

**KEY TO POLYPEDILUM SPECIES**

- 1. Cephalic tubercles present and large (Fig. 242-243) ..... 2
- 1'. Cephalic tubercles absent or small (Fig. 244) ..... 3

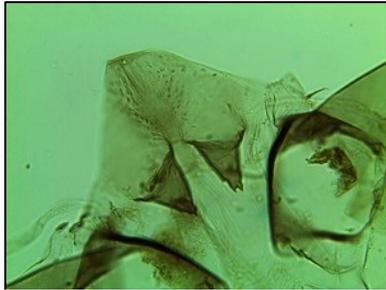


Figure 242. Frontal apotome of *Polypedilum* sp. 2

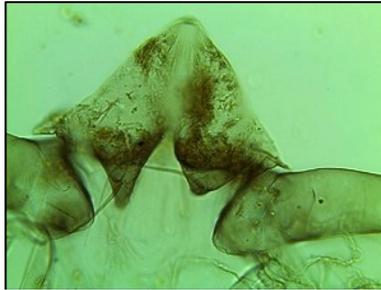


Figure 243. Frontal apotome of *Polypedilum* sp. 4

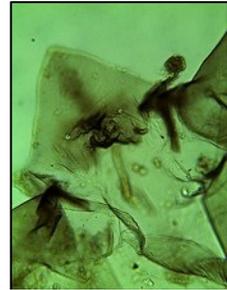


Figure 244. Frontal apotome of *Polypedilum* sp. 5

- 2(1). Frontal apotome granulose (Fig. 242); golden anal claw with main spur not reaching past segment VIII into anal lobes (Fig. 245) ..... ***Polypedilum* sp. 2**
- 2'. Frontal apotome smooth (Fig. 243); golden anal claw with main spur reaching past segment VIII into anal lobes (Fig. 246) ..... ***Polypedilum* sp. 4**



Figure 245. Anal claw of *Polypedilum* sp. 2



Figure 246. Anal claw of *Polypedilum* sp. 4

- 3(1'). Anal claw with apical and lateral accessory spines (Figs. 247-248) ..... 4
- 3'. Anal claw with only apical accessory spines (Figs. 249-250) ..... 9

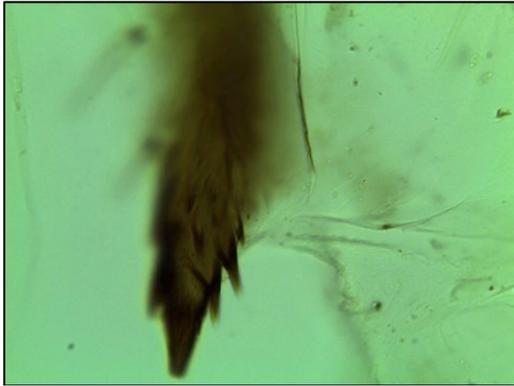


Figure 247. Anal claw of *Polypedilum* sp. 5



Figure 248. Anal claw of *Polypedilum* sp. 8



Figure 249. Anal claw of *Polypedilum* sp. 1



Figure 250. Anal claw of *Polypedilum* sp. 10

- 4(3). Tergites II-VI with distinct dark anterior band of shagreen (Fig. 251-253) ..... 5
- 4'. Tergites II-VI with light anterior band of shagreen (Fig. 254-256) ..... 7



Figure 251. Tergite II of *Polypedilum* sp. 5

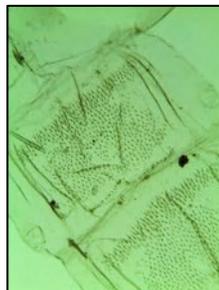


Figure 252. Tergite II of *Polypedilum* sp. 8



Figure 253. Tergite II of *Polypedilum* sp. 12



Figure 254. Tergite II of *Polypedilum* sp. 6



Figure 255. Tergite II-III of *Polypedilum* sp. 7



Figure 256. Tergite II of *Polypedilum* sp. 13

5(4). Tergite II with light, sparse median field of shagreen (Figs. 251, 253) ..... 6

5'. Tergite II with dark, dense median field of shagreen (Fig. 252) .... ***Polypedilum* sp. 8**

6(5). Tergite VII with light anterolateral patches of shagreen (Fig. 257); each anal lobe with around 30 fringe setae ..... ***Polypedilum* sp. 5**

6'. Tergite VII with dark anterior band of shagreen (Fig. 258); each anal lobe with around 21 fringe setae ..... ***Polypedilum* sp. 12**

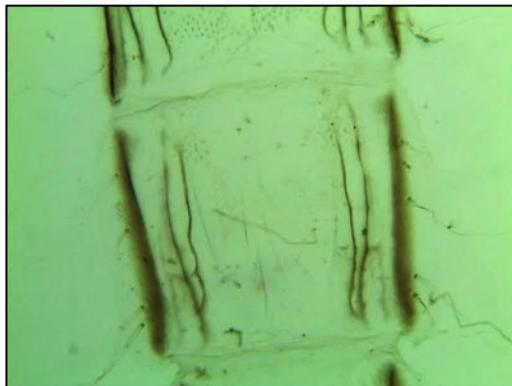


Figure 257. Tergite VII of *Polypedilum* sp. 5

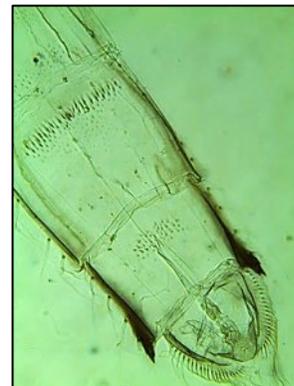


Figure 258. Tergite VII of *Polypedilum* sp. 12

7(4'). Tergites II-VI with light median shagreen without fenestrations (Fig. 254-255); each anal lobe with around 16 fringe setae ..... 8

7'. Tergites II-VI with dark median shagreen with large fenestrations (Fig. 256); each anal lobe with around 30 fringe setae ..... ***Polypedilum* sp. 13**

8(7). Tergite II with continuous,  $\frac{1}{2}$  width hook row (Fig. 254); no distinct pigmentation of pleural area of segments ..... *Polypedilum* sp. 6

8'. Tergite II with continuous,  $\frac{3}{4}$  width hook row (Fig. 255); dark brown pigmentation of pleural area of segments ..... *Polypedilum* sp. 7

9(3'). Tergite II with anterior band of light, short spines; hook row continuous,  $\frac{1}{2}$  width (Figs. 259-260) ..... 10

9'. Tergite II with anterior band of dark, long spines; hook row continuous  $\frac{3}{4}$  width (Figs. 261-263) ..... 11



Figure 259 Tergite II of *Polypedilum* sp. 3



Figure 260. Tergite II of *Polypedilum* sp. 11



Figure 261. Tergite II of *Polypedilum* sp. 1



Figure 262. Tergite II of *Polypedilum* sp. 9



Figure 263. Tergite II of *Polypedilum* sp. 10

10(9). Tergites II-III with light, sparse median shagreen (Fig. 259); light brown anal claw and anal lobes (Figs. 264-265) ..... ***Polypedilum* sp. 3**

10'. Tergites II-III with dark, dense median shagreen (Fig. 260); dark brown anal claw and anal lobes (Figs. 266-267) ..... ***Polypedilum* sp. 11**



Figure 264. Lower tergites of *Polypedilum* sp. 3



Figure 265. Anal claw of *Polypedilum* sp. 3

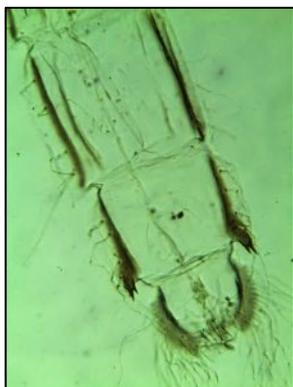


Figure 266. Lower tergites of *Polypedilum* sp. 11



Figure 267. Anal claw of *Polypedilum* sp. 11

11(9'). Tergites III-IV with single anterior row of long spines (Figs. 268-269) ..... 12

11'. Tergites III-IV with multiple anterior rows of short spines (Fig. 270) ..... ***Polypedilum* sp. 9**

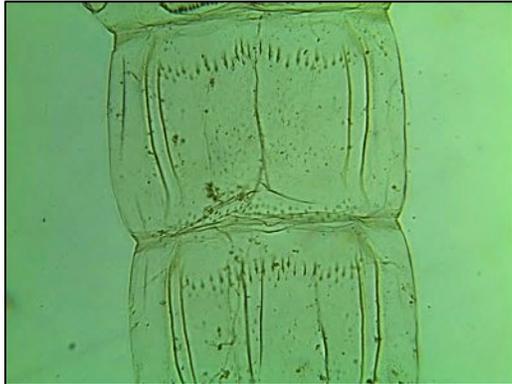


Figure 268. Tergites III-IV of *Polypedilum* sp. 1



Figure 269. Tergites III-IV of *Polypedilum* sp. 10



Figure 270. Tergites III-IV of *Polypedilum* sp. 9

12(11). Anal claw yellow, 3-point (Fig. 249); nose present ..... ***Polypedilum* sp. 1**

12'.; Anal claw brown with one major spur and minor apical accessory spines (Fig. 250); nose absent ..... ***Polypedilum* sp. 10**

## NOTES ON *POLYPEDILUM* SPECIES

### *Polypedilum* sp. 1

**Locality:** Laguna del Tortuguero 1, 2, 3 & Quebrada

**Head:** Cephalic tubercles absent; long frontal setae

**Thorax:** Thoracic horn with less than 20 branches (Fig. 142); wing sheaths with nose

**Abdomen:** Abdomen most like Fig. 10.61 E (Wiederholm 1986); tergite II-VI with dark anterior band of spines (single row of spines), tergite II-V with median light shagreen; tergite II with continuous,  $\frac{3}{4}$  width hook row (Figs. 108, 261, 268); pedes spurii A and B present; conjunctives between tergites III-VI with band of shagreen; tergites VII and VIII with anterolateral patches of shagreen; segment VIII with 3-4 point golden anal claw (Fig. 249); complete anal fringe with 20 setae; tergites V-VI with 3 LS setae; tergites VII-VIII with 4 LS setae

**Comments:** Closest to *Polypedilum* sp. 9 and sp. 10; around 4 mm long exuviae; keys to *P. (Polypedilum) illinoense*, but lighter median shagreen pattern on tergites II-IV than Fig. 90 (Maschwitz and Cook 2000); anal spur close to *Polypedilum (Tripodura) epomis* (see Figs. 170-172, Sublette & Sasa 1994)

### *Polypedilum* sp. 2

**Locality:** Laguna del Tortuguero 1 & 2

**Head:** Cephalic tubercles large, dark brown with 3 points; long frontal setae; frontal apotome granulose (Fig. 242)

**Thorax:** Wing sheaths with nose

**Abdomen:** Tergite I bare; tergites II-VI with anterior bands of shagreen; tergite II with median shagreen and continuous,  $\frac{3}{4}$  width hook row; pedes spurii A and B present; conjunctives between tergites IV and V with band of shagreen; tergites V-VI with posterior patches of shagreen; tergite VII-VIII with anterolateral patches of shagreen; segment VIII with larger, multi-pointed golden anal claw (similar to Fig. 35, Maschwitz and Cook 2000) (Fig. 245); complete anal fringe with 27 setae

**Comments:** Closest to *Polypedilum* sp. 4; around 4 mm long exuviae; keys to *Polypedilum (Tripodura) digitifer*, but there is variation in the median shagreen on tergites II-V, none is visible in this specimen (see Fig. 38, Maschwitz and Cook 2000)

***Polypedilum* sp. 3**

**Locality:** Laguna del Tortuguero 2

**Head:** Cephalic tubercles small; long frontal setae

**Thorax:** Wing sheaths with nose

**Abdomen:** Light, sparse median shagreen on tergites II-VI (Figs. 155, 259); conjunctives between tergites III and IV with band of shagreen; tergite VIII with small, dark anal claw (Fig. 265); anal lobes with complete anal lobe fringe with around 30 setae (Fig. 264)

**Comments:** Closest to *Polypedilum* sp. 11; keys to *Polypedilum (Uresipedilum) aviceps* (see Fig. 51, Maschwitz and Cook 2000)

***Polypedilum* sp. 4**

**Locality:** Laguna del Tortuguero 1 & 2

**Head:** Frontal apotome smooth (Figs. 129, 243); cephalic tubercles large, dark brown; frontal setae present

**Thorax:** Wing sheaths with nose

**Abdomen:** Tergites III-VI with no median shagreen; conjunctive between tergites III and IV without band of shagreen; conjunctive between tergites IV and V with band of shagreen; golden, 3-4 point anal claw (Fig. 246); complete anal lobe fringe with around 30 setae

**Comments:** Closest to *Polypedilum* sp. 2; keys to *Polypedilum (Uresipedilum) aviceps*, but appears to have more median shagreen on tergite II (see Fig. 51, Maschwitz and Cook 2000)

***Polypedilum* sp. 5**

**Locality:** Laguna del Tortuguero 1, 2, 3 & Quebrada

**Head:** Cephalic tubercles absent; frontal setae present (Figs. 153, 244)

**Thorax:** Wing sheaths without nose

**Abdomen:** Tergite II with dark anterior band of shagreen, light median shagreen, and  $\frac{3}{4}$  width, continuous hook row (Figs. 157, 251); tergites II-VI with median shagreen with fenestrations; conjunctives between tergites III and IV with band of shagreen; space between posterior patches of shagreen on tergite IV and V; tergite VII with light anterolateral patches of shagreen (Fig. 257); segment VIII with darker brown spine with smaller spines along armature and one strong spine toward tip (Fig. 247); complete anal lobe fringe with around 30 setae

