

New or Little Known Species of the Subgenus *Hirtodrosophila* DUDA (Diptera, Drosophilidae, *Drosophila*) from the Oriental and Adjacent Regions

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Abstract Twelve new species of the subgenus *Hirtodrosophila* DUDA (Diptera, Drosophilidae, *Drosophila*) are described from the Oriental and adjacent Regions: Malaysia, Philippines, Formosa, New Guinea and New Britain. Some taxonomic notes and new distributional records are given for five known species of this subgenus.

Key words: *Drosophila* (*Hirtodrosophila*); taxonomy; numerical analyses; Oriental Region; Papua New Guinea.

About 135 species of the subgenus *Hirtodrosophila* DUDA are known in the world; 41 from the Southeast Asia, 27 from Australia, 20 each from Eastern Asia and S. America, 7 each from Oceania and N. America, 5 each from Africa and Europe and 2 from New Guinea. In spite of shifting some of atypical species from this subgenus to the subgenus *Lordiphosa* BASDEN (OKADA, 1990) and the genus *Collessia* BOCK (OKADA, 1984), *Hirtodrosophila* still remains paraphyletic (GRIMALDI, 1986).

In this article, 12 new species of this subgenus are described mostly from the Southeast Asia with additional notes on 5 known species.

The *hirticornis* Species-group

The *hirticornis* Species-subgroup

Drosophila (*Hirtodrosophila*) *hirticornis* DE MEIJERE

(Fig. 1 A–B)

Drosophila hirticornis DE MEIJERE, 1914, Tijdschr. Ent., 57: 261 (Java); BÄCHLI, 1973, Mitt. Zool. Mus. Berl., 49: 273 (Java); OKADA, 1988, Ent. Scand., Suppl., 39: 137 (Sri Lanka).

Male genitalia as in Fig. 1 A–B. Hypandrium with a long median process.

Specimens examined. 5 ♂, Tugu, Java, 27–30.VII.1971 (OKADA).

Distribution. Indonesia (Java, Sumatra), Sri Lanka.

Drosophila (*Hirtodrosophila*) *manonoensis* HARRISON

Drosophila (*Hirtodrosophila*) *manonoensis* HARRISON, 1954, Trans. ent. Soc. Lond., 105: 101 (Samoa); WHEELER et KAMBYSELLIS, 1966, Univ. Texas Publ., 6615: 534 (Samoa); BÄCHLI, 1973,

Mitt. Zool. Mus. Berl., 49: 275 (Samoa, Sumatra, Micronesia?).

Drosophila (*Hirtodrosophila*) *hirtinokogiri* OKADA, 1967, Mushi, 41: 18 (Iriomote), n. syn.

Distribution. Samoa, Indonesia, Ryukyus, Micronesia?.

Remarks. This species is characteristic in having aedeagus subapically much expanded laterally and finely serrated.

***Drosophila* (*Hirtodrosophila*) *nudimanona* n. sp.**

(Fig. 1 C–D)

♂, ♀. Body ca. 2.2 mm in length. Eye bright red, with fine pilosity. Antenna yellowish brown; 2nd joint anteriorly dark; 3rd with short hairs anteriorly. Arista with 3 upper and 1 lower long branches. Palpus yellowish brown. Ocellar triangle black. Periorbit pale brown. Frons as broad as long, pale brown, anteriorly orange yellow. Face gray. Carina short and low. Clypeus yellow. Cheek pale, 1/12 as broad as greatest diameter of eye. Anterior reclinate orbital 2/3 proclinate, placed at middle between proclinate and posterior reclinate. Second oral short. Mesoscutum brown, diffuse below. Scutellum brown. Thoracic pleura pale yellowish gray. Humerals 2. Anterior dorso-centrals 2/3 posteriors; length distance of dorsocentrals 1/3 cross distance. Lateral

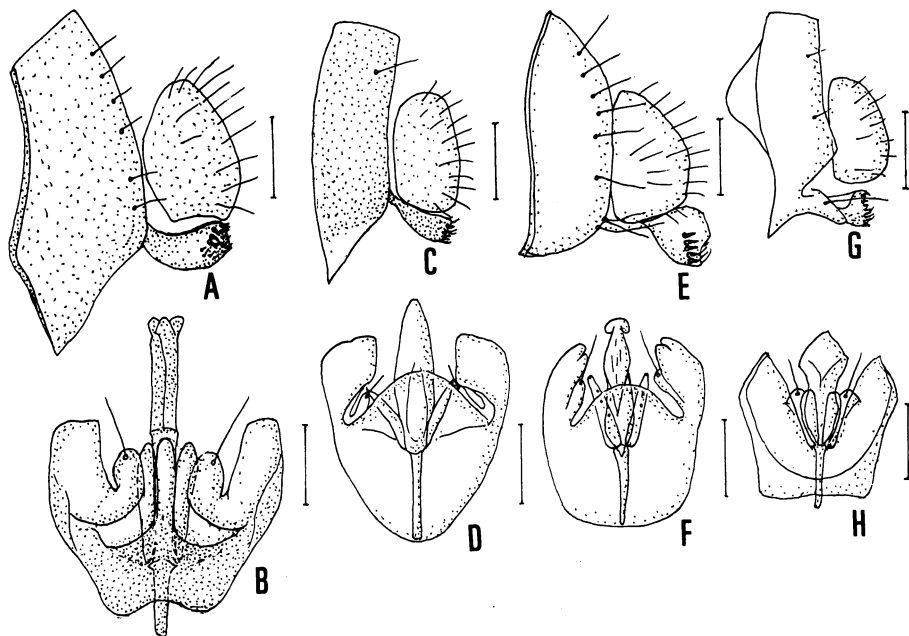


Fig. 1. A–B, *Drosophila* (*Hirtodrosophila*) *hirticronis*; C–D, *D. (H.) nudimanona*; E–F, *D. (H.) paramanona*; G–H, *D. (H.) dentata*. A, C, E, G, periphallallic organs; B, D, F, H, phallic organs. Scales: 0.1 mm.

scutellars parallel, slightly shorter than apicals, which are equally apart from each other and from laterals. Sterno-index 0.3. Legs yellow; $f_1 = t_{2+3}$, $f_{2,3} = t_{2-4}$. Preapicals on hind tibiae; apicals on mid. Wing slightly fuscous. C-index 2.4; 4V-index 1.6; 4C-index 1.1; 5x-index 2.0; Ac-index 3.8; C3-fringe 4/5. Halter yellow. Abdominal tergites yellowish brown, with dark brown caudal bands. Periphallallic organs (Fig. 1 C) black; epandrium ventrally pointed and pale. Phallic organs (Fig. 1 D) pale; aedeagus simple; novasternum with broad median process.

