The bloodsucking biting midges of Argentina
(Diptera: Ceratopogonidae)

Gustavo R Spinelli†, María M Ronderos, Florentina Díaz, Pablo I Marino

Division Entomología, Museo de La Plata, Paseo del Bosque s/n, 1900 La Plata, Argentina

A key is presented for the identification of the adults of 54 species of bloodsucking ceratopogonids, 51 of which are known inhabitants of Argentina, and Culicoides uruguayensis Ronderos, C. pifanoi Ortiz, and C. trilineatus Fox, which are known to occur in bordering Uruguay and Paraguay. Wing photographs are provided of females of the 45 species of Culicoides. Three new species of Culicoides Latreille from Northeastern Argentina are described and illustrated: C. austroparaensis Spinelli, C. bachmanni Spinelli, and C. williamsi Spinelli. The following six species are recorded for the first time from Argentina and/or bordering localities in Paraguay: Leptoconops brasiliensis (Lutz), C. gabaldoni Ortiz, C. ginesi Ortiz, C. pifanoi Ortiz, C. pseudocrescentis Tavares and Luna Dias, and C. trilineatus; and C. estevezae Ronderos and Spinelli is newly recorded from Misiones province of Argentina. C. lopesi Barretto is excluded from the Argentinean ceratopogonid fauna.

Key words: Diptera - Ceratopogonidae - biting midges - hematophagous - key - new species - Argentina

Of the 102 living genera of Ceratopogonidae listed in the recent world catalog by Borkent and Wirth (1997), females of only the following four suck blood from vertebrates: Astroconops Wirth and Lee, endemic to Australia, and the cosmopolitan Leptoconops Skuse, Forcipomyia Meigen (only species included in the subgenus Lasiohelea Kieffer) and Culicoides Latreille.

The medical and veterinary importance of these species in Argentina was recently reviewed by Ronderos et al. (2003), and the taxonomic status of the bloodsucking species in the country was treated by Ronderos and Spinelli (1992) for Leptoconops, Ronderos and Spinelli (1999), Marino and Spinelli (2005) for Forcipomyia (Lasiohelea) and Ronderos and Spinelli (2002) for Culicoides.

As a result of several collecting trips to northern sites in Argentina and Paraguay, material containing three undescribed species of Culicoides and several hitherto previously unrecorded species of Leptoconops and Culicoides for Argentina were processed and accessioned into the entomological collection of the Museo de La Plata. This paper deals with the description and illustration of three previously undescribed species, as well to provide a key for the identification of 54 species of bloodsucking ceratopogonids, 51 of which are known inhabitants of Argentina, and C. uruguayensis Ronderos, C. pifanoi Ortiz, and C. trilineatus Fox, which are known to occur in bordering Uruguay and Paraguay.

Forattini (1957) recorded C. lopesi Barretto from Argentina, based on two females from Misiones province. During the present study these two females were re-examined and we determined that they actually belong to two different species. These specimens are mounted in Canada balsam, are very damaged and unidentifiable, but it could be verified that the antenna of both species differ from the one described by Forattini (1957) as the antenna of C. lopesi. Therefore, we conclude that C. lopesi is not present in Argentina.

MATERIALS AND METHODS

Specimens were slide mounted in Canada balsam and examined, measured, and drawn using a binocular compound microscope with attached camera lucida. Types of the new species, as well as the remaining specimens examined are deposited in the collection of the División Entomología, Museo de la Plata, Argentina (MLPA). Illustrations are based on types. All specimens were collected biting or with different types of light traps.

Terms for structures follow those used in the Manual of Nearctic Diptera (McAlpine et al. 1981). Terms for wing veins follow the system in the Manual of Nearctic Diptera, with modifications proposed by Szadziewski (1996). Names of veins are in upper case and those cells in lower case. Pale areas in cell r3 posterior to or immediately distal to second radial cell are called poststigmatic pale spots. Four abbreviated terms are used in the text: antennal ratio (AR) is the combined length of the five distal flagellomeres divided by the combined length of the eight proximal ones; palpal ratio (PR) is the length of the third palpal segment divided by its greatest width; proboscis/head ratio (P/H ratio) is the length of the proboscis measured from the distal end of the labrum-epipharynx to the anterior margin of the torae, divided by the distance measured from the anterior margin of the torae to the median hair socket between the eyes; costal ratio (CR) is obtained by dividing the length of the costa by wing length, measuring both from the level of the basal arculus of the wing.