**Comments:** Closest to *Polypedilum* sp. 8 and sp. 12; keys to *Polypedilum* (*Polypedilum*) *nubeculosum*, but specimen differs in the shape and point of the anal spur (see Figs. 103-104, Maschwitz and Cook 2000)

***Polypedilum* sp. 6**

**Locality:** Laguna del Tortuguero 2 & 3

**Head:** Cephalic tubercles absent; frontal setae present

**Thorax:** Wing sheaths without nose

**Abdomen:** Tergites II-VI with light anterior band of shagreen; sparse median shagreen on tergites II-VI (Fig. 254); conjunctive between tergites III and IV with band of shagreen; dark anal claw with many spines; complete anal lobe fringe with around 16 setae

**Comments:** Closest to *Polypedilum* sp. 7 and sp. 13; less than 4 mm long; keys to *Polypedilum* (*Pentapedilum*) *tritum*, but varies in tergite II-VI and number of LS setae on anal lobes (tergites II-VI without strong, prominent anterior row of spines like Oyewo & Saether 2008 or Fig. 36, Maschwitz and Cook 2000)

***Polypedilum* sp. 7**

**Locality:** Laguna del Tortuguero 2 & Quebrada

**Head:** Cephalic tubercles small and bulbous; long frontal setae present

**Thorax:** Wing sheaths without nose

**Abdomen:** Tergite I bare; tergite II-VI with light anterior band of shagreen and light median shagreen; tergite II with ½ width, continuous hook row (Fig. 255); pedes spurii A and B present; conjunctive between tergites III and IV with band of shagreen; tergite VII with anterior and posterior shagreen; dark anal comb; complete anal lobe fringe with around 16 setae

**Comments:** Closest to *Polypedilum* sp. 6 and sp. 13; around 3 mm long exuviae; keys to *Polypedilum* (*Tripodura*) *scalaenum*, but differs in the anal spur (Fig. 39, Maschwitz and Cook 2000)

***Polypedilum* sp. 8**

**Locality:** Laguna del Tortuguero 1, 2 & 3

**Head:** Cephalic tubercles small and bulbous; long frontal setae present

**Thorax:** Wing sheaths without nose

**Abdomen:** Shagreen on tergites II-VIII; tergites II-VI with dark, dense anterior band of shagreen; tergite II with dark, dense median field of shagreen (Fig. 252); conjunctives between tergites III and IV with band of shagreen; tergites V-VI with 3 LS setae; tergites VII-VIII with 4 LS setae; segment VIII with darker brown anal claw (Fig. 248); complete anal lobe fringe with around 30 setae

**Comments:** Closest to *Polypedilum* sp. 5 and sp. 12; *Polypedilum* subgenus; close to *Polypedilum* (*Polypedilum*) *laetum*, but appears to be distinction in the anal spur (Fig. 98, Maschwitz and Cook 2000)

***Polypedilum* sp. 9**

**Locality:** Laguna del Tortuguero 1 & 2

**Head:** Cephalic tubercles absent; frontal setae present

**Thorax:** Wing sheaths with nose

**Abdomen:** Tergites II-VI with anterior row of spines (multiple rows of spines) (Fig. 270); tergite II with anterior band of dark, long spines;  $\frac{3}{4}$  width, continuous hook (Fig. 262); segment VIII with golden anal claw; complete anal lobe fringe with around 25 setae

**Comments:** Closest to *Polypedilum* sp. 1 and sp. 10; *Polypedilum* subgenus

***Polypedilum* sp. 10**

**Locality:** Laguna del Tortuguero 2

**Head:** Cephalic tubercles absent; frontal setae present

**Thorax:** Wing sheaths without nose

**Abdomen:** Tergite II with anterior band of dark, long spines; hook row continuous  $\frac{3}{4}$  width (Fig. 263); tergites III-IV with single anterior row of long spines (Fig. 269); band of light anterior shagreen on tergite VIII; anal claw made up of singular dark spine and apical and lateral accessory spines (Fig. 250)

**Comments:** Closest to *Polypedilum* sp. 1 and sp. 9; around 4mm long exuviae; keys to *Polypedilum* (*Pentapedilum*) *tritum*, but varies in tergite VIII shagreen (Oyewo & Saether 2008) and *Polypedilum* (*Polypedilum*) *prolixipartum*, but varies in shagreen pattern (Fig. 137, Maschwitz and Cook 2000)

***Polypedilum* sp. 11**

**Locality:** Quebrada

**Head:** Cephalic tubercles absent; frontal setae present

**Thorax:** Wing sheaths without nose

**Abdomen:** Tergites II-III with dark, dense median shagreen; tergite II with anterior band of shagreen light and made up of short spines and  $\frac{1}{2}$  width, continuous hook row (Fig. 260); dark brown anal claw and anal lobes (like Fig. 40 I Oyewo & Saether 2008) (Figs. 121, 266-267)

**Comments:** Closest to *Polypedilum* sp. 3; close to *Polypedilum* (*Pentapedilum*) *uncinatum* (see Fig. 40 Oyewo & Saether 2008), but varies in the shagreen pattern on tergites II-VI (see Fig. 40 B)

***Polypedilum* sp. 12**



Figure 271. Frontal apotome of *Polypedilum* sp. 12

**Locality:** Quebrada

**Head:** Cephalic tubercles absent; frontal setae present; frontal apotome rounded, cone-like (most closely resembles *Polypedilum* subgenus *Cerobregma*, Sæther & Sundal 1999) (Fig. 271)

**Thorax:** Wing sheaths without nose

**Abdomen:** Tergites II-VIII with very dark anterior bands of shagreen; tergites II-VI with median shagreen; tergite II with continuous 3/4 width hook row; pedes spurii A & B present (Fig. 253); conjunctives between tergites III/IV and IV/V with band of shagreen; tergite VII with dark anterior band of shagreen; smaller spines on dark anal claw (somewhat close to *Polypedilum* sp. 5); tergites V-VIII with 3, 3, 4, 4 LS setae pattern; complete anal lobe fringe with 21 setae (Fig. 258)

**Comments:** Closest to *Polypedilum* sp. 5 and sp. 8

***Polypedilum* sp. 13**

**Locality:** Laguna del Tortuguero 2

**Head:** Cephalic tubercles absent; frontal setae present

**Thorax:** Wing sheaths without nose

**Abdomen:** Tergites II-VI with light anterior band of shagreen and dark median shagreen with large fenestrations (Fig. 256); dark pleural lines; conjunctive between tergites III and IV with band of shagreen; tergites II-VI with extensive shagreen and large fenestrations; complete anal lobe fringe with 30 setae

**Comments:** Closest to *Polypedilum* sp. 6 and sp. 7; around 6 mm long exuviae; keys to *Polypedilum* (*Polypedilum*) tuberculum, but doesn't match shagreen pattern on tergites II-VI (Maschwitz and Cook 2000)

## ADDITIONAL REFERENCES

- Maschwitz, D.E. and E.F. Cook, 2000. Revision of the Nearctic species of the genus *Polypedilum* Kieffer (Diptera: Chironomidae) in the subgenera *P.* (*Polypedilum*) Kieffer and *P.* (*Uresipedilum*) Oyewo and Sæther. Ohio Biological Survey, Ohio State University.
- Oyewo, E.A. and O.A. Sæther. 2008. Revision of *Polypedilum* (*Pentapedilum*) Kieffer and *Ainuyusurika* Sasa et Shirasaki (Diptera: Chironomidae). *Zootaxa*: 1953, 1–145.
- Sæther, O.A. and A. Sundal. 1999. *Cerobregma*, a new subgenus of *Polypedilum* Kieffer, with a tentative phylogeny of subgenera and species groups within *Polypedilum* (Diptera: Chironomidae). *Journal of the Kansas Entomological Society* 71: 315–382.
- Sæther, O. A., Andersen, T., Pinho, L.C., Mendes, H.F. 2010: The problems with *Polypedilum* Kieffer (Diptera: Chironomidae), with the description of *Probolum* subgen. n.. *Zootaxa*, 2497: 1–36.
- Soponis, A.R. and K.W. Simpson. 1992. *Polypedilum digitifer* Townes and *Polypedilum griseopunctatum* (Malloch) (Diptera, Chironomidae): Redescription of adult males with a description and separation of the immature stages. *Netherlands Journal of Aquatic Ecology* 26: 203–213.
- Sublette, J.E. and M. Sasa. 1994. Chironomidae collected in Onchocerciasis endemic areas of Guatemala (Insecta, Diptera). *Spixiana Supplement* 20: 1-60.
- Vårdal, H., Bjørlo, A. and O.A. Sæther. 2002. Afrotropical *Polypedilum* subgenus *Tripodura*, with a review of the subgenus (Diptera: Chironomidae). *Zoologica Scripta* 31: 331-402.

## NOTES ON *SAETHERIA* SPECIES



Figure 272. Cephalic tubercles of *Saetheria* nr. *tylus*



Figure 273. Thoracic horn of *Saetheria* nr. *tylus*

### *Saetheria* near *tylus* Townes, 1945

**Locality:** Laguna del Tortuguero 2

**Head:** Cephalic tubercles small and apically pointed; long frontal setae present (Fig. 272)

**Thorax:** Thoracic horn made up of thick, branches (differs from generic description, Wiederholm 1986) (Fig. 273)

**Abdomen:** Tergite II with continuous hook row on projecting flap; tergite III with posterior rows of triangular spines, with a yellow base with dark brown tips (Fig. 124); caudolateral margin of segment VIII without spines (Fig. 122); tergites V-VIII with 4 LS setae

**Comments:** Represented by 1 specimen; closest to Unknown Chironomini #3; around 3.5 mm long exuviae

### ADDITIONAL REFERENCE

Jackson, G.A. 1977. Nearctic and Palaearctic *Paracladopelma* Harnisch and *Saetheria* n. gen. (Diptera: Chironomidae). *Journal of the Fisheries Research Board of Canada*. 34: 1321-1359.

**KEY TO *STENOCHIRONOMUS* SPECIES**

1. Tergite II with posterior hook row restricted to medial portion of tergite (Fig. 274-275); tergites VII-VIII with at least some shagreen (Figs. 277-278); subgenus *Petalopholeus* ..... 2
- 1'. Tergite II with posterior hook row extending to lateral margins of tergite (Fig. 276); tergites VII-VIII without shagreen (Fig. 279-280); subgenus *Stenochironomus* ..... 3

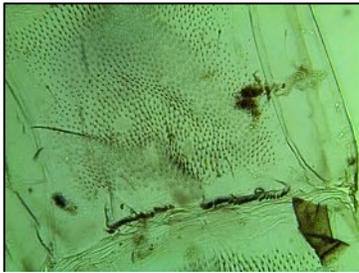


Figure 274. Tergite II of *Stenochironomus* sp. 5

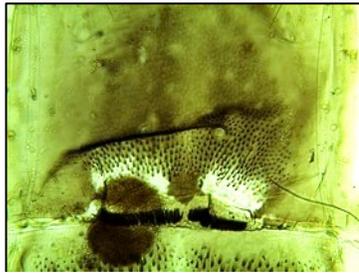


Figure 275. Tergite II of *Stenochironomus quadrinotatus*

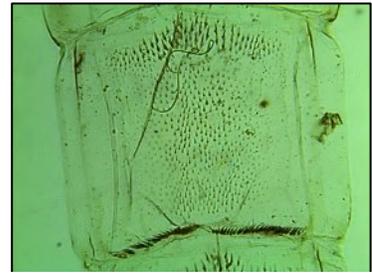


Figure 276. Tergite II of *Stenochironomus* sp. 1

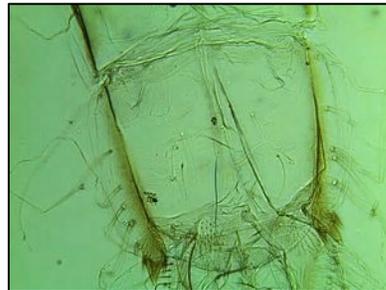


Figure 277. Tergite VIII of *Stenochironomus* sp. 5

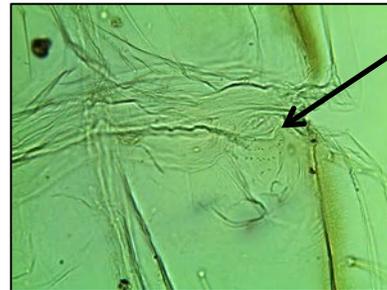


Figure 278. Tergite VIII of *Stenochironomus* sp. 5

shagreen



Figure 279. Tergite VIII of *Stenochironomus* sp. 1



Figure 280. Tergite VIII of *Stenochironomus* sp. 1

2(1). Tergite II hooklets on hook row very long (Fig. 275); yellow, 3-point anal claw, all points equal in length (Fig. 281) ..... *Stenochironomus (Petalopholeus) quadrinotatus*

2'. Tergite II hooklets on hook row short (Fig. 274); yellow, 5-point anal claw, middle point longer in length than posterior points (Fig. 282) ..... *Stenochironomus sp. 5*



Figure 281. Anal claw of *Stenochironomus quadrinotatus*



Figure 282. Anal claw of *Stenochironomus sp. 5*

3(1'). Male genital sheaths ending before anal lobes (Fig. 283); tergite V with continuous, dense shagreen (Fig. 285); anal claw very large and bulbous with at least 8 points (Fig. 289) ..... *Stenochironomus sp. 2*

3'. Male genital sheaths extending beyond anal lobes (Fig. 284); tergite V with discontinuous, sparse spines or shagreen (Figs. 286-289); anal claw large with 2-4 points (Figs. 290-292) ..... 4



