New *Culicoides* Latreille of the subgenus *Mataemyia* Vargas from Pará, Brazil (Diptera: Ceratopogonidae)

Maria Luiza Felippe-Bauer¹/², Tiago do Nascimento da Silva¹, Rosimeire Lopes da Trindade²

¹Laboratório de Diptera, Instituto Oswaldo Cruz-Fiocruz, Rio de Janeiro, RJ, Brasil  
²Coordenação de Zoologia, Entomologia, Museu Paraense Emílio Goeldi, Belém, PA, Brasil

Two new species of *Culicoides* Latreille of the Neotropical subgenus *Mataemyia* Vargas are described and illustrated based on female specimens from Jurutí, Pará, Brazil and compared with their similar congeners. This paper also presents a diagnosis of the subgenus *Mataemyia* and a systematic key for the identification of the 19 species of the subgenus.

**Key words:** *Culicoides* (*Mataemyia*) aldomari sp. nov. - *Culicoides* (*Mataemyia*) sherlocki sp. nov. - bloodsucking midges - Neotropical Region

The subgenus *Mataemyia* Vargas is represented by the species included in the *discrepans* species group by Wirth and Blanton (1973). This group was formally characterized by Wirth and Soria (1981) based on eight Neotropical species. Borkent and Spinelli (2000) recognize the subgenus based on *Culicoides mojingaensis* Wirth & Blanton, type species of *Mataemyia*. The subgeneric classification has been followed by several authors including the more recently and comprehensive paper by Borkent (2011).

From the 273 Neotropical species reported in Borkent (2012), 17 belong to *Culicoides* of the subgenus *Mataemyia*. In the revision of the biting midges from the Amazon Basin, Wirth and Blanton (1973) cited three species of this subgenus (*Culicoides alburquerquii* Wirth & Blanton, *Culicoides bricenoi* Ortiz and *Culicoides wallacei* Wirth & Blanton). Trindade and Gorayeb (2005) recorded *Culicoides daviesi* Wirth & Blanton for the first time from Brazilian Amazonia in Outeiro Island, state of Pará (PA), Brazil. Recently, Spinelli et al. (2007) described *Culicoides felipebaueri* from the state of Amazonas, so five species from this subgenus are presently known inhabiting northern Brazil.

In the present paper, we describe and illustrate two new species from the municipality of Jurutí, PA, based on females specimens collected by CDC light trap and discuss the similarities and differences with their related species of the subgenus *Mataemyia*. With the addition of the two new species described here, there are now 11 species of *Culicoides* (*Mataemyia*) known from Brazil (7 from the Brazilian Amazon Region) and 19 from the Neotropical Region. As the available key for subgenus *Mataemyia* was provided by Wirth and Soria (1981) for only eight species included in *discrepans* group, we update the key for the identification of the 19 species belonging to the subgenus and made a synopsis of the subgenus *Mataemyia*.

**MATERIALS AND METHODS**

The specimens are slide-mounted in phenol-balsam in the manner described by Wirth and Marston (1968). The new species is deposited in Emílio Goeldi Museum (MPEG) (Invertebrates Collection) and Oswaldo Cruz Institute (Ceratopogonidae Collection) (CCER), Brazil. Diagnostic characters were illustrated using a *camera lucida* attached to an Olympus BH-2 microscope and the plates were prepared using Photoshop GIMP Portable. Microphotographs of the wings were taken with a Nikon Eclipse E-800. The general terminology used is that employed for *Culicoides* by Felippe-Bauer (2003). Terms for structures follow the Manual of Central America Diptera (Brown et al. 2009). The measurements of the spermathecae are in micrometres and those of the wings are in millimetres. Meristic information is given as range, following by the mean and number of specimens examined.

