

Subdivision of the Genus *Colocasiomyia* DE MEIJERE (Diptera, Drosophilidae) with Descriptions of Two New Species from Sulawesi and Note on Color Adaptation of Synhospitalic Species

Toyohi OKADA

Gotokuji 2-30-18, Setagaya-ku, Tokyo 154, Japan

ABSTRACT The genus *Colocasiomyia* DE MEIJERE (Diptera, Drosophilidae) is divided into three species groups, *cristata*, *baechlii* and *arenga*. Two new species of the *arenga* species group are described from Sulawesi. The abdominal coloration of some synhospitalic species of this genus is found to be adaptive to the microenvironments of the host flowers. The stamencolous species dwelling in open microenvironment has abdominal tergites paler than in the pistilicolous partners inhabiting darker microenvironment.

I. Description of new species from Sulawesi

Three described and one unnamed species of the genus *Colocasiomyia* DE MEIJERE, 1914, are known from Sulawesi, all associated with the flowers of Araceae: *C. colocasiae* (DUDA, 1924) (YAFUSO, unpublished), *C. diconica* (TODA et OKADA, 1983), *C. sulawesiana* (OKADA et YAFUSO, 1989), and an unnamed species (OKADA & YAFUSO, 1989). The present report adds two new species to the fauna, which were found by Dr. H. KURAHASHI in 1973. The types are deposited in the National Science Museum (Nat. Hist.), Tokyo.

***Colocasiomyia sagittata* n. sp.**

(Fig. 1 A-E)

♂, ♀. Body about 1.5 mm in length. Eye dark red, with fine pile. Antenna (Fig. 1 E) yellowish brown, broadly separated at bases. Arista with about 8 upper and 3 lower short branches, lower branches confined to distal part of arista. Palpus yellowish brown. Ocellars outside ocellar triangle, which is black. Frons yellowish gray, anteriorly yellowish orange, broader than long. Face gray; carina broad but low. Clypeus pale yellowish gray. Cheek pale yellowish gray, 2/3 as broad as greatest diameter of eye. Anterior reclinate orbital bristle minute, ca. 1/5 of posterior reclinate orbital. Second oral 1/3 of vibrissa. Mesoscutum and scutellum mat yellowish brown. Thoracic pleura paler. Mesopleuron dark. Humerals 2, lower humeral longer than upper one. Acrostichal hairs in 4 rows. Anterior dorsocentrals 2/3 of posteriors; distance between anterior and posterior dorsocentrals 2/3 of distance between anterior pair. Lateral scutellars divergent, slightly shorter than apicals. Sterno-index

about 0.3. Legs pale yellow, slender; metatarsi as long as rest of tarsal joints. Preapicals prominent on mid and hind tibiae, apicals on mid tibia. Wing (Fig. 1 A) hyaline, veins yellowish brown. Costal bristles heavy, chaetotaxy of B₂ type. C-index 3.5; 4V-index 2.7; 4C-index 0.9; 5x-index 1.1; Ac-index 2.0; C3-fringe 1/5. Halter yellowish gray. Abdominal tergites pale grayish brown. Periphallalic organs (Fig. 1 B) pale brown. Ventral margin of epandrium narrowly elongated and curved, apically tapering; caudoventral corner triangular, pointed. Surstylus oval, with 2 or 3 black teeth. Cercus oval, caudoventrally pointed. Phallic organs (Fig. 1 C) pale yellow. Aedeagus slender, distally sagittated (thus the specific name), finely serrated marginally. Ovipositor (Fig. 1 D) pale brown, slightly constricted medially but not sinuated, marginally with fine bristles.

Type series. Holotype ♂, allotype ♀, 44 ♂ and 51 ♀ paratypes: Sulawesi Utara, Noongan, 50 km S of Manado, 1,200 m, 3. VII. 1973 (H. KURAHASHI).

Relationships. This species resembles *C. arenga* (OKADA) from Java in the general structure, but distinguished from the latter by having lower branches of arista fewer, aedeagus sagittated (rod-shaped in *arenga*), caudoventral corner of epandrium triangular (rounded in *arenga*), and ventral narrow flap of epandrium curved and distally tapered (hooked in *arenga*).