Figure 283. Anal lobes of *Stenochironomus sp. 2*

Figure 284. Anal lobes of *Stenochironomus sp. 4*

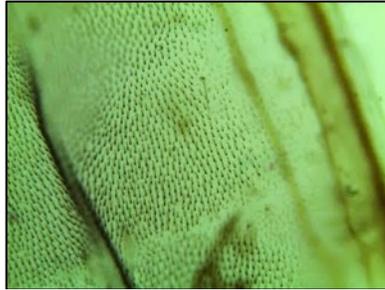


Figure 285. Tergite V of *Stenochironomus* sp. 2



Figure 286. Tergite V of *Stenochironomus* sp. 1

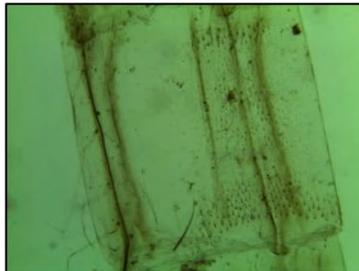


Figure 287. Tergite V of *Stenochironomus* sp. 3

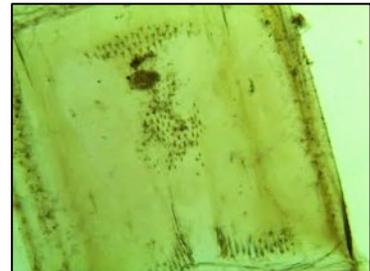


Figure 288. Tergite V of *Stenochironomus* sp. 4



Figure 289. Anal claw of *Stenochironomus* sp. 2



Figure 290. Anal claw of *Stenochironomus* sp. 1

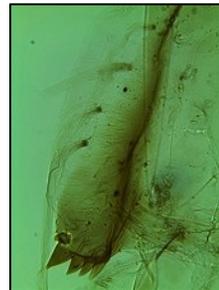


Figure 291. Anal claw of *Stenochironomus* sp. 3

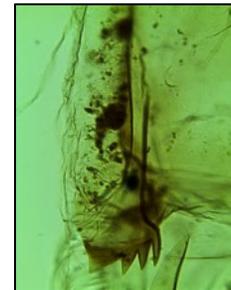


Figure 292. Anal claw of *Stenochironomus* sp. 4

4(3'). Tergite II with dark band of thick, long anterior spines (Fig. 293); tergite V with median patch of spines (Fig. 288); around 10 mm long exuviae

..... *Stenochironomus* sp. 4

4'. Tergite II with dark band of thin, short anterior spines (Figs. 276, 294); tergite V with median patch of shagreen (Figs. 286-287); around 5 mm long exuviae ..... 5

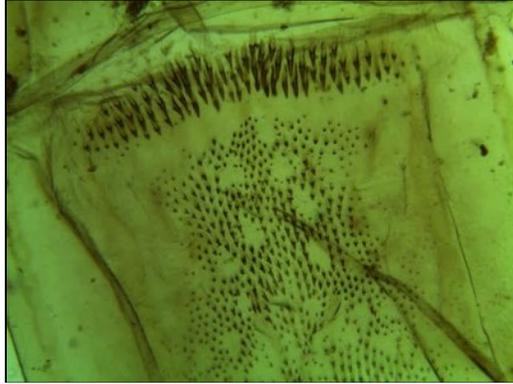


Figure 293. Tergite II of *Stenochironomus* sp. 4

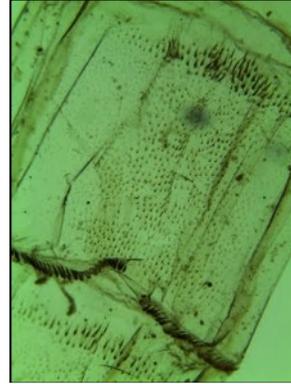


Figure 294. Tergite II of *Stenochironomus* sp. 3

- 5(4'). Segment VIII with yellow, thick, 2-point anal claw (Fig. 290)  
 ..... ***Stenochironomus* sp. 1**
- 5'. Segment VIII with yellow, thick, 3-4 point anal claw (Fig. 291)  
 ..... ***Stenochironomus* sp. 3**

## NOTES ON *STENOCHIRONOMUS* SPECIES

### *Stenochironomus (Petalopholeus) quadrinotatus* Borkent, 1984

**Locality:** Laguna del Tortuguero 2

**Abdomen:** Tergite I bare; tergite II with posterior hook row restricted to medial portion of tergite; tergite II hooklets on hook row very long (Fig. 275); tergite VI with thick band of posterior shagreen; anterior and median shagreen very light; no shagreen on tergite VII; light anterolateral shagreen on tergite VIII; anal lobe with two patches of shagreen; yellow, 3-point anal claw, all points equal in length, somewhat like *Stenochironomus* sp. 3 (Fig. 281)

**Comments:** Closest to *Stenochironomus* sp. 5; around 6 mm long exuviae; Borkent 1984 documented species in Costa Rica

### *Stenochironomus* sp. 1

**Locality:** Laguna del Tortuguero 1 & 2

**Thorax:** Thoracic horn with several fine branches and one simple, spinose branch (Figs. 18, 132)

**Abdomen:** Tergite I bare; tergites II-V dense shagreen; posterior corners of segments II-IV not brown; tergite II with dark band of thin, short anterior spines; tergite II with posterior hook row extending to lateral margins of tergite, medial interruption of hook row (Fig. 276); tergite V with median patch of shagreen (Fig. 286); tergite VI with darker, posterior patch of shagreen, lack anterior shagreen row; tergites VII-VIII without shagreen (Figs. 134, 279-280); segment VIII with yellow, thick, 2-point anal claw (Fig. 290)

**Comments:** Closest to *Stenochironomus* sp. 3; part of *Stenochironomus* subgenus; around 5 mm long exuviae

## **Stenochironomus sp. 2**

**Locality:** Laguna del Tortuguero 2

**Abdomen:** Tergite I with median, light shagreen; tergites II-V with dense, uniform shagreen; tergite II with posterior hook row extending to lateral margins of tergite; tergite V with continuous, dense shagreen (Fig. 285); tergite VI with anterior and posterior patches of shagreen, tergites VII-VIII without shagreen; two anterior patches of shagreen on anal lobe; male genital sheaths ending before anal lobes (Fig. 283); anal claw very large and bulbous with at least 8 points (Fig. 289)

**Comments:** Represented by 1 specimen; around 10 mm long exuviae; part of *Stenochironomus* subgenus; somewhat close to *Stenochironomus* near species "Peru", but varies from description of anal claw (Borkent 1984)

## **Stenochironomus sp. 3**

**Locality:** Laguna del Tortuguero 1, 2 & 3

**Abdomen:** Tergite II with posterior hook row extending to lateral margins of tergite and dark band of thin, short anterior spines (Fig. 294); tergite V with median patch of shagreen (Fig. 287); tergites VII-VIII without shagreen; segment VIII with yellow, thick, 3-4 point anal claw (Fig. 291); male genital sheaths extending beyond anal lobes

**Comments:** Closest to *Stenochironomus* sp. 1; around 5 mm long exuviae; part of *Stenochironomus* subgenus

## **Stenochironomus sp. 4**

**Locality:** Laguna del Tortuguero 2 & 3

**Abdomen:** Tergite II with dark band of thick, long anterior spines and posterior hook row extending to lateral margins of tergite (Fig. 293); tergite V with median patch of spines (Fig. 288); tergites VII-VIII without shagreen; yellow, 3-4 point anal claw (Fig. 292); male genital sheaths extending beyond anal lobes (Fig. 284)

**Comments:** Closest to *Stenochironomus* sp. 1 and sp. 3; around 11 mm long exuviae; part of *Stenochironomus* subgenus

## **Stenochironomus sp. 5**

**Locality:** Laguna del Tortuguero 1 & 2

**Head:** Cephalic tubercles absent (Fig. 127)

**Abdomen:** Tergite II with posterior hook row restricted to medial portion of tergite; hook row  $\frac{1}{2}$  width with medial interruption and short hooklets (Fig. 274); tergite II-V with continuous shagreen; tergite VI with median shagreen; tergite VII bare, tergite VIII anterolateral patches of shagreen (Figs. 277-278); yellow, 5-point anal claw, middle point longer in length than posterior points (Fig. 282); anal lobe with anterolateral patches of shagreen

**Comments:** Closest to *Stenochironomus (Petalopholeus) quadrinotatus*; around 6 mm long exuviae; close to *S. totifuscus*, but doesn't match tergite VIII (Borkent 1984)

### **ADDITIONAL REFERENCE**

Borkent, A. 1984. The systematics and phylogeny of the *Stenochironomus* complex (*Xestochironomus*, *Harrisius*, and *Stenochironomus*) (Diptera: Chironomidae). Memoirs of the Entomological Society of Canada. No. 128.

**KEY TO XESTOCHIRONOMUS SPECIES**

1. Anal claw yellow, small and with several small, thin points (Fig. 295)

..... *Xestochironomus subletti*

1'. Anal claw light brown, moderate and with 4-6 points (Fig. 296)

..... *Xestochironomus* sp. 1



Figure 295. Anal claw of *Xestochironomus subletti*



Figure 296. Anal claw of *Xestochironomus* sp. 1

## NOTES ON *XESTOCHIRONOMUS* SPECIES



Figure 297. Tergite II of *Xestochironomus subletti*



Figure 298. Tergites VII-VIII of *Xestochironomus* sp. 1

### *Xestochironomus subletti* Borkent, 1984

**Locality:** Laguna del Tortuguero 1 & 3

**Abdomen:** Tergite II with continuous hook row (1/2 width) (Fig. 297); tergites VII & VIII with posterior shagreen patches; anal lobes with two patches of shagreen; one major spur with 5-6 minor spines on anal claw (Fig. 295); tergite V with 3 LS setae; tergites VII-VIII with posterior shagreen (Fig. 135); tergite VI-VII with 4 LS setae; tergite VIII with 5 LS setae

**Comments:** Represented by 2 specimens

***Xestochironomus* sp. 1**

**Locality:** Laguna del Tortuguero 3

**Abdomen:** Tergite I no shagreen; tergites II-V with continuous, uniform shagreen; tergite II with continuous hook row (1/2 width); pedes spurii A and B absent; tergite VI with hourglass-shaped shagreen; tergites VII & VIII with thick posterior patches of shagreen (Fig. 298); anal comb with one spur and many minor spines (Fig. 296); tergites V-VII with 4 LS setae; tergite VIII with 5 LS setae

**Comments:** Represented by 1 specimen; apex of abdomen missing in voucher specimen

**ADDITIONAL REFERENCE**

Borkent, A. 1984. The systematics and phylogeny of the *Stenochironomus* complex (*Xestochironomus*, *Harrisius*, and *Stenochironomus*) (Diptera: Chironomidae). Memoirs of the Entomological Society of Canada. No. 128.

**KEY TO ZAVRELIELLA SPECIES**

1. Anal claw small, brown with many small spines (Fig. 299); dark brown pigmentation of median and pleural areas of segments II-VI (Fig. 301); anal lobes dark brown pigmentation (Fig. 303) ..... *Zavreliella nr. marmorata*
- 1'. Anal claw small, yellow with 2 main spurs and many small spines (Fig. 300); light brown pigmentation of median areas of segments II-VI (Fig. 302); anal lobes light brown pigmentation (Fig. 304) ..... *Zavreliella sp. 1*



Figure 299. Anal claw of *Zavreliella nr. marmorata*



Figure 300. Anal claw of *Zavreliella sp. 1*

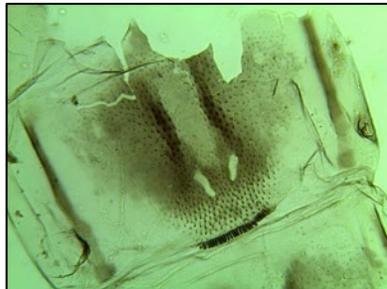


Figure 301. Tergite II of *Zavreliella nr. marmorata*



Figure 302. Tergite II of *Zavreliella sp. 1*

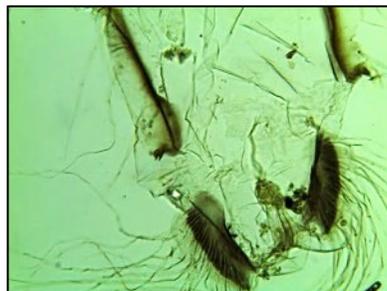


Figure 303. Anal lobes of *Zavreliella nr. marmorata*



Figure 304. Anal lobes of *Zavreliella sp. 1*

## NOTES ON ZAVRELIELLA SPECIES

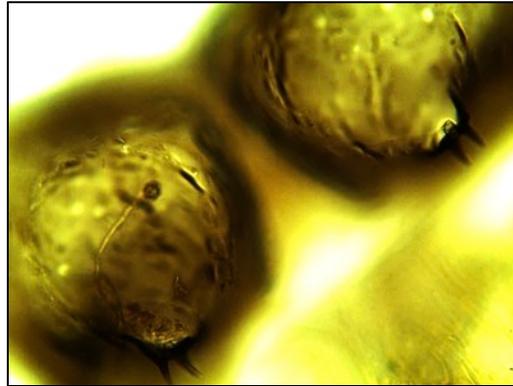


Figure 305. Cephalic tubercles of *Zavreliella* nr. *marmorata*

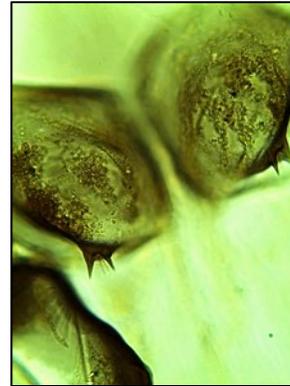


Figure 306. Cephalic tubercles of *Zavreliella* sp. 1

### *Zavreliella* near *marmorata* van der Wulp, 1859

**Locality:** Laguna del Tortuguero 3

**Head:** Cephalic tubercles with bulbous base and bifurcated apical tips, frontal setae absent (Fig. 305)

**Thorax:** Thoracic horn with four thick branches (Fig. 140)

**Abdomen:** Shagreen and dark paired median patches of tergites II-IV (Fig. 139); dark brown pigmentation of median and pleural areas of segments II-VI (Fig. 301); tergites VII & VIII with posterior shagreen patches; two patches of shagreen on anal lobes; anal claw small, brown with many small spines (Fig. 299); tergite V with 3 LS setae; tergite VI-VII with 4 LS setae; tergite VIII with 5 LS setae; anal lobes dark brown pigmentation (Fig. 303)

**Comments:** Represented by one specimen

***Zavreliella* sp. 1**

**Locality:** Laguna del Tortuguero 2 & 3

**Head:** Cephalic tubercles with bulbous base and bifurcated apical tips, frontal setae present (Fig. 306)

**Abdomen:** Shagreen and dark paired median patches on tergites II-VI; light brown pigmentation of median areas of segments II-VI (Fig. 302); light anterolateral patches of shagreen on tergites VII-VIII; at least 6 D setae on tergite VII and 4 D setae on tergite VIII; ventral tubercle sheath between tergite VII and VIII; anal claw small, yellow with 2 main spurs and many small spines, like *Zavreliella junki* (Reiss 1990) (Fig. 300); anal lobes light brown pigmentation (Fig. 304)

**Comments:** Represented by two specimens

**ADDITIONAL REFERENCE**

Reiss, F. 1990. Revision der Gattung *Zavreliella* Kieffer, 1920 (Diptera, Chironomidae). Spixiana 13: 83-115.

