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New records of biting midges of the genus *Culicoides* Latreille from Mexico (Diptera: Ceratopogonidae)

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New records of biting midges of the genus *Culicoides* Latreille from Mexico (Diptera: Ceratopogonidae)

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Abstract. We provide the first records of six species of biting midges (Diptera: Ceratopogonidae) in the genus *Culicoides* Latreille from Mexico: *C. baueri* Hoffman, *C. castillae* Fox, *C. debilipalpis* Lutz, *C. iriartei* Fox, *C. leoni* Barbosa and *C. pusilloides* Wirth and Blanton. In addition, *C. leopoldoi* Ortiz is confirmed from Mexico, and new records are included for 25 other species previously recorded in Mexico: *C. arubae* Fox and Hoffman, *C. blantoni* Vargas and Wirth, *C. crepuscularis* Malloch, *C. daedalus* Macfie, *C. diabolicus* Hoffman, *C. foxi* Ortiz, *C. furens* (Poey), *C. gabaldoni* Ortiz, *C. haematopotus* Malloch, *C. hylas* Macfie, *C. insignis* Lutz, *C. jamaicensis* Edwards, *C. luteovenus* Root and Hoffman, *C. neopulicaris* Wirth, *C. nigrigenus* Wirth and Blanton, *C. pampoikilus* Macfie, *C. panamensis* Barbosa, *C. paraensis* (Goeldi), *C. phlebotomus* (Williston), *C. poikilonotus* Macfie, *C. pusillus* Lutz, *C. stigmatis* Wirth, and all three species in the *C. (Monoculicoides) variipennis* complex, *C. variipennis* (Coquillett), *C. occidentalis* Wirth and Jones, and *C. sonorensis* Wirth and Jones.

Key words. Biting midges, *Culicoides*, Diptera, Ceratopogonidae, Mexico, new records, distribution

Introduction

The biting midge genus *Culicoides* Latreille is the most diverse group in the family Ceratopogonidae (Diptera). Species in this genus occur on all continents except Antarctica and most large oceanic island groups except New Zealand (Borkent and Wirth 1997). Borkent (2010) provided an online subgeneric classification of over 1,350 species of *Culicoides*, including fossil species, contained in 30 subgenera, 39 species groups and miscellaneous unplaced species. Many species are biting pests of humans and other warm-blooded vertebrates, some of which are important vectors of pathogenic viruses, protozoans, and filarial nematodes (Mellor et al. 2000; Borkent 2005).

In their catalog of New World biting midges south of the United States, Borkent and Spinelli (2000) listed 71 species of *Culicoides* in Mexico. However, the genus has not received a modern taxonomic review in this biogeographically diverse nation. Consequently, some species still remain only superficially described and the types of several species await detailed study. Herein, we provide the first records of six species of *Culicoides* from Mexico: *C. baueri* Hoffman, *C. castillae* Fox, *C. debilipalpis* Lutz, *C. iriartei* Fox, *C. leoni* Barbosa and *C. pusilloides* Wirth and Blanton. In addition, *C. leopoldoi* Ortiz is confirmed from this country, and new distributional records are included for 25 other species previously recorded in Mexico.

Material and Methods

All specimens examined are slide-mounted in Canada balsam and housed in the Collection of Arthropods with Medical Importance, Distrito Federal, Mexico (**CAIM**). Other slide-mounted specimens are in the Florida State Collection of Arthropods, Gainesville, Florida, USA (**FSCA**). Additional material was collected for this study with the support of two projects, CONACYT-FOMIX-Veracruz Salud No. 68317 and CONACYT Salud 2009-01-114902. Adults were collected for this study by sweeping vegetation with aerial nets, or captured in Malaise traps or CDC light traps, then preserved in ethanol and subsequently cleared, dissected and mounted on microscope slides in Canada balsam by the techniques described by Borkent and Spinelli (2007).

Morphological terms are those in the chapter on Ceratopogonidae by Downes and Wirth (1981) in the Manual of Nearctic Diptera (McAlpine et al. 1981), except for modifications of certain wing veins and cells proposed by Szadziewski (1996), which were summarized in a table by Spinelli and Borkent (2004) and included in the chapter on Ceratopogonidae in the recent Manual of Central American Diptera (Borkent et al. 2009). Assignment of species to subgenera and species groups follows the system proposed by Borkent (2010). Regardless of how locality and collection data of specimens are presented on specimen labels, this information is presented verbatim in the following order: State, locality/localities data, date(s) of collection, name(s) of collector(s), method(s) of collection, number of specimens and their sexes.

New Records for Mexico

Culicoides (Avaritia) pusilloides Wirth and Blanton

Culicoides pusilloides Wirth and Blanton, 1955: 104 (Panama).

Culicoides (Avaritia) pusilloides: Wirth 1974: 21 (in New World Catalog south of the USA; distribution); Borkent and Spinelli 2000: 28 (in New World catalog south of USA; distribution); Borkent and Spinelli 2007: 63 (in Neotropical Catalog; distribution).

Discussion. This species is widely distributed in the Neotropics and was previously known from Guatemala and Belize to Panama (Borkent and Spinelli 2000, 2007). Two other very similar species in the subgenus *Avaritia* Fox also occur in Mexico, *C. pusillus* Lutz and *C. boydi* Wirth and Mullens. *Culicoides pusilloides* differs from *C. boydi* by the 2nd radial cell that is distinctly pale on its apical half, a shorter proboscis (Proboscis/Head ratio 0.50) and the short, broad aedeagus with sides strongly bowed outward. We provide the first records of *C. pusilloides* from Mexico.

New records. Chiapas, El Vergel, 30 April 1935, light trap, M. F. Alfonso Dampf, 4525 ft, 1 female, 1 male. **New country record.**

Culicoides (Diphaomyia) baueri Hoffman

Culicoides baueri Hoffman, 1925: 297 (Maryland, USA).

Culicoides (Diphaomyia) baueri: Vargas 1960: 40 (as type species of subgenus *Diphaomyia*).

Culicoides (Diphaomyia) haematopotus: Blanton and Wirth 1979: 61 (subgenus *sic*; Florida records; distribution).

Discussion. This species was previously known only from the USA in Colorado, Maryland and Tennessee south to Louisiana and Florida (Borkent and Grogan 2009). Only two species in the subgenus *Diphaomyia* Vargas were previously known from Mexico, *C. blantoni* Vargas and Wirth and *C. haematopotus* Malloch. However, Root and Hoffman (1937) mentioned specimens of *C. baueri* from Distrito Federal, Mexico in the collection of Alfonso Dampf. Vargas (1945) also included Mexican records of *C. baueri* from Guerrero and Tamaulipas. In his Neotropical catalog, Wirth (1974) refers to erroneous

identifications of *C. baueri* by Ortiz and Mirsa (1951) and Forattini (1957), and indicated that these were probably specimens of *C. iriartei* Fox.

During our examination of material in CAIM, we compared specimens of *C. baueri* with specimens of *C. blantoni*, *C. haematopotus*, *C. iriartei* and other species in the subgenus *Diphaomyia*. *Culicoides baueri* differs from *C. blantoni* and *C. haematopotus* by its wing pattern that features a pale line bordering the anterior side of M_1 just below the poststigmatic pale spot in cell r_3 . We identified males of *C. baueri* collected in Puebla, Mexico based on the descriptions and illustrations in Blanton and Wirth (1979) and by comparing them with other specimens of this species from the USA. However, we were unable to confirm earlier records of *C. baueri* from Mexico by Vargas (1945), because his material was not found in the CAIM collection.

New records. Puebla, Atlixco, Metepec, Cañada, 29 November 1993, F. Castro, colecta directa, en madriguera cerca de un río, en reposo, 4 males. **New country record.**

Culicoides (Diphaomyia) iriartei Fox

Culicoides iriartei Fox, 1952: 368 (Venezuela).

