus</i> Lutz            |
| 5(4) Wing with a pale spot straddling middle of vein $M_2$ ; pale apex of veins $M_1$ and $M_2$ .....  | 6                                  |
| - . Wing without a pale spot straddling middle of vein $M_2$ ; usually dark apex of veins $M_1$ and $M_2$ .....  | 8                                  |
| 6(5) Third palpal segment with shallow, sensory pit; cibarial armature present; cell $r_3$ with a basal pale spot (Fig. 2A).....                                     | <i>C. blantoni</i> Vargas & Wirth  |
| - . Third palpal segment with a large, deep, sensory pit; without cibarial armature; cell $r_3$ without a basal pale spot (Fig. 2B).....                             | 7                                  |
| 7(6) Cell $r_3$ with distal pale area reaching the wing margin; base of vein $M_1$ with straddling pale spot (Fig. 2B).....  | <i>C. jamaicensis</i> Edwards      |
| - . Cell $r_3$ with distal pale area without reaching the wing margin; base of vein $M_1$ without straddling pale spot (Fig. 2C).....                                | <i>C. poikilonotus</i> Macfie      |
| 8(5) Second radial cell with an isolated small round dark spot behind (Fig. 2G).....   | <i>C. dicourus</i> Wirth & Blanton |
| - . Second radial cell without an isolated small round dark spot behind.....   | 9                                  |

- 9(8) Cell  $R_3$  with the distal pale spot meeting wing margin ..... 10  
 -. Cell  $R_3$  with the distal pale spot not meeting wing margin ..... 11  
 10(9) Vein r-m with extensive, pale spot broadly meeting anterior wing margin; cell  $m_1$  with 2 small pale spots, the distal no located at the wing margin (Fig. 3A) ..... *C. leopoldoi* Ortiz  
 -. Vein r-m without extensive, pale spot broadly meeting anterior wing margin; cell  $m_1$  with 3 small pale spots, the distal located at the wing margin ..... *C. furens* (Poey)  
 11(9) Cell  $m_1$  with 3 small pale spots (Fig. 2D) ..... *C. paraensis* (Goeldi)  
 Cell  $m_1$  with 2 small pale spots ..... 12  
 12(11) Second radial cell closed; macrotrichia sparce, only a few in apices of cells  $r_3$ ,  $m_1$  and  $m_2$  (Fig. 3B) ..... *C. gabaldoni* Ortiz  
 -. Second radial cell open; macrotrichia more numerous, present at least on distal half of wing (Fig. 2C) ..... *C. poikilonotus* Macfie (in part)

