A REVISION OF THE GENUS EOSTEGANA
(DIPTERA: DROSOPHILIDAE), WITH DESCRIPTIONS
OF FIVE NEW SPECIES

Toyohi Okada

Abstract. The genus Eostegana of the family Drosophilidae is reviewed with descriptions of 5 new species from the Bishop Museum collection from the Philippines, New Guinea, Bismarck Archipelago and Solomon Is. Division of the genus into 2 species groups is proposed. The wing patterns are taxometrically analyzed to illustrate relationships of the species. A key to species-groups and specites is automatically constructed from the resulting dendrogram.

The genus Eostegana Hendel has been distinguished from the genus Stegana Meigen by having R4+5 and M distally divergent. Although this character breaks down by the finding in this study of exceptional cases in which R4+5 and M are slightly convergent distally, in known species the Ac-index, a ratio of length of the 3rd and 4th costal sections, is lower than 4.0 in Eostegana but higher than 8.0 in Stegana. Stegana bakeri Sturtevant was transferred to Eostegana (Okada 1977), but this species is better included in Amiota (Amiota) because it has clear wings.

The type specimens of the new species and all remaining specimens treated here belong to the Bishop Museum, Honolulu, Hawaii (BISHOP).

Genus Eostegana Hendel, 1913


Division of this genus into 2 species-groups is attempted here: I. biroi species-group, in which R4+5 and M are distally divergent and white patches of wing are few and roughly in 3 groups; II. tesselata species-group, in which R4+5 and M are distally somewhat convergent and white patches of wing are numerous and scattered.

I. The biroi species-group

Eostegana punctipennis Okada, new species

♂. Body 3-5 mm in length, generally brownish black. Eye dark red. Antenna with 2nd joint brown, 3rd dark brown. Arista with about 12 upper and 7 lower branches and a small

1. Materials examined are partial results of fieldwork supported by grants to Bishop Museum from the U.S. National Science Foundation (G-4114, G-10734, GB-518, GB-3245, GB-730), the U.S. National Institutes of Health (AI-01725), and the U.S. Army Medical Research & Development Command (DA-MD-49-193-02-047 & G-03).
2. Gōokuji 2-30-18, Setagaya-ku, Tokyo 154, Japan.
fork. Palpus black. Frons quadrate. Cheek very narrow. Anterior reclinate orbital nearly as long as proclinate, outside and just behind it. Vibrissa strong, other orals fine. Mesoscutum subshining brown, gray pruinose. Scutellum darker, flat and caudally rounded. Thoracic pleura darker than mesoscutum. Humerals 2, lower one 2× as long as upper. Anterior dorsocentrals ½ as long as posteriors; length distance of dorsocentrals 9/5 cross distance. Acrostichal hairs in about 20 rows. Apical scutellars ½ as long as laterals, equally apart from each other and from laterals. Sterno-index 0.8. Legs black, tarsi yellow; mid tibia with a row of about 15 bristles above; fore and hind metatarsi as long as other tarsal joints; mid metatarsus 2× as long as other tarsal joints. Wing (Fig. 1A) black, paler along caudal margin, with 3 white bands; inner band composed of 3 small spots around anterior crossvein; median band interrupted by R14; outer band parallel to median band, divided into 3 spots. C-index 1.5; 4V-index 1.0; 4C-index 1.2; 5x-index 0.6; Ac-index 2.5; C3-fringe ½. Halteres yellow. Abdominal tergites matte brownish black, narrowly yellow at caudal margins. Periphallic organs (Fig. 2E) with epandrium broad, dorsally not narrowing; cercus small; surstylus without teeth. Phallic organs (Fig. 2F) with aedeagus large, ellipsoidal; apodeme short.

Hollandia area, 150–250 m, 23.VI.1959, Maa. PNG: NEW GUINEA (NE): 1♂, Karimui, S of Goroka, 1080 m, 14.VII.1963, Sedlacek; 1♂, Moife, 15 km NW of Okapa, 2100 m, 11–15.X.1959, Maa. PNG: BISMARCK ARCH.: NEW IRELAND: 1♂, Gilingil Plantation, 2 m, 6.VII.1956, Greistt; 1♂, ridge above “Camp Bishop,” 15 km up Kait Riv, 250–750 m, 14.VII.1956, Greistt.

**Distribution.** New Guinea, New Ireland.

This species resembles *D. striatipennis* Duda in general wing patching and yellow halteres, but differs from the latter in having the outer white band of the wing divided into 3 spots.

