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A REVISION OF THE GENUS *MICRODROSOPHILA* WITH DESCRIPTIONS OF TEN NEW SPECIES (DIPTERA: DROSOPHILIDAE)

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Abstract. The genus *Microdrosophila* is revised. It comprises 48 species, including 10 described as new (9 from SE Asia, 1 from New Caledonia). Taximetrical analyses are made of 45 species of the genus, using 18 diagnostic characters, and a key to the subgenera and species is constructed from the resulting dendrogram. Notes are given on some special features of the genus.

About 38 species have been described in the genus *Microdrosophila* Malloch, which is distributed mostly in the tropical and subtropical regions of the Old World. This paper adds 10 new species: 9 from SE Asia and 1 from New Caledonia.

Subdivision of the genus *Microdrosophila* has been attempted by Okada (1956, 1960, 1968) and Wheeler (1981). Okada (1960) and Wheeler (1981) agree in recognizing 2 subgenera, *Microdrosophila* and *Oxystyloptera* Duda. *Microdrosophila urashimae* Okada and *M. fuscata* Okada, included erroneously in the subgenus *Microdrosophila* by Okada, have been shifted to the subgenus *Oxystyloptera* by Wheeler. Treating *Incisurifrons* Duda as a distinct subgenus (Okada 1956, 1968) or as synonymous with *Oxystyloptera* (Wheeler 1981) is considered here erroneous, because *M. congesta* (Zetterstedt), the type of *Incisurifrons,* actually belongs to the subgenus *Microdrosophila*: the wing tip is less pointed (see figure in Duda 1924) and the 3rd costal fringe is about 6/7 (Basden 1957). Bock (1982) does not consider subgenera, because "none of the characters exhibits an unequivocal '+ or −' condition across the whole genus." In spite of such difficulty, the present paper will follow Wheeler's system (1981) with slight emendations. Types of new species are deposited in the National Science Museum, Tokyo (NSMT) and Bernice P. Bishop Museum, Honolulu (BPBM), as indicated for each species.

Genus **Microdrosophila** Malloch

Microdrosophila Malloch, 1921, Entomol. News **32**: 312.

Arista plumose. Frons short, ca. ½ as long as broad. Eye with pile. Periorbit large, anteriorly much broadened. Ocellars inside ocellar triangle. Anterior reclinate orbital fine. Carina short, narrow, but high. Cheek relatively narrow. Second oral fine. Acrostichal hairs in more than 6 rows. Anterior dorsocentrals near suture. One humeral bristle. Legs with ultimate tarsal joint thick, with large claws. Wing tip more or less pointed. Second costal break deep. Male epandrium usually elongate below. Surstylus without teeth. Ovipositor triangular or oblong,

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with ca. 3 setae. Puparium flat ventrally. Egg with 1 or 2 long filaments inserted on anterior tip.

Subgenus **Microdrosophila** Malloch

Incisurifrons Duda, 1924, Arch. Naturgesch. **90** A3: 202. **New synonymy.**

Body relatively small. Wing tip less pointed. Second costal break not very deep. Outer occipital bristle not developed. Proclinate orbital outside posterior reclinate (except *discrepantia* Bock). Mesoscutum often with dark stripes. Cercus usually fused to epandrium; aedeagus usually globular, with ventral recurved process developed; paramere small. Ovipositor triangular or flat. Malpighian tubules with common stalks long and branches short (in species examined for internal anatomy).

Subgenus **Oxystyloptera** Duda

Oxystyloptera Duda, 1924, Arch. Naturgesch. **90** A3: 192.

Body relatively large. Wing tip pointed. Second costal break very deep. Outer occipital bristles often developed. Proclinate orbital usually inside posterior reclinate (except *tectifrons* (de Meijere), *bimaculata* (de Meijere) and *philippina*, n. sp., from the Philippines). Mesoscutum unicolorous. Cercus slender, usually separated from epandrium; aedeagus slender, without ventral recurved process; paramere elongate. Ovipositor oblong. Malpighian tubules with common stalks long and branches short (in species examined for internal anatomy).

DESCRIPTIONS OF NEW SPECIES

Microdrosophila (Microdrosophila) bicornua Okada, **new species** Fig. 1A–C

♂,♀. Body ca. 2.7 mm in length. Eye dark red. Antenna dark brown. Arista with 7 upper and 3 lower branches, and a fork. Palpus black. Ocellar triangle black. Periorbits brown. Frons brownish black, anteriorly narrowly yellow. Face yellowish gray, darker below. Clypeus yellowish gray. Mesoscutum mat brownish black. Scutellum dark brown. Thoracic pleura yellow, with a broad brownish black longitudinal stripe above. Acrostichal hairs in 8 rows. Anterior dorsocentrals slightly shorter than posteriors. Lateral scutellars nearly ½ length of apicals, which are nearer to laterals than to each other. Sterno-index 0.35. Legs yellowish gray; femora black except basally; ♂ hind trochanter with 2–3 long stout black setae medially. Wing hyaline. C-index 1.3–1.5; 4V-index 3.1–4.3; 4C-index 2.1–2.9; 5x-index 3.4–5.3; Ac-index 3.4–4.0. C1-bristles 2; C3-fringe 9/10. Abdominal tergites mat dark brown, 1T orange-brown. Periphallic organs (Fig. 1A): epandrium bifurcated below, thus the specific name; cercus fused to epandrium; surstylus absent. Phallic organs (Fig. 1B): aedeagus broad, triangular. Ovipositor (Fig. 1C) flat.

Type data. INDONESIA: JAVA: holotype ♂, 3♂,1♀ paratypes, Tjibodas, 27.VII.1971; 4♀ paratypes, Tugu, 27–30.VII.1971; 1♀ paratype, Bogor, 27.VII.1971 (Ikeda & Okada). Types in NSMT.

Distribution. Java.

Relationships. This species somewhat resembles *M.* (*M.*) *frontata* (de Meijere) by having the palpus and frons dark brown, but it differs from the latter by having a dark brown halter (yellow in *frontata*) and the arista with 7 upper and 3 lower branches (5 upper and 1 lower in *frontata*).