RESULTS

Key to species

1. Eyes widely separated dorsally, lacking frontal suture; female antenna with 12 flagellomeres; palpus with four segments (only one beyond elongate and/or swollen third) and with membranous gap between segment 3
and 4+5; wing whitish hyaline without macrotrichia, crossvein r-m absent, female with radial cells fused into swollen stigma; female cerci very elongate (except subgenus Brachycyonops Wirth and Atchley); male gonostylus with an apical, socketed peg (Leptoconops Skuse) 2

- Eyes narrowly separated dorsally, with frontal suture; female antenna with 13 flagellomeres; palpus with five segments but with a membranous gap between the last two segments; wing with numerous or scattered macrotrichia, crossvein r-m present, female with radial cells not fused; female cerci short; male gonostylus without apical, socketed peg although apex may be pointed 7

2. Female cerci short; tarsomeres 1-2 of foreleg with strong spines, other tarsomeres with slender, sharp, or inconspicuous spines only; tarsal claws of female each with basal, bifid tooth (subgenus Brachycyonops) L. (B.) patagoniensis Ronderos

- Female cerci very elongate; female tarsi without strong ventral spines, or with spines only at apices of tarsomere 1 of foreleg, or with a few moderately strong ventral spines on tarsomere 1 of foreleg and at apices of distal tarsomeres (subgenus Leptoconops Skuse) 3

3. CR 0.20 ..... L. (L.) petrochiae Shannon and Del Ponte

- CR 0.40-0.50 ....................................... 4

4. Apical flagellomere 2.0-2.6 times longer than broad .................................. 5

- Apical flagellomere 4-5 times longer than broad ........................................ 6

5. Apical flagellomere twice as long as broad; third palpal segment slender, with small, rounded sensory pit; hind tibial comb with four spines, second from spur longest; three spermatacethae L. (L.) chilensis Forattini

- Apical flagellomere 2.6 times longer than broad; third palpal segment broad, with large sensory pit; hind tibial comb with four spines, second and third from spur longest; two spermatacethae L. (L.) ricardoi Ronderos and Spinelli

6. Apical flagellomere with conical apex; third palpal segment pale brown, subequal to fourth, which bears a pale basal ring; longitudinal veins abutting wing margin L. (L.) brasiliensis (Lutz)

- Apical flagellomere with blunt apex; third palpal segment 1.5 times longer than fourth, both entirely dark brown; longitudinal veins not abutting wing margin L. (L.) casali Cavalieri and Chiassone

7. Wing with numerous macrotrichia, without distal pattern of dark and/or light pigmentation; apical flagellomere with terminal nipple which is constricted basally; claws strongly curved; empodia well developed (Forcipomyia Meigen, subgenus Lasiohelea Kieffer) 8

- Wing with scattered macrotrichia on apical half of the wing (a few species have some macrotrichia more basally on the wing but these are scattered), with or without distinct pattern of dark and/or light pigmentation; apical flagellomere without terminal nipple; claws only slightly curved; empodia poorly developed (Culicoides Latreille)

8. CR 0.50 ........................... F. (L.) saltensis (Cavaliere)

- CR 0.60 ....................................... 9

9. Third palpal segment fusiform, palpal ratio 1.90-2.10; cibarial armature with 9-10 spines in one row; sclerites of aedeagus contacting at 2/3 of total length, distal portion elongate, directed latero posteriorly F. (L.) stylifer (Lutz)

- Third palpal segment greatly swollen, PR 1.27-1.55; cibarial armature with 12-15 spines in one row; sclerites of aedeagus in contact their entire length, distal portion very short, divergent, forming right angles F. (L.) inops Huerta and Ibañez-Bernal