## NOTES ON UNKNOWN CHIRONOMINI GENERA

### Unknown Chironomini #1

**Locality:** Laguna del Tortuguero 2

**Head:** Swollen frontal apotome similar to *Endochironomus*, but no conspicuous frontal setae (Fig. 133)

**Thorax:** Blunt nose similar to *Paralauterborniella* (Fig. 10.54 F, Wiederholm 1986); dark pigmentation of wing sheaths

**Abdomen:** Pedes spurii A & B present; tergite VIII with shagreen similar to *Endochironomus* (Fig. 10.21 A Wiederholm 1986), segment VIII with anal claw bending in towards segment with at least 14 points (Fig. 136); 4 LS on tergites V-VII; 5 LS on tergite VIII

**Comments:** Closest to Unknown Chironomini #2; around 5 mm long exuviae

### Unknown Chironomini #2

**Locality:** Laguna del Tortuguero 1 & 2

**Abdomen:** Tergite II with continuous hook row; pedes spurii A & B present; lighter anterior band of shagreen on tergite VII; lighter anterolateral patches of shagreen on tergite VIII; segment VIII with anal claw bending in towards segment (Fig. 137)

**Comments:** Closest to Unknown Chironomini #1

### Unknown Chironomini #3

**Locality:** Laguna del Tortuguero 1

**Thorax:** Pale brown coloration; small protuberance on wing sheath; 4 dorsocentrals (thorax matches *Saetheria*)

**Abdomen:** Tergite II with interrupted hook row; two dark rows of spines on tergites II-IV (tergite IV smaller, about ½ size, and lighter color) (Fig. 125); tergite V with two light colored rows of spines (~1/3 size of tergites II & III); pedes spurii A & B absent; shagreen present on tergites I-VII; no anal comb; 4 LS setae on tergites V-VIII; shagreen and spine pattern on tergites I-VIII doesn't match *Saetheria* (Fig. 123)

**Comments:** Closest to *Saetheria*

### Unknown Chironomini #4

**Locality:** Laguna del Tortuguero 2

**Head:** Cephalic tubercles large and pointed; frontal setae present

**Thorax:** Thoracic horn plumose (Fig. 141); circular basal ring; granulose thorax; 4 dorsocentral setae (D1 and D2 separated with distance)

**Abdomen:** Very dark abdomen; tergite I with light shagreen and scales; tergites II-V with dense, dark shagreen (somewhat hourglass-shaped); tergite II hook row continuous (3/4 width); pedes spurii A & B large and conspicuous; conjunctives between tergites III/IV and IV/V with double row of small spines; tergite VI with triangular-shaped shagreen (denser anteriorly) and scales; scales similar to abdomen of *Robackia* (Fig. 10.69, Wiederholm 1986); tergite VII with two anterior patches of shagreen and scales (Fig. 149); tergite VIII with two medial bands of shagreen and scales; large 1-point yellow anal spur; complete anal fringe, 4 LS setae on tergites V-VII; 3 LS setae on tergite VIII

**Comments:** Closest to *Goeldichironomus*

**KEY TO PSEUDOCHIRONOMUS SPECIES**

1. Segment VIII with 5 LS setae (Figs. 307-308) ..... 2

1'. Segment VIII with 6 LS setae (Fig. 309) ..... *Pseudochironomus sp. 2*

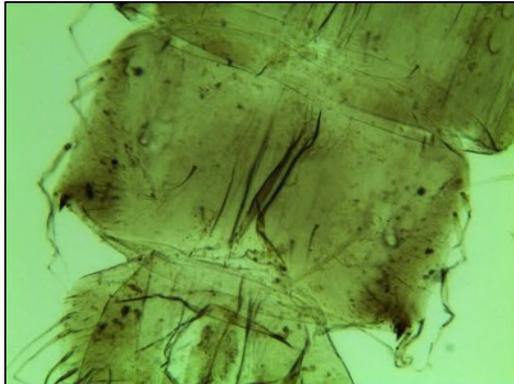


Figure 307. Segment VIII of *Pseudochironomus richardsoni*



Figure 308. Segment VIII and anal lobes of *Pseudochironomus sp. 1*

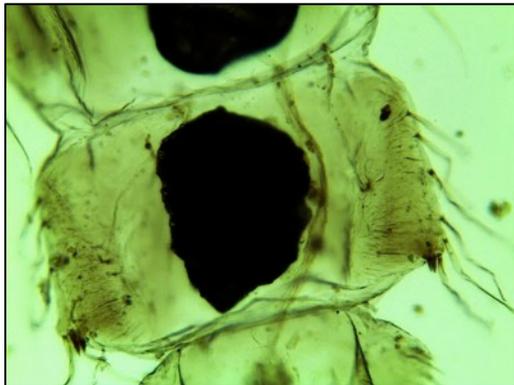


Figure 309. Segment VIII of *Pseudochironomus sp. 2*

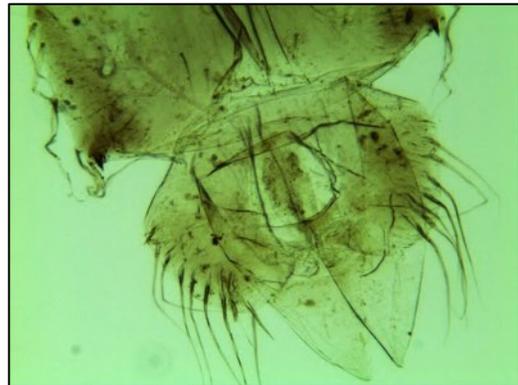


Figure 310. Anal lobes of *Pseudochironomus richardsoni*

2(1). Anal lobe fringe with more than 20 setae on each side (Fig. 308)  
 ..... *Pseudochironomus sp. 1*

2'. Anal lobe fringe with less than 10 setae on each side (Fig. 310)  
 ..... *Pseudochironomus richardsoni*

## NOTES ON *PSEUDOCHIRONOMUS* SPECIES

### *Pseudochironomus richardsoni* Malloch, 1915

**Locality:** Laguna del Tortuguero 1, 2 & 3

**Abdomen:** Overall abdomen like Fig. 10.67 C (Wiederholm 1986); sternite I with light median shagreen; tergite II with strong anterior band of shagreen and continuous hook row (1/2 width); tergites III-IV with strong anterior and posterior band of shagreen; tergites V-VI with anterior drop shaped patch of shagreen and light posterior shagreen; tergite IV with dark anterior band of color; tergites VII-VIII with anterior median circle of shagreen; several small dark spines (like Fig. 10.66 F, Wiederholm 1986); tergite V with 3 LS setae; tergites VI-VII with 4 LS setae; tergite VIII with 5 LS setae (Fig. 307); anal lobe fringe with around 8 setae per lobe (Fig. 310)

**Comments:** Closest to *Pseudochironomus* sp. 1; most common *Pseudochironomus* species

### *Pseudochironomus* sp. 1

**Locality:** Laguna del Tortuguero 1

**Abdomen:** Overall dark coloration of abdomen; no shagreen on tergite I; tergites II-VI with complete light shagreen and stronger anterior bands of shagreen; tergite II with continuous hook row (2/3 width); tergite VII with anterior band of shagreen; tergite VIII with two posterolateral patches of shagreen; yellow, 3-point anal claw; complete anal fringe with around 30 setae per lobe (much more setae than *Pseudochironomus* sp. 1); tergite V with 3 LS setae; tergites VI-VII with 4 LS setae; tergite VIII with 5 LS setae (Fig. 308)

**Comments:** Closest to *Pseudochironomus richardsoni*; represented by 1 specimen; close to *Pseudochironomus prasinatus* (Staeger, 1839), but doesn't match anal comb (Wiederholm 1986)

***Pseudochironomus* sp. 2**

**Locality:** Laguna del Tortuguero 2

**Abdomen:** Tergite V with 3 LS; tergites VI-VII 4 LS; tergite VIII with 6 LS setae; segment VIII with 2 major spines and several small spines (Fig. 309); anal lobe fringe with around 8 setae per lobe

**Comments:** Represented by 1 specimen; close to *Pseudochironomus richarsoni*, except segment VIII with 6 LS setae and anal claw differs (Wiederholm 1986)

**ADDITIONAL REFERENCE**

Sæther, O.A. 1977. Taxonomic studies on Chironomidae: *Nanocladius*, *Pseudochironomus*, and the *Harnischia* complex. Bulletin of the Fisheries Research Board of Canada. Bulletin 196.

**KEY TO GENERA OF TANYTARSINI PUPAE**

1. Thoracic horn with long chaetae (Fig. 311) ..... *Cladotanytarsus*

1'. Thoracic horn bare (Fig. 312) or with small spines (Fig. 313) ..... 2



Figure 311. Thoracic horn of *Cladotanytarsus* sp. 1

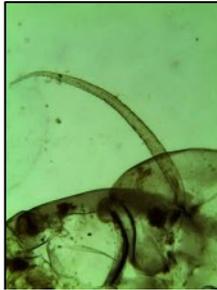


Figure 312. Thoracic horn of *Tanytarsus* sp. 1



Figure 313. Thoracic horn of Unknown Tanytarsini #1

2(1'). Thoracic horn bare (Fig. 312) ..... 3

2'. Thoracic horn with small spines (Fig. 313) ..... 4

3(2). Segment VIII with anal spur (Fig. 314); tergites II-V with dark, paired point patches (Fig. 317) ..... *Rheotanytarsus*

3'. Segment VIII with anal claw (Figs. 315-316); tergites II-V vary from bare, to paired point patches, to bands of spines (Figs. 318-319) ..... *Tanytarsus*



Figure 314. Segment VIII of *Rheotanytarsus* sp. 1



Figure 315. Segment VIII of *Tanytarsus* sp. 1

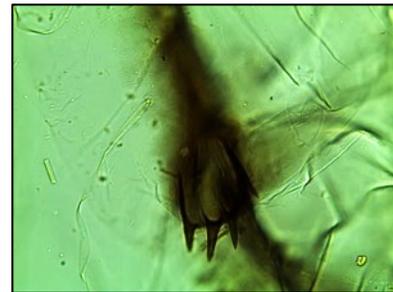


Figure 316. Segment VIII of *Tanytarsus* sp. 3

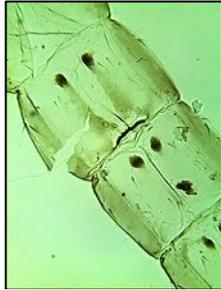


Figure 317. Tergites II-III of *Rheotanytarsus* sp. 1

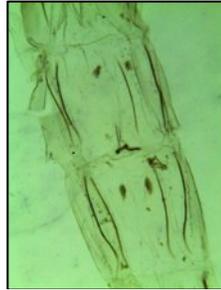


Figure 318. Tergites II-III of *Tanytarsus* sp. 6



Figure 319. Tergites II-IV of *Tanytarsus* sp. 9

4(2'). Frontal setae robust, thorn-like (Fig. 320); tergites III-V with dark posterior patches of spines and with dark brown median pigmentation (Fig. 322)

..... **Unknown Tanytarsini #1**

4'. Frontal setae long, slender (Fig. 321); tergites III-V with light posterior patches of spines and without dark brown median pigmentation (Fig. 323)

..... **Unknown Tanytarsini #2**



Figure 320. Frontal apotome of Unknown Tanytarsini #1



Figure 321. Frontal apotome of Unknown Tanytarsini #2



Figure 322. Tergites II-V of Unknown Tanytarsini #1

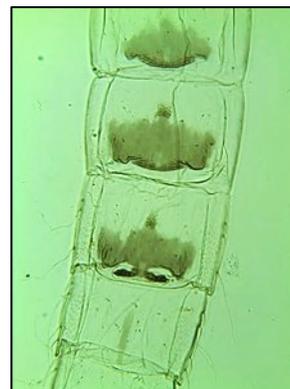


Figure 323. Tergites II-V of Unknown Tanytarsini #2

## NOTES ON CLADOTANYTARSUS SPECIES

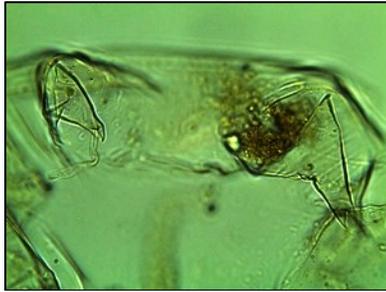


Figure 324. Cephalic tubercles of *Cladotanytarsus* sp. 1

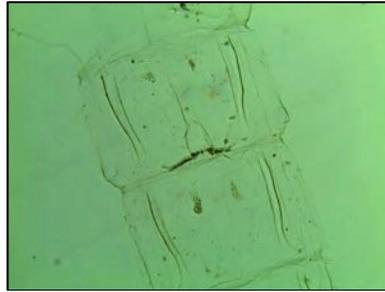


Figure 325. Tergites II-III of *Cladotanytarsus* sp. 1



Figure 326. Anal claw of *Cladotanytarsus* sp. 1

### *Cladotanytarsus* sp. 1

**Locality:** Laguna del Tortuguero 2

**Head:** Cephalic tubercles long with frontal setae (Fig. 324)

**Thorax:** Thoracic horn with long chaetae (Fig. 311)

**Abdomen:** Tergites II-VI with paired anterior point patches; tergite VII bare; tergite VIII with anterolateral patches of shagreen (Fig. 325); multi-point anal claw (Fig. 326)

**Comments:** Very transparent exuviae

### ADDITIONAL REFERENCES

Bilyj, B. and I.J. Davies. 1989. Descriptions and ecological notes on seven new species of *Cladotanytarsus* (Chironomidae: Diptera) collected from an experimentally acidified lake. *Canadian Journal of Zoology* 67: 948-962.