**Eostegana argentea** Okada, new species

Anterior dorsocentrals ½ as long as posteriors; length distance of dorsocentrals ½ cross distance. Sterno-index 1.5. Scutellars subequal in length and in distance: lateral scutellars divergent. Legs yellow; femora and mid and hind tibiae except bases black; fore and hind metatarsi as long as other tarsal joints; mid metatarsus 2× as long as other tarsal joints. Wing (Fig. 1B) black, with 3 white bands; median band very broad and long, not interrupted; outer band narrow, not interrupted, parallel to median one; inner band obscure, often missing. C-index 1.5; 4V-index 2.2; 4C-index 1.3; 5x-index 0.9; Ac-index 2.4; C3-fringe 7/8. Halteres yellow. Abdominal tergites matte brownish black, caudal margins of 2nd to 4th tergites yellow. Periphallic organs (Fig. 2A) black, epandrium truncate below, dorsally narrowing; surstylus with about 6 small teeth, cercus large. Phallic organs (Fig. 2B) black, aedeagus ellipsoidal.


Distribution. New Guinea, Manus Island.

This species resembles E. biroi Hendel in having the median white band of the wing not interrupted and parallel to the outer band, but it differs from the latter in having the inner white band of the wing obscure and the halteres yellow.

Eostegana inclinata Okada, new species

♂, ♀. Body about 4–5 mm in length. Antenna brownish black. Arista with 9 upper and 3 lower branches and a small fork. Palpus slender, yellowish orange, basal ¾ black, with a few weak setae. Frons quadrate, dark brown, gray pruinose, anterior margin yellow. Periorbit brown, broad. Face brownish black, much broadened below; ventral ½ silvery pruinose. Cheek ¾ as broad as greatest diameter of eye. Anterior recline orbital nearer to procline than to posterior recline. Vibili strong, other orals fine. Mesoscutum matte brown, gray pruinose. Scutellum velvety dark brown. Thoracic pleura pruinose brownish black. Humeral 1, with 3 additional small bristles. Acrostichal hairs in about 16 irregular rows. Anterior dorsocentrals ¾ as long as posteriors; length distance of dorsocentrals ½ cross distance. Sterno-index 0.7. Lateral scutellars parallel, longer than apicals, which are as long as scutellum itself. Legs black except proximal 3 tarsal joints, which are yellowish white; fore and hind metatarsi slightly longer than other tarsal joints; mid metatarsus much longer than other tarsal joints. Wing (Fig. 1C) black, with 3 white crossbands; median and outer bands convergent caudally (thus the specific name); median band situated, not interrupted; outer band interrupted by R4+5; inner band composed of 4 small spots around anterior crossvein. R_{2+3} situated; R_{4+5} and M nearly parallel. C-index 1.7; 4V-index 1.1; 4C-index 1.1; 5x-index 0.7; Ac-index 2.8; C3-fringe 7/8. Halteres yellow. Abdominal tergites yellowish brown, caudal margins pale. Periphallic organs (Fig. 2C) black; epandrium narrow, pointed below; surstylus broad but short, distally with about 7 large teeth. Phallic organs (Fig. 2D) black; aedeagus oblong, tapering basally; hypantrium quadrated.

Holotype ♂ (Bishop 11,913), PNG: NEW GUINEA (NF): Wau, Mt Missim, 1400–1600 m, 28.XII.1964, L. & M. Gressitt; allotype ♀ (Bishop), Wau, 1200 m, 17.VI.1961, Gressitt. Paratypes. 1♂, same data as allotype; 1♀, same locality as allotype, 14.XI.1965, malaise trap, Shanahan; 1♀, same locality, 1250 m, 4.V.1965, Sedlacek; 1♀, Chimbu Val, 1900 m, 16.V.1963, Sedlacek. IRIAN: NEW GUINEA (NW): 1♂, Swart Val, Karubaka, 1350 m, 18.XI.1958, Gressitt.

This species resembles *E. biroi* Hendel in having a noninterrupted median band on the wing and a divided outer band, but it differs from the latter in having median and outer bands caudally convergent, R₄₋₅ and M nearly parallel, and the halteres not black.

**Eostegana biroi** Hendel, 1913


Body about 4 mm in length. Arista with 8 upper and 3 lower branches. Face broad, with silvery crossband. Wing (Fig. 3A) with 3 white bands; outer band interrupted in 2 patches; median band not interrupted; inner band composed of 3 small spots. Halteres black.


I. R. Bock has sent me his sketch of a wing of a specimen labelled *E. biroi*, which is preserved in the Deutsches Entomologische Museum, Berlin. It shows the outer band of the wing divided, the median band complete, and the inner band composed of 3 spots, as described above. Although distinctions between *E. biroi* and the following species, *striatipennis* (Duda), *ortalioides* (Walker) and *ortalioides* (Walker), are not yet clear, each is tentatively recognized as a separate species.

**Eostegana striatipennis** (Duda), 1923


*Eostegana* (*Stegophoria*) *striatipennis*: Duda, 1929, Treubia 7: 419 (Buru; conspecificity with *biroi* not yet certain).