*Culicoides* of the subgenus *Mataemyia* Vargas

**Diagnosis** - Medium to large-sized species (wing with 0.80-1.8 mm). Eyes bare. Palpus moderately swollen; third segment with moderately broad pit located on mid-length or subapical; palpal ratio (PR) 1.8-3.0. Antenna usually with transition in length between proximal and distal series; sensilla coeloconica present on flagellomeres 1, (4), (5), 6-8 (except in *C. alburquerquii* 1, 6-12); antennal ratio (AR) 0.75-1.70 (usually more than 1.00). Scutum dark brown with prominent pattern of yellowish spots. Wing with distinct pale spots; poststigmatic pale spot in *r*, usually as inverted L-shaped, nearly isolating a small dark spot behind second radial cell; sometimes this small dark spot is connected to the oblique dark line in *r*, separating the poststigmatic pale spots; distal pale spot in *r*, usually reaching the anterodistal portion of wing margin; *CuA* and *CuA₁* usually dark; wing base usually with broad pale spot extending from costal mar-

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+ Corresponding author: mlfbauer@ioc.fiocruz.br

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gin to anal cell; macrotrichia in distal half of wing. Legs dark brown with distinct pale bands characteristics of each species; hind tibial comb with four spines (rarely 5 or 6). Two (rarely 1) spermathecae present. Male tergite 9 with long, subparallel apicolateral processes (rarely slender and well separated). Gonocoxite moderately stout, dorsal and ventral root moderately to well developed; gonostylus curved, slender. Aedeagus triangular with rounded basal arch extending 0.5 of total length, tapering to bifid or slender, single apex. Parameres separate; mid-portion long, slender; apical portion tapered, abruptly bent ventrally, mesally directed, with fringe of fine spicules or as simple, filiform tip.

**Key to the species of the Culicoides (Mataenymia) Vargas (primarily to females)**

1. Sensilla coeloconica on flagellomeres 1, 6-12
   - Sensilla coeloconica on flagellomeres 1, 4, 5, 6-8 ................................................. 2
   - Sensilla coeloconica on flagellomeres 1, 5-8 ..................................................... 3
   - Sensilla coeloconica on flagellomeres 1, 4, 5, 6-8 ............................................. 4

2. One spermatheca; hind femur dark to tip; sensilla coeloconica on flagellomeres 1, 5-8
   - Sensilla coeloconica on flagellomeres 1, 4, 5, 6-8 ............................................. 4

3. Mid femur dark to tip; hind tibial comb with six spines; second radial cell pale in mid portion with extreme base and tip in dark spots.................................................. C. daviesi Wirth & Blanton
   - Mid femur with subapical pale band; hind tibial comb with four spines; second radial cell in dark spot................................................................. C. felipebaueri Spinelli

4. Base of the wing with a pale spot restricted to the area near basal arculus.................................. 5
   - Base of the wing broadly pale, sometimes extending from costal margin to anal cell................................. 7

5. Large species, wing length 1.45 mm; one distal pale spot in anal cell; distal pale spot in r₉, single, irregular, slightly meeting wing margin in reduced breadth............ C. volcanensis Wirth & Blanton
   - Smaller species, wing length 1.22-1.38 mm; two distal pale spot in anal cell; pale spot on apical ½ of M₁................................................................. C. lenti Tavares & Luna Dias

6. Hind tibia broad pale apically; single distal pale spot in r₉; distal pale spot in M₁ reaching wing margin; distal portion of the aedeagus rounded on lateral margin, ending in a pair of posteriorly directed processes.................................................. C. dalesi Barreto
   - Hind tibia with apical, narrow pale rings; double distal pale spot in r₉; distal pale spot in M₁ far from wing margin; distal portion of the aedeagus slightly expanded on lateral margin, ending in a pair of divergent lateral processes............................................... C. huyanacapaci Felippe-Bauer

7. Hind femur dark to tip........................................................................ 8
   - Hind femur with subapical pale band............................................................. 11

8. Second radial cell long, 2x longer than first; AR 1.47-1.70................................. 9
   - First and second radial cells nearly similar in length; AR 0.75-0.84....................... 10