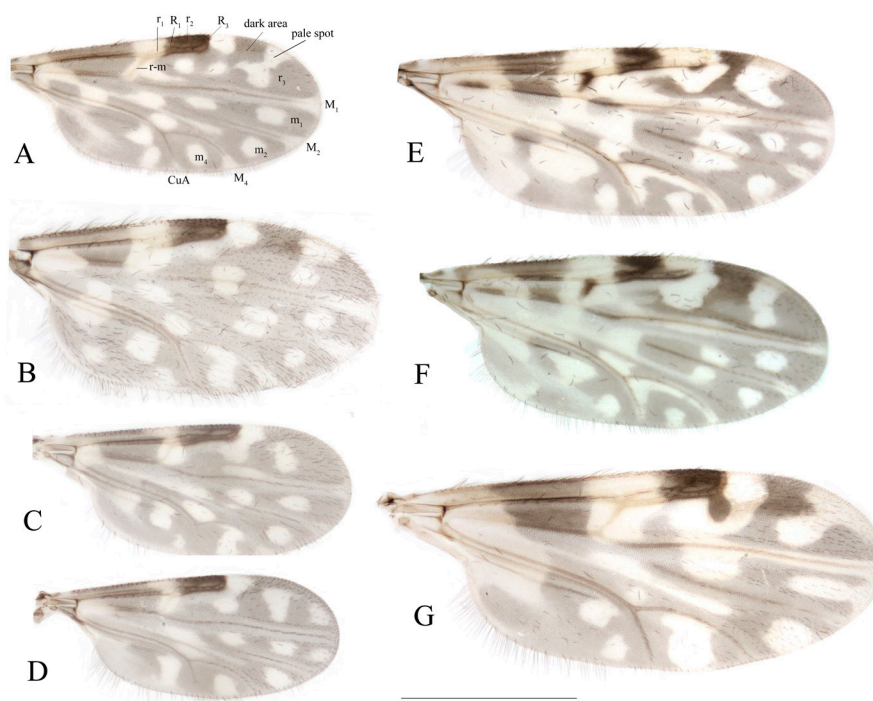


Figure 2. Wing, dorsal view. Female: A. *Culicoides blantoni*; B. *Culicoides jamaicensis*; C. *Culicoides poikilonotus*; D. *Culicoides paraensis*; E. *Culicoides foxi*; F. *Culicoides insignis*; G. *Culicoides dicrourus*. Scale = 0.5 mm. Abbreviations (wing): CuA = anterior branch of cubital veins;  $M_1$  = first branch of media;  $M_2$  = second branch of media, and  $M_4$  = fourth branch of media;  $m_1$  = first medial cell,  $m_2$  = second medial cell and  $m_4$  = fourth medial cell; r-m = radial-medial crossvein;  $R_1$  = anterior branch of radius, first longitudinal vein,  $R_3$  = lower branch of second branch of radius;  $r_1$  = first radial cell,  $r_2$  = second radial cell;  $r_3$  = third radial cell.

Order Diptera Linnaeus, 1758  
 Family Ceratopogonidae Newman, 1834  
 Subfamily Forcipomyiinae Lenz, 1934  
 Tribe Forcipomyiini Lenz, 1934  
 Genus *Forcipomyia* Meigen, 1818  
*Forcipomyia (Lasiohelea) stylifer* (Lutz, 1913)

#### Taxonomic summary

*Material examined*: 1 male. Mexico, Tabasco, Cunduacán, locality Huimango 2nd section, sector La Ceiba, site 2: 7 October 2019, CDC trap, coll. personnel of the Health Ministry, slide mounted, deposited in CAIM.

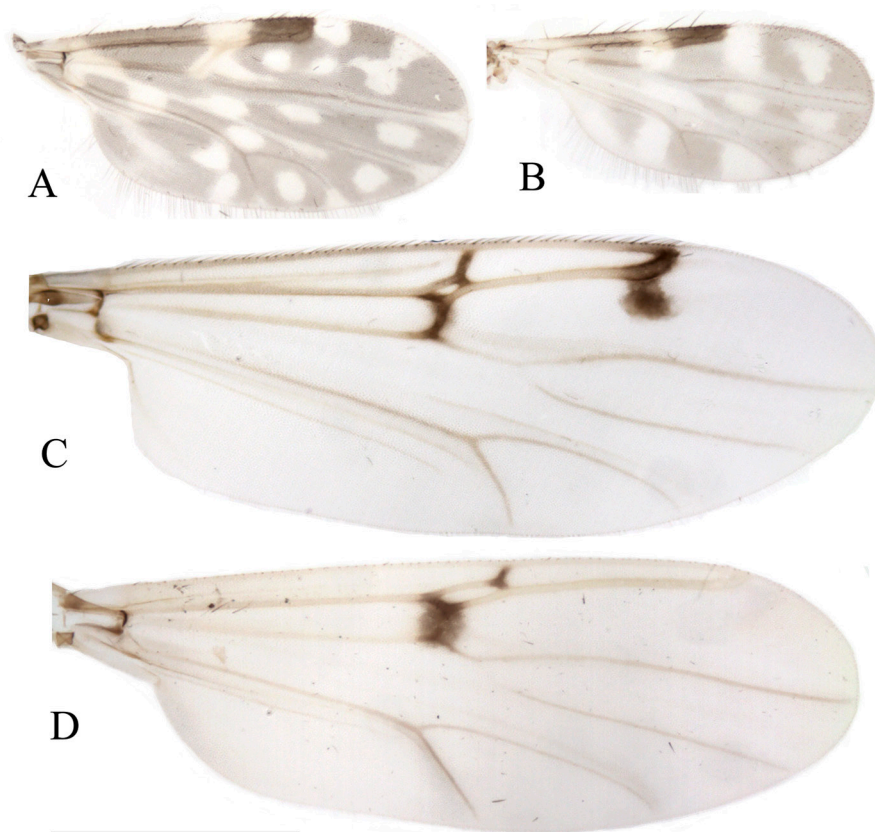


Figure 3. Wing, dorsal view. Female; A. *Culicoides leopoldoi*; B. *Culicoides gabaldoni*; C. *Stilobezzia coquilletti*; D. *Stilobezzia kiefferi*. Scale = 0.5 mm.

*New record*: Cunduacán, locality Huimango 2nd section, sector La Ceiba, Tabasco, Mexico (Fig. 1).

*Distribution*. Mexico (Oaxaca, Tabasco) to Ecuador, Trinidad, Venezuela and northeastern Argentina.

