

# A Catalogue of the Bloodsucking Midges of the Americas (*Culicoides*, *Leptoconops*, and *Lasiohelea*) with Keys to the Subgenera and Nearctic Species, a Geographic Index, and Bibliography

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## INTRODUCTION

The last complete list of *Culicoides* (Vargas, 1949b)<sup>2</sup> included 30 Nearctic and 60 Neotropical species; but so great has been taxonomic activity during the past 5 years that many more species are known today. By the end of June 1954 a total of 198 trivial names had been used for *Culicoides* of the Western Hemisphere, of which 14 pertain to species belonging in other genera and at least 24 are synonyms. In *Leptoconops* 12 names have been used of which 3 are synonyms; and 12 names have also been proposed in *Lasiohelea*.

Recently attempts have been made to divide *Culicoides* into subgenera. The system which follows differs from two previous efforts, those of Khalaf (1954) and Vargas (1953a), in that primary emphasis for separation of the subgenera is placed on the male terminalia. It is possible in this way to retain Khalaf's name *Monoculicoides* even though he included in this subgenus the type of Vargas' *Beltranmyia*. Vargas erected *Beltranmyia* for a small group of species related to *crepuscularis* Malloch, but since the males differ from others only in having a reduced ventral root, it is deemed desirable to use the subgeneric name for a much larger group of species. It has not been possible to place in subgeneric synonymy two names which have been considered synonyms of *Culicoides*, *Synhelea* Kieffer (1925a), which was based on two species never again found, and *Cotocripus* Brèthes (1912), which was based on *caridei*, a disputed species placed in *Culicoides* by some authors and in *Dasyhelea* by others. *Caridei* is here included among those Neotropical species whose males have not been described which probably belong in either *Oecacta* or *Beltranmyia*.

## LITERATURE REVIEW

It is the general opinion today that only three of the genera of Ceratopogonidae occurring in the Western Hemisphere include members which suck mammalian blood; these are *Culicoides*, *Leptoconops*, and *Lasiohelea*. In 1915, Townsend erroneously postulated that two species of *Forcipomyia*,

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<sup>2</sup> For references see Bibliography, pp. 270-85.

*utae* Knab and *townsendi* Knab, both described in 1915, were the vectors of American leishmaniasis. Edwards (1922) and Goetghebuer (1923, 1935) indicated that any records of biting by *Forcipomyia*, *Atrichopogon*, or *Dasyhelea* are very likely in error. The bloodsucking midges affect man's welfare by causing severe annoyance from their bites, to which certain individuals react very strongly (Dampf, 1936a; Hase, 1933; Jobling, 1928; Leclercq, 1950; Mandoul, 1926) and by transmitting human and animal diseases. They are the proven vectors of three human nematodes, *Acanthocheilonema perstans* (Garnham and Harper, 1944; Hopkins, 1952; Hopkins and Nicholas, 1952; Kershaw, 1950; Nicholas, 1953a, Nicholas, *et al.*, 1953; Roman, 1941; Sharp, 1927, 1928); *Acanthocheilonema streptocerca* (Chardome and Peel, 1949; Henrard and Peel, 1949; Van Den Berghe and Chardome, 1952); and *Mansonella ozzardi* (Briceño-Rossi, 1949; Buckley, 1933, 1934a, 1934b; O'Connor, 1937; Romaña and Wygodzinsky, 1950); but not of *Onchocerca volvulus* (Gibson and Ascoli, 1952). Various authors have suspected them to be vectors of fevers of undetermined origin (Huttel, *et al.*, 1953; Loughnan, 1921; Purcell, 1937; Stephens, 1923; Wanson, 1939). As regards animal diseases, they transmit equine and bovine onchocerciasis (Buckley, 1938; Moignoux, 1951; Steward, 1933, 1935; Wehr and Lucker, 1952), African horse sickness and blue tongue of sheep (Bradley, 1954; Du Toit, 1944, 1945), and a filaria of frogs (Desportes, 1941, 1942). On several occasions unidentified filariae have been found in them (Causey, 1938; Dampf, 1936a; Hoffman, 1939; Mirsa, *et al.*, 1952; Sergent, *et al.*, 1933; Vargas, 1941).

A number of workers have dealt with the morphology of the adult (Goetghebuer, 1923; Jobling, 1928; Leon, 1924; Mukerji, 1931a, 1931b; Pomerantzev, 1932; Snodgrass, 1943; Tokunaga, 1937) and of the immature stages (Anderson, 1937; Carter, *et al.*, 1920; Dove, *et al.*, 1932; Fox, 1942; Goetghebuer, 1919; Goetghebuer and Lenz, 1934; Hill, 1947; Hoffman, 1924; Jobling, 1929, 1953; Kettle and Lawson, 1952; Lawson, 1951; Mayer, 1934; Medwedewa, 1927; Painter, 1926; Parker, 1950; Patel, 1921; Patton, 1913; Rieth, 1915; Smith and Lowe, 1948; Thienemann, 1928; Thomsen, 1937; Williams, 1951a, 1951b; Wirth, 1952a, 1952c).

Flight range, seasonal incidence, and other aspects of bionomics have been treated by Atchely and Hull, 1936; Bequaert, 1924; Carpenter, 1951; Downes, 1950; Foley and Picout-Laforest, 1923; Fox, 1952b; Fox and Maldonado, 1953; Gerry, 1953; Glick, 1939; Hull, *et al.*, 1934; Kettle, 1951a, 1951b; Meyers, 1932; Nicholas, 1953b; Parker, 1949; Roberts, 1950; Sergent, 1922; Shields and Hull, 1943; and Woke, 1954.

Control measures against the immature stages include the use of dikes and pumps (Anonymous, 1938, 1941; Dove and Hall, 1934; Hull and Dove, 1935; Hull, *et al.*, 1939, 1943; Platts, *et al.*, 1943) and treatment of the soil with insecticides such as DDT, BHC, dieldrin, and others (Anonymous,

1930; Dorsey, 1947; Curran and Goulding, 1950; Fennah, 1945; Gerry, 1950; Goulding, 1950; Goulding, *et al.*, 1953; Hill and Roberts, 1947; Kettle, 1949, 1952; Labrecque and Goulding, 1954; Labrecque, *et al.*, 1951; Madden, *et al.*, 1946; Rees and Smith, 1950, 1952; Steward, 1946; Wilson, 1951). Adults in houses are controlled by DDT and other sprays (Anonymous, 1947; Bishopp, 1946; Hull and Shields, 1939; Trapido, 1947) and temporary control out-of-doors is often obtained by DDT aerosols (Brescia and Wilson, 1947; Bruce and Blakeslee, 1948; Glasgow and Collins, 1946; Travis, 1949; Wilson, *et al.*, 1949). Various repellents such as dimethyl pthalate and Indalone have been used with success (Applewhite and Cross, 1951; Applewhite and Smith, 1950; Cameron, 1946; Granett, *et al.*, 1949; Holden and Findlay, 1944; Peacock, *et al.*, 1948; Pijoan, *et al.*, 1946; Travis and Morton, 1950; Travis, *et al.*, 1946).

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**KEY TO THE SUBGENERA OF *CULICOIDES* LATREILLE (MALES)**

1. Ninth tergite rounded apically, the apicolateral processes absent or small and convergent..... 2  
     Ninth tergite shaped variously, the apicolateral processes prominent and usually divergent..... 5
2. Aedeagus basally with a long curved hooklike process at the middle  
     *Macfiella*  
     Aedeagus without such a process..... 3
3. Aedeagus triangular with a definite basal marginal band and extended tip; ventral root absent..... *Hoffmania*  
     Aedeagus otherwise, if triangular usually without a basal band; ventral root present..... 4
4. Ventral root long; inner side of basistyle without prominent setae  
     *Avaritia*  
     Ventral root short; inner side of basistyle with prominent setae  
     *Culicoides*
5. Parameres fused medially to form a plate, sometimes with the tips free..... 6  
     Parameres entirely separate..... 7
6. Plate (fused parameres) usually triangular with one apical point or two small lobes; aedeagus not bifid.....*Selfia*

Plate with two apical points and aedeagus often bifid

*Monoculicoides*

7. Parameres fringed with spines or long hairs apically on one side

*Oecacta*

Parameres without such spines.....*Beltranmyia*

**KEY TO THE SUBGENERA OF *CULICOIDES* (FEMALES)**

1. Wing with second radial cell in a light spot..... 2  
    Wing with second radial cell in a dark spot or without spots..... 4
2. Size small, 1.0 to 1.5 mm., wing markings faint and macrotrichiae scanty..... *Avaritia*  
    Size large, 1.5 to 2.5 mm., wing markings distinct and macrotrichiae abundant..... 3
3. Wing with cubital fork in a light area..... *Hoffmania*  
    Wing with cubital fork in a dark area..... *Culicoides*
4. Spermathecae not apparent..... *Selfia*  
    Spermathecae apparent, single or double..... 5
5. Spermatheca single, opening to the duct wide..... *Monoculicoides*  
    Spermathecae usually double, if single the opening to the duct narrow 6
6. Fourth hind tarsal segment cordiform..... *Macfiella*  
    Fourth hind tarsal segment cylindrical..... *Oecacta*, *Beltranmyia*

**MACFIELLA, NEW SUBGENUS**

Male hypopygium with the ninth tergite more or less rounded apically, the apicolateral processes very small. Parameres separate the tips without spines. Aedeagus without a prominent arch, the apical portion long, distally truncate, basally with a long curved hooklike pointed process. Ventral root long with a prominent basal projection, dorsal root about as long as the ventral somewhat boot-shaped. Female with eyes contiguous, wing with second radial cell in a dark spot, spermathecae two, fourth tarsal segment of all the legs cordiform and wider than the fifth. Type, here designated, *Ceratopogon phlebotomus* Williston.

Only two species of this subgenus are known, *phlebotomus* (Williston) and *willistoni* Wirth and Blanton, and both are Neotropical. They are very similar as regards the hypopygium and wing but may be easily distinguished by the mesonotum, which in *willistoni* has a pattern of conspicuous dark spots, while in *phlebotomus* it is greenish gray without a distinct pattern.

**SUBGENUS *HOFFMANIA* FOX**

*Hoffmania*, Fox, 1947, 21. Ortiz, 1950, 437. Vargas, 1953a, 34. Type, by original designation, *Culicoides inamollae* Fox and Hoffman.

Male hypopygium with the ninth tergite rounded apically, the apicolateral processes small and convergent or absent. Parameres entirely separate or fused basally, the tips sometimes with fine hairs on both sides. Aedeagus more or less triangular with a basal marginal sclerotized band and distally extended to form a "peg". Ventral root absent, dorsal root more or less fingerlike. Females with the eyes contiguous; wing with the second radial cell mainly in a light spot and the cubital fork in a light area; spermathecae, two.

Only two species of this subgenus occur in the Nearctic Region, *venustus* Hoffman and *inamollae* Fox and Hoffman. The males may be distinguished by the parameres which in *venustus* are completely separated while in *inamollae* they are joined at their bases by a peculiar loop. The wing of the female of *venustus* usually has two small light spots in cell  $M_1$  beyond the light spot on vein  $M_2$  and the crossvein is in a light spot; the wing of the female of *inamollae* has only one light spot in the tip of cell  $M_1$  and there is a dark spot on the cross vein at its junction with the first radial cell.

Neotropical species (including Mexico).—*bimaculatus* Floch and Abonnenc, *coulinhoi* Barretto, *decor* Williston, *diabolicus* Hoffman, *diminutus* Barbosa, *flavivenula* Lutz, *foxi* Ortiz, *guttatus* (Coquillett), *heliconiae* Fox and Hoffman, *hylas* Macfie, *inamollae* Fox and Hoffman, *insignis* Lutz, *lutzi* Lima, *maruim* Lutz, *ocumarensis* Ortiz, *oliveri* Fox and Hoffman, *recifei* Barbosa, *rozeboomi* Barbosa, *verecundus* Macfie.

#### AVARITIA, NEW SUBGENUS

Male hypopygium with the ninth tergite usually without a median notch and the apicolateral processes absent; in one species (*chiopterus*) with the posterior margin of the ninth tergite concave and the corners prominent but not forming characteristic processes. Parameres separate or joined basally, the tips with or without hairs. Aedeagus various, sometimes triangular. Inner margin of the basistyle without setae; ventral root very long, longer than the dorsal root. Females very small, 1.0–1.5 mm., eyes contiguous; wing markings faint, macrotrichiae scanty, the second radial cell usually in a light spot, but sometimes in a dark spot; spermathecae double. Type, here designated, *Ceratopogon obsoletus* Meigen.

Only two species of this subgenus occur in the Nearctic Region, *obsoletus* (Meigen) and *chiopterus* (Meigen). The females cannot be distinguished easily, but the males may be readily separated by the terminalia; in *chiopterus* the aedeagus is more or less triangular and the ninth sternite has a very wide excavation, but in *obsoletus* the aedeagus is different in shape and the ninth sternite has a narrow deep median notch. The Neotropical *pusillus* Lutz belongs to this subgenus on the basis of the terminalia, which resemble somewhat those of *chiopterus*, however, the female is unusual in that the second radial cell of the wing is in a dark spot.

SUBGENUS *CULICOIDES* LATREILLE

*Culicoides* Latreille, 1809, 251. Type, by original designation, *Culicoides pubicularis* (Linnaeus) as *Culicoides punctata* Latreille. Vargas, 1953a, 33. Khalaf, 1954, 38.

*Haemophructus* Macfie, 1925, 349. Type, by monotypy, *Haemophructus maculipennis* Macfie.

*Prosapelma* Kieffer, 1925a, 417. Type, by original designation, *Prosapelma cinerea* Kieffer.

Male hypopygium with ninth tergite rounded, often projecting at the midline, apicolateral processes usually reduced or absent, sometimes long but weakly sclerotized. Aedeagus various, if triangular without a basal marginal band. Inner margin of the basistyle with prominent setae. Ventral root short, not longer than the dorsal root. Female large, 1.5 to 2.5 mm. long; eyes contiguous or very close together; wings with the second radial cell in a light spot and markings prominent, often with three broad transverse dark stripes, the middle one enclosing the basal portion of the cubital fork in a dark area; spermathecae double.

NEARCTIC FORMS.—*cockerellii cockerellii* (Coquillett), *c. saltonensis* Wirth, *luteovenus* Root and Hoffman, *sordidellus* (Zetterstedt), *tristriatulus* Hoffman, *yukonensis* Hoffman.

NEOTROPICAL SPECIES (INCLUDING MEXICO).—*beebei* Fox, *cova-garciai* Ortiz, *efferus* Fox, *elutus* Macfie, *luteovenus* Root and Hoffman, *yukonensis* Hoffman.

KEY TO THE NEARCTIC SPECIES OF *CULICOIDES* (MALES)

1. Apicolateral processes extending beyond the middle portion of the tergite. . . . . 2  
    Apicolateral processes not extending beyond the middle portion of the tergite. . . . . 3
2. Basistyle with a pronounced hump on the inner margin . . . . . *yukonensis*  
    Basistyle without such a hump . . . . . *tristriatulus*
3. Basal arms of aedeagus short, the distal triangular portion about twice their length. . . . . *luteovenus*  
    Basal arms long, about as long as the distal portion . . . . . *c. cockerelli, c. saltonensis*

KEY TO THE NEARCTIC SPECIES OF *CULICOIDES* (FEMALES)

1. Wing with a dark spot centrally in cell  $Cu_1$ . . . . . *yukonensis*  
    Cell  $Cu_1$  without such a dark spot . . . . . 2
2. Mesonotum with three distinct dark bands. . . . . *tristriatulus*  
    Mesonotum not as above . . . . . 3

- 3. Hind tibiae with basal light bands.....*luteovenus*  
Hind tibiae uniform brown or yellowish..... 4
- 4. Mesonotum usually uniform gray.....*c. saltonensis*  
Mesonotum with two dark spots.....*sordidellus, c. cockerellii*

SUBGENUS *SELFIA* KHALAF

*Selfia* Khalaf, 1954, 38. Type, by original designation, *Culicoides hieroglyphicus* Malloch.

Male hypopygium with ninth tergite of various shapes, apicolateral processes long and divergent. Parameres fused to form a plate usually triangular with one distal point but sometimes with two small lobes. Aedeagus consisting of two sclerotized pieces often fused apically. Ventral root prominent but often partly internal, dorsal root absent or internal. Females with spermathecae unsclerotized, not apparent; wings without spots.

NEARCTIC SPECIES.—*brookmani* Wirth, *denningi* Foote and Pratt, *hieroglyphicus* Malloch, *jamesi* Fox, *multipunctatus* Malloch, *tenuistylus* Wirth. No Neotropical species appear to have been described.

KEY TO THE NEARCTIC SPECIES OF *SELFIA* (MALES)

- 1. Plate (fused parameres) with a pair of lobes distally; aedeagus with three prongs apically..... *multipunctatus*  
Plate without such lobes, more or less triangular; aedeagus not as above..... 2
- 2. Ninth sternite with projecting processes at least three times as long as wide..... *hieroglyphicus*  
Ninth sternite without such processes..... 3
- 3. Aedeagus a pair of boomerang-shaped plates with apices widely separated..... *brookmani*  
Aedeagus not as above..... 4
- 4. Dististyle distally foot-shaped..... *jamesi*  
Dististyle distally slender..... 5
- 5. Apicolateral processes as long as or longer than the distances between their bases..... *tenuistylus*  
Apicolateral processes much shorter than the distances between their bases..... *denningi*

KEY TO THE NEARCTIC SPECIES OF *SELFIA* (FEMALES)

- 1. Mesonotum with small dark dots..... *multipunctatus*  
Mesonotum otherwise..... 2
- 2. Mesonotum with broad light spots..... *hieroglyphicus, denningi*  
Mesonotum uniform brown or with narrow light bands..... 3

3. *Mesonotum* uniform brown..... *brookmani*  
*Mesonotum* with two submedian light bands..... *jamesi*, *tenuistylus*

SUBGENUS *MONOCULICOIDES* KHALAF

*Monoculicoides* Khalaf, 1954, 39. Type, by original designation, *Ceratopogon nubeculosus* Meigen.

Male hypopygium with ninth tergite shaped variously, the apicolateral processes broad and long. Parameres fused to form a plate usually bifid distally with two apical points. Aedeagus usually deeply bifid as well. Dorsal root usually longer than the ventral root and often boot-shaped. Females very large 2.0 mm. or more, with a small round tubercle above the base of each antenna; wings with the second radial cell in a dark spot; spermatheca single, large, often irregular in shape and with opening to the duct wide.

Only two species of this subgenus definitely occur in the Nearctic Region, *variipennis* (Coquillett) and *gigas* Root and Hoffman, which is known only from the female. The two species are easily distinguished by the mesonotum which in *variipennis* has a stippling of prominent brown dots while in *gigas* it is gray with indistinct markings; the spermathecae are also different being C-shaped in the former species and ovate in the latter. No Neotropical species appear to have been described, but *variipennis* occurs in Mexico.

SUBGENUS *OECACTA* POEY

*Oecacta* Poey, 1851, 236. Type, by monotypy, *Oecacta furens* Poey. Kieffer, 1906, 55. Kieffer, 1926, 106. Khalaf, 1954, 36 (in part).

*Haematomyidium* Goeldi, 1905, 137. Type, by original designation, *Haematomyidium paraense* Goeldi.

*Psychophaena* Philippi, 1865, 628. Type, by monotypy, *Culicoides venezuelensis* Ortiz and Mirsa as *Psychophaena pictipennis* Philippi (name preoccupied).

*Diplosella* Kieffer, 1921b, 113. Type, by monotypy, *Diplosella sergenti* Kieffer.

Male hypopygium with ninth tergite quadrangular, wider basally than apically, the apicolateral processes usually long, median cleft usually present. Parameres separate, the tips with spines varying in number and size forming a fringe on one side or with long hairs on one side, often with a lobelike swelling before the tip. Aedeagus with a wide basal arch. Ventral root in almost all the species with a basal projection giving the whole a "boathook" shape, dorsal root fingerlike about as long as the ventral root. Females usually with two spermathecae and wings usually with the second



radial cell included in a dark spot, occasionally wings uniform without dark spots.