10. Wing without pattern of pale and dark spots 11

- Wing with pattern of pale and dark spots 13

11. Large species, wing length 1.30 mm; sensilla coeloconica on flagellomeres 3-10 C. irwini Spinelli and Wirth (Fig. 1)

- Smaller species, wing length less than 1.10 mm; sensilla coeloconica on different flagellomeres 12

12. Sensilla coeloconica on flagellomeres 1, (5), 6-8, (9-10), 11-12, (13); halter dark brown; eyes bare; aedagus with bifid apex; parameres without distal fringe 12

- Sensilla coeloconica on flagellomeres 1, 6, (7-8), (11), 12, (13); halter pale brown; eyes pubescent between lower ommatidia; apex of aedeagus concave; parameres with distal fringe 12

- C. caridei (Brèthes) (Fig. 2)

13. Pale spots at periphery of wing very faint 14

- Pale spots at periphery of wing well defined 16

14. Small species, wing length 0.64 mm; eyes contiguous, pubescent; wing nearly bare of macrotrichia; poststigmatic pale spots abutting vein M 1; legs yellow except for dark knees P. pusillus Lutz (Fig. 4)

- Larger species, wing length 1.00 mm or greater; eyes separated, bare; wing with abundant macrotrichia; poststigmatic pale spot not abutting vein M 1; legs brown, femora with or without pale rings 15

15. Third palpal segment with deep pit; femora without pale rings; sensilla coeloconica on flagellomeres 1, 5-8 CR 0.62 ........................... C. bambusicola Lutz (Fig. 5)