#### Remarks

Very common species, widely distributed in the Neotropical region (Borkent & Spinelli, 2007). Huerta and Spinelli (2017) provided the first record from Mexico (Oaxaca).

Subfamily Ceratopogoninae Newman, 1834

Tribe Culicoidini Kieffer, 1911

Genus *Culicoides* Latreille, 1809

*Culicoides (Diphaomyia) blantoni* Vargas & Wirth, 1955 (Fig. 2A)

#### Taxonomic summary

*Material examined*: 96 females. Mexico, Tabasco, Cunduacán, locality Huimango 2nd section, sector La Ceiba, site 1: 7 October 2019, CDC trap, coll. personnel

of the Health Ministry, 7 females (slide mounted deposited in CAIM); same data except, 8 October 2019, 7 females (slide mounted), 9 October 2019, 5 females (ethyl alcohol); same data except, site 3: 7 October-2019, 32 females (ethyl alcohol); same data except, 8 October 2019, 30 females (ethyl alcohol); 9 October 2019, 15 females (slide mounted).

*New record*: Cunduacán, locality Huimango 2nd section, Tabasco, Mexico (Fig. 1).

*Distribution*. USA (Texas), Mexico (Sinaloa, San Luis Potosí, Puebla, Guerrero, Tamaulipas, Morelos, Veracruz, Tabasco).

#### Remarks

This species was originally described from Tamaulipas, Mexico, including additional series of specimens from Guerrero, San Luis Potosí and Puebla (Vargas & Wirth, 1955). Borkent and Grogan (2009) reported this species from Sinaloa, Tamaulipas and Morelos. Huerta et al. (2012) included new records from Veracruz, Guerrero and San Luis Potosí.

*Culicoides (Drymodesmyia) jamaicensis* Edwards, 1922  
(Fig. 2B)

*Taxonomic summary*

*Material examined:* 8 males, 39 females. Mexico, Tabasco, Cunduacán, locality Huimango 2nd section, sector La Ceiba, site 1: 7 October 2019, CDC trap, coll. personnel of the Health Ministry, 2 females (slide mounted deposited in CAIM); same data except, 8 October 2019, 2 females (ethyl alcohol), 9 October 2019, 6 females (slide mounted), 3 males (slide mounted); same data except, site 2: 7 October 2019, 7 females, 1 male (slide mounted); same data except, 8 October 2019, 4 females, 2 males (slide mounted), 9 October 2019, 10 females, 2 males (ethyl alcohol); same data except, site 3: 7 October 2019, 5 females (ethyl alcohol); same data except, 8 October 2019, 2 females (ethyl alcohol); 9 October 2019, 1 female (ethyl alcohol).

*New record:* Cunduacán, locality Huimango, 2nd section, sector La Ceiba, Tabasco, Mexico (Fig. 1).

*Distribution.* USA (Texas, Florida), Mexico (Jalisco, México, Veracruz, Guerrero, Chiapas, Oaxaca, Tabasco, Yucatán), Central America and Caribbean to Colombia and Venezuela.

*Remarks*

Macfie (1948) included the first record of *Culicoides jamaicensis* in Mexico from Chiapas. Wirth and Hubert (1960) reported this species from Veracruz. Huerta et al. (2012) provided records from of the states Guerrero, Jalisco, México, Oaxaca, Veracruz and Yucatán.

*Culicoides (Drymodesmyia) poikilonotus* Macfie  
(Fig. 2C)

Synonymy:

*cacozelus* Macfie, 1948: 85 (Mexico)

*hertigi* Wirth and Blanton, 1953: 229 (Panama)

*Taxonomic summary*

*Material examined:* 1 male, 6 females. Mexico, Tabasco, Cunduacán, locality Huimango 2nd section, sector La Ceiba, site 1: 8 October 2019, CDC trap, coll. personnel of the Health Ministry, 2 females (slide mounted deposited in CAIM); same data except, 9 October 2019, 1 female (ethyl alcohol); same data except, site 2: 9 October 2019, 1 male (slide mounted); same data except, site 3: 8 October 2019, 2 females (slide mounted), 9 October 2019, 1 female (ethyl alcohol).

*New record:* Cunduacán, locality Huimango 2nd section, sector La Ceiba, Tabasco, Mexico (Fig. 1).

*Distribution.* Mexico (Estado de México, Chiapas, Veracruz, Tabasco), Central America, Venezuela and Trinidad to Brazil.

*Remarks*

Species originally described from Chiapas, Mexico (Macfie, 1948). This widely distributed in the Neotropical region (Borkent & Spinelli, 2007). Huerta et al. (2012) provided a new record from the Estado de México and Veracruz.