9. r₁ with two large pale spots, the distal one located in distal portion of cell reaching anterodistal wing margin; sensilla coeloconica on flagellomeres 1, 6-8; AR 1.70................. C. briceoi Wirth
   - r₁ with three small, round, pale spots, the distal one located in middle of cell; sensilla coeloconica on flagellomeres 1, 5-8; AR 1.47......................... C. cuiaba Wirth

10. Small species, wing length 0.88-0.90 mm; distal pale spot in r₁, rounded, not reaching wing margin; anal cell with one, large, distal pale spot......................................................... C. sherlocki Felippe-Bauer & Trindade
   - Large species, wing length 1.47 mm; distal pale spot in r₁ oblique, broadly reaching wing margin; anal cell with two distal small, round, pale spot............................................. C. wallacei Wirth & Blanton

11. PR 2.8-3.0.............................................................. 12
   - PR 1.8-2.5 ................................................................ 14

12. Distal pale spot in r₁ double; basal pale spot in m₁, small, not connected with the basal pale spot in m₂; distal pale spot in m₁, not reaching wing margin........................................ C. avilaensis Ortiz & Missa
   - Distal pale spot in r₁ single; basal pale spot in m₁, large, slightly connected with the basal pale spot in m₂; distal pale spot in m₂ reaching wing margin........... C. discreps Ortiz & Missa

13. Large species, wing length 1.80 mm; one distal pale spot in anal cell; pale spot on M₁, restricted to extreme apex, connected with the distal pale spot in r₁ and m₁; C. discreps Ortiz & Missa
   - Smaller species, wing length 1.20 mm; two distal pale spot in anal cell; pale spot on apical ½ of M₁................................................................. C. lenti Tavares & Luna Dias

14. AR 1.31-1.33; third palpal segment with a shallow, broad pit; parameres straight in mid portion, abruptly curved ventrally to simple tip, without lateral fringe of spines; apex of aedeagus slender and rounded........................................ C. mojngua Wirth & Blanton
   - AR 0.77-1.21; third palpal segment with a moderately deep pit; parameres and aedeagus various ................. 15

15. Flagellomeres 8, 9 subequal, AR 0.77-0.89; sensilla coeloconica on flagellomeres 1, 6-8................................. C. aldomari Felippe-Bauer & Trindade.
   - Flagellomere 8 clearly shorter than 9, AR 0.98-1.21; sensilla coeloconica on flagellomeres 1, (4), 5-8........... 16

16. Poststigmatic pale spot without dark spot behind second radial cell; anal cell with two distal connected pale spots........................................ C. barthi Tavares & Souza
   - Poststigmatic pale spot with dark spot just behind second radial cell; anal cell with two distal separated pale spots....................................................... 17

17. AR 1.15-1.21; base of the wing with a pale band extending from costal vein to wing margin in anal cell; distal pale spots in anal cell oblique, the proximal one in the midlength of CuA; poststigmatic pale not divided by the dark spot behind second radial cell; distal portion of the parameres slender, without ventral expansion or lobe, tapered to simple tip without lateral fringe of spines; aedeagus ending in a simple tip................................................. C. azureus Wirth & Blanton
- AR 0.98-1.08; base of the wing with a pale band extending from costal vein to proximal portion of anal cell; distal pale spots in anal cell longitudinally aligned, the proximal one near mediodiutic bull fork; poststigmatic pale divided by the dark spot behind second radial cell; distal portion of the parameters with well developed ventral expansion or lobe, tapered to simple tip with lateral fringe of fine spines; aedeagus ending in a bifid tip............ 18

18. Apex of aedeagus, long, slender, with bifid point laterally directed............... C. dicoururus Wirth & Blanton
- Apex of aedeagus like a clamp process directly connected to the basal arch............ C. macielii Tavares & Ruiz

C. aldomari Felippe-Bauer & Trindade, sp. nov. (Figs 1-7)

Diagnosis - Only species in the subgenus Mataemyia Vargas with the following combination of characters: medium-sized, eyes narrowly separated, flagellomeres 8 and 9 subequal, sensilla coeloconica on flagellomeres 1, 6-8, AR 0.77-0.89, PR 2.0-2.2.

