

## The Genus *Chymomyza* CZERNY (Diptera, Drosophilidae) from New Guinea, Bismarck Archipelago and Southeast Asia, with an Ecological Note

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*paratype not designated*

**Synopsis** Ten new species of the genus *Chymomyza* of the family Drosophilidae are described from New Guinea, the Bismarck Archipelago, the Philippines and Borneo, with distribution records for some species. A brief ecological note is given for some New Guinean species. The materials are obtained from various sources, especially the Bernice P. Bishop Museum collection. The relationships of the new and the related species are taximetrically analysed to automatically construct a key to species.

The present report describes 10 new species of the genus *Chymomyza* CZERNY from Borneo, the Philippines, New Guinea, New Ireland, and New Britain, and gives new distribution records of 2 known species. The materials are obtained from the Bernice P. Bishop Museum collection (1955-1967), Tokyo Metropolitan University collection (1979) and the collections by Mr. H. SHIMA of Kyushu University (1975) and myself (1977).

The type-specimens are deposited in the Bishop Museum.

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The genus *Chymomyza* is classified into 5 species-groups (OKADA, 1976): I, *obscura*, II, *procnemis*, III, *fuscimana*, IV, *costata*, and V, *aldrichii*. The present materials are involved in I, II and IV.

### I. The *obscura* Species-group

#### *Chymomyza femorata* sp. n.

(Fig. 1A-B)

♂, ♀. Body about 2 mm in length. Eye dark red. Antenna with 2nd joint orange yellow, 3rd gray. Arista with 3 upper and 2 lower branches and a moderate

fork. Palpus yellowish gray, slender, with an apical seta. Frons as long as broad, shining black, anterior border orange. Ocellar triangle and periorbits glossy black. Face and clypeus gray. Cheek narrow, yellowish gray. Anterior reclinate orbital as long as proclinate; posterior reclinate longer than others. Thorax entirely mat black, gray pruinose. Acrostichal hairs in 6 rows. Anterior dorsocentrals half as long as posteriors; length distance of dorsocentrals half of cross distance. Lateral scutellars parallel, apicals also parallel, nearly twice as long as laterals, equally apart from each other and from laterals. Legs yellow; fore leg with femur except base, tibia and metatarsus black; mid and hind tibiae fuscous. Wing hyaline, apically milky white; C and costal cell black;  $R_{2+3}$  straight;  $R_{4+5}$  and M slightly convergent distally. C-index 1.1; 4V-index 2.5; 4C-index 2.0; 5x-index 2.4; Ac-index 5.5; C3-fringe 4/5. Haltere yellowish gray. Abdominal tergites subshining black.

Periphallic organs (Fig. 1A) black; epandrium finger-like below, thick above; surstylus small, with about 6 teeth; cercus sometimes bifurcated below. Phallic organs (Fig. 1B) black; aedeagus slender; paramere shorter than lateral arm of hypandrium.

*Specimens examined.* *New Guinea:* Holotype ♂ (No. 12095), allotype ♀ (No. 12095a), 20 ♂, 12 ♀, Bulolo, PNG, 18 IX 1977, OKADA; 1 ♂, 1 ♀, Bambari, altitude 700–900 m, Vogelkop, WI, 8 VI 1958, MAA; 1 ♂, 1 ♀, 1 km N. of Awelkom, altitude 600 m, Umboi Is., PNG, 21–23 II 1967, SAMUELSON; 1 ♀, Jimmi R., altitude 600 m, PNG, 19 VII 1956, GRESSITT. *New Ireland:* 1 ♂, Ridge above “Camp Bishop”, 15 km up Kait R., altitude 260–500 m, 11 VI 1956, GRESSITT.

*Distribution.* New Guinea, New Ireland.

*Relationships.* This species is closely allied to *C. obscura* (DE MEIJERE) in general coloration and male genitalia, but distinguished from the latter by mostly yellow fore femur and paler face.