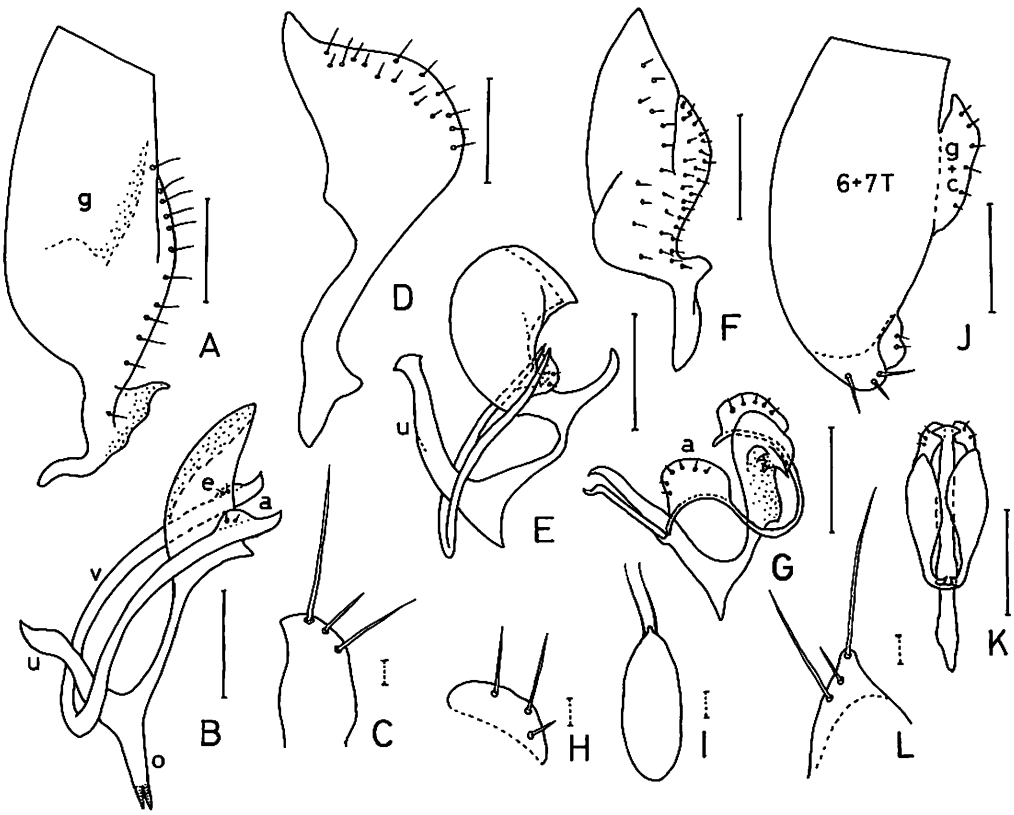

FIG. 1. **A–C,** *Microdrosophila* (*Microdrosophila*) *bicornua*. **D–E,** *M.* (*M.*) *rhoparia*. **F–I,** *M.* (*M.*) *suvae*. **J–L,** *M.* (*M.*) *sarawakana*. **A, D, F, J,** periphallic organs; **B, E, G, K,** phallic organs; **C, H, L,** ovipositor; **I,** egg. a = paramere; c = cercus; e = aedeagus; g = epandrium; o = apodeme of aedeagus; r = vertical rod of aedeagus; t = surstylus; u = ventral recurved process of aedeagus; v = ventral fragma; 6+7T = 6th and 7th abdominal tergites. Scale: solid line, 0.1 mm, broken line, 0.01 mm.

Microdrosophila (Microdrosophila) rhoparia Okada, **new species** Fig. 1D–E

♂,♀. Body ca. 2.0 mm in length. Eye deep red. Antenna with 2nd joint brownish black, 3rd gray. Arista with 7–8 upper and 2–3 lower branches, and a fork. Palpus black. Ocellar triangle black. Periorbit grayish white. Frons dark brown. Face grayish white. Clypeus white. Cheek white. Mesoscutum subshining dark brownish black, paler anteromedially and above humerus. Scutellum dark brownish black. Thoracic pleura yellowish white, with a broad black longitudinal stripe above. Acrostichal hairs in about 8 rows. Anterior dorsocentrals ⅔ length of posteriors. Lateral scutellars ⅘ length of apicals, which are equally apart from each other and from laterals. Sterno-index 0.5. Legs yellowish gray. Wing hyaline, apex not sharply pointed. C-index 1.3; 4V-index 4.2; 4C-index 3.3; 5x-index 5.5; Ac-index 4.0. C3-fringe 8/9. Halter black, stalk yellowish gray. Abdominal tergites mat black. Periphallic organs (Fig. 1D): epandrium elongate below, ending in short bifurcation, thus the specific name; cercus fused to epandrium. Phallic organs (Fig. 1E): aedeagus globular. Ovipositor triangular.

Type data. INDONESIA: JAVA: holotype ♂, 1♀ paratype, Tjibodas, 20.VII.1971 (Kurokawa & Okada). Types in NSMT.

Distribution. Java.

Relationships. This species resembles *M.* (*M.*) *bicornua* Okada by having a ventrally bifurcated epandrium, but it differs from the latter by having the bifurcation less prominent, a black halter (yellow in *bicornua*), and lateral scutellars more than ⅜ length of apicals (less than ⅜ in *bicornua*).

Microdrosophila (Microdrosophila) sarawakana Okada, **new species** Fig. 1J–L

♂,♀. Body 1.7–2.0 mm in length. Antenna yellowish brown, 3rd joint darker. Arista with 7 upper and 3 lower branches, and a fork. Palpus dark brown. Frons dark grayish brown. Face white. Carina yellow. Cheek white. Mesoscutum dark brown, somewhat paler anteriorly. Scutellum dark brown, with a narrow yellow longitudinal line. Thoracic pleura yellow, broadly blackish above. Acrostichal hairs in 6 rows. Lateral scutellars fine, apicals equally apart from each other and from laterals. Legs pale yellow. Wing hyaline, weakly pointed apically. C-index 0.8–1.0; 4V-index 4.0; 4C-index 3.5; 5x-index 4.0; Ac-index 4.3. C1-bristles 2; C3-fringe 7/9. Halter brownish black in ♀, whitish in ♂. Abdominal tergites mat black, ♂ 6+7T caudoventrally projected and pale. Periphallic organs (Fig. 1J) very small. Phallic organs (Fig. 1K): aedeagus elongate. Ovipositor (Fig. 1L) triangular.

Type data. MALAYSIA: SARAWAK: holotype ♂, 2♀ paratypes, Santabong, 30 km N of Kuchin, 20.XI.1975 (Shinonaga & Shima). Types in NSMT.

Distribution. Sarawak.

Relationships. The male of this species resembles *M.* (*M.*) *bullata* Takada & Momma in the shape of the 6+7th abdominal tergites, but it differs from the latter by the shape of the aedeagus.

Microdrosophila (Microdrosophila) filamentea Okada, **new species** Fig. 2F–H

♂,♀. Body ca. 1.5 mm in length. Eye reddish brown. Antenna brown. Arista with 7 upper and 2 lower branches, and a fork. Palpus yellowish gray. Ocellar triangle black. Outer occipital bristle somewhat developed. Occiput yellowish white. Frons subshining gray, yellow anteromedially. Face yellowish white. Clypeus yellowish white. Cheek white. Second oral relatively large, about ⅓ length of vibrissa. Mesoscutum uniformly brown or dark brown, or somewhat paler anteriorly. Scutellum dark brown. Thoracic pleura yellowish white or yellowish brown, with a black longitudinal stripe above. Acrostichal hairs in 6 rows. Anterior dorsocentrals ¾ length of posteriors. Lateral scutellars ⅓ length of apicals, which are nearer to laterals than to each other. Additional small lateral scutellar sometimes present. Sterno-index 0.3. Legs yellow. Wing hyaline, weakly pointed apically, R_{4+5} and M slightly divergent. C-index 0.9; 4V-index 3.5; 4C-index 1.8; 5x-index 1.8; Ac-index 4.8. C1-bristles 2, equal in length; C3-fringe 6/7. Halter yellowish brown. Abdominal tergites brown. Periphallic organs (Fig. 2F): epandrium filamentous below, thus the specific name; surstylus absent. Phallic organs (Fig. 2G): aedeagus fusiform in lateral aspect; ventral recurved process much shorter than aedeagus. Ovipositor (Fig. 2H) triangular.