Wiedenbrug, S and R. Ospina-Torres. 2005. A key of pupal exuviae of Neotropical Tanytarsini (Diptera: Chironomidae). *Amazoniana* 18: 317-371.

## NOTES ON *RHEOTANYTARSUS* SPECIES

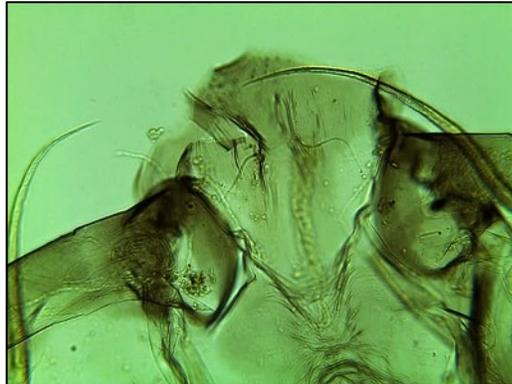


Figure 327. Frontal apotome of *Rheotanytarsus* sp. 1

### ***Rheotanytarsus* sp. 1**

**Locality:** Laguna del Tortuguero 1, 2, 3 & Quebrada

**Head:** Cephalic tubercles short; long frontal setae (Fig. 327)

**Thorax:** Thoracic horn long, slender with short apical hairs; frontal apotome granulose; wing sheaths with prominent nose

**Abdomen:** Tergite I bare; tergite II-V with anterior dark pair of patches (Fig. 317); tergite II with small patches of posterior shagreen and hook row (1/3 width); tergite VI with very light anterior and posterolateral shagreen; tergite VIII with very light anterior patches of shagreen; dark curved single spur (Fig. 314); 3/4 complete anal fringe; tergite V with 3 LS setae; tergites VI-VII with 4 LS setae; tergite VIII with 4 LS setae

**Comments:** 3 mm long exuviae

### **ADDITIONAL REFERENCE**

Wiedenbrug, S. and R. Ospina-Torres. 2005. A key of pupal exuviae of Neotropical Tanytarsini (Diptera: Chironomidae). *Amazoniana* 18: 317-371.

**KEY TO *TANYTARSUS* SPECIES**

1. Tergites III-VI with only anterior paired point patches (Figs. 328-329) ..... 2
- 1'. Tergites III-VI with some anterior paired point patches, bands of spines, or bare (Figs. 330-332) ..... 7



Figure 328. Tergites III-IV of *Tanytarsus* sp. 3



Figure 329. Tergites III-IV of *Tanytarsus* sp. 6

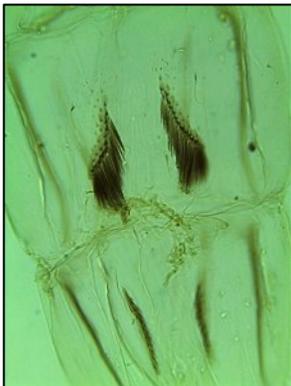


Figure 330. Tergites III-IV of *Tanytarsus* sp. 5



Figure 331. Tergites III-IV of *Tanytarsus* sp. 7

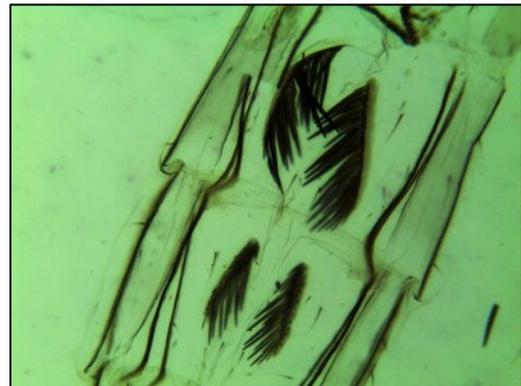


Figure 332. Tergites III-IV of *Tanytarsus* sp. 12

- 2(1). Tergite II with anterior paired point patch (Fig. 333-334) ..... 3
- 2'. Tergite II without anterior paired point patch (Fig. 335-336) ..... 5

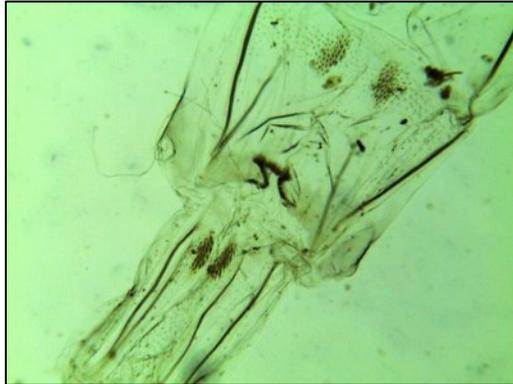


Figure 333. Tergites II-III of *Tanytarsus* sp. 3



Figure 334. Tergites II-III of *Tanytarsus* sp. 6

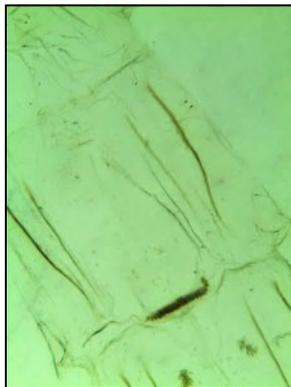


Figure 335. Tergite II of *Tanytarsus* sp. 8



Figure 336. Tergites II-III of *Tanytarsus* sp. 13

- 3(2). Tergite II with anterior paired point patches without anterolateral or median shagreen (Fig. 337) ..... ***Tanytarsus* sp. 6**
- 3'. Tergite II with anterior paired point patches with anterolateral (Fig. 338) or median shagreen (Fig. 339) ..... 4



Figure 337. Tergites II-III of *Tanytarsus* sp. 6

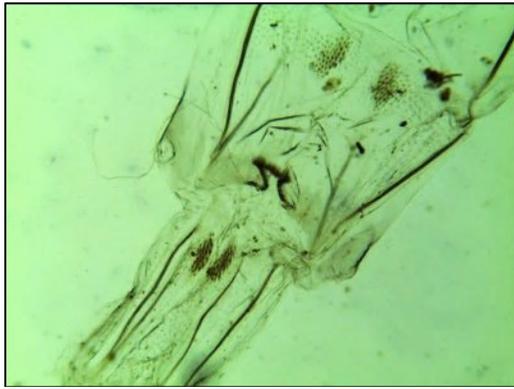


Figure 338. Tergites II-III of *Tanytarsus* sp. 3

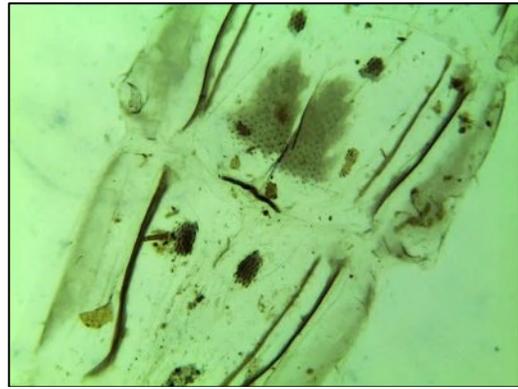


Figure 339. Tergites II-III of *Tanytarsus* sp. 10

- 4(3'). Tergite II with anterior paired point patches surrounded by anterolateral patches of shagreen (Fig. 338) ..... ***Tanytarsus* sp. 3**
- 4'. Tergite II with dark brown pigmentation and median shagreen below anterior paired point patches (Fig. 339) ..... ***Tanytarsus* sp. 10**
- 5(2'). Tergite II without a hook row (Figs. 336, 340) ..... ***Tanytarsus* sp. 13**
- 5'. Tergite II with a hook row (Figs. 335, 341) ..... 6



Figure 340. Tergite II of *Tanytarsus* sp. 13



Figure 341. Tergite II of *Tanytarsus* sp. 14

6(5'). Tergite II with light posterior patch of shagreen (Fig. 335); cephalic tubercles large and pointed (Fig. 342); anal claw large, yellow with multi-points (Fig. 344)

..... ***Tanytarsus* sp. 8**

6'. Tergite II with dark posterior patch of shagreen and dark brown pigmentation (Fig. 341); cephalic tubercles absent (Fig. 343); anal claw small, brown with few points (Fig. 345)

..... ***Tanytarsus* sp. 14**

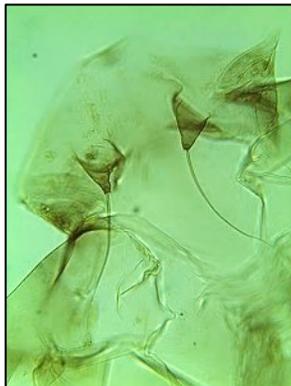


Figure 342. Frontal apotome of *Tanytarsus* sp. 8

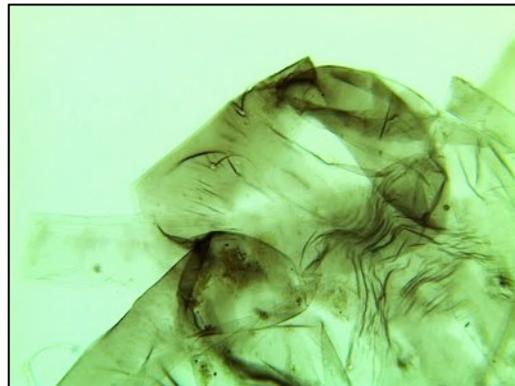


Figure 343. Frontal apotome of *Tanytarsus* sp. 14



Figure 344. Anal claw of *Tanytarsus* sp. 8

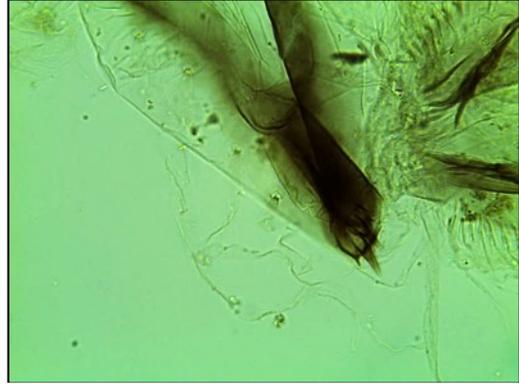


Figure 345. Anal claw of *Tanytarsus* sp. 14

7(1'). Tergite II with anterior paired point patches (Figs. 346-347) ..... 8  
 7'. Tergite II without anterior paired point patches (Figs. 348-349) ..... 9



Figure 346. Tergite II of *Tanytarsus* sp. 4

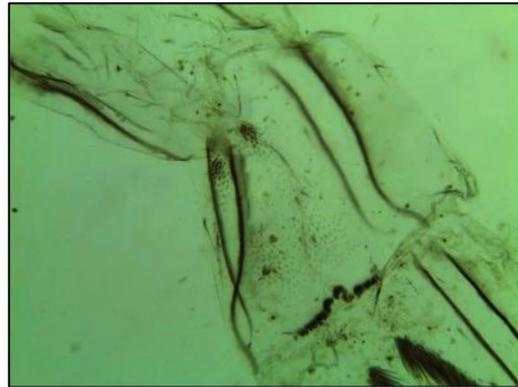


Figure 347. Tergite II of *Tanytarsus* sp. 11

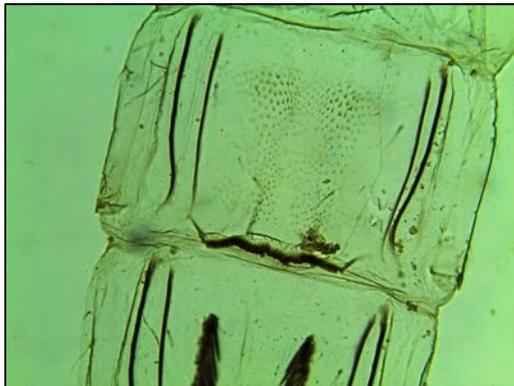


Figure 348. Tergite II of *Tanytarsus* sp. 1

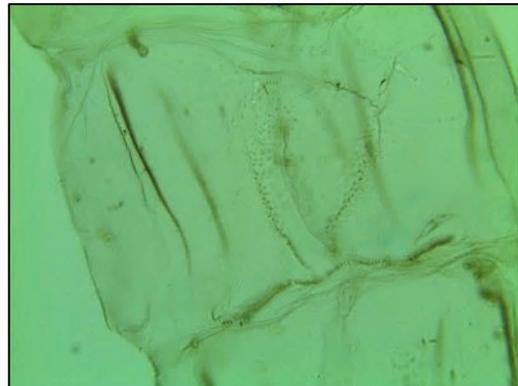


Figure 349. Tergite II of *Tanytarsus* sp. 5

8(7). Tergites II-III and VI with anterior paired point patches (Fig. 346); tergites IV-V with long bands of spines (Fig. 350) ..... *Tanytarsus* sp. 4