### *Chymomyza nigripes* sp. n.

(Fig. 1C–D)

♂, ♀. Body about 2.2 mm in length. Eye dark red, bare. Antenna with 2nd joint reddish brown, 3rd darker. Arista with 2–3 upper and 1 lower branches and a large fork. Palpus dark reddish brown, with a short apical seta. Frons subshining black, pruinose, anterior margin dark orange. Face dark reddish brown, convexed below. Clypeus black. Orbitals subequal in length with each other. Second oral slightly shorter than vibrissa. Thorax entirely subshining black, pruinose. Humeral 1. Acrostichal hairs in 6 rows. Anterior dorsocentrals half as long as posteriors; length distance of dorsocentrals half of cross distance. Legs brownish black except tibiae and tarsi of mid and hind legs, which are yellowish brown. Wing hyaline; apically milky white; C and costal cell black;  $R_{2+3}$  straight, medially sinuated. C-index 1.0; 4V-index 2.1; 4C-index 1.7; 5x-index 3.0; Ac-index 4.5; C3-fringe 7/9. Haltere yellow. Abdominal tergites mat black, distal segments

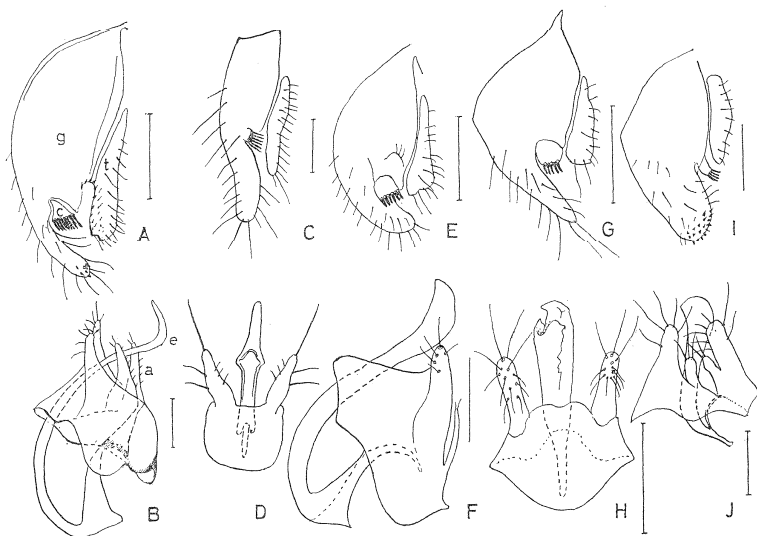


Fig. 1. Peripheral organs (upper figures) and phallic organs (lower figures) of *Chymomyza* species. — A-B, *femorata*; C-D, *nigripes*; E-F, *subobscura*; G-H, *rufa*; I-J, *brevis*; a, paramere; c, surstylus; e, aedeagus; g, epandrium; t, cercus. Scales 0.1 mm.

reddish brown.

Peripheral organs (Fig. 1C) yellowish brown; epandrium thick, finger-like below; surstylus short, with about 7 long black teeth. Phallic organs (Fig. 1D) yellowish brown; aedeagus dorsocentrally compressed; paramere finger-like.

*Specimens examined.* New Guinea: Holotype ♂ (Bishop 11931), Eliptamin Valley, altitude 1,200–1,350 m, PNG, 1–15 VII 1959, BRANDT; allotype ♀ (Bishop 11931a), Big Wau Creek, altitude 1,300 m, Wau, PNG, XI 1965, SHANAHAN; 1 ♀, 40 km N. of Baliem Valley, Bokondini, altitude 1,300 m, WI, 16–23 XI 1961, QUATE; 1 ♀, Enarotadi, Wisselmeren, altitude 1,900 m, WI, 30 VII 1955, GRESSITT (in light trap).

*Distribution.* New Guinea.

*Relationships.* This species is closely allied to *C. femorata*, but distinguished from the latter by entirely black fore legs.

### *Chymomyza subobscura* sp. n.

(Fig. 1E–F)

♂. Body about 2.2 mm in length, mostly black. Eye dark red, bare. Antenna orange brown, 3rd joint paler than 2nd and short. Arista with 2 upper and 1 lower branches and a large fork. Palpus yellowish orange, with a few fine setae.

Frons mat black, anteriorly orange and as broad as median length, posteriorly broader. Face grayish orange, flat and ventrally swollen. Carina very short. Clypeus yellowish orange. Second oral slightly shorter than vibrissa. Thorax entirely velvety black. Lateral scutellars parallel, half as long as apicals, which are nearer to laterals than to each other. Humeral 1. Acrostichal hairs in 6 rows. Anterior dorsocentrals half as long as posteriors; length distance of dorsocentrals 1/3 cross distance. Legs black; coxae and trochanters pale; fore tarsi except metatarsus white. Wing hyaline, apically milky white; C and costal cell black;  $R_{2+3}$  somewhat sinuated;  $R_{4+5}$  and M parallel. C-index 1.3; 4V-index 2.7; 4C-index 1.9; 5x-index 4.3; Ac-index 4.0; C3-fringe 5/6. Haltere orange yellow. Abdominal tergites mat velvety black.

