

The genus *Holorusia* Loew (Diptera: Tipulidae) in Fiji^{1,2}

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Abstract: The genus *Holorusia* in Fiji is reviewed and a key to species is given. The known species from Fiji are described and illustrated, including four new species: *Holorusia damuda*, **n. sp.**, *H. mamare*, **n. sp.**, *H. picturata*, **n. sp.**, and *H. schlingeri*, **n. sp.** One species, *H. vitiana* Alexander is synonymized with *H. fijiensis* (Alexander), **n. syn.** A total of eight species are now known to occur in the Fiji islands.

INTRODUCTION

The Tipulidae of Fiji are represented by only one genus, *Holorusia* Loew (see Evenhuis, 2005 for a preliminary list of Fiji tipuloids). Species originally described in the genus *Ctenacroscelis* Enderlein have been transferred to *Holorusia* in Vane-Wright (1967). Their relatively large size makes *Holorusia* easy to spot in collection of Fiji tipuloids. The only species similar in size in Fiji is *Libnotes colossus* Alexander, only known from Matuku Island. No previous work has synthesized our knowledge of the genus in Fiji. Alexander described all the previously known species in separate papers (1921, 1924, 1978). In his last paper (1978), he provided illustrations of the wing venation and hypopygia of some species but not all. In this paper, I summarize the knowledge of *Holorusia* in Fiji based on examination of the types of all previously described species and provide an illustrated key to the species.

Extensive Malaise trapping throughout many Fijian islands since 2002 has captured dozens of specimens of *Holorusia*, revealing four new species described below. The genus is found in relative abundance on the larger islands of Viti Levu, Vanua Levu, and Kadavu, relatively uncommon on Taveuni, and has not yet been found on any of the smaller islands in the Lau group or elsewhere.

MATERIAL AND METHODS

The material examined in this study derives primarily from specimens collected under the auspices of the NSF-funded "Fiji Arthropods Survey" and the Schlinger Foundation-funded Fiji Biodiversity of Arthropods study, primary types of which will be deposited in the Fiji National Insect Collection, Suva (FNIC). Other specimens derive from the Bishop Museum, Honolulu (BPBM). Types of previously described species were borrowed from the United States National Museum of Natural History, Washington, DC (USNM) and the Natural History Museum, London (BMNH).

Descriptive terminology follows McAlpine (1981) and Young (1999) with genitalic terminology following Alexander (1978). Due to the confusing nature of previous and modern wing vein and cell terminology, a schematic illustration of the apical portion of the wing for *Holorusia* is given with veins and cells labeled (Fig. 1), which forms the basis for the terminology used herein.

1. Contribution No. 2006-002 to the NSF-Fiji Arthropod Survey.

2. Contribution No. 2006-003 to the Pacific Biological Survey.



Figure 3. *Holorusia* heads, dorsal view. **a.** *H. schlingeri*, n. sp.; **b.** *H. fijiensis* (Alexander).

Legs. Fijian taxa appear to fall into two groups based on the presence (*fijiensis*, *mamare*) or absence (*damuda*, *degeneri*, *lepida*, *schlingeri*, *walkeriana*) of a subterminal yellow band on an otherwise dark brown apical femoral coloration.

Wing. All Fijian taxa have an effaced area near the distal third of the wing. This is shown by whitish veins and sometimes whitish or pale coloration in the midst of otherwise smoky or infuscated cell coloration. In addition, a slight bulge in the costa at the level of effaced area in the distal portion of the wing may be noticed in some species (e.g., Figs. 13, 17, 18). Infuscation is always present in the stigma and on basal portion of vein CuA_1 , and may be present at the junctions of other veins in the distal half of the wing, although the intensity of darkness or paleness of this infuscation is highly variable within the genus but appears to be consistent within species. The width of the opening of cell cup at the wing margin can be used to group taxa, but may not be of phylogenetic significance (e.g., a wide opening (wider than cell $r4+5$) easily groups large, generally yellowish species [*lepida* and *schlingeri*], but also includes the smaller, heavily brown-patterned *picturata*). The length of the petiole at the base of cell $m1$ (= vein M_{1+2} at base of this cell) can be used to group taxa; having a petiole shorter than cell $m1$ groups the same taxa that have a yellow subterminal band on the femora (*fijiensis*, *mamare*).

Male hypopygia. The shape of the ninth tergite and the inner and outer gonostyli are useful in species identifications but may not be of phylogenetic value as shapes and sizes do not seem to conform to discrete species groupings.

Ovipositor. Other than size differences extremely long for the large yellowish species (*lepida* and *schlingeri*) and much shorter for the smaller more brown species (cf. Figs. 20a and 20b), there appear to be few characters of phylogenetic significance or taxonomic value.

KEY TO SPECIES OF *HOLORUSIA* LOEW OF FIJI

1. Wing with extensive brown infuscation pattern (Figs. 10, 17); cell r4+5 infuscated brown, with only small hyaline streak near m-m crossvein **picturata** Evenhuis, **n. sp.**
- . Wing not as extensively patterned; cell r4+5 without infuscation, if present, then either pale smoky or as part of cloud of brown at base of cell 2
2. Cell cup at wing margin wider than cell m3 (Figs. 15, 18); large (usually yellowish) flies (wing length usually more than 23 mm) 3
- . Cell cup at wing margin narrower than cell m3 (e.g., Fig. 12); smaller brownish flies (wing length usually less than 20 mm) 4
3. Wing cells cup, a1, and anal lobe with distinct but pale brownish clouds of infuscation (Fig. 9); vein CuA₂ with distinct infuscation to wing margin; outer gonostyle subellipsoid-rectangular, without apical sclerotization **lepida** Alexander
- . Wing without distinct brown infuscation in cells cup, a1, and anal lobe (Fig. 11); vein CuA₂ with infuscation restricted to junction of CuA₁ and CuA₂; outer gonostyle subrectangular, slightly constricted medially, with dark sclerotization apically **schlingeri** Evenhuis, **n. sp.**
4. Femora apex black to dark brown, with contrasting pale yellow band subapically; petiole of vein M₁₊₂ subequal in length to cell m1 5
- . Femora without contrasting pale band subapically (although femoral tips may be darker than remainder of femora in some specimens); petiole of vein M₁₊₂ longer than cell m 6
5. Vein Rs with brown infuscation basally; rostrum yellowish laterally; male genitalia with outer gonostylus very thin, U-shaped (Fig. 30c) **mamare** Evenhuis, **n. sp.**
- . Vein Rs without infuscation basally; rostrum brown to dark brown laterally; outer gonostylus subtriangular (Fig. 27c) **fijiensis** Alexander
6. Vein M₃+CuA₁ shorter than r-m crossvein (Fig. 13); wing infuscation generally yellowish **degeneri** Alexander
- . Vein M₃+CuA₁ as long or longer than r-m crossvein (e.g. Figs. 12, 19); wing infuscation yellowish brown to dark brown 7
7. Stigma pale brown; antenna reddish yellow in color; male tergite IX subquadrate (Fig. 33b) **walkeriana** Alexander
- . Stigma brown; antenna yellowish; male tergite IX hemispherical (Fig. 26a) **damuda** Evenhuis, **n. sp.**

