

Description of *Culicoides pseudoheliconiae* sp.n. from Peruvian Amazon and revalidation of *Culicoides contubernalis* Ortiz & Leon (Diptera: Ceratopogonidae)

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A new species of the Culicoides hylas species group, Culicoides pseudoheliconiae Felipe-Bauer is described and illustrated based on female specimens from Peruvian Amazon, and Culicoides contubernalis Ortiz & Leon from Ecuador is resurrected and redescribed as a valid species. A systematic key, table with numerical characters of females of species of the Culicoides hylas group are given.

Key words: *Culicoides hylas* group - *C. pseudoheliconiae* sp.n. - *C. contubernalis* - Neotropical bloodsucking midges - Peruvian Amazon - Ecuador

Ortiz and Leon (1954) described *Culicoides contubernalis* as a variety of *Culicoides rozeboomi* Barbosa from two females collected in San Miguel de Los Colorados, Ecuador, focused primarily on the differences on the pale spots of the legs. Wirth and Blanton (1956) based on original description, considered *C. contubernalis* as junior synonym of *Culicoides verecundus* Macfie. This synonymy was accepted in several subsequent publications by Forattini (1957), Wirth and Blanton (1959, 1968), Wirth et al. (1988), Borkent and Wirth (1997), Borkent and Spinelli (2000).

During an entomological survey in Departments of Madre de Dios and San Martín, Peru, four specimens of *Culicoides* were collected by CDC light trap. These specimens belonging to the *hylas* species group of the subgenus *Hoffmania* Fox were given to the first author for determination. Two specimens belong to an undescribed species of this species group are described herein. The other two, are very similar to one female specimen deposited in the Ceratopogonidae Collection's of Laboratório de Diptera of Instituto Oswaldo Cruz (IOC) and determined by Willis Wirth as *C. verecundus* Macfie. This slide mounted specimen was collected by Luis A Leon in San Miguel de Los Colorados, Ecuador, type locality of *C. contubernalis*. We could observe that the specimens from Ecuador and Peru differ from *C. verecundus* in the aspect of the pale wing spots and

length of the proboscis. Unfortunately, we could not examine the type material of *C. contubernalis* deposited at Universidad Central de Quito. Based on the original description of *C. contubernalis*, we can conclude that the assumption of Wirth and Blanton (1956) was erroneous and therefore, *C. verecundus* and *C. contubernalis* must be considered as two distinct species.

The purpose of this work is to describe and illustrate one new species of the *C. hylas* species group, redescribe *C. contubernalis* and provide a key for the identification of species of this group.

The general terminology used is that employed in *Culicoides* papers by Wirth and Blanton (1959, 1973, 1974) for Panama, the Amazon Basin, and the West Indies, and the atlas of wing photographs of Neotropical species by Wirth et al. (1988). The terms of wing veins follow the system of the Manual of Nearctic Diptera (Mac Alpine et al. 1981), with modifications proposed by Szadziewski (1996). A revision of the neotropical biting midges of the *C. hylas* species group and its distribution can be found in Wirth and Blanton (1968) and in Borkent and Spinelli (2000). All measurements are in micrometers, except those of the wings which are in millimeters.

KEY TO THE SPECIES OF THE *CULICOIDES HYLAS* GROUP

1. Wing markings diffuse, pale spots not brightly contrasting; pale spot that crosses the second radial cell subdivided in two separate spots (Figs 1-2)
..... *pseudoheliconiae* sp.n. Felipe-Bauer
Wing with contrasting pattern of dark and pale spots; pale spot that crosses the second radial cell, single (Fig. 7) 2
2. Hind femur dark to tip 3
Hind femur with subapical pale band 5
3. Mid femur with subapical pale band (mid knee dark);