Culicoides (Diphaomyia) iriartei: Vargas 1960: 40 (in list of New World species in subgenus *Diphaomyia*).

Discussion. This species is presently known from Guatemala to Colombia, Venezuela, Tobago and Brazil (Borkent and Spinelli 2000, 2007). Two other species in the subgenus *Diphaomyia* have been previously recorded in Mexico, *C. blantoni* and *C. haematopotus*. *Culicoides baueri* is somewhat similar to *C. iriartei*, but differs in lacking distal pale bands on the hind femora and tibiae in that species. We provide the first records of *C. iriartei* from Mexico.

New records. Chiapas, Punta Macuilapa, 22 May 1964, 1 female (FSCA). Veracruz, Fortin, 20 May 1964, F. S. Blanton, 1 female; Perote Nacional, 17 August 1964, 1 female (FSCA). **New country record.**

Culicoides (Haematomyidium) debilipalpis Lutz

Culicoides debilipalpis Lutz, 1913: 60 (Brazil); Macfie 1948: 86 (Mexico, Chiapas).

Culicoides (Haematomyidium) debilipalpis: Vargas 1960: 42 (in list of New World species in subgenus *Haematomyidium*).

Culicoides (Oecacta) debilipalpis: Wirth 1965: 129 (in Nearctic catalog; distribution); Wirth 1974: 29 (in New World Catalog south of the USA; distribution).

Culicoides ichesi Ronderos and Spinelli, 1995: 77 (Argentina).

Culicoides khalafi Beck, 1957: 104 (Florida, USA).

Discussion. Under their distribution section for *C. debilipalpis*, Vitale et al. (1981) stated “A common species in the southeastern U.S. from Maryland and Kentucky to Florida and Louisiana; absent in Texas, Mexico, and the West Indies; present in Central and South America south to Argentina. It is replaced in Texas and Mexico by *C. eadsi* Wirth and Blanton and in West Indies by *C. hoffmani* Fox.” More recently, Borkent and Spinelli (2007) listed this species distribution as “Widespread from the USA (Maryland, Kentucky, Nebraska south to Louisiana and Florida), Guatemala and Belize to Argentina.” Whereas, Borkent and Grogan (2009) listed it from “...Honduras south to Argentina. Macfie (1948) reported *C. debilipalpis* in Mexico from Chiapas based on specimens collected during 1935 in the collection of Alfonso Dampf. However, we have been unable to confirm these records because we were unable to locate his specimens in CAIM. We provide records of *C. debilipalpis* from Mexico based on specimens in the FSCA collected in Veracruz and Yucatán that were identified as this species by Willis Wirth. **Confirmed Mexico record.**

Spinelli and Wirth (1986) considered *C. debilipalpis* a junior (subjective) synonym of *C. lahillei* (Iches) based on overall similarities of specimens of *C. debilipalpis* with the original description and illustrations

of *C. lahillei*. Soon after, Ronderos and Spinelli (1997) examined a single female from the type series of *C. debilipalpis* collected from the Brazilian states of São Paulo and Formosa in the Instituto Oswaldo Cruz, Rio de Janeiro, Brazil. They noted that the palpus of this specimen was illustrated by Costa Lima (1937) who pointed out that it was collected 30 January 1918 from Salto de Iguacu, Paraná, Brazil. Ronderos and Spinelli (1997) concluded that Costa Lima (1937) incorrectly assumed that this specimen was an example of *C. debilipalpis*, and, that it agreed with Iches' (1906) description and illustrations of *C. lahillei*. Therefore, Spinelli and Ronderos resurrected *C. debilipalpis* from synonymy with *C. lahillei*, and noted several morphological differences between females of *C. lahillei* and *C. debilipalpis*. For example, *C. lahillei* has a very slender 3rd palpal segment (palpal ratio 3.70-4.00 vs. 2.00-2.60 in *C. debilipalpis*), a greater number of mandibular teeth (18-22 vs. 14-17 in *C. debilipalpis*), a pale halter (dark in *C. debilipalpis*) and the wing lacks macrotrichia in cell m_2 and anal cell (macrotrichia present in both cells in *C. debilipalpis*). Spinelli and Ronderos also provided illustrations of the male genitalia of both species and noted several features in *C. lahillei* that differ from males of *C. debilipalpis*. For example, males of *C. lahillei* have much shorter apicolateral processes, the aedeagus has a much lower basal arch, the mid-portion of the parameres lack a subapical ventral lobe and the apices only have an indistinct fringe of barbs, sternite 9 has a deeper, broader caudomedian excavation and the ventral root of the gonocoxite is much broader basally. Finally, it is also worth noting that during the brief period that both species were considered conspecific, the Neotropical Wing Atlas (Wirth et al. 1988; fig. 179) featured a photograph of a female wing of *C. lahillei*, which is actually a specimen of *C. debilipalpis* from Panama.

We initially identified female specimens in ethanol of the related, very similar species, *C. eadsi* Wirth and Blanton from Mexico in the CAIM collection. The type series of this species was collected from tree holes in Cameron County, Texas in the extreme southeastern tip of this state just north of the Rio Grande River. Wirth and Blanton (1971) also identified 58 females and 8 males of *C. eadsi* from Nayarit, San Luis Potosí, Sonora and Yucatán, Mexico, but they did not designate these paratypes. More recently, Borkent and Spinelli (2000, 2007) included Cuba, Guatemala and Florida, USA within the geographic range of this species. The aedeagus of male *C. eadsi* has a broad distal portion with a truncate apex that bears five sharply pointed sclerites and the median sclerite is much broader than the two lateral ones on either side. By contrast, the distal portion of the aedeagus of male *C. debilipalpis* is much longer, more slender with a narrow pointed apex.

However, we discovered problems with several published morphometric differences between females of these two species. For example, Wirth and Blanton (1971) gave palpal ratio (PR) 2.80, costal ratio (CR) 0.57 and proboscis/head (P/H) ratio 0.83 for *C. eadsi* and these values were repeated in the Nearctic (Wirth et al. 1985) and Neotropical (Wirth et al. 1988) wing atlases of *Culicoides*. In their "The Sand Flies (*Culicoides*) of Florida" Blanton and Wirth (1979) listed the following for *C. debilipalpis*: PR 2.20, CR 0.65 and P/H 1.00, and, these values were repeated in the Nearctic and Neotropical wing atlases. Based on the illustration of the female palpus of *C. eadsi* in Wirth and Blanton (1971), we calculated 2.33 for PR, which is considerably lower than 2.8 they reported. We then measured five female paratypes of *C. eadsi* that yielded the following: PR 2.44-2.50, CR 0.56-0.58 and P/H 0.81-0.90. We also measured 20 female *C. debilipalpis* from the USA from Florida (n=9), Georgia (n=5), Maryland (n=4), Alabama (n=1), and Virginia (n=1) and 30 females from Mexico (n=8), El Salvador (n=10), Honduras (n=10) and Panama (n=2) and obtained the following means and ranges for these 50 specimens: PR 2.40 (1.90-2.82), CR 0.58 (0.55-0.60) and P/H 0.91 (0.69-1.01). It is now obvious that the CR of female *C. debilipalpis* is much lower than 0.65 as listed by Blanton and Wirth (1979), Wirth et al. (1985) and Wirth et al. (1988). We suspect that the values of this character were inverted and the true value for this character in Blanton and Wirth (1979) was probably meant to be 0.56. It is also apparent that none of these three morphometric characters adequately distinguish females of both species and, therefore, we have not included any new records of *C. eadsi* from Mexico herein.