Holorusia damuda Evenhuis, new species

(Figs. 8, 12, 20b, 21, 26)

Diagnosis. *Holorusia damuda* appears closest to *H. walkeriana*, but can be separated from it by the distinct brown stigma and other infuscation of the wing (the stigma and other wing infuscation pale brown in *H. walkeriana*) as well as the hemispherical shape of the ninth male tergite (this tergite subquadrate in *H. walkeriana*).

Description. Lengths: Body: 16.0–18.5 mm; wing: 17.1–19.4 mm. **Male.** *Head.* Rostrum yellowish orange, brown laterally; nasus distinct, yellowish orange, black at extreme tip, subequal in length to second flagellomere. Occiput yellowish orange, golden brown pruinose laterally, with short sparse yellowish hairs. Palpi brown with yellow bases and apices. Antenna 12-segmented, with first and second flagellomere yellowish, remainder of antennal segments yellowish brown; apicalmost flagellomere longer than penultimate one.

Thorax. Pronotum brown dorsally and dorsolaterally, yellow ventrolaterally. Prescutum brownish with three dark brown stripes; median stripe extending almost to transverse suture, with grayish brown median vitta; lateral pair shorter, extending from just posterior to pseudosutural fovea to transverse suture. Scutum grayish pruinose with paired brown spots, anterior pair almost black. Scutellum dark brown basally, brown pruinose apically. Pleura predominantly yellowish pruinose, with dark brown stripe from proepimeron to laterotergite, gray pruinose patches on anepisternum and anepimeron; katepisternum and meron brown ventrally. Metatergite grayish brown pruinose, dark brown posteroventrally. Halter with stem and knob yellowish brown.

Legs. Coxae brown, gray pruinose, yellow haired; fore trochanter shining reddish brown; mid and hind trochanters pale brown pruinose. Remainder of legs yellowish becoming darker brown on tarsal segments II–V.

Wing (Fig. 12). Pale yellowish brown; veins brown; stigma brown. Effaced areas of veins and associated cells include: end of Sc, apical half of Rs, crossveins r-m and m-m; vein at base of cell m2. Brown infuscation in cells sc and cup and along basal portion of vein CuA₁. Petiole of cell m1 (vein M₁₊₂ at base of cell m1) longer than cell m1. Cell cup narrowly open in wing margin.

Abdomen. Tergites I–VI reddish brown, with whitish posterior transverse band on segments II–V; tergites VII–IX dark brown. Sternites slightly paler reddish brown than tergites.

Male hypopygium (Fig. 26). Tergite IX hemispherical, slightly emarginate medially, posterolateral angles rounded. Outer gonostyle broad basally, tapering sharply mesally to blunt apex, finely hirsute, pale hairs throughout, longer hairs basally. Inner gonostyle with beaklike apical portion, a few minute hairs subapicodorsally, arm slender, lateral surface from beak to middle of arm with three strong reddish ridges, base swollen with black hairs.

Female. As in male except: with terminalia as in Figs. 20b, 21. Tergites VIII–IX dark brown. Sternite VIII brownish yellow, length about 1.5 times width, bilobed and deeply emarginate medially, each lobe sharply rounded; hypovalve shining yellowish brown with some dark coloration medially.

Types. Holotype ♂ from FIJI: **Viti Levu:** Koroyanitu EcoPark, 1 km E Abaca Village, Savuione trail, 800 m, 5–18 Oct 2004, Malaise, L. Tuimereke. *Paratypes:* FIJI: **Viti Levu:** 3 ♂, 2 km E Navai Village, Mt. Tomanivi, 700 m, 23 Sep–6 Nov 2004, Malaise, E. Namatalau; 1 ♀, Koroyanitu EcoPark, 1 km E Abaca Village, Savuione Trail, 800 m, 25 Oct–5 Nov 2002, Malaise, L. Tuimereke (FBA003010). Holotype to be deposited in FNIC. Paratypes in FNIC and BPBM.

Etymology. The species epithet derives from the Fijian *damuda* = “reddish, brownish”, referring to the general brownish coloration of wing and body patterning.

Distribution. Known only from northwestern and north central Viti Levu.



Figures 4–5. *Holorusia* heads and thoraces, lateral view. 4. *H. fijiensis* (Alexander). 5. *H. lepida* (Alexander), holotype.



Figures 6–7. *Holorusia* heads and thoraces, lateral view. 6. *H. mamare*, n. sp. 7. *H. picturata*, n. sp.

Holorusia degeneri Alexander

(Figs. 13, 27)

Holorusia degeneri Alexander, 1978: 103. Oosterbroek, 1989: 56. Evenhuis, 2005: 28

Alexander (1978) described this species based on eight specimens collected by the botanist Otto Degener at his lantern in Nadele (originally spelled as "Nandala") west of Nadarivatu on Viti Levu while he was pressing plants in his bungalow near the Fish Hatchery there (Degener, 1949).

Male genitalia (Fig. 27) [some structures redrawn from holotype slide]: Tergite IX subhemispherical, deeply emarginate medially. Inner gonostyle with beaklike apical portion slightly less than half length of entire gonostyle, sharply pointed apically, dorsal surface with reddish ridges. Outer gonostyle subtriangular with broadly rounded lateral and mesal projections [Note: the illustration in Alexander (1978) has the orientation of this structure inadvertently flipped from the actual as it was drawn from a slide preparation that flipped the structure].