8'. Tergite II with anterior paired point patches (Fig. 347); tergite III with long bands of spines; tergites IV-V with short bands of spines (Fig. 351) ..... *Tanytarsus* sp. 11



Figure 350. Tergites IV-V of *Tanytarsus* sp. 4



Figure 351. Tergites IV-V of *Tanytarsus* sp. 11

9(7') Tergites III-IV with paired long bands of spines (Figs. 352-353) ..... 10

9'. Tergites III with paired long bands (Fig. 356-357) or short bands of spines (Fig. 355); tergite IV with short bands of spines ..... 12

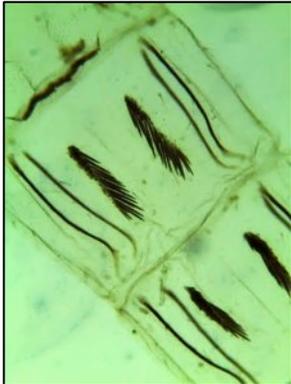


Figure 352. Tergites III-IV of *Tanytarsus* sp. 1



Figure 353. Tergites III-IV of *Tanytarsus* sp. 7



Figure 354. Tergites III-IV of *Tanytarsus* sp. 12

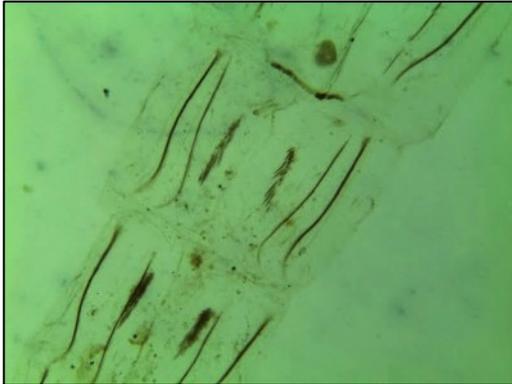


Figure 355. Tergites III-IV of *Tanytarsus* sp. 2



Figure 356. Tergites III-IV of *Tanytarsus* sp. 5



Figure 357. Tergites II-IV of *Tanytarsus* sp. 9

- 10(9). Tergite IV with paired, bifurcated sclerotized structure (Fig. 358)  
 ..... ***Tanytarsus* sp. 7**
- 10'. Tergite IV without sclerotized structure ..... 11



Figure 358. Tergite IV of *Tanytarsus* sp. 7

- 11(10'). Tergite III with paired long, medially pointing parallel bands of spines (Fig. 352)  
 ..... ***Tanytarsus* sp. 1**
- 11'. Tergite III with paired very long, medially pointing C-shaped bands of spines (Fig. 354)  
 ..... ***Tanytarsus* sp. 12**

- 12(9'). Tergite III with paired parallel bands of spines (Fig. 355) ..... *Tanytarsus* sp. 2
- 12'. Tergite III with paired posteriorly divergent band of spines (Figs. 356-357) ..... 13
- 13(12'). Tergite III with paired thick, dark brown spines; tergite IV with paired line of short spines (Fig. 356) ..... *Tanytarsus* sp. 5
- 13'. Tergite III with paired thin, light brown spines; tergite IV with anterior paired point patches (Fig. 357) ..... *Tanytarsus* sp. 9

## NOTES ON *TANYTARSUS* SPECIES

### *Tanytarsus* sp. 1

**Locality:** Laguna del Tortuguero 1, 2 & 3

**Thorax:** Thoracic horn long, slender, and spinose (Fig. 312); wing sheaths with prominent nose

**Abdomen:** Tergite II with median bands of light shagreen, pedes spurii B, and continuous hook on projecting flap (1/2 width) (Fig. 348); tergite III with parallel dark spines pointing inward (1/2 length of segment); tergite IV with parallel dark spines slightly curved posteriorly (1/3 length) (Fig. 352); tergite V with anterior dark patch of spines; tergite VI with anterior smaller dark patch of spines; tergite VII bare; tergite VIII with small anterior patches of shagreen and dark anal claw (Fig. 315); 5 LS setae on tergite VIII; 4 LS setae on tergite VII; no LS setae on tergite V; D setae on tergite I longer than half of the segment; anal lobe with two anal macrosetae

**Comments:** Closest to *Tanytarsus* sp. 12; around 4mm long exuviae; keys to *Caladomyia* sp. 4 (Fig. 20 A-F, Wiedenbrug et al. 2005), close to *Tanytarsus hamatus* Reiss, but tergite II and III varies (Fig. 20, Sanseverino & Fittkau 2006)

### *Tanytarsus* sp. 2

**Locality:** Laguna del Tortuguero 1, 2 & 3

**Thorax:** Thoracic horn long, slender, and spinose; wing sheaths with prominent nose

**Abdomen:** Tergite II with anterior and posterior light patches of shagreen (Fig. 335); tergites III-IV with paired light bands of spines (Fig. 355)

**Comments:** Closest to *Tanytarsus* sp. 5 and sp. 9; around 2 mm long exuviae; keys to *Caladomyia* sp. 4 (Fig. 20 A-F, Wiedenbrug et al. 2005)

***Tanytarsus* sp. 3**

**Locality:** Laguna del Tortuguero 3 & Quebrada

**Thorax:** Thoracic horn long and slender; granulose median suture; wing sheaths with prominent nose

**Abdomen:** Tergite I bare; tergite II-VI with light anterior patches surrounded by shagreen and very light anterolateral shagreen; tergite II only with continuous hook row (~1/2 width); tergite II and III with shagreen between point patches (Figs. 328, 333, 338); tergite VII bare; tergite VIII with dark, bulbous anal claw (Fig. 316); anal lobe with anterolateral patches of shagreen; 4-5 LS setae on tergite VIII

**Comments:** Closest to *Tanytarsus* sp. 10; 3 mm long exuviae; keys to *Tanytarsus* sp. 19 (Fig. 14 J-L, Wiedenbrug *et al.* 2005)

***Tanytarsus* sp. 4**

**Locality:** Laguna del Tortuguero 2

**Thorax:** Thoracic horn long and slender; rugulose frontal apotome

**Abdomen:** Tergite II with anterior patches of shagreen (Fig. 346); tergite III with anterior paired patch points; long spines present tergite IV-V (Fig. 350); tergite VI with anterior patches of spines; 3 LS setae on tergite VI-VII; 4 LS setae on tergite VIII

**Comments:** Closest to *Tanytarsus* sp. 11

***Tanytarsus* sp. 5**

**Locality:** Laguna del Tortuguero 1, 2 & 3

**Thorax:** Wing sheaths with prominent nose

**Abdomen:** Tergite I bare; tergite II with strong median shagreen and thin, light, continuous hook row (3/4 width) (Fig. 349); tergite III with long spines (curved outward posteriorly); tergite IV with linear, short dark spines (Figs. 330, 356); tergites V-VI with anterior patches of spines; tergite VIII with bulbous anal claw

**Comments:** Closest to *Tanytarsus* sp. 9; around 4mm long exuviae; keys to *Caladomyia* sp. 5 (Fig. 25 F-J, Wiedenbrug *et al.* 2005)

***Tanytarsus* sp. 6**

**Locality:** Laguna del Tortuguero 2 & 3

**Thorax:** Thoracic horn short and slender

**Abdomen:** Tergite II with anterior patches of dark spines and continuous dark hook row (1/2 width) (Figs. 318, 334, 337); tergites III-VI with anterior patches of dark spines (circular shagreen patches like *Cladotanytarsus*) (Fig. 329); segment VIII with dark anal claw; anal lobe with two anal macrosetae; anal lobes with around 16 fringe setae

**Comments:** Closest to *Tanytarsus* sp. 3 and sp. 10; keys to *Tanytarsus* sp. 21 (Fig. 15 A-I, Wiedenbrug *et al.* 2005)

***Tanytarsus* sp. 7**

**Locality:** Laguna del Tortuguero 1, 2, 3 & Quebrada

**Thorax:** Thoracic horn long and slender

**Abdomen:** Tergite III with convex origin for spines; tergite IV with anterior long spines originating from several points rather than in a line and unusual sclerotized paired structures each with two points along posterior half of tergite (Figs. 331, 353, 358); pair of point patches on anterior of tergites V-VI; tergite VII bare; tergite VIII with anterolateral pair of shagreen; 5 LS setae on tergite VIII

**Comments:** Closest to *Tanytarsus* sp. 1 and sp. 12

***Tanytarsus* sp. 8**



Figure 359. Thoracic horn of *Tanytarsus* sp. 8

**Locality:** Laguna del Tortuguero 1 & 3

**Head:** Cephalic tubercles large and point with frontal setae (Fig. 342)

**Thorax:** Thoracic horn long and thick (thicker than other *Tanytarsus* species) (Fig. 359); wing sheaths with prominent nose

**Abdomen:** Tergite II with continuous dark hook row on projecting flap (1/3 width) and small anterior and posterior patches of shagreen (Fig. 335); tergites III-VI with paired anterior circular patches; tergite VIII with large, light colored anal claw with around 8 points (Fig. 344)

**Comments:** Closest to *Tanytarsus* sp. 14

***Tanytarsus* sp. 9**



Figure 360. Thoracic horn of *Tanytarsus* sp. 9

**Locality:** Laguna del Tortuguero 1, 2 & 3

**Thorax:** Thoracic horn serrated on one side (Fig. 360); wing sheaths with prominent nose

**Abdomen:** Tergite II light median shagreen and continuous hook row (3/4 width); tergite III with two medially pointing bands of spines with lateral shagreen; tergite IV with two point patches of spines (Figs. 319, 357); tergite V-VI with smaller point patches of spines; tergite VII-VII bare; anal claw light brown, 4-5 point

**Comments:** Closest to *Tanytarsus* sp. 5; keys to *Caladomyia* sp. 4, but more lighter spines on tergite III, shorter spines of tergite IV, and serrated thoracic horn (Fig. 20 A-F, Wiedenbrug *et al.* 2005)

***Tanytarsus* sp. 10**

**Locality:** Laguna del Tortuguero 1 & Quebrada

**Thorax:** Thoracic horn long and slender

**Abdomen:** Tergite II with anterior dark patches of spines, posterior median patch of shagreen on dark segment coloration, continuous hook row on projecting flap (~1/4 width), and pedes spurii B (Fig. 339); tergites III-VI with dark anterior patches of spines; tergite VIII with small dark anal claw; 3 LS setae on tergite VI, 4 LS setae on tergites VII-VIII

**Comments:** Closest to *Tanytarsus* sp. 3; keys to *Tanytarsus amazonicus*, but there is variation from tergite II (Fig. 46, Sanseverino & Fittkau 2006)

***Tanytarsus* sp. 11**

**Locality:** Quebrada

**Thorax:** Thoracic horn long and slender; wing sheath with prominent nose

**Abdomen:** Tergite II with dark anterior patches of spines, median shagreen, and continuous hook row (1/2 width) (Fig. 347); tergite III with long band of spines; tergites IV-V with dark bands of spines (Fig. 351); tergites VI-VIII bare; tergite VIII with dark, bulbous anal claw; 5 LS setae on tergite VIII

**Comments:** Closest to *Tanytarsus* sp. 4; keys to *Tanytarsus hamatus* Reiss, but varies in tergites II-IV (Fig. 20, Sanseverino & Fittkau 2006)

***Tanytarsus* sp. 12**

**Locality:** Laguna del Tortuguero 2

**Thorax:** Thoracic horn long and slender; wing sheath with prominent nose

**Abdomen:** Tergite II with dense shagreen; tergite III with a pair long bands of spines pointing medially (C-shaped); tergite IV with long spines pointing medially (Figs. 332, 354); segment VIII with large, wide light brown anal claw

**Comments:** Closest to *Tanytarsus* sp. 1

***Tanytarsus* sp. 13**

**Locality:** Laguna del Tortuguero 2

**Thorax:** Thoracic horn long and slender

**Abdomen:** No hook row on tergite II; pairs of spine patches on tergite III-VI; tergite II with pedes spurii B and posterior patch of shagreen (Figs. 336, 340); tergite VIII with anterolateral patches of shagreen; anal lobe with patches of shagreen; segment VIII with dark anal comb with many minor spines; anal lobe with 2 anal macrosetae; 4 LS setae on tergite VIII

**Comments:** Closest to *Tanytarsus* sp. 8; keys close to *Tanytarsus* sp. 62 (Wiedenbrug *et al.* 2005)

***Tanytarsus* sp. 14**

**Locality:** Laguna del Tortuguero 2

**Head:** Cephalic tubercles absent (Fig. 343)

**Thorax:** Thoracic horn long and slender; wing sheath with prominent nose

**Abdomen:** Tergite II with continuous, 1/4 width hook row and median to posterior patches of shagreen (Fig. 341); tergite III-VI with anterior patches of shagreen; segment VIII with 2-3 point anal claw (Fig. 345)

**Comments:** Closest to *Tanytarsus* sp. 8; 3 mm long exuviae

**ADDITIONAL REFERENCES**

- Ekrem, T., M.F. Sublette and J.E. Sublette. 2003. North American *Tanytarsus* I. Descriptions and keys to species in the *eminulus*, *gregarius*, *lugens* and *mendax* species groups (Diptera: Chironomidae). *Annals of the Entomological Society of America* 96: 265-328.
- Sanseverino, A. M. and E.J. Fittkau. 2006. Four new species of *Tanytarsus* van der Wulp, 1874 (Diptera: Chironomidae) from South America. *Zootaxa* 1162: 1-18.
- Sublette, J.E. and M. Sasa. 1994. Chironomidae collected in Onchocerciasis endemic areas of Guatemala (Insecta, Diptera). *Spixiana Supplement* 20: 1-60.
- Wiedenbrug, S. and R. Ospina-Torres. 2005. A key of pupal exuviae of Neotropical *Tanytarsini* (Diptera: Chironomidae). *Amazoniana* 18: 317-371.