- Third palpal segment with broad, shallow pit; fore and midfemora with subapical pale rings; sensilla coeloconica on flagellomeres 1, 6-8 CR 0.53 C. pampaensis Spinelli and Wirth (Fig. 6)
16. Second radial cell wholly or mainly included in a light spot .............................................. 17
- Second radial wholly included in a dark spot .......... 28
17. Wing dark, with well separated pale spots, veins CuA1 and CuA2 pale bordered in cell cula; sensilla coeloconica on flagellomeres 1, 9-13 or 1, (2), 3, 4, 5, (6), 7, (8), 9-13; legs dark brown, femora and tibiae with pale rings ..................................... 18
- Wing with large, interconnected pale spots; sensilla coeloconica on flagellomeres 1-13; legs yellowish except for dark knee spots .............................................. C. nigrigenus Wirth and Blanton (Fig. 7)
18. Cell m1 with one pale spot distal to the double spot straddling vein M2 .............................................. 19
- Cell m1 with two pale spots distal to the double spot straddling vein M2 ......................................... 23
19. Crossvein r-m dark on anterior half; vein R3 blackened into adjacent distal pale area up to a point where vein turns abruptly forward to meet the costa; sensilla coeloconica on flagellomeres 1, 9-13 (variable on flagellomeres 5 and 7 in C. fernandoi); mandible with 13-18 teeth; third palpal segment various ..................................... 20
20. Crossvein r-m dark .............................................. 21
- Crossvein r-m pale .............................................. 22
21. Eyes V-shaped where they contact; PR 1.90; vein R3 with a small blackish spot just beyond apex; vein CuA2 with apical pale spot; mandible with 18 teeth ...................... C. charrus Spinelli and Martínez (Fig. 9)
- Eyes contiguous by distance equal to diameter of 1.5 ommatidia; PR 4.00; vein R3 pale, without blackish spot just beyond apex; apex of vein CuA2 dark; mandible with 13 teeth ...................... C. biestroi Spinelli and Ronderos (Fig. 10)
22. Yellowish brown species; third palpal segment with subdivided pit; palpal ratio 3.30; mandible with 12-14 teeth; halter knob dark .............................................. C. ferreyrai Ronderos and Spinelli (Fig. 11)
- Brown species; third palpal segment stout, with irregular pit; palpal ratio 2.40; mandible with 17-19 teeth; halter knob pale .................. C. lutzi Costa Lima (Fig. 12)
23. Crossvein r-m pale; wing pattern with extensive pale areas predominant ...C. brasiliannum Forattini (Fig. 13)
- Crossvein r-m dark, or at least faintly infuscated; wing with pale areas smaller, contrasting ...................... 24
24. Vein R3 with a small black spot just beyond apex ...... 25
- Vein R3 pale, without black spot just beyond apex ... 26
25. Sensilla coeloconica on flagellomeres 1, 9-13; third palpal segment very elongated, with shallow, rounded pit, PR 4.20; P/H ratio 1.22; tergite 9 of male with widely spaced apicolateral processes; apex of aedeagus truncated ....................................... C. foxi Ortiz (Fig. 14)
- Sensilla coeloconica on flagellomeres 1, (5), (7), 9-13; third palpal segment swollen at midpoint, with irregular pit, PR 3.50; P/H ratio 1.00; tergite 9 of male with closer apicolateral processes; apex of aedeagus with terminal papilla.................................................. C. fernandoi Tavares and Souza (Fig. 15)
26. Large, blackish species; mandible with 20-23 very small teeth; scutum with prominent pattern .............................................. C. ignacoi Forattini (Fig. 16)
- Medium-sized, brown species; mandible with 13-18 stouter teeth; scutum without prominent pattern .............................................. 27
27. Crossvein r-m very dark on anterior half; third palpal segment with irregular pit, PR 3.00-3.35 ................. C. plaumanni Spinelli (Fig. 17)
- Crossvein r-m only faintly darkened on anterior half; third palpal segment elongate, with capitate sensilla in a shallow pit (with 2-3 other shallow depressions in a few specimens), PR 3.60-5.35................................................................. C. guttatus (Coquillett) (Fig. 18)
28. Wing with pale spot straddling middle of vein M2 or veins M1 and M2 entirely pale-margined, including this area ................................................................. 29
- Wing with no pale spot straddling vein M2, this vein usually dark to apex .............................................. 36
29 Wing with extensive, interconnected pale markings (cell m1 with distal pale spot shorter than dark area between it and wing margin; cell r3 with poststigmatic pale spot not enclosing a dark spot behind second radial cell; scutum yellowish with dark brown sublateral bands) .................. C. pifanoi Ortiz (Fig. 19)
- Wing dark with well separated pale spots............ 30
30. Vein M1 with pale spot present straddling basal portion; sensilla coeloconica on flagellomeres 1, 9-13 ................................................................. 31
- Vein M1 without pale spot straddling basal portion; distribution of sensilla coeloconica different from above ................................................................. 33
31. One spermatheca without sclerotized neck; two separate, small, distal pale spots in cell cell r2; fore, mid femora with subapical pale rings .................................................. C. uruguayensis Ronderos (Fig. 20)
- Two spermathecae; distal pale spots in cell cell r3 fused ........................................................................ 32
32. Small species, wing length 1.10 mm; spermathecae ovoid, length 0.044, 0.035 mm, respectively ..........
33. Cell m₁ with two pale spots past the pale spots straddling vein M₂; cell r₃ with six small round pale spots

34. Sternite 9 of male with broad, shallow postero medial excavation; third palpal segment with shallow pit; hind tibial comb with five spines ................. C. venezuelensis Ortiz and Mirsa (Fig. 23)

35. Cell r₃ with pale spot lying in front of vein M₁ located between poststigmatic and the crescent-shaped, distal pale spot ............................................. C. crecentis Wirth and Blanton (Fig. 25)

36. Cell m₂ with two (or one with at least part of a second) pale spot lying distal to level of cubital fork ........ 37

37. Distal pale spot in cell m₁ broadly abutting wing margin ........................................ 38

38. Apices of veins M₁, M₂ dark; hind femur with subapical pale ring ........................ C. limai Barretto (Fig. 27)

39. Second radial cell long, CR 0.75; scutum dark brown, without prominent pattern ................................. C. cuiabai Wirth (Fig. 29)

40. Anal cell with one distal pale spot; distal pale spot in cell r₃ not abutting wing margin; legs largely pale ........................................ C. aureus Ortiz (Fig. 30)