Type data. SRI LANKA: holotype ♂, 19♂,5♀ paratypes, Peradeniya, 17–19.VII.1971 (Okada); 1♂ paratype, Kandy, 2–5.VII.1979 (Kitagawa). Types in NSMT.

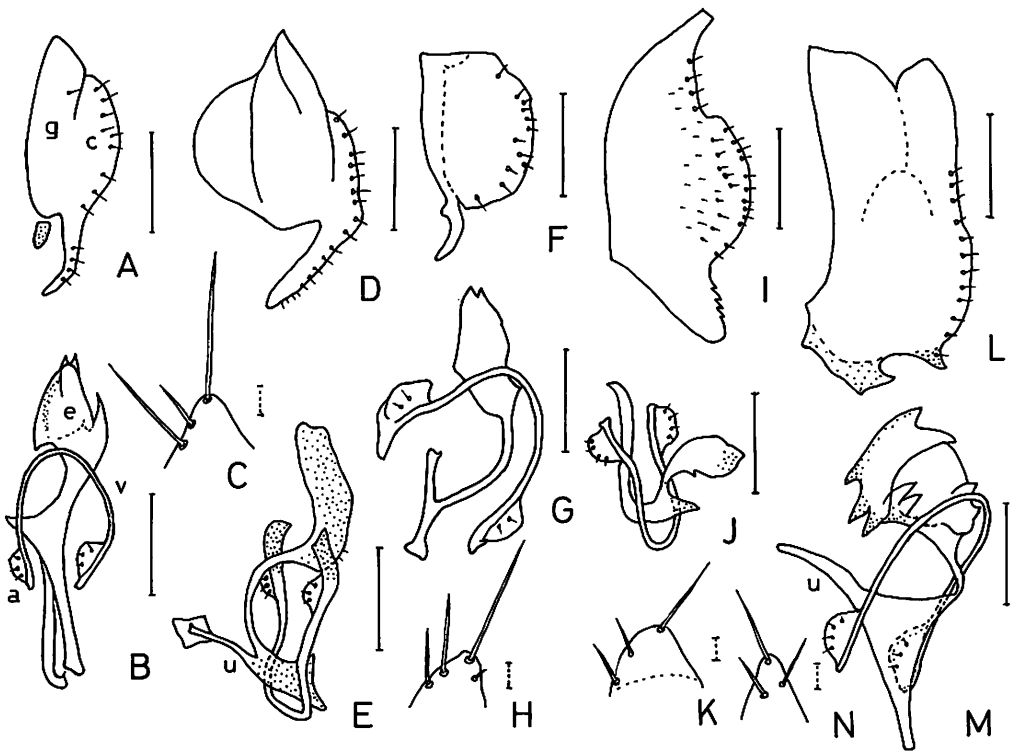

FIG. 2. **A–C,** *Microdrosophila* (*Microdrosophila*) *ochracella.* **D–E,** *M.* (*M.*) *bullata.* **F–H,** *M.* (*M.*) *filamentea.* **I–K,** *M.* (*M.*) *serrata.* **L–N,** *M.* (*M.*) *vittata.* **A, D, F, I, L,** periphallic organs; **B, E, G, J, M,** phallic organs; **C, H, K, N,** ovipositor; symbols and scales as in Fig. 1.

Distribution. Sri Lanka.

Relationships. This species resembles *M.* (*M.*) *suvae* Wheeler & Kambysellis by having the lower tip of the epandrium elongate and bare, but it differs from the latter by having this elongation much more slender, the ventral recurved process of the aedeagus shorter, the palpus paler, and the mesoscutum paler.

Microdrosophila (Microdrosophila) serrata Okada, **new species** Fig. 2I–K

♂,♀. Body ca. 1.5 mm in length. Eye dark red. Antenna with 2nd joint yellowish gray, 3rd gray. Arista with 6 upper and 3 lower branches, and a fork. Palpus yellow, black apically. Ocellar triangle black. Periorbit and frons subshining gray. Face yellowish white. Clypeus grayish white. Cheek white. Mesoscutum grayish yellow, with broad brownish black longitudinal stripes inside dorsocentral lines. Scutellum subshining brownish black, laterally yellow. Thoracic pleura white, with a black longitudinal stripe above. Acrostichal hairs in 8 row. Anterior dorsocentrals ⅔ length of posteriors. Lateral scutellars slightly convergent, ⅔ length of apicals, which are nearer to laterals than to each other. Sterno-index 0.3. Legs yellowish gray. Wing hyaline. C-index 1.0; 4V-index 5.0; 4C-index 4.1; 5x-index 4.0; Ac-index 4.0. C1-bristle 1; C3-

fringe 4/5. Halter black. Abdominal tergites mat black or yellowish brown with obscure dark bands. Periphallic organs (Fig. 2I): epandrium rounded below and serrated on caudal margin, thus the specific name. Phallic organs (Fig. 2J): aedeagus globular; ventral recurved process longer than aedeagus. Ovipositor (Fig. 2K) triangular.

Type data. PHILIPPINES: Luzon I: holotype ♂, 6♂,4♀ paratypes, Mt Maquiling, 6.I.1976 (Shima); 1♂ paratype, Los Banos, 20.X.1976 (Shima). PENIN. MALAYSIA: 1♂ paratype, Penang [Pinang], 15–19.VIII.1971 (Ikeda). Types in NSMT.

Distribution. Malaysia, Philippines.

Relationships. This species resembles *M.* (*M.*) *pseudopleurolineata* Okada by having the lower tip of the epandrium rounded; however, the tip is serrated in the present species while it is not in *pseudopleurolineata.*

Microdrosophila (Microdrosophila) vittata Okada, **new species** Fig. 2L–N

♂,♀. Body 1.8–2.0 mm in length. Eye bright red. Antenna brown. Arista with 7 upper and 2–3 lower branches, and a fork. Palpus black. Ocellar triangle black. Periorbit grayish brown. Frons orange-brown. Face yellowish gray. Clypeus and cheek yellow. Mesoscutum pale yellowish gray, with distinct brownish black anteriorly confluent longitudinal stripes medially and laterally, thus the specific name. Scutellum brownish black, marginally pale. Thoracic pleura whitish, with a black longitudinal stripe above. One humeral bristle. Acrostichal hairs in 6 rows. Anterior dorsocentrals ⅔ length of posteriors. Lateral scutellars ½ length of apicals, which are equally apart from each other and from laterals. Sterno-index 0.5. Legs yellowish brown, coxa white, hind femur white, ♂ hind trochanter with 2 black bristles medially. Wing weakly pointed. C-index 1.5; 4V-index 4.6; 4C-index 2.7; 5x-index 4.5; Ac-index 4.0. Halter yellowish brown. Abdominal tergites brownish black, laterally black. Periphallic organs (Fig. 2L): epandrium angular below, triangularly projected caudally below; surstylus absent. Phallic organs (Fig. 2M); aedeagus globular and angular; ventral recurved process nearly as long as aedeagus. Ovipositor (Fig. 2N) elongate triangular.

Type data. NEW CALEDONIA: holotype ♂, 3♂,6♀ paratypes, Col d'Amieu, 29 km SW of Canala, 20.II.1976 (Shima). Holotype in NSMT, paratypes in NSMT (2♂,5♀) and BPBM (10♂,1♀).