New records. Veracruz, Fortin, 17 May 1964, F. S. Blanton, 1 female; same data except 30 August 1964, 1 male; same data except Fortin de la Flores, 23 July 1964, 3 females (FSCA). Yucatán, Merida, 31 July 1964, P. J. Spangler, light trap, 5 females (FSCA). **New country record.**

Species Unplaced to Subgenus

Leoni Species Group

Culicoides leoni Barbosa

Culicoides leoni Barbosa, 1952: 17 (Ecuador).

Culicoides (Oecacta) leoni: Wirth 1974: 33 (in New World catalog south of the USA; distribution).

Discussion. The leoni species group is composed of 7 species, 6 of which inhabit the Neotropical region (Borkent and Spinelli 2007). The 7th species, *C. reevesi* Wirth, is known in the Nearctic region from Arizona, California, New Mexico and Utah (Grogan et al. 2004; Borkent and Grogan 2009). The only species previously known from this group in Mexico is *C. gabaldoni* Ortiz, which is widely distributed in the Neotropical region (Borkent and Spinelli 2007).

Culicoides leoni differs from other species in the leoni group by the following combination of characters: sensilla coeloconica on flagellomeres 1, 5-8; female wing length 0.63 mm; wing pattern with the caudal extension of the post-stigmatic pale spot not oblique in cell r_3 and usually connected to vein M_1 ; smaller pale spot on r-m crossvein; one pale spot in cell M_1 near base; and distal pale spot in anal cell abutting wing margin.

This species was previously known from Ecuador (Borkent and Spinelli 2007), and Colombia (Spinelli et al. 2009). We provide the first records of *C. leoni* from Mexico.

New records. Veracruz, Huatusco, Rancho Tenejapa, 7 May 1993, H. Huerta, colecta con aspirador, 2 females. **New country record.**

Fluvialis Species Group

Culicoides castillae Fox

Culicoides castillae Fox, 1946: 251 (Honduras).

Culicoides (Oecacta) castillae: Wirth 1974: 29 (in New World catalog south of the USA; distribution).

Culicoides flochabonnenci Ortiz and Mirsa, 1952: 267. (Venezuela).

Culicoides gibsoni Wirth, 1952b: 246. (Guatemala).

Discussion. The known distribution of this species was Guatemala to Ecuador, Venezuela and Trinidad (Borkent and Spinelli 2007), and, Spinelli et al. (2009) recorded it from Colombia. Two species of the fluvialis species group occur in Mexico, *C. castillae* and *C. leopoldoi* Ortiz, both of which have similar wing patterns. However, in *C. castillae*, the three pale spots in cell r_3 are separated and arranged in a triangle-like pattern. We provide the first record of *C. castillae* from Mexico.

New records. Michoacán, Punta Garnica, 20 August 1964, 9272 ft., 1 male (FSCA). **New country record.**

Culicoides leopoldoi Ortiz

Culicoides leopoldoi Ortiz, 1951: 579 (Venezuela).

Culicoides (Oecacta) castillae: Wirth 1974: 33 (in New World catalog south of the USA; distribution).

Discussion. This species was previously known in the Neotropical region from Guatemala and Belize, south to Trinidad, Bolivia and northeastern Argentina (Borkent and Spinelli 2007). Vargas (1954) provided the first reference of *C. leopoldoi* in Mexico based on specimens identified by Wirth from Chiapas. Of the then 10 known species in the fluvialis species group, Wirth and Blanton (1959) only listed *C.*

leopoldoi from Mexico. However, in his catalog of the Americas south of the United States, Wirth (1974) did not include Mexico under his distribution section for *C. leopoldoi*. Consequently, all subsequent New World distributional references to *C. leopoldoi* did not include Mexico. We provide the first definitive records of this species from Mexico.

New records. Oaxaca, San Juan Guichicovi, El Zarzal, Malaise trap, 24-25 July 2009, S. B. Salceda, A. J. Rodríguez & A. J. Ordoñez, 2 males. **New country record.**

New distributional records of species previously recorded from Mexico

***Culicoides (Anilomyia) nigrigenus* Wirth and Blanton**

Culicoides (Culicoides) nigrigenus Wirth and Blanton, 1956: 222 (Panama).

Culicoides (Anilomyia) nigrigenus: Wirth 1974: 20 (in New World catalog south of the USA; distribution).

Discussion. This species is known from Mexico south to Colombia, Trinidad and northwestern Argentina (Borkent and Spinelli 2007). In Mexico, it was previously known only from Veracruz; we provide the first records from Hidalgo and additional records from Veracruz.

New records. Hidalgo, Tlanchinol carretera Tlanchinol-Aplantlazol, 4 km, 2-6 August 1997, J. Blackaller, S. B. Salceda and G. A. Pérez, Malaise trap, 1 female. **Veracruz**, Teocelo, Texin, 2 September 2008, Entomological brigade JS IV, CDC trap, 1 female.

***Culicoides (Avaritia) pusillus* Lutz**

Culicoides pusillus Lutz, 1913: 52 (Brazil).

Culicoides (Avaritia) pusillus: Fox 1955: 218 (in list of New World species assigned to subgenus *Avaritia*).

Discussion. This primarily Neotropical species ranges from Florida and Mexico south to Brazil and northeastern Argentina (Borkent and Spinelli 2000, 2007). *Culicoides pusillus* is considered to be one of three possible Neotropical species that are capable of vectoring bluetongue to domestic and wild ruminants (Sáenz and Greiner 1994; Borkent 2005). It was previously known in Mexico from only Chiapas; we provide the first records from Tabasco and Veracruz.

New records. Tabasco, Villahermosa, Zoológico, 23 December 2008-8 Jan 2009, A. Villanueva, Malaise trap, 3 females, 3 males. **Veracruz**, Axalan, Plan de Arroyo, 3 September 2008, Entomological brigade JS V, Malaise trap, 1 female; same data except CDC trap, 3 February 2009, 1 male; Juchique de Ferrer, Los Arroyos, 5 February 2009, Entomological brigade JS V, CDC trap, 1 female; same data except 18 February 2010, Malaise trap, 1 female, 1 male; Teocelo, Texin, en cafetal, 2 September 2008, CDC trap, 2 females; Alto Lucero, Arroyo Agrío, 5 September 2008, Malaise trap, 1 female; Fortin de Las Flores, June 1964, F. S. Blanton, 3 females, 3 males (FSCA); same data except 11 July 1964, 3 females (FSCA); same data except 16 July 1964, 1 male (FSCA); same data except 23 July 1964, 2 males (FSCA); same data except 9 August 1964, 2 females, 1 male (FSCA); same data except 11 August 1964, 1 female (FSCA).

***Culicoides (Beltranmyia) crepuscularis* Malloch**

Culicoides crepuscularis Malloch, 1915: 303 (Illinois, USA).

Culicoides (Beltranmyia) crepuscularis: Vargas 1953: 34 (as type species of subgenus *Beltranmyia*).

Discussion. This wide ranging species occurs from southern Canada (British Columbia to Nova Scotia), the USA and Mexico south to Costa Rica (Borkent and Grogan 2009). It was previously known in Mexico from Distrito Federal, Morelos, Sonora and Veracruz (Root and Hoffman 1937, Vargas 1945, Blanton and Wirth 1979, Wirth et al. 1988). We provide the first record from Coahuila.

New record. Coahuila, San Lorena (=San Lorenzo), 29 June 1966, R. E. Woodruff, 1 male (FSCA).

***Culicoides (Culicoides) luteovenus* Root and Hoffman**

Culicoides luteovenus Root and Hoffman, 1937: 156 (Mexico, Distrito Federal); Vargas 1945: 44 (Mexico, Oaxaca); Macfie 1948: 72 (Mexico, Chiapas); Wirth 1952a: 175 (USA, California records, listed from Utah and Washington); Wirth 1955b: 110 (Guatemala; feeding on horses).

Culicoides (Culicoides) luteovenus: Wirth and Blanton 1956: 214.