41. One spermatheca; pale spot on crossvein r-m extensive; pale spot present behind second radial cell, proximal to the poststigmatic pale spots; poststigmatic pale spots longitudinally aligned, posterior one smaller; distal pale spot in cell r₃ large, with narrow proximal extension .......................... C. leopoldoi Ortiz (Fig. 31)

42. Sensilla coeloconica on flagellomeres 1, 9-12 ............................ C. guaranii Ronderos and Spinelli (Fig. 33)

43. One spermatheca ................................. C. estevezae Ronderos and Spinelli (Fig. 34)

44. Cell r₃ with three pale spots (two poststigmatic, and one located between the poststigmatic pale spots and wing margin); cell m₁ with two pale spots (additional, faint third pale spot may be present in C. duretti and C. trilineatus) .............................. 46

45. Distal portion of parameres with well developed ventral lobe, tapered to fine point with lateral fringe of fine spines ........................................ C. paraeais (Goeldi) (Fig. 35)

46. Sensilla coeloconica on flagellomeres 1, 4-8 .............. C. trilineatus Fox (Fig. 37)

47. Poststigmatic pale spot fused, longitudinally aligned; third palpal segment moderatelly swollen, with deep pit ............................................... 48

48. Palpus pale yellowish ........................................... C. gabaldoni Ortiz (Fig. 38)

49. Flagellomeres 9-10 subequal to preceding and following ones ........................................ C. horticola Lutz (Fig. 39)

50. Scutum with prominent pattern of punctiform brown
dots; pale spot present anterior to cubital fork; distal pale spots in cells m3 and cu1 not abutting wing margin. ...

C. ginesi Ortiz (Fig. 41)

- Scutum without prominent pattern; no pale spot anterior to cubital fork; distal pale spots in cells m3 and cu1 abutting wing margin. 51

51. Sensilla coeloconica on flagellomeres 1, 5-8 ........ 52

- Sensilla coeloconica on flagellomeres 1, 6-8 ...... 53

52. Flagellomeres 8, 9 subequal, AR 0.82; additional, faint sensilla coeloconica on flagellomeres 1, 5-8 ........… 53

53. Third palpal segment stout, PR 2.00-2.60; flagellomere 8 slightly shorter than 9; AR 0.75 (0.68-0.80, n = 3); sensilla coeloconica on flagellomeres 1, 6-8. Palpus (Fig. 51) pale brown; third segment moderately slender with small, deep pit; PR 2.85 (2.20-3.20, n = 3); P/H ratio 0.86 (n = 3). Mandible with 12-16 (n = 3) teeth.

Thorax: scutum dark brown, without pattern. Legs dark brown; fore, mid femora with subapical, tibiae with subbasal pale rings, hind tibia pale distally; hind tibial comb with four spines, second from spur longest. Wing (Fig. 36), length 0.85 (0.82-0.87, n = 3) mm; width 0.41 (0.40-0.42, n = 3) mm; CR 0.57 (n = 3); with second radial cell in dark spot; pale spot on crossvein r-m small, rounded, barely abutting costal wing margin; poststigmatic pale spots in cell r3 small, rounded, posterior one located distinctly proximal to anterior one; two additional pale spots in cell r1, anterior one small, located in center of cell, distal one near apex of cell; cell m1 with three pale spots; cell m2 with one distal pale spot, another lying anterior to cubital fork, another behind crossvein r-m; cell cu1 with small pale spot not abutting wing margin nor veins CuA1, CuA2; anal cell with one distal pale spot well separated from wing margin; apices of veins M1, M2, CuA1, CuA2 dark. Macrotrichia very sparse on distal half of wing, a few on base of anal cell and on distal portion of cell m2. Halter pale. Abdomen: brown. Two ovoid spermathecae with sclerotized necks (Fig. 52), larger measuring 0.048 (n = 3) by 0.040 (n = 3) mm, neck length 0.008 mm, width 0.005 mm (n = 3), smaller measuring 0.040 (n = 3) by 0.032 (n = 3) mm, neck length 0.008 mm, width 0.003 mm (n = 3); rudimentary third, ring present.

Distribution - Known only from its type-locality in northern Corrientes province of Argentina.