Body about 3.5 mm in length, black. Arista with about 10 upper and 5 lower branches. Frons brownish black. Face silvery below. Cheek black, linear. Mesoscutum subshining brownish black, thickly and finely bristled. Scutellum brownish black, with thick pubescence. Wing (Fig. 3B) black, with white patches, which are slightly different from those of *biroi*. C-index 1.6; 4V-index 3.0; 5x-index 0.5; 5c-index more than 2. Halteres yellow.


**Eostegana ortalioides** (Walker), 1864


Body dull black, about 5 mm in length. Head silvery in front. Thorax posteriad and abdomen with slight cinereous tomentum. Wing (Fig. 3B) black, with 2 outer white interrupted crossbands and 3 inner white spots. Halteres pale. 5x-index less than 1.0.

Distribution. Misool I.

**Eostegana ortalioides** (Walker), 1865

Body black, about 3.5 mm in length. Thorax with picaceous tomentosus. Wing (Fig. 3C) black with 8 white marks; 4 marks minute, near base; 4 exterior larger, transverse. 5x-index 0.5.

**Distribution.** Salvatty 1.

In a letter to D. E. Hardy in 1975, B. H. Cogan suggested that *Notiphila ortalioides* Walker should be a *Stegophortica*. Cogan wrote to M. R. Wheeler in 1977, "There are two separate descriptions, both could apply to the same genus if not species; such was the way that Walker wrote." Cogan showed me in 1979 a wing picture of the type of *ortalioides* preserved in the British Museum, which shows the median and outer white bands of wing well fit to that of *striatipennis*.

II. The tessellata species-group

**Eostegana tessellata** Okada, new species

3. Body about 5–6 mm in length, matte brown in general coloration. Antenna with 2nd joint dark brown; 3rd gray, basally pale. Arista with about 9 upper and 5 lower long branches and a fine fork. Palpus yellowish orange, basally dark. Frons quadrate, orange-brown, anterior ¾ grayish, with scattered frontal hairs. Face silvery white, medially with a small brownish spot. Clypeus silvery white. Anterior reclinate orbital close to procline, slightly longer than procline and slightly shorter than posterior reclinate. Mesoscutum matte brown, gray pruinose, with scattered obscure dark patches. Scutellum darker especially laterally, with many long discal hairs. Thoracic pleura brownish black. Humeral 1, long. Acrostichal hairs in about 16 irregular rows. Anterior dorsocentrals about ⅚ as long as posteriors; length distance of dor-
socentrals 1/4 cross distance. Sterno-index 0.8. Legs black, tarsi yellow; fore metatarsus as long as other tarsal joints; mid and hind metatarsi slightly longer than other tarsal joints; mid tibia with a row of about 14 bristles above. Wing (Fig. 1D) black with a score of scattered white spots, medioanterior spot and caudal interrupted crossband especially large. C-index 1.7; 4V-index 1.0; 4C-index 1.0; 5x-index 0.7; Ac-index 3.5; C3-fringe 3/4. Halteres yellow. Abdominal tergites matte brown, caudal margins of 2nd to 4th tergites yellowish gray. Periphalic organs (Fig. 2G) with epandrium black, rounded below, narrowing above; cercus yellowish brown; surstylus large, partly fused to epandrium, distally with about 10 black, long, pointed teeth. Phallic organs (Fig. 2H) black; aedeagus slender, with long apodeme; hypantrium quadrate, lateral arm long.

Holotype ♂ (Bishop 11,910) SOLOMON IS: NW of Mataia, Data, 19.VI.1964, mateuse trap, Straatman. Paratypes. 1♀, same data as holotype; 1 ex, same data except 3.VII.1964.

Distribution. Solomon Is.

This species differs from other known members of the genus in having numerous white spots on wings and a densely haired scutellum.

Eostegana maculosa Okada, new species

♂, ♀. Body about 4–5 mm in length, grayish black in general coloration. Antenna brown; 3rd joint elongate, apically dark. Arista with about 9 upper and 7 lower branches and a small fork. Palpus yellowish white, with short setae below. Frons quadrature, black with bluish pruinose, caudally brown. Periorbital broad, dark brown. Face pruinose yellowish gray, mediately with a black transverse band. Cheek narrow, grayish brown. Clypeus protruded, grayish white. Anterior reclinatum orbital near proclineate, slightly shorter than posterior reclinatum, slightly longer than proclineate. Mesoscutum and scutellum matte grayish black, the former with thick microtrichia and obscure paler patches. Distal margin of scutellum narrowly pale. Hemeral 1, long. Acrostichal hairs in about 14 irregular rows. Anterior dorsocentrals 1/2 as long as posterior; length distance of dorsocentrals 1/2 of cross distance. Sterno-index 0.8. Lateral scutellars weakly divergent, slightly longer than apicals, which are equally apart from each other and from laterals. Legs black; tarsi yellow; mid tibia with about 12 stout bristles above; mid metatarsus much longer than other tarsal joints; hind metatarsus slightly longer than other tarsal joints. Wing (Fig. 1E) black with about 30 scattered small white spots. R2+3 weakly curved to C. C-index 2.0; 4V-index 1.2; 4C-index 1.0; 5x-index 0.7; Ac-index 3.5; C3-fringe 3/4. Halteres yellowish white. Abdominal tergites mostly matte brownish black, gray pruinose. Periphalic
Fig. 5. A dendrogram of 9 species of Eustegana based on wing patterns, resulting from SCD proximity analysis and WPRA cluster analysis.
Table 1. Characters \((n = 8) \times \text{taxa} \ (t = 9)\) matrix for 9 species of *Eostegana*.