Material Examined. *Types:* Holotype ♂ and paratype ♀ (pinned together) FIJI: **Viti Levu:** Nandala [= Nadele], 24 Mar 1941, O. Degener (both in USNM). *Other material:* FIJI: **Viti Levu:** 1 ♀, Veilasele Track, 3.2 km E Navai Village, 1020 m, 18 Oct–28 Nov 2004, 17°37'27"S, 178°00'33"E, Malaise, E. Namatalau (FNIC); 1 ♂, 0.5 km N. Abaca Village, 800 m, 29 Nov–13 Dec 2004, 17°40'S, 177°33'E, Malaise, L. Tuimereke (BPBM).

Remarks. Degener (1949) gave details on his collection of this species:

"Though professionally interested in plants and concentrating upon their collection and study, I am attracted as a hobby to most remaining phases of Natural History. I always carried a "cyanide bottle" with me or had one within reach. When strange insects flew into my lantern at night while I was working on my plants, I caught, killed and preserved them. As my friend Dr. C.P. Alexander of the University of Massachusetts was particularly interested in Tipulidae, or crane-flies, I paid particular attention to these two-winged, long-legged insects. I placed them in dry paper packets, labeled them as to locality and date, and then mailed them to him in Postum containers with odd accumulations of dead tree crickets, wasps, flies, etc. They reached him at his study in Amherst usually in good condition."

Distribution. Known only from north central and northwestern Viti Levu.

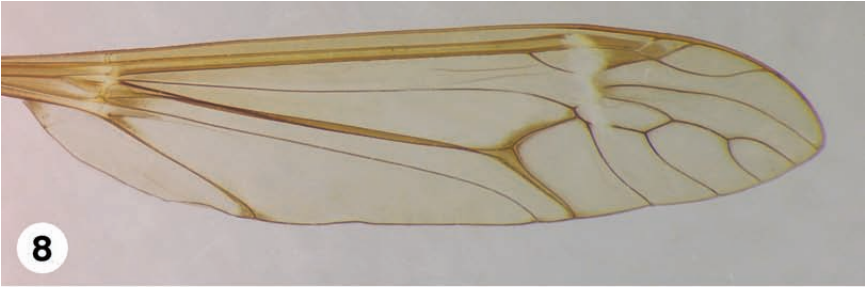
Holorusia fijiensis Alexander

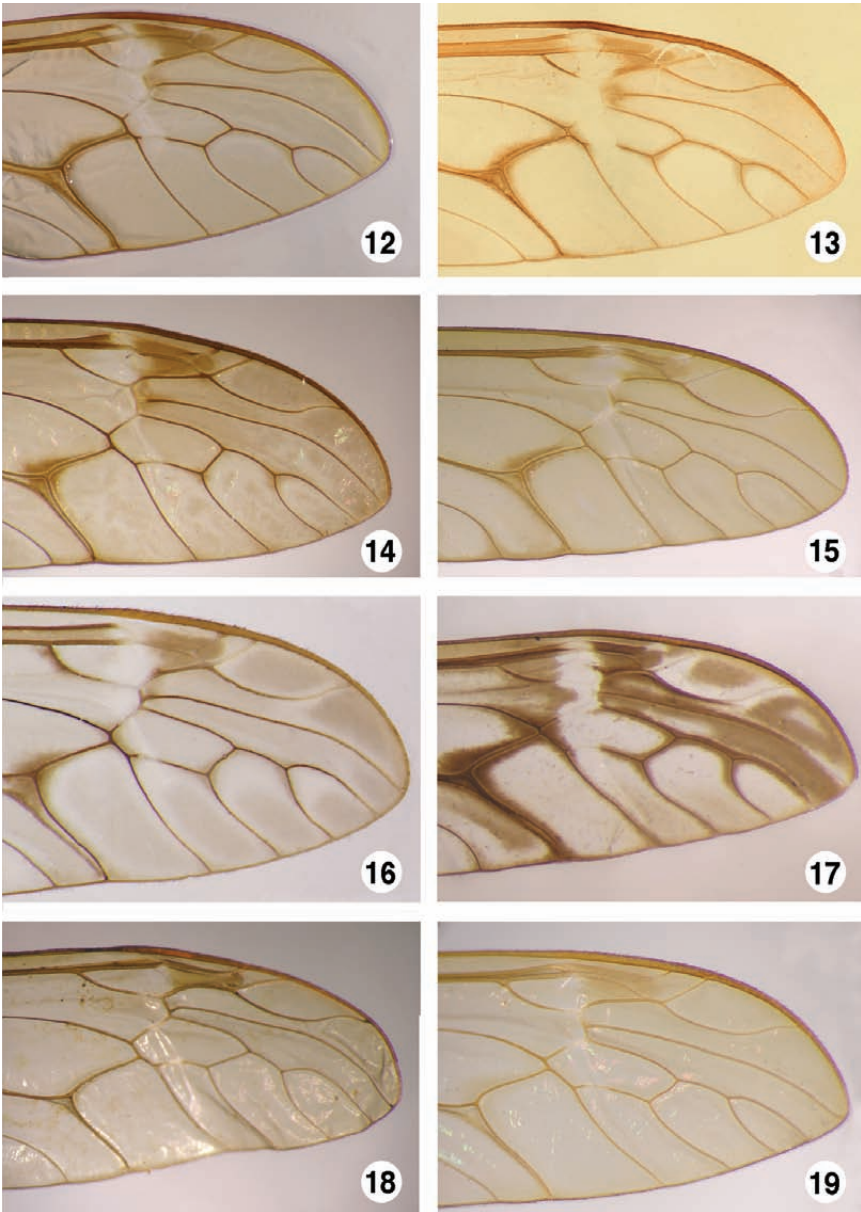
(Figs. 2, 3b, 4, 14, 22, 28)

Ctenacroscelis fijiensis Alexander, 1921: 562.*Holorusia fijiensis* (Alexander). Vane-Wright, 1967: 537; Oosterbroek, 1989: 56. Evenhuis, 2005: 28.*Holorusia vitiana* Alexander, 1978: 104; Oosterbroek, 1989: 56. Evenhuis, 2005: 28. **N. syn.**

Numerous specimens of this species have been examined in this study showing it to be widely distributed throughout Fiji (viz., Viti Levu, Kadavu, Lakeba, Gau, Vanua Levu, and Taveuni). It is easily distinguished from most other Fijian *Holorusia* species by the

Figures 8–11. *Holorusia* wings. **8.** *H. damuda*, n. sp. **9.** *H. lepida* (Alexander). **10.** *H. picturata*, n. sp. **11.** *H. schlingeri*, n. sp.