Taxonomic discussion - This new species is a typical member of the C. paraensis group in the subgenus Hoeematodium Goeldi. Wirth and Felippe-Bauer (1989) reviewed the group, treating the hitherto known four species, C. paraensis, C. quasiparaensis Clastrier, C. neo-paraensis Tavares and Souza, and C. filiductus Wirth. Two more species belonging to this group, C. diversus Felippe-Bauer, and C. peruianus Felippe-Bauer, were recently described from the Peruvian Amazonia (Felippe-Bauer et al. 2003).

The male of this new species is very distinctive, unique within the paraensis group due to the absence of a lateral fringe of spicules on the distal portion of parameres. The parameres lacking a ventral lobe is a character only shared by C. quasiparaensis, but females of this species differ from C. austroparensis by the stouter third palpal segment and by the very narrowly separated eyes. The females of C. austroparaensis are indistinguishable from those of C. paraensis.

There is one male specimen from the type-locality which also lacks the lateral fringe of spicules on the distal portion of parameres. However, this specimen has a tergite 9 with stout, triangular apicolateral processes. It may be a variant of C. austroparensis but due to this difference, we do not designate it as a paratype.

The male and female of this species were associated by their shared pigmentation patterns and were collected together at the type locality.

Types - Holotype male, allotype female, Argentina,
Figs 11-20: photographs of female wings of *Culicoides* from Argentina. 11: *C. ferreyrai*; 12: *C. lutzi*; 13: *C. brasiliannum*; 14: *C. foxi*; 15: *C. fernandoi*; 16: *C. ignacioi*; 17: *C. plaumanni*; 18: *C. guttatus*; 19: *C. pifanoi*; 20: *C. uruguayensis*. 

**Derivation of specific epithet** - A reference to the southernmost type-locality of species belonging to the *C. paraensis* group.

*Culicoides bachmanni* Spinelli, n. sp.
(Figs 40, 53-55)


**Diagnosis** - Female: only species of the subgenus *Haeematomyidium* with poststigmatic pale spots in cell r3 fused and longitudinally aligned, and in which flagellomeres 9-10 are clearly shorter than preceding and following ones. **Female.** Head: brown. Eyes with scattered pubescence, narrowly separated by distance shorter than diameter of one ommatidium. Flagellum (Fig. 53) pale brown, flagellomeres 9-10 clearly shorter than preceding and following ones; AR 0.58 (0.52-0.64, n = 5); sensilla coeloconica on flagellomeres 1, 6-8. Palpus (Fig. 54) pale brown; third segment swollen with moderately large, shallow pit; PR 1.65 (1.40-1.95, n = 6); P/H ratio 0.58 (0.56-0.60, n = 8). Mandible with 12-13 (n = 8) teeth. **Thorax:** scutum dark brown, without pattern; scutellum, postscutellum dark brown. Legs dark brown, knees darkish; fore, mid femora with subapical, tibiae with subbasal pale rings, hind tibia slightly pale distally; hind tibial comb with four spines, second from spur longest. Wing (Fig. 40), length 0.71 (0.64-0.78, n = 9) mm; width 0.34 (0.30-0.37, n = 9) mm; CR 0.56 (0.53-0.58, n = 9); with second radial cell in dark spot; pale spot on crossvein r-m small, rounded, barely abutting costal wing margin; poststigmatic pale spots in cell r3 fused, longitudinally aligned; distal pale spot in cell r3 rounded, located in center of cell, not abutting wing margin; two elongate pale spots in cell m1, distal one narrowly separated from wing margin; cell m2 with small distal pale spot not abutting wing margin, another lying anterior to cubital fork, the latter continuous to conspicuous pale spot extending to crossvein r-m; cell cu1 with rounded pale spot broadly abutting wing margin, reaching distal portion of vein CuA1; anal cell with one distal, large pale spot broadly abutting wing margin; apices of veins M1, M2, CuA1, CuA2 dark. Macrotrichia very sparse on distal fourth of wing. Halter pale.