*Culicoides (Haematomyidium) paraensis* (Goeldi, 1905)  
(Fig. 2D)

Synonymy:

*undecimpunctatus* Kieffer, 1917: 307 (Argentina).

*Taxonomic summary*

*Material examined:* 25 males, 54 females. Mexico, Tabasco, Cunduacán, locality Huimango 2nd section, sector La Ceiba, site 1: 7 October 2019, CDC trap, coll. personnel of the Health Ministry, 2 females, 1 male (slide mounted deposited in CAIM); same data except, 8 October 2019, 5 females (ethyl alcohol); same date except, site 2: 7 October 2019, 23 females, 7 males (slide mounted); same data except, 8 October 2019, 12 females, 8 males (slide mounted), 9 October 2019, 12 females, 7 males (ethyl alcohol); same data except, site 3: 7 October 2019, 2 males (slide mounted).

*New record:* Cunduacán, locality Huimango 2nd section, sector La Ceiba, Tabasco, Mexico (Fig. 1).

*Distribution.* USA (Colorado, Nebraska, Pennsylvania, Wisconsin to Louisiana and Florida), Mexico (San Luis Potosí, Tabasco, Veracruz, Chiapas, Quintana Roo) to Argentina.

*Remarks*

This species is considered an important virus vector in the Neotropical region (Hoch et al., 1990; Mellor et al., 2000); with a wide distribution from southern USA (Wirth et al., 1985) to Argentina (Borkent & Grogan, 2009). In Mexico, it was previously reported from San Luis Potosí, Quintana Roo (Blanton & Wirth, 1979), Tabasco and Veracruz (Wirth & Felipe-Bauer, 1989). Huerta et al. (2012) provided the first record from Chiapas and additional records from San Luis Potosí and Veracruz. We include a new locality in state of Tabasco.

*Culicoides (Hoffmania) foxi* Ortiz, 1950  
(Fig. 2E)

#### Taxonomic summary

*Material examined:* 20 females. Mexico, Tabasco, Cunduacán, locality Huimango 2nd section, sector La Ceiba, site 1: 7 October 2019, CDC trap, coll. personnel of the Health Ministry, 2 females (slide mounted deposited in CAIM); same data except, 8 October 2019, 4 females (ethyl alcohol), 9 October 2019, 6 females (slide mounted); same data except, site 2: 7 October 2019, 3 females (slide mounted); same data except, site 3: 7 October 2019, 3 females (slide mounted); 9 October 2019, 2 females (ethyl alcohol).

*New record:* Cunduacán, locality Huimango 2nd section, sector La Ceiba, Tabasco, Mexico (Fig. 1).

*Distribution.* Mexico (Veracruz, Tabasco, Guerrero, Oaxaca, Chiapas) to Bolivia, Puerto Rico to northeastern Argentina.

#### Remarks

Very common species in the Neotropical region. Previous records known from southern Mexico (Aitken et al., 1975; Wirth & Blanton, 1974). Spinelli et al. (1993) reported this species for the states of Veracruz, Oaxaca, and Guerrero. Huerta et al. (2012) included new local records from Veracruz and Oaxaca.

#### *Culicoides (Hoffmania) insignis* Lutz, 1913

(Fig. 2F)

Synonymy:

*inamollae* Fox and Hoffman, 1944: 110 (Puerto Rico).  
*painteri* Fox, 1946: 257 (Honduras).

#### Taxonomic summary

*Material examined:* 1 male, 24 females. Mexico, Tabasco, Cunduacán, locality Huimango 2nd section, sector La Ceiba, site 1: 7 October 2019, CDC trap, coll. personnel of the Health Ministry, 3 females (slide mounted deposited in CAIM); same data except, 8 October 2019, 1 male (slide mounted), 9 October 2019, 6 females (slide mounted); same data except, site 2: 7 October 2019, 5 females (ethyl alcohol); same data except, 8 October 2019, 1 female (ethyl alcohol); same data except, site 3: 7 October 2019, 9 females (ethyl alcohol).

*New record:* Cunduacán, locality Huimango 2nd section, sector La Ceiba, Tabasco, Mexico (Fig. 1).

*Distribution.* USA (Alabama, Georgia, Florida), Mexico (Tamaulipas, Veracruz, Tabasco, Nayarit, Morelos, Oaxaca, Chiapas, Yucatán), Central American and Caribbean to central Argentina.