NEARCTIC SPECIES.—*baueri* Hoffman, *floridensis* Beck, *furens* (Poey), *haematopotus* Malloch, *mohave* Wirth, *pifanoi* Ortiz; *piliferus* Root and Hoffman, *salihii* Khalaf, *stellifer* (Coquillett), *stilobezzioides* Foote and Pratt, *unicolor* (Coquillett).

NEOTROPICAL SPECIES (INCLUDING MEXICO).—*baueri* Hoffman, *bambusicola* Lutz, *carpenteri* Wirth and Blanton, *dampfi* Root and Hoffman, *dasyophrus* Macfie, *furens* (Poey), *galindoi* Wirth and Blanton, *gorgasi* Wirth and Blanton, *haematopotus* Malloch, *hoffmani* Fox, *iriartei* Fox, *lanei* Ortiz, *leopoldoi* Ortiz, *limai* Barretto, *lopesi* Barretto, *magnipalpis* Wirth and Blanton, *mojingaensis* Wirth and Blanton, *paraensis* (Goeldi), *pifanoi* Ortiz, *piliferus* Root and Hoffman, *propriipennis* Macfie, *scopus* Root and Hoffman, *stigmalis* Wirth, *uniradialis* Wirth and Blanton, *venezuelensis* Ortiz and Mirsa.

KEY TO THE NEARCTIC SPECIES OF *OECACTA* (MALES)

1. Apex of aedeagus bent anteriorly; parameres with several long hairs before the tip..... *stilobezzioides*  
Aedeagus not as above; parameres with spines apically..... 2
2. Arch of aedeagus with a distinct process on each side..... 3  
Arch of aedeagus without such processes..... 5
3. Parameres with a lobelike swelling before the broadly expanded tip  
*haematopotus*  
Parameres without lobelike swellings and the tips not broadly expanded..... 4
4. Processes on arch of aedeagus very long, longer than one-half the apical portion of the aedeagus..... *salihii*  
Processes on arch of aedeagus shorter than one-half the apical portion  
*baueri*
5. Apex of aedeagus clearly divided into lobes..... 6  
Apex of aedeagus not divided, but may be striated..... 7
6. Apicolateral processes longer than the distance between them  
*furens*  
Apicolateral processes shorter than the distance between them  
*pifanoi*
7. Parameres with a lobelike swelling on stem before the tip..... 8  
Parameres slender without lobelike swellings..... 9
8. Fringing spines of parameres limited to an expanded basal portion of tip..... *stellifer*  
Fringing spines not so limited and tip not expanded..... *mohave*

9. Apex of aedeagus truncate and striated; basal projection of ventral root distinct..... *piliferus*  
 Apex of aedeagus pointed or conelike; basal projection of ventral root indefinite..... 10
10. Apicolateral processes long and prominent..... *unicolor*  
 Apicolateral processes very short..... *floridensis*

SUBGENUS *BELTRANMYIA* VARGAS

*Beltranmyia* Vargas, 1953a, 34. Type, by original designation, *Culicoides crepuscularis* Malloch.

Male hypopygium as in *Oecacta* except that the parameres do not have a fringe of spines on one side at the tip. The ventral root is usually long and slender but may be short or even absent and rarely in the shape of a "boat-hook". Females usually with two spermatacae but often with one, otherwise as in *Oecacta*.

NEARCTIC FORMS.—*alaskensis* Wirth, *arboricola* Root and Hoffman, *biguttatus* (Coquillett), *canithorax* Hoffman, *copiosus* Root and Hoffman, *crepuscularis* Malloch, *guttipennis* (Coquillett), *hinmani* Khalaf, *horneae* Foote and Pratt, *loughnani* Edwards, *melleus* (Coquillett), *monoensis* Wirth, *nanus* Root and Hoffman, *niger* Root and Hoffman, *ousairani* Khalaf, *palmerae* James, *pumilus* (Winnertz), *spinus* Root and Hoffman, *stonei* James, *travisi* Vargas, *usingeri* Wirth, *utahensis* Fox, *villosipennis villosipennis* Root and Hoffman, *v. oklahomensis* Khalaf, *weesei* Khalaf, *wirthi* Foote and Pratt.

NEOTROPICAL SPECIES (INCLUDING MEXICO).—*albomacula* Root and Hoffman, *arubae* Fox and Hoffman, *aureus* Ortiz, *bahiensis* Barbosa, *borinqueni* Fox and Hoffman, *briceñoi* Ortiz, *copiosus* Root and Hoffman, *crepuscularis* Malloch, *daedalus* Macfie, *dominicii* Ortiz, *eublepharus* Macfie, *fluvialis* Macfie, *guyanensis* Floch and Abonnenc, *hertigi* Wirth and Blanton, *jamaicensis* Edwards, *kintzi* Wirth and Blanton, *loughnani* Edwards, *macrostigma* Wirth and Blanton, *panamensis* Barbosa, *propinquus* Macfie, *reticulatus* Lutz, *stigmalis* Wirth, *trilineatus* Fox, *wirthomyia* Vargas.

KEY TO THE NEARCTIC SPECIES OF *BELTRANMYIA* (MALES)

1. Ventral root greatly reduced or absent..... 2  
 Ventral root various not greatly reduced or absent..... 3
2. Apex of aedeagus pointed..... *alaskensis*, *crepuscularis*  
 Apex of aedeagus truncate..... *canithorax*
3. Aedeagus consisting of the arch only..... *pumilus*  
 Apex of aedeagus expanded and otherwise modified..... 4

4. Parameres with apex flaring into several radiating points . . . . . 5  
 Parameres not so modified . . . . . 6

5. Apex of aedeagus narrow, not much wider than an apicolateral process  
*spinosus*  
 Apex of aedeagus broadly rounded, much wider than an apicolateral  
 process . . . . . *usingeri*

6. Apex of aedeagus with a conspicuous hooklike process on each side  
 distally . . . . . *melleus*  
 Aedeagus without such processes . . . . . 7

7. Apex of aedeagus with lateral lobes or with a mesal notch . . . . . 8  
 Aedeagus not as above . . . . . 9

8. Apex of aedeagus with 1 or 2 distinct lobes on each side  
*v. villosipennis, v. oklahomensis*  
 Apex of aedeagus with a mesal notch and lateral points . . . *monoensis*

9. Aedeagus deeply excavated at distal third to form distinct shoulders  
 and a narrow apex . . . . . *palmerae*  
 Aedeagus not as above . . . . . 10

10. Membrane spiculate . . . . . 11  
 Membrane bare . . . . . 14

11. Dististyles markedly bent beyond the middle; apex of aedeagus pointed;  
 ventral root short, broad, and mostly internal . . . . . *guttipennis*  
 Dististyles not markedly bent; apex of aedeagus truncate; ventral  
 root slender and external . . . . . 12

12. Ventral roots very long, longer than the dorsal roots and almost  
 meeting . . . . . *biguttatus*  
 Ventral roots shorter, about as long as the dorsal roots . . . . . 13

13. Dististyle short, about one-half as long as basistyle and distally ex-  
 panded . . . . . *copiosus*  
 Dististyle long, about as long as basistyle and distally attenuated  
*weesei*

14. Apex of aedeagus extended to a very slender point  
*arboricola, ousairani*  
 Apex of aedeagus rounded or truncate . . . . . 15

15. Parameres enlarged in middle as wide as or wider than at the base . . 16  
 Parameres slender, tapering to tip, much wider at base than in the  
 middle . . . . . 18

16. Base of parameres bent almost at right angles; ninth tergite without  
 a median notch . . . . . *loughnani*  
 Parameres not as above; ninth tergite with a notch . . . . . 17

17. Dististyle bent at base; ventral root obscure, shorter than dorsal root  
*utahensis*  
 Dististyle not as above; ventral root as long as or longer than dorsal  
 root . . . . . *niger, hinmani*

18. Apicolateral processes very wide at base, each wider than distance between them; ventral root about one-half as long as dorsal root  
*stonei*  
 Apicolateral processes narrower than the distance between them; ventral root about as long or longer than dorsal root. . . . . 19
19. Apical portion of aedeagus much extended giving the whole the shape of an inverted Y. . . . . *travisi, horneae*  
 Apical portion of aedeagus not greatly extended, triangular, massive, giving the whole the shape of an inverted V. . . . . 20
20. Paramere greatly enlarged and footlike at the base. . . . . *wirthi*  
 Paramere not as above. . . . . *nanus*

*Nocivum* Harris, briefly described in 1862, has never been identified and so is omitted from the following key to the females of *Beltranmyia* and *Oecacta*. Also omitted are three species of Foote and Pratt which are known only from the males, *horneae*, *stilobezzioides* and *wirthi*. *Reevesi* Wirth was described only from the female, hence its subgenus cannot be definitely determined, however, it probably belongs in one of these subgenera and is included in the key. There are a number of Neotropical species whose males are undescribed which also appear to belong in these two subgenera, as follows: *acotylus* Lutz, *alahialinus* Barbosa, *alambiculorum* Macfie, *avilaensis* Ortiz and Mirsa, *bennarrochei* Ortiz and Mirsa, *cacozelus* Macfie, *caprilesi* Fox, *caridei* Brèthes, *castillae* Fox, *debilipalpis debilipalpis* Lutz, *d. equatoriensis* Barbosa, *d. glabrior* Macfie, *discrepans* Ortiz and Mirsa, *flocha-bonnenci* Ortiz, and Mirsa, *germanus* Macfie, *gibsoni* Wirth, *ginesi* Ortiz, *guadeloupensis* Floch and Abonnenc, *horticola* Lutz, *leoni* Barbosa, *lichyi* Floch and Abonnenc, *obnoxius* Fox, *pachymerus* Lutz, *pampoikilus* Macfie, *paucienfuscatus* Barbosa, *poikilonotus* Macfie, *pulchripennis* Macfie, *rangeli* Ortiz and Mirsa, *wokei* Fox.

KEY TO THE NEARCTIC SPECIES OF *BELTRANMYIA* AND *OECACTA* (FEMALES)

1. Spermatheca single. . . . . 2  
 Spermathecae double. . . . . 4
2. Ring present; antennal flagellum with segments in a continuous series, segment XI not much larger than X. . . . . *reevesi*  
 Ring absent; an abrupt change in shape between antennal segments X and XI, the latter much larger than the former. . . . . 3
3. Apical half of second radial cell in a light spot; third palpal segment moderate in size; mesonotum without a distinct pattern  
*canithorax*  
 Apical half of second radial cell in a dark spot; third palpal segment large and swollen; mesonotum with a distinct pattern  
*crepuscularis, alaskensis*

4. Wing uniform without light or dark spots.....	5
Wing with light or dark spots.....	8
5. Spermathecae large, dark, without ring.....	6
Spermathecae smaller, light, with ring.....	7
6. Third palpal segment with pit small or indefinite.....	<i>melleus</i>
Third palpal segment with a large pit.....	<i>stonei, weesei</i>
7. Legs uniform brownish black; mesonotum shining black....	<i>monoensis</i>
Legs light yellow, sometimes with knees dark; mesonotum yellow or brown.....	<i>salihi, floridensis, pumilus</i>
8. Wing with only two distinct light spots, one on the cross vein and one just beyond the second radial cell.....	9
Wing with other light spots as well as those on the cross vein and beyond the second radial cell.....	10
9. Hind tibial comb with 5 or 6 spines.....	<i>unicolor</i>
Hind tibial comb with 4 spines.....	<i>usingeri, spinosus, biguttatus</i>
10. Basal half of cell $M_1$ with a light area or with a light spot on vein $M_2$ .....	11
Basal half of cell $M_1$ dark.....	<i>travisi, nanus, hollensis</i>
11. No light spots in the apical halves of cells $R_5$ and $M_1$ and a transverse row of light spots across the middle of the wing.....	<i>niger</i>
Wing not as above.....	12
12. Hind tibial comb with 5 or 6 spines.....	13
Hind tibial comb with 4 spines.....	17
13. Wing with circumscribed light spots straddling veins $M_1$ and $M_2$	14
Wing without such light spots.....	16
14. Light spot on cross vein small hardly extending beyond vein $M_1$	<i>villosipennis</i>
Light spot on cross vein large extending well beyond vein $M_1$ .....	15
15. Vein $Cu_2$ with a light border.....	<i>arboricola, ousairani</i>
Vein $Cu_2$ without a light border.....	<i>guttipennis, v. oklahomensis</i>
16. Cell $R_5$ with 3 light spots, the distal 2 may be connected to form a single inverted U-shaped spot; cell $M_1$ with 3 light spots	<i>stellifer</i>
Cells $R_5$ and $M_1$ with at most 2 light spots.....	<i>unicolor</i>
17. Cell $R_5$ with at least 2 light spots in addition to the one just beyond the second radial cell; mesonotal pattern consisting of many small dark dots.....	<i>furens</i>
Cell $R_5$ with 1 light spot only in addition to the one just beyond the second radial cell; mesonotum not as above.....	18
18. Distal light spot of cell $R_5$ small, near the tip of the wing	<i>haematopotus</i>
Cell $R_5$ not as above.....	19

19. Third palpal segment large and swollen, about  $1\frac{1}{2}$  times as long as the first and second together . . . . . 20  
 Third palpal segment moderate, only slightly longer than the first and second . . . . . 22
20. Cubital fork in a light area, cell  $R_5$  with a dark spot at the middle and at the tip . . . . . *loughmani*  
 Cubital fork in a dark area, cell  $R_5$  not as above . . . . . 21
21. Cell  $R_5$  clearly with a double light spot at the middle; mesonotum with a distinct pattern . . . . . *baueri*  
 Cell  $R_5$  with a faint oval spot at the middle; mesonotum without a pattern . . . . . *copiosus*
22. Last 5 segments of antennal flagellum much shorter than first 8 . . . . . *pifanoi*  
 Last 5 segments about equal to or longer than the first 8 . . . . . 23
23. Size very small, about 1.0 mm . . . . . 24  
 Size larger, about 1.3 mm . . . . . 25
24. Base of vein  $M_2$  straddled by a light spot; mesonotum with a distinct pattern . . . . . *hinmani*  
 Base of vein  $M_2$  without a spot; mesonotum without a pattern . . . . . *mohave*
25. A light spot in the middle of vein  $M_2$  . . . . . *piliferus*  
 A light area at the base of vein  $M_2$  . . . . . *utahensis, palmerae*

### CULICOIDES LATREILLE

#### acotylus Lutz

*Culicoides acotylus* Lutz, 1913, 69 (♀, Salto Augusto, Rio Tapajoz, Brazil). Vargas, 1945, 43. Barbosa, 1947, 10 (♀, Brazil). Macfie, 1948, 74. Ortiz and Peña Garcia, 1948, 6 (Venezuela). Vargas, 1949b, 194. Iriarte, 1950, 391. Ortiz, 1951a, 8 (Venezuela). Ortiz and Mirsa, 1952b, 258 (♀, Venezuela).

*Culicoides acolytus* Lima, 1937, 413.

*Culicoides panamericanus* Fox, 1947, 90 (♀, Mexico).

#### alahialinus Barbosa

*Culicoides alahialinus* Barbosa, 1952, 11 (♀, Limones, Esmeralda, Ecuador).

#### alambiculorum Macfie

*Culicoides alambiculorum* Macfie, 1948, 81 (♀, El Vergel, Chiapas, Mexico).

#### alaskensis Wirth

*Culicoides alaskensis* Wirth, 1951a, 84 (♂ ♀, Valdez, Alaska). Williams, 1951a, 181 (Alaska).

*Culicoides (Monoculicoides) alaskensis* Khalaf, 1954, 40.

**albomacula Root and Hoffman**

*Culicoides albomacula* Root and Hoffman, 1937, 164 (♂ ♀, San Jacinto, D. F., Mexico). Vargas, 1945, 44 (Mexico). Macfie, 1948, 71. Vargas, 1949b, 194. Ortiz, 1950, 462.

*Culicoides albomaculatus* Johannsen, 1943, 779.

*Culicoides (Oecacta) albomacula* Khalaf, 1954, 36.

**amazonius Macfie**

See *Culicoides phlebotomus* (Williston).

**ancorus Coquillett**

*Ceratopogon ancorus* Coquillett, 1902, 87.

*Culicoides ancorus* Kieffer, 1906, 54.

REMARKS.—A species of *Dasyhelea* (Wirth, 1952a, 159).

**arboricola Root and Hoffman**

*Culicoides arboricola* Root and Hoffman, 1937, 166 (♂ ♀, Baltimore, Md.; Georgia, Mississippi, U. S. A.) Fox, 1942, 416 (pupa, Maryland, U. S. A.) Johannsen, 1943, 779. Vargas, 1945, 43. Vargas, 1949b, 194. Ortiz, 1950, 462. Johannsen, 1952, 161. Khalaf, 1952b, 349 (Oklahoma, U. S. A.) Beck, 1952, 103 (Florida, U. S. A.). Snow and Pickard, 1953, 28 (Tennessee, U. S. A.) Foote and Pratt, 1954, 15 (♂ ♀, Florida, Georgia, Illinois, Louisiana, U. S. A.).

*Culicoides (Oecacta) arboricola* Khalaf, 1954, 37.

**arubae Fox and Hoffman**

*Culicoides arubae* Fox and Hoffman, 1944, 109 (♂ ♀, Aruba, D. W. I.). Vargas, 1945, 43. Fox, 1946a, 250. Anduze, *et al.*, 1947, 11 (Venezuela). Barbosa, 1947, 11 (♂ ♀, Venezuela; Canal Zone). Macfie, 1948, 71. Ortiz and Peña Garcia 1948, 7 (Venezuela). Ortiz, 1949, 326 (Venezuela). Floch and Abonnenc, 1949a, 71. Vargas, 1949b, 195. Iriarte, 1950, 369. Ortiz, 1950, 462. Ortiz, 1951a, 10. Ortiz and Mirsa, 1952b, 269 (♂ ♀, Venezuela)

*Culicoides* species (1) Fox, 1942, 420 (pupa, D. W. I.).

*Culicoides variipennis* Ortiz (not Coquillett), 1942, 258 (Venezuela). Iriarte, 1943, 192 (Venezuela).

**aureus Ortiz**

*Culicoides aureus* Ortiz, 1951c, 585 (♀, San Felipe, Yaracuy, Venezuela).

*Culicoides miyamotoi* Wirth and Blanton, 1953b, 231 (♂ ♀, Canal Zone).

REMARKS.—The above synonymy is given on the authority of Wirth (personal communication).

**avilaensis Ortiz and Mirsa**

*Culicoides avilaensis* Ortiz and Mirsa, 1951, 593 (♀, Los Chorros, Miranda, Venezuela).

**bahiensis Barbosa**

*Culicoides bahiensis* Barbosa, 1947, 11 (♂ ♀, Bahia, Brazil). Vargas, 1949b, 195. Ortiz, 1950, 462.

**bambusicola Lutz**

*Culicoides bambusicola* Lutz, 1913, 62 (♂, Brazil). Rieth, 1915, 417. Lima, 1937, 412. Barretto, 1944, 95 (♂, Brazil). Vargas, 1945, 43. Lane, 1947, 166 (larva, pupa, Brazil). Macfie, 1948, 71. Vargas, 1949b, 195.

*Culicoides bambusicolus* Barbosa, 1947, 12 (Brazil). Ortiz, 1950, 462. Barbosa, 1952, 11 (larva, pupa).

*Culicoides (Oecacta) bambusicola* Khalaf, 1954, 37.

**baueri Hoffman**

*Culicoides baueri* Hoffman, 1925, 297 (♀, Baltimore, Md., U. S. A.). Root and Hoffman, 1937, 163 (♂ ♀, Mexico). Johannsen, 1943, 779. James, 1943, 149 (Colorado, U. S. A.) Vargas, 1945, 44 (Mexico). Macfie, 1948, 72. Vargas, 1949b, 195. Ortiz and Mirsa, 1951, 559 (♂ ♀, Venezuela) Wirth, 1952a, 183 (♂ ♀, California, U. S. A.) Johannsen, 1952, 160. Beck, 1952, 104 (Florida, U. S. A.). Snow and Pickard, 1953, 28 (Tennessee, U. S. A.). Foote and Pratt, 1954, 16 (♂ ♀, Georgia, California, Maryland, U. S. A.).

*Culicoides baueri* Ortiz, 1950, 462. Ortiz, 1951a, 9. Ortiz, 1951b, 442 (Venezuela).