Periphallalic organs (Fig. 1E) brown; epandrium narrowing above, ventrally broad and finger-like; surstylus with about 6 teeth. Phallic organs (Fig. 1F) orange brown; aedeagus slender, S-shaped in lateral aspect; paramere slender, shorter than lateral arm of hypandrium.

*Specimen examined.* Philippines: Holotype ♂ (Bishop 11932), Camarines Sur, altitude 800–850 m, 29 IV 1963, TORREVILLAS.

*Distribution.* Philippines.

*Relationships.* This species is closely allied to *C. obscuroides* OKADA in general coloration and male genitalia, but distinguished from the latter in having 2nd tarsal joint of fore leg yellow, surstylus with smaller number of teeth and paramere smaller.

### *Chymomyza obscura* (DE MEIJERE)

*Amphoroneura obscura* DE MEIJERE, 1911, Tijdschr. Ent., 54: 424.

*Specimens examined.* 4 ♂, 4 ♀, Muara Mongkes, Sarawak, 25–27 XI 1975, SHIMA. 15 ♂, 4 ♀, Banos Ros, Luzon, Philippines, 20 X 1979, HIHARA *et al.*

*Distribution.* Java, Sumatra, Sri Lanka, Sarawak (new record), Philippines (new record).

*Remarks.* Aedeagus apically curved upward (erroneously figured as curved downward by OKADA, 1976).

## II. The *procnemis* Species-group

### *Chymomyza rufa* sp. n.

(Fig. 1G–H)

♂, ♀. Body about 1.5 mm in length, orange yellow in general. Eye purple red, bare. Antenna with 3rd joint grayish. Arista with 3–4 upper and 2 lower branches and a small fork. Palpus with a short apical and shorter ventral setae. Frons as broad as long. Face flat. Cheek narrow. Anterior reclinate orbital

as long as proclinate; posterior reclinate longer. Vibrissa long but weak, 2nd to 5th orals shorter than vibrissa. Thorax subshining orange yellow, pleura paler. Lateral scutellars slightly convergent. Humeral 1, long. Acrostichal hairs in 6 rows. Anterior dorsocentrals  $2/3$  as long as posteriors; length distance of dorsocentrals half of cross distance. Legs yellow; fore leg with distal end of femur, tibia and proximal 2 tarsal joints black. Wing hyaline, C and costal cell black; wing tip milky white.  $R_{2+3}$  medially sinuated;  $R_{4+5}$  and M slightly convergent distally. C-index 0.9; 4V-index 2.2; 4C-index 1.8; 5x index 2.5; Ac-index 4.0; C3 fringe 7/9. Haltere orange yellow. Abdominal tergites subshining black.

Periphallalic organs (Fig. 1G) pale yellow; epandrium thick, narrowing above, ventrally tapering and with a few long hairs; surstylus with about 6 teeth. Phallic organs (Fig. 1H) pale yellow; aedeagus rod-like, apically asymmetrical; paramere rod-like, shorter than aedeagus, distally with several long hairs.

*Specimens examined.* New Guinea: Holotype ♂ (No. 12096), allotype ♀ (No. 12096a), 7 ♂, 6 ♀, Bulolo, PNG, 18 XI 1977, OKADA. 1 ♂, Karimui, S. of Goroka, altitude 1,000 m, PNG, 6 VI 1961, J. L. and M. GRESSITT; 1 ex, NE. Busu River, E. of Lae, altitude 100 m, PNG, 13 IX 1955, GRESSITT.

*Distribution.* New Guinea.

*Relationships.* This species seems to coincide with *C. rufithorax* (DE MEIJERE) in general coloration including leg ornamentation. The conspecificity is, however, still uncertain due to insufficient information about the latter species.