#### Remarks

This species is widely distributed in the Neotropical region (Borkent & Spinelli, 2007), including part from the

south USA (Borkent & Grogan, 2009). It was previously known in Mexico from Chiapas and Yucatán (Blanton & Wirth, 1979; Borkent & Spinelli, 2007; Macfie, 1948). Huerta et al. (2012) provided records from Tabasco and Veracruz. We report a new locality in the state of Tabasco.

*Culicoides (Mataemyia) dicrourus* Wirth & Blanton, 1955

(Fig. 2G)

#### Taxonomic summary

*Material examined:* 2 females. Mexico, Tabasco, Cunduacán, locality Huimango 2nd section, sector La Ceiba, site 1: 9 October 2019, CDC trap, coll. personnel of the Health Ministry, 2 females (slide mounted deposited in CAIM).

*New record:* Cunduacán, locality Huimango 2nd section, sector La Ceiba, Tabasco, Mexico (Fig. 1).

*Distribution.* Mexico (Tabasco), Costa Rica to Ecuador.

#### Remarks

This species was originally reported from Mexico by Wirth and Blanton (1959) without any locality data. The Neotropical catalogue by Wirth (1974) only includes the distribution record from Panama. Current reported distribution includes a range from Costa Rica to Ecuador (Borkent & Spinelli, 2007). We confirmed the distribution of this species in Mexico from state of Tabasco.

#### *Culicoides leopoldoi* Ortiz, 1951

(Fig. 3A)

#### Taxonomic summary

*Material examined:* 1 male, 21 females. Mexico, Tabasco, Cunduacán, locality Huimango 2nd section, sector La Ceiba, site 1: 7 October 2019, CDC trap, coll. personnel of the Health Ministry, 1 female, 1 male (slide mounted); 9 October 2019, 1 female (ethyl alcohol); same data except, site 2: 7 October 2019, 2 females (slide mounted); same data except, site 3: 7 October 2019, 10 females (ethyl alcohol); same data except, 8 October 2019, 2 females (slide mounted); 9 October 2019, 5 females (ethyl alcohol).

*New record:* Cunduacán, locality Huimango 2nd section, sector La Ceiba, Tabasco, Mexico (Fig. 1).

*Distribution.* Mexico (Oaxaca, Tabasco), Guatemala and Belize to Bolivia and northeastern Argentina, Trinidad.

#### Remarks

This species was originally reported in Mexico, based on specimens identified by Wirth W. Wirth from the state of Chiapas (Vargas, 1954). Wirth and Blanton (1959) later



reported specimens from Tapachula, Chiapas. Wirth (1974) in his catalogue of the Americas south of the USA reported the distribution of this species as restricted to Panama, Venezuela, and Brazil. Huerta et al. (2012) provided new records of this species from Oaxaca.

*Culicoides gabaldoni* Ortiz, 1954  
(Fig. 3B)

#### Taxonomic summary

*Material examined:* 17 males, 31 females. Mexico, Tabasco, Cunduacán, locality Huimango 2nd section, sector La Ceiba, site 1: 7 October 2019, CDC trap, coll. personnel of the Health Ministry, 1 female (slide mounted deposited in CAIM); same data except, 8 October 2019, 2 females (slide mounted); same data except, site 2: 7 October 2019, 11 females, 13 males (slide mounted); same data except, 8 October 2019, 14 females, 3 males (slide mounted), 9 October 2019, 1 female, 1 male (slide mounted); same data except, site 3: 7 October 2019, 1 female (ethyl alcohol); same data except, 9 October 2019, 1 female (ethyl alcohol).

*New record:* Cunduacán, locality Huimango 2nd section, sector La Ceiba, Tabasco, Mexico (Fig. 1).

*Distribution.* Mexico (Tabasco, Veracruz, Oaxaca) to Ecuador, Venezuela, Trinidad, Brazil, Paraguay, northeastern Argentina.

#### Remarks

Previously known members of the *leoni* species group from Mexico were reported by Wirth and Blanton (1973). This species is widely distributed in the Neotropical region (Borkent & Spinelli, 2007). In Mexico, it was previously known only from Tabasco (Wirth & Blanton, 1973; Wirth et al., 1988) and more recently from Oaxaca and Veracruz (Huerta et al., 2012). We reported a new locality record in the state of Tabasco.

Subfamily Ceratopogoninae Newman, 1834

Tribe Ceratopogonini Newman, 1834

Genus *Stilobezzia* Kieffer, 1911

*Stilobezzia (Stilobezzia) coquilletti* Kieffer, 1905  
(Fig. 3C)

Synonymy:

*picta* (Coquillett), 1905: 60 (*Ceratopogon*) (preoccupied by *Sphaeromyias pictus* (Meigen), 1818. USA (Virginia).