## NOTES ON UNKNOWN TANYTARSINI GENERA

### Unknown Tanytarsini #1

**Locality:** Laguna del Tortuguero 1 & 2

**Head:** Frontal apotome with granulose mound; frontal setae robust, thorn-like (Fig. 320)

**Thorax:** Thoracic horn slender with small spines (Fig. 313); median suture of thorax with small spines; prominent nose

**Abdomen:** Tergite I and II bare; hook row of tergite II complete (1/3 width); tergites III-V with dark posterior patches of spines and with dark brown median pigmentation (Fig. 322); tergite III with two posterior patches of shagreen; tergite IV with one median band of shagreen and two posterior patches of shagreen; tergite V with one median band of shagreen and two posterior patches of dark spines (extending laterally) and light shagreen in pleural area; tergite VI with median band of light shagreen and light shagreen in pleural area; two small anterior patches of shagreen on tergites VII-VIII; anal spur with one main point and around 4 minor points; 3/4 complete anal fringe with 18 fringe setae per lobe (like *Stempellina*); pedes spurii A present and B absent; 3 LS setae on tergite V; 4 LS setae on tergites VI-VII; 2 LS setae on tergite VIII (setation like *Constempellina*)

**Comments:** Genera between *Constempellina* and *Stempellina*

## Unknown Tanytarsini #2

**Locality:** Laguna del Tortuguero 1, 2 & 3

**Head:** Frontal apotome with granulose mound; frontal setae long, slender (Fig. 321)

**Thorax:** Thoracic horn slender with small spines; median suture of thorax with small spines; prominent nose

**Abdomen:** Tergite I bare; tergite II with continuous hook row (1/3-1/2 width) and minimal shagreen; tergites III-V with light posterior patches of spines and without dark brown median pigmentation (Fig. 323); tergites III with triangular dark patch and posterior row of small spines; tergite IV with triangular dark patch, median circle of shagreen and posterior row of small spines; tergite V with triangular dark patch, median circle of shagreen, and posterior row of dark, larger spines; tergite VI with shagreen in pleural area; tergite VII with two anterior lateral patches of shagreen; tergite VIII with lateral bands of shagreen; pedes spurii A present and B absent; 3 LS setae on tergite V; 4 LS setae on tergites VI-VII; 2 LS setae on tergite VIII; 3-point yellow to brown anal claw; complete anal fringe with 11 fringe setae per lobe (like *Constempellina*)

**Comments:** Genera between *Constempellina* and *Stempellina*

## REFERENCES CITED

- Adam, J.I. and O.A. Sæther. 1999. Revision of the genus *Nilothauma* Kieffer, 1921 (Diptera: Chironomidae). *Entomologica Scandinavica Supplement* 56: 1-107.
- Armitage, P.D. and J.H. Blackburn. 1985. Chironomidae in a Pennine stream system receiving mine drainage and organic enrichment. *Hydrobiologia*. 121: 165-172.
- Armitage, P.D, P.S. Cranston and L.C.V. Pinder. 1995. *The Chironomidae: The Biology and Ecology of Non-biting Midges*. Chapman and Hall, London.
- Barbour, M.T., J. Gerritsen, B.D. Snyder and J.B. Stribling. 1999. Rapid bioassessment protocols for use in streams and wadeable rivers: Periphyton, benthic macroinvertebrates, and Fish. 2<sup>nd</sup> edition. Report number EPA 841-B-99-002. US EPA, Washington, U.S.A.
- Bilyj, B. and I.J. Davies. 1989. Descriptions and ecological notes on seven new species of *Cladotanytarsus* (Chironomidae: Diptera) collected from an experimentally acidified lake. *Canadian Journal of Zoology* 67: 948-962.
- Borkent, A. 1984. The systematics and phylogeny of the *Stenochironomus* complex (*Xestochironomus*, *Harrisius*, and *Stenochironomus*) (Diptera: Chironomidae). *Memoirs of the Entomological Society of Canada*. No. 128.
- Coffman, W.P. and L.C. Ferrington Jr. 1996. Chironomidae. In Meritt, R. W. & K. W. Cummins (eds), *An introduction to the aquatic insects of North America*, Third Edition. Kendall/Hunt Publishing Company, Dubuque, IW: 635-643.
- Curry, L.L. 1958. Larvae and pupae of the species *Cryptochironomus* (Diptera) in Michigan. *Limnology and Oceanography* 3: 427-442.
- De la Rosa, C.L. 1997. Chironomidae. In Solís, A. (ed.) *Las familias de insectos de Costa Rica*. INBio. <http://www.inbio.ac.cr/papers/insectoscr/Texto197.htm>
- Ekrem, T., M.F. Sublette and J.E. Sublette. 2003. North American *Tanytarsus* I. Descriptions and keys to species in the eminulus, gregarious, lugens and mendax species groups (Diptera: Chironomidae). *Annals of the Entomological Society of America* 96: 265-328.
- Ferrington, L.C. Jr., M.A. Blackwood, C.A. Wright, N.H. Crisp, J.L. Kavanaugh and F.J. Schmidt. 1991. A protocol for using surface-floating pupal exuviae of Chironomidae for rapid bioassessment of changing water quality. Pp.181-190. In *Sediment and stream water quality in a changing environment: trends and explanations*. IAHS Publication Number 203. 374 pp.

- Ferrington, L.C. Jr., M.B. Berg and W.P. Coffman. 2008. Chironomidae. Chapter 26 In R.W. Merritt, K.W. Cummins, and M.B. Berg, eds. An introduction to the aquatic insects of North America. 4th Ed., Kendall/Hunt Publishing Co., Dubuque, Iowa.
- Fittkau, E.J. 1968. *Chironomus streinzkei* n. sp. (Chironomidae, Dipt.), ein neues Laboratoriumstier. Zeitschrift für Morphologie der Tiere 63: 239–250.
- Grodhaus, G. 1976. Two species of *Phaenopsectra* with drought-resistant larvae (Diptera: Chironomidae). Journal of the Kansas Entomological Society. 49: 405-418.
- Grodhaus, G. 1987. *Endochironomus* Kieffer, *Tribelos* Townes, *Synendotendipes*, n. gen., and *Endotribelos*, n. gen. (Diptera: Chironomidae) of the Nearctic Region. Journal of the Kansas Entomological Society 60: 167-247.
- Hayford, B.L. 1998. A systematic revision of *Paratendipes* (Diptera: Chironomidae) with special emphasis on the evolution of thermophily. Unpublished PhD thesis.
- Hayford, B. and L.C. Ferrington Jr. 2006. Distribution of Chironomidae (Diptera) in Lake Hövsgöl, Mongolia. In Goulden, C. E., T. Sitnikova, J. Gelhaus, B. Boldgiv (eds), The geology, biodiversity, ecology of Lake Hövsgöl (Mongolia). Backhuys Publishers, Leiden, The Netherlands, 433–452, Chapter 26.
- Hestenes, T.C. and O.A. Saether. 2000. Three new Nearctic *Thiennemanniella* Kieffer species with a review of the Nearctic species. In late 20<sup>th</sup> century research on Chironomidae: an anthology from the 13<sup>th</sup> International Symposium on Chironomidae. O. Hoffrichter (ed.). Shaker Verlag, Aachen.
- Heyn, M.W. 1992. A review of the systematic position of the North American species of the genus *Glyptotendipes*. Netherlands Journal of Aquatic Ecology 26: 129-137.
- Jackson, G.A. 1977. Nearctic and Palaeartic *Paracladopelma*, *Harnischa*, and *Sætheria* n. gen. (Diptera: Chironomidae). Journal of the Fisheries Research Board of Canada 34: 1321-1359.
- Jacobsen, R.E. and S.A. Perry. 2000. A review of *Beardius* Reiss & Sublette, with description of a new species from Everglades National Park (Insecta, Diptera, Chironomidae). Spixiana 23: 129-144.
- Lehmann, J. 1970a. Revision der europäischen Arten (Imagines ) der Gattung *Parachironomus* Lenz (Diptera, Chironomidae). Hydrobiologia 33: 129-158.
- Lehmann, J. 1970b. Revision der europäischen Arten (Imagines und Puppen) der Gattung *Rheotanytarsus* Bause (Diptera, Chironomidae). Zoologische Anzeiger 185: 344-378.

- Maschwitz, D.E. and E.F. Cook. 2000. Revision of the Nearctic species of the genus *Polypedilum* Kieffer (Diptera: Chironomidae) in the subgenera *P.* (Polypedilum) Kieffer and *P.* (Uresipedilum) Oyewo and Sæther. Ohio Biological Survey, Ohio State University.
- Mason, P.G. 1986. Four new species of the *Cryptochironomus fulvus* (Johannsen) species complex (Diptera: Chironomidae). *Entomologica Scandinavica* 16: 399-413.
- Mendes, H.F. and T. Andersen. 2009. Neotropical *Nilothauma* Kieffer, 1921, with the description of thirteen new species (Diptera: Chironomidae). *Zootaxa* 2063: 1-45.
- Murphy, P.M. and R.W. Edwards. 1982. The spatial distribution of the freshwater macroinvertebrate fauna of the River Ely, South Wales, in relation to pollutional discharges. *Environmental Pollution (Series A)*. 29: 111-124.
- Oliveira, C.S.N. and F.L. Da Silva. 2011. Two new species of *Larsia* Fittkau, 1962 (Diptera Chironomidae: Tanypodinae) from Neotropical region, with a checklist of *Larsia* species of the world. *Zootaxa* 2786: 27-41.
- Oliver, D.R., M.E. Dillon and P.S. Cranston. 1990. A catalog of Nearctic Chironomidae. Research Branch Agriculture Canada, Publication 1857/B.
- Oliver, D. R. and M.E. Dillon. 1994. Corrections and additions to "A catalog of Nearctic Chironomidae". *Proceedings of the Entomological Society of Washington* 96: 8-10.
- Oyewo, E.A. and O.A. Sæther. 2008. Revision of *Polypedilum* (Pentapedilum) Kieffer and *Ainuyusurika* Sasa et Shirasaki (Diptera: Chironomidae). *Zootaxa* 1953: 1-145.
- Rae, J.G. 1989. Chironomid midges as indicators of organic pollution in the Scioto River Basin, Ohio. *The Ohio Journal of Science* 89: 5-9.
- Rawson, D. S. and J.E. Moore. 1944. The saline lakes of Saskatchewan. *Canadian Journal of Research* 22: 141-201.
- Reiss, F. 1974a. Vier neue *Chironomus*-Arten (Chironomidae, Diptera) und ihre ökologische Bedeutung für die Benthosfauna zentralamazonischer Seen und Überschwemmungswälder. *Amazoniana* 5: 3-23.
- Reiss, F. 1974b. Die in stehenden Gewässern der Neotropis verbreitete Chironomidengattung *Goeldichironomus* Fittkau (Diptera, Insecta). *Studies on Neotropical Fauna* 9: 85-122.

- Reiss, F. and L. Säwedal. 1981. Keys to males and pupae of the Palaearctic (excl. Japan) *Paratanytarsus* Thienemann & Bause, 1913, n. comb., with descriptions of three new species (Diptera: Chironomidae). *Entomologica Scandinavica Supplement* 15:
- Reiss, F. 1990. Revision der Gattung *Zavreliella* Kieffer, 1920 (Diptera: Chironomidae). *Spixiana* 13: 73-104.
- Reiss, F. and J.E. Sublette. 1985. *Beardius* new genus with notes on additional Pan-American taxa (Diptera, Chironomidae). *Spixiana Supplement* 11: 179-193.
- Roback, S.S. 1974. The immature stages of the genus *Coelotanypus* (Chironomidae; Tanypodinae: Coelotanypodini) in North America. *Proceedings of the Academy of Natural Sciences of Philadelphia* 126: 9-19.
- Roback, S.S. and K.J. Tennessen. 1978. The immature stages of *Djalmabatista pulcher* [= *Procladius (Calotanypus) pulcher* (Joh.)]. *Proceedings of the Academy of Natural Sciences of Philadelphia* 130: 11-20.
- Roback, S.S. 1980. The immature chironomids of the eastern United States IV. Tanypodinae – Procladiinae. *Proceedings of the Academy of Natural Sciences of Philadelphia* 132: 1-63.
- Roback, S.S. 1981. The immature chironomids of the eastern United States V. Pentaneurini – Thienemannimyia Group. *Proceedings of the Academy of Natural Sciences of Philadelphia* 133: 73-128.
- Roback, S.S. and W.P. Coffman. 1983. Results of the Catherwood Bolivian-Peruvian Altiplano expedition Part II. Aquatic Diptera including montane Diamesinae and Orthocladiinae (Chironomidae) from Venezuela. *Proceedings of the Academy of Natural Sciences of Philadelphia* 135: 9-79.
- Roback, S.S. 1985. The immature chironomids of the eastern United States VI. Pentaneurini – Genus *Ablabesmyia*. *Proceedings of the Academy of Natural Sciences of Philadelphia* 137: 153-212.
- Roback, S.S. 1987. The immature chironomids of the eastern United States IX. Pentaneurini – genus *Labrundinia* with the Description of some Neotropical material. *Proceedings of the Academy of Natural Sciences of Philadelphia* 139: 159-209.
- Roque, F.O. and S. Trivinho-Strixino. 2008. Four new species of *Endotribelos* Grodhaus, a common fallen fruit-dwelling chironomid genus in Brazilian streams (Diptera: Chironomidae: Chironominae). *Studies on Neotropical Fauna and Environment* 43: 191-207.