Figures 12–19. *Holorusia* wing tips. 12. *H. damuda*, n. sp. 13. *H. degeneri* Alexander. 14. *H. fijien-sis* (Alexander). 15. *H. lepida* (Alexander). 16. *H. mamare*, n. sp. 17. *H. picturata*, n. sp. 18. *H. schlingeri*, n. sp. 19. *H. walkeriana* (Alexander), holotype.

horizontal striping pattern on the pleura (Fig. 4) (no other Fijian species has this type of striping pattern). It is also distinguished by the dark brown occiput and dorsum of the head. *Holorusia picturata* also has this characteristic but can be separated from *H. fijiensis* by the heavily dark brown wing pattern (more modest wing patterning in *H. fijiensis*). Examination of the types of both species and comparison with the specimens examined during this study show that the type female of *H. fijiensis* is a pale variant (possibly teneral) of *H. vitiana*. Both species have a characteristic yellow subterminal band on the femora, but the contrast between it and the more typical dark blackish brown tip of the femora is not as distinct in the type female of *H. fijiensis*. Although Alexander (1978) said that the male genitalia of the two were different, an examination of numerous specimens shows that the differences he illustrated were actually very slight (tergite IX) or fall within a normal range of variation for this widespread species (shape of outer gonostylus). I conclude here that the male hypopygia of both are conspecific; therefore, I synonymize the two names.

Male hypopygium (Fig. 28). Tergite IX subquadrate, with slightly concave posterior margin, emarginate medially, posterolateral corners acute, but rounded. inner gonostyle with beaklike portion about half length of entire gonostyle, with minute hairs on dorsoapical surface, dorsal surface with reddish brown ridges. outer gonostyle ellipsoid with protruding mesal portion; apical and mesal projections minutely haired.

Female terminalia (Fig. 22). Entirely dark brown. Sternite VIII subquadrate, length subequal to width, bilobed apically with each lobe broadly rounded. Hypo valve unicolorous.

Material Examined. *Types:* Holotype ♀ of *fijiensis*: FIJI: **Vanua Levu:** Labasa, Oct 1914, R. Veitch (BMNH). Holotype ♂ of *vitiana*: FIJI: **Viti Levu:** Nadele, 24 Mar 1941, Otto Degener, at light (USNM). *Other material examined:* Numerous specimens from the following islands: Gau (**new record**), Kadavu (**new record**), Lakeba (**new record**), Taveuni (**new record**), Vanua Levu, and Viti Levu. Representative specimens in FNIC, BPBM, and USNM.

Remarks: *Holorusia fijiensis* was originally described based on a single female collected from Labasa on Vanua Levu (incorrectly spelled as “Labaea” [based on an incorrect transcription of the handwritten label]) in October 1914 by R. Veitch. The male genitalia were illustrated by Alexander (1978) from subsequently collected material. *Holorusia vitiana* was described based on a single male collected by Otto Degener in Nadele (originally spelled as “Nandala”). Representative specimens deposited in FNIC, BPBM, and USNM.

Distribution. Widespread throughout Fiji (Viti Levu, Vanua, Levu, Gau, Kadavu, Lakeba, Taveuni).

Holorusia lepida Alexander

(Figs. 5, 9, 15, 23, 29)

Ctenacroscelis lepida Alexander, 1924: 45.

Holorusia lepida (Alexander). Vane-Wright, 1967: 537; Oosterbroek, 1989: 56. Evenhuis, 2005: 28.

This species was described based on a single male and female collected at Loloti on Viti Levu on 19 Dec 1920 by W. Greenwood. The male genitalia are here redescribed based on examination of the type and additional specimens collected during this survey.

Male hypopygium (Fig. 29). Tergite IX subquadrate with concave posterior margin, narrowly and deeply emarginate medially, apical corners knoblike, truncate and rounded apically. inner gonos-

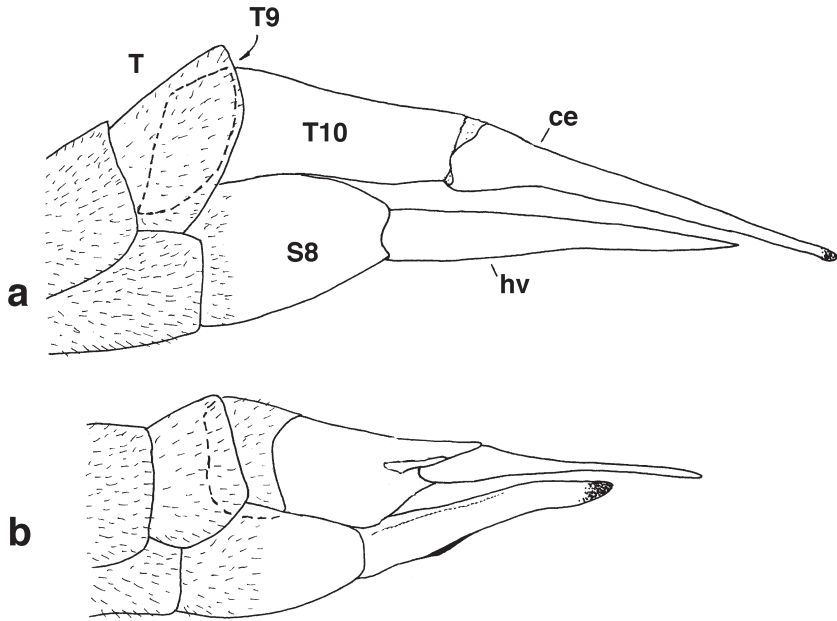


Figure 20. *Holorusia* female terminalia. **a.** *H. schlingeri*, n. sp.; **b.** *H. damuda*, n. sp. Abbreviations: ce = cercus; hv = hypovalve; S8 = sternite VIII; T8 = tergite VIII; T9 = tergite IX; T10 = tergite X.

tyl with beaklike apical portion slightly less than half entire length of gonostyle, with minute hairs dorsoapically, longer hairs along thin rod and on mesal surface basally. outer gonostyle

Female terminalia (Fig. 23). Sternite VIII subquadrate, shiny brown on apical three-fourths, bilobed with shallow cleft medially, posterodorsal corners slightly produced, knoblike; hypovalve shiny yellow to yellowish brown with dark medial coloration, tips darkly sclerotized.