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- 3rd palpal segment with irregular sensory pit
 *hylas* Macfie
 Mid femur with apical pale band (mid knee pale); 3rd
 palpal segment without sensory pit, the sensoria scat-
 tered on surface of 3rd segment 4
 4. Apices of veins M₁, M₂, CuA₁ and CuA₂ pale.....
 *heliconiae* Fox & Hoffman
 Apices of veins M₁ and M₂ pale, CuA₁ and CuA₂ dark
 *palpalis* Macfie
 5. Pale spot absent in front of base of vein M₁;
 flagellomeres 2-8 with prominent four or five-branched
 hyaline sensory filaments *xanifer* Wirth & Blanton
 Pale spot present in front of base of vein M₁, flagellom-
 eres 2-8 with simple hyaline sensory filament 6
 6. Apices of veins M₁, M₂, CuA₁ and CuA₂ pale 7
 Apices of veins M₁ and M₂ pale, CuA₁ and CuA₂
 dark 8
 7. Greater species, with wing length 1.50 mm, P.R. 6.0,
 A.R. 1.26, P/H ratio 1.38 *aitkeni* Wirth & Blanton
 Smaller species, wing length 1.30-1.35 mm, P.R.
 3.8-4.3, A.R. 1.09-1.14, P/H ratio 1.14-1.18
 *contubernalis* Ortiz & Leon
 8. Mid knee dark *polypori* Wirth & Blanton
 Mid knee pale *verecundus* Macfie

C. pseudoheliconiae Felipe-Bauer, sp.n. (Figs 1-6)

Diagnosis - This new species can be easily distinguished from the other species of the *C. hylas* group by the diffuse pale spots in the wing and by the presence of double pale spot which crosses the second radial cell reaching cell r₃. Male unknown.

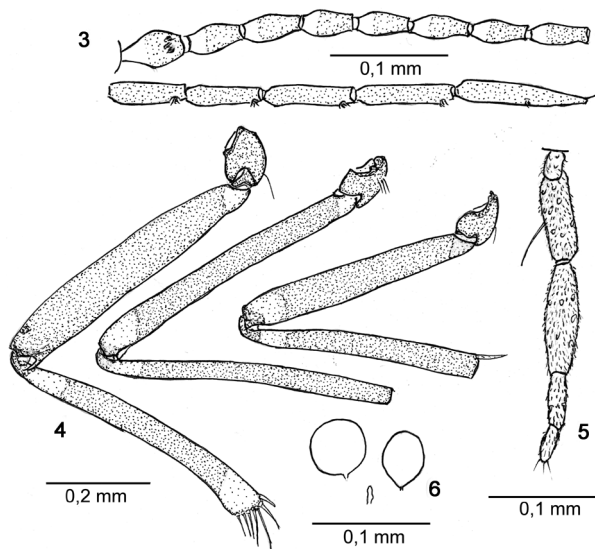
Female - Wing length 1.22-1.27 (1.25, n = 2) mm; breadth 0.54-0.59 (0.57, n = 2) mm.

Head - Brown. Eyes contiguous, bare. Flagellum (Fig. 3) brown, with base of flagellomeres 1-8 conspicuously pale; flagellomeres with mean lengths of 53-45-45-45-45-48-59-64-72-80-112 μm (n = 2); antennal ratio 1.01-1.03 (1.02, n = 2); sensilla coeloconia on flagellomeres 1, 9-13. Palpus (Fig. 5) brown; lengths of segments 27-77- 96-45-32 μm (n = 2); 3rd segment slender, subcylindrical, without sensory pit, with scattered sensoria; palpal ratio 3.7-4.3 (4.0, n = 2). Proboscis moderately long, P/H ratio 1.08-1.09 (1.08, n = 2); mandible with 19-21 teeth.