*Culicoides (Oecacta) baueri* Khalaf, 1954, 37.

**beebei Fox**

*Culicoides beebei* Fox, 1952a, 366 (♀, Rancho Grande near Maracay, Venezuela).

**bellus Coquillett**

*Ceratopogon bellus* Coquillett, 1902, 87.

*Culicoides bellus* Kieffer, 1906, 54.

REMARKS.—A species of *Alluaudomyia* (Wirth, 1952a, 195).

**benarrochei Ortiz and Mirsa**

*Culicoides benarrochei* Ortiz and Mirsa, 1952a, 127 (♀, Caraballeda, Vargas, Dpto. Federal, Venezuela).



**biguttatus Coquillett**

*Ceratopogon biguttatus* Coquillett, 1901, 604 (♀, Washington, D. C., U. S. A.). Aldrich, 1905, 108.

*Culicoides biguttatus* Kieffer, 1906, 54. Malloch, 1915b, 308 (♀, Illinois, U. S. A.). Hoffman, 1925, 283 (♀, Maryland, Massachusetts, New York, Texas, U. S. A.). Leonard, 1928, 707 (New York, U. S. A.). Metcalf, 1932, 5 (New York, U. S. A.). Metcalf and Sanderson, 1932, 59 (New York, U. S. A.). Jellison and Phillips, 1933, 26 (Montana, U. S. A.). Root and Hoffman, 1937, 170 (♂ ♀, Connecticut, U. S. A.). Thomsen, 1937, 70 (pupa, New York, U. S. A.). Curtis, 1941, 18 (Canada). Johannsen, 1943, 779. Vargas, 1945, 43. Vargas, 1949b, 195. Ortiz, 1950, 462. Wirth, 1951c, 318 (Virginia, U. S. A.). Johannsen, 1952, 160. Beck, 1952, 103 (Florida, U. S. A.). Snow and Pickard, 1953, 28 (Tennessee, U. S. A.). Foote and Pratt, 1954, 16 (♂ ♀, Florida, Georgia, Illinois, Kansas, Maryland, Massachusetts, New Jersey, New York, Ohio, Pennsylvania, Texas, Vermont, Virginia, U. S. A.).

*Culicoides (Oecacta) biguttatus* Khalaf, 1954, 38.

**bimaculatus Floch and Abonnenc**

*Culicoides bimaculatus* Floch and Abonnenc, 1942b, 3 (♀, Cayenne, French Guiana). Barbosa, 1947, 8. Vargas, 1949b, 195. Floch, 1952, 295 (French Guiana).

**borinqueni Fox and Hoffman**

*Culicoides borinqueni* Fox and Hoffman, 1944, 110 (♂ ♀, Palmas Abajo, P. R.). Vargas, 1945, 43. Barbosa, 1947, 12. Wolcott, 1948, 426. Fox 1949, 30 (♂ ♀, Puerto Rico). Vargas, 1949b, 195. Fox and Kohler, 1950, 342 (Puerto Rico). Ortiz, 1950, 462. Fox and Maldonado, 1953, 165, (Puerto Rico).

*Culicoides* species (2) Fox, 1942, 417 (pupa, Puerto Rico).

**briceñoi Ortiz**

*Culicoides briceñoi* Ortiz, 1951a, 10 (Venezuela). Ortiz, 1951b, 445 (♂, Venezuela).

**brookmani Wirth**

*Culicoides brookmani* Wirth, 1952a, 179 (♂ ♀, Arroyo Seco Ranger Station, Monterey Co., Cal., U. S. A.).

*Culicoides (Selfia) brookmani* Khalaf, 1954, 38.

**cacozelus Macfie**

*Culicoides cacozelus* Macfie, 1948, 85 (♀, El Vergel, Chiapas, Mexico) Ortiz, 1951c, 581 (♀, Venezuela).

*Culicoides cacozelus* Vargas, 1949b, 195.

**canithorax Hoffman**

*Culicoides canithorax* Hoffman, 1925, 284 (♀, Brunswick, Ga., U. S. A.). Dove, *et al.*, 1932, 508 (South Carolina, U. S. A.). Atchley and Hull, 1936, 514. Root and Hoffman, 1937, 160 (♂ ♀, Maryland, South Carolina, U. S. A.). Johannsen, 1943, 779. Vargas, 1945, 43. Vargas, 1949b, 195. Dove, 1949, 869. Ortiz, 1950, 462. Johannsen, 1952, 160. Beck, 1952, 103 (Florida, U. S. A.). Foote and Pratt, 1954, 17 (♂ ♀, Delaware, Florida, Georgia, Maine, Maryland, Massachusetts, Mississippi, New Jersey, South Carolina, U. S. A.).

*Culicoides mississippiensis* Hoffman, 1926a, 158 (♀, Mississippi, U. S. A.). Hinman, 1932, 773 (Louisiana, Mississippi, U. S. A.). Root and Hoffman, 1937, 160 (♀, Louisiana, U. S. A.). Johannsen, 1943, 779. Vargas, 1945, 43. Vargas, 1949b, 195. Foote and Pratt, 1954, 17. Bradley, 1954, 126.

*Culicoides (Beltranmyia) canithorax* Vargas, 1953a, 35.

*Culicoides (Monoculicoides) canithorax* Khalaf, 1954, 40.

**caprilesi Fox**

*Culicoides caprilesi* Fox, 1952a, 364 (♀, Mount Marahuaca, Venezuela).

**caridei Brèthes**

*Cotocripus caridei* Brèthes, 1912, 451 (♀, Buenos Aires, Argentina). Lutz, 1914, 81.

*Centrorhynchus setifer* Lutz, 1913, 64 (♀, Brazil).

*Culicoides setifer* Edwards, 1922, 166. Vargas, 1945, 43.

*Culicoides caridei* Lane 1945, 366 (♀, Brazil; Argentina). Barbosa, 1947, 13 (Uruguay). Macfie, 1948, 69. Vargas, 1949b, 195.

*Dasyhelea caridei* Lane and Ortiz, 1950, 460.

**castillae Fox**

*Culicoides castillae* Fox, 1946a, 251 (♀, Puerto Castilla, Honduras).

Barbosa, 1947, 7. Macfie, 1948, 73. Vargas, 1949b, 196. Ortiz, 1950, 462.

Ortiz and Mirsa, 1952a, 126.

**carpenteri Wirth and Blanton**

*Culicoides carpenteri* Wirth and Blanton, 1953a, 72 (♂ ♀, Madden Dam, C. Z.).

**chiopterus Meigen**

*Ceratopogon chiopterus* Meigen, 1830, 263 (Europe).

*Ceratolphus chiopterus* Kieffer, 1906, 60 (North America).

*Culicoides chiopterus* Root and Hoffman, 1937, 156 (♂, Maryland, U. S. A.).

Johannsen, 1943, 779. Vargas, 1945, 43. Vargas, 1949b, 196. Ortiz, 1950, 462. Johannsen, 1952, 160. Kettle and Lawson, 1952, 447 (larva, pupa,

England). Downes and Kettle, 1952, 66 (♂ ♀, Scotland). Foote and Pratt, 1954, 18, ♂.

*Culicoides (Culicoides) chiopterus* Khalaf, 1954, 39.

REMARKS.—This species is widely distributed in Europe (Kieffer, 1925b, 76; Goetghebuer and Lenz, 1934, 41; Edwards, 1939, 143; Hill, 1947, 107).

### **cinctus Coquillett**

*Ceratopogon cinctus* Coquillett, 1901, 605.

*Culicoides cinctus* Kieffer, 1906, 54.

REMARKS.—A species of *Dasyhelea* (Wirth, 1952a, 150).

### **cockerellii Coquillett**

*Ceratopogon cockerellii* Coquillett, 1901, 603 (♀, Custer Co., Colo., U. S. A.).

*Ceratopogon cockerelli* Aldrich, 1905, 108.

*Culicoides cockerelli* Kieffer, 1906, 54. Hoffman, 1925, 293 (♀, Colorado, U. S. A.; Canada). Root and Hoffman, 1937, 157 (Canada). Curtis, 1941, 18 (Canada). Johannsen, 1943, 779. James, 1943, 149 (♂, Colorado, U. S. A.). Vargas, 1945, 43. Vargas, 1949b, 196.

*Culicoides cockerellii* Knowlton and Fronk, 1950, 114 (Utah, U. S. A.). Wirth, 1951a, 81 (♂ ♀, Alaska). Wirth, 1952a, 171 (♂ ♀, California, Colorado, Utah, Wyoming, U. S. A.; Alaska; Canada). Foote and Pratt, 1954, 18 (♂ ♀, Montana, Wyoming, U. S. A.).

*Culicoides (Culicoides) cockerellii* Khalaf, 1954, 39.

### **cockerellii saltonensis Wirth**

*Culicoides cockerellii saltonensis* Wirth, 1952a, 173 (♂ ♀, Seeley, Imperial Co., Calif., U. S. A.).

*Culicoides (Culicoides) c. saltonensis* Khalaf, 1954, 39.

### **cockerelli var. tristriatulus Hoffman**

See *Culicoides tristriatulus* Hoffman

### **columbianus Kieffer**

*Culicoides columbianus* Kieffer, 1917b, 304.

*Dasyhelea columbianus* Kieffer, 1919a, 64.

REMARKS.—Macfie, 1948, 69, states that this is not a *Culicoides*.

### **copiosus Root and Hoffman**

*Culicoides copiosus* Root and Hoffman, 1937, 171 (♂ ♀, San Jacinto, D.F., Mexico). Johannsen, 1943, 779. Vargas, 1945, 49 (♂, Mexico). Macfie,

1948, 69. Vargas, 1949b, 196. Ortiz, 1950, 462. Wirth, 1952a, 191 ( $\sigma^7$  ♀, California, U. S. A.).

*Culicoides (Oecacta) copiosus* Khalaf, 1954, 37.

#### **coutinhoi Barretto**

*Culicoides coutinhoi* Barretto, 1944, 96 ( $\sigma^7$ , Mogi das Cruzes e Prainha, S. Paulo, Brazil). Barbosa, 1947, 13 (♀, Brazil). Vargas, 1949b, 196. Ortiz, 1950, 449.

*Culicoides (Culicoides) coutinhoi* Khalaf, 1954, 46.

#### **cova-garciai Ortiz**

*Culicoides cova-garciai* Ortiz, 1950, 457 ( $\sigma^7$  ♀, Caracas, Venezuela). Ortiz, 1951a, 9. Ortiz, 1951b, 444.

*Culicoides (Culicoides) cova-garciai* Khalaf, 1954, 39.

#### **crepuscularis Malloch**

*Culicoides crepuscularis* Malloch, 1915a, 303 ( $\sigma^7$  ♀, Dubois, Ill., Arizona, Michigan, U. S. A.). Hoffman, 1925, 298 (♀, Colorado, Maryland, New Mexico, Texas, U. S. A.). Jellison and Philip, 1933, 26 (Montana, U. S. A.). Root and Hoffman, 1937, 159 ( $\sigma^7$  ♀, Montana, U. S. A.; Mexico). Thomsen, 1937, 70 (pupa, New York, U. S. A.). Adams, 1940, 125 (Missouri, U. S. A.). Curtis, 1941, 18 (Canada). Fox, 1942, 415 (pupa, Maryland, U. S. A.). Johannsen, 1943, 779. James, 1943, 149 (Colorado, U. S. A.). Vargas, 1945, 44 (Mexico). Macfie, 1948, 71. Vargas, 1949b, 196. Knowlton and Fronk, 1950, 113 (Utah, U. S. A.). Ortiz, 1950, 462. Gerry, 1950, 191 (Massachusetts, U. S. A.). Knowlton and Kardos, 1951, 163 (Utah, U. S. A.). Wirth, 1951c, 318 (Virginia, U. S. A.). Wirth, 1952a, 188 ( $\sigma^7$  ♀, California, Colorado, Florida, Georgia, Kansas, Maryland, Minnesota, Montana, Nebraska, South Dakota, Texas, Utah, Virginia, Washington, Wyoming, U. S. A.; Canada). Johannsen, 1952, 160. Khalaf, 1952b, 349 (Oklahoma, U. S. A.). Beck, 1952, 103 (Florida, U. S. A.). Snow and Pickard, 1953, 28 (Tennessee, U. S. A.). Foote and Pratt, 1954, 19 ( $\sigma^7$  ♀, Alabama, Florida, Georgia, Illinois, Kansas, Maryland, Michigan, Montana, New Jersey, New York, South Dakota, Virginia, Utah, Vermont, U. S. A.). Edmunds and Keener, Jr., 1954, 82 (Nebraska, U. S. A.).

*Culicoides (Beltranomyia) crepuscularis* Vargas, 1953a, 35.

*Culicoides (Monoculicoides) crepuscularis* Khalaf, 1954, 40.

#### **daedalus Macfie**

*Culicoides daedalus* Macfie, 1948, 83 ( $\sigma^7$ , El Vergel, Chiapas, Mexico). Vargas, 1949b, 196. Ortiz, 1950, 462. Ortiz and Mirsa, 1952b, 277 ( $\sigma^7$  Venezuela).

*Culicoides* sp. Ortiz, 1951c, 583 (♀, Venezuela).

*Culicoides* (*Oecacta*) *daedalus* Khalaf, 1954, 37.

### **dampfi Root and Hoffman**

*Culicoides dampfi* Root and Hoffman, 1937, 169 (♂ ♀, San Jacinto, D. F., Mexico). Johannsen, 1943, 779. Vargas, 1945, 44 (Mexico). Macfie, 1948, 71. Vargas, 1949b, 197. Ortiz, 1950, 462.

*Culicoides* (*Oecacta*) *dampfi* Khalaf, 1954, 36.

### **dasyophrus Macfie**

*Culicoides dasyophrus* Macfie, 1940a, 27 (♂ ♀, New River, British Guiana). Vargas, 1945, 43. Macfie, 1948, 74. Vargas, 1949b, 197. Ortiz, 1950, 462. Carpenter, 1951, 205 (Canal Zone). Ortiz and Mirsa, 1952a, 126 (♀, Venezuela).

*Culicoides dasyophrus* Barbosa, 1947, 13 (♂, Canal Zone).

### **debilipalpis Lutz**

*Culicoides debilipalpis* Lutz, 1913, 60 (♀, Anhemby, São Paulo, Brazil). Macfie, 1937, 7 (♀, Trinidad). Lima, 1937, 420 (♀, Brazil). Macfie, 1938, 164 (Trinidad). Macfie, 1939, 200 (♀, Brazil). Adamson, 1939, 79 (Trinidad). Floch and Abonnenc, 1942a, 9 (♀, French Guiana). Vargas, 1945, 43. Briceño-Iragorry, 1946, 398 (Venezuela). Anduze *et al.*, 1947, 11 (Venezuela). Barbosa, 1947, 14 (♀, Brazil; Barbados; St. Croix; Trinidad; Venezuela). Macfie, 1948, 86 (♀, Mexico). Briceño-Iragorry, 1949, 318 (Venezuela). Floch and Abonnenc, 1949a, 71 (Venezuela). Vargas, 1949b, 197. Iriarte, 1950, 388. Ortiz, 1951a, 10 (Venezuela). Barbosa, 1952, 12 (pupa, Argentina; Brazil).

### **debilipalpis equatoriensis Barbosa**

*Culicoides debilipalpis equatoriensis* Barbosa, 1952, 13 (♀, Sto. Domingo, Colorados, Ecuador).

### **debilipalpis glabrior Macfie**

*Culicoides debilipalpis* var. *glabrior* Macfie, 1940a, 27 (♀, New River, British Guiana). Vargas, 1945, 43. Barbosa, 1947, 14 (Panama). Macfie, 1948, 73. Vargas, 1949b, 197. Warmke, 1952, 474 (Brazil).

### **decor Williston**

*Ceratopogon decor* Williston, 1896, 281 (♀, St. Vincent). Aldrich, 1905, 108. Kieffer, 1906, 50.

*Culicoides decor* Johannsen, 1943, 779. Vargas, 1945, 43. Macfie, 1948, 68. Vargas, 1949b, 197.

*Culicoides (Hoffmania) decor* Ortiz, 1950, 439.

*Culicoides (Culicoides) decor* Khalaf, 1954, 46.

### **denningi Foote and Pratt**

*Culicoides denningi* Foote and Pratt, 1954, 20 (♂ ♀, Saskatoon, Saskatchewan, Canada; Wyoming, U. S. A.).

### **diabolicus Hoffman**

*Culicoides diabolicus* Hoffman, 1925, 294 (♀, Cabima, Panama). Macfie, 1932, 487 (♀, Colombia). Lima, 1937, 417 (♀, Brazil). Adamson, 1939, 81 (Trinidad). Kumm, *et al.*, 1940, 420 (Costa Rica). Floch and Abonenc, 1942a, 2 (French Guiana). Fairchild, 1943, 572 (Panama). Johannsen, 1943, 779. Vargas, 1944, 163 (♂ ♀, Mexico). Vargas, 1945, 43. Floch, 1952, 295 (French Guiana). Macfie, 1953, 102 (Costa Rica).

*Culicoides* species Dampf, 1936a, 228 (♀, Mexico).

*Culicoides guttatus* var. *diabolicus* Macfie, 1937, 8 (♂ ♀, Trinidad).

*Culicoides filariferus* Hoffman, 1939, 172 (♀, Mexico). Gibson and Ascoli, 1952, 315. Bradley, 1954, 135. Foote and Pratt, 1954, 1.

*Culicoides guttatus (diabolicus)* Macfie, 1940a, 25 (British Guiana). Woke, 1954, 69 (Panama).

*Culicoides pseudodiabolicus* Fox, 1946a, 256 (♀, Trinidad). Vargas, 1949b, 204.

*Culicoides guttatus* Macfie, 1948, 74.

*Culicoides (Hoffmania) diabolicus* Fox, 1948, 24 (♂ ♀, Canal Zone). Ortiz, 1950, 446.

*Culicoides (Culicoides) diabolicus* Khalaf, 1954, 46.

### **diminutus Barbosa**

*Culicoides diminutus* Barbosa, 1951, 163 (new name for *wokei* Barbosa, pre-occupied). Woke, 1954, 68 (Canal Zone; Nicaragua).

*Culicoides wokei* Barbosa (not Fox), 1947, 28 (♂ ♀, Balboa, C. Z.; Mexico; Guatemala; Nicaragua). Vargas, 1949b, 208. Ortiz, 1950, 464.

### **discrepans Ortiz and Mirsa**

*Culicoides discrepans* Ortiz and Mirsa, 1951, 595 (♀, Los Chorros, Miranda, Venezuela).

### **dominicii Ortiz**

*Culicoides dominicii* Ortiz, 1951a, 7 (♂, Ocumare del Tuy, Miranda, Venezuela). Mirsa and Ortiz, 1952, 475 (♀, Venezuela).

*Culicoides (Oecacta) dominicii* Khalaf, 1954, 38.

**dovei Hall**

See *Culicoides furens* (Poey).

**efferus Fox**

*Culicoides efferus* Fox, 1952a, 365 (♀, Rio Charape, Peru).

**elutus Macfie**

*Culicoides elutus* Macfie, 1948, 75 (♀, El Carrizal, Chiapas, Mexico).  
Vargas, 1949b, 197. Wirth, 1952a, 175.

**eublepharus Macfie**

*Culicoides eublepharus* Macfie, 1948, 86 (♀, British Guiana). Vargas, 1949b,  
197. Ortiz, 1952a, 129 (♂ ♀, Venezuela). Ortiz and Mirsa, 1952a, 126

**filariferus Hoffman**

See *Culicoides diabolicus* Hoffman.

**flavivenula Lutz**

*Culicoides flavivenula* Lutz, 1937, 418 (♀, Japuhya, Angra dos Reis,  
Brazil). Floch and Abonnenc, 1942a, 3 (French Guiana). Vargas, 1945, 3.  
Barbosa, 1947, 15 (Brazil). Vargas, 1949b, 198.

*Culicoides (Hoffmania) flavivenula* Fox, 1948, 26. Ortiz, 1950, 448.

*Culicoides (Culicoides) flavivenula* Khalaf, 1954, 46.

**flochabonnenci Ortiz and Mirsa**

*Culicoides flochabonnenci* Ortiz and Mirsa, 1952b, 267 (♀, Los Chorros,  
Miranda, Venezuela).