Holotype. ♂, Wau, Papua New Guinea, 25.VIII.1977 (OKADA); allotype ♀, 3 ♂, 1 ♀ paratypes, same data as the holotype; 2 ♂ paratypes, Khao Yai, Thailand, 4-5.X.1973 (KURAHASHI); 3 ♂, 1 ♀ paratypes, Los Baños, Luzon, Philippines, 10.X.1979 (HIHARA *et al.*). Types in National Science Museum, Tokyo (NSMT).

Distribution. Thailand, Philippines, Papua New Guinea.

Relationships. This species resembles the foregoing species, *manonoensis*, in the shape of male genitalia, but differs in having 8 rows of acrostichal hairs and bare aedeagus.

Drosophila (*Hirtodrosophila*) *paramanona* n. sp.

(Fig. 1 E-F)

♂, ♀. Body ca. 2.0 mm in length. Eye castaneous red, nearly bare. Antenna yellowish brown; 2nd joint anteriorly brown; 3rd long, basally yellowish white, with long anterior hairs. Palpus yellowish brown. Ocellar triangle black. Periorbit yellowish gray. Frons as broad as long, yellowish orange, paramedially light brown. Face gray, whitish below. Clypeus yellowish white. Cheek yellowish white, 1/6 as broad as greatest diameter of eye. Anterior reclinate orbital half posterior reclinate, slightly nearer to proclinate than to posterior reclinate. Second oral minute. Mesoscutum yellowish brown, with faint dark paramedian stripes. Scutellum yellowish brown, paramedially dark. Thoracic pleura pale yellow. Humerals 2, long. Acrostichal hairs in 8 rows. Anterior dorsocentrals half posteriors; cross distance of dorsocentrals 1/3 length distance. Scutellars equal in length and in mutual distance. Sterno-index ca. 0.5. Legs yellow. Preapicals on hind tibiae; apicals on mid; $f_1 = t_{2+3}$, $f_{2,3} = t_{2-4}$. Wing hyaline. C-index 3.6; 4V-index 1.9; 4C-index 1.4; 5x-index 2.0; Ac-index 3.6; C3-fringe 1/2. Halter yellowish gray. Abdominal tergites yellowish brown, with obscurely demarcated dark caudal bands, which are medially interrupted on 2-3T. Male genitalia (Fig. 1 E-F) pale yellow. Epandrium truncate below.

Holotype. ♂, Penang, Malaya, 15-19.VII.1971 (IKEDA); paratype 1 ♂, Kuala Lumpur, Malaya, 20-22.VII.1971 (IKEDA, KUROKAWA). Types in NSMT.

Distribution. Malaysia.

Relationships. This species resembles the foregoing species, *nudimanona*, but periphallallic organs of *paramanona* are pale and its epandrium is truncate

below.

***Drosophila (Hirtodrosophila) dentata* DUDA**

(Fig. 1 G-H)

Drosophila (Hirtodrosophila) longecrinita DUDA var. *dentata* DUDA, 1924, Arch. Naturgesch., 90A 3: 205 (Formosa).

Drosophila (Hirtodrosophila) dentata: FROTA-PESSOA, 1945, Rev. Brasil. Biol., 5: 480; BÄCHLI, 1973, Mitt. zool. Mus. Berl., 49: 284 (Formosa).

Periphallic organs (Fig. 1 G) pale yellow; epandrium truncate below. Phallic organs (Fig. 1 H) pale yellow; aedeagus basally expanded laterally.

Specimens examined. 45 ♂, 8 ♀, Mt. Maquiling, Luzon, Philippines, 23.X.1975 (KURAHASHI); 21 ♂, 3 ♀, Wau, Papua New Guinea, 18.VIII-26.IX.1977 (OKADA); 1 ♂, Lae, Papua New Guinea, 27-29.IX.1977 (OKADA); 3 ♂, Keravat, Rabaul, New Britain, 25.I.1974 (SHINONAGA).

Distribution. Formosa, Philippines (n. loc.), Papua New Guinea (n. loc.), New Britain (n. loc.).

***Drosophila (Hirtodrosophila) bicoloripennis* n. sp.**

(Fig. 2 A-E)

♂, ♀. Body ca. 2.8 mm in length. Eye dark red, bare. Antenna with 2nd joint yellowish brown; 3rd brownish black, with short hairs anteriorly. Arista with 4-5 upper and 1-2 lower branches. Palpus yellow. Ocellar triangle and periorbit black. Frons black, medially and anteriorly orange, broader than long. Face yellowish white. Carina undeveloped. Clypeus yellowish white. Cheek yellowish white, 1/8 as broad as greatest diameter of eye. Anterior reclinate orbital small. Second oral fine. Mesoscutum and scutellum brownish black. Thoracic pleura yellowish white, with a black longitudinal stripe below humerus. Humerals 2, long. Acrostichal hairs in 8 rows. Anterior dorsocentrals 1/3 posteriors; cross distance of dorsocentrals twice length distance. Lateral scutellars divergent, 2/3 apicals, which are equally apart from each other and from laterals. Legs yellow; $f_1=t_{2+3}$, $f_2=t_{2-5}$, $f_3=t_{2-4}$. Preapicals on mid and hind tibiae; apicals on mid. Wing (Fig. 2 A) with distal half dark brown. C-index 2.8; 4V-index 1.6; 4C-index 0.9; 5x-index 1.4; Ac-index 1.4; C3-fringe 1/2. Halter black. Abdominal tergites mat black. Periphallic organs (Fig. 2 B) pale yellow; epandrium truncate below. Phallic organs (Fig. 2 C, D) pale yellow; aedeagus small narrow, bifid. Ovipositor (Fig. 2 E) apically pointed, with minute marginal teeth.

Holotype. ♂, Mt Kinabaru, Sabah, 1.XI.1975 (SHINONAGA); allotype ♀, 2 ♂, 4 ♀ paratypes, same data as the holotype. Types in NSMT.

Distribution. Malaysia (Sabah).