Material Examined. *Types:* Holotype ♂ and allotype ♀ FIJI: **Viti Levu:** Loloti, 19 Dec 1920, W. Greenwood (BMNH). *Other material examined:* FIJI: **Viti Levu:** 1♂, Koroyanitu EcoPark, Savuione Trail, 1 km E Abaca Village, 800 m, 28 Aug–6 Sep 2004, 17°40'S, 177°33'E, Malaise, L. Tuimereke, (FNIC); 1♀, same data except: 20 Sep–5 Oct 2004 (FNIC); 1♀, same data except: 21 Oct–18 Nov 2004, [FBA 49605]; 1♀, 2.0 km SW Vaturu Dam, 700 m, 7–19 Aug 2004, 17°44'41"S, 177°39'54"E, Malaise, A. Namaqa. **Vanua Levu** (new island record): 1♂, Wainibeqa, 4 km NW of Kilaka Village, 150 m, 9–20 Dec 2004, 16°48'21.5"S, 178°59'23.8"E, Malaise P. Manueli (BPBM).

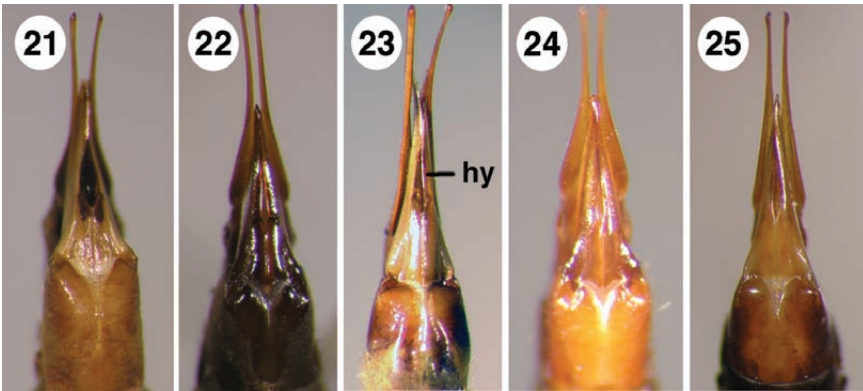
Remarks. Representative specimens deposited in FNIC, BPBM, and USNM.

Distribution. Found on Viti Levu and Vanua Levu islands.

Holorusia mamare Evenhuis, new species

(Figs. 6, 16, 24, 30)

Diagnosis. *Holorusia mamare* fits in the group of species with a yellow subterminal band on the femora, but is easily distinguished from them by the generally brownish pleura



Figures 21–25. *Holorusia* female terminalia, ventral view, showing hypovalve and shape of sternite VIII. **21.** *H. damuda*, n. sp. **22.** *H. fijiensis* (Alexander). **23.** *H. lepida* (Alexander). **24.** *H. mamare*, n. sp. **25.** *H. schlingeri*, n. sp.

(with stripes in the other species) and the unusually thin and U-shaped outer gonostyle of the male hypopygium.

Description. Lengths: Body: 17.8–18.4 mm; wing: 18.0–20.2 mm. **Male.** *Head.* Rostrum brown; nasus distinct, brown, subequal in length to first flagellomere. Occiput brown, yellow along posterior margin of eyes, scattered silvery pruinose, with short sparse black hairs. Palpi brown. Antenna 12-segmented, brown; apicalmost flagellomere subequal in length to penultimate one.

Thorax. Pronotum brown. Prescutum brownish with three vaguely apparent brown stripes; median stripe extending almost to transverse suture. Scutum grayish pruinose. Scutellum dark brown. Pleura (Fig. 6) predominantly brownish, yellowish on posterior sclerites. Metatergite grayish brown pruinose, dark brown dorsally. Halter with stem brown, knob yellowish brown.

Legs. Coxae brown basally, yellow apically, gray pruinose, yellow haired; trochanters brown. Femora yellowish brown basally, with subapical band of yellow, dark brown apically. Remainder of legs yellowish becoming darker brown on tarsal segments II–V.

Wing (Fig. 16). Pale yellowish brown; veins brown; stigma brown. Effaced areas of veins and associated cells include: end of Sc, apical third of Rs, crossveins r-m and m-m; vein at base of cell m2. Brown infuscation in cells sc and cup and along basal portion of vein CuA1. Petiole of cell m1 (vein M₁₊₂ at base of cell m1) shorter than cell m1. Cell cup narrowly open in wing margin, narrower than opening at wing margin of cell m3.

Abdomen. Tergites I–VIII reddish brown, with whitish posterior transverse band on segments III–V; tergites IX dark brown. Sternites yellow.

Male hypopygium (Fig. 30). Tergite IX subrectangular with deeply concave posterior margin, concavity with deep medial cleft, posterolateral corners acute, rounded. Inner gonostyle with large beaklike apical portion, a few minute hairs subapicodorsally, arm slender with prominent flange near middle of dorsal surface, dorsal surface from beak to middle of arm with three strong reddish ridges. Outer gonostyle U-shaped, thin, finely hirsute, pale hairs throughout.

Female. As in male except: with terminalia as in Fig. 24. Tergites VIII–IX dark brown. Sternite VIII brownish yellow, length about 1.5 times width, bilobed and deeply emarginate medially, each lobe sharply rounded; hypovalve shining yellowish brown with some dark coloration medially.