*Culicoides lichyi* Ortiz and Mirsa (not Floch and Abonnenc) 1951, 601 (♀,  
Venezuela).

**floridensis Beck**

*Culicoides floridensis* Beck, 1951, 135 (♂ ♀, Englewood, Sarasota Co., Fla.,  
U. S. A.). Beck, 1952, 105. Foote and Pratt, 1954, 21.

**fluvialis Macfie**

*Culicoides fluvialis* Macfie, 1940a, 25 (♀, New River, British Guiana).  
Vargas, 1945, 43. Barbosa, 1947, 15. Macfie, 1948, 73. Vargas, 1949b,  
198. Ortiz, 1951a, 2 (♀, Venezuela). Ortiz and Mirsa, 1952b, 264 (♂,  
Venezuela).

**fluviatilis Lutz**

See *Lasiohelea fluviatilis* (Lutz).

**foxi Ortiz**

- Culicoides foxi* Ortiz, 1950, 461 (Venezuela). Ortiz, 1951a, 4 ( $\sigma^7$  ♀, Venezuela). Ortiz, 1951b, 444 (Venezuela). Mirsa, *et al.*, 1952, 161 (Venezuela). Fox and Maldonado, 1953, 165 (Puerto Rico).  
*Culicoides (Hoffmania) guttatus* Fox (not Coquillett), 1948, 23 (♀, in part, Venezuela).  
*Culicoides guttatus* Fox, 1949, 31 ( $\sigma^7$  ♀, Puerto Rico). Fox and Kohler, 1950, 342 (Puerto Rico).  
*Culicoides (Culicoides) foxi* Khalaf, 1954, 39.

**furens Poey**

- Oecacta furens* Poey, 1851, 236 ( $\sigma^7$  ♀, Cuba). Osten-Sacken, 1878, 23. Cockerell, 1894, 419 (Jamaica). Townsend, 1893b, 381 (Jamaica). Townsend, 1897, 17 (Mexico). Aldrich, 1905, 119. Johannsen, 1905, 102. Kieffer, 1906, 55. Pratt, 1907, 28 (Cuba; Montserrat, W. I.; Mexico). Johannsen, 1908, 267. Surcouf and González-Rincones, 1912, 307. Stephens, 1923, 368 (Cuba).  
*Ceratopogon maculithorax* Williston, 1896, 277 (♀, St. Vincent, W. I.). Aldrich, 1905, 109.  
*Culicoides maculithorax* Kieffer, 1906, 54. Johannsen, 1908, 267. Lutz, 1912, 21 (Brazil). Rieth, 1915, 417. Loughnan, 1921, 202 (Jamaica). Edwards, 1922, 164 (Jamaica). Gibson, 1923, 41 (British Honduras).  
*Culicoides furens* Lutz, 1912, 16. Lutz, 1913, 53 (♀, Brazil). Root, 1922, 396 (Puerto Rico). Root, 1924, 208 (Honduras). Bequaert, 1924, 197 (Honduras). Kieffer, 1925a, 419 (♀, Hoffman, 1925, 287 (♀, Cuba; Mexico; Trinidad; Puerto Rico; Canal Zone; Bahama Group; Florida, U. S. A.). Painter, 1926, 245 (Honduras). Wolcott, 1927, 312 (Haiti). Hall, 1932, 88 (Honduras). Meyers, 1932, 1 (Bahamas). Hinman, 1932, 775 (Louisiana, U. S. A.). Buckley, 1933, 257 (St. Vincent). Buckley, 1934a, 99 (St. Vincent). Buckley, 1934b, 1. Myers, 1935, 71 (Trinidad). Van Volkenberg, 1935, 17 (Puerto Rico). Dampf, 1936a, 232 (Mexico). Atchley and Hull, 1936, 514. Wolcott, 1936, 325 (Puerto Rico). Root and Hoffman, 1937, 162 ( $\sigma^7$  ♀, Louisiana, Texas, U. S. A.). Macfie, 1937, 10 ( $\sigma^7$  ♀, Trinidad). Lima, 1937, 414. Tokunaga, 1937, 298. Adamson, 1939, 80 (Trinidad). Wolcott, 1941, 109 (Puerto Rico). Fox, 1942, 418 (pupa, Puerto Rico). Floch and Abonnenc, 1942b, 1 (♀, French Guiana). Johannsen, 1943, 779. Fairchild, 1943, 572 (Panama). Barretto, 1944, 89 ( $\sigma^7$ , Brazil). Beatty, 1944, 144 (St. Croix). Vargas, 1945, 44. Fox, 1946a, 255 (St. John, V. I.; Dominican Republic; Trinidad). Woke, 1947, 364 (Nicaragua). Trapido, 1947, 472 (Panama). Barbosa, 1947, 15 ( $\sigma^7$ , Trinidad; St. Croix; Nicaragua; Honduras; Venezuela; Barbados; Panama; Mexico; British Honduras; Antigua; Cuba; Bahamas; Guatemala;



- Puerto Rico; Jamaica; Florida, Georgia, Maryland, Massachusetts, New Jersey, U. S. A.). Macfie, 1948, 73. Ortiz and Peña Garcia, 1948, 7 (Venezuela). Wolcott, 1948, 426 (Puerto Rico). Briceño-Iragorry, 1949, 318 (Venezuela). Ortiz, 1949, 328 (Venezuela). Dove, 1949, 869 (Florida, U. S. A.). Floch and Abonnenc, 1949a, 71. Floch and Abonnenc, 1949b, 1343 (French Guiana). Vargas, 1949b, 198. Floch and Abonnenc, 1950, 1 (Guadeloupe). Travis and Morton, 1950, 154 (Florida, U. S. A.). Fox and Kohler, 1950, 342 (Puerto Rico). Iriarte, 1950, 375. Ortiz, 1950, 462. Goulding, 1950, 102 (Florida, U. S. A.): Kohler and Fox, 1951, 113 (Puerto Rico). Ortiz, 1951a, 10 (Venezuela). Carpenter, 1951, 205 (Panama). Wirth, 1952c, 95 (larva, pupa, Florida, U. S. A.). Beck, 1952, 104 (Florida, U. S. A.). Fox, 1952b, 888. Barbosa, 1952, 13 (Ecuador). Goulding, *et al.*, 1953, 37 (Florida, U. S. A.). Fox and Maldonado, 1953, 165 (Puerto Rico). Bradley, 1954, 125. Foote and Pratt, 1954, 21 ( $\sigma^7$  ♀, Florida, Georgia, Maryland, Massachusetts, Mississippi, New Jersey, South Carolina, Texas, U. S. A.). Labrecque and Goulding, 1954, 20 (Florida, U. S. A.) Woke, 1954, 71 (Panama; Nicaragua).
- Culicoides dovei* Hall, 1932, 88 ( $\sigma^7$  ♀, Florida, Georgia, North Carolina, South Carolina, U. S. A.). Dove, *et al.*, 1942, 505 (egg, larva, pupa,  $\sigma^7$  ♀, South Carolina, U. S. A.). Hull, *et al.*, 1934, 162 (North Carolina, U. S. A.).
- Culicoides (Oecacta) furens* Khalaf, 1954, 37.

#### **galindoi Wirth and Blanton**

- Culicoides galindoi* Wirth and Blanton, 1953a, 73 ( $\sigma^7$  ♀, Mojinga Swamp, Fort Sherman, C. Z.).

#### **germanus Macfie**

- Culicoides germanus* Macfie, 1940a, 27 ( $\sigma^7$ , New River, British Guiana) Vargas, 1945, 43. Barbosa, 1947, 17. Macfie, 1948, 74.

#### **gibsoni Wirth**

- Culicoides gibsoni* Wirth, 1952b, 246 (♀, Finca San Rafael, San Pedro Yepocapa, Chimaltenango, Guatemala). Gibson and Ascoli, 1952; 317 (Guatemala).

#### **gigas Root and Hoffman**

- Culicoides gigas* Root and Hoffman, 1937, 172 (♀, Fort a la Corne, Canada). Curtis, 1941, 18 (Canada). Leech, 1943, 23 (Canada). Johannsen, 1943, 779. Vargas, 1945, 43. Vargas, 1949b, 198. Ortiz, 1950, 463.

#### **ginesi Ortiz**

- Culicoides ginesi* Ortiz, 1951c, 586 (♀, San Felipe, Yaracuy, Venezuela).

**gorgasi Wirth and Blanton**

*Culicoides gorgasi* Wirth and Blanton, 1953b, 232 (♂ ♀, Las Tablas, Los Santos, Panama).

**griseus Coquillett**

*Ceratopogon griseus* Coquillett, 1901, 602.

*Culicoides griseus* Kieffer, 1906, 54.

REMARKS.—A species of *Dasyhelea* (Wirth, 1952a, 155).

**guadeloupensis Floch and Abonnenc**

*Culicoides guadeloupensis* Floch and Abonnenc, 1950, 2 (♀, St. Claude, Guadeloupe). Ortiz and Mirsa, 1952a, 126.

**guttatus Coquillett**

*Ceratopogon guttatus* Coquillett, 1904, 35 (♀, São Paulo, Brazil).

*Culicoides guttatus* Kieffer, 1906, 54. Lutz, 1912, 16 (Brazil). Lutz (in part), 1913, 58 (♀, Brazil). Neiva and Penna, 1916, 96 (Brazil). Lima, 1937, 416 (♀, Brazil). Macfie, 1939, 199 (Brazil). Vargas, 1944, 164. Barretto, 1944, 91 (♂, Brazil). Vargas, 1945, 43. Barbosa, 1947, 17 (Brazil). Wolcott, 1948, 426. Lane, 1949, 115 (♂ ♀, Brazil). Vargas, 1949b, 199. Ortiz, 1950, 440. Warmke, 1952, 474 (Brazil).

*Culicoides (Culicoides) guttatus* Khalaf, 1954, 39.

REMARKS.—This species has also been reported from British Honduras (Gibson, 1923, 41); Columbia (Macfie, 1932, 448); Trinidad (Macfie, 1938, 164; Adamson, 1939, 79); British Guiana (Macfie, 1940b, 185); Nicaragua (Barbosa, 1947, 17); Venezuela (Ortiz, 1951a, 9); Canal Zone (Carpenter, 1951, 205); French Guiana (Floch, 1952, 295); Guatemala (Gibson and Ascoli, 1952, 317); and Ecuador (Barbosa, 1952, 15). All of these records, however, are questionable because authors do not agree in regard to what zoological species should be ascribed to the name. In 1949 Lane synonymized the following 9 names with *guttatus*: *insignis*, *diabolicus*, *flavivenula*, *filariferus*, *bimaculatus*, *coutinhoi*, *inamollae*, *pseudodiabolicus*, and *painteri*. Other authors, however, do not agree and have their own versions concerning synonymy. In this catalogue all these names are considered good species except *filariferus* and *pseudodiabolicus* (believed to be synonyms of *diabolicus*) and *painteri*, a synonym of *inamollae*.

**guttipennis Coquillett**

*Ceratopogon guttipennis* Coquillett, 1901, 603 (♀, Medina, Ohio, U. S. A.).

Aldrich, 1905, 109. Pratt, 1907, 23 (larva, pupa, ♀, Arizona, Maryland, Ohio, Texas, Virginia, U. S. A.).

*Ceratopogon (Culicoides) guttipennis* Lutz, 1913, 71.

*Culicoides guttipennis* Kieffer, 1906, 54. Malloch, 1915a, 299 (♀, Illinois, U. S. A.). Malloch, 1915b, 306. Kieffer, 1919b, 191. Hoffman, 1924, 88. Hoffman, 1925, 296 (♀, Arizona, Maryland, Texas, Virginia, U. S. A.). Leonard, 1928, 707 (New York, U. S. A.). Hinman, 1932, 774 (Louisiana, U. S. A.). Baker, 1935, 150 (larva, New York, U. S. A.). Root and Hoffman, 1937, 160 (♂ ♀, Connecticut, Louisiana, Maryland, U. S. A.). Fox 1942, 415 (pupa, Maryland, U. S. A.). Johannsen, 1943, 779. Fenton, 1944, 5 (Oklahoma, U. S. A.). Vargas, 1945, 43. Ortiz, 1950, 463. Wirth, 1951c, 318 (Virginia, U. S. A.). Khalaf, 1952b, 349 (Oklahoma, U. S. A.). Johannsen, 1952, 161. Snow and Pickard, 1953, 28 (Tennessee, U. S. A.). Foote and Pratt, 1954, 22 (♂ ♀, Florida, Georgia, Maryland, Missouri, Ohio, Oklahoma, Texas, Virginia, Vermont, U. S. A.).

*Culicoides guttipennis* Vargas, 1949b, 199.

*Culicoides (Oecacta) guttipennis* Khalaf, 1954, 38.

#### **guyanensis Floch and Abonnenc**

*Culicoides guyanensis* Floch and Abonnenc, 1942a, 5 (♂ ♀, Cayenne, French Guiana). Barbosa, 1947, 19 (♂, Brazil; Canal Zone; Trinidad). Macfie, 1948, 80. Vargas, 1949b, 199. Ortiz, 1950, 463. Ortiz, 1951a, 9 (Venezuela). Floch, 1952, 295 (French Guiana). Woke, 1954, 68 (Canal Zone).

*Culicoides stellifer* Macfie (not Coquillett), 1937, 12 (♀, Trinidad). Macfie, 1938, 165 (Trinidad). Adamson, 1939, 80 (Trinidad).

*Culicoides recifensis* Barbosa, 1943, 263 (♀, Brazil). Vargas, 1945, 43.

*Culicoides stubalensis* Fox, 1946a, 254 (♀, Trinidad).

#### **haematopotus Malloch**

*Culicoides haematopotus* Malloch, 1915a, 302 (♂ ♀, Urbana, Ill., U. S. A.). Malloch, 1915b, 308. Hoffman, 1925, 299 (♀, Maryland, U. S. A.). Root and Hoffman, 1937, 161 (♂ ♀, District of Columbia, Kansas, New Mexico, U. S. A.; Mexico). Thomsen, 1937, 70 (pupa, New York, U. S. A.). James, 1943, 149 (Colorado, U. S. A.). Johannsen, 1943, 779. Vargas, 1945, 44 (Mexico). Macfie, 1948, 71. Vargas, 1949b, 199. Knowlton and Fronk, 1950, 114 (Utah, U. S. A.). Ortiz, 1950, 463. Wirth, 1951c, 318 (Virginia, U. S. A.). Wirth, 1952a, 182 (♂ ♀, California, Colorado, Georgia, Louisiana, Maryland, Nevada, New Mexico, Oklahoma, Texas, U. S. A.). Khalaf, 1952b, 349 (Oklahoma, U. S. A.). Johannsen, 1952, 160. Snow and Pickard, 1953, 28 (Tennessee, U. S. A.). Foote and Pratt, 1954, 23 (♂ ♀, Florida, Georgia, Illinois, Louisiana, Michigan, New York, Ohio, Pennsylvania, Tennessee, Utah, Virginia, U. S. A.). Edmunds and Keener, Jr., 1954, 83 (Nebraska, U. S. A.).

*Culicoides (Oecacta) haematopotus* Khalaf, 1954, 37.

**heliconiae Fox and Hoffman**

*Culicoides heliconiae* Fox and Hoffman, 1944, 108 (♂ ♀, Maracay, Venezuela). Fox, 1946a, 256. Barbosa, 1947, 8. Macfie, 1948, 70. Vargas, 1949b, 199. Iriarte, 1950, 372. Ortiz, 1951a, 9.

*Culicoides* species (3) Fox, 1942, 418 (pupa, Venezuela).

*Culicoides helioconiae* Vargas, 1945, 43.

*Culicoides (Hoffmania) heliconiae* Fox, 1948, 22 (♂ ♀, Trinidad; Honduras). Ortiz, 1950, 450.

*Culicoides (Culicoides) heliconiae* Khalaf, 1954, 39.

**hertigi Wirth and Blanton**

*Culicoides hertigi* Wirth and Blanton, 1953b, 229 (♂ ♀, Río Hato, Coclé Prov., Panama).

**hieroglyphicus Malloch**

*Culicoides hieroglyphicus* Malloch, 1915a, 297 (♀, Ash Creek, Graham Mt., Ariz., U. S. A.). Hoffman, 1925, 280 (♀, Arizona, U. S. A.). Root and Hoffman, 1937, 158 (♂ ♀, Arizona, Kansas, Montana, U. S. A.). James, 1943, 148 (♂, Colorado, U. S. A.). Johannsen, 1943, 779. Vargas, 1945, 43. Vargas, 1949b, 199. Ortiz, 1950, 462. Knowlton and Kardos, 1951, 163 (Utah, U. S. A.). Wirth, 1952a, 176 (♂ ♀, Arizona, California, Colorado, Kansas, Nevada, New Mexico, Oklahoma, Texas, U. S. A.). Khalaf, 1952b, 349 (Oklahoma, U. S. A.). Foote and Pratt, 1954, 24 (♂ ♀, Arizona, Kansas, Montana, Nevada, New Mexico, Oklahoma, U. S. A.). Edmunds and Keener, Jr., 1954, 83 (Nebraska, U. S. A.).

*Culicoides (Selfia) hieroglyphicus* Khalaf, 1954, 38.

**hinmani Khalaf**

*Culicoides hinmani* Khalaf, 1952b, 353 (♂ ♀, Wichita Refuge, Okla., U. S. A.).

*Culicoides (Oecacta) hinmani* Khalaf, 1954, 37.

**hirtipes Kieffer**

*Culicoides hirtipes* Kieffer, 1917b, 305. Lima, 1937, 412. Vargas, 1945, 43.

*Dasyhelea hirtipes* Kieffer, 1919a, 64. Macfie, 1948, 69. Vargas, 1949b, 199.

REMARKS.—Lane and Ortiz, 1950, 460, consider this species to be a synonym of *caridei* Brèthes, which they believe to be a *Dasyhelea*.

**hirtulus Coquillett**

See *Culicoides obsoletus* Meigen.

**hoffmani Fox**

*Culicoides hoffmani* Fox, 1946a, 251 (♀, Camuto Village, Trinidad). Barbosa, 1947, 7. Macfie, 1948, 74. Wolcott, 1948, 426. Ortiz and Peña

García, 1948, 6 (Venezuela). Fox, 1949, 29 (♂ ♀, Puerto Rico). Ortiz 1949, 328 (Venezuela). Vargas, 1949b, 199. Floch and Abonnenc, 1949a, 72. Fox and Kohler, 1950, 342 (Puerto Rico). Iriarte, 1950, 373. Ortiz, 1950, 463. Ortiz, 1951a, 10. Fox and Maldonado, 1953, 165 (Puerto Rico).

### ***hollensis* Melander and Brues**

*Ceratopogon hollensis* Melander and Brues, 1903, 13 (♀, Woods Hole, Mass., U. S. A.). Aldrich, 1905, 109. Kieffer, 1906, 50.

*Culicoides hollensis* Johannsen, 1943, 779. Vargas, 1945, 43. Vargas, 1949b, 199. Foote and Pratt, 1954, 24.

### ***horneae* Foote and Pratt**

*Culicoides horneae* Foote and Pratt, 1954, 25 (♂, Batavia, N. Y., U. S. A.).

### ***horticola* Lutz**

*Culicoides horticola* Lutz, 1913, 61 (♀, Tatuhy, São Paulo, Brazil). Rieth 1915, 417. Lima, 1937, 420 (♀, Brazil). Floch and Abonnenc, 1942a, 4 (♀, French Guiana). Vargas, 1945, 43. Macfie, 1948, 74. Vargas, 1949b, 199. Ortiz, 1951a, 10 (Venezuela).

*Culicoides horticola* Barbosa, 1947, 7.

### ***hylas* Macfie**

*Culicoides hylas* Macfie, 1940a, 26 (♀, New River, British Guiana). Vargas, 1945, 43. Barbosa, 1947, 9. Macfie, 1948, 70.

### ***inamollae* Fox and Hoffman**

*Culicoides inamollae* Fox and Hoffman, 1944, 110 (♂ ♀, Mayagüez, P. R.). Vargas, 1945, 43. Fox, 1946a, 257. Barbosa, 1947, 9. Vargas, 1949b, 200. Fox and Kohler, 1950, 342 (Puerto Rico). Kohler and Fox, 1951, 113 (Puerto Rico). Fox, 1952b, 888 (Puerto Rico). Fox and Maldonado, 1953, 165 (Puerto Rico). Foote and Pratt, 1954, 25 (♂ ♀, Florida, U. S. A.; Puerto Rico).