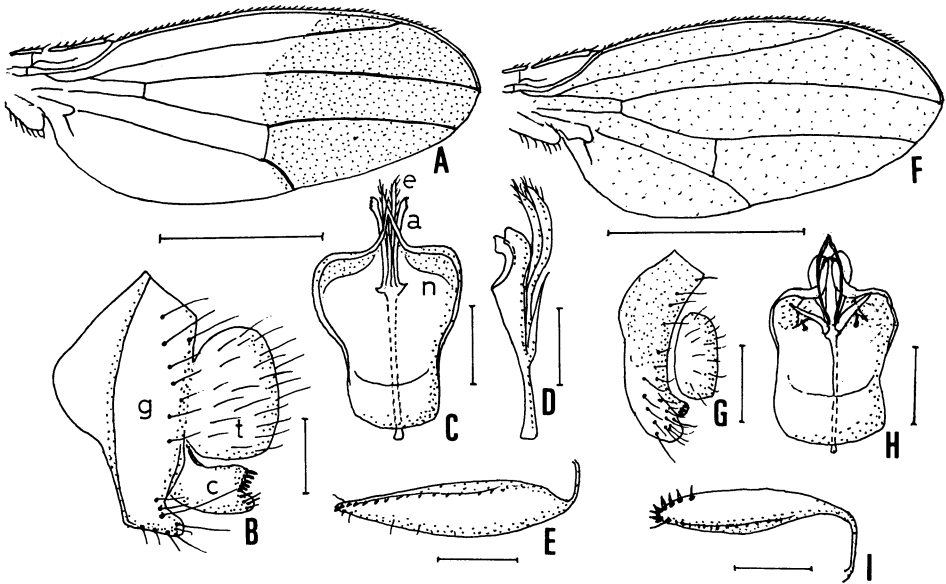


Fig. 2. A–E, *Drosophila* (*Hirtodrosophila*) *bicoloripennis*; F–I, *D. (H.) taeniopleura*. A, F, wing; B, G, peripheral organs; C, D, H, phallic organs; E, I, ovipositor. a, anterior paramere; c, surstylus; e, aedeagus; g, epandrium; n, novasternum; t, cercus. Scales: 1.0 mm for wings; 0.1 mm for other figures.

Relationships. This species is unusual among the *hirticornis* subgroup in having the frons broader than long. Wing coloration is unique in this subgenus.

***Drosophila* (*Hirtodrosophila*) *taeniopleura* n. sp.**

(Fig. 2 F–I)

♂, ♀. Body ca. 1.5 mm in length. Eye dark red, bare. Antenna with 2nd joint grayish yellow; 3rd brown, with short hairs anteriorly. Arista with 6 upper and 2 lower branches. Palpus yellowish gray. Ocellar triangle black. Periorbit brown, caudally pale. Frons slightly broader than long, mat brownish black, anteriorly dark yellow. Face subshining brownish black. Carina undeveloped. Clypeus black. Cheek yellow, ca. 1/10 as broad as greatest diameter of eye. Anterior reclinate orbital small, placed at middle between proclinate and posterior reclinate. Second oral ca. 1/3 vibrissa. Mesoscutum and scutellum brownish black. Thoracic pleura yellowish gray, with a broad black longitudinal stripe above (thus the specific name). Humerals 2 or 3. Acrostichal hairs in 6 rows. Anterior dorsocentral ca. 1/3 posterior dorsocentral; length distance of dorso-centrals 1/3 cross distance. Lateral scutellars divergent, 2/3 as long as apicals, which are equally apart from each other and from laterals. Sterno-index ca. 0.5. Legs yellow; $f=t_{2-4}$. Preapicals on mid and hind tibiae; apicals on fore and mid. Wing (Fig. 2 F) slightly fuscous; veins dark. C-index 1.6; 4V-index 2.0; 4C-index

1.9; 5x-index 1.9; Ac-index 2.5; C3-fringe 2/5-1/2. Halter pale. Abdominal tergites black. Periphallalic organs (Fig. 2 G) pale; epandrium rounded below. Phallic organs (Fig. 2 H) pale; aedeagus fusiform; apodeme longer than aedeagus. Ovipositor (Fig. 2 I) elliptical, pale yellowish brown; upper teeth stronger than lower ones.

Holotype. ♂, Penang, Malaya, 20.VII.1971 (KUROKAWA); allotype ♀, 3 ♂ paratypes, same data as the holotype (OKADA); 3 ♂ paratypes, Kuala Lumpur, Malaya, 21-22.VII.1971 (IKEDA, KUROKAWA). Types in NSMT.

Distribution. Malaysia.

Relationships. This species somewhat resembles the foregoing species, *bicoloripennis*, in the shape of male and female genitalia, but differs in the coloration of wing.

***Drosophila (Hirtodrosophila) hexapogon* n. sp.**

(Fig. 3 A-C)

♂, ♀. Body ca. 2.2 mm in length. Eye dark red, with pile. Antenna with 2nd joint black, grayish below; 3rd grayish brown, anteriorly with long hairs. Arista with 4 upper and 1 lower branches in addition to large terminal fork. Ocellar triangle glossy black, large. Periorbit gray. Frons mat brownish black, anteriorly narrower than median length; anterior margin and median short line pale. Face gray, flat below. Carina high, narrow. Clypeus brownish black. Cheek yellowish gray, black anteriorly, 1/5 as broad as greatest diameter of eye. Anterior reclinate orbital half proclinate; posterior reclinate slightly longer than proclinate; orbitals equally apart from each other. Second oral weak, 1/4 vibrissa. Mesoscutum mat deep velvety black, gray pruinose in anterior view. Scutellum black, gray pruinose. Thoracic pleura pale yellow. Humerals 3. Acrostichal hairs in ca. 8 rows. Anterior dorsocentrals half posteriors; length distance of dorsocentrals ca. 1/3 cross distance. Lateral scutellars divergent, slightly shorter than apicals, which are equally apart from each other and from laterals. Sterno-index 0.5. Legs yellow; ultimate tarsal joint somewhat fuscous; ♂ fore tarsus with long recurved hairs anteriorly; $f_1 = t_{2-4}$, $f_{2,3} = t_{2-5}$. Preapicals on hind tibiae; apicals on mid. Wing hyaline; R_{4+5} and m slightly convergent. C-index 1.4; 4V-index 1.6; 4C-index 1.2; 5x-index 1.8; Ac-index 5.0; C3-fringe 3/5. Halter yellow. Abdominal tergites yellowish orange, each T fuscous caudally. Phallic organs (Fig. 3 A) pale yellow, with epandrium pointed below; surstylus concaved on distal margin. Phallic organs (Fig. 3 D) pale yellow; aedeagus slender; paramere distally with 3 long setae (thus the specific name); novasternum somewhat pointed proximally. Ovipositor (Fig. 3 C) slender, apically with 2 stout black teeth.