### *Chymomyza brevis* sp. n.

(Fig. 1I-J)

♂, ♀. Body about 1.8 mm in length. Eye dark brownish red, bare. Antenna orange, 3rd joint gray. Arista with 3 upper and 1 lower branches and a large fork. Palpus orange gray, with short setae. Frons orange gray, anteriorly orange, slightly broader than long, somewhat concaved. Periorbit glossy brownish black. Cheek narrow, yellow. Face yellowish gray, anteriorly orange, somewhat concaved, slightly broader than long. Three orbitals nearly equal in length. Vibrissa weak, 2nd oral half as long as vibrissa. Thorax entirely subshining orange brown. Humeral 1. Acrostichal hairs in 6 rows. Legs pale yellowish brown; fore leg with femur, tibia and 2 proximal tarsal joints black. Wing hyaline, apically milky white: C and costal cell black;  $R_{2+3}$  sinuated at middle;  $R_{4+5}$  and M slightly convergent distally. C-index 1.1; 4V-index 2.2; 4C-index 1.7; 5x-index 3.5; Ac-index 1.7; C3-fringe 4/5. Abdominal tergites glossy black.

*Specimens examined.* Philippines: Holotype ♂ (Bishop 11930), allotype ♀ (Bishop 11930a), Mt. Empagatao, Misamis Or., altitude 1,050–1,200 m, 19–30 VI 1961, TORREVILLAS. Sarawak: 1 ♂, Muara Mongkes, 25–27 XI 1975, SHIMA.

*Distribution.* Philippines, Sarawak. 3♂, 1♀

*Relationships.* This species resembles *C. rufa* in general coloration including leg

ornamentation, but distinguished from the latter by having ventrally robust and shaggy epandrium.

### *Chymomyza pararufithorax* VAIDYA et GODBOLE

*Chymomyza pararufithorax* VAIDYA and GODBOLE, 1973, Dros. Inf. Serv., 50: 71.

*Chymomyza vaidyai* OKADA, 1976, Kontyû, Tokyo, 44: 500.

*Specimens examined.* 1 ♀, Penang, Malaya, 23 XI 1979, HIHARA *et al.*

*Distribution.* India, Malaya (new record).

*Remarks.* WHEELER reached the conclusion that "Drosophila Information Service" constitutes a publication within the meaning of Nomenclatural Code (personal information). Thus *vaidyai* becomes a junior synonym of *pararufithorax*.

#### IV. The *costata* Species-group

##### *Chymomyza clavata* sp. n.

(Fig. 2A-B)

♂, ♀. Body about 1.8 mm in length. Eye dark red. Antenna mostly black. Arista with 4 upper and 2 lower branches and a large fork. Palpus yellow, with a few setae. Frons twice as broad as long, mat grayish brown. Periorbits grayish brown, somewhat convexed. Face grayish brown, white above. Proclinate orbital 2/3 as long as posterior reclinate; anterior reclinate minute. Second oral slightly shorter than vibrissa. Clypeus black. Thorax mat grayish black. Humeral 1, long. Acrostichal hairs in 6 rows. Anterior dorsocentrals 2/3 as long as posteriors: length distance of dorsocentrals 3/5 cross distance. Sterno-index 0.7. Lateral scutellars as long as apicals, which are slightly nearer to each other than to laterals. Legs brownish black except coxae, which are yellow. Wing hyaline, apically not whitish. C-index 1.5; 4V-index 3.5; 4C-index 2.1; 5x-index 2.5; Ac-index 3.7; C3-fringe 2/3. Haltere gray. Abdominal tergites mat grayish brown.

*Specimens examined.* New Guinea: Holotype ♂ (No. 12097), allotype ♀ (No. 12097a), and 25 ♂, Bulolo, PNG, 2-18 IX 1977, OKADA.

*Distribution.* New Guinea.

*Relationships.* This species resembles *C. costata* (ZETTERSTEDT) in having entirely dark fore leg, but differs in having C-cell not black.

##### *Chymomyza flagellata* sp. n.

(Fig. 2C-D)

♂, ♀. Body about 2.3 mm in length. Eye dark red, bare. Antenna with 2nd joint black, 3rd orange and apically black. Arista with 3 upper and 1 lower branches and a large fork. Palpus yellow, slender, with a terminal seta. Frons yellowish

gray, as long as broad, anterior margin orange. Face gray. Anterior reclinate orbital small, proclinate longer than posterior reclinate. Clypeus whitish gray. Vibrissa strong, other orals fine. Mesoscutum mat gray, anterior margin and sutures yellow. Scutellum gray, Thoracic pleura paler below. Humeral 1. Acrostichal hairs in 6 rows. Anterior dorsocentrals half as long as posteriors; length distance of dorsocentrals half of cross distance. Lateral scutellars convergent, half as long as apicals, which are equally apart from each other and from laterals. Fore leg black, 2nd to 5th tarsal joints white; other legs entirely orange brown. Wing hyaline, apically not white;  $R_{2+3}$  straight;  $R_{4+5}$  and M parallel; costa pale. C-index 1.5; 4V-index 2.5; 4C-index 1.7; 5x-index 2.3; Ac-index 4.0; C3-fringe 3/4. Haltere yellowish gray. Abdominal tergites mat pruinose black.