*Culicoides oliveri* Fox and Hoffman (in part), 1944, 108 (♂, Haiti).

*Culicoides painteri* Fox, 1946a, 258 (♀, Honduras).

*Culicoides (Hoffmania) inamollae* Fox, 1948, 25 (♂ ♀, Florida, U. S. A.). Wolcott, 1948, 426.

*Culicoides (Hoffmania) painteri* Fox, 1948, 26 (♂ ♀, Honduras).

*Culicoides insignis* Ortiz and Peña Garcia (not Lutz), 1948, 6 (Venezuela).

Ortiz, 1949, 328 (Venezuela). Floch and Abonnenc, 1949a, 72 (Venezuela).

Ortiz, 1950, 441 (♂ ♀, Venezuela). Ortiz, 1951a, 9 (Venezuela).

*Culicoides guttatus* Beck (not Coquillett), 1952, 102 (Florida, U. S. A.).

*Culicoides (Culicoides) inamollae* Khalaf, 1954, 46.

**indianus Macfie**

See *Culicoides verecundus* Macfie.

**insignis Lutz**

*Culicoides insignis* Lutz, 1913, 51 (♂ ♀, pupa, Rio de Janeiro, Brazil). Lutz 1912, 21. Rieth, 1915, 417. Lima, 1937, 415 (♀, Brazil). Vargas, 1945, 43. Barbosa, 1947, 20 (♂, Brazil). Vargas, 1949b, 200. Iriarte, 1950, 389. Ortiz, 1950, 462. Barbosa, 1952, 17 (Brazil).

*Culicoides guttatus* Lutz (not Coquillett, in part), 1913, 58 (♀, Brazil).

*Culicoides (Hoffmania) insignis* Fox, 1948, 25.

*Culicoides (Culicoides) insignis* Khalaf, 1954, 39.

REMARKS.—Floch and Abonnenc, 1942b, 1, have reported this species from French Guiana and Macfie, 1948, 75, doubtfully ascribed the name to specimens from Mexico. There has been so much disagreement in regard to the identification of this species that its distribution outside of Brazil is uncertain.

**iriartei Fox**

*Culicoides iriartei* Fox, 1952a, 368 (♀, La Salina, Edo. Zulia, Venezuela).

*Culicoides vargasi* Wirth and Blanton, 1953a, 74 (♂ ♀, Las Tablas, Los Santos, Prov., Panama; Venezuela).

REMARKS.—The above synonymy is given on the authority of Wirth (personal communication).

**jamaicensis Edwards**

*Culicoides loughnani* var. *jamaicensis* Edwards, 1922, 165 (♀, Kingston, Jamaica). Hoffman, 1925, 283 (Panama). Lima, 1937, 413. Fairchild, 1943, 572 (Panama). Johannsen, 1943, 779. Vargas, 1945, 43. Macfie, 1948, 80 (Mexico). Ortiz, 1950, 463.

*Culicoides loughnani* Fox (not Edwards), 1946a, 254 (Jamaica). Ortiz and Mirsa, 1952b, 271 (♂ ♀, Venezuela).

*Culicoides loughnani* var. *jamaicensis* Barbosa, 1947, 21 (♂, Panama; Jamaica; St. Croix).

*Culicoides loughnani* var. *jamaicensis* Vargas, 1949b, 201.

*Culicoides loughnani jamaicensis* Fox, 1949, 32 (♂ ♀, Puerto Rico). Fox and Kohler, 1950, 342 (Puerto Rico). Kohler and Fox, 1951, 113 (Puerto Rico). Ortiz, 1951a, 9 (Venezuela). Ortiz, 1951b, 442 (Venezuela). Fox, 1952b, 888 (Puerto Rico). Fox and Maldonado, 1953, 165 (Puerto Rico).

**jamesi Fox**

*Culicoides jamesi* Fox, 1946b, 244 (♂ ♀, Hamilton, Mont., U. S. A.). Vargas, 1949b, 200. Ortiz, 1950, 463. Wirth, 1952a, 178 (♂ ♀, California,

Colorado, Montana, Washington, U. S. A.; Canada). Foote and Pratt, 1954, 26 (♂, Colorado, Montana, U. S. A.).

*Culicoides (Selfia) jamesi* Khalaf, 1954, 38.

#### **kintzi Wirth and Blanton**

*Culicoides kintzi* Wirth and Blanton, 1953a, 72 (♂ ♀, Mojinga Swamp, Fort Sherman, C. Z.).

#### **lanei Ortiz**

*Culicoides lanei* Ortiz, 1950, 431 (♂, Cerro Sefa (?), Panama). Ortiz, 1951c, 557 (♂, Panama).

*Culicoides (Oecacta) lanei* Khalaf, 1954, 37.

#### **leoni Barbosa**

*Culicoides leoni* Barbosa, 1952, 17 (♀, Sto. Domingo, Ecuador).

#### **leopoldoi Ortiz**

*Culicoides leopoldoi* Ortiz, 1951c, 579 (♀, Ocumare del Tuy, Miranda, Venezuela). Ortiz and Mirsa, 1951, 596 (♂, Venezuela). Ortiz and Mirsa, 1952a, 127 (♀, Venezuela; Panama).

#### **levis Coquillett**

*Ceratopogon levis* Coquillett, 1901, 604.

*Culicoides levis* Kieffer, 1906, 54.

REMARKS.—A species of *Atrichopogon* (Wirth, 1952a, 121).

#### **lichyi Floch and Abonnenc**

*Culicoides lichyi* Floch and Abonnenc, 1949a, 69 (♀, Río Borburata, Venezuela). Ortiz, 1951a, 10. Ortiz and Mirsa, 1952a, 125.

#### **limai Barretto**

*Culicoides limai* Barretto, 1944, 99 (♂, Mogí das Cruzes, São Paulo, Brazil).

Barbosa, 1947, 8. Vargas, 1949b, 201. Ortiz, 1950, 463. Ortiz and Mirsa, 1951, 597. (♂, Venezuela). Ortiz and Mirsa, 1952b, 265 (♀, Venezuela)

*Culicoides (Oecacta) limai* Khalaf, 1954, 37.

#### **lituratus Williston**

*Ceratopogon lituratus* Williston, 1896, 281.

*Culicoides lituratus* Kieffer, 1906, 54.

REMARKS.—A species of *Atrichopogon* (Macfie, 1948, 68).

**lopesi Barretto**

*Culicoides lopesi* Barretto, 1944, 102 (♂, Mogi das Cruzes, São Paulo, Brazil). Barbosa, 1947, 6. Vargas, 1949b, 201. Ortiz, 1950, 463.

*Culicoides (Oecacta) lopesi* Khalaf, 1954, 37.

**lotus Williston**

*Ceratopogon lotus* Williston, 1896, 282.

*Culicoides lotus* Kieffer, 1906, 54.

REMARKS.—A species of *Forcipomyia* (Macfie, 1948, 68).

**loughnani Edwards**

*Culicoides loughnani* Edwards, 1922, 165 (♀, Kingston, Jamaica). Hoffman, 1925, 282. Lima, 1937, 413. Johannsen, 1943, 779. Vargas, 1945, 43. Macfie, 1948, 72. Beck, 1952, 104 (Florida, U. S. A.). Foote and Pratt, 1954, 26 (♂ ♀, Florida, U. S. A.).

*Culicoides laughnani* Beatty, 1944, 144 (St. Croix).

*Culicoides longnani* Barbosa, 1947, 21.

*Culicoides loughmani* Vargas, 1949b, 201.

**loughnani var. jamaicensis Edwards**

See *Culicoides jamaicensis* Edwards.

**luteovenus Root and Hoffman**

*Culicoides luteovenus* Root and Hoffman, 1937, 156 (♂ ♀, San Jacinto, D. F., Mexico). Johannsen, 1943, 779. Vargas, 1945, 44 (Mexico). Barbosa, 1947, 21 (Canal Zone). Macfie, 1948, 76 (Mexico). Vargas, 1949b, 201. Knowlton and Fronk, 1950, 114 (Utah). Ortiz, 1950, 463. Wirth, 1952a, 175 (♂ ♀, California, Utah, Washington, U. S. A.; Mexico).

*Culicoides (Culicoides) luteovenus* Khalaf, 1954, 39.

**lutzi Lima**

*Culicoides lutzi* Lima, 1937, 419 (♀, Abaeté, Pará, Brazil). Floch and Abonnenc, 1942a, 2 (♀, French Guiana). Floch and Abonnenc, 1942b, 2 (♂, French Guiana). Vargas, 1945, 43. Barbosa, 1947, 8. Vargas, 1949b, 201. Ortiz, 1951a, 9 (Venezuela). Floch, 1952, 295 (French Guiana).

*Culicoides (Hoffmania) lutzi* Fox, 1948, 22. Ortiz, 1950, 448.

*Culicoides (Culicoides) lutzi* Khalaf, 1954, 46.

**macrostigma Wirth and Blanton**

*Culicoides macrostigma* Wirth and Blanton, 1953b, 230 (♂ ♀, Mojinga Swamp, Fort Sherman, C. Z.).



**maculithorax Williston**

See *Culicoides furens* (Poey).

**magnipalpis Wirth and Blanton**

*Culicoides magnipalpis* Wirth and Blanton, 1953a, 76 (♂ ♀, Cerro Campana, Panama).

**maruim Lutz**

*Culicoides maruim* Lutz, 1913, 48 (egg, pupa, ♀, Rio de Janeiro, Brazil; Trinidad). Rieth, 1915, 417. Lima, 1937, 412. Barbosa, 1947, 29 (♂ ♀ Brazil). Macfie, 1948, 71. Briceño-Iragorry, 1949, 318 (Venezuela). Floch and Abonnenc, 1949a, 79. Iriarte, 1950, 363. Ortiz, 1951a, 8. Barbosa, 1952, 18 (pupa, Brazil).

*Culicoides marium* Vargas, 1945, 43. Vargas, 1949b, 201.

*Culicoides (Hoffmania) maruim* Fox, 1948, 22 (♂ ♀, Brazil).

*Culicoides trinidadensis* Hoffman, 1925, 286 (♀, Trinidad). Myers, 1935, 71 (Trinidad). Macfie, 1937, 9. Lima, 1937, 416. Johannsen, 1943, 780. Vargas, 1945, 43. Fox, 1946a, 256 (Trinidad). Barbosa, 1947, 27. Macfie, 1948, 75.

*Culicoides (Hoffmania) trinidadensis* Fox, 1948, 23 (♀, Trinidad). Ortiz, 1950, 450.

*Culicoides (Culicoides) marium* Khalaf, 1954, 46.

**melleus Coquillett**

*Ceratopogon melleus* Coquillett, 1901, 604 (♀, Lake Worth, Fla., U. S. A.). Aldrich, 1905, 109.

*Culicoides melleus* Kieffer, 1906, 54. Hoffman, 1925, 278 (♀, Maryland, U. S. A.). Hoffman, 1926a, 159 (Mississippi, U. S. A.). Dove, *et al.*, 1932 508 (South Carolina, U. S. A.). Atchley and Hull, 1936, 514. Root and Hoffman, 1937, 152. Johannsen, 1943, 779. Vargas, 1945, 43. Goulding, *et al.*, 1951, 9 (Florida, U. S. A.). Johannsen, 1952, 159. Beck, 1952, 104 (Florida, U. S. A.). Wirth, 1952c, 94 (larva, pupa, Florida, U. S. A.). Bradley, 1954, 126. Foote and Pratt, 1954, 27 (♂ ♀, Florida, Georgia, Maryland, Massachusetts, Mississippi, New York, U. S. A.).

*Culicoides meleus* Vargas, 1949b, 201.

**mississippiensis Hoffman**

See *Culicoides canithorax* Hoffman.

**minutissimus Zetterstedt**

See *Culicoides pumilus* Winnertz.

**miyamotoi Wirth and Blanton**

See *Culicoides aureus* Ortiz.

**mohave Wirth**

*Culicoides mohave* Wirth, 1952a, 187 (♂ ♀, Vidal, San Bernardino Co., Calif.; Arizona, U. S. A.).

*Culicoides (Oecacta) mohave* Khalaf, 1954, 37.

**mojingaensis Wirth and Blanton**

*Culicoides mojingaensis* Wirth and Blanton, 1953b, 232 (♂ ♀, Mojinga Swamp, Fort Sherman, C. Z.).

**monoensis Wirth**

*Culicoides monoensis* Wirth, 1952a, 193 (♂ ♀, Huntoon Creek, Mono Co., Calif., U. S. A.).

*Culicoides (Oecacta) monoensis* Khalaf, 1954, 38.

**multipunctatus Malloch**

*Culicoides multipunctatus* Malloch, 1915a, 296 (♀, Urbana, Ill., U. S. A.). Hoffman, 1925, 280. Root and Hoffman, 1937, 152. Johannsen, 1943, 779. Vargas, 1945, 43. Vargas, 1949b, 202. Khalaf, 1952b, 349 (♂ ♀, Oklahoma, U. S. A.). Johannsen, 1952, 159. Foote and Pratt, 1954, 28 (♂ ♀, Oklahoma, Texas, U. S. A.).

*Culicoides (Selfia) multipunctatus* Khalaf, 1954, 38.

**mutabilis Coquillett**

*Ceratopogon mutabilis* Coquillett, 1901, 602.

*Culicoides mutabilis* Kieffer, 1906, 54.

REMARKS.—A species of *Dasyhelea* (Wirth, 1952a, 157).

**nanus Root and Hoffman**

*Culicoides nanus*, Root and Hoffman, 1937, 165 (♂ ♀, Gwynn's Falls Park, Baltimore, Md., U. S. A.). Fox, 1942, 417 (pupa, Maryland, U. S. A.). Johannsen, 1943, 779. Vargas, 1945, 43. Vargas, 1949b, 202. Ortiz, 1950, 463. Khalaf, 1952b, 349 (Oklahoma, U. S. A.). Beck, 1952, 104 (Florida, U. S. A.). Johannsen, 1952, 160. Foote and Pratt, 1954, 28 (♂ ♀, Georgia, South Carolina, U. S. A.).

*Culicoides (Oecacta) nanus* Khalaf, 1954, 37.

**niger Root and Hoffman**

*Culicoides niger* Root and Hoffman, 1937, 168 (♂ ♀, Bay Shore near Baltimore, Md., U. S. A.). Fox, 1942, 417 (pupa, Maryland, U. S. A.).

Johannsen, 1943, 779. Vargas, 1945, 43. Vargas, 1949b, 202. Ortiz, 1950, 463. Beck, 1952, 104 (Florida, U. S. A.). Johannsen, 1952, 160. Foote and Pratt, 1954, 28 (♂ ♀, Florida, Virginia, U. S. A.).

*Culicoides (Oecacta) niger* Khalaf, 1954, 37.

### **nocivum Harris**

*Simulium nocivum* Harris, 1862, 602 (Massachusetts, U. S. A.).

*Ceratopogon nocivum* Osten Sacken, 1878, 14. Aldrich, 1905, 109.

*Culicoides nocivum* Johannsen, 1943, 779. Vargas, 1945, 43. Vargas, 1949b, 202. Foote and Pratt, 1954, 29.

### **obnoxius Fox**

*Culicoides obnoxius* Fox, 1952a, 365 (♀, Mount Marahuaca, Venezuela).

### **obsoletus Meigen**

*Ceratopogon obsoletus* Meigen, 1818, 76 (Europe).

*Culicoides obsoletus* Edwards, 1926, 405 (♀, England; North America).

Jobling, 1928, 211. Twinn, 1931, 248 (Canada). Goetghebuer and Lenz, 1934, 45 (Europe). Mayer, 1934, 205 (larva, pupa). Root and Hoffman, 1937, 155 (♂ ♀, Kansas, Montana, New York, Tennessee, U. S. A.; Canada). Hearle, 1938, 29 (Canada). Edwards, 1939, 143 (♂ ♀, England). Curtis, 1941, 18 (Canada). James, 1943, 148 (Colorado, U. S. A.). Johannsen, 1943, 779. Vargas, 1945, 43. Hill, 1947, 97 (egg, larva, pupa, England). Hill and Roberts, 1947, 160. Jenkins, 1948, 153 (Alaska). Vargas, 1949b, 202. Ortiz, 1950, 463. Wirth, 1951a, 77 (♀, Alaska). Wirth, 1951c, 318 (Virginia, U. S. A.). Williams, 1951a, 181 (Alaska). Wirth, 1952a, 169 (♂ ♀, California, Colorado, Indiana, Maryland, Massachusetts, Missouri, Montana, New Hampshire, New York, Ohio, Oklahoma, Pennsylvania, Tennessee, Washington, U. S. A.; Alaska; Canada). Beck, 1952, 103 (Florida, U. S. A.). Kettle and Lawson, 1952, 447 (larva, pupa, England). Johannsen, 1952, 160. Downes and Kettle, 1952, 61 (♂ ♀, Scotland). Snow and Pickard, 1953, 28 (Tennessee, U. S. A.). Gerry, 1953, 142 (Massachusetts, U. S. A.). Bradley, 1954, 129. Foote and Pratt, 1954, 30 (♂ ♀, Georgia, Illinois, Indiana, Maryland, Massachusetts, Missouri, Montana, New Hampshire, New Jersey, New York, Ohio, Oklahoma, Pennsylvania, Tennessee, Vermont, Virginia, U. S. A.; Alaska).

*Ceratopogon hirtulus* Coquillett, 1900, 396 (♀, Alaska). Aldrich, 1905, 110. Kieffer, 1906, 50.

*Culicoides hirtulus* Root and Hoffman, 1937, 173. Johannsen, 1943, 779.

*Ceratopogon sanguisuga* Coquillett, 1901, 64 (♀, Maryland, U. S. A.).

Pratt, 1907, 26 (Maryland, U. S. A.; Canada). Leonard, 1928, 707 (New York, U. S. A.).

*Culicoides sanguisugus* Malloch, 1951a, 301 (♂ ♀, Illinois, U. S. A.). Malloch, 1915b, 307. Cole and Lovett, 1921, 213 (Oregon, U. S. A.). Hoffman, 1925, 281 (♀, District of Columbia, Maine, Maryland, New Hampshire, New York, Pennsylvania, South Carolina, U. S. A.; Canada). Gerry, 1950, 191 (Massachusetts, U. S. A.).

*Culicoides biguttatus* Jenkins (not Coquillett), 1948, 154.

*Culicoides (Culicoides) obsoletus* Khalaf, 1954, 39.

REMARKS.—In addition to being widely distributed in Europe and North America, this species occurs in Japan (Tokunaga, 1940, 143).

### **ocumarensis Ortiz**

*Culicoides ocumarensis* Ortiz, 1950, 455 (♂ ♀, Ocumare del Tuy, Miranda, Venezuela). Ortiz, 1951a, 9. Ortiz, 1951b, 442.

*Culicoides (Culicoides) ocumarensis* Khalaf, 1954, 46.

### **oliveri Fox and Hoffman**

*Culicoides oliveri* Fox and Hoffman (in part), 1944, 108 (♀, Mariani, Haiti).

Vargas, 1945, 43. Fox, 1946a, 250 (♀, Haiti). Barbosa, 1947, 9. Macfie, 1948, 70. Vargas, 1949b, 203. Ortiz, 1950, 449.

*Culicoides (Hoffmania) oliveri* Fox, 1948, 23.

*Culicoides (Culicoides) oliveri* Khalaf, 1954, 46.

### **ortizi Fox**

See *Culicoides venezuelensis* Ortiz and Mirsa.

### **ousairani Khalaf**

*Culicoides ousairani* Khalaf, 1952b, 354 (♂ ♀, Wichita Refuge, Okla., U. S. A.).

*Culicoides (Oecacta) ousairani* Khalaf, 1954, 37.

### **pachymerus Lutz**

*Culicoides pachymerus* Lutz, 1914, 83 (♀, Amazonas, Brazil). Bequaert, 1926, 203 (Brazil). Lima, 1937, 421. Barbosa, 1947, 22. Macfie, 1948, 69.

Vargas, 1949b, 203.

*Culicoides pachymerus* Vargas, 1945, 43.