Distribution. New Caledonia.

Relationships. This species closely resembles *M.* (*M.*) *pleurolineata* Wheeler & Takada in the shape of the periphallic and phallic organs, but it differs from the latter by having the lower tip of the epandrium angular and the arista not sexually dimorphic.

Microdrosophila (Microdrosophila) duplicristata Okada, **new species** Fig. 3A–C

♂,♀. Body 1.2–2.0 mm in length. Eye dark red. Antenna dark brown, 3rd joint gray. Arista with 4 upper and 1–2 lower branches, and a fork. Palpus brown. Ocellar triangle black. Periorbit and frons dark brown, anteriorly orange-yellow. Clypeus black. Face grayish brown. Cheek yellow. Mesoscutum mat dark brown. Scutellum darker. Thoracic pleura brownish black. Acrostichal hairs in 6 rows. Anterior dorsocentrals ⅘ length of posteriors. Lateral scutellars as long as apicals, which are nearer to each other than to laterals. Sterno-index 0.4. Legs dark brown, coxae pale. Wing hyaline. C-index 1.2; 4V-index 4.5; 4C-index 3.0; 5x-index 7.0; Ac-index 4.5. C1-bristles 2; C3-fringe ⅘. Halter brownish black. Abdominal tergites mat brownish black. Periphallic organs (Fig. 3A): epandrium clavate below. Phallic organs (Fig. 3B): aedeagus

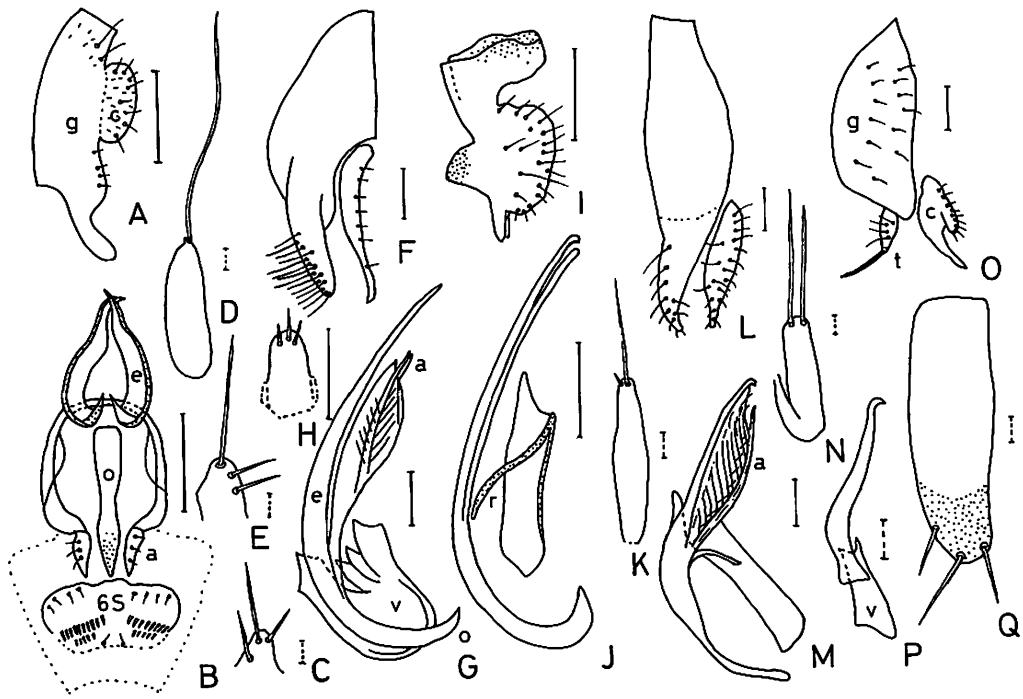

FIG. 3. **A–C,** *Microdrosophila (Microdrosophila) duplicristata.* **D–E,** *M. (M.) convergens.* **F–H,** *M. (Oxystyloptera) bimaculata.* **I–K,** *M. (O.) conica.* **L–N,** *M. (O.) tectifrons.* **O–P,** *M. (O.) nigrispina.* **Q,** *M. (O.) philippina.* **A, F, I, L, O,** periphallic organs; **B, G, H, M, P,** phallic organs; **C, E, H, K, N, Q,** ovipositor; **D,** egg. p = penis envelope (posterior paramere); 6S = 6th abdominal sternite; other symbols and scales as in Fig. 1.

elongate, bifid; apodeme rod-shaped, as long as aedeagus. ♂ 6th sternite with double transverse combs of thick teeth on both sides, thus the specific name. Ovipositor (Fig. 3c) triangular.

Type data. INDONESIA: JAVA: holotype ♂, 2♀ paratypes, Tugu, 27–30.VII.1971 (Okada). Types in NSMT.

Distribution. Java.

Relationships. This species resembles *M. (M.) cristata* Okada by having transverse combs on the ♂ 6th abdominal sternite, but it differs from the latter by having the transverse combs doubled (single in *cristata*).

Microdrosophila (Oxystyloptera) conica Okada, **new species** Fig. 3I–K

♂,♀. Body ca. 2.0 mm in length. Eye dark red. Antenna yellowish brown, 3rd joint paler. Arista with 5 upper and 2 lower branches, and a fork. Palpus yellow, fuscous apically. Ocellar triangle black. Outer occipital developed. Periorbit yellowish gray. Frons yellowish gray, orange anteriorly. Face white, gray laterally. Carina yellow. Clypeus yellowish white. Cheek yellow, about 1/7 as broad as greatest diameter of eye. Anterior reclinate orbital 1/3 length of proclinate.

Second oral ¼ length of vibrissa. Mesoscutum and scutellum uniformly mat reddish brown. Thoracic pleura brown, sternepisternum yellow. Acrostichal hairs in 8 rows. Anterior dorsocentrals ⅔ length of posteriors. Lateral scutellars ⅓ length of apicals, which are equally apart from each other and from laterals. Sterno-index 0.3–0.6. Legs yellow; ♂ hind trochanter with 2–3 stout black bristles inside. Wing hyaline, weakly pointed apically; veins R_{4+5} and M slightly divergent. C-index 1.1; 4V-index 3.9; 4C-index 2.8; 5x-index 5.7; Ac-index 3.4. C1-bristles 2, long, subequal; C3-fringe entire. Abdominal tergites mat brownish black. Periphallic organs (Fig. 3I): epandrium conically elongate below, thus the specific name; surstylus absent. Phallic organs (Fig. 3J): aedeagus slender, apically hooked; paramere short, ⅓ as long as aedeagus. Ovipositor (Fig. 3K) oblong.

Type data. INDONESIA: JAVA: holotype ♂, 2♂ paratypes, Tugu, 27–30.VII.1971 (Ikeda & Okada). SRI LANKA: 2♂,3♀ paratypes, Peradeniya, 17–19.VIII.1971 (Kurokawa & Okada); 1♂ paratype, Colombo, 17–20.VIII.1971 (Ikeda). TAIWAN: 1♂,2♀ paratypes, Taipei, Yangmingshan, 28.III.1965 (Saigusa); 1♂ paratype, Chiay-i, Chiaoliping, 13.IV.1965 (Saigusa); 1♂ paratype, Taichung, Lishan, 1.VI.1971 (Kanmiya); 2♀ paratypes, Taipei, Wulai, 10.VIII.1967 (Throckmorton). Types in NSMT.