Thorax - Brown, without definite pattern in slide mounted specimens. Legs mostly brown; fore and mid femora, respectively, with subapical and apical pale bands, hind femur entirely dark; mid knee pale; fore and hind tibiae with subbasal and mid tibia with basal pale band; hind tibia pale apically (Fig. 4); hind tibial comb with six spines, the second from de spur longest. Tarsi pale, first tarsomere darkest. Wing (Figs 1-2) with pattern typical of *C. hylas* group: one round pale spot over the 2nd radial cell; three spots on cell r₃: one in front of base of vein M₁, extending over vein into cell m₁, another just below the pale spot on 2nd radial cell, not reach-



Figs 1-2: variation in the wing pattern of *Culicoides pseudoheliconiae* sp.n.



Figs 3-6: *Culicoides pseudoheliconiae* sp.n., female. 3: antenna; 4: legs (left to right) hind, mid, and fore; 5: palpus; 6: spermathecae.

ing vein M₁ and one distal and narrow pale spot; a pale spot over r-m crossvein extending from vein M to costal margin, narrow, slender and subdivided in one specimen (Fig. 1) or entire in an other (Fig. 2); cell m₁ with two rounded pales spots, the distal one smaller and far from wing margin; cell m₂ with five pale spots, one in proximal part of cell, double pale spot lying between medial, mediocubital forks, one rounded, subapical and another in distal portion near wing margin; cell cua₁ with a rounded pale spot reaching wing margin and continued proximad along vein CuA₁ reaching base of fork; anal cell with two well separated pale spots on distal portion, one anterior of mediocubital fork and the other reaching wing margin (Fig. 1) or near wing margin (Fig. 2); base of the wing greatly pale since the costal vein to anal cell; apices of veins M₁ and M₂ pale, CuA₁ and CuA₂ dark; costal ratio 0.67-0.70 (0.69, n = 2).

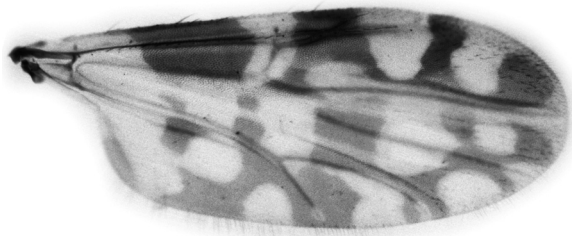
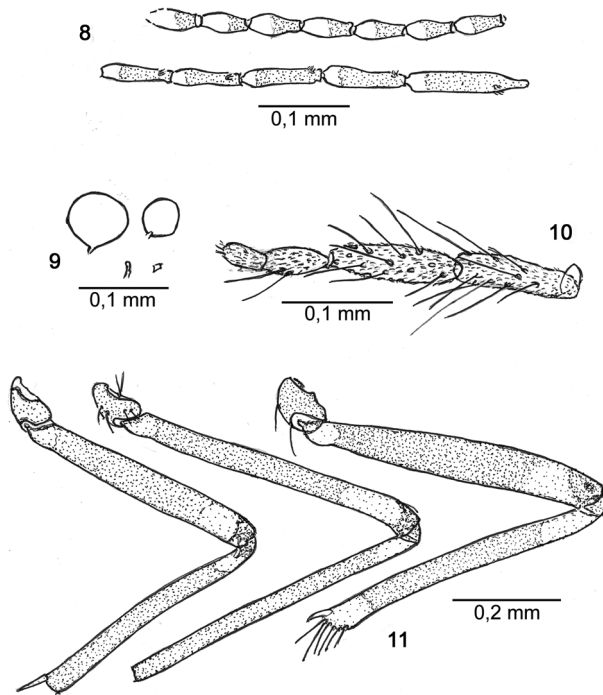


Fig. 7: *Culicoides contubernalis* Ortiz & Leon, female. Wing photograph



Figs. 8-11: *Culicoides contubernalis* Ortiz & Leon, female. 8: antenna; 9: spermathecae; 10: palpus; 11: legs (left to right) fore, mid, and hind.

Abdomen - Brown. Two unequal sized ovoid spermathecae (Fig. 6) with very short, slender necks, measuring 59-64 (62, $n = 2$) by 45-48 (47, $n = 2$) μm and 43-53 (48, $n = 2$) by 32-37 (35, $n = 2$) μm , respectively. Rudimentary third spermathecae present.