Female - Head - Brown. Eyes (Fig. 2) separated by distance equal to diameter of ½ ommatidia. Flagellum (Fig. 1) pale brown, flagellomeres vasiform, without transition in length between proximal and distal series; antennal ratio 0.77-0.89 (0.82, n = 10); sensilla coeloconica on flagellomeres 1, 6-8, one on 1, two on 6-7, three or four on 8. Palpus (Fig. 4) brown; third segment stout with deep sensory pit on mid length; palpal ratio 2.0-2.2 (2.1 n = 9). Proboscis short; P/H ratio 0.67-0.75(0.71, n = 10); mandible with 12-14 (n = 6) teeth.

Thorax - Dark brown. Scutum with prominent pattern of oval yellowish patches; scutellum yellowish on sides; postscutellum brown. Wing (Fig. 3) with contrasting pattern: second radial cell in dark spot; pale spot over R-M large, extending from M to costal margin (in some specimens extending from CuA to costal margin), poststigmatic pale spot in r, extending behind second radial cell, nearly isolating small dark spot that is connected to the oblique dark line in r, separating the poststigmatic pale spots; distal pale spot in r, broadly reaching wing margin or nearly rounded and not reaching wing margin; m, with two pale spots, distal one usually meeting wing margin; m, with four pale spots, one in front of mediodiutic fork, second behind medial fork, third in the middle of cell, forth reaching wing margin; cua, with rounded pale spot nearly reaching wing margin; anal cell with two distal rounded pale spots; wing base with broad pale spot extending from costal margin to anal cell; M, and M, faint pale, CuA, and CuA, dark; macrotrichia scarce in distal half of wing; wing length 0.80-0.88 (0.83, n = 10) mm; breadth 0.40-0.43 (0.42, n = 10) mm; costal ratio 0.60-0.62 (0.61, n = 10). Halter pale. Legs (Fig. 7) mostly brown; femora with subapical pale bands (in some specimens faint in hind femur), tibiae with subbasal pale bands; hind tibia with a large and faint pale band apically; hind tibial comb (Fig. 6) with four spines, the two nearest the spur longest, subequal.

Abdomen - Dark brown. Two slightly unequal or sometimes subequal, ovoid spermathecae with long necks (10 µm), measuring 49 by 31 µm, 45 by 29 µm (Fig. 5); long, slender third spermatheca (30 µm), sclerotized ring present.

Male - Unknown.

Type data and depository - Holotype female, Fazenda Gavião, Forest, Ourém, PA, 1º29'44"S 47°13'7"W 28-29. XI.2008, CDC light trap, Trindade & Guimarães col. (MPEG). Paratypes nine females as follows: two, same data as holotype, except curral, 1º29'39"S 47°13'16"W (MPEG; #468 CCER); three, same data as holotype, except 26-27.XI.2008 (MPEG; #469 CCER); two, same data as holotype, except 27-28.XI.2008 (MPEG; #470 CCER); one, same data as holotype, except 29-30.XI.2008 (MPEG) and one paratype, Fazenda Rezende, Comunidade do Café Torrado, Juruti, 02º18'77.3"S 56º05'244.4"W, 17-18. XII.2007, CDC light trap, Trindade col. (MPEG).

Distribution - PA.

Etymology - This species is named in honour to Aldomar Aairão Monteiro, resident in the field area in recognition of his continuous support.

Taxonomic discussion - C. aldomari has similar wing pattern to that of C. azureus Wirth & Blanton, C. barthi Tavares & Souza, C. felippebauerae Spinelli and C. mojingaensis Wirth & Blanton, but it can be distinguished from these species by the smaller wing 0.80-0.88 (1.02-1.09 in C. azureus, 1.29 in C. barthi, 0.96-1.20 in C. felippebauerae, 0.89-1.02 in C. mojingaensis), darker lumen of the second radial cell (pale lumen in the others species), by the small dark spot in r, located on the distal end of second radial cell (without defined dark spot in C. barthi, dark spot behind second radial cell in C. azureus, C. felippebauerae and C. mojingaensis) and by the flagellomeres without transition in length between proximal and distal series (flagellomeres 9-12 more elongated than 2-8 in the others species).