Culicoides (Anilomyia) luteovenus: Vargas 1960: 37 (in list of species in new subgenus *Anilomyia*).

Discussion. This Neotropical species is currently known from southern Mexico south to Panama (Borkent and Spinelli 2000). Wirth (1952a) recorded *C. luteovenus* in the USA from several localities in California and also listed it from Utah and Washington. Subsequently, Wirth (1965) listed these USA records in the Nearctic Diptera catalog, as did Borkent and Spinelli (2007) in their Neotropical catalog. However, in Wirth's (1974) catalog south of the United States, *C. luteovenus* was not listed from the USA, and it was not included in the Nearctic Wing Atlas (Wirth et al. 1985) or in the recent Nearctic catalog by Borkent and Grogan (2009). Therefore, it is now apparent that earlier records of *C. luteovenus* from the USA probably referred to another species. This species was previously known in Mexico from Chiapas, Distrito Federal and Oaxaca (Root and Hoffman 1937, Macfie 1948, Vargas 1945); we provide the first records from Veracruz.

New records. Veracruz, Ayahualulco, Apanteopan, 12 May 2008, Entomological brigade JS IV, CDC trap, 2 females; same data except 18 May 2009, 1 female.

***Culicoides (Culicoides) neopulicaris* Wirth**

Culicoides neopulicaris Wirth, 1955a: 355 (Texas, USA).

Culicoides (Culicoides) neopulicaris: Vargas 1960: 39 (in list of New World species in subgenus *Culicoides*).

Discussion. The type locality of this species is Kerrville, Kerr County, Texas, but in his original description, Wirth (1955a) also identified four females from San Luis Potosí, Mexico that he did not designate as paratypes. Subsequently, Wirth and Blanton (1969) revised the pulicaris group in North America and identified additional specimens of *C. neopulicaris* from Chiapas, Morelos and Veracruz, Mexico and other material from Costa Rica and El Salvador. In their Nearctic wing atlas, Wirth et al. (1985) also listed this species from Louisiana, USA. We provide the first records from the states of Hidalgo, México and Yucatán, and additional records from Chiapas, Morelos and Veracruz.

New records. Chiapas, Punta Macuilapa, 22 May 1964, 1 female (FSCA). **Hidalgo,** Tlanchinol, Carretera Tlanchinol-Apantlazol, 4 km, 11 March 1997, S. B. Salceda, J. Blackaller and G. A. Pérez, Malaise trap, 1 male (FSCA). **México,** Otumba, Coyotepec, 24 August-14 September 2007, Z. D. Hdez., Malaise trap, 1 female. **Morelos,** El Salto Falls, 17 June 1969, W. & D. Hasse, light trap, 44 females (FSCA). **San Luis Potosí,** El Salto Falls, 9 May 1964, 2 females; same data except April 1965, H. V. Weems, 1 female; same data except 21 April 1965, 1 female (FSCA). **Veracruz,** Actopan, Soyacuautla, 15 May 2008, Entomological brigade JS IV, CDC UV trap, 2 females; Emiliano Zapata, Chavarrillo, 14 May 2008, CDC UV trap, 3 females; same data except 3 September 2008, Entomological brigade JS IV, 2 females; Juchique de Ferrer, Los Arroyos, 5 February 2009, CDC trap, 1 female; same data except 18 February 2010, Entomological brigade JS IV, Malaise trap, 1 female; Atzalan, Plan de Arroyos, 19 May 2009, Entomological brigade JS

IV, CDC trap, 2 females; Vega de Alatorre, Emilio Carranza, 8 September 2009, Entomological brigade JS IV, CDC trap, 1 female; Misantla, Paso Blanco, 23 February 2010, Entomological brigade JS IV, Malaise trap, 1 female. **Yucatán**, Celestun, near Ecoparaíso, 22-25 Jul 1998, H. Huerta & R. C. Pérez, Malaise trap, 1 male; Reserva Ría Lagartos, 8 July 1997, H. Huerta, S. P. Manrique & R. R. Paz, Malaise trap, 1 male.

***Culicoides (Diphaomyia) blantoni* Vargas and Wirth**

Culicoides (Oecacta) blantoni Vargas and Wirth, 1955: 33 (Mexico).

Culicoides (Diphaomyia) blantoni: Vargas 1960: 39 (in list of New World species in the subgenus *Diphaomyia*).

Discussion. The type locality of this species is in Tamaulipas, Mexico (holotype, allotype, paratypes), with additional paratypes from Guerrero, San Luis Potosí and Puebla. In his catalog of the New World south of the USA, Wirth (1974) also listed it from Texas. In their recent Nearctic catalog, Borkent and Grogan (2009) only listed it in Mexico from Sinaloa, Tamaulipas and Morelos, and, although the record from Sinaloa may be accurate, we are not certain of this. We provide the first records from Veracruz and additional records from Guerrero and San Luis Potosí.

New records. **Guerrero**, Iguala, Río Balsas, 26 March 1936, 15 females, 15 males. **San Luis Potosí**, El Salto Falls, April 1965, H. V. Weems, 4 females; same data except 21 April 1965, 1 female; same data except 9 May 1964, F. S. Blanton, 2 females (FSCA). **Veracruz**, Juchique de Ferrer, Los Arroyos, 13 May 2008, CDC trap, 2 females, 9 females; same data except 14 May 2008, Malaise trap, 1 female; same data except 5 February 2009, Entomological brigade JS IV, CDC trap, 17 females; same data except 21 May 2009, 1 female; same data except 4 September 2008, 2 females; Actopan, Soyacuautila, 15 May 2008, Entomological brigade JS IV, CDC UV trap, 4 females; same data except 5 February 2009, 1 female, 2 males; same data except 20 May 2009, 1 female; same data except 4 September 2008, 2 females; Actopan, Arroyo Agrío, 27 June 2006, Entomological brigade JS IV, CDC trap, 4 females; Emiliano Zapata, Chavarrillo, 14 May 2008, Entomological brigade JS IV, CDC trap, 1 female, 1 male; Vega de Alatorre, Emilio Carranza, 9 February 2009, Entomological brigade JS IV, CDC UV trap, 2 females, 1 male; same data except 26 May 2009, 1 female; Misantla, Paso Blanco, 4 February 2009, Entomological brigade JS IV, CDC trap, 1 female; Alto Lucero, Arroyo Agrío, 2 September 2009, Entomological brigade JS IV, CDC trap, 1 female; same data except 5 September 2008, 5 females, 1 male; same data except 5 September 2009, Malaise trap, 1 male; Atzalan, Plan de Arroyos, 1 September 2009, Entomological brigade JS IV, CDC trap, 1 female.

***Culicoides (Diphaomyia) haematopotus* Malloch**

Culicoides haematopotus Malloch 1915: 302 (Illinois).

Culicoides (Diphaomyia) haematopotus: Vargas 1960: 40 (in list of species in new subgenus *Diphaomyia*).

Culicoides (Diphaomyia) haematopotus: Blanton and Wirth 1979: 95 (subgenus *sic*; Florida records; distribution).

Discussion. This wide ranging species occurs in North America from British Columbia to Nova Scotia, throughout the USA south to Honduras. It was first recorded in Mexico by Root and Hoffman (1937) from Distrito Federal, and then Vargas (1945) recorded it from Guerrero and Macfie (1948) from Chiapas. We provide the first records from Puebla and Veracruz.

New records. **Puebla**, Atlixco, Metepec, 29 November 1993, F. Castro, 1 female, 1 male. **Veracruz**, Ayahualulco, Apanteopan, 12 May 2008, Entomological brigade JS IV, CDC trap, 1 female.

***Culicoides (Drymodesmyia) jamaicensis* Edwards**

Culicoides loughnani var. *jamaicensis* Edwards, 1922: 165 (as variety of *C. loughnani*; Jamaica); Macfie 1948: 80 (Chiapas, Mexico).