Figs 41-45: photographs of female wings of *Culicoides* from Argentina. 41: *C. ginesi*; 42: *C. dureti*; 43: *C. flinti*; 44: *C. debilipalpis*; 45: *C. lahillei*. 
Abdomen: brown. Two ovoid spermathecae with sclerotized necks (Fig. 55), larger measuring 0.035 (0.028-0.040, n = 6) by 0.029 (0.026-0.031, n = 6) mm, neck 0.009 (0.007-0.010, n = 6) mm, smaller measuring 0.032 (0.026-0.035, n = 6) by 0.027 (0.024-0.028, n = 6) mm, neck 0.007 (0.005-0.008, n = 6) mm; rudimentary third, ring present.

Male. Unknown.

Distribution - Argentina (Buenos Aires and Misiones provinces), Paraguay (Itapua).

Taxonomic discussion - This new species belongs to the subgenus *Haematomyidium*, and keys to couplet 66 in Spinelli and Wirth (1986) where it may be distinguished from *C. horticola* by the antenna with flagellomeres 9-10 clearly shorter than preceding and following ones.

*C. gabaldoni*, a species currently placed in the *C. leoni* species group (Borkent & Wirth 1997, Borkent & Spinelli 2000), is also similar to *C. bachmanni* and *C. horticola*, especially by its wing pattern with the poststigmatic pale spots in cell r_3 fused and longitudinally aligned, and by the third palpal segment swollen with moderately large, shallow pit. However, *C. gabaldoni* differs from both species by the palpus typically pale yellowish and more elongated flagellomeres 11-13.


Derivation of specific epithet - This species is named after Dr Axel O Bachmann (Museo “Bernardino Rivadavia”, Buenos Aires, Argentina) in recognition of his important contribution to Entomology in Argentina and his valuable assistance to several young entomologists during the past 50 years.

*Culicoides williamsi* Spinelli, n. sp. (Figs 32, 56-63)

Diagnosis - Male: only species of the *fluvialis* species group in which the ventral root of gonocoxite lacks a heel-like expansion and with the distal portion of parameres bearing a lateral fringe of fine spicules, which are very inconspicuous. Female is the only species of the *fluvialis* species group with a narrow pale spot on crossvein r-m, with a separate pale spot distal to crossvein r-m in cell r_3, and the distal pale spot in cell r_3 divided into two smaller, oblique pale spots.

Male. Similar to female with usual sexual differences. Flagellum as in Fig. 56; flagellomeres 2 and 3 strongly fused. Wing length 0.80 mm; width 0.32 mm; CR 0.55. Genitalia (Fig. 57): tergite 9 tapering gradually, distally without posterior medial notch, apicolateral processes short; sternite 9 short, with shallow postero medial excavation. Gonocoxite 2.2 X longer than broad, ventral root stout without heel-like expansion, dorsal root long, slender; gonostylus broad at base, tapering distally from proximal third, distal portion moderately curved, with broad bent tip. Parameres (Fig. 58) separate, each with large, basal knob; basal portion slender, bent near base, with well developed ventral lobe, distal portion recurved, tapered to slender, sharply pointed tip, with lateral fringe of inconspicuous fine spicules (Fig. 59). Aedeagus with broad, rounded basal arch, extending to 0.60 of total length; basal arms slender, distal portion slender, simple, with narrow rounded apex.

Female. Head brown. Eyes bare, narrowly separated by distance shorter than diameter of one ommatidium. Flagellum (Fig. 60) brown, bases of flagellomeres 2-8 pale; AR 1.16 (1.12-1.18, n = 4); sensilla coeloconica on flagellomeres 1, 5-8. Palpus (Fig. 61) dark brown; third segment slightly swollen with shallow, subapical pit; PR 1.90 (1.80-2.00, n = 4); P/H ratio 0.63 (0.62-0.65, n = 3). Mandible with 12-13 (n = 4) teeth.