Holotype. ♂, Wau, Papua New Guinea, 29.VIII.1977 (OKADA); allotype ♀, *ibid.*, 9.IX.1977 (OKADA); 15 ♂, 14 ♀ paratypes, *ibid.*, 18.VIII-26.IX.1977

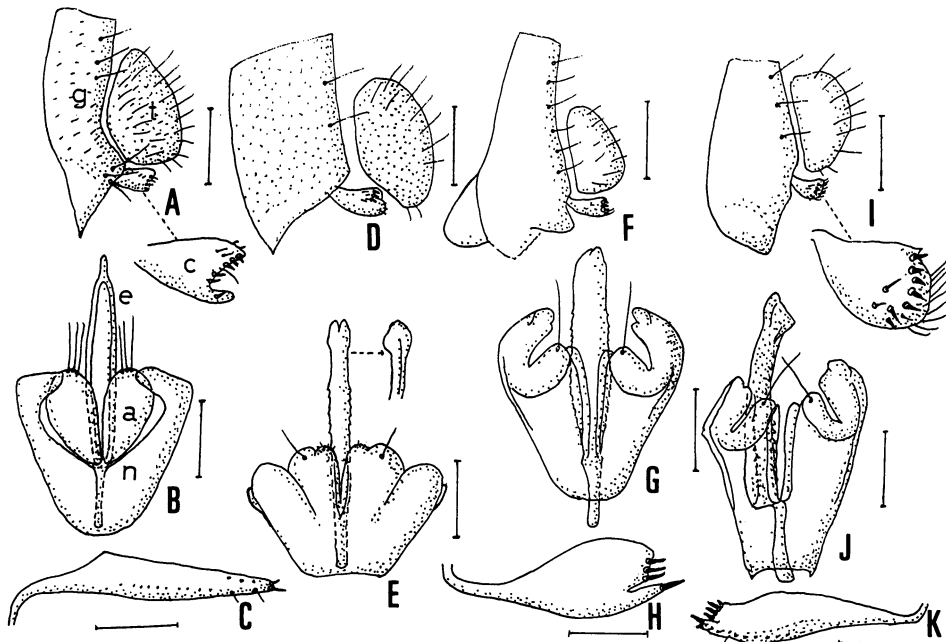


Fig. 3. A–C, *Drosophila* (*Hirtodrosophila*) *hexapogon*; D–E, *D. (H.) tenuinokogiri*; F–H, *D. (H.) latinokogiri*; I–K, *D. (H.) trapezina*. A, D, F, I, periphallic organs; B, E, G, J, phallic organs; C, H, K, ovipositor. Signs as in Fig. 2. Scales: 0.1 mm.

(OKADA). Types in B. P. Bishop Museum (BM), paratypes partly in NSMT.

Distribution. Papua New Guinea.

Relationships. This species is somewhat intermediate between the *hirticornis* and *latifrontata* species-subgroups; frons is longer than broad as in the former, surstylus is concaved distally and novasternum is somewhat pointed anteriorly as in the latter. Long setae of paramere of *hexapogon* is unique in this subgenus.

***Drosophila* (*Hirtodrosophila*) *tenuinokogiri* n. sp.**

(Fig. 3 D–E)

♂. Body ca. 1.5 mm in length. Eye castaneous red, with pile. Antenna yellowish gray; 3rd joint with long hairs anteriorly. Palpus yellowish brown, with many hairs below. Ocellar triangle small, black. Periorbit yellowish gray. Frons as broad as long, pale brown, anteriorly orange yellow. Face yellowish gray. Carina low but long. Clypeus yellowish brown. Cheek yellowish white, 1/4 as broad as greatest diameter of eye. Anterior reclinate orbital 1/3 proclinate. Second oral 1/3 vibrissa. Mesoscutum yellowish brown, with 4 dark brown longitudinal stripes. Scutellum pale brown. Thoracic pleura pale yellow, with 4 brown longitudinal stripes. Humerals 2, long. Acrostichal hairs in 6 rows. Length distance of dorsocentrals 1/3 cross distance. Lateral scutellars

divergent. Legs yellow; $f_1 = t_{2-4}$; $f_2 = t_{2-5}$. Preapicals on hind tibiae; apicals on mid. Wing hyaline. C-index 1.4; 4V-index 1.6; 4C-index 1.4; 5x-index 1.6; Ac-index 3.8; C3-fringe 2/5. Halter yellow. Abdominal tergites with 1-3T brownish black, anterolaterally yellow, other T yellow. Periphallallic organs (Fig. 3 D) dark brown; epandrium pointed below. Phallic organs (Fig. 3 E) pale; aedeagus slender, laterally finely serrated.

Holotype. ♂, Kerawat, Rabaul, New Britain, 25.I.1974 (SHINONAGA); 1 ♂ paratype, same data as the holotype. Types in NSMT.

Distribution. New Britain.

Relationships. This species resembles *D. (H.) nokogiri* OKADA in having the serrated aedeagus, but differs in having the aedeagus more slender, novasternum without median process, epandrium pointed below and mesoscutum striped.

***Drosophila (Hirtodrosophila) latinokogiri* n. sp.**

(Fig. 3 F-H)

♂, ♀. Body ca. 2.0 mm in length. Eye dark red, bare. Antenna yellowish brown; 3rd joint darker, with short hairs anteriorly. Arista with 3 upper and 1 lower long branches in addition to large fork. Palpus black. Ocellar triangle gray. Frons as broad as long, gray, anteriorly yellowish white. Face yellowish gray, darker below. Carina low, long. Clypeus black. Cheek yellowish gray, ca. 1/10 as broad as greatest diameter of eye. Anterior reclinate orbital half posteriors, placed at middle between proclinate and posterior reclinate. Second oral small. Mesoscutum and scutellum mat pale brown. Thoracic pleura pale. Humerals 2. Anterior dorsocentrals 2/3 posteriors; length distance of dorsocentrals half cross distance. Humerals 2. Acrostichal hairs in ca. 8 rows. Lateral scutellars as long as apicals, which are equally apart from each other and from laterals. Sterno-index 0.7; posterior sternopleurals strong. Legs yellow; $f_1 = t_{2+3}$, $f_{2,3} = t_{2-4}$. Preapicals on hind tibiae; apicals on mid. Wing hyaline. R_{2+3} straight. C-index 1.2; 4V-index 1.6; 4C-index 1.3; 5x-index 2.3; Ac-index 4.0; C3-fringe 2/3. Halter yellow. Abdominal tergites yellowish brown, with narrow black caudal bands. Periphallallic organs (Fig. 3 F) pale; surstylus small. Phallic organs (Fig. 3 G) pale; aedeagus rod-shaped, laterally serrated. Ovipositor (Fig. 3 H) broad.