Culicoides jamaicensis: Wirth 1955b: 112 (Guatemala record).

Culicoides (Drymodesmyia) jamaicensis: Vargas 1960: 40 (in list of New World *Culicoides* in new subgenus *Drymodesmyia*).

Discussion. This wide ranging primarily Neotropical species occurs in the extreme southern portion of the USA in Texas and Florida, south to Colombia and Venezuela and the Caribbean (Borkent and Spinelli 2000, 2007). Macfie (1948) first recorded *C. jamaicensis* in Mexico from Chiapas; we provide the first records from the states of Guerrero, Jalisco, México, Oaxaca, Veracruz and Yucatán.

New records. **Guerrero**, Coyuca de Catalán, Río Balsas, 1 September 1984, S. Ibáñez-Bernal, man-biting, 1 male. **Jalisco**, Estación Biológica de Chamela, 24 February 1994, A. Pescador, J. Palacios & A. Cadena, Malaise trap, 1 female, 2 females. **México**, Otumba, 12 April 2007-4 May 2007, Z. D. Hdez., Malaise trap, 1 female; same data except 24 May-4 June 2007, 1 male; same data except 5-26 June 2007, 1 female; same data except 23 January-13 February 2008, 3 females. **Oaxaca**, San Juan Guichicovi, El Zarzal, 25-26 July 2009, A. Salceda, A. Rodríguez & A. J. Ordóñez, Malaise trap, 1 female. **Veracruz**, Emiliano Zapata, Chavarrillo, 14 May 2008, Entomological brigade JS IV, CDC trap, 1 female; same data except 3 September 2008, 1 female; Actopan, Soyacuautla, 15 May 2008, Entomological brigade JS IV, CDC trap, 5 females; same data except 20 May 2009, 2 females; Actopan, Arroyo Agrío, 27 June 2006, Entomological brigade JS IV, CDC trap, 1 female; Actopan, La Mancha, 16 April 2010, Entomological brigade JS IV, Malaise trap, 1 female; Misantla, Paso Blanco, 14 May 2008, Entomological brigade JS IV, CDC trap, 2 females; same data except 3 September 2008, Malaise trap, 1 female; same data except CDC trap, 1 female; same data except 3 September 2009, 1 female; Juchique de Ferrer, Los Arroyos, 21 May 2009, Entomological brigade JS IV, Malaise trap, 1 female; Vega de Alatorre, Emilio Carranza, 9 September 2008, Entomological brigade JS IV, Malaise trap, 1 female; same data except 26 May 2009, CDC trap, 2 females. **Yucatán**, Celestún, Reserva de Celestún, 21 January 1997, H. Huerta, S. P. Manrique & A. A. Godínez, Malaise trap, 1 male.

***Culicoides (Drymodesmyia) panamensis* Barbosa**

Culicoides panamensis Barbosa, 1947: 22 (Panama).

Culicoides (Culicoides) panamensis: Wirth and Blanton 1959: 334 (review of *Culicoides* of Panama; distribution).

Culicoides (Drymodesmyia) panamensis: Vargas 1960: 40 (in list of New World *Culicoides* in subgenus *Drymodesmyia*).

Culicoides alambicorum Macfie, 1948: 81 (Mexico).

Discussion. This species occurs from Mexico, south to Panama and Jamaica (Borkent and Spinelli 2007). It was previously known in Mexico from Chiapas, Nayarit and Veracruz (Macfie 1948, Wirth and Blanton 1974, Wirth et al. 1988). We provide the first records from the states of Baja California, México, and Morelos, and additional records from Veracruz.

New records. **Baja California**, Isla Monserrat, 17-18 May 1997, Malaise trap, 5 females, 1 male; Isla San Lorenzo, Malaise trap, 10-11 May 1997, 4 females, 19 males. **México**, Otumba, 24 August-14 September 2007, Z. D. Hdez., Malaise trap, 3 females, 3 males; same data except, 12 April-4 May 2007, 9 females, 10 males; same data except 24 May-14 June 2007, 1 female, 2 males; same data except 5-26 June 2007, 8 females, 5 males; same data except 24 August-14 September 2007, 4 females, 3 males; same data except 4-31 October 2007, 6 females, 6 males; same data except 5 November-6 December 2007, 5 females, 6 males; same data except 23 January-13 February 2008, 2 females, 3 males. **Morelos**, Jojutla, San Vicente Aranda, 10 July 1985, S. Ibáñez-Bernal, 1 female. **Veracruz**, Ayahualulco, Apanteopan, 12 May 2008, Entomo-

logical brigade JS IV, CDC trap, 6 females, 8 males; same data except 2 September 2008, Malaise trap, 2 females; same data except 1 September 2008, CDC trap, 2 females, 1 male; Atzalan, Plan de Arroyos, Malaise trap, 2 September 2008, Entomological brigade JS IV, 1 female; same data except 19 May 2009, CDC trap, 6 females; Vega de Alatorre, Emilio Carranza, 13 May 2008, Entomological brigade JS IV, Malaise trap, 1 female; Emiliano Zapata, Chavarrillo, 9 September 2009, Entomological brigade JS IV, Malaise trap, 1 female; same data except, 10 September 2008, CDC trap, 2 females; Juchique de Ferrer, Los Arroyos, 5 February 2009, CDC trap, 1 female; Vega de Alatorre, Los Arroyos, 21 May 2009, Entomological brigade JS IV, CDC trap, 1 female; Teocelo, Texin, 1 September 2009, Entomological brigade JS IV, CDC trap, 2 females; Actopan, Soyacuautla, 20 May 2009, Entomological brigade JS IV, CDC trap, 1 female; same data except, Malaise trap, 1 female; Jalacingo, Guadalupe Victoria, 1 September 2008, Entomological brigade JS IV, CDC trap, 1 male.

***Culicoides (Drymodesmyia) poikilonotus* Macfie**

Culicoides poikilonotus Macfie, 1948: 82 (Mexico).

Culicoides (Oecacta) poikilonotus: Wirth and Blanton 1959: 337 (review of *Culicoides* of Panama; distribution).

Culicoides (Drymodesmyia) poikilonotus: Vargas 1960: 40 (in list of New World *Culicoides* in the subgenus *Drymodesmyia*).

Culicoides cacozelus Macfie, 1948: 82 (Mexico).

Culicoides hertigi Wirth and Blanton, 1953a: 229 (Panama).

Discussion. This primarily Neotropical species ranges from Mexico, south through Central America, Venezuela and Trinidad to Brazil (Borkent and Spinelli 2007). It was previously known in Mexico from only Chiapas (Macfie 1948); we provide the first record from Veracruz.

New record. Veracruz, Fortin de Flores, April 1965, H. V. Weems, 1 female (FSCA).

***Culicoides (Haematomyidium) paraensis* (Goeldi)**

Haematomyidium paraense Goeldi, 1905: 137 (Brazil).

Culicoides paraensis: Lutz 1913: 55 (combination).

Culicoides (Oecacta) paraensis: Wirth and Blanton 1959: 440 (review of *Culicoides* of Panama; distribution).

Culicoides (Haematomyidium) paraensis: Vargas 1960: 42 (in list of New World *Culicoides* in subgenus *Haematomyidium*).

Culicoides undecimpunctatus Kieffer, 1917: 307 (Argentina).

Discussion. This wide ranging species occurs in the USA from Colorado, Nebraska, Wisconsin and Pennsylvania to Louisiana and Florida, south to Argentina (Borkent and Grogan 2009). In Mexico, this species has been previously recorded from San Luis Potosí and Quintana Roo (Blanton and Wirth 1979), and Tabasco and Veracruz (Wirth and Felipe-Bauer 1989). We provide the first records from Chiapas and additional records from San Luis Potosí and Veracruz.