Distribution. Java, Sri Lanka, Taiwan.

Relationships. This species somewhat resembles *M.* (*O.*) *bimaculata* by having the sterno-index less than 0.5, but it differs from the latter by having the proclinate orbital inside the posterior reclinate (it is outside in *bimaculata*).

Microdrosophila (Oxystyloptera) nigrispina Okada, **new species** Fig. 3O–P

♂. Body ca. 2.7 mm in length. Eye dark red. Antenna with 2nd joint orange-yellow, 3rd yellowish white. Arista with 6 upper and 2 lower branches, and a long fork. Palpus yellow. Ocellar triangle gray. Periorbit mat whitish gray. Frons grayish white, yellowish orange anteriorly. Face black, buccal margin narrowly yellow. Carina black, upper ½ yellowish white. Cheek yellow, about ⅓ as broad as greatest diameter of eye. Mesoscutum mat yellowish brown. Scutellum same color, with median pale longitudinal line. Pleura yellow, with a dark longitudinal stripe above. Acrostichal hairs in ca. 10 rows. Anterior dorsocentrals ½ length of posteriors. Lateral scutellars ⅓ length of apicals, which are nearer to each other than to laterals. Sterno-index 0.6. Legs yellow. Wing hyaline; veins R_{4+5} and M divergent distally. C-index 1.0; 4V-index 4.0; 4C-index 3.0; 5x-index 5.2; Ac-index 3.3. C3-bristles 2; C3-fringe entire. Halter yellowish orange. Abdominal tergites yellowish brown, caudal segments darker. Periphallic organs (Fig. 3O): cercus and surstylus separated from each other and from epandrium. Surstylus with a long stout black spine apically, thus the specific name. Phallic organs (Fig. 3P): aedeagus elongate, hooked apically; paramere apparently absent.

Type data. SRI LANKA: holotype ♂, Peradeniya, 17–19.VIII.1971 (Okada). Type in NSMT.

Distribution. Sri Lanka.

Relationships. This species resembles *M.* (*O.*) *pectinata* Okada by having lateral scutellars short, about ⅓ the length of the apicals, but it differs from the latter by having about 10 rows of acrostichal hairs (6 in *pectinata*) and having a large spine on the surstylus.

Microdrosophila (Oxystyloptera) philippina Okada, **new species** Fig. 3Q

♀. Body ca. 2.0–2.5 mm in length. Eye dark purplish red. Antenna with 2nd joint black, yellow below, 3rd gray. Arista with 5 upper and 1 lower branches, and a fork. Palpus yellow, black apically. Ocellar triangle black. Periorbit dark brown. Frons mat dark brown, anteromedially yellowish gray. Face grayish brown. Carina yellow. Cheek yellowish white, ⅛ as broad as greatest diameter of eye. Occiput black, pale above. Outer occipital present but weak. Proclinate orbital outside posterior reclinate. Mesoscutum subshining deep brown, somewhat paler anteromedially. Scutellum mat deep brown. Thoracic pleura yellowish white, with a broad black longitudinal stripe above. Acrostichal hairs in about 12 rows. Anterior dorsocentrals ¾ length of posteriors. Lateral scutellars divergent, ⅔ length of apicals, which are slightly nearer to each other than to laterals. Sterno-index 0.6. Legs yellow, tibiae fuscous. Wing hyaline, pointed apically. C-index 1.0; 4V-index 4.3; 4C-index 3.3; 5x-index 4.6. C1-bristles 2; C3-fringe entire. Halter yellowish gray. Abdominal tergites mostly mat black, 1T yellow. Ovipositor (Fig. 3Q) oblong, distally dark.

Type data. PHILIPPINES: Luzon I: holotype ♀, 1♀ paratype, Los Banos, 20.X.1979 (Hihara). Types in NSMT.

Distribution. Philippines.

Relationships. This species resembles *M.* (*O.*) *tectifrons* (de Meijere) in general features but differs from the latter by having the Ac-index higher, 4.0 (2.4 in *tectifrons*).

NEW DISTRIBUTION RECORDS WITH TAXONOMIC NOTES

New distribution records indicated by an asterisk (*)

Microdrosophila (Microdrosophila) suvae Wheeler & Kambysellis Fig. 1F–I

Microdrosophila suvae Wheeler & Kambysellis, 1966, Univ. Texas Publ. **6615**: 539.

Specimens examined. FIJI: Viti Levu: 1♂,1♀, Mt Victoria, 4–5.III.1978 (Shima).

Distribution. Fiji.

Taxonomic notes. Periphallic organs (Fig. 1F): epandrium bifurcate below. Phallic organs (Fig. 1G): aedeagus globular; ventral recurved process as long as aedeagus. Ovipositor (Fig. 1H) flat. Egg (Fig. 1I) with 2 filaments, each ½ as long as egg itself, similar to *M.* (*M.*) *cristata*. *Microdrosophila* (*M.*) *purpurata* Okada and *M.* (*M.*) *quadrata* (Sturtevant) also have 2 filaments, but they are as long as egg itself in the former and about ⅔ (unequal) as long as egg itself with their basal portions fused in the latter (Wheeler 1952). *Microdrosophila* (*M.*) *convergens* (Malloch) (Fig. 3D), *M.* (*O.*) *matsudairai* Okada and *M.* (*O.*) *urashimae* Okada have only 1 filament, which is 2×, ½ or ⅓, and 4× as long as egg itself in the 3 species, respectively.

Microdrosophila (Microdrosophila) ochracella Wheeler & Takada Fig. 2A–C

Microdrosophila ochracella Wheeler & Takada, 1964, Insects Micronesia **14**(6): 218.

Specimens examined. PAPUA NEW GUINEA: 1♂,2♀, Wau, 18–30.VIII.1977; 2♂, Wau, 5.X.1977 (Okada). Mostly in light traps.

Distribution. Belau, Australia, Papua New Guinea*.

Taxonomic notes. Periphallic organs (Fig. 2A): surstylus separated from epandrium. Phallic organs (Fig. 2B): aedeagus fusiform. Ovipositor (Fig. 2C) triangular. Arista with ca. 8 upper and 4 lower branches, as suggested in the original description. The Australian form shows sexual dimorphism in the number of the branches (Bock 1982).

Microdrosophila (Microdrosophila) bullata Takada & Momma Fig. 2D–E

Microdrosophila bullata Takada & Momma, 1975, J. Fac. Sci. Hokkaido Univ. Ser. VI, Zool. **20:** 20.

Specimens examined. SRI LANKA: 1♂,1♀, Peradeniya, 17–19.VIII.1971 (Okada). PAPUA NEW GUINEA: 2♂,1♀, Bulolo, 9–15.IX.1977 (Okada).

Distribution. Malaya, Sri Lanka*, Papua New Guinea*.

Taxonomic notes. Periphallic organs (Fig. 2D): epandrium with fingerlike projection below; cercus somewhat separated from epandrium; surstylus absent. Phallic organs (Fig. 2E): aedeagus black, rod-shaped. Ovipositor triangular. Egg with 2 filaments, each ½ as long as egg itself.