Holotype. ♂, allotype ♀, Los Baños, Luzon, Philippines, 10.X.1978 (HIHARA *et al.*) 1 ♀ paratype, same data as the holotype. Types in NSMT.

Distribution. Philippines.

Relationships. This species resembles *D. (H.) seminokogiri* OKADA, but aedeagus and ovipositor of the former are broader than those of the latter.

***Drosophila* (*Hirtodrosophila*) *trapezina* DUDA**

(Fig. 3 I–K)

Drosophila (*Hirtodrosophila*) *trapezina* DUDA, 1923, Annls hist-nat. Mus. natn. hung., 20: 41; BÄCHLI, 1973, Mit. Zool. Mus. Berl., 49: 278 (Formosa).

Third to 5th abdominal tergites with trapeziform black spots. Periphallallic organs (Fig. 3 I) pale; surstylus small, as broad as long. Phallic organs (Fig. 3 J) pale; aedeagus pale brown, laterally serrated. Ovipositor (Fig. 3 K) pale yellowish brown, elliptical.

Specimens examined. 1 ♂, Khao Yai, Thailand, 4–5.X.1975 (KURAHASHI).

Distribution. Formosa, Thailand (n. loc.).

***Drosophila* (*Hirtodrosophila*) *actinia* n. sp.**

(Fig. 4 A–C)

♂, ♀. Body ca. 3.0 mm in length. Eye dark purple red, with fine pile. Antenna yellowish brown; 3rd joint rather short, with short hairs anteriorly. Arista with 2–3 upper, 1 lower shorter branches and small terminal fork. Palpus gray orange, with a few setae below. Ocellar triangle glossy black. Periorbit narrow, glossy black. Frons slightly longer than broad, orange, medially darker.

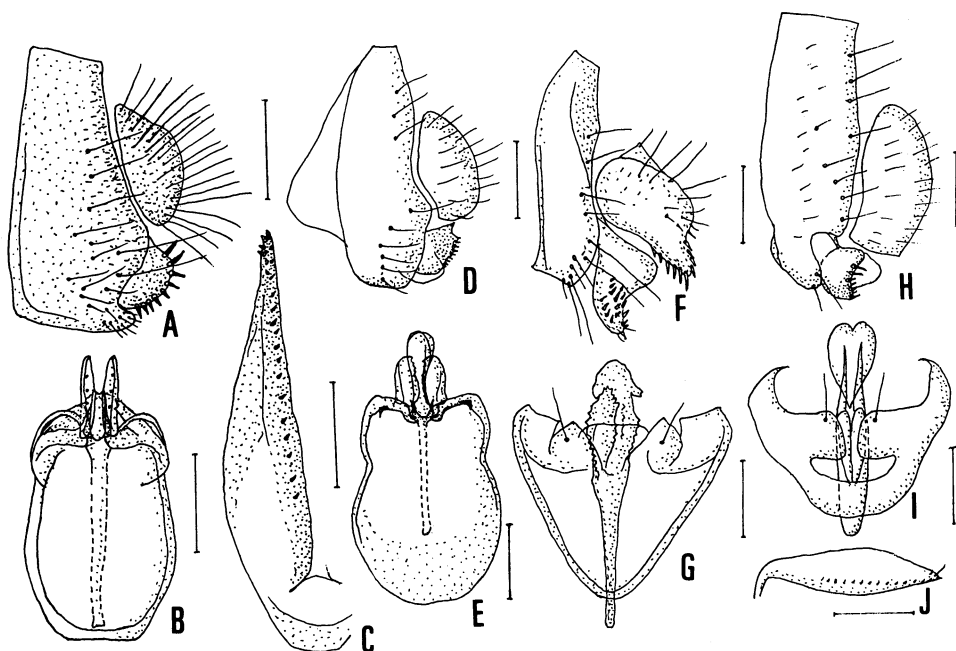


Fig. 4. A–C, *Drosophila* (*Hirtodrosophila*) *actinia*; D–E, *D. (H.) miniserrata*; F, G, *D. (H.) borbonica*; H–J, *D. (H.) nubalata*. A, D, F, H, periphallallic organs; B, E, G, I, phallic organs; C, J, ovipositor. Scales: 0.1 mm.

Face grayish white. Carina undeveloped. Clypeus black. Cheek narrow, yellowish white. Anterior reclinate orbital 2/5 proclinate, placed at middle between proclinate and posterior reclinate. Vibrissa prominent; 2nd oral obscure. Mesoscutum glossy blackish brown, somewhat pruinose, paler along humeral callus and notopleural line. Scutellum pruinose black, marginally gray. Thoracic pleura glossy black. Humerals 4; 2nd upper one longest. Acrostichal hairs in ca. 8 rows. Anterior dorsocentrals 2/5 posteriors; length distance of dorsocentrals 2/5 cross distance. Lateral scutellars divergent, as long as apicals, which are equally apart from each other and from laterals. Sterno-index ca. 0.5. Legs yellowish orange, ultimate tarsal joint dark; $f_{1,2}=t_{2-4}$, $f_3=t_{2-5}$. Preapicals on hind tibiae; apicals on mid. Wing hyaline; veins pale yellow. C-index 2.9; 4V-index 2.4; 4C-index 1.0; 5x-index 1.5; Ac-index 2.0; Cl-bristle 1; C3-fringe 1/4. Halter yellowish orange. Abdominal tergites mostly glossy black, 2-5T anteriorly dark brown. Periphallalic organs (Fig. 4 A) dark brown; epandrium truncate below; surstylus with ca. 10 strong black teeth arranged radially on caudal margin (thus the specific name). Phallic organs (Fig. 4 B) pale; aedeagus small, distally bifid; paramere longer; novasternum without submedian spines. Ovipositor (Fig. 4 C) slender, pointed, dark brown, with ca. 17 teeth along lower margin.