New records. Chiapas, Huixtla, July 1945, M. Macías, planta de luz, 15 females. **San Luis Potosí,** Tamazunchale, La Fortuna, September 1944, M. Macías, 20 females; same data except Tamán, July 1945, 25 females. **Veracruz,** Ayahualulco, Apanteopan, Malaise trap, 12 May 2008, Entomological brigade JS IV, 2 females; Teocelo, Texin, 14 May 2008, Entomological brigade JS IV, Malaise trap, 1 female; same data except 2 September 2008, CDC trap, 1 female; same data except 1 September 2009, 2 females; Vega de Alatorre, Emilio Carranza, 12 May 2008, Entomological brigade JS IV, Malaise trap, 1 female; same data except 25 May 2009, 1 female; same data except 26 May 2009, 1 female; Actopan, Soyacuautla, 4 September 2008, Entomological brigade JS IV, Malaise trap, 1 female; same data except 4 September 2008, CDC

trap, 1 female; same data except 7 September 2009, 1 female; Juchique de Ferrer, Los Arroyos, 21 May 2009, Entomological brigade JS IV, CDC UV trap, 1 female; Alto Lucero, Arroyo Agrío, 5 September 2008, Entomological brigade JS IV, CDC trap, 1 female.

***Culicoides (Hoffmania) diabolicus* Hoffman**

Culicoides diabolicus Hoffman, 1925: 294 (Panama).

Culicoides (Hoffmania) diabolicus: Fox 1948: 24 (in list of New World species in subgenus *Hoffmania*).

Discussion. This Neotropical species ranges from Mexico south to Venezuela and Ecuador (Borkent and Spinelli 2007). It has been recorded in Mexico from Chiapas and Veracruz (Vargas 1945); we provide the first records from Oaxaca and additional records from Veracruz.

New records. **Oaxaca**, San Juan Guichicovi, El Zarzal, 24-25 July 2009, S. B. Salceda, A. Rodríguez & A. J. Ordoñez, light trap, 1 female. **Veracruz**, Teocelo, Texin, 1 September 2009, Entomological brigade JS IV, CDC trap, 9 females; same data except 2 September 2008, 15 females; Alto Lucero, Arroyo Agrío, 5 September 2008, Entomological brigade JS IV, Malaise trap, 1 female, 2 males; Emiliano Zapata, Chavarrillo, 10 September 2008, Entomological brigade JS IV, CDC trap, 1 female.

***Culicoides (Hoffmania) foxi* Ortiz**

Culicoides foxi Ortiz, 1950: 461 (Puerto Rico).

Culicoides (Hoffmania) foxi: Wirth and Blanton 1959: 283 (review of *Culicoides* of Panama; distribution).

Discussion. This wide ranging Neotropical species is known from Mexico south to Bolivia and north-eastern Argentina and Puerto Rico (Borkent and Spinelli 2007). It was previously known in Mexico from only Veracruz (Wirth and Blanton 1974); we provide the first records from Oaxaca and additional records from Veracruz.

New records. **Oaxaca**, San Juan Guichicovi, El Zacatal, 26-28 July 2009, S. B. Salceda, A. Rodríguez & A. J. Ordoñez, CDC trap, 1 female; Istmo de Tehuantepec, Jaltepec river, 21 May 1964, 27 females. **Veracruz**, Atzalan, Plan de Arroyos, 26 Feb 2008, Entomological brigada JS IV, CDC trap, 2 females; Alto Lucero, Arroyo Agrío, 2 September 2009, Entomological brigade JS IV, CDC trap, 1 male; same data except 5 September 2008, Malaise trap, 1 male; same data except CDC trap, 1 male; Actopan, Soyacuautla, 4 September 2008, Entomological brigade JS IV, CDC trap, 1 female.

***Culicoides (Hoffmania) hylas* Macfie**

Culicoides hylas Macfie, 1940: 26 (Guyana).

Culicoides (Hoffmania) hylas: Wirth and Blanton 1959: 276 (review of *Culicoides* of Panama; distribution).

Discussion. This Neotropical species ranges from Mexico south to Guyana, Peru and Brazil (Borkent and Spinelli 2007). It is known in Mexico from only Veracruz; we provide additional records from this state.

New records. **Veracruz**, Atzalan, Plan de Arroyos, 26 February 2008, Entomological brigade JS IV, CDC trap, 4 males, 1 female; same data except 3 February 2009, 2 females, 1 male; Misantla, Paso Blanco, 2 September 2009, Malaise trap, 1 female; same data except 3 September 2009, CDC trap, 3 females; Juchique de Ferrer, Los Arroyos, 7 September 2009, Entomological brigade JS IV, CDC trap, 2 females.

***Culicoides (Hoffmania) insignis* Lutz**

Culicoides insignis Lutz, 1913: 51 (Brazil).

Culicoides (Hoffmania) insignis: Fox, 1948: 25 (in new subgenus *Hoffmania*).

Culicoides inamollae Fox and Hoffman, 1944: 110 (Puerto Rico).

Culicoides painter Fox, 1946: 257 (Honduras).

Discussion. This primarily Neotropical species occurs in the southeastern USA in Alabama, Georgia and Florida (Borkent and Grogan 2009), and in Mexico south through Central America to central Argentina, and in the Caribbean region (Borkent and Spinelli 2007). It was previously known in Mexico from Chiapas and Yucatán (Macfie 1948, Blanton and Wirth 1979, Borkent and Spinelli 2007); we provide the first records from Tabasco and Veracruz. *Culicoides insignis* is one of three possible vectors of bluetongue in the Neotropical Region (Sáenz and Greiner 1994; Borkent 2005).

New records. **Tabasco**, Villahermosa, Zoológico Central, 23 December 2008-8 January 2009, A. Villanueva, Malaise trap, 2 males, 4 females. **Veracruz**, Actopan, Arroyo Agrío, 14 February 2008, Entomological brigade JS IV, Malaise trap, 1 female; same data except 16 April 2010, CDC UV trap, 1 female; Teocelo, Texin, 3 September 2008, Entomological brigade JS IV, Malaise trap, 1 female; Atzalan, Plan de Arroyos, 19 May 2009, Entomological brigade JS IV, CDC trap, 1 female; Alto Lucero, Arroyo Agrío, 2 September 2009, Entomological brigade JS IV, CDC trap, 3 females; same data except 5 September 2008, Malaise trap, 6 females, 15 males; same data except CDC trap, 4 males; Juchique de Ferrer, Los Arroyos, 4 September 2008, Entomological brigade JS IV, CDC trap, 1 female; Misantla, Paso Blanco, 23 February 2010, Entomological brigade JS IV, Malaise trap, 1 female.

***Culicoides (Macfiella) phlebotomus* (Williston)**

Ceratopogon phlebotomus Williston, 1896: 281 (St. Vincent).

Culicoides phlebotomus: Kieffer 1906: 55 (combination).

Culicoides (Macfiella) phlebotomus: Fox 1955: 217 (as type species of new subgenus *Macfiella*).

Culicoides amazonius Macfie, 1935: 52 (Brazil).

Discussion. This is a coastal Neotropical species that ranges from Mexico to Ecuador, Jamaica and Brazil (Borkent and Spinelli 2007). It was previously known in Mexico from Guerrero, Sinaloa and Oaxaca (Wirth and Blanton 1953b; Vargas 1954, Wirth and Blanton 1959, Wirth et al. 1988); we provide the first records from Campeche, Quintana Roo and Yucatán.

New records. **Campeche**, Campeche, June 1961, 6 females, 1 male. **Quintana Roo**, Puerto Morelos, 8 females. **Yucatán**, Progreso, May 1961, 14 females, 1 male.