Periphallalic organs (Fig. 2C) pale yellow; epandrium with 2 long hairs below; surstylus short but distally very broad, with about 45 small teeth. Phallic organs (Fig. 2D) pale yellow; aedeagus elliptical; paramere rod-shaped, apically with 2 long hairs. Testis yellow, banana-shaped, basally narrowing and folded. Ventral receptacle small, twice folded.

*Specimens examined.* *New Guinea:* Holotype ♂ (No. 12098), allotype ♀ (No. 12098a), 4 ♂, 4 ♀, Bulolo, PNG, 15–18 IX 1977, OKADA; 2 ♂, Pak Pak, S. coast of Bomberai, altitude 10–100 m, Vogelkop, WI, 10 VI 1961, MAA; 3 ♀, Sibil Valley, Star Mts., altitude 1245 m, WI, 18 XI 1961, QUATE. *New Britain:* 2 ♂, 1 ♀, Mt. Sinewit, altitude 900 m, Gazelle Peninsula, 5–15 XI 1962, SEDLACEK (at light trap).

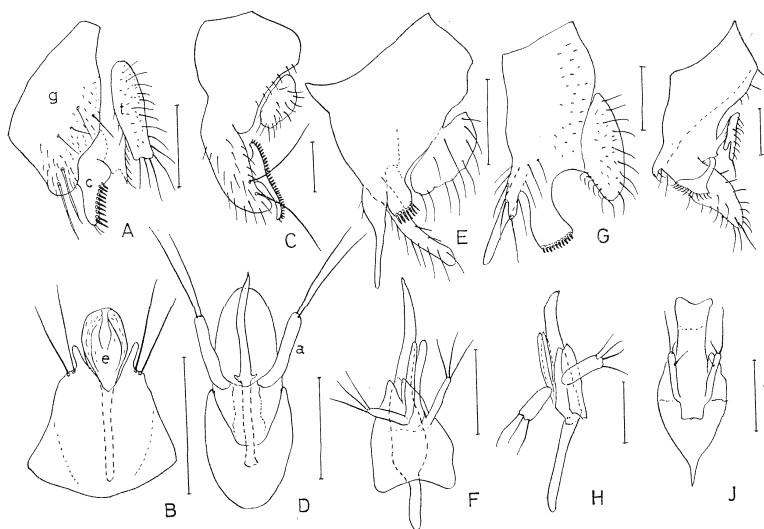


Fig. 2. Peripheral organs (upper figures) and phallic organs (lower figures) of *Chymomyza* species. — A–B, *clavata*; C–D, *flagellata*; E–F, *longicauda*; G–H, *scutellata*; I–J, *flabellata*. Signs and scales as in Fig. 1.

*Philippines*: 2 ♂, Mt. Empagatao, altitude 1,050–1,200 m, 19–30 IV 1956, TORREVILLAS. *Sabah*: 3 ♂, 2 ex, Forest Camp, 19 km N. of Kalabakan, 10–12 X 1962, KUCHERIA; 1 ♀, Sapagaya Lumber Camp, altitude 1–20 m, Sandakan Bay, 3 XI 1957, GRESSITT.

*Distribution.* New Guinea, New Britain, Philippines, Sabah.

*Relationships.* This species resembles *C. clavata* in general coloration and male genitalia, but distinguished from the latter by having 2nd to 5th tarsal joints of fore leg yellow and surstylus with more numerous teeth.

*Chymomyza longicauda* sp. n.