Types. Holotype ♂ from FIJI: **Taveuni:** Mt. Koronibuabua, 3.2 km NW Lavena Village, 235

m, 16°51'17"S, 179°53'29.9"W, 4–19 Nov 2003, Malaise, B. Soroalau, (FBA046594). *Paratypes*: FIJI: **Taveuni**: 1 ♂, topotypic, collected with holotype (FBA046611) (BPBM); 1 ♀, Devo Peak, 5.6 km SE Tavuki Village, 1187 m, 16°50'35.7"S, 179°57'56.7"W, 3–10 Jan 2003, Malaise, E. Ratu, (FBA058168) (FNIC). Holotype to be deposited in FNIC. Paratypes in FNIC and BPBM

Etymology. The species epithet derives from the Fijian *mamare* = thin, referring to the thin U-shape of the outer gonostyle of the male hypopygium.

Distribution: Known only from Taveuni.

Holorusia picturata Evenhuis, new species

(Figs. 7, 10, 17, 31)

Diagnosis. *Holorusia picturata* can be separated from the other Fijian species in *Holorusia* by the extensive brown infuscation of the wing. Specifically, cell r3 is almost completely infuscated and brown color is present in cells r3, r4+5, and cup (these cells predominantly hyaline in other Fijian species).

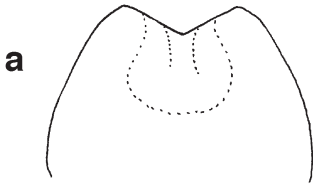
Description. Lengths: Body: 16.8–18.4 mm; wing: 17.5–20.0 mm. **Male.** *Head.* Rostrum and nasus yellowish brown dorsally, rostrum brown laterally, darkest near eye; nasus distinct, subequal in length to second flagellomere. Black spot on frons at base of antenna. Occiput yellowish brown with short sparse black hairs. Palpi brown. Antenna 12-segmented, yellowish; apicalmost flagellomere slightly longer than penultimate segment.

Thorax. Pronotum yellowish, white pruinose dorsally, with brown band laterally, extending posteriorly along lateral prescutal area to prealar area, brown band thickest dorsally just posterior to pseudofoveal suture. Prescutum olive gray pruinose with 2 pairs of dark gray stripes; admedian stripe tapering caudally, extending almost to transverse suture; lateral pair shorter, extending from pseudo-sutural fovea to transverse suture. Scutum olive gray pruinose with paired brown spots, anterior pair darkest. Scutellum brownish gray pruinose. Pleura (Fig. 7) predominantly whitish yellow pruinose with dark brown pattern; anepisternum with brown on posterior half; anepimeron with brown color medially on sclerite surrounded by pruinescence; katapisternum and meron brown ventrally. Metatergite grayish brown pruinose, dark brown posteroventrally. Halter with stem brown, knob yellowish brown.

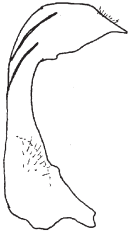
Legs. Coxae and trochanters brown pruinose, pale haired. femora brown with broad yellow sub-terminal band. tibiae yellow at extreme base. Remainder of legs brown.

Wing (Figs. 10, 17). Subhyaline with extensive brown infuscation pattern; veins brown; cell cup widely open in wing margin, wider than width of cell r4+5 at wing margin; stigma distinct, brown; infuscated brown in following cells: base of wing (with yellowish to whitish area at base of vein R near arculus); base of cup; all of sc; at extreme base and apex in anal lobe with paler spot medially; extreme base of a1 with large squarish paler spot distally at wing margin; basal half of cup with paler streak subapically from deflexion of basal portion of vein CuA₁ to wing margin; almost all of r4+5 with subhyaline streak near apex of cell dm; medially in r1+2 and r3; basally in r3 with small brown-

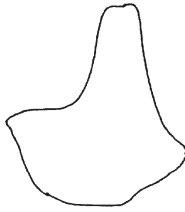
Figures 26–29. *Holorusia*, male genitalia. **26.** *H. damuda*, n. sp. **a.** tergite IX; **b.** inner gonostyle; **c.** outer gonostyle. **27.** *H. degeneri* Alexander. **a.** tergite IX (redrawn from Alexander, 1978); **b.** inner gonostyle; **c.** outer gonostyle. **28.** *H. fijiensis* (Alexander). **a.** tergite IX (redrawn from Alexander, 1978); **b.** inner gonostyle; **c.** outer gonostyle. **29.** *H. lepida* (Alexander). **a.** tergite IX; **b.** inner gonostyle (redrawn from Alexander, 1978); **c.** outer gonostyle.



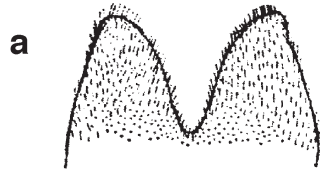
26



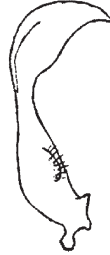
b



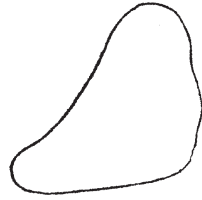
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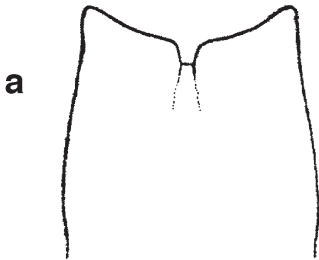
27



b



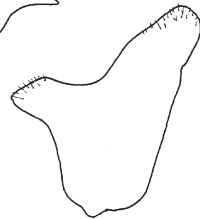
c



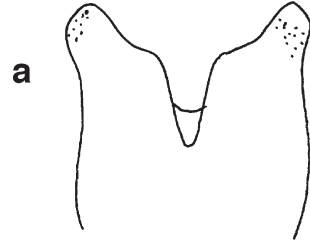
28



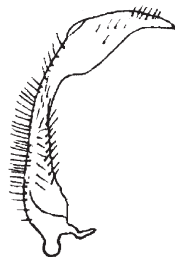
b



c



29



b



c

ish area medially; all veins from level of basal portion of vein CuA_1 distally suffused with dark brown except R_{1+2} and distal half of R_3 and distal fourth of R_{4+5} .

Abdomen. Tergites I–II brown dorsally, with brownish subterminal transverse band; tergites II–VI pale brown with dark brown posteriorly; tergites VII–VIII yellowish brown dorsally, brown posteriorly. Tergite IX brown with yellow tips to posterolateral corners. Sternites I–VI brown; sternites VII–VIII dark brown.