#### Taxonomic summary

*Material examined:* 4 females. Mexico, Tabasco, Cunduacán, locality Huimango 2nd section, sector La Ceiba, site 1: 8 October 2019, CDC trap, coll. personnel of the Health Ministry, 1 female (slide mounted deposited

in CAIM); 9 October 2019, 3 females (slide mounted); same data except, site 3: 7 October 2019, 1 female (slide mounted).

*New record:* Cunduacán, locality Huimango 2nd section, sector La Ceiba, Tabasco, Mexico (Fig. 1).

*Distribution.* USA (Maryland, Virginia, Illinois south to Florida and Louisiana), Mexico (San Luis Potosí, Tamaulipas, Veracruz, Tabasco, Chiapas, Yucatán) to Panama, and South America in Trinidad and Brazil.

#### Remarks

A common species widely distributed in Neotropical region, including part of USA (Maryland, Virginia, Illinois south to Florida and Louisiana (Borkent & Grogan 2009). Wirth (1953) included a first record for Mexico (Tamaulipas, San Luis Potosí, Chiapas), Huerta (1996) reported this species from the locality of Esquipula (Chiapas), and first record from Yucatán (Huerta, 2002) and Veracruz (Huerta et al., 2012).

*Stilobezzia (Stilobezzia) kiefferi* Lane, 1947  
(Fig. 3D)

Synonymy:

*punctipes* Wirth, 1953: 79. USA (Florida).

#### Taxonomic summary

*Material examined:* 1 male, 2 females. Mexico, Tabasco, Cunduacán, locality Huimango 2nd section, sector La Ceiba, site 1: 9 October 2019, CDC trap, coll. personnel of the Health Ministry, 2 females, 1 male (slide mounted deposited in CAIM).

#### Remarks

This species was previously recorded from Mexico from the state of Tamaulipas (Wirth, 1953), Yucatán (Huerta, 2002), Jalisco and Oaxaca (Huerta et al., 2012) and Tabasco (Cazorla, 2016). We provide a new locality record from Tabasco.

*New record:* Cunduacán, locality Huimango 2nd section, sector La Ceiba, Tabasco, Mexico (Fig. 1).

*Distribution.* USA (Florida), Mexico (Tamaulipas, Jalisco, Tabasco, Oaxaca, Yucatán), Belize, Panama, Brazil, Jamaica and Argentina.

#### Discussion

This study increases the biting midge fauna from Tabasco State to 12 species of *Culicoides*, 2 species of *Stilobezzia* and 1 species of *Forcipomyia (Lasiohelea)*. However, the study on the fauna of ceratopogonids in the state is still limited (Table 1), and given the different types of vegetation and ecological environments of the state, it is

very probable that many more species could be described in the future.

Various *Culicoides* spp. of medical and veterinary importance are reported (v. gr., *C. furens*, *C. insignis*, *C. paraensis*, and *C. pusillus*). These species are recognized vectors, for being involved in the transmission of viruses and filarial nematodes in the Neotropical region (Borkent & Spinelli, 2007). Entomological surveillance is relevant to detect different species in order to determinate the distribution specific for localities.

### Acknowledgements

To the staff of the Secretaría de Salud y personal del Programa de control de vectores del Centro Nacional de Programas Preventivos y Control de Enfermedades (CENAPRECE) for the states of Tabasco, Campeche, Chiapas, Nayarit, Quintana Roo, Oaxaca, Veracruz, as well as the Organización Panamericana de la Salud (OPS) for their support in the collection of specimens during the study of entomological surveillance of Leishmaniasis in the locality of Huimango, Tabasco. To Lawrence J. Hribar, Florida Key Mosquito Control District, Marathon, Florida, for his input which greatly helped to improve this manuscript.