Microdrosophila (Microdrosophila) elongata Okada

Microdrosophila elongata Okada, 1965, Kontyû **33:** 330.

Specimens examined. TAIWAN: 1♂, Tainan, Kuang-tzu-lin, 6.IV.1965 (Saigusa). SRI LANKA: 1♂, Peradeniya, 17–19.VIII.1971 (Okada); 9♂, Kandy, 25.VII.1979 (Kitagawa). PHILIPPINES: Luzon I: 57♂,47♀, Los Banos, 20.X.1979 (Hihara).

Distribution. Ryukyus, Taiwan, Sri Lanka*, Philippines*.

Microdrosophila (Microdrosophila) convergens (Malloch) Fig. 3D–E

Hopkinsomyia convergens Malloch, 1934, Insects Samoa, Pt. 6, Fasc. 8: 289.
Microdrosophila errator Wheeler & Takada, 1964, Insects Micronesia **14:** 215.

Specimens examined. AMERICAN SAMOA: 9♂,10♀, Pago Pago, 16.VIII.1981 (Tobari). FIJI: Viti Levu: 2♂, Mt Victoria, 4–5.III.1978 (Shima). PONAPE: 1♀, 23–26.VI.1981 (Fuyama).

Distribution. Micronesia, Fiji, American Samoa.

Taxonomic notes. Ovipositor (Fig. 3E) triangular. Egg (Fig. 3D) with a long filament ½ as long as egg itself. A row of short stout black bristles on the medial surface of hind trochanter of the male was discovered by Wheeler & Takada (1964) in this species and *M. (M.) pleurolineata.* This structure has been found by me also in *M. (M.) bicornua, elongata* Okada, *filamentea, maculata* Okada, *ochracella, pseudopleurolineata, purpurata, serrata,* and *M. (O.) conica, fuscata, nigrispina* Okada, *tectifrons* and *urashimae,* while it has not been found in *M. (M.) acristata* Okada, *sarawakana, duplicristata, submarginata* Okada, *suvae, rhopaira,* and *M. (O.) matsudairai* and *pectinata.*

Microdrosophila (Oxystyloptera) tectifrons (de Meijere) Fig. 3L–N

Leucophenga tectifrons de Meijere, 1914, Tijdschr. Entomol. **57:** 263.

Specimens examined. TAIWAN: 2♀, Tainan, Kuang-tzu-lin, 28–29.V.1971 (Kanmiya). INDONESIA: JAVA: 1♀, Bogor, 27.VII.1971 (Okada). INDONESIA: SUMATRA: 1♂,1♀, Pekanbaru, 1–4.VIII.1971

(Okada). SRI LANKA: 2♂,2♀, Peradeniya, 17–19.VIII.1971 (Okada); 1♂, Kandy, 25.VII.1971 (Kitagawa). PHILIPPINES: Luzon I: 1♂, Camarines Sur Prov, Mt Isarog, Pili, 600 m, 4.V.1965, light trap (H.M. Torrevillas). IRIAN JAYA: 1♂,2♀, Star Mts, Sibil Val, 1345 m, 18.X–8.XI.1961 (L.W. Quate). PAPUA NEW GUINEA: 2♂,3♀, Wau, 27.IX–5.X.1977, light trap (Okada).

Distribution. Java, Sumatra*, Sri Lanka*, Philippines*, Taiwan*, Irian Jaya*, Papua New Guinea*.

Taxonomic notes. Periphallic organs (Fig. 3L): epandrium narrowed and hooked below; cercus slender, separated from epandrium, with a long subapical seta. Phallic organs (Fig. 3M): aedeagus slender, hooked apically, medially swollen ventrally; paramere shorter than aedeagus. Ovipositor (Fig. 3N) rod-shaped, with 2 long stout terminal setae. The proclinate orbital is inside the posterior reclinate in most of the species of the subgenus *Oxystyloptera*; it is outside in this species as well as in *M.* (*O.*) *bimaculata, conica,* and *philippina.* It is outside in all species of the subgenus *Microdrosophila* examined except *M.* (*M.*) *filamentea.*

Microdrosophila (Oxystyloptera) matsudairai Okada

Microdrosophila (*Oxystyloptera*) *matsudairai* Okada, 1960, Kontyû **28:** 213.

Specimens examined. SRI LANKA: 1♂,2♀, Peradeniya, 17–19.VIII.1971 (Okada).

Distribution. Japan, Korea, Sri Lanka*.

TAXIMETRICAL ANALYSES

For the purpose of expressing the relationships of the subgenera and the species and of constructing automatically a key to the subgenera and species, analyses have been made for 45 species ($t = 45$), using 18 diagnostic characters ($n = 18$). Each is divided into 2 states as shown below.

A—Outer occipital bristle (occe) absent (A = 0) or present (a = 1)
B—Proclinate orbital bristle inside (B = 0) or outside (b = 1) posterior reclinate
C—Palpus pale (C = 0) or black (c = 1)
D—Acrostichal hairs (ac) in 6 or 8 rows (D = 0) or more than 10 rows (d = 1)
E—Frons blackish (E = 0) or yellowish (e = 1)
F—Third costal fringe (3Cf) less than 0.9 (F = 0) or 0.95–1.00 (f = 1)
G—Surstylus conical (G = 0) or rod-shaped (g = 1)
H—4V-index less than 5.0 (H = 0) or more than 5.5 (h = 1)
I—Second costal break not very deep, less than 2× the breadth of underlying vein (I = 0) or very deep, more than 3× the breadth of underlying vein (i = 1)
J—Halter yellowish (J = 0) or blackish (j = 1)
K—Sterno-index less than 0.5 (K = 0) or more than 0.6 (k = 1)
L—Thoracic pleura pale with black stripe above (L = 0) or entirely blackish (l = 1)

M—Mesoscutum unicolorous (M = 0) or dark striped (m = 1)
N—Lateral scutellars less than ⅘ (N = 0) or more than ⅘ (n = 1) length of apicals
O—Aedeagus slender (O = 0) or globular (o = 1)
P—Ovipositor triangular or flat (P = 0) or oblong (p = 1)
Q—Surstylus conical (Q = 0) or rod-shaped (q = 1)
R—Components of male periphallic organs (epandrium, surstylus, cercus) separated from each other at least partially (R = 0) or completely fused (r = 1)

SCD (sum of character differences) proximity analysis and UPGMA cluster analysis have been applied. Taxa showing more than 8 NC-characters are omitted from the analyses [*M.* (*M.*) *quadrata* (Sturtevant), *M.* (*M.*) *congesta*, and *M.* (*M.*) *frontata*] and are not treated in the key. In constructing the key, some additional characters have been adopted as necessary.

The result of clustering is shown in Fig. 4. The species are clearly divided into 2 major clusters that correspond to the 2 subgenera (*Microdrosophila* and *Oxystyloptera*). From the resulting dendrogram, a key to the subgenera and species is constructed.