- Sæther, O.A. 1977. Taxonomic studies on Chironomidae: *Nanocladius*, *Pseudochironomus*, and the *Harnischia* complex. Bulletin of the Fisheries Research Board of Canada. Bulletin 196.
- Sæther, O.A. 1980. Glossary of chironomid morphology terminology (Chironomidae: Diptera). Entomologica Scandinavica Supplement 14: 1-51.
- Sæther, O.A. 1981. Orthocladiinae (Chironomidae: Diptera) from the British West Indies with descriptions of *Antillocladius* n. gen., *Lipurometriocnemus* n. gen. , *Comptosmittia* n. gen. and *Diplosmittia* n. gen. – Entomologica Scandinavica Supplement 16: 1-46.
- Sæther, O.A. and A. Sundal. 1999. *Cerobregma*, a new subgenus of *Polypedilum* Kieffer, with a tentative phylogeny of subgenera and species groups within *Polypedilum* (Diptera: Chironomidae). Journal of the Kansas Entomological Society 71: 315-382.
- Sæther, O.A., T. Andersen, L.C. Pinho, and H.F. Mendes. 2010: The problems with *Polypedilum* Kieffer (Diptera: Chironomidae), with the description of *Probolum* subgen. n.. Zootaxa 2497: 1-36.
- Serrano, M.A.S. and U. Nolte. 1996. A sit-and-wait predatory chironomid from tropical Brazil - *Fittkauimyia crypta* sp. n. (Diptera: Chironomidae). Entomologica Scandinavica 27: 251-258.
- Simpson, K.W., R.W. Bode and P. Albu. 1983. Keys for the genus *Cricotopus* adapted from Revision der Gattung *Cricotopus* van der Wulp und ihrer Verwandten (Diptera, Chironomidae) by M. Hirvenoja. New York State Museum, The University of the State of New York, Albany, NY. Bulletin 450.
- Soponis, A.R. and K.W. Simpson. 1992. *Polypedilum digitifer* Townes and *Polypedilum griseopunctatum* (Malloch) (Diptera, Chironomidae): Redescription of adult males with a description and separation of the immature stages. Netherlands Journal of Aquatic Ecology 26: 203–213.
- Spies, M. and F. Reiss. 1996. Catalog and bibliography of Neotropical and Mexican Chironomidae (Insecta, Diptera). Spixiana Supplement 22: 61-119.
- Spies, M., T. Andersen, J.H. Epler and C.N. Watson Jr. 2009. Chironomidae (non-biting midges). Pp. 437-480 in: Brown, B.V. et al. (eds.) Manual of Central American Diptera, vol. 1. NRC Research Press, Ottawa.
- Sublette, J.E. and M. Sasa. 1994. Chironomidae collected in Onchocerciasis endemic areas of Guatemala (Insecta, Diptera). Spixiana Supplement 20: 1-60.

- Trivinho-Strixino, S. and T. Siqueira. 2007. New species of *Beardius* Reiss et Sublette, 1985 (Diptera: Chironomidae) from southeastern Brazil. In: T. Andersen (ed.). Contributions to the Systematics and Ecology of Aquatic Diptera- A tribute to Ole A. Saether. The Caddis Press. p 281-286.
- Vårdal, H., A. Bjørlo and O.A. Sæther. 2002. Afrotropical *Polypedilum* subgenus *Tripodura*, with a review of the subgenus (Diptera: Chironomidae). Zoologica Scripta 31: 331-402.
- Vallenduuk H.J. and E.E. Morozova. 2005. *Cryptochironomus*: An identification key to the larvae and pupal exuviae in Europe. Lautrebornia 55: 1-22.
- Wiedenbrug, S. and R. Ospina-Torres. 2005. A key of pupal exuviae of Neotropical Tanytarsini (Diptera: Chironomidae). Amazoniana 18: 317-371.
- Wiedenbrug, S. and S. Trivinho-Strixino. 2011. New species of the genus *Corynoneura* Winnertz (Diptera, Chironomidae) from Brazil. Zootaxa 2822: 1-40.
- Wiederholm, T. 1989. Chironomidae of the Holarctic Region: Keys and diagnoses. Part 2. Pupae. Entomologica scandinavica Supplement 28: 1-482.
- Wilson, R.S. 1987. Chironomid communities in the River Trent in relation to water chemistry. Entomologica Scandinavica Supplement. 29: 387-193.

**Table 1.** Chironomid taxa collected in Tortuguero National Park, Costa Rica in June 2010 and January 2011 (taxonomic order follows Ferrington *et al.* 2008)

| Subfamily       | Tribe                         | Genus                   | Species  |
|-----------------|-------------------------------|-------------------------|--|
| Tanypodinae     | Coelotanypodini               |                         | <i>Coelotanypus</i> sp. 1                              |
|                 |                               |                         | <i>Coelotanypus</i> sp. 2                              |
|                 |                               |                         | <i>Fittkauimyia crypta</i> Serrano & Nolte, 1996       |
|                 | Macropelopiini                |                         | <i>Djalmabatista</i> sp. 1                             |
|                 |                               |                         | <i>Procladius (Psilotanypus) bellus</i> Loew, 1866     |
|                 | Pentaneurini                  |                         | <i>Ablabesmyia</i> sp. 1                               |
|                 |                               |                         | <i>Ablabesmyia</i> sp. 2                               |
|                 |                               |                         | <i>Labrundinia</i> sp. 1                               |
|                 |                               |                         | <i>Labrundinia</i> sp. 2                               |
|                 |                               |                         | <i>Labrundinia</i> sp. 3                               |
|                 |                               |                         | <i>Larsia</i> sp. 1                                    |
|                 |                               |                         | <i>Paramerina</i> sp. 1                                |
|                 |                               |                         | Unknown Pentaneurini #1                                |
|                 |                               | Unknown Pentaneurini #2 |  |
|                 |                               | Unknown Pentaneurini #3 |  |
| Orthoclaadiinae | Corynoneurini                 |                         | <i>Corynoneura</i> sp. 1                               |
|                 |                               |                         | <i>Corynoneura</i> sp. 2                               |
|                 |                               |                         | <i>Corynoneura</i> sp. 3                               |
|                 |                               |                         | <i>Thienemanniella</i> sp. 1                           |
|                 |                               |                         | <i>Thienemanniella</i> sp. 2                           |
|                 | Orthoclaadiini                |                         | <i>Cricotopus</i> sp. 1                                |
|                 |                               |                         | <i>Cricotopus</i> sp. 2                                |
|                 |                               |                         | <i>Cricotopus</i> sp. 3                                |
|                 |                               |                         | <i>Nanocladius (Nanocladius) minimus</i> Saether, 1977 |
|                 |                               |                         | <i>Nanocladius</i> sp. 1                               |
|                 |                               |                         | Unknown Orthoclaadiinae #1                             |
|                 |                               |                         | Unknown Orthoclaadiinae #2                             |
| Chironomini     | Chironomini                   |                         | <i>Beardius</i> sp. 1                                  |
|                 |                               |                         | <i>Chironomus</i> sp. 1                                |
|                 |                               |                         | <i>Chironomus</i> sp. 2                                |
|                 |                               |                         | <i>Cladopelma</i> sp. 1                                |
|                 |                               |                         | <i>Cryptochironomus</i> sp. 1                          |
|                 |                               |                         | <i>Cryptochironomus</i> sp. 2                          |
|                 |                               |                         | <i>Cryptochironomus</i> sp. 3                          |
|                 |                               |                         | <i>Cryptochironomus</i> sp. 4                          |
|                 |                               |                         | <i>Cryptotendipes</i> sp. 1                            |
|                 |                               |                         | <i>Cryptotendipes</i> sp. 2                            |
|                 |                               |                         | <i>Endotribelos</i> sp. 1                              |
|                 |                               |                         | <i>Goeldichironomus</i> sp. 1                          |
|                 |                               |                         | <i>Goeldichironomus</i> sp. 2                          |
|                 | <i>Goeldichironomus</i> sp. 3 |                         |  |
|                 | <i>Goeldichironomus</i> sp. 4 |                         |  |

(Table 1. Continued)

| Subfamily | Tribe | Genus | Species   |
|-----------|-------|-------|---|
|           |       |       | <i>Harnischia</i> sp. 1                                       |
|           |       |       | <i>Nilothauma</i> nr. <i>reissi</i> 1 Mendes & Anderson, 2009 |
|           |       |       | <i>Nilothauma</i> nr. <i>reissi</i> 2 Mendes & Anderson, 2009 |
|           |       |       | <i>Nilothauma</i> nr. <i>reissi</i> 3 Mendes & Anderson, 2009 |
|           |       |       | <i>Nilothauma</i> sp. 1                                       |
|           |       |       | <i>Nilothauma</i> sp. 2                                       |
|           |       |       | <i>Nilothauma</i> sp. 3                                       |
|           |       |       | <i>Nilothauma</i> sp. 4                                       |
|           |       |       | <i>Parachironomus</i> nr. <i>cayapo</i> Spies et al. 1994     |
|           |       |       | <i>Parachironomus</i> sp. 1                                   |
|           |       |       | <i>Parachironomus</i> sp. 2                                   |
|           |       |       | <i>Parachironomus</i> sp. 3                                   |
|           |       |       | <i>Parachironomus</i> sp. 4                                   |
|           |       |       | <i>Paralauterborniella nigrohalteralis</i> Malloch, 1915      |
|           |       |       | <i>Paratendipes</i> sp. 1                                     |
|           |       |       | <i>Paratendipes</i> sp. 2                                     |
|           |       |       | <i>Paratendipes</i> sp. 3                                     |
|           |       |       | <i>Paratendipes</i> sp. 4                                     |
|           |       |       | <i>Paratendipes</i> sp. 5                                     |
|           |       |       | <i>Paratendipes</i> sp. 6                                     |
|           |       |       | <i>Paratendipes</i> sp. 7                                     |
|           |       |       | <i>Polypedilum</i> sp. 1                                      |
|           |       |       | <i>Polypedilum</i> sp. 2                                      |
|           |       |       | <i>Polypedilum</i> sp. 3                                      |
|           |       |       | <i>Polypedilum</i> sp. 4                                      |
|           |       |       | <i>Polypedilum</i> sp. 5                                      |
|           |       |       | <i>Polypedilum</i> sp. 6                                      |
|           |       |       | <i>Polypedilum</i> sp. 7                                      |
|           |       |       | <i>Polypedilum</i> sp. 8                                      |
|           |       |       | <i>Polypedilum</i> sp. 9                                      |
|           |       |       | <i>Polypedilum</i> sp. 10                                     |
|           |       |       | <i>Polypedilum</i> sp. 11                                     |
|           |       |       | <i>Polypedilum</i> sp. 12                                     |
|           |       |       | <i>Polypedilum</i> sp. 13                                     |
|           |       |       | <i>Saetheria</i> nr. <i>tylus</i> Townes, 1945                |
|           |       |       | <i>Stenochironomus quadrinotatus</i> Borkent, 1984            |
|           |       |       | <i>Stenochironomus</i> sp. 1                                  |
|           |       |       | <i>Stenochironomus</i> sp. 2                                  |
|           |       |       | <i>Stenochironomus</i> sp. 3                                  |
|           |       |       | <i>Stenochironomus</i> sp. 4                                  |

(Table 1. Continued)

| Subfamily | Tribe             | Genus                  | Species  |
|-----------|-------------------|------------------------|--|
|           |                   |                        | <i>Stenochironomus</i> sp. 5                               |
|           |                   |                        | <i>Xestochironomus subletti</i> Borkent, 1984              |
|           |                   |                        | <i>Xestochironomus</i> sp. 1                               |
|           |                   |                        | <i>Zavreliella</i> nr. <i>marmorata</i> van der Wulp, 1859 |
|           |                   |                        | <i>Zavreliella</i> sp. 1                                   |
|           |                   | Unknown Chironomini #1 |  |
|           |                   | Unknown Chironomini #2 |  |
|           |                   | Unknown Chironomini #3 |  |
|           |                   | Unknown Chironomini #4 |  |
|           | Pseudochironomini |                        | <i>Pseudochironomus richardsoni</i> Malloch, 1915          |
|           |                   |                        | <i>Pseudochironomus</i> sp. 1                              |
|           |                   |                        | <i>Pseudochironomus</i> sp. 2                              |
|           | Tanytarsini       |                        | <i>Cladotanytarsus</i> sp. 1                               |
|           |                   |                        | <i>Rheotanytarsus</i> sp. 1                                |
|           |                   |                        | <i>Tanytarsus</i> sp. 1                                    |
|           |                   |                        | <i>Tanytarsus</i> sp. 2                                    |
|           |                   |                        | <i>Tanytarsus</i> sp. 3                                    |
|           |                   |                        | <i>Tanytarsus</i> sp. 4                                    |
|           |                   |                        | <i>Tanytarsus</i> sp. 5                                    |
|           |                   |                        | <i>Tanytarsus</i> sp. 6                                    |
|           |                   |                        | <i>Tanytarsus</i> sp. 7                                    |
|           |                   |                        | <i>Tanytarsus</i> sp. 8                                    |
|           |                   |                        | <i>Tanytarsus</i> sp. 9                                    |
|           |                   |                        | <i>Tanytarsus</i> sp. 10                                   |
|           |                   |                        | <i>Tanytarsus</i> sp. 11                                   |
|           |                   |                        | <i>Tanytarsus</i> sp. 12                                   |
|           |                   |                        | <i>Tanytarsus</i> sp. 13                                   |
|           |                   |                        | <i>Tanytarsus</i> sp. 14                                   |
|           |                   | Unknown Tanytarsini #1 |  |
|           |                   | Unknown Tanytarsini #2 |  |