Holotype. ♂, Alishan, Formosa, 25.V.1971 (KANMIYA); allotype ♀, 4 ♂ paratypes, same data as the holotype; 3 ♂, 1 ♀ paratypes, Alishan, 9.IV.1965 (SAIGUSA); 1 ♂ paratype, Alishan, 14-15.VIII.1967 (THROCKMORTON). Types in NSMT.

Distribution. Formosa.

Relationships. This species somewhat resembles *D. (H.) longifrons* DUDA in having long frons, but differs in having the smaller C-index and R_{2+3} and M being parallel (convergent in *longifrons*).

Drosophila (Hirtodrosophila) miniserrata n. sp.

(Fig. 4 D-E)

♂. Body ca. 2.0 mm in length. Eye dark reddish brown, bare. Antenna with 2nd joint orange yellow; 3rd short, grayish yellow, anteriorly dark brown and with short hairs. Arista with 4 upper and 1 lower branches. Palpus grayish yellow. Ocellar triangle black. Periorbit black, not well-demarcated. Frons glossy black, anteriorly dark brown, as broad as long, caudally broader. Face grayish brown, convex below, with white line on anterior corner. Clypeus grayish yellow. Cheek yellowish gray, narrow, ca. 1/10 as broad as greatest diameter of eye. Anterior reclinate orbital small, placed at middle between proclinate and posterior reclinate. Vibrissa strong; 2nd oral small. Mesoscutum and scutellum brown. Thoracic pleura dark brown. Humeral 1. Acrostichal hairs in 6 rows. Anterior dorsocentrals 1/3 posteriors; cross distance of dorsocentrals twice length distance. Lateral scutellars divergent; apicals slightly longer than laterals and

equally apart from each other and from laterals. Sterno-index 0.3. Legs yellowish gray; femora thick; femora and tibiae excepting lower tips brown. Preapicals on mid tibiae; apicals on mid. Wing dusky; veins brownish black. C-index 2.3; 4V-index 1.7; 4C-index 1.1; 5x-index 1.3; Ac-index 2.7; C3-fringe 1/2. Halter yellowish gray. Abdominal tergites entirely mat black. Periphallalic organs (Fig. 4 D) pale brown; epandrium truncate below; surstylus with ca. 8 pale teeth. Phallic organs (Fig. 4 E) pale gray: aedeagus conical, short, laterally with minute serration (thus the specific name); ventral fragma rounded at anterior margin.

Holotype. ♂, Mt. Kinabalu, Sabah, 10.X.1975 (SHIMA). Type in NSMT.

Distribution. Malaysia (Sabah).

Relationships. This species somewhat resembles the foregoing species, *actinia*, in the shape of periphallalic and phallic organs, but differs in having the body smaller, surstylus teeth fine, and paramere serrated and shorter than aedeagus.

***Drosophila* (*Hirtodrosophila*) *borbonica* TSACAS et DAVID**

(Fig. 4 F–G)

Drosophila (*Hirtodrosophila*) *borbonica* TSACAS et DAVID, 1975, Bull. Soc. Linn. Lyon, 44: 373 (Reunion).

Preapicals on hind tibiae; apicals on mid. Periphallalic and phallic organs as in Fig. 4 F–G.

Specimens examined. 7 ♂, La Nicoliere, Mauritius, 15.VIII.1979 (KITAGAWA *et al.*).

Distribution. Reunion, Mauritius (n. loc.).

Remarks. This species resembles *D. (H.) vina* BURLA from Africa and *D. (H.) naumanni* BOCK from Norfolk Island, Australia.

***Drosophila* (*Hirtodrosophila*) *nubalata* n. sp.**

(Fig. 4 H–J)

♂, ♀. Body ca. 2.5 mm in length, rather slender. Eye reddish brown, bare. Antenna with 2nd joint orange gray; 3rd grayish brown, anteriorly with short hairs. Arista with 4 upper and 1 lower branches and moderate fork. Palpus grayish brown, with many long hairs below. Ocellar triangle brownish black. Periorbit brownish black, not well-demarcated. Frons anteriorly 3/5 as broad as head width, as broad as median length. Face whitish gray, quadrate. Carina short, low. Cheek yellow, narrow. Clypeus brownish gray. Anterior reclinate orbital fine, placed at middle between proclinate and posterior reclinate. Second oral long but weaker than vibrissa. Mesoscutum mat brownish black; humeral callus yellow. Scutellum mat brownish black, apically slightly paler. Thoracic pleura brownish black, yellow below. Humerals 2. Acrostichal hairs in 8 rows.

Anterior dorsocentrals short, fine, 2/5 posteriors, close to the latter. Sterno-index 0.4. Lateral scutellars parallel, half apicals, which are nearer to laterals than to each other. Legs gray; $f_{1,3}=t_{2-5}$, f_2 longer than t_{2-5} . Preapicals on hind tibiae; apicals on mid. Fore tarsi without long recurved hairs anteriorly. Wings slightly fuscous. R_{2+3} straight; R_{4+5} and convergent distally. C-index 1.5; 4V-index 1.7; 4C-index 1.3; 5x-index 1.9; Ac-index 6.0. Cl-bristles 2; C3-fringe 1/2. Halter white, large; stem darker. Abdominal tergites mat brownish black; 1T yellowish brown. Periphallallic organs (Fig. 4 H) dark brown; epandrium truncate below. Phallic organs (Fig. 4 I) pale, aedeagus distally dilated. Ovipositor (Fig. 4 J) slender, with ca. 18 small ventral and 1 discal teeth.

Holotype. ♂, allotype ♀, Bulolo, Papua New Guinea, 23.VIII.1977 (OKADA), ex fungi; 4 ♂, 27 ♀ paratypes, same data as the holotype. Types in BM, paratypes partly in NSMT.

Distribution. Papua New Guinea.

Relationships. This species is unique among the subgenus in having the distally dilated aedeagus.

Ungrouped Species

Drosophila (Hirtodrosophila) hirtinotata n. sp.