Key to subgenera and species of *Microdrosophila*

Numbers preceding species names correspond to list of species following key

1. Second costal break not very deep, about as deep as breadth of underlying vein (I); 3Cf less than 0.9 (F); palpus black if 3Cf is 0.95–1.00 (c if f) ..... subgenus *Microdrosophila* 2
   Second costal break very deep, more than 3× as deep as breadth of underlying vein (i); 3Cf 0.95–1.00 (f); palpus pale (C) ..... subgenus *Oxystyloptera* 30
2. Thoracic pleura entirely blackish (l) 3
   Thoracic pleura pale, with black longitudinal stripe above (L) 5
3. Palpus black (c); C-index more than 1.7 (g); frons yellow (e); 4V-index less than 5.5 (h) ..... 17. **acristata**
   Palpus pale (C); C-index less than 1.5 (G); frons black (E); 4V-index less than 5.0 (H) 4
4. Halter black (j); surstylus conical (Q) ..... 24. **duplicristata**
   Halter yellow (J); surstylus rodlike (q) ..... 42. **residua**
5. Palpus dark (c); halter black if palpus is pale (j if C); 6
   Palpus pale (C); mesoscutum striped and surstylus rodlike if palpus is dark (mq if c) 16
6. Surstylus conical (Q) 7
   Surstylus rodlike (q) 13
7. Frons black (E) 8
   Frons yellow (e) 9
8. Halter yellow (J); lateral scutellars less than ⅘ length of apicals (N) ..... 18. **bicornua**
   Halter black (j); lateral scutellars more than ⅘ length of apicals (n) ..... 43. **rhoparia**
9. 3Cf 0.95–1.00 (f) ..... 35. **nigrohalterata**
   3Cf less than 0.9 (F) 10
10. Halter black (j); aedeagus not globular 11
    Halter yellow (J) except for *vittata*; aedeagus globular (o) 12
11. Mesoscutum pale (M); aedeagus slender (O) ..... 44. **sarawakana**
    Mesoscutum dark (m); aedeagus globular (o) ..... 34. **nigripalpis**

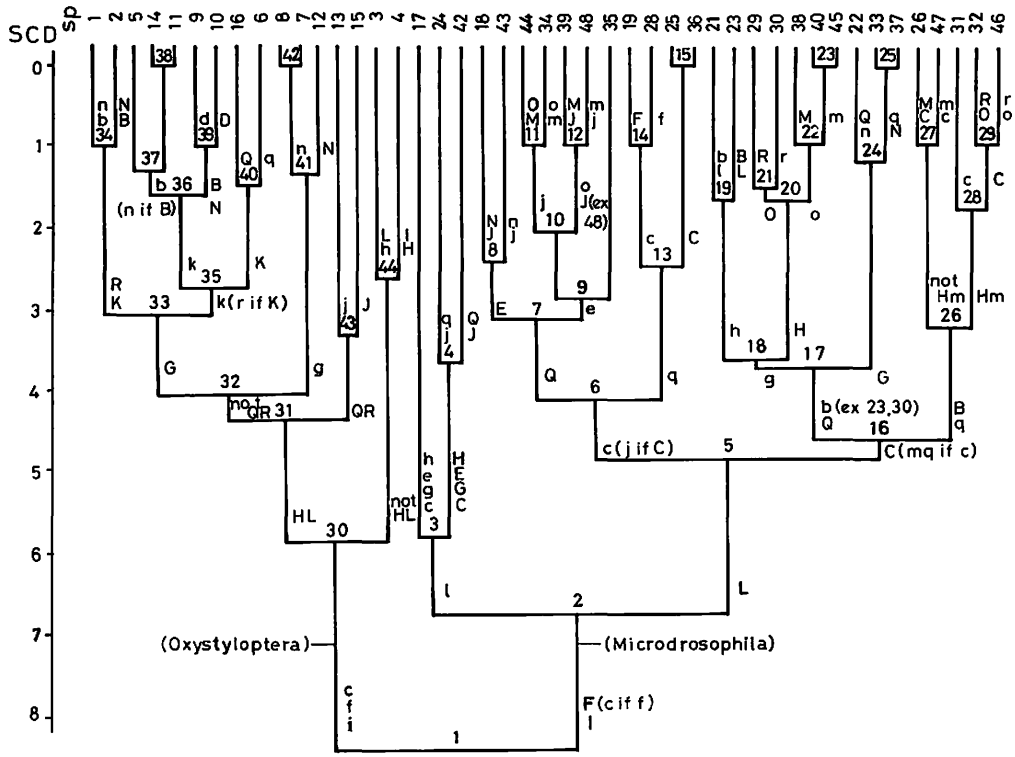

FIG. 4. Dendrogram showing relationships of the subgenera and species of the genus *Microdrosophila* derived from SCD proximity analysis and UPGMA cluster analysis. Alphabetical signs attached on the branches show the character states selected from original $n \times t$ matrix. Numerical figures at the branching points of clusters correspond to the orders of key couplets. For species name see the list of species.

12. Halter yellow (j); mesoscutum pale (M); epandrium rounded below ..... 39. **pseudopleurolineata**
    Halter black (j); mesoscutum dark (m); epandrium angular below ..... 48. **vittata**
13. Palpus black (c) 14
    Palpus pale (C) 15
14. 3Cf less than 0.9 (F) ..... 19. **bullata**
    3Cf 0.95–1.00 (f) ..... 28. **hasta**
15. Elongate lower tip of epandrium sharply pointed ..... 25. **elongata**
    Elongate lower tip of epandrium not sharply pointed ..... 36. **ochracella**
16. Surstylus conical (Q); proclinate orbital outside posterior reclinate (b), except in 23. *discrepantia* and 30. *korogo* 17
    Surstylus rodlike (q); proclinate orbital inside posterior reclinate (B) 26
17. C-index more than 1.7 (g) 18
    C-index less than 1.5 (G) 24
18. 4V-index more than 0.6 (h) 19
    4V-index less than 0.5 (H) 20

19. Thoracic pleura entirely blackish (l); proclinate orbital outside posterior reclinate (b) ..... 21. **convergens**
Thoracic pleura pale below (L); proclinate orbital inside posterior reclinate (B) ... . 23. **discrepantia**
20. Aedeagus slender (O) 21
Aedeagus globular (o) 22
21. Components of periphallic organs separated at least partially (R) ..... 29. **jarrae**
Components of periphallic organs completely fused (r) ..... 30. **korogo**
22. Mesoscutum unicolorous (M) ..... 38. **pleurolineata**
Mesoscutum striped (m) 23
23. Scutellum yellowish; epandrium not serrated below ..... 40. **purpurata**
Scutellum blackish; epandrium serrated below ..... 45. **serrata**
24. Lateral scutellars more than ⅘ length of apicals (n); surstylus conical (Q) ..22. **cristata**
Lateral scutellars less than ⅘ length of apicals (N); surstylus rodlike (q) 25
25. Arista with 7 upper and 3 lower branches ..... 33. **marginata**
Arista with 3 upper and 2 lower branches ..... 37. **pauciramosa**
26. 4V-index less than 5.0 (H); mesoscutum striped (m) 28
Not simultaneously as above (not Hm) 27
27. Palpus pale (C); mesoscutum unicolorous (M); epandrium filamentous below .... 26. **filamentea**
Palpus black (c); mesoscutum striped (m); epandrium bladelike below ..... 47. **suvae**
28. Palpus dark (c) ..... 31. **laticlavia**
Palpus pale (C) 29
29. Aedeagus slender (O); components of periphallic organs separated at least partially (R) ..... 32. **maculata**
Aedeagus globular (o); components of periphallic organs completely fused (r) .... 46. **submarginata**
30. 4V-index less than 5.0 (H); thoracic pleura pale below (L) 31
Not simultaneously as above (not HL) 44
31. Surstylus conical (Q); components of periphallic organs separated at least partially (R) 43
Not simultaneously as above (not QR) 32
32. C-index less than 1.5 (G) 33
C-index more than 1.7 (g) 41
33. Sterno-index less than 0.5 (K); components of periphallic organs separated at least partially (R) 34
Sterno-index more than 0.6 (k); components of periphallic organs completely fused if sterno-index is less than 0.5 (r if K) 35
34. Proclinate orbital outside posterior reclinate (b); lateral scutellars more than ⅘ length of apicals (n) ..... 1. **bimaculata**
Proclinate orbital inside posterior reclinate (B); lateral scutellars less than ⅘ length of apicals (N) ..... 2. **conica**
35. Sterno-index more than 0.6 (k) 36
Sterno-index less than 0.5 (K) 40
36. Proclinate orbital outside posterior reclinate (b); if inside, lateral scutellars more than ⅘ length of apicals (n if B) 37
Proclinate orbital inside posterior reclinate (B); lateral scutellars less than ⅘ length of apicals (N) 39