### References

- Aitken, T. H. G., Wirth, W. W., William, R. W., Davis, J. B., & Tikasingh, E. S. (1975). A review of the bloodsucking midges of Trinidad and Tobago, West Indies (Diptera: Ceratopogonidae). *Journal of Entomology B*, 44, 101–144.
- Blanton, F. S., & Wirth, W. W. (1979). *The sand flies (Culicoides) of Florida (Diptera: Ceratopogonidae)*. Arthropods of Florida and Neighboring Land Areas, Volume 10. Gainesville, Florida: Florida Department of Agriculture and Consumer Services.
- Borkent, A. (2005). Ceratopogonidae. In W. C. Marquardt (Ed.), *Biology of disease vectors* (pp. 113–126). Burlington, Massachusetts: Elsevier Press.
- Borkent, A. (2017). Ceratopogonidae (biting midges). In A. H. Kirk-Spriggs, & B. J. Sinclair (Eds.), *Manual of Afrotropical Diptera. Volume 2. Nematoceros Diptera and lower Brachycera. Suricata 5* (pp. 733–812). Pretoria, South Africa: South African National Biodiversity Institute.
- Borkent, A., & Dominiak, P. (2020). Catalog of the biting midges of the world (Diptera: Ceratopogonidae). *Zootaxa*, 4787, 1–377. <https://doi.org/10.11646/zootaxa.4787.1.1>
- Borkent, A., & Grogan, Jr. W. L. (2009). Catalog of the new world biting midges north of Mexico (Diptera: Ceratopogonidae). *Zootaxa*, 2273, 1–48. <https://doi.org/10.11646/zootaxa.2273.1.1>
- Borkent, A., & Spinelli, G. R. (2000). Catalog of the new world biting midges south of the United States of America (Diptera: Ceratopogonidae). *Contributions on Entomology International*, 4, 1–107.
- Borkent, A., & Spinelli, G. R. (2007). Neotropical Ceratopogonidae (Diptera: Insecta). In J. Adis, J. R. Arias, G. Rueda-Delgado, & K. M. Wantzen (Eds.), *Aquatic biodiversity in Latin America (ABLA)*, Volume 4 (pp. 1–198). Sofia, Moscow: Pensoft.
- Borkent, A., Spinelli, G. R., & Grogan, Jr., W. L. (2009). Ceratopogonidae (biting midges, purrujas). In B. V. Brown, A. Borkent, J. M. Cumming, D. M. Wood, N. E. Woodley, & M. A. Zumbado (Eds.), *Manual of Central American Diptera*. Volume 1 (pp. 407–435). Ottawa: NRC Research Press.
- Cazorla, C. G. (2016). New records of “jejenes” on the subgenus *Stilobezzia* of *Stilobezzia* (Diptera: Ceratopogonidae) from the Neotropical Region. *Revista de la Sociedad Entomológica Argentina*, 75, 186–190.
- Harrup, L. E., Bellis, G. A., Balenghien, T., & Garros, C. (2015). *Culicoides* Latreille (Diptera: Ceratopogonidae) taxonomy: Current challenges and future directions. *Infection, Genetics and Evolution*, 30, 249–266. <https://doi.org/10.1016/j.meegid.2014.12.018>
- Hoch, A. L., Roberts, D. R., & Pinheiro, F. P. (1990). Hot-seeking behavior and seasonal abundance of *Culicoides paraensis* (Diptera: Ceratopogonidae) in Brazil. *Journal American Mosquito Control Association*, 6, 110–114.
- Huerta, H. (1996). *Los ceratopogónidos colectados por Alfonso Dampf en Chiapas, México (Diptera: Ceratopogonidae) (Tesis)*. Facultad de Ciencias, Universidad Autónoma de México. México D.F.
- Huerta, H. (2002). *Ceratopogoninae (Diptera: Ceratopogonidae) de las reservas de Ría Lagartos y Ría Celestún, Yucatán, México (Tesis de maestría, Biología Animal)*. Facultad de Ciencias, Universidad Autónoma de México. México D.F.
- Huerta, H., & Grogan, Jr. W. L. (2017). New species and new records of predaceous midges in the genera, *Schizonyxhelea* Clastrier and *Stilobezzia* Kieffer from Mexico (Diptera: Ceratopogonidae). *Zootaxa*, 4294, 401–418. <https://doi.org/10.11646/zootaxa.4908.2.11>
- Huerta, H., Rodríguez-Castrejón, A. M., Grogan, W. L. Jr., & Ibáñez-Bernal, S. (2012). New records of biting midges of the genus *Culicoides* Latreille from Mexico (Diptera: Ceratopogonidae). *Insecta Mundi*, 211, 1–20.
- Huerta, H., & Spinelli, G. R. (2017). A distinctive new species of biting midge in the subgenus *Euprojoannisia* Brèthes from Mexico with new records of Neotropical species of *Forcipomyia* Meigen (Diptera: Ceratopogonidae). *Zootaxa*, 4329, 189–195. <https://doi.org/10.11646/zootaxa.4329.2.6>
- Ibáñez-Bernal, S., Wirth, W. W., & Huerta, H. (1996). Ceratopogonidae (Diptera). In J. Llorente-Busquets, A. García-Aldrete y E. González-Soriano (Eds.), *Biodiversidad, taxonomía y biogeografía de artrópodos de México: hacia una síntesis de su conocimiento*. Volumen 1 (pp. 567–577). Ciudad de México: Universidad Nacional Autónoma de México.