C. sherlocki Felippe-Bauer & Trindade, sp. nov. (Figs 8-14)

Diagnosis - Only species in the subgenus Mataemyia Vargas with the following combination of characters: medium size, eyes contiguous, sensilla coeloconica on flagellomeres 1, 6-8, AR 0.84, distal pale spot in r, rounded not reaching wing margin and anal cell with one, large, distal pale spot, hind femur dark to tip.

Female - Head - Brown. Eyes (Fig. 9) nearly contiguous, Flagellum pale brown, with transition in length between proximal and distal series; antennal ratio 0.84 (n = 1); sensilla coeloconica (Fig. 8) on flagellomeres 1, 6-8. Palpus (Fig. 11) brown; third segment stout with moderately deep sensory pit on mid length; palpal ratio 2.3 (n = 1). Proboscis short; P/H ratio 0.64-0.66 (0.65, n = 2); mandible with nine (n = 1) teeth.

Thorax - Dark brown. Scutum without definite pattern in slide mounted specimens; scutellum, postscutellum brown. Wing with contrasting pattern as in Fig. 10: second radial cell in dark spot; pale spot over R-M large, extending from M, to costal margin, poststigmatic pale spot in r, extending behind second radial cell, nearly isolating small dark spot that in one specimen is connected to the
oblique dark line in r₂, separating the poststigmatic pale spots; distal pale spot in r₁ rounded, located in the middle of cell, not reaching wing margin and M₁; m₁ with two pale spots, distal most far from wing margin; m₁ with three pale spots, one between medial, mediocubital forks, connected with subapical pale spot, distal one reaching wing margin; cua with rounded, large pale spot reaching wing margin; anal cell with large distal spot, broadly reaching wing margin, connected with pale spot on wing base, which extends from costal margin to anal cell; M₁ and M₂ dark in distal ½, CuA₁ and CuA₂ dark; macrotrichia present on distal margin of wing; wing length 0.88-0.90 (0.89, n = 2) mm; breadth 0.43-0.45 (0.44, n = 2); costal ratio 0.64 (n = 2). Halter knob brown. Legs (Fig. 14) mostly brown; fore-, mid femur with subapical pale bands, tibiae with subbasal pale bands; hind tibial comb (Fig. 13) with four spines, the two nearest the spur longest, subequal.

Abdomen - Dark brown. Two subequal, ovoid spermathecae, measuring 31 by 26 µm, 30 by 26 µm (Fig. 12); long, slender third spermatheca (13 µm), sclerotized ring present.

Male - Unknown.

Type data and depository - Holotype female, Fazenda Rezende Comunidade do Café Torrado, Juruti, PA, “barn”, CDC light trap, 06-07.IV.2008, DDR Guimarães, E Monteiro & A Quaresma cols. (MPEG). Paratype female, same data as holotype, except 07.IV.2008, 06:00 pm-09:00 pm, RL Trindade & DDR Guimarães cols. (#471 CCER).

Distribution - PA.

Etymology - This species is named in honour to Dr Italo Sherlock in recognition of his important contributions to the knowledge of the tropical maladies, especially leishmaniasis.

Taxonomic discussion - C. sherlocki shows the hind femur dark to tip as in C. bricenoi Ortiz, C. cuiabai Wirth and C. wallacei Wirth & Blanton. However, it can be distinguished from the two first mentioned species by the wing pattern, by the subequal first and second radial cells (2nd radial cell 2x longer than 1st in C. bricenoi and C. cuiabai) and by the AR 0.84 (1.70 in C. bricenoi and 1.47 in C. cuiabai). From C. wallacei Wirth & Blanton can be distinguished by the smaller length, by the round ed distal pale spot in r, not reaching wing margin and by the presence of one, large distal pale spot in anal cell.

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