Male hypopygium (Figs. 31). Tergite IX black, subquadrate, emarginate medially, posterolateral angles rounded. Outer gonostyle ellipsoid, finely hirsute, pale hairs throughout, longer hairs basally. Inner gonostyle with beaklike apical portion, arm slender, base swollen with black hairs.

Female. Unknown.

Types. Holotype ♂ (FBA5011565) and 2♂ paratypes (FBA501157–501158) from FIJI: **Viti Levu:** Koroyanitu Eco Park, 0.5 km N Abaca Village, 800 m, 29 Nov–13 Dec 2004, 17°40'S 177°33'E, Malaise, L. Tuimereke. (FNIC). Holotype to be deposited in FNIC. Paratypes in BPBM and FNIC.

Etymology. The specific epithet derives from the Latin *picturatus* = “painted, embroidered”; referring to the well-marked dark pattern on the wing.

Holorusia schlingeri Evenhuis, new species

(Figs. 3a, 11, 18, 20a, 25, 32)

Diagnosis. *Holorusia schlingeri* fits in the species group with those species that are large-sized, yellowish, and have the cell *cua1* widely open in the wing margin. It can be separated from the only other species in that group, *H. lepida*, by the hyaline cells *cua2*, *a1*, and anal lobe (these cells with cloudy infuscations in *H. lepida*). The male hypopygium has the outer gonostyle subrectangular and darkly sclerotized apically (it is subellipsoid and not darkly sclerotized apically in *H. lepida*).

Description. Lengths: Body: 22.4–24.5 mm. Wing: 24.5–25.5 mm. **Male.** **Head** (Fig. 3a). Rostrum and nasus yellowish orange; nasus distinct, subequal in length to second flagellomere. Occiput pale yellowish orange with short sparse yellowish hairs. Palpi yellowish. Antenna 12-segmented, with first and second flagellomere yellowish brown, remainder of antennal segments yellowish orange; apicalmost flagellomere with very short, nib-like apex.

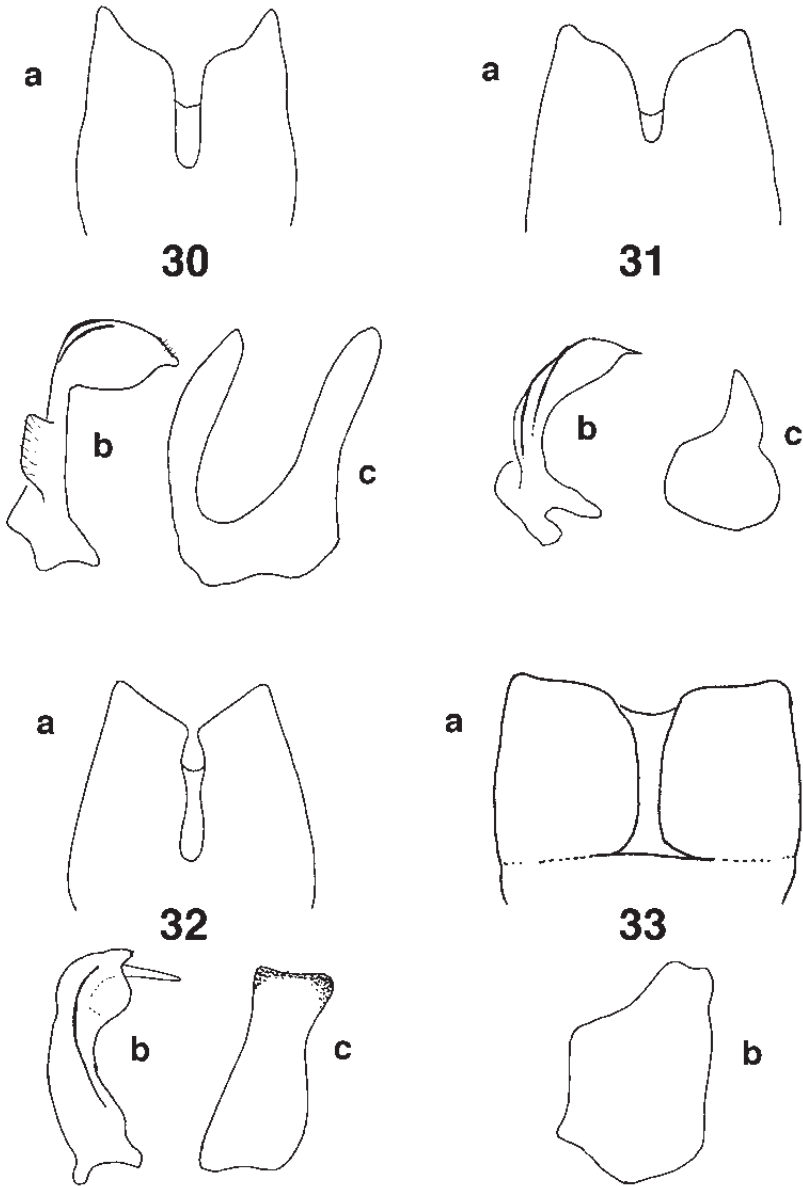
Thorax. Pronotum yellowish with brown band laterally. Prescutum yellowish orange with 2 pairs of brown stripes; admedian stripe tapering caudally, extending almost to transverse suture; lateral pair shorter, extending from pseudosutural fovea to transverse suture. Scutum yellowish orange with paired brown spots. Scutellum yellowish brown. Pleura predominantly yellowish orange; anepimeron with dark brown area medially and ventrally; katapisternum and meron with dark brown ventrally. Metatergite dark brown with yellowish brown anterior corners. Halter with stem shining yellowish, knob dark brown.

Legs. Coxae and trochanters predominantly yellow; fore coxa with brown basally; hind coxa with brown along anterobasal surface. Remainder of legs yellowish becoming darker toward tarsi.

Wing (Figs. 11, 18). Subhyaline, pale yellowish; veins yellowish brown; stigma indistinct, pale brown. Vein *Sc* distinct, yellowish brown. Cell *c* infuscated yellowish brown; basal portion of vein CuA_1 infuscated faintly yellowish brown. Cell *cup* widely open in wing margin, wider than cell r_{4+5} . Vein *Rs* and veins at base of cell *dm* and cell *m3* effaced and whitish in color.