(Fig. 2E–F)

♂, ♀. Body about 3 mm in length. Eye dark red, bare. Antenna with 2nd joint mat black, protruded; 3rd yellowish brown, apically darker. Arista with 4 upper and 2 lower branches and a small fork. Palpus yellow, slender. Frons broader than long, velvety black, laterally yellowish orange. Face yellow. Carina low, distally somewhat convexed. Clypeus yellow. Thorax mostly pruinose grayish black, pale along dorsocentral lines, ventrally whitish. Acrostichal hairs in 6 rows. Anterior dorsocentrals half as long as posteriors; length distance of dorsocentrals 3/5 cross distance. Legs brown; fore leg with femur, tibia and metatarsus black. Wing hyaline, apically not milky white; costa pale;  $R_{2+3}$  straight. C-index 2.0; 4V-index 3.3; 4C-index 1.7; 5x-index 3.0; Ac-index 3.3; C3-fringe 2/3. Abdomen slender, tergites pruinose grayish black.

Periphallallic organs (Fig. 2E) pale brown; epandrium broad, bifurcated and narrowly pointed below; surstylus with about 7 long teeth. Phallic organs (Fig. 2F) pale yellowish brown; aedeagus slender; paramere slender, ending in 3 long hairs. Testis thick, banana-shaped, subbasally folded, pale yellow.

*Specimens examined.* *New Guinea*: Holotype ♂ (No. 12099), allotype ♀ (No. 12099a), 9 ♂, 2 ♀, Bulolo, PNG, 18 IX 1977, OKADA; 1 ♂, Wau, altitude 1,790 m, PNG, 25 VII 1965, J. and M. SEDLACEK; 1 ♂, Hospital Creek, Wau, altitude 1,230 m, PNG, 26 VI 1965, SEDLACEK; 1 ♀, Big Wau Creek, Wau, altitude 1,390 m, PNG, XI 1965, SHANAHAN; 1 ♀, SE. Milne Bay, altitude 10 m, PNG, III 1965, STRAATMAN. *Sabah*: 2 ♂, Sapagaya Lumber Camp, Sandakan Bay, altitude 2–20 m, 7 XI 1965, GRESSITT; 2 ♂, 1 ♀, Forest Camp, 19 m N. of Kalabakan, 27 X 1962, GRESSITT.

*Relationships.* This species resembles *C. flagellata* in general coloration and in having long paramere, but distinguished from the latter by bifurcated epandrium, small surstylus and slender aedeagus.

*Chymomyza scutellata* sp. n.

(Fig. 2G–H)

♂, ♀. Body about 2.5 mm in length. Eye deep red, bare. Antenna grayish



brown. Arista with 4 upper and 1 lower branches and a large fork. Frons mat orange, anteriorly as broad as median length, posteriorly broader. Periorbit black with gray pruinosity. Face gary, laterally whitish. Cheek narrow, yellowish white. Thorax mat pale brown; thoracic pleura ventrally black. Lateral scutellars as long as apicals; scutellars equally apart from each other. Humeral 1, long. Acrostichal hairs in 6 rows. Anterior dorsocentrals  $3/4$  as long as posteriors; length distance of dorsocentrals half of cross distance. Legs yellowish gray; fore leg with femur, tibia and metatarsus black. Wing hyaline, costa not black, tip not whitish;  $R_{2+3}$  straight. C-index 2.1; 4V-index 3.0; 4C-index 1.5; 5x-index 3.0; Ac-index 2.8; C3-fringe  $3/4$ . Haltere yellowish brown. Abdominal tergites mat black.

Periphallalic organs (Fig. 2G) pale yellowish brown; epandrium broad, ventrally furcated; surstylus with about 10 teeth. Phallic organs (Fig. 2H) pale yellowish orange; aedeagus slender; paramere rod-like, ending in 3 hairs.

*Specimens examined.* Sabah: Holotype ♂ (Bishop 11929), allotype ♀ (Bishop 11929a), Forest Camp, 19 km N. of Kalabakan, altitude 60 m, 14 X 1962, KUNCHERIA. New Guinea: 1 ♂, Pak Pak, altitude 100–700 m, Vogelkop, WI, 3 VI 1959, GRESSITT.

*Distribution.* Sabah, New Guinea.

*Relationshps.* This species resembles *C. longicauda* in general coloration and male genitalia, but distinguished from the latter by broader paramere and larger number of surstylus teeth.