- INEGI (Instituto Nacional de Estadística y Geografía). (2015). *Anuario estadístico y geográfico de Tabasco*. Ciudad de México: INEGI.
- Kettle, D. S. (1977). Biology and bionomics of bloodsucking ceratopogonids. *Annual Review Entomology*, 22, 33–51.
- Linley, J. R., Hoch, A. L., & Pinheiro, F. P. (1983). Biting midges (Diptera: Ceratopogonidae) and human health. *Journal of Medical Entomology*, 20, 347–364.
- Macfie, J. W. S. (1948). Some species of *Culicoides* (Diptera, Ceratopogonidae) from the state of Chiapas, Mexico. *Annals of Tropical Medicine and Parasitology*, 42, 67–87.
- Mellor, P. S., Boorman, J., & Baylis, M. (2000). *Culicoides* biting midges: Their role as arbovirus vectors. *Annual Review of Entomology*, 45, 307–340.
- Ronderos, M. M., & Spinelli, G. R. (1999). On the subgenus *Forcipomyia* (*Lasiohelea*) in the Neotropical Region (Diptera: Ceratopogonidae). *Transactions of the American Entomological Society*, 125, 151–161.
- Spinelli, G. R., Greiner, E. C., & Wirth, W. W. (1993). The Neotropical bloodsucking midges of the *Culicoides guttatus* group of the subgenus *Hoffmania* (Diptera: Ceratopogonidae). *Contributions of the American Entomological Institute*, 27, 1–91.
- Spinelli, G. R., & Huerta, H. (2015). Four new species of mesoamerican biting midges of the genus *Culicoides* (Diptera: Ceratopogonidae). *Acta Entomologica Musei Nationalis Pragae*, 55, 811–824.
- Vargas, L. (1954). Dos nuevas especies de *Culicoides* Mexicanos (Diptera, Heleidae). *Revista del Instituto de Salubridad y Enfermedades Tropicales*, 14, 25–30.
- Vargas, L., & Wirth, W. W. (1955). *Culicoides blantoni* n. sp. (Diptera, Heleidae). *Revista del Instituto de Salubridad y Enfermedades Tropicales*, 15, 33–35.
- Wirth, W. W. (1953). Biting midges of the heleid genus *Stilobezzia* in North America. *Proceedings United States National Museum*, 103, 57–85.
- Wirth, W. W. (1974). Family Ceratopogonidae. In N. Papavero (Ed.), *A catalog of the Diptera of the Americas, South of the United States*. Fascicle 14 (pp. 1–89). São Paulo: Museum of Zoology of the University of São Paulo.
- Wirth, W. W., & Blanton, F. S. (1959). Biting midges of the genus *Culicoides* from Panama (Diptera: Heleidae). *Proceedings of the United States National Museum*, 109, 237–482.
- Wirth, W. W., & Blanton, F. S. (1973). A review of the maruins or biting midges of the genus *Culicoides* (Diptera: Ceratopogonidae) in the Amazon Basin. *Amazoniana*, 4, 405–470.
- Wirth, W. W., & Blanton, F. S. (1974). *The West Indian sandflies of the genus Culicoides* (Diptera: Ceratopogonidae). Washington D.C.: Agricultural Research Service, United States Department of Agriculture, Technical Bulletin 1474.
- Wirth, W. W., Dyce, A. L., & Peterson, B. V. (1985). An atlas of wing photographs, with a summary of the numerical characters of the Nearctic species of *Culicoides* (Diptera: Ceratopogonidae). *Contributions of the American Entomological Institute*, 22, 1–46.
- Wirth, W. W., Dyce, A. L., & Spinelli, G. R. (1988). An atlas of wing photographs, with a summary of the numerical characters of the Neotropical species of *Culicoides* (Diptera: Ceratopogonidae). *Contributions of the American Entomological Institute*, 25, 1–72.
- Wirth, W. W., & Felipe-Bauer, M. L. (1989). The Neotropical biting midges related to *Culicoides paraensis* (Diptera: Ceratopogonidae). *Memorias do Instituto Oswaldo Cruz*, 84, 551–565.
- Wirth, W. W., & Hubert, A. A. (1960). Ceratopogonidae (Diptera) reared from cacti, with a review of the *copiosus* group of *Culicoides*. *Annals of the Entomological Society of America*, 53, 639–658.