Abdomen. Tergites yellowish orange. Sternites yellowish brown to yellowish orange, paler, than on tergites; sternite IX dark brown with yellowish orange posterior border.

Male hypopygium (Fig. 32). Tergite IX subquadrate, deeply emarginate medially, posterolater-



Figures 30–33. *Holorusia*, male genitalia. **30.** *H. mamare*, n. sp. **a.** tergite IX; **b.** inner gonostyle; **c.** outer gonostyle. **31.** *H. picturata*, n. sp. **a.** tergite IX; **b.** inner gonostyle; **c.** outer gonostyle. **32.** *H. schlingeri*, n. sp. **a.** tergite IX; **b.** inner gonostyle; **c.** outer gonostyle. **33.** *H. walkeriana* (Alexander), holotype. **a.** tergite IX; **b.** outer gonostyle.

al angles truncate. Inner gonostyle swollen apically with long, thin, tapering apical rod, arm relatively broad, base slightly swollen with black hairs. Outer gonostyle subrectangular, darkly sclerotized apically, finely hirsute, pale hairs throughout.

Female. As in male except: coloration is paler than in males; halter knob yellowish; terminalia (Fig. 25) with sternite VIII shiny brown, dark brown laterally, bilobed apically, each lobe rounded; hypovalve shiny brown, undifferentiated.

Variation. The admedian thoracic stripes can be coalesced and appear as a single median stripe in some specimens. Some specimens may have brown on the posterior borders of some abdominal segments.

Types. Holotype ♂ (BPBM 16,590) from FIJI: **Viti Levu:** Nadarivatu, Oct 1937, J.M. Valentine. The specimen carries a label "*Ctenacroscelis walkeriana*" determined by C.P. Alexander. **Paratypes:** Fiji: **Viti Levu:** 1♂, 2♀, 3.8 km N Veisari Settlement, logging road to Waiwudava, 300 m, 18°04'45"S, 178°21'45"E, 25 Apr–25 May 2003, Malaise, M. Tokota'a (FBA055302–055304); 1♂, 1.8 km E Navai Village, Mt. Tomanivi, 700 m, 9–30 Aug 2004, Malaise, E. Namatalau (FBA501153); 3♂, Koroyanitu EcoPark, Savuione Trail, 1 km E Abaca Village, 800 m, 2–16 Nov 2004, 17°40'S, 177°33'E, Malaise, L. Tuimereke, (FBA501155) (FNIC); 1♂, Koroyanitu EcoPark, Savuione Trail, 1 km E Abaca Village, 800 m, 16–29 Nov 2004, 17°40'S, 177°33'E, Malaise, L. Tuimereke, (FBA501154) (FNIC). Holotype in BPBM. Paratypes in FNIC, USNM, and BPBM.

Etymology. The species is named in honor of Dr. Evert I. Schlinger, for his efforts in increasing the knowledge of Fiji arthropod biodiversity.

Distribution. Known only from Viti Levu.

Holorusia walkeriana Alexander

(Figs. 19, 33)

Ctenacroscelis walkerianus Alexander, 1924: 47.

Holorusia walkeriana (Alexander). Vane-Wright, 1967: 537; Oosterbroek, 1989: 56. Evenhuis, 2005: 28.

This species was originally described based on a single male specimen (not female as incorrectly cited by Alexander (1978)) collected at Lautoka near Mt. Evans (Koroyanitu) on 4 April 1920. No further specimens of this species have yet been collected despite extensive Malaise trapping in the same general area for over two years.

Male hypopygium [unique type specimen not dissected] (Fig. 33): Tergite IX almost square with shallow indentation posteriorly and deep cleft on posteromedial surface making segment appear almost bifid, distal corners slightly pointed. Outer gonostyle subhexagonal with extended and blunt lateral lobe.

Material Examined. *Types:* Holotype ♂ FIJI: **Viti Levu:** Lautoka, Mt. Evans [= Koroyanitu], 4 Apr 1920, W. Greenwood (BMNH).

Distribution. Only known from the type male from northwestern Viti Levu.

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LITERATURE CITED

- Alexander, C.P.** 1921. New or little-known Tipulidae (Diptera).—VII. Australasian species. *Annals and Magazine of Natural History* (9) **8**: 546–563.
- . 1924. New or little-known Tipulidae (Diptera).—XIX. Australasian species. *Annals and Magazine of Natural History* (9) **13**: 33–49.
- . 1978. New or insufficiently known Australasian crane flies. III (Tipulidae, Diptera). *Studia Entomologica* **20**(1–4): 99–139.
- Degener, O.** 1949. *A naturalist's South Pacific expedition: Fiji*. Paradise of the Pacific, Honolulu. [viii] + 303 p.
- Evenhuis, N.L.** 2005. Preliminary checklist of the Tipuloidea (Diptera) of Fiji, with new combinations. *Bishop Museum Occasional Paper* **82**: 27–30.
- McAlpine, J.F.** 1981. Morphology and terminology—adults, p. 9–63. In: McAlpine, J.F., B.V. Peterson, G.E. Shewell, H.J. Teskey, J.R. Vockeroth & D.M. Wood (coordinators), *Manual of Nearctic Diptera*. Volume 1. *Agriculture Canada Monograph* **27**: 1–674.
- Oosterbroek, P.** 1989. Family Tipulidae, p. 53–116. In: Evenhuis, N.L. (ed.), *Catalog of the Diptera of the Australasian and Oceanian Regions*. *Bishop Museum Special Publication* **186**: 1–1155.
- Vane-Wright, R.I.** 1967. A re-assessment of the genera *Holorusia* Loew (= *Ctenacroscelis* Enderlein), *Ischnotoma* Skuse and *Zelandotipula* Alexander (Diptera: Tipulidae) with notes on their phylogeny and zoogeography. *Journal of Natural History* **1**: 511–547.
- Young, C.W.** 1999. New species and immature instars of crane flies of subgenus *Tipulodina* Enderlein from Sulawesi (Insecta: Diptera: Tipulidae: *Tipula*). *Annals of the Carnegie Museum* **69**(2): 81–90.