(Fig. 5 A–F)

♂, ♀. Body (Fig. 5 C) ca. 2.5 mm in length. Head (Fig. 5 B) broader than thorax. Eye dark red, with fine pile. Antenna with 2nd joint grayish brown; 3rd grayish black, twice as long as broad, anteriorly with short hairs. Arista with 5–6 upper and 2 lower branches and small fork. Palpus grayish yellow. Ocellar triangle black. Periorbit black. Frons mat black, broader than long. Face brownish red. Carina short but high, narrow, yellowish brown. Clypeus yellowish brown. Cheek gray, ca. 1/5 as broad as greatest diameter of eye. Anterior reclinate orbital minute, close to posterior reclinate. Second oral short; vibrissa strong. Mesoscutum subshining black, laterally orange brown. Scutellum subshining black, apex and median line orange. Thoracic pleura black. Humerals 2, long. Acrostichal hairs in ca. 10 rows. Anterior dorso-centrals 2/3 posteriors; cross distance of dorsocentrals twice length distance. Lateral scutellars divergent; apicals slightly longer than laterals and equally apart from each other and from laterals. Sterno-index 0.8. Legs yellow, slender; $f_1=t_{2-4}$, $f_{2,3}=t_{2-5}$. Preapicals on hind tibiae; apicals on mid. Wing (Fig. 5 A) hyaline; C reaching m. C-index 2.5; 4V-index 2.0; 4C-index 1.1; 5x-index 1.8; Ac-index 2.3; Cl-bristle 1; C3-fringe 1/2. Halter white. Abdominal tergites entirely mat black. Periphallallic organs (Fig. 5 E) pale brown; epandrium truncate below. Phallic organs (Fig. 5 D) pale brown; aedeagus large, flat, distally broadly incised. Ovipositor (Fig. 5 F) pale, rhombic, tapering distally.

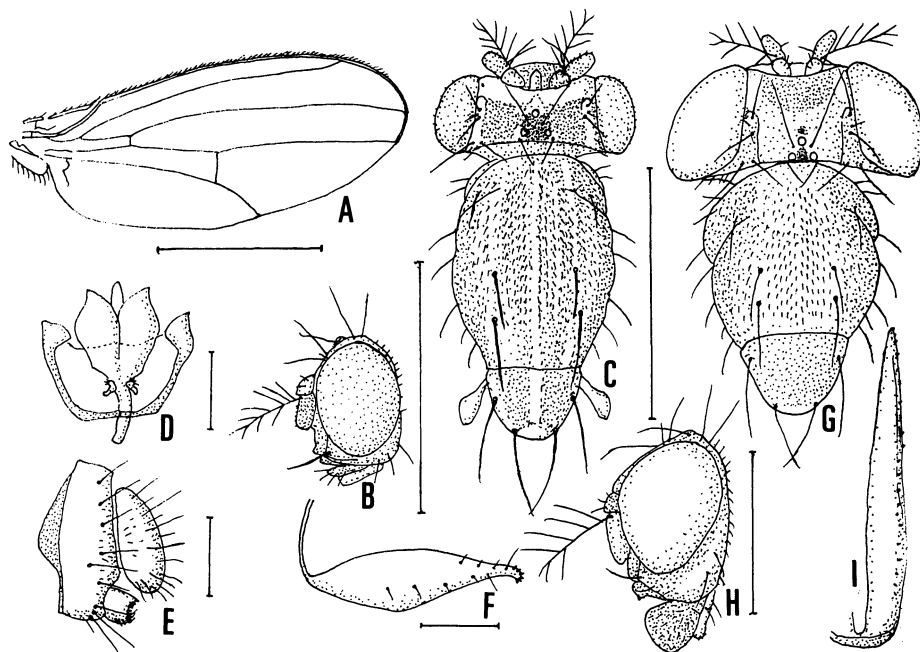


Fig. 5. A–F, *Drosophila* (*Hirtodrosophila*) *hirtinotata*; G–I, *D. (H.) flabellopalpis*. A, wing; B, H, head; C, G, head and thorax; D, phallic organs; E, periphallalic organs; F, I, ovipositor. Scales: 1.0 mm for Figs. A–C, G, H; 0.1 mm for other figures.

Holotype. ♂, Mt. Kaindi, Wau, Papua New Guinea, 3.IV.1977 (OKADA), ex fungi on rotten tree; allotype ♀, 2♂, 2♀ paratypes, same data as the holotype. Holo- and allotypes in BP, paratypes in NSMT.

Distribution. Papua New Guinea.

Relationships. This species has the frons broader than long as in the *latifrontata* subgroup, but its surstylus is quadrate as in the *hirticornis* subgroup.

***Drosophila* (*Hirtodrosophila*) *flabellopalpis* n. sp.**

(Fig. 5 G–I)

♀. Body ca. 3.2 mm in length, brownish black. Head (Fig. 5 G, H) broader than thorax. Eye dark red, bare. Antenna with 2nd joint grayish brown, anteriorly black; 3rd dark orange gray, oblong, anteriorly with short hairs. Arista with 4 upper and 1 lower long branches and large fork. Palpus very large, broad, fan shaped, mat black, pubescent. Ocellar triangle black. Periorbit glossy brownish black, anteriorly white. Frons slightly broader than long, grayish brown, anteriorly black. Face reddish brown. Carina undeveloped. Clypeus glossy black, large, swollen. Cheek gray, ca. 1/4 greatest diameter of eye, dark at eye margin. Anterior reclinate orbital minute, nearer to posterior reclinate than to proclinate; three orbitals close together. Vibrissa strong; other orals fine.

Mesoscutum subshining dark brown, laterally and caudally brownish black. Scutellum subshining brownish black. Thoracic pleura black. Humerals 3; median one longest. Acrostichal hairs in ca. 12 rows. Anterior dorsocentrals 2/3 posteriors; length distance of dorsocentrals 1/3 cross distance. Lateral scutellars parallel, longer than apicals, which are nearer to each other than to laterals. Sterno-index 1.5. Legs black; *f* longer than *t*₂₋₅. Preapicals on all tibiae; apicals on mid. Wing dark; C reaching m. C-index 2.7; 4V-index 2.3; 4C-index 1.1; 5x-index 1.5; Ac-index 3.3; Cl-bristles 2, subequal; C3-fringe 1/10. Halter yellowish gray; knob darker. Abdominal tergites mostly black; anterior margins of T2-4 pale. Ovipositor (Fig. 5 I) slender, brown, with ca. 20 small teeth on lower margin.

Holotype. ♀, Mt. Maquilang, Luzon, Philippines, 6.I.1976 (SHIMA). Type in NSMT.

Distribution. Philippines.

Relationships. This species somewhat resembles the foregoing species, *hirtinotata*, in having ca. 12 rows of acrostichal hairs, three orbitals close together, the frons slightly broader than long, and anterior reclinate orbitals fine, but differs in having the ovipositor more slender and palpus very large.