***Culicoides (Monoculicoides) variipennis* complex**

The *variipennis* complex was previously divided into five subspecies by Wirth and Jones (1957), however, their ranges greatly overlapped, and this cast doubts on the validity of this arrangement. Recently, this complex was intensively re-examined morphologically and electrophoretically by Holbrook et al. (2000) who demonstrated that this complex is actually composed of three distinct species: *C. variipennis* (Coquillett), *C. sonorensis* Wirth and Jones, and *C. occidentalis* Wirth and Jones. Two of these species are the primary vectors of two economically important related viral diseases of domestic and wild ruminants in North America: bluetongue, vectored by *C. sonorensis* in primarily sheep, goats and cattle; and, epizootic hemorrhagic disease, vectored by *C. variipennis* in deer and elk. Females of *C. variipennis* are readily distinguished by their slender 3rd palpal segment with a small sensory pit, whereas females of *C. sonorensis* and *C. occidentalis* have a broad 3rd palpal segment with a large palpal pit and are currently morphologically indistinguishable (Holbrook et al. 2000). Males of *C. sonorensis* are distinctive in pos-

sessing spicules on the ventral membrane of their aedeagus, whereas males of *C. variipennis* and *C. occidentalis* lack these spicules and can be difficult to distinguish morphologically, however, their respective ranges are nearly mutually exclusive (Holbrook et al. 2000). This species complex is still poorly known in Mexico ecologically and economically, therefore, we relist all previously known records and provide new records based on specimens we examined in CAIM and the FSCA.

***Culicoides (Monoculicoides) occidentalis* Wirth and Jones**

Culicoides variipennis occidentalis Wirth and Jones, 1957: 21 (California, USA).

Culicoides occidentalis occidentalis: Downes 1978: 63 (change in status).

Culicoides occidentalis: Holbrook et al. 2000: 71 (genetic analysis of *variipennis* complex; distribution).

Culicoides (Monoculicoides) occidentalis: Borkent and Spinelli 2000: 36 (in catalog of the Americas south of the USA; distribution); Borkent and Grogan 2009: 15 (in Nearctic catalog; distribution).

Discussion. This western Nearctic species occurs in southern British Columbia, Canada south to California, Nevada, New Mexico and Texas in the USA, and Mexico in Baja California and Puebla (Holbrook et al. 2000; Borkent and Grogan 2009). We provide an additional record from Baja California.

New records. **Baja California Sur**, Loreto, 10 mi. S. Canipole, 28 August 1959, Radford & Werner, light trap, 3 females, 2 males.

***Culicoides (Monoculicoides) sonorensis* Wirth and Jones**

Culicoides variipennis sonorensis Wirth and Jones, 1957: 18 (Arizona, USA).

Culicoides occidentalis sonorensis: Downes 1978: 63 (change in status).

Culicoides sonorensis: Holbrook et al. 2000: 70 (species status; genetic analysis of *variipennis* complex; distribution).

Culicoides (Monoculicoides) sonorensis: Borkent and Spinelli 2000: 36 (in catalog of the Americas south of the USA; distribution); Borkent and Grogan 2009: 15 (in Nearctic catalog; distribution).

Culicoides variipennis australis Wirth and Jones, 1957: 15 (Louisiana, USA).

Culicoides variipennis albertensis Wirth and Jones, 1957: 17 (Alberta, Canada).

Culicoides occidentalis albertensis: Downes 1978: 63.

Discussion. This wide ranging primarily western Nearctic species occurs in British Columbia and Alberta, Canada and in the USA in Washington, Montana, and South Dakota, south to California, Kansas and Texas and in scattered localities east of the Mississippi River in Illinois, Ohio, Virginia, Maryland, Kentucky, Tennessee, North Carolina, Louisiana, Alabama and Florida, south to Mexico (Borkent and Grogan 2009). Wirth and Jones (1957) listed specimens in Mexico from the states of Guerrero, Distrito Federal, México, Nuevo León, Puebla and Sonora. We provide the first records from Coahuila, Durango, Nayarit and San Luis Potosí, as well as additional records from Distrito Federal and Nuevo León.

New records. **Coahuila**, San Lorena (=San Lorenzo), 29 June 1966, R. E. Woodruff, 5 females (FSCA).

Distrito Federal, Cabello Trailer Park, 14 May 1964, R. E. Woodruff, 10 females, 7 males (FSCA).

Durango, 42 km S Caballos, 3 July 1967, R. E. Woodruff, 1 female (FSCA). **Nayarit**, Tepic, 3000', 21 August 1964, F. S. Blanton, 2 females, 3 males (FSCA). **Nuevo León**, Monterrey, 7 May 1964, F. S. Blanton, 1 female (FSCA). **San Luis Potosí**, El Salto Falls, April 1965, H. V. Weems, 1 female (FSCA).

***Culicoides (Monoculicoides) variipennis* (Coquillett)**

Ceratopogon variipennis Coquillett, 1901: 602 (Virginia, New Jersey, Mexico).

Culicoides variipennis: Kieffer 1906: 55 (combination); Holbrook et al. 2000: 68 (genetic analysis and revision of complex; distribution).

Culicoides variipennis variipennis: Wirth and Jones 1957: 12 (Virginia syntype designated lectotype; revision of *variipennis* complex).

Culicoides (Monoculicoides) variipennis: Khalaf 1954: 40; Borkent and Spinelli 2000: 36 (in catalog of the Americas south of the USA; distribution); Borkent and Grogan 2009: 15 (in Nearctic catalog; distribution).

Discussion. This species primarily inhabits the eastern forest of North America east of the 100th Meridian from Nova Scotia, southern Ontario and Quebec, south to Texas and Florida, with outlying populations in southern British Columbia, Washington and Montana, and Mexico (Borkent and Grogan 2009; Holbrook et al. 2000; Wirth and Jones 1957). This species is known only in México from **Distrito Federal** and the nearby state of México (Holbrook et al. 2000); we relist these two earlier records and provide additional new records from Distrito Federal and the state of México.

Previous records. Distrito Federal, O. W. Barrett, 1 female (syntype, in USNM); **México**, Ixtapan de la Sal, 5,500´ Mex., Mex. 9 VIII 1954, J. G. Chillcott, 1 female (in Canadian National Collection, Ottawa; listed in Holbrook et al. 2000).

New records. Distrito Federal, San Jacinto, 1931-1932, A. Dampf, light trap, 3 females. **México**, Otumba, Coyotepec, 24 May 14-June 2007, Z. D. Hdez, Malaise trap, 1 female.

Culicoides (Oecacta) furens (Poey)

Oecacta furens Poey, 1853: 238 (female; Cuba).

Culicoides furens: Lutz, 1912: 16 (combination).

Culicoides (Oecacta) furens: Khalaf, 1954: 37.

Ceratopogon maculithorax Williston, 1896: 277 (St. Vincent).

Culicoides dovei Hall, 1932: 88 (Georgia, USA).

Culicoides (Oecacta) birabeni Cavalieri, 1966: 59 (Venezuela).

Discussion. This pestiferous human-biting coastal species ranges from Massachusetts south to Florida and Texas in the USA, Mexico south to Ecuador, Brazil and the Caribbean region (Borkent and Spinelli 2007). It was previously known in Mexico from Campeche, Guerrero, Oaxaca, Sinaloa, Sonora, Tabasco, Tamaulipas, Veracruz and Yucatán (Hoffman 1925, Root and Hoffman 1937, Wirth and Blanton 1974). We provide the first records from Baja California, Hidalgo, Nayarit and additional records from Guerrero, Sinaloa, Tabasco, Veracruz, and Yucatán.