### **painteri Fox**

See *Culicoides inamollae* Fox.

**palmerae James**

*Culicoides palmerae* James, 1943, 151 (♂ ♀, Ft. Collins, Colo., U. S. A.). Vargas, 1945, 43. Vargas, 1949b, 203. Knowlton and Fronk, 1950, 114. (Utah, U. S. A.). Wirth, 1952a, 191 (♂ ♀, California, Utah, U. S. A.). Foote and Pratt, 1954, 30 (♂ ♀, Colorado, Montana, Nevada, New Mexico, Wyoming, U. S. A.). Edmunds and Keener, Jr., 1954, 83 (Nebraska, U. S. A.).

*Culicoides (Oecacta) palmerae* Khalaf, 1954, 38.

**palpalis Macfie**

See *Culicoides verecundus* Macfie.

**pampoikilus Macfie**

*Culicoides pampoikilus* Macfie, 1948, 79 (♀, El Vergel, Chiapas, Mexico). Vargas, 1949b, 203.

**panamensis Barbosa**

*Culicoides panamensis* Barbosa, 1947, 22 (♂ ♀, Barro Colorado, C. Z.). Vargas, 1949b, 203. Ortiz, 1950, 463.

**panamericanus Fox**

See *Culicoides acotyhus* Lutz.

**paraensis Goeldi**

*Haematomyidium paraense* Goeldi, 1905, 137 (♀, Pará, Brazil). Kieffer 1906, 66.

*Culicoides paraensis* Lutz, 1913, 55 (♀, Brazil). Rieth, 1915, 23. Neiva and Penna, 1916, 96 (Brazil). Wille, 1925, 415 (Brazil). Lutz and Núñez Tovar, 1928, 13 (♀, Venezuela). Macfie, 1932, 486 (♀, Trinidad). Dunn, 1934, 178 (Panama). Buckley, 1934a, 99 (St. Vincent). Lima, 1937, 414. Macfie, 1938, 164 (Grenada). Macfie, 1939, 200 (Brazil). Martorell, 1939, 210 (Venezuela). Ortiz, 1942, 258 (Venezuela). Floch and Abonnenc, 1942a, 4 (♀, French Guiana). Johannsen, 1943, 779. Fairchild, 1943, 572 (Panama). Iriarte, 1943, 192 (Venezuela). Barretto, 1944, 92 (♂, Brazil). Ortiz, 1944, 248 (Venezuela). Vargas, 1945, 43. Fox, 1946a, 250. Briceño-Iragorry, 1946, 398 (Venezuela). Anduze, *et al.*, 1947, 11 (Venezuela). Barbosa, 1947, 23 (Brazil; Panama; Peru; Venezuela). Macfie, 1948, 72. Ortiz and Peña Garcia, 1948, 7 (Venezuela). Briceño-Iragorry, 1949, 318 (Venezuela). Ortiz, 1949, 326. Vargas, 1949b, 203. Floch and Abonnenc, 1949a, 71. Floch and Abonnenc, 1949b, 1343 (French Guiana). Romaña and Wygodzinsky, 1950, 31 (Argentina). Iriarte, 1950, 363. Ortiz, 1950, 464. Ortiz, 1951a, 10. Ortiz, 1951c, 574

(♂ ♀, Venezuela). Barbosa, 1952, 19 (Argentina; Bolivia; Brazil). Gibson and Ascoli, 1952, 317 (Guatemala). Floch, 1952, 295 (French Guiana). Mirsa, *et al.*, 1952, 161 (Venezuela). Tucker, 1952, 349 (Barbados). Macfie, 1953, 102 (Costa Rica). Woke, 1954, 71 (Panama).

*Culicoides undecimpunctatus* Kieffer, 1917b, 307 (♀, Argentina). Lima, 1937, 414. Macfie, 1948, 72.

*Culicoides (Oecacta) paraensis* Khalaf, 1954, 37.

### **paucienfuscatus** Barbosa

*Culicoides paucienfuscatus* Barbosa, 1947, 23 (♀, Manaus, Amazonas, Brazil; Panama). Vargas, 1949b, 203.

### **phlebotomus** Williston

*Ceratopogon phlebotomus* Williston, 1896, 281 (♀, St. Vincent Island, B. W. I.). Aldrich, 1905, 109.

*Culicoides phlebotomus* Kieffer, 1906, 55. Lutz, 1912, 16. Lutz, 1913, 70. Wolcott, 1923, 210 (Puerto Rico). Wolcott, 1924, 169. Root, 1924, 208 (Honduras). Hoffman, 1925, 285 (♀, Puerto Rico). Painter, 1926, 258 (Honduras). Ciferri, 1929, 520 (Dominican Republic). Wolcott, 1936, 325 (Puerto Rico). Root and Hoffman, 1937, 151. Lima, 1937, 414. Fox, 1942, 419 (pupa, Virgin Islands). Johannsen, 1943, 779. Vargas, 1945, 43. Fox, 1946a, 252 (St. Croix). Barbosa, 1947, 24 (Trinidad). Macfie, 1948, 72. Wolcott, 1948, 426. Vargas, 1949b, 204. Fox and Kohler, 1950, 342 (Puerto Rico). Iriarte, 1952, 526 (Venezuela). Wirth and Blanton, 1953c, 114 (♂ ♀, Puerto Rico, Mexico; Honduras; Nicaragua; Panama; Venezuela; Brazil). Ortiz and Mirsa, 1952b, 275 (♂ ♀, Venezuela). Fox and Maldonado, 1953, 165 (Puerto Rico). Woke, 1954, 71 (Nicaragua).

*Culicoides amazonius* Macfie, 1935a, 52 (♂ ♀, Brazil). Macfie, 1937, 7 (Trinidad; Tobago). Adamson, 1939, 79 (Trinidad). Floch and Abonenc, 1942a, 3 (♀, French Guiana). Floch, 1952, 295 (French Guiana).

*Culicoides amazonicus* Vargas, 1945, 43. Barbosa, 1947, 11 (Brazil). Ortiz, 1950, 462.

*Culicoides (Oecacta) amazonius* Khalaf, 1954, 36.

### **pictipennis** Phillipi

See *Culicoides venezuelensis* Ortiz and Mirsa.

### **pifanoi** Ortiz

*Culicoides pifanoi* Ortiz, 1951c, 588 (♂ ♀, San Felipe, Yaracuy, Venezuela). Mirsa, *et al.*, 1952, 160 (Venezuela).

*Culicoides tricoloratus* Wirth and Blanton, 1953b, 233 (♂ ♀, Panama; Florida, U. S. A.).

REMARKS.—The above synonymy is given on the authority of Wirth (personal communication).

**piliferus Root and Hoffman**

*Culicoides piliferus* Root and Hoffman, 1937, 163 (♂ ♀, Baltimore, Md., U. S. A.). Johannsen, 1943, 779. Vargas, 1945, 44 (♀, Mexico). Vargas, 1949b, 204. Wirth, 1952a, 186. Beck, 1952, 104 (Florida, U. S. A.). Johannsen, 1952, 160. Snow and Pickard, 1953, 28 (Tennessee, U. S. A.). Foote and Pratt, 1954, 31 (♂ ♀, Georgia, New York, Vermont, Virginia, U. S. A.).

*Culicoides (Oecacta) piliferus* Khalaf, 1954, 36.

**poikilonotus Macfie**

*Culicoides poikilonotus* Macfie, 1948, 82 (♀, El Vergel, Chiapas, Mexico).

**polystictus Kieffer**

*Culicoides polystictus* Kieffer, 1921a, 181. (♀, Paraguay). Macfie, 1948, 69. *Culicoides polystictus* Barbosa, 1947, 25. Vargas, 1949b, 204.

REMARKS.—The status of this species is uncertain because of its incomplete original description.

**propinquus Macfie**

*Culicoides propinquus* Macfie, 1948, 81 (♂, San Cristobal, Chiapas, Mexico). Vargas, 1949b, 204. Ortiz, 1950, 464.

*Culicoides (Oecacta) propinquus* Khalaf, 1954, 38.

**proprïipennis Macfie**

*Culicoides proprïipennis* Macfie, 1948, 84 (♀, San Cristobal, Chiapas, Mexico). Ortiz and Mirsa, 1952b, 262 (♂, Venezuela).

*Culicoides proprïipennis* Vargas, 1949b, 204.

**pseudodiabolicus Fox**

See *Culicoides diabolicus* Hoffman.

**pulchripennis Macfie**

*Culicoides pulchripennis* Macfie, 1939, 200 (♀, Nova Teutonia, Brazil). Vargas, 1945, 43. Barbosa, 1947, 7. Macfie, 1948, 73. Vargas, 1949b, 204. Ortiz and Mirsa, 1952a, 125.

**pulicaris Linnaeus**

REMARKS.—The report of this European species in Cuba by Stephens, 1923, 368, was undoubtedly based on a misidentification.

**pumilus Winnertz**

*Ceratopogon pumilus* Winnertz, 1852, 46 (Europe).

*Culicoides pumilus* Edwards, 1939, 142 (♂, England). Vargas, 1945, 43 (New World).

*Ceratopogon minutissimus* Zetterstedt, 1855, 4860 (Scandinavia).

*Culicoides minutissimus* Edwards, 1926, 405 (♀, England). Johannsen, 1943, 779 (Greenland).

*Culicoides (Oecacta) pumilus* Khalaf, 1954, 36.

REMARKS.—This species is widely distributed in Europe (Goetghebuer and Lenz, 1934, 44; Kieffer, 1925b, 77).

**pusillus Lutz**

*Culicoides pusillus* Lutz, 1913, 52 (♀, Manguinhos, Brazil). Rieth, 1915, 417. Lima, 1937, 412. Macfie, 1938, 165 (♂ ♀, Trinidad). Adamson, 1939, 81 (Trinidad). Floch and Abonnenc, 1942b, 2 (♂ ♀, French Guiana). Vargas, 1945, 43. Barbosa, 1947, 25 (Panama; Jamaica). Macfie, 1948, 79 (Mexico). Vargas, 1949b, 205. Fox and Kohler, 1950, 342 (Puerto Rico). Ortiz, 1950, 464. Ortiz, 1951a, 8. Ortiz, 1951b, 442 (Venezuela). Ortiz and Mirsa, 1951, 603 (♂ ♀, Venezuela). Fox, 1952b, 888 (Puerto Rico). Mirsa, *et al.*, 1952, 161 (Venezuela). Fox and Maldonado, 1953, 165. (Puerto Rico).

**pygmaeus Williston**

*Ceratopogon pygmaeus* Williston, 1896, 278.

*Culicoides pygmaeus* Kieffer 1906, 55.

REMARKS.—A species of *Dasyhelea* (Macfie, 1948, 68).

**rangeli Ortiz and Mirsa**

*Culicoides rangeli* Ortiz and Mirsa, 1952a, 126 (♀, Los Chorros, Miranda, Venezuela).

**recifei Barbosa**

*Culicoides recifei* Barbosa, 1947, 25 (♂ ♀, Recife, Pernambuco, Brazil). Vargas, 1949b, 205. Barbosa, 1952, 20.

*Culicoides insignis* Barbosa (not Lutz), 1944, 259 (♂ ♀, Brazil).

*Culicoides (Culicoides) recifi* Khalaf, 1954, 46.

**recifensis Barbosa**

See *Culicoides guyanensis* Floch and Abonnenc.

**reevesi Wirth**

*Culicoides reevesi* Wirth, 1952a, 193 (♀, Bakersfield, Kern Co., Calif., U. S. A.).



**reticulatus Lutz**

*Culicoides reticulatus* Lutz, 1913, 49 (larva, ♀, Rio de Janeiro, Brazil).  
Lutz, 1912, 21. Rieth, 1915, 417. Lima, 1937, 413. Barbosa, 1943, 261  
(♂ ♀, Brazil). Vargas, 1945, 43. Barbosa, 1947, 25 (Brazil). Macfie,  
1948, 73. Vargas, 1949b, 205. Ortiz, 1950, 464.

**riethi Kieffer**

*Culicoides riethi* Kieffer, 1914, 237 (Europe). Root and Hoffman 1937, 159  
(♀, Arizona, U. S. A.). Vargas, 1945, 43. Foote and Pratt, 1954, 12.

REMARKS.—Root and Hoffman were unable to decide whether they had an  
aberration of *variipennis* or whether *riethi* really occurs in the United  
States, hence the occurrence of the latter in the Western Hemisphere is  
doubtful.

**rozeboomi Barbosa**

*Culicoides rozeboomi* Barbosa, 1947, 26 (♂ ♀, Trinidad; Peru; Panama).  
Vargas, 1949b, 206. Ortiz, 1950, 452. Carpenter, 1951, 205 (Panama).  
Woke, 1954, 68 (Canal Zone).

*Culicoides (Culicoides) rozeboomi* Khalaf, 1954, 46.

**salih Khalaf**

*Culicoides salih* Khalaf, 1952b, 351 (♂ ♀, Wichita Refuge, Okla., U. S. A.)

*Culicoides (Oecacta) salih* Khalaf, 1954, 37.

**sanctae-marthae Kieffer**

*Culicoides sanctae-marthae* Kieffer, 1917b, 306.

*Dasyhelea sanctae-marthae* Kieffer, 1919a, 64.

REMARKS.—Macfie, 1948, 69, stated that this species is not a *Culicoides*.

**sanguisuga Coquillett**

See *Culicoides obsoletus* Meigen.

**scopus Root and Hoffman**

*Culicoides scopus* Root and Hoffman, 1937, 170 (♂ ♀, San Jacinto, D. F.,  
Mexico). Johannsen, 1943, 780. Vargas, 1945, 43. Macfie, 1948, 71.  
Vargas, 1949b, 206. Ortiz, 1950, 464.

*Culicoides (Oecacta) scopus* Khalaf, 1954, 36.

**setifer Lutz**

See *Culicoides caridei* (Brèthes).

**simulans Root and Hoffman**

See *Culicoides travisi* Vargas.

**sordidellus Zetterstedt**

*Ceratopogon sordidellus* Zetterstedt, 1838, 820 (♀, Greenland). Staeger 1844, 355. Osten Sacken, 1878, 23. Aldrich, 1905, 110.

*Ceratophorus sordidellus* Kieffer, 1906, 61.

*Ceratopogon (Culicoides?) sordidellus* Goetghebuer 1935, 310.

*Johannsoniella sordidella* Brumpt, 1936, 1454 (Greenland).

*Culicoides sordidellus* Edwards, 1938, 545 (♀, Greenland). Johannsen, 1943, 780. Vargas, 1945, 43. Vargas, 1949b, 207.

**spinus Root and Hoffman**

*Culicoides spinus* Root and Hoffman, 1937, 172 (♂, Baltimore, Md., U. S. A.). Johannsen, 1943, 780. Vargas, 1945, 43. Vargas, 1949b, 207. Ortiz, 1950, 464. Beck, 1952, 104 (Florida, U. S. A.). Johannsen, 1952, 160. Khalaf, 1953, 46 (♂ ♀, Oklahoma, U. S. A.). Foote and Pratt, 1954, 32 (♂ ♀, New York, Virginia, U. S. A.).

*Culicoides (Oecacta) spinus* Khalaf, 1954, 38.

**stellifer Coquillett**

*Ceratopogon stellifer* Coquillett, 1901, 603 (♀, Washington, D. C., U. S. A.). Howard, 1904, 92 (Texas, U. S. A.). Aldrich, 1905, 110. Pratt, 1907, 26 (♀, Arizona, District of Columbia, Mississippi, New Mexico, Tennessee, Virginia, U. S. A.).

*Ceratopogon (Culicoides) stellifer* Lutz, 1913, 71.

*Culicoides stellifer* Kieffer, 1906, 55. Malloch, 1915a, 300 (♂ ♀, Illinois, Michigan, U. S. A.). Malloch, 1915b, 307. Hoffman, 1925, 295 (♀, District of Columbia, New Mexico, U. S. A.). Hoffman, 1926a, 159 (New York, U. S. A.). Leonard, 1928, 707 (New York, U. S. A.). Root and Hoffman, 1937, 162 (♂ ♀, Connecticut, Kansas, Maryland, Mississippi, Virginia, U. S. A.). Fox, 1942, 419 (pupa, Maryland, U. S. A.). James, 1943, 148 (Colorado, U. S. A.). Johannsen, 1943, 780. Vargas, 1945, 43. Barbosa, 1947, 26 (Colorado, Florida, Georgia, Kentucky, Maryland, Mississippi, New Mexico, Ohio, Oklahoma, South Carolina, Tennessee, Virginia, U. S. A.). Vargas, 1949b, 207. Knowlton and Fronk, 1950, 114 (Utah, U. S. A.). Ortiz, 1950, 464. Knowlton and Kardos, 1951, 163 (Utah, U. S. A.). Wirth, 1951c, 318 (Virginia, U. S. A.). Ortiz, 1951c, 576 (♀, Florida, Louisiana, U. S. A.). Wirth, 1952a, 184 (♂, California, Delaware, District of Columbia, Florida, Georgia, Maryland, New Mexico, Oklahoma, South Carolina, Tennessee, Utah, Virginia, U. S. A.). Khalaf, 1952b, 349 (Oklahoma, U. S. A.). Beck, 1952, 104 (Florida, U. S. A.). Johannsen, 1952, 160. Snow and Pickard, 1953, 28 (Tennessee, U. S. A.). Foote and Pratt, 1954, 32 (♂ ♀, Alabama, Delaware, Florida, Georgia, Illinois, Maryland, Ohio, Pennsylvania, Utah,

Virginia, U. S. A.). Edmunds and Keener, Jr., 1954, 83 (Nebraska, U. S. A.).

*Culicoides (Oecacta) stellifer* Khalaf, 1954, 37.

REMARKS.—Several authors have mentioned this species as occurring in Venezuela (Iriarte, 1943, 192; Ortiz, 1944, 251; Anduze, *et al.*, 1947, 11; Floch and Abonnenc, 1949a, 71; Iriarte, 1950, 363; and Ortiz, 1951a, 10) but these records appear to be based on misidentifications.

### **stigmalis Wirth**

*Culicoides stigmalis* Wirth, 1952b, 245 (♀, Finca San Rafael, San Pedro Yepocapa, Chimaltenango, Guatemala). Gibson and Ascoli, 1952, 317 (Guatemala). Vargas, 1953b, 229 (♂, Mexico; Panama).

### **stilobezzioides Foote and Pratt**

*Culicoides stilobezzioides* Foote and Pratt, 1954, 33 (♂, Ithaca, N. Y.).

### **stonei James**

*Culicoides stonei* James, 1943, 149 (♂ ♀, Ft. Collins, Colo., U. S. A.). Vargas, 1945, 43. Vargas, 1949b, 207. Foote and Pratt, 1954, 33 (♀, Colorado, U. S. A.).

*Culicoides (Oecacta) stonei* Khalaf, 1954, 38.

### **stubalensis Fox**

See *Culicoides guyanensis* Floch and Abonnenc.

### **stylifer Lutz**

See *Lasiohelea stylifer* (Lutz).

### **tenuistylus Wirth**

*Culicoides tenuistylus* Wirth, 1952a, 178 (♂ ♀, Wheeler's Springs, Ventura Co., Calif., U. S. A.).

*Culicoides (Selfia) tenuistylus* Khalaf, 1954, 38.

### **transiens Walker**

*Ceratopogon transiens* Walker, 1848, 25 (♀, St. Martin's Falls, Albany River, Hudson's Bay). Osten Sacken, 1878, 23. Aldrich, 1905, 110. Kieffer, 1906, 52. Smith, 1900, 628. (New Jersey, U. S. A.).

*Culicoides transiens* Johannsen, 1943, 780. Vargas, 1949b, 207.

REMARKS.—A species of *Atrichopogon* according to Paul Freeman who studied the types in the British Museum (personal communication).

**travisi Vargas**

*Culicoides travisi* Vargas, 1949a, 233 (new name for *simulans* R.&H., preoccupied by Vimmer, 1932). Ortiz, 1950, 464. Wirth, 1951c, 318, (Virginia, U. S. A.). Beck, 1952, 104 (Florida, U. S. A.). Johannsen, 1952, 160. Snow and Pickard, 1953, 28 (Georgia, Tennessee, U. S. A.). Foote and Pratt, 1954, 33 (♂ ♀, Florida, Georgia, Maryland, New York, Ohio, Pennsylvania, Virginia, U. S. A.).