Male - Unknown.

Distribution - Peru (Madre Dios, San Martin).

Types - Holotype female (Dip.Cer. 448), El Porvenir, Distrito de Juan Guerra, Provincia de San Martin, Departamento de San Martin, PERU, 24.II.2001, CDC light trap. Paratype female (Dip.Cer. 449), Santa Rosa (12°42'11"S 69°33'14"W), Distrito de Laberinto, Provincia de Tambopata, Departamento de Madre de Dios, PERU, 08.VIII.2002, CDC light trap. Deposited in Ceratopogonidae Collection of Diptera Laboratory, Instituto Oswaldo Cruz (IOC), Rio de Janeiro, Brazil.

Etymology - The name of this species is based on its close similarity in the wing pattern with *C. heliconiae*.

Discussion - *C. pseudoheliconiae* sp.n. is a typical member of the subgenus *Hoffmania* and most closely resembles *C. heliconiae*, *C. hylas* and *C. palpalis* by the entirely dark hind femur. Regarding the peculiar aspect of the wing it is most similar to *C. heliconiae* from which can be distinguished by the absence of pale spots on apices of veins CuA_1 and CuA_2 , by the smaller size 1.22-1.27 mm (1.29-1.69 mm in *C. heliconiae*) and P/H ratio 1.08-1.09 (1.33 in *C. heliconiae*). Also it can be distinguished from all species of the *C. hylas* group by characteristics outlined in the key.

C. contubernalis Ortiz & Leon, redescription and revalidation (Figs 7-11)

C. contubernalis var. of *rozeboomi* Ortiz and Leon (1954): 574 (female; Ecuador; figs antennae, palpus, spermathecae, wing).

C. verecundus Wirth and Blanton (1956): 98 (syn. of *C. contubernalis* var. of *rozeboomi*); Forattini (1957): 249 (in neotropical catalog; in part, Ecuador records); Wirth and Blanton (1959): 278 (in part, Ecuador records); Wirth and Blanton (1968): 209 (in part, Ecuador records); Wirth et al. (1988): 20 (in Atlas; in part, Ecuador records); Borkent and Wirth (1997): 85 (in catalog; syn. of *C. contubernalis* var. of *rozeboomi*); Borkent and Spinelli (2000): 35 (in catalog, syn. of *C. contubernalis* var. of *rozeboomi*); Borkent and Spinelli (2007): 69 (in catalog, syn. of *C. contubernalis* var. of *rozeboomi*).

Diagnosis - This species of the *C. hylas* species group is distinguished by the following combination of characters: mid and hind femur with subapical pale band (mid knee dark); apices of veins M_1 , M_2 , CuA_1 and CuA_2 pale and wing pattern most similar to *verecundus*. Male unknown.

Female - Wing length 1.30-1.35 (1.32, $n = 3$) mm; breadth 0.57-0.59 (0.57, $n = 3$) mm.

Head - Brown. Eyes contiguous, bare. Flagellum (Fig. 8) brown with base of segments conspicuously pale; flagellomeres with mean lengths of 63-52-50-48-51-50-49-51-78-78-85-89-128 μm ($n = 3$); antennal ratio 1.09-1.14 (1.11, $n = 3$); sensilla coeloconia on flagellomeres 1, 9-13. Palpus (Fig. 10) brown; lengths of segments 27-92-119-55-41 μm ($n = 3$); 3rd segment slender, subcylindrical, without sensory pit, with scattered sensoria; palpal ratio 3.8-4.3 (4.1, $n = 3$). Proboscis moderately long, P/H ratio 1.14-1.18 (1.15, $n = 3$); mandible with 20-23 teeth.