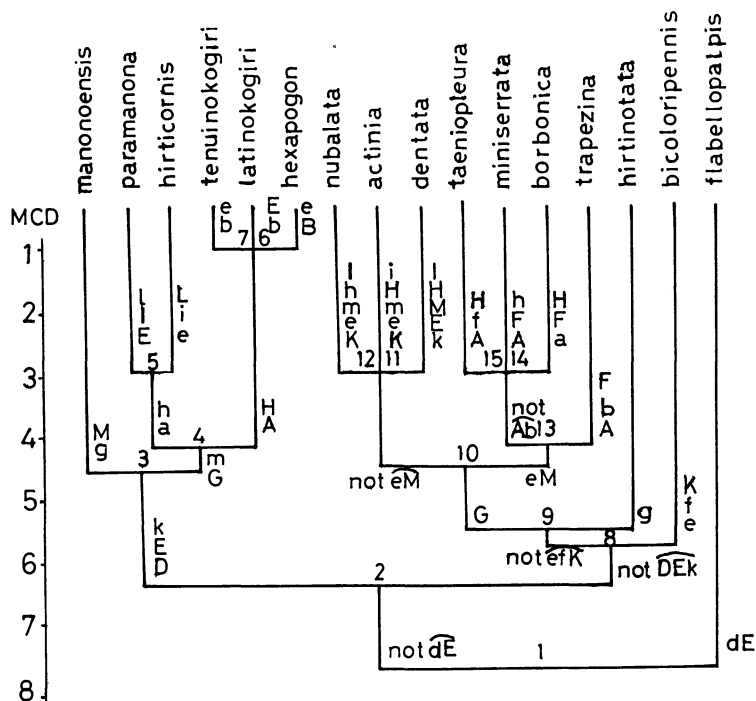


Fig. 6. A dendrogram of relationships of the species. Alphabetical signs on the branches of dendrogram: character states chosen from original $n \times t$ matrix; numerical figures on the branching points: orders of key couplets.

Taximetric Analyses

For finding relationships of the species, 13 diagnostic characters each coded into 2 states (0, 1) are taken for comparison.

- A. Median process of hypandrium absent (A=0) or present (a=1).
- B. Aedeagus laterally without (B=0) or with (b=1) serration.
- C. Epandrium ventrally truncate (C=0) or pointed (c=1).
- D. Mesopleura pale (D=0) or dark (d=1).
- E. 3rd antennal fringe long (E=0) or short (e=1).
- F. Ventral branches of arista one (F=0) or two (f=1).
- G. Acrostichal hairs in 6 or 8 rows (G=0) or 10 or more rows (g=1).
- H. Wing hyaline (H=0) or fuscous (h=1).
- I. C-index less than 2.0 (I=0) or more than 2.0 (i=1).
- J. 4V-index more than 2.0 (J=0) or less than 2.0 (j=1).
- K. C3-fringe 1/2 or less (K=0) or more than 1/2 (k=1).
- L. Halter yellow (L=0) or black (l=1).
- M. Body 2.5 mm or less (M=0) or more than 2.5 mm (m=1) in length.

Basing on the original n (character) \times t (taxon) matrix, a dendrogram of relationships of the species (Fig. 6) is established by means of MCD proximity analysis and UPGMA cluster analysis. A key to species is provided from the dendrogram by choosing diagnostic characters of each cluster from the original $n \times t$ matrix, supplemented if needed by some special characters.

Key to the Species

- 1. Mesopleura dark (d); 3rd antennal fringe long (E); palpus large, fan-shaped.
..... *flabellopalpis*
- Not simultaneously mesopleura dark and 3rd antennal fringe long (not dE);
palpus normal. 2
- 2. Mesopleura pale (D); 3rd antennal fringe long (E); C3-fringe more than 1/2
(k). 3
- Not simultaneously mesopleura pale, 3rd antennal fringe long and C3-fringe
more than 1/2 (not DEk). 8
- 3. Acrostichal hairs in 10 or more rows (g); body less than 2.5 mm in length
(M).
..... *manonoensis*
- Acrostichal hairs in 6 or 8 rows (G); body more than 2.5 mm in length (m).
..... 4
- 4. Median process of hypandrium present (a); wing fuscous (h). 5
- Median process of hypandrium absent (A); wing hyaline (H). 6
- 5. 3rd antennal fringe long (E); C-index less than 2.0 (I); halter black (l).

- *paramanona*
 — 3rd antennal fringe short (e); C-index more than 2.0 (i); halter yellow (L).
 *hirticornis*
 6. Aedeagus laterally without serration (B); 3rd antennal fringe short (e).
 *hexapogon*
 — Aedeagus laterally with serration (b). 7
 7. 3rd antennal fringe long (E). *latinokogiri*
 — 3rd antennal fringe short (e). *tenuinokogiri*
 8. 3rd antennal fringe short (e); ventral branches of arista two (f); C3-fringe
 1/2 or less (K); wing bicolorous, apical half dark. *bicoloripennis*
 — Not simultaneously 3rd antennal fringe short, ventral branches of arista two
 and C3-fringe 1/2 or less (not efK). 9
 9. Acrostichal hairs in 10 or more rows (g). *hirtinotata*
 10. Acrostichal hairs in 6 or 8 rows (G). 10
 — Not simultaneously 3rd antennal fringe short and body less than 2.5 mm in
 length (not eM); median process of hypandrium absent (A). 11
 — 3rd antennal fringe short (e); body less than 2.5 mm in length (M). 13
 11. C3-fringe more than 1/2 (k); 3rd antennal fringe long (E); body 2.5 mm or
 less in length (M); wing hyaline (H); C-index less than 2.0 (I).
 *dentata*
 — C3-fringe 1/2 or less (K); 3rd antennal fringe short (e); body more than 2.5
 mm in length (m). 12
 12. Wing hyaline (H); C-index more than 2.0 (i). *actinia*
 — Wing fuscous (h); C-index less than 2.0 (I). *nubalata*
 13. Median process of hypandrium absent (A); aedeagus with serration laterally
 (b); ventral branch of arista one (F). *trapezina*
 — Not simultaneously median process of hypandrium absent and aedeagus with
 serration laterally (not Ab). 14
 14. Median process of hypandrium present (a); ventral branch of arista one (F);
 wing hyaline (H). *borbonica*
 — Median process of hypandrium absent (A). 15
 15. Ventral branches of arista one (F); wing fuscous (h). *miniserrata*
 — Ventral branches of arista two (f); wing hyaline (H). *taeniopleura*

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