*Culicoides simulans* Root and Hoffman, 1937, 167 (♂ ♀, Baltimore, Md., U. S. A.). Johannsen, 1943, 779. Vargas, 1945, 43. Khalaf, 1952b, 349 (Oklahoma, U. S. A.).

*Culicoides (Oecacta) travisi* Khalaf, 1954, 37.

**tricoloratus Wirth and Blanton**

See *Culicoides pifanoi* Ortiz.

**trilineatus Fox**

*Culicoides trilineatus* Fox, 1946a, 250 (♀, Red Hook, St. Thomas, V. I.) Barbosa, 1947, 6. Macfie, 1948, 72. Wolcott, 1948, 426. Fox, 1949, 30. (♂ ♀, Puerto Rico). Fox and Kohler, 1950, 352 (Puerto Rico).

*Culicoides trilineatus* Vargas, 1949b, 207.

**trinidadensis Hoffman**

See *Culicoides maruim* Lutz.

**tristriatulus Hoffman**

*Culicoides cockerelli* var. *tristriatulus* Hoffman, 1925, 294 (♀, Eureka, Calif., U. S. A.). Root and Hoffman, 1937, 157. Johannsen, 1943, 779. Vargas, 1949b, 196. Ortiz, 1950, 462.

*Culicoides tristriatulus* Jenkins, 1948, 154 (Alaska). Travis, 1949, 455 (Alaska). Applewhite and Smith, 1950, 353 (Alaska). Applewhite and Cross, 1951, 21 (Alaska). Williams, 1951a, 173 (Alaska). Williams, 1951b, 430 (egg, larva, pupa, Alaska). Wirth, 1951a, 78 (♂ ♀, Alaska). Wirth, 1952a, 173 (♂ ♀, California, U. S. A.).

*Culicoides sordidellus* Jenkins (not Zetterstedt), 1948, 154 (Alaska).

*Culicoides (Culicoides) tristriatulus* Khalaf, 1954, 39.

REMARKS.—Vargas, 1945, 48, described what he believed to be the male of this species but Wirth, 1952a, 175, stated that Vargas was dealing with another species possibly *elutus* Macfie.

**undecimpunctatus Kieffer**

See *Culicoides paraensis* (Goeldi).

**unicolor Coquillett**

*Ceratopogon unicolor* Coquillett, 1905, 65 (♀, Eureka, Calif., U. S. A.).

Kieffer, 1906, 51. Pratt, 1907, 26 (California, U. S. A.).

*Culicoides unicolor* Hoffman, 1925, 279 (♀, California, U. S. A.). Root and Hoffman, 1937, 152. Curtis, 1941, 18 (Canada). Johannsen, 1943, 780. Vargas, 1945, 43. Vargas, 1949b, 208. Wirth, 1951a, 85 (♂ ♀, Alaska). Williams, 1951a, 181 (Alaska). Wirth, 1952a, 185 (♂ ♀, California, Montana, Oregon, U. S. A.; Canada; Alaska).

*Culicoides (Oecacta) unicolor* Khalaf, 1954, 36.

**uniradialis Wirth and Blanton**

*Culicoides uniradialis* Wirth and Blanton, 1953a, 70 (♂ ♀, Mojinga Swamp, Fort Sherman, C. Z.)

**usingeri Wirth**

*Culicoides usingeri* Wirth, 1952a, 192 (♂ ♀, Hat Creek Ranger Station, Shasta, Co., Calif., U. S. A.).

*Culicoides (Oecacta) usingeri* Khalaf, 1954, 38.

**utahensis Fox**

*Culicoides utahensis* Fox, 1946b, 246 (♂, Logan, Utah, U. S. A.). Vargas, 1949b, 208. Knowlton and Fronk, 1950, 113 (Utah, U. S. A.). Ortiz, 1950, 464. Wirth, 1952a, 189 (♂ ♀, California, Idaho, Montana, Utah, U. S. A.).

*Culicoides (Oecacta) utahensis* Khalaf, 1954, 38.

**vargasi Wirth and Blanton**

See *Culicoides iriartei* Fox.

**variipennis Coquillett**

*Ceratopogon variipennis* Coquillett, 1901, 602 (♀, Richmond, Va., New Jersey, U. S. A.; Mexico). Smith, 1900, 628 (New Jersey, U. S. A.). Aldrich, 1905, 110. Pratt, 1907, 26 (New Jersey, New Mexico, Virginia, U. S. A.).

*Culicoides variipennis* Kieffer, 1906, 55. Hoffman, 1924, 67 (Maryland, U. S. A.). Hoffman, 1925 (♂ ♀ Maryland, New York, U. S. A.). Leonard, 1928, 707 (New York, U. S. A.). Stanford, 1931, 99 (Utah, U. S. A.). Whitehead, 1934, 264 (Oklahoma, U. S. A.). Root and Hoffman, 1937, 158 (♂ ♀, Arizona, California, Kansas, Mississippi, New Jersey, Texas, U. S. A.; Mexico). Thomsen, 1937, 70 (pupa, New York, U. S. A.). Curtis, 1941, 18 (Canada). Fox, 1942, 414 (pupa, Maryland, U. S. A.). Johannsen, 1943, 780. James, 1943, 148 (Colorado, U. S. A.). Var-

gas, 1945, 45 (Mexico). Macfie, 1948, 71. Vargas, 1949b, 208. Knowlton and Fronk, 1950, 113 (Utah, U. S. A.). Ortiz, 1950, 464. Knowlton and Kardos, 1951, 163 (Utah, U. S. A.). Wirth, 1952a, 180 (♂ ♀, Arizona, California, Colorado, Georgia, Illinois, Indiana, Maryland, Mississippi, Montana, Nevada, New Jersey, New Mexico, Ohio, Oklahoma, Oregon, Texas, Washington, U. S. A.). Khalaf, 1952b, 349 (Oklahoma, U. S. A.). Johannsen, 1952, 160. Ortiz and Mirsa, 1952a, 125 (♀, Louisiana, U. S. A.). Snow and Pickard, 1953, 28 (Tennessee, U. S. A.). Foote and Pratt, 1954, 34 (♂ ♀, Arizona, Arkansas, Colorado, Georgia, Illinois, Indiana, Kansas, Maryland, Mississippi, Nebraska, New Jersey, Ohio, Texas, Virginia, U. S. A.) Edmunds and Keener, Jr., 1954, 83 (Nebraska, U. S. A.).

*Culicoides variipennis* Malloch, 1915a, 297 (pupa, ♂ ♀, Arizona, Illinois, U. S. A.). Adams, 1940, 125 (Missouri, U. S. A.).

*Culicoides (Monoculicoides) variipennis* Khalaf, 1954, 40.

REMARKS.—This species has been mentioned several times as occurring in Venezuela (Ortiz, 1942, 258; Iriarte, 1943, 192; Anduze, *et al.*, 1947, 11; Iriarte, 1950, 363; Ortiz, 1951a, 10). Ortiz and Mirsa, 1952a, 125, indicate that the record is due to a misidentification. See *Culicoides arubae* Fox and Hoffman.

#### **venezuelensis Ortiz and Mirsa**

*Culicoides venezuelensis* Ortiz and Mirsa, 1950, 137 (♂ ♀, Los Chorros, Caracas, Venezuela).

*Psychophaena pictipennis* Phillipi, 1865, 628 (♀, Chile; name preoccupied by Staeger, 1839). Kieffer, 1906, 65.

*Psychophaena (Culicoides) pictipennis* Lutz, 1913, 71.

*Culicoides pictipennis* Ingram and Macfie, 1931, 155. Vargas, 1945, 43. Barbosa, 1947, 24. Macfie, 1948, 80.

*Culicoides ortizi* Fox, 1952a, 366 (♀, Venezuela).

#### **venustus Hoffman**

*Culicoides venustus* Hoffman, 1925, 290 (♀, Baltimore, Md., U. S. A.). Hoffman, 1926a, 159 (New York, U. S. A.). Leonard, 1928, 707 (New York, U. S. A.). Root and Hoffman, 1937, 155 (♂ ♀, Connecticut, U. S. A.). Thomsen, 1937, 70 (larva, pupa, New York, U. S. A.). Johannsen, 1943, 780. Vargas, 1945, 43. Vargas, 1949b, 208. Beck, 1952, 102 (Florida, U. S. A.). Snow and Pickard, 1953, 28 (Tennessee, U. S. A.). Foote and Pratt, 1954, 35 (♂ ♀, Alabama, Delaware, Florida, Georgia, Maryland, Mississippi, North Carolina, Ohio, Pennsylvania, Vermont, Virginia, U. S. A.).

*Culicoides (Hoffmania) venustus* Fox, 1948, 28 (♂ ♀). Ortiz, 1950, 446.  
Johannsen, 1952, 160.

*Culicoides (Culicoides) venustus* Khalaf, 1954, 39.

#### **verecundus Macfie**

*Culicoides verecundus* Macfie, 1948, 76 (♂ ♀, El Vergel, Chiapas, Mexico).

Vargas, 1949b, 208. Ortiz and Mirsa, 1952b, 259 (♂ ♀, Venezuela).

*Culicoides indianus* Macfie, 1940a, 25 (British Guiana; not *indianus* Macfie, 1932, 488).

*Culicoides palpalis* Macfie, 1948, 78 (♀, Mexico).

*Culicoides (Hoffmania) verecundus* Ortiz, 1950, 453.

*Culicoides (Culicoides) verecundus* Khalaf, 1954, 46.

#### **villosipennis Root and Hoffman**

*Culicoides villosipennis* Root and Hoffman, 1937, 165 (♂ ♀, Sparrow's Point near Baltimore, Md., U. S. A.). Fox, 1942, 416 (pupa, Maryland, U. S. A.). Johannsen, 1943, 780. Vargas, 1945, 43. Vargas, 1949b, 208. Wirth, 1951c, 318 (Virginia, U. S. A.). Beck, 1952, 103 (Florida, U. S. A.). Johannsen, 1952, 161. Stone and Pickard, 1953, 28 (Tennessee, U. S. A.). Foote and Pratt, 1954, 36 (♂ ♀, Georgia, Louisiana, Oklahoma, Texas, Virginia, U. S. A.).

*Culicoides (Oecacta) villosipennis* Khalaf, 1954, 37.

#### **villosipennis oklahomensis Khalaf**

*Culicoides villosipennis oklahomensis* Khalaf, 1952b, 355 (♂, Wichita Refuge, Oklahoma, U. S. A.).

*Culicoides (Oecacta) v. oklahomensis* Khalaf, 1954, 37.

#### **villosipes Kieffer**

*Culicoides villosipes* Kieffer, 1917b, 305.

*Dasyhelea villosipes* Kieffer, 1919, 64.

REMARKS.—Macfie, 1948, 69, stated that this species is not a *Culicoides*.

#### **weesei Khalaf**

*Culicoides weesei* Khalaf, 1952a, 65 (♂, Wichita Refuge, Okla., U. S. A.).

Khalaf, 1952b, 351 (♀, Oklahoma, U. S. A.).

*Culicoides (Oecacta) weesei* Khalaf, 1954, 38.

#### **willistoni Wirth and Blanton**

*Culicoides willistoni* Wirth and Blanton, 1953c, 116 (♂ ♀, Río Hato, Panama).

**wirthi Foote and Pratt**

*Culicoides wirthi* Foote and Pratt, 1954, 36 (♂, Helena, Mont., U. S. A.).

**wirthomyia Vargas**

*Culicoides wirthomyia* Vargas, 1953b, 227 (♂, Iguala, Guerrero, Mexico).

**wokei Barbosa**

See *Culicoides diminutus* Barbosa.

**wokei Fox**

*Culicoides wokei* Fox, 1947, 91 (♀, West Bank, Balboa, C. Z.). Macfie, 1948, 73. Vargas, 1949b, 208. Woke, 1954, 68 (Canal Zone).

**yukonensis Hoffman**

*Culicoides yukonensis* Hoffman, 1925, 291 (♀, Yukon Territory, Canada). Root and Hoffman, 1937, 152. Curtis, 1941, 18 (Canada). Johannsen, 1943, 780. Vargas, 1945, 45 (Mexico). Jenkins, 1948, 153 (Alaska). Travis, 1949, 455 (Alaska). Vargas, 1949b, 208. Wirth, 1951a, 81 (♂ ♀, Alaska). Williams, 1951a, 181 (Alaska).

*Culicoides (Culicoides) yukonensis* Khalaf, 1954, 39.

**LEPTOCONOPS SKUSE**

This genus has recently been defined by Wirth (1952a, 110) who recognizes three Nearctic subgenera, *Leptoconops* Skuse (1889, 288), *Holoconops* Kieffer (1918, 135), and *Styloconops* Kieffer (1921b, 107), the subgeneric characters applying only to the females. Ortiz (1952b) has listed the 9 species which occur in the Western Hemisphere giving the subgenera to which they belong and a key to most of the Neotropical species. The males of only 4 of the 9 species have been described.

**KEY TO THE NEARCTIC SPECIES OF LEPTOCONOPS (FEMALES)**

1. Antenna with 13 segments (*Holoconops*)..... 2
  - Antenna with 14 segments..... 4
2. Small species, wing 0.8–0.9 mm..... 3
  - Larger species, wing 1.0–1.5 mm..... *kertészii*
3. Mesonotum black contrasting with yellowish legs and abdomen
  - bequaerti*
  - Not as above, uniform reddish-brown..... *catowbae*
4. Claws with a stout basal tooth; basitarsi with 15–20 short dark spines (*Styloconops*)..... *freeborni*
  - Claws simple; basitarsi without such spines but with slender setae (*Leptoconops*)..... 5



5. Fourth palpal segment half as long as third..... *floridensis*  
 Fourth palpal segment as long as third..... *torrens*

**bequaerti (Kieffer)**

*Holoconops bequaerti* Kieffer, 1925a, 405 (♀, Puerto Castilla, Honduras).  
*Leptoconops (Holoconops) hondurensis* Hoffman, 1926b, 135, (♂ ♀, Honduras; Cuba).

*Holoconops hondurensis* Macfie, 1937, 2 (♀, Trinidad). Adamson, 1939, 81 (Trinidad).

*Holoconops bequaerti* Johannsen, 1943, 776.

*Leptoconops (Holoconops) bequaerti* Wirth, 1951b, 281 (Florida, Mississippi, U. S. A.; Dominican Republic; Jamaica; Venezuela). Ortiz, 1952b, 164 (Venezuela).

*Leptoconops bequaerti* Woke, 1954, 71 (Nicaragua). Mayer, 1934, 256 (pupa).

**brasiliensis (Lutz)**

*Tersesthes brasiliensis* Lutz, 1913, 66 (♀, Rio Tocantins, Brazil).

*Protersesthes brasiliensis* Kieffer, 1921b, 107.

*Leptoconops braziliensis* Carter, 1921, 13 (♀, Brazil).

*Leptoconops brasiliensis* Lane, 1945, 358 (♀, Brazil).

*Leptoconops (Leptoconops) brasiliensis* Ortiz, 1952b, 168.

**carteri Hoffman**

See *Leptoconops torrens* (Townsend).

**catawbae (Boesel)**

*Holoconops catawbae* Boesel, 1948, 69 (♀, Lakeside, Ohio, U. S. A.). Johannsen, 1952, 156.

*Leptoconops (Holoconops) catawbae* Wirth, 1951b, 282 (♀, Michigan, U. S. A.).

**floridensis Wirth**

*Leptoconops (Leptoconops) floridensis* Wirth, 1951b, 282 (♀, Santa Rosa Island, Escambia Co., Fla., U. S. A.). Ortiz, 1952b, 168.

**freeborni Wirth**

*Leptoconops (Styloconops) freeborni* Wirth, 1952a, 115 (♂ ♀, Hueneme, Ventura Co., Calif., U. S. A.).

**hondurensis Hoffman**

See *Leptoconops bequaerti* (Kieffer).

**kertészi Kieffer**

*Leptoconops kertészi* Kieffer, 1908, 576 (♀, Cairo, Egypt). Freeborn and Zimmerman, 1934, 261 (♂, California, U. S. A.). Knowlton and Fronk, 1950, 113 (Utah, U. S. A.). Knowlton and Kardos, 1951, 163 (Utah, U. S. A.).

*Leptoconops (Holoconops) kertészi* var. *americanus* Carter, 1921, 22 (♀, Utah, U. S. A.). Rees and Smith, 1950, 9 (Utah, U. S. A.).

*Leptoconops kertészi* var. *americanus* Knowlton, 1949, 93 (Utah, U. S. A.). Rees and Smith, 1952, 49 (Utah, U. S. A.).

*Holoconops kertészi* Smith and Lowe, 1948, 157 (egg, larva, pupa, ♂ ♀, California, U. S. A.). Boesel, 1948, 70.

*Holoconops kertészi* var. *americanus* Johannsen, 1943, 776.

*Leptoconops (Holoconops) kertészi* Wirth, 1952a, 113 (♂ ♀, California, Colorado, Montana, Nebraska, New Mexico, Utah, Wyoming, U. S. A.).

**kertészi var. americanus Carter**

See *Leptoconops kertészi* Kieffer.

**petrocchiae Shannon and Del Ponte**

*Leptoconops petrocchiae* Shannon and Del Ponte, 1927, 734 (♀, Río Tapia (La Posta), Tucumán, Argentina).

*Leptoconops (Leptoconops) petrocchiae* Ortiz, 1952b, 168.

**torrens (Townsend)**

*Tersesthes torrens* Townsend, 1893a, 369 (♀, Continental Divide, N. Mex., U. S. A.). Johannsen, 1905, 96. Kieffer, 1906, 47. Pratt, 1907, 28 (Arizona, Florida, New Mexico, Utah, U. S. A.; Cuba). Kieffer, 1921b, 107. Stephens, 1923, 368 (Cuba).

*Leptoconops torrens* Aldrich, 1905, 107. Kieffer, 1908, 557. Kieffer, 1917a, 190 (New Mexico, U. S. A.). Carter, 1921, 15 (♂ ♀, New Mexico, U. S. A.). Freeborn and Zimmerman, 1934, 258 (♂, California, New Mexico, Texas, U. S. A.). Johannsen, 1943, 776 (California, Colorado, New Mexico, U. S. A.). Smith and Lowe, 1948, (larva, California, U. S. A.). Boesel, 1948, 70.

*Leptoconops carteri* Hoffman, 1926b, 133 (♀, California, U. S. A.).

*Leptoconops (Leptoconops) torrens* Wirth, 1952a, 110 (♂ ♀, Arizona, California, Texas, U. S. A.). Ortiz, 1952b, 168 (♀, California, U. S. A.).

**venezuelensis Ortiz**

*Leptoconops (Leptoconops) venezuelensis* Ortiz, 1952b, 165 (♀, San Carlos de Río Negro, Terr. Federal Amazonas, Venezuela).

**LASIOHELEA KIEFFER 1921b**

Goetghebuer and Lenz (1934, 6) considered *Lasiohelea* to be a synonym of *Forcipomyia* but recent authors (Macfie, 1940b, 15; Tokunaga, 1940, 101; Johannsen, 1943, 770) maintain the two separate. No Nearctic species have been reported but Johannsen (1943, 777) cites an undescribed species from Georgia, U. S. A. Only two of the species listed below are known to suck mammalian blood, *fluviatilis* (Lutz) and *styliifer* (Lutz).

**aeronautica Macfie**

*Forcipomyia (Lasiohelea) aeronautica* Macfie, 1935b, 265 (♀, Tumatumari, British Guiana).

**bromelicola (Lutz)**

*Ceratopogon bromelicola* Lutz, 1914, 84 (♂ ♀, Ilha do Governador, Rio de Janeiro, Brazil).

*Apelma bromicola* Saunders, 1925, 263 (larva, pupa, ♂ ♀, Brazil).

*Lasiohelea bromelicola* Lane, 1945, 360 (♂ ♀, Brazil).

**cretea Boesel**

*Lasiohelea cretea* Boesel, 1937, 46 (♀, Cretaceous amber, Canada).

**danaisi Floch and Abonnenc**

*Lasiohelea danaisi* Floch and Abonnenc, 1949a, 73 (♀, Rancho Grande, Aragua, Venezuela).