New records. Baja California, Isla Smith, 14-15 May 1997, Malaise trap, 15 males, 10 females. **Guerrero**, Coyuca de Catalán, Río Balsas, S. Ibáñez-Bernal, 2 November 1984, 5 females. **Hidalgo**, Tlanchinol, Carretera Tlanchinol-Apantlazol Km 4, 11 March 1997, S. B. Salceda, J. Blackaller & G. A. Pérez, Malaise trap, 2 females. **Nayarit**, Matanchen, 9 February 1959, 15 females. **Sinaloa**, Topolobampo, July 1943, M. Macías, 15 females; Campo Pesquero "Arenitas", 30 May 1984, M. Salinas, 10 females; Teacapán, 20 May 1984, M. Salinas, 10 females. **Tabasco**, Ceibas, 17 June 1958, N. A. Díaz, 15 females. **Veracruz**, Actopan, Arroyo Agrío, 27 June 2006, Entomological brigade JS IV, CDC trap, 4 females; Vega de Alatorre, Emilio Carranza, 8 September 2009, Entomological brigade JS IV, CDC trap, 1 female. **Yucatán**, Celestún, near Ecoparaíso, 4 September 1995, H. Huerta, net, 4 females; same data except 15 January 1998, Mariposa trap, S. Ibáñez-Bernal, S. P. Manrique & H. Huerta, 2 females; same data except 23-26 January 1999, H. Huerta & R. C. Pérez, Malaise trap, 1 male, 2 females; same data except 4 July 1997, light trap, 1 female; same data except 3 July 1997, H. Huerta, R. R. Paz & S. P. Manrique, 10 females, 3 males; Reserva Ría Lagartos, 9 July 1997, Malaise trap, 1 female; same data except 7 December 1995, 2 females; same data except 8 July 1997, S. P. Manrique, R. R. Paz & H. Huerta, light trap, 1 female; same data except 4 April 1997, S. P. Manrique, R. R. Paz & H. Huerta, Malaise trap, 1 male; same data except 14 January 1997, 1 female; same data except 21 January 1997, 4 females; same data except 3 April 1997, 1 female, 3 males; same data except 10 April 1997, light trap, 8 females; same data except 7 March 1997, S.

Ibáñez-Bernal, M. C. L. Miranda, S. P. Manrique & H. Huerta, 1 female; same data except 4 July 1997, Malaise trap, H. Huerta, S. P. Manrique & R. R. Paz, 1 male; same data except 2 April 1997, S. Ibáñez-Bernal, M. C. L. Miranda & H. Huerta, 1 female; same data except 3 July 1997, H. Huerta, S. P. Manrique & R. R. Paz, 1 female; same data except 21 January 1997, A. A. Godinez, man biting, 5 females; same data except 11 April 1997, R. R. Paz, S. P. Manrique & H. Huerta, 2 females; same data except 8 April 1997, S. Ibáñez-Bernal, M. C. L. Miranda, S. P. Manrique & H. Huerta, Malaise trap, 1 female; same data except 9 Abr 1997, Mariposa trap, 1 female; same data except 3 July 1997, R. R. Paz, light trap, 1 female.

Species Unplaced to Subgenus

Daedalus Species Group

Culicoides daedalus Macfie

Culicoides daedalus Macfie, 1948: 83 (Mexico); Borkent and Spinelli 2000: 38 (in catalog of Americas south of the USA; distribution).

Culicoides (Oecacta) daedalus: Wirth and Blanton 1959: 319 (in *Culicoides* of Panama; distribution).

Discussion. This Nearctic and Neotropical species occurs in Arizona and New Mexico in the USA, and Mexico south to Colombia (Spinelli and Borkent 2000, 2007). It was previously known in Mexico from only Chiapas; we provide the first record from Veracruz.

New records. Veracruz, Ayahualulco, Apanteopan, 1 September 2008, Entomological brigade JS IV, CDC trap, 1 female.

Culicoides pampoikilus Macfie

Culicoides pampoikilus Macfie, 1948: 79 (Mexico); Borkent and Spinelli 2000: 38 (in catalog of Americas south of the USA; distribution).

Culicoides (Oecacta) pampoikilus: Wirth and Blanton 1959: 324 (review of *Culicoides* of Panama; distribution).

Culicoides dominicii Ortiz, 1951: 7 (Venezuela).

Discussion. This Nearctic and Neotropical species occurs in the USA in Arizona and New Mexico, and Mexico south to Venezuela (Spinelli and Borkent 2000, 2007). It was previously known in Mexico from Chiapas and Oaxaca (Macfie 1948, Wirth and Blanton 1959); we provide the first record from Veracruz.

New records. Veracruz, Teocelo, Texin, 2 September 2008, Entomological brigade JS IV, CDC trap, 1 male.

Leoni Species Group

Culicoides gabaldoni Ortiz

Culicoides gabaldoni Ortiz, 1954: 221 (Venezuela); Borkent and Spinelli 2000: 39 (in catalog of Americas south of the USA; distribution).

Culicoides (Oecacta) gabaldoni: Wirth and Blanton 1959: 431 (in *Culicoides* of Panama; distribution).

Discussion. This Neotropical species ranges from Mexico south to Ecuador, Venezuela, Trinidad, Brazil, Paraguay and northeastern Argentina (Borkent and Spinelli 2000, 2007). It was previously known in Mexico from only Tabasco (Wirth et al. 1988); we provide the first records from Oaxaca and Veracruz.

New records. Oaxaca, San Juan Guichicovi, El Zacatal, 26-28 July 2009, S. B. Salceda, A. Rodríguez & A. J. Ordoñez, CDC trap, 1 male. **Veracruz,** Alto Lucero, Arroyo Agrío, 2 September 2009, Entomological brigade JS IV, Malaise trap, 1 female; Vega de Alatorre, Emilio Carranza, 26 May 2009, Entomological brigade JS IV, CDC trap, 1 female.

Stigmalis Species Group

Culicoides stigmalis Wirth

Culicoides stigmalis Wirth, 1952b: 245 (Guatemala); Borkent and Spinelli 2007: 75 (in Neotropical catalog; distribution).

Discussion. This Neotropical species occurs in Mexico, Guatemala, Costa Rica and Panama. It is known in Mexico from only Oaxaca (Vargas 1953); we provide the first records from Veracruz.

New records. Veracruz, Juchique de Ferrer, Los Arroyos, 21 May 2009, Entomological brigade JS IV, Malaise trap, 1 female; same data except CDC trap, 1 female; Vega de Alatorre, Emilio Carranza, 10 Feb 2009, Entomological brigade JS IV, Malaise trap, 1 female.

Unplaced to Species Group

Culicoides arubae Fox and Hoffman

Culicoides arubae Fox and Hoffman, 1944: 109 (Aruba); Borkent and Spinelli 2007: 75 (in Neotropical catalog; distribution).

Discussion. This primarily Neotropical species occurs in the USA in Texas, and Mexico south to Colombia and Venezuela, and, in the Caribbean on Aruba and Grenada (Borkent and Spinelli 2007). It was previously known in Mexico from Campeche, Guerrero and Tamaulipas (Wirth et al. 1988); we provide the first records from Veracruz and Yucatán, and additional records from Tamaulipas.

New records. Tamaulipas, Tampico, Laguna del Carpintero, November 1945, M. Macías, 17 females, 2 males. **Veracruz,** Alto Lucero, Arroyo Agrío, 5 September 2008, Entomological brigade JS IV, Malaise trap, 1 male. **Yucatán,** Reserva Ría Lagartos, Malaise trap, 30 August 1995, Malaise trap, 1 female; same data except 8 July 1997, H. Huerta, S. P. Manrique & R. R. Paz, light trap, 1 male; Tizimin, 31 August 1995, H. Huerta, S. P. Manrique & R. R. Paz, Malaise trap, 15 females, 15 males; same data except near Zac Bo, 2 April 1997, S. Ibáñez-Bernal, M. C. L. Miranda, H. Huerta & S. P. Manrique, Malaise trap, 1 male.

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