Thorax: scutum dark brown, with conspicuous pattern as illustrated (Fig. 62); scutellum dark brown on broad
midportion, sides narrowly yellowish, postscutellum dark brown. Legs dark brown; femora with subapical, tibiae with subbasal pale rings, hind tibiae pale distally, knees darkish; hind tibial comb with four spines, one nearest spur longest. Wing (Fig. 32), length 0.92 (0.86-1.01, n = 4) mm; width 0.45 (0.42-0.48, n = 4) mm; CR 0.61 (0.60-0.62, n = 4); with second radial cell in dark spot; pale spot on crossvein r-m narrow, broadly abutting costal wing margin; cell r3 with small, separate pale spot distal to crossvein r-m, poststigmatic pale spots subequal, posterior one located proximal to first; distal pale spot in cell r3 divided in two smaller, oblique pale spots, distal most barely abutting wing margin; two pale spots in cell m1, distal most well separated from wing margin; cell m2 with two elongate pale spots on distal portion, distal most small, not abutting wing margin, another pale spot lying anterior to cubital fork, another behind crossvein r-m; cell cuA1 with small pale spot not abutting wing margin nor veins CuA1, CuA2; anal cell with two distal pale spots, distal one barely abutting wing margin, irregular pale area at base; apices of veins M1, M2, CuA1 with small pale spots, apex of vein CuA2 dark. Macrotrichia few, scattered on distal fourth of wing membrane. Halter dark brown.

Abdomen: brown. Two ovoid spermathecae with long, sclerotized, recurved necks (Fig. 63), larger measuring 0.059 (0.058-0.060, n = 4) by 0.050 (0.048-0.053, n = 4) mm, neck 0.021 (0.020-0.022, n = 4) mm, smaller measuring 0.049 (0.046-0.050, n = 4) by 0.040 (0.038-0.043, n = 4) mm, neck 0.019 (0.017-0.020, n = 4) mm; rudimentary third, ring present.

**Distribution** - Argentina (Formosa province); Paraguay (Itapua).

**Taxonomic discussion** - This new species belongs to the *C. fluvialis* species group, and keys to couplet 48 in Spinelli and Wirth (1986) where it may be distinguished from *C. leopoldoi* by the presence of two spermathecae (one in *C. leopoldoi*). The wing pattern of *C. leopoldoi* is also very similar to that of *C. williamsi*, but it can be distinguished by the extensive pale spot on crossvein r-m, the presence of a pale spot behind second radial cell proximal to the poststigmatic pale spots, these pale areas longitudinally aligned, the posterior one smaller, and by the distal pale spot in cell r3 large with narrow proximal extension.

The male and female of this species were associated by their shared pigmentation patterns and were collected together at the type locality.


**Derivation of specific epithet** - This species is named after Prof. Jorge D. Williams, herpetologist at the Museo de La Plata, Argentina, in recognition of his friendship and important help collecting ceratopogonids.

**New records**

*Leptoconops (Leptoconops) brasiliensis* (Lutz)

**Teresthes brasiliensis** Lutz, 1913: 66 (female; Brazil); Gezuelo and Franca-Rodríguez, 1972: 39 (Uruguay record).

*L. brasiliensis* Lane, 1945: 358 (comb.; type redescri.).

**L. (Leptoconops) brasiliensis** Roenderos and Spinelli, 1992: 43 (in key to Neotropical species); Borkent and Spinelli, 2000: 9 (in Neotropical catalog; distrib.).


**Distribution** - Northwestern Argentina; Brazil (Amazonas); Uruguay.

*Culicoides estevezae* Roenderos and Spinelli

**C. estevezae** Roenderos and Spinelli, 1994: 47 (female; Argentina, Salta province); Borkent and Spinelli, 2000: 38 (in Neotropical catalog; distrib.).


**Distribution** - Northwestern and northeastern Argentina.

*Culicoides gabaldoni* Ortiz

**C. gabaldoni** Ortiz, 1954: 221 (female; Venezuela); Wirth and Blanton, 1959: 431 (redescr.; Panama); Vitale et al. 1981: 146 (in key, *C. debilipalpis* group); Wirth et al. 1988: 48 (wing photo); Roenderos and Spinelli 1998: 81 (Paraguay record); Borkent and Spinelli 2000: 39 (in Neotropical catalog; distrib.).
Acknowledgments

To Drs Art Borkent, William Grogan for their detailed critical review of the manuscript acting as a journal referees.