37. Proclinate orbital inside posterior reclinate (B) ..... 5. **latifrons**
Proclinate orbital outside posterior reclinate (b) 38
38. Ac-index about 4.0 ..... 11. **philippina**
Ac-index about 2.4 ..... 14. **tectifrons**
39. Acrostichal hairs in more than 10 rows (d) ..... 9. **nigrispina**
Acrostichal hairs in 6 or 8 rows (D) ..... 10. **pectinata**
40. Aedeagus slender (Q) ..... 16. **zetterstedti**
Aedeagus rod-shaped (q) ..... 6. **mabi**
41. Lateral scutellars less than ⅘ length of apicals (N) ..... 12. **sexsetosa**
Lateral scutellars more than ⅘ length of apicals (n) 42
42. Dorsocentrals in 2 pairs ..... 8. **matsudairai**
Dorsocentrals in 3 pairs ..... 7. **mamaru**
43. Halter black (j) ..... 13. **takadai**
Halter yellow (J) ..... 15. **urashimae**
44. 4V-index more than 5.5 (h); thoracic pleura pale below, with black longitudinal stripe above (L) ..... 3. **distincta**
4V-index less than 5.0 (H); thoracic pleura entirely blackish (l) ..... 4. **fuscata**

LIST OF SPECIES

New species indicated by a dagger (†)

Subgenus *Oxystyloptera* Duda

1.	*bimaculata* de Meijere, 1908	Java
2.	*conica* Okada†	Taiwan, Sri Lanka, Java
3.	*distincta* Wheeler & Takada, 1964	Micronesia
4.	*fuscata* Okada, 1960	Japan, Korea
5.	*latifrons* Okada, 1965	Ryukyus, Korea
6.	*mabi* Burla, 1954	Africa
7.	*mamaru* (Burla, 1954)	Africa
8.	*matsudairai* Okada, 1960	Japan, Korea, Ryukyus, Sri Lanka
9.	*nigrispina* Okada†	Sri Lanka
10.	*pectinata* Okada, 1966	Taiwan, Nepal
11.	*philippina* Okada†	Philippines
12.	*sexsetosa* (Duda, 1939)	Africa
13.	*takadai* Bock, 1982	Australia
14.	*tectifrons* (de Meijere, 1914)	Taiwan, Philippines, Java, Irian Jaya, Papua New Guinea
15.	*urashimae* Okada, 1960	Japan, Korea
16.	*zetterstedti* Wheeler, 1959	Europe

Subgenus *Microdrosophila* Malloch

17.	*acristata* Okada, 1968	Taiwan
18.	*bicornua* Okada†	Java
19.	*bullata* Takada & Momma, 1975	Penin. Malaysia, Sri Lanka
20.	*congesta* (Zetterstedt, 1847)	Europe
21.	*convergens* (Malloch, 1934)	Micronesia, American Samoa, Fiji
22.	*cristata* Okada, 1960	Japan, Korea, Taiwan
23.	*discrepantia* Bock, 1982	Australia

24. *duplicristata* Okada†	Java
25. *elongata* Okada, 1965	Philippines, Ryukyus, Taiwan, Sri Lanka
26. *filamentea* Okada†	Sri Lanka
27. *frontata* (de Meijere, 1916)	Java
28. *hasta* Bock, 1982	Australia
29. *jarrae* Bock, 1982	Australia
30. *korogo* Burla, 1954	Africa
31. *laticlavia* Wheeler & Kambysellis, 1966	American Samoa
32. *maculata* Okada, 1960	Japan
33. *marginata* Okada, 1966	Nepal
34. *nigripalpis* Okada, 1966	Japan, Nepal
35. *nigrohalterata* Okada, 1966	Nepal
36. *ochracella* Wheeler & Takada, 1964	Australia, Micronesia, Papua New Guinea
37. *pauciramosa* Okada, 1977	Nepal
38. *pleurolineata* Wheeler & Takada, 1964	Australia, Fiji, Hong Kong, India, Japan, Penin. Malaysia, Micronesia, Ryukyus, Singapore, Sri Lanka, Papua New Guinea
39. *pseudopleurolineata* Okada, 1968	Japan, Ryukyus, Taiwan, Thailand, Java
40. *purpurata* Okada, 1956	Japan, Korea, Ryukyus, Taiwan, India
41. *quadrata* (Sturtevant, 1916)	N America
42. *residua* Bock, 1982	Australia
43. *rhoparia* Okada†	Java
44. *sarawakana* Okada†	Malaysia (Sarawak)
45. *serrata* Okada†	Penin. Malaysia, Philippines
46. *submarginata* Okada, 1965	Ryukyus
47. *suvae* Wheeler & Kambysellis, 1966	Fiji
48. *vittata* Okada†	New Caledonia

SUMMARY OF DISTRIBUTION RECORDS

9 spp.: Japan (nos. 4, 8, 15, 22, 32, 34, 38, 39, 40).
8 spp.: Taiwan (2, 10, 14, 17, 22, 25, 39, 40); Java (1, 2, 14, 18, 24, 27, 39, 43).
7 spp.: Ryukyus (5, 8, 25, 38, 39, 40, 46); Sri Lanka (2, 8, 9, 19, 25, 26, 38); Australia (13, 23, 28, 29, 36, 38, 42).
6 spp.: Korea (4, 5, 8, 15, 22, 40).
5 spp.: Nepal (10, 33, 34, 35, 37).
4 spp.: Philippines (11, 14, 25, 45); Papua New Guinea (14, 19, 36, 38); Micronesia (3, 21, 36, 38); Fiji, American Samoa (21, 31, 38, 47).
3 spp.: Peninsular Malaysia (19, 38, 45).
2 spp.: India (38, 40); Europe (16, 20).
1 sp.: Hong Kong (38); Thailand (39); Singapore (38); Malaysia (Sarawak) (44); Irian Jaya (14); New Caledonia (48); N America (41).

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