**fluviatilis (Lutz)**

*Johannseniella fluviatilis* Lutz, 1914, 82 (♀, Rio Negro, Massaraby, Brazil).

*Culicoides fluviatilis* Dunn, 1934, 178 (Panama). Fairchild, 1943, 572 (Panama).

*Serromyia fluviatilis* Fox, 1946a, 249.

*Lasiohelea fluviatilis* Lane, 1945, 363. Barbosa, 1947, 15. Vargas, 1949b, 198.

**globosa Boesel**

*Lasiohelea globosa* Boesel, 1937, 47 (♀, Cretaceous amber, Canada).

**intrepida Macfie**

*Forcipomyia (Lasiohelea) intrepida* Macfie, 1936, 228 (♀, Iquitos, Peru).

**louriei Macfie**

*Lasiohelea louriei* Macfie, 1935a, 49 (♀, Tutoia, Piaui, Brazil).

**nana Macfie**

*Lasiohelea nana* Macfie, 1939, 171 (♀, Nova Teutonia, Brazil). Macfie, 1944, 297 (♂, Trinidad).

**opilionivora Lane**

*Lasiohelea opilionivora* Lane, 1947, 159 (♀, Juquiá, S. Paulo, Brazil).

**shannoni Ingram and Macfie**

*Lasiohelea shannoni* Ingram and Macfie, 1931, 171 (♀, L. Correntoso, Chile).

**stylifer (Lutz)**

*Centrorhynchus stylifer* Lutz, 1913, 63 (♀, Lassance, Minas, Brazil).

*Lasiohelea stylifer* Edwards, 1922, 166. Dunn, 1934, 178 (Panama). Macfie, 1939, 171 (Brazil). Macfie, 1940b, 181 (British Guiana). Fairchild, 1943, 572 (Panama). Macfie, 1944, 298 (Trinidad). Lane, 1945, 362 (♀, Brazil).

Lane, 1947, 161 (larva, pupa, Brazil). Ortiz, 1952c, 242 (♀, Venezuela).  
*Culicoides stylifer* Vargas, 1945, 43. Vargas, 1949b, 207.

**GEOGRAPHIC INDEX**

ALASKA.—*Culicoides alaskensis*, *obsoletus*, *cockerellii*, *tristriatulus*, *unicolor*, *yukonensis*.

ANTIGUA.—*Culicoides furens*.

ARGENTINA.—*Culicoides caridei*, *debilipalpis*, *paraensis*, *Leptoconops petrocchia*.

ARUBA.—*Culicoides arubae*.

BAHAMA.—*Culicoides furens*.

BARBADOS.—*Culicoides furens*, *debilipalpis*, *paraensis*.

BOLIVIA.—*Culicoides paraensis*.

BRAZIL.—*Culicoides acotylus*, *bahiensis*, *bambusicola*, *caridei*, *coutinhoi*, *debilipalpis*, *debilipalpis glabrior*, *diabolicus*, *flavivenula*, *furens*, *guttatus*, *guyanensis*, *horticola*, *insignis*, *limai*, *lopesi*, *lutzi*, *maruim*, *pachymerus*, *paraensis*, *paucienfuscatus*, *phlebotomus*, *pulchripennis*, *pusillus*, *recifei*, *reticulatus*. *Leptoconops brasiliensis*. *Lasiohelea bromelicola*, *fluviatilis*, *louriei*, *nana*, *opilionivora*, *stylifer*.

BRITISH GUIANA.—*Culicoides dasyophrus*, *debilipalpis glabrior*, *diabolicus*, *eublepharus*, *fluvialis*, *germanus*, *hylas*, *verecundus*. *Lasiohelea aeronautica*, *stylifer*.

BRITISH HONDURAS.—*Culicoides furens*.

CANADA.—*Culicoides biguttatus*, *cockerellii*, *crepuscularis*, *denningi*, *gigas*, *jamesi*, *obsoletus*, *unicolor*, *variipennis*, *yukonensis*. *Lasiohelea cretea*, *globosa*.

- CHILE.—*Culicoides venezuelensis*. *Lasiohelea shannoni*.
- COLOMBIA. *Culicoides diabolicus*, *furens*, *phlebotomus*.
- COSTA RICA.—*Culicoides diabolicus*, *paraensis*, *phlebotomus*.
- CUBA.—*Culicoides furens*. *Leptoconops bequaerti*, *torrens*.
- DOMINICAN REPUBLIC.—*Culicoides furens*, *phlebotomus*. *Leptoconops bequaerti*.
- ECUADOR.—*Culicoides alahialinus*, *caridei*, *debilipalpis equatoriensis*, *furens*, *leoni*.
- FRENCH GUIANA.—*Culicoides bimaculatus*, *debilipalpis*, *diabolicus*, *flavi-venula*, *furens*, *guyanensis*, *horticola*, *lutzi*, *paraensis*, *phlebotomus*, *pusillus*.
- GREENLAND.—*Culicoides pumilus*, *sordidellus*.
- GRENADA.—*Culicoides paraensis*.
- GUADALOUPE.—*Culicoides furens*, *guadeloupensis*.
- GUATEMALA.—*Culicoides diminutus*, *furens*, *gibsoni*, *paraensis*, *stigmatis*.
- HAITI.—*Culicoides furens*, *inamollae*, *oliveri*.
- HONDURAS.—*Culicoides castillae*, *furens*, *heliconiae*, *inamollae*, *phlebotomus*. *Leptoconops bequaerti*.
- JAMAICA. *Culicoides furens*, *jamaicensis*, *loughnani*, *pusillus*. *Leptoconops bequaerti*.
- MEXICO.—*Culicoides acotylus*; *alambicorum*, *albomacula*, *baueri*, *cacozelus*, *copiosus*, *crepuscularis*, *daedalus*, *dampfi*, *debilipalpis*, *diabolicus*, *diminutus*, *elutus*, *furens*, *haematopotus*, *jamaicensis*, *luteovenus*, *pampoikilus*, *phlebotomus*, *piliferus*, *poikilonotus*, *propinquus*, *propriipennis*, *pusillus*, *scopus*, *stigmatis*, *variipennis*, *verecundus*, *wirthomyia*, *yukonensis*.
- NICARAGUA.—*Culicoides diminutus*, *furens*, *phlebotomus*. *Leptoconops bequaerti*.
- PANAMA (INCLUDING CANAL ZONE).—*Culicoides arubae*, *aureus*, *carpenteri*, *dasyophrus*, *debilipalpis glabrior*, *diabolicus*, *diminutus*, *furens*, *galindoi*, *gorgasi*, *guyanensis*, *hertigi*, *iriartei*, *jamaicensis*, *kintzi*, *lanei*, *leopoldoi*, *luteovenus*, *macrostigma*, *magnipalpis*, *mojingaensis*, *panamensis*, *paraensis*, *paucienfuscatus*, *phlebotomus*, *pifanoi*, *pusillus*, *rozeboomi*, *stigmatis*, *uniradialis*, *willistoni*, *wokei*. *Lasiohelea fluviatilis*, *stylifer*.
- PARAGUAY.—*Culicoides polystictus*.
- PERU.—*Culicoides efferus*, *paraensis*, *rozeboomi*. *Lasiohelea intrepida*.
- PUERTO RICO. *Culicoides borinqueni*, *foxi*, *furens*, *hoffmani*, *inamollae*, *jamaicensis*, *phlebotomus*, *pusillus*, *trilineatus*.
- ST. CROIX.—*Culicoides furens*, *jamaicensis*, *loughnani*, *phlebotomus*.
- ST. JOHN.—*Culicoides furens*.
- ST. THOMAS.—*Culicoides trilineatus*.
- ST. VINCENT.—*Culicoides decor*, *furens*, *paraensis*, *phlebotomus*.
- TOBAGO.—*Culicoides phlebotomus*.
- TRINIDAD.—*Culicoides debilipalpis*, *diabolicus*, *furens*, *guyanensis*, *heli-*

*coniae*, *hoffmani*, *maruim*, *paraensis*, *phlebotomus*, *pusillus*, *rozeboomi*, *trinidadensis*. *Leptoconops bequaerti*. *Lasiohelea nana*, *stylifer*.

UNITED STATES.—*Culicoides arboricola*, *baueri*, *biguttatus*, *brookmani*, *canithorax*, *chiopterus*, *cockerellii*, *c. saltonensis*, *copiosus*, *crepuscularis*, *denningi*, *floridensis*, *furens*, *guttipennis*, *haematopotus*, *hieroglyphicus*, *hinmani*, *hollensis*, *horneae*, *inamollae*, *jamesi*, *loughnani*, *luteovenus*, *melleus*, *mohave*, *monoensis*, *multipunctatus*, *nanus*, *niger*, *nocivum*, *obsoletus*, *ousairani*, *palmerae*, *pifanoi*, *piliferus*, *reevesi*, *salihii*, *spinosus*, *stellifer*, *stilobezzioides*, *stonei*, *tenuistylus*, *travisi*, *tristriatulus*, *unicolor*, *usingeri*, *utahensis*, *variipennis*, *venustus*, *villosipennis*, *v. oklahomensis*, *weesei*, *wirthi*. *Leptoconops bequaerti*, *catawbae*, *floridensis*, *freeborni*, *kertészi*, *torrens*. (See below).

URUGUAY.—*Culicoides caridei*.

VENEZUELA.—*Culicoides acotylus*, *arubae*, *aureus*, *avilaensis*, *baueri*, *bebei*, *benarrochei*, *briceñoi*, *cacozelus*, *caprilesi*, *cova-garciai*, *daedalus*, *dasyophrus*, *debilipalpis*, *discrepans*, *dominicii*, *eublepharus*, *flochabonnenci*, *fluvialis*, *foxi*, *furens*, *ginesi*, *guyanensis*, *heliconiae*, *hoffmani*, *horticola*, *inamollae*, *iriartei*, *jamaicensis*, *leopoldoi*, *lichyi*, *limai*, *lutzi*, *maruim*, *obnoxius*, *ocumarensis*, *paraensis*, *phlebotomus*, *pifanoi*, *propriipennis*, *pusillus*, *rangeli*, *venezuelensis*, *verecundus*. *Leptoconops bequaerti*, *venezuelensis*. *Lasiohelea danaisi*, *stylifer*.

#### GEOGRAPHIC INDEX OF THE UNITED STATES

ALABAMA.—*Culicoides crepuscularis*, *stellifer*, *venustus*.

ARIZONA.—*Culicoides crepuscularis*, *guttipennis*, *hieroglyphicus*, *mohave*, *stellifer*, *variipennis*. *Leptoconops torrens*.

ARKANSAS.—*Culicoides variipennis*.

CALIFORNIA.—*Culicoides baueri*, *brookmani*, *cockerellii*, *c. saltonensis*, *copiosus*, *crepuscularis*, *haematopotus*, *hieroglyphicus*, *jamesi*, *luteovenus*, *mohave*, *monoensis*, *obsoletus*, *palmerae*, *reevesi*, *stellifer*, *tenuistylus*, *tristriatulus*, *unicolor*, *usingeri*, *utahensis*, *variipennis*. *Leptoconops freeborni*, *kertészi*, *torrens*.

COLORADO.—*Culicoides baueri*, *cockerellii*, *crepuscularis*, *haematopotus*, *hieroglyphicus*, *jamesi*, *obsoletus*, *palmerae*, *stellifer*, *stonei*, *variipennis*. *Leptoconops kertészi*, *torrens*.

CONNECTICUT.—*Culicoides biguttatus*, *guttipennis*, *stellifer*, *venustus*.

DELAWARE.—*Culicoides canithorax*, *stellifer*, *venustus*.

DISTRICT OF COLUMBIA.—*Culicoides biguttatus*, *haematopotus*, *obsoletus*, *stellifer*.

FLORIDA.—*Culicoides arboricola*, *baueri*, *biguttatus*, *canithorax*, *crepuscularis*, *floridensis*, *furens*, *guttipennis*, *haematopotus*, *inamollae*, *loughnani*, *melleus*, *nanus*, *niger*, *obsoletus*, *pifanoi*, *piliferus*, *spinosus*, *stellifer*, *travisi*, *venustus*, *villosipennis*. *Leptoconops bequaerti*, *floridensis*, *torrens*.

- GEORGIA.—*Culicoides arboricola*, *baueri*, *biguttatus*, *canithorax*, *crepuscularis*, *furens*, *guttipennis*, *haematopotus*, *melleus*, *nanus*, *obsoletus*, *piliferus*, *stellifer*, *travisi*, *variipennis*, *venustus*, *villosipennis*..
- IDAHO.—*Culicoides utahensis*.
- ILLINOIS.—*Culicoides arboricola*, *biguttatus*, *crepuscularis*, *guttipennis*, *haematopotus*, *multipunctatus*, *obsoletus*, *stellifer*, *variipennis*.
- INDIANA.—*Culicoides obsoletus*, *variipennis*.
- KANSAS.—*Culicoides biguttatus*, *crepuscularis*, *haematopotus*, *hieroglyphicus*, *obsoletus*, *stellifer*, *variipennis*.
- KENTUCKY.—*Culicoides stellifer*.
- LOUISIANA.—*Culicoides arboricola*, *canithorax*, *furens*, *guttipennis*, *haematopotus*, *stellifer*, *variipennis*, *villosipennis*.
- MAINE.—*Culicoides canithorax*, *obsoletus*.
- MARYLAND.—*Culicoides arboricola*, *baueri*, *biguttatus*, *canithorax*, *chiop-terus*, *crepuscularis*, *furens*, *guttipennis*, *haematopotus*, *melleus*, *nanus*, *niger*, *obsoletus*, *piliferus*, *spinosus*, *stellifer*, *travisi*, *variipennis*, *venustus*, *villosipennis*.
- MASSACHUSETTS.—*Culicoides biguttatus*, *canithorax*, *crepuscularis*, *furens*, *hollensis*, *melleus*, *nocivum*, *obsoletus*.
- MICHIGAN.—*Culicoides crepuscularis*, *haematopotus*, *stellifer*. *Leptoconops catawbae*.
- MINNESOTA.—*Culicoides crepuscularis*.
- MISSISSIPPI.—*Culicoides arboricola*, *canithorax*, *furens*, *guttipennis*, *melleus*, *stellifer*, *variipennis*, *venustus*. *Leptoconops bequaerti*.
- MISSOURI.—*Culicoides crepuscularis*, *guttipennis*, *obsoletus*, *variipennis*.
- MONTANA.—*Culicoides biguttatus*, *cockerellii*, *crepuscularis*, *hieroglyphicus*, *jamesi*, *obsoletus*, *palmerae*, *unicolor*, *utahensis*, *variipennis*, *wirthi*. *Leptoconops kertészi*.
- NEBRASKA.—*Culicoides crepuscularis*, *haematopotus*, *hieroglyphicus*, *palmerae*, *stellifer*, *variipennis*. *Leptoconops kertészi*.
- NEVADA.—*Culicoides haematopotus*, *hieroglyphicus*, *palmerae*, *variipennis*.
- NEW HAMPSHIRE.—*Culicoides obsoletus*.
- NEW JERSEY.—*Culicoides biguttatus*, *canithorax*, *crepuscularis*, *furens*, *obsoletus*, *variipennis*.
- NEW MEXICO.—*Culicoides crepuscularis*, *haematopotus*, *hieroglyphicus*, *palmerae*, *stellifer*, *variipennis*. *Leptoconops kertészi*, *torrens*.
- NEW YORK.—*Culicoides biguttatus*, *crepuscularis*, *guttipennis*, *haematopotus*, *horneae*, *melleus*, *obsoletus*, *piliferus*, *spinosus*, *stellifer*, *stilobezzioides*, *travisi*, *variipennis*, *venustus*.
- NORTH CAROLINA.—*Culicoides furens*, *venustus*.
- OHIO.—*Culicoides biguttatus*, *haematopotus*, *guttipennis*, *obsoletus*, *stellifer*, *travisi*, *variipennis*, *venustus*. *Leptoconops catawbae*.

- OKLAHOMA.—*Culicoides arboricola*, *crepuscularis*, *guttipennis*, *haematopotus*, *hieroglyphicus*, *hinmani*, *multipunctatus*, *nanus*, *obsoletus*, *ousairani*, *salihi*, *spinosus*, *stellifer*, *travisi*, *variipennis*, *villosipennis*, *v. oklahomensis*, *weesei*.
- OREGON.—*Culicoides obsoletus*, *unicolor*, *variipennis*.
- PENNSYLVANIA.—*Culicoides biguttatus*, *haematopotus*, *obsoletus*, *stellifer*, *travisi*, *venustus*.
- SOUTH CAROLINA.—*Culicoides canithorax*, *furens*, *melleus*, *nanus*, *obsoletus*, *stellifer*.
- SOUTH DAKOTA.—*Culicoides crepuscularis*.
- TENNESSEE.—*Culicoides arboricola*, *baueri*, *biguttatus*, *crepuscularis*, *guttipennis*, *haematopotus*, *obsoletus*, *piliferus*, *stellifer*, *travisi*, *variipennis*, *venustus*, *villosipennis*.
- TEXAS.—*Culicoides biguttatus*, *crepuscularis*, *furens*, *guttipennis*, *haematopotus*, *hieroglyphicus*, *multipunctatus*, *stellifer*, *variipennis*, *villosipennis*. *Leptoconops torrens*.
- UTAH.—*Culicoides cockerellii*, *crepuscularis*, *haematopotus*, *hieroglyphicus*, *luteovenus*, *palmerae*, *stellifer*, *utahensis*, *variipennis*. *Leptoconops kertészi*, *torrens*.
- VERMONT.—*Culicoides biguttatus*, *crepuscularis*, *guttipennis*, *obsoletus*, *piliferus*, *venustus*.
- VIRGINIA.—*Culicoides arboricola*, *biguttatus*, *crepuscularis*, *guttipennis*, *haematopotus*, *niger*, *obsoletus*, *piliferus*, *spinosus*, *stellifer*, *travisi*, *variipennis*, *venustus*, *villosipennis*.
- WASHINGTON.—*Culicoides crepuscularis*, *jamesi*, *luteovenus*, *obsoletus*, *variipennis*.
- WYOMING.—*Culicoides crepuscularis*, *cockerellii*, *denningi*, *palmerae*. *Leptoconops kertészi*.

## SUMMARY

This catalogue dealing with the bloodsucking Ceratopogonidae of the Western Hemisphere includes 198 subspecific and specific names in *Culicoides*, 12 in *Leptoconops* and 12 in *Lasiohelea*, together with most of the literature references to them which had appeared up to June 1954. A subgeneric system in *Culicoides* based particularly on the male genitalia is proposed and eight subgenera are described or redescribed: *Macfiella* (new subgenus), *Hoffmania*, Fox, *Avaritia* (new subgenus), *Culicoides* Latreille, *Selfia* Khalaf, *Monoculicoides* Khalaf, *Oecacta* Poey, and *Beltranmyia* Vargas. The species are placed in the appropriate subgenera, as far as possible, and a key is given to the males and females of the Nearctic forms. The Geographic Index lists the species reported from the geographic units of the Western Hemisphere as well as each of the states of the United States.



A brief review of the literature on biology, control, and medical importance is also included.

### RESUMEN

Este catálogo trata de los ceratopogónidos hematófagos del hemisferio occidental e incluye 198 nombres específicos y subespecíficos del género *Culicoides*, 12 del género *Leptoconops* y 12 del género *Lasiohelea*. Incluye además casi todas las referencias de la literatura que han sido publicadas hasta Junio, 1954. Se ofrece un sistema de clasificación subgenérico en los *Culicoides* basado particularmente en los órganos genitales del macho. Hay descripciones de ocho subgéneros de los cuales dos son nuevos: *Macfiella* (subgénero nuevo), *Hoffmania* Fox, *Avaritia* (subgénero nuevo), *Culicoides* Latreille, *Selfia* Khalaf, *Monoculicoides* Khalaf, *Oecacta* Poey y *Beltranmyia* Vargas. Las especies están colocadas en los subgéneros apropiados hasta donde es posible y se da una clave de los machos y las hembras de las formas Neárticas. El índice geográfico incluye las especies informadas de las unidades geográficas del hemisferio occidental así como las de cada estado de los Estados Unidos de América. Se incluye también un breve repaso sobre la biología, el control y la importancia médica de los ceretopogónidos hematófagos.

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