Thorax - Brown, without definite pattern in slide mounted specimens. Legs mostly brown; fore, mid and hind femora with subapical, tibiae with subbasal pale bands; mid knee dark; hind tibia pale apically (Fig. 11); hind tibial comb with six spines, the second from de spur longest. Tarsi pale, first tarsomere darkest. Wing (Fig. 7) with pattern typical of *C. hylas* group: cell r_3 with three spots, one in front of base of vein M_1 , extending over vein into cell m_1 , a pale spot which crosses the second radial cell, single and large, not reaching vein M_1 and one distal pale spot broadly meeting wing margin; a pale spot over r-m crossvein extending from costal margin to cell m_2 ; cell m_1 with two rounded pale spots, the distal one smaller and far from wing margin; cell m_2 with five

TABLE
Numerical characters of females of the *Culicoides hylas* group

Species	Wing length (mm)	Costal ratio	Antennal ratio	Palpal ratio	P/H ratio
<i>C. aitkeni</i>	1.50	0.70	1.26	6.0	1.38
<i>C. heliconiae</i>	1.29-1.69	0.66-0.75	0.99-1.12	3.1-4.6	1.33
<i>C. hylas</i>	0.99-1.29	0.67-0.72	1.03-1.16	2.7-4.0	1.15
<i>C. contubernalis</i>	1.30-1.35	0.66-0.69	1.09-1.14	3.8-4.3	1.14-1.18
<i>C. palpalis</i>	1.38-1.59	0.65-0.74	1.07-1.20	4.2-6.0	1.32
<i>C. polypori</i>	1.25-1.59	0.68-0.72	1.09-1.28	3.4-5.6	1.20
<i>C. pseudoheliconiae</i> sp.n.	1.22-1.27	0.67-0.70	1.01-1.03	3.7-4.3	1.08-1.09
<i>C. verecundus</i>	1.35-1.56	0.65-0.72	1.01-1.09	4.6-5.9	1.40
<i>C. xanifer</i>	1.29-1.50	0.66-0.72	0.97-1.06	4.0-6.0	1.25

pale spots, one in proximal part of cell, double pale spot lying between medial, mediocubital forks, one rounded and subapical and other in distal portion reaching wing margin; cell cua_1 with a rounded pale spot reaching wing margin and continued proximad along vein CuA_1 not reaching base of fork; anal cell with two well separated pale spots on distal portion, one anterior of mediocubital fork and the other reaching wing margin; base of the wing greatly pale since the costal vein to anal cell; apices of veins M_1 , M_2 , pale and CuA_1 and CuA_2 slightly pale; costal ratio 0.66-0.69 (0.68, n = 3).

Abdomen - Brown. Two unequal sized ovoid spermathecae (Fig. 9) with very short, slender necks, measuring 56-59 (57, n = 2) by 48-59 (54, n = 2) μ m and 43-45 (44, n = 3) by 37-43 (39, n = 3) μ m, respectively. Rudimentary third spermathecae and sclerotized ring present.

Male - Unknown.

Distribution - Ecuador (Pichincha); Peru (Madre de Dios).

Specimens examined - 1 female, Santo Domingo de los Colorados, Provincia de Pichincha, ECUADOR, I. 1956, LA Leon col.; 2 females, Santa Rosa (12°42'11" S 69°33'14"W), Distrito de Laberinto, Provincia de Tambopata, Departamento de Madre de Dios, PERU, 08.VIII.2002, CDC light trap. Specimens deposited as voucher material in Ceratopogonidae Collection's of Diptera Laboratory, IOC, Rio de Janeiro, Brazil.

Discussion - *C. contubernalis* is a typical member of the subgenus *Hoffmania* and, as outlined in the key, table and in the description, can be distinguished from the other species of the *C. hylas* group by its medium size, aspect of the pale spots of the wing, mid and hind femur with subapical pale band, apices of veins M_1 , M_2 , CuA_1 and CuA_2 pale, P.R. 4.1, P/H ratio 1.15 and A.R.1.11.

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