### *Chymomyza flabellata* sp. n.

(Fig. 2I–J)

♂, ♀. Body about 1.6 mm in length. Eye castaneous red, with fine sparse pile. Antenna orange brown. Arista with 3 upper and 2 lower branches and a small fork. Palpus yellowish white, with a few short setae. Frons velvety black, quadrate. Clypeus yellowish white. Face yellowish gray. Cheek yellowish white, narrow. Carina undeveloped. Vibrissa weak. Thorax uniformly deep grayish black. Lateral scutellars  $2/5$  as long as apicals, which are equally apart from each other and from laterals. Acrostichal hairs in 6 rows. Anterior dorsocentrals  $2/3$  as long as posteriors. Legs yellow; fore leg with femur, tibia and metatarsus black. Wing hyaline; costa pale; tip not milky white;  $R_{2+3}$  straight. C-index 1.3; 4V-index 2.9; 4C-index 2.0; 5x-index 3.8; Ac-index 3.8; C3-fringe  $3/4$ . Haltere brownish black. Abdomen slender; tergites mat subshining black.

Periphallalic organs (Fig. 2I) pale brown; epandrium much narrowing above, tapering below; surstylus basally narrow, distally with about 16 teeth. Phallic organs (Fig. 2J) yellowish brown; aedeagus thick, truncate apically; paramere short, rod-like, distally with 3 long hairs.

*Specimens examined.* New Guinea: Holotype ♂ (No. 12100), allotype ♀ (No. 12100a), Bulolo, PNG, 18 IX 1977, OKADA. Sarawak: 1 ♂, Muara Mongkës, 25–27

Ruda, 1927:34. Both *Cladochaeta nebulosa* and *Drosophila nebulosa* have the habit of waving their wings as do the species of *Chymomyza*

XI 1975, SHIMA.

*Distribution.* New Guinea, Sarawak.

*Relationships.* This species resembles *C. flagellata* in general coloration and male genitalia, but distinguished from the latter by the smaller number of surstylus teeth. A specimen from Sarawak shows paler body and more slender aedeagus.

Ecological Notes

Although the *Chymomyza* species are usually known to wave their wings alternatively while resting or walking around, *C. flagellata* and *C. longicauda* were observed not waving wings in Bulolo, Papua New Guinea, in 1977. These two species were found together on the same cut stump of *Araucaria* tree, which was not occupied by other wing-waving species of *Chymomyza* (*femorata*, *rufa*, *clavata*, *flabellata*). The latter were found occupying other stumps of the same tree even close to those occupied by the formers. No special differences were perceived between the stumps.

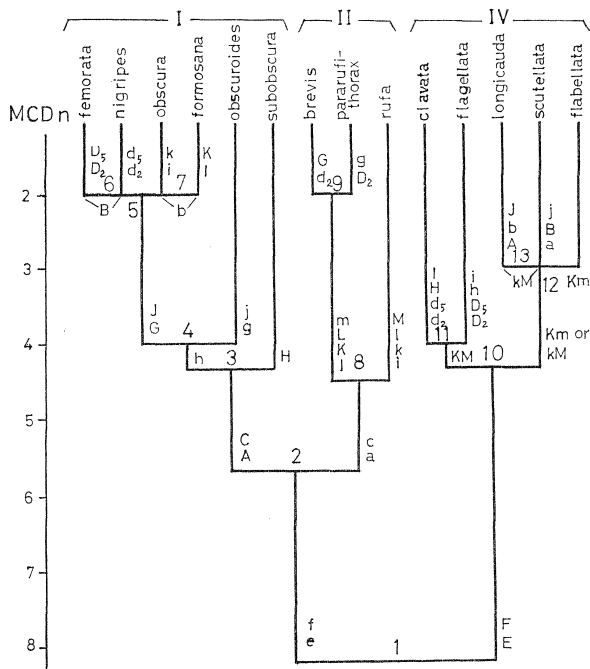


Fig. 3. A dendrogram of the 14 species of *Chymomyza*, based on MCD proximity analysis and UPGA cluster analysis. — I, *obscura* species-group; II, *procnemis* species-group; IV, *costata* species-group. The numbers attached on the branching points indicate key order.

### Taximetric Analysis and Automatic Construction of a Key

Using 20 diagnostic characters ( $n=20$ ) which are same as adopted by OKADA (1976), the relationships among these 10 new species and 4 related species — *obscuroides* OKADA, *obscura* (DE MEIJERE), *formosana* OKADA and *pararufithorax* VAIDYA and GODBOLE — ( $t=14$ ) are analysed. Each character is coded in 2 states, 0 and 1 as done before. MCD (mean character differences) proximity analysis of the  $n \times t$  matrix and UPGA cluster analysis of the  $t \times t$  matrix resulted in obtaining a dendrogram (Fig. 3), which shows that these species are clearly clustered into 3 major clusters corresponding to 3 species groups, I *obscura*, II *procnemis* and IV *costata*. From this dendrogram a key to species-groups and species is automatically constructed as below.