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* Figures in body of table refer to numbers of distinct white patches on specified wing cells.

organisms (Fig. 21) brownish black; epandrium broadly truncate below, not narrowing above; surstysus small, with scattered black pointed teeth. Phallic organs (Fig. 22) black; aedeagus elliptical; hypandrium setigerous.

Holotype \(\delta\) (museum 11.915), IRIAN: NEW GUINEA: Waris, S of Hollandia, 450–500 m, 16–23.VIII.1959, Max; allotype \(\varphi\) (museum), same data as holotype except 3–15.VII.1959. Para-types. 2 \(\delta\), same data as holotype; 1 \(\delta\), Biak I, Kampong Lanabouw, 30 km NE of air strip, 46 m, 17.VII.1957, Hardy. PNG: NEW GUINEA (NE); 1 \(\delta\), Brown Riv, 5 m, 23.X.1960, Gressitt; 1 \(\delta\), Wau, 1200 m, 14.XI.1965, malaise trap, Shanahan; 1 \(\delta\), Daradae Plain, 80 km N of Port Moretown, 500 m 5 IX 1950, Maa PHILIPPINE IS: Luzon: 1 \(\delta\), Nueva Vizcaya, 6 km W of Imugan, 11.IV.1968, Hardy.

**Distribution.** New Guinea, Philippines.

This species is allied to *E. tessellata*, but it differs from the latter in having more numerous small white spots on the wing and yellowish gray, not silvery, face.

**A TAXOMETRICAL ANALYSIS OF WING PATTERNS AND A KEY TO SPECIES**

The number of distinct white patches on 8 wing cells: C, R₁, R₁₂, R, R₁₃, 1st M₂, M₂ and 2nd M₂ (Fig. 4) were counted for each of 9 species of the genus *Eostegana*. From this characters \((n) \times \text{taxa} (t)\) matrix (Table 1), a dendrogram (Fig. 4) was produced by means of SCD (sum of character differences) proximity analysis and WPPO (weighted pair-group) cluster analysis. A key to species was automatically constructed from the dendrogram, as below. *E. ortalioides* and *E. biroii* share the same character states for all 8 characters, and they are distinguished by another character (couplet 7).

**KEY TO THE SPECIES OF *Eostegana***

1. C=0; R₁≤1; R₁₂≤2; 1st M₂≤2; M₂=0
   
2. C=0; R₁≤2; R₁₂≥3; 1st M₂≥3; M₂=3; 2nd M₂=4

8
2. \(R_{2+3}=2; R_{4+5}=2; \) 1st \(M_4=0; \ R_1=1\) ................................. argentea
\(R_{2+3}=3; R_{4+5}=3; \) 1st \(M_2=1\) ................................. 3
3. 1st \(M_2=2; M_3=2; R=1; R_1=1\) ................................. inclinata
1st \(M_4=1; M_3=1\) ................................. 4
4. \(R_1=2; R_{2+3}=3; R=0\) ................................. striatipennis
\(R_1=1\) ................................. 5
5. \(R_{2+3}=4; R=0\) ................................. punctipennis
\(R_{2+3}=3\) ................................. 6
6. \(R=0\) ................................. ortalidooides
\(R=1\) ................................. 7
7. Median band interrupted ................................................ ortalidooides
Median band not interrupted ........................................ biroi
8. \(R_1=5; R_{3+4}=3\) ................................................ tessellata
\(R_1=3; R_{3+4}=10\) ................................................ maculosa

Acknowledgments. I am much indebted to Drs J. L. Gressitt, F. J. Radovsky and W. A. Steffen, who kindly allowed me free access to the Bishop Museum collection. Many thanks are due to Drs L. R. Bock of La Trobe University, Victoria, B. H. Cogan of British Museum, Natural History, D. E. Hardy of the University of Hawaii, and M. R. Wheeler of the University of Texas, Austin, for their valuable comments, and also to various persons who collected materials, whose names are mentioned in the collection data of each species. This work was partly aided by a fund from the Japan-U.S. Cooperative Science Program, JSPS 5R 102.

LITERATURE CITED