1. Wing tip milky white (e); costal cell black (f).....2  
 — Wing tip not milky white (E); costal cell hyaline (F).....  
     .....IV. *costata* species-group....10
2. Frons and mesoscutum black (A, C).....I. *obscura* species-group...3  
 — Frons and mesoscutum yellowish (a, c)....II. *procnemis* species-group...8
3. 4V-index about 3.0 (H).....*subobscura*  
 — 4V-index less than 2.5 (h).....4
4. C-index more than 1.5 (g); surstylus teeth more than ten (j).....*obscuroides*  
 — C-index about 1.0 (G); surstylus teeth less than eight (J).....5
5. Face blackish (B).....6  
 — Face yellowish (b).....7
6. 2nd and 5th tarsal joints of fore leg yellow ( $D_2, D_5$ ).....*femorata*  
 — 2nd and 5th tarsal joints of fore leg black ( $d_2, d_5$ ).....*nigripes*
7. Ac-index more than 4.0 (i); lower elongate portion of epandrium narrow (k)  
     ..... *obscura*  
 — Ac-index about 3.8 (I); lower elongate portion of epandrium broad (K).....  
     .....*formosana*
8. Ac-index more than 4.0 (i); lower elongate portion of epandrium narrow (k);  
 aedeagus bilaterally asymmetrical (l); phallosomal index less than 3.0 (M)....*rufa*  
 — Ac-index about 3.8 (I); lower elongate portion of epandrium broad (K); aedeagus  
 bilaterally symmetrical (L); phallosomal index more than 3.5 (m).....9
9. Second tarsal joint of fore leg black ( $d_2$ ); C-index about 1.0 (G).....*brevis*  
 — Second tarsal joint of fore leg yellow ( $D_2$ ); C-index more than 1.5 (g).....  
     .....*pararufithorax*
10. Lower elongate portion of epandrium broad and phallosomal index less than  
 3.0 (KM).....11  
 — Lower elongate portion of epandrium broad and phallosomal index more than  
 3.5 (Km), or lower elongate portion of epandrium narrow and phallosomal  
 index less than 3.0(kM).....12

11. Second and 5th tarsal joints of fore leg black ( $d_2, d_5$ ); 4V-index about 3.0 (H); Ac-index about 3.8 (I).....*clavata*  
 — Second and 5th tarsal joints of fore leg yellow ( $D_2, D_5$ ); 4V-index less than 2.5 (h); Ac-index more than 4.0 (i).....*flagellata*
12. Lower elongate portion of epandrium broad (K); phallosomal index more than 3.5 (m).....*flabellata*  
 — Lower elongate portion of epandrium narrow (k); phallosomal index less than 3.0 (M) .....13
13. Frons black (A); face yellow (b); surstylus teeth less than eight (J)...*longicauda*  
 — Frons yellow (a); face black (B); surstylus teeth more than ten (j)...*scutellata*

### Literature

- OKADA, T., 1976. Subdivision of the genus *Chymomyza* CZERNY (Diptera, Drosophilidae), with description of three new species. *Kontyû, Tokyo*, 44: 496-511.

Lin Bächli Throckmorton Wirth Isaac Speer Simpson  
 Steynfal Pite Papp Mäcke Mather Lästörke Bakovaara Laelan  
 Krishnamoorthy Hoeningberg Herzkowitz Reed Hackman Pledy  
 Gupta Grewitt Frydenberg Forts-Person Relfinodi Lovdesri  
 Chvāla Cobben Pay-Chauhan Prevosti Bock Basden S. Reddy  
 Wheel Carson Val Stærmer 丸太 中田, 木村, 高岡 全 an. rem 鈴木  
 今江 小笠原 黒川 多田 別府 利國 安松 有永 加野 倉橋 橋 野村  
 中田 山崎 酒井 Shabalikh, Vilela 郭昭 池田 日及 渡辺 若菜 尾崎  
 酒井 David Grubelli Univ Cambridge 甘 郭昭 尾崎 山 B.T. Brand  
 Lee 伊藤 Etokud 後 Ceianu Ding rem (ambiguo)