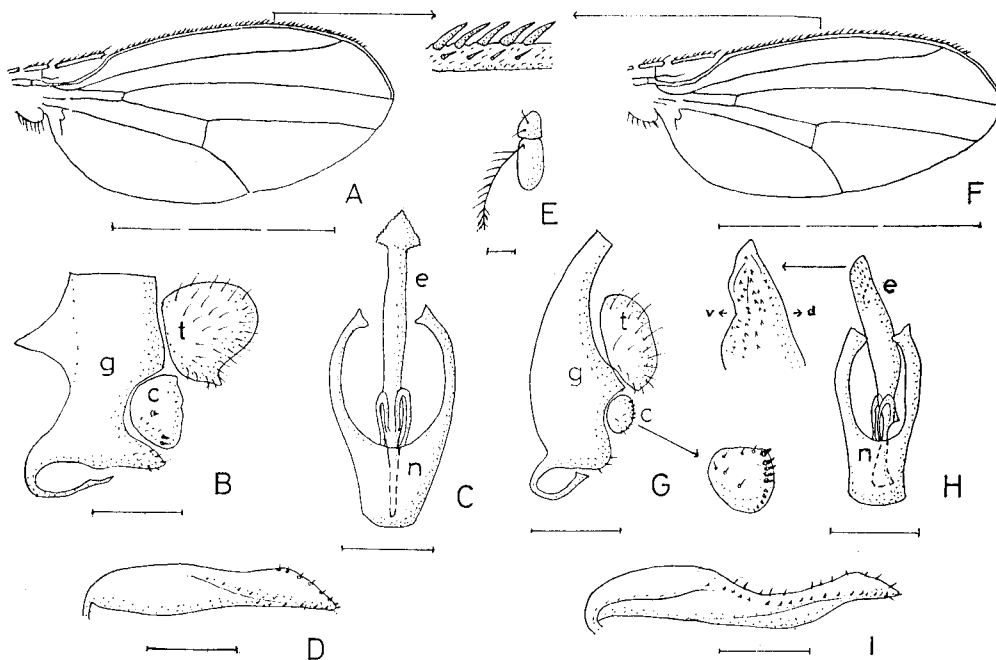


Fig. 1. A-E, *Colocasiomyia sagittata*; F-I, *C. pararenga*. A, F, wing; B, C, periphallalic organs; C, H, phallic organs; D, I, ovipositor; E, antenna. c, surstylus; e, aedeagus; g, epandrium; n, novasternum; t, cercus. Scales 1.0 mm for wings, 0.1 mm for other figs.

Colocasiomyia pararenga n. sp.

(Fig. 1 F-I)

♂, ♀. Body about 1.7 mm in length. Eye dark red, with pile. Antennae yellowish white, broadly separated from each other at bases. Arista with about 8 upper and 2 lower branches, lower branches confined to distal end of arista. Palpus yellowish white. Ocellars outside ocellar triangle, which is yellowish white. Periorbit yellowish gray. Frons yellowish gray, anterior 1/3 yellowish white. Face yellowish white. Carina large, broad below. Clypeus yellowish white. Cheek yellowish white, about 1/8 as broad as greatest diameter of eye. Anterior reclinate orbital small, nearer to posterior reclinate than to proclinate. Second oral small. Mesoscutum yellowish brown. Thoracic pleura paler. Humerals 2. Acrostichal hairs in 4 rows. Anterior dorsocentrals half of posteriors; distance between anterior and posterior dorsocentrals half of distance between anterior pair. Lateral scutellars parallel, 2/3 of apicals, which are slightly nearer to each other than to laterals. Sterno-index about 0.3. Legs yellow; metatarsi as long as rest of tarsal joints. Wings (Fig. 1 F) hyaline. Costal chaetotaxy of B₂ type. C-index 2.6; 4V-index 1.9; 4C-index 1.0; 5x-index 2.3; Ac-index 2.8; C3-fringe 1/5. Halter yellow. Abdominal tergites mostly brownish black; proximal and caudal segments yellow. Periphallic organs (Fig. 1 G) pale yellowish gray. Epandrium with caudo-ventral corner rounded, ventral margin much elongated and curved, with distal end hooked. Surstylus rounded, distally with a row of about 5 black teeth and about 5 finer pale teeth. Cercus oblong. Phallic organs (Fig. 1 H) pale yellow. Aedeagus rod-shaped, distally finely spiculated. Ovipositor (Fig. 1 I) elongate, medially sinuated, marginally with fine bristles.

Type series. Holotype ♂, allotype ♀, 15♂, 36♀ paratypes: Sulawesi Utara, Noongan, 50 km S of Manado, 1,200 m, 3. XII. 1983 (H. KURAHASHI), collected together with the foregoing species.

II. Subdivision of the genus *Colocasiomyia*

Subdivision into species groups of the genus *Colocasiomyia* is attempted basing on four diagnostic characters (A, D', G, V) (A, D', G, as used in OKADA, 1988; V, newly coined). Each character is divided into two character state (0, 1). A dendrogram is made by means of MCD proximity analysis and UPGMA cluster analysis (Table 1, Fig. 2).

Table 1. Original n (characters) × t (taxa) matrix of three species groups of the genus *Colocasiomyia*.

t	n	A	D'	G	V
i. <i>Cristata</i> group		1	1	1	1
ii. <i>Baechlii</i> group		1	0	1	1
iii. <i>Arenga</i> group		0	0	0	0

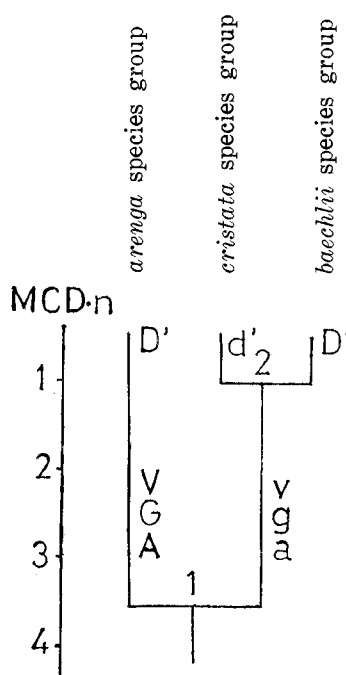


Fig. 2. A dendrogram of relationship of three species groups of the genus *Colocasiomyia*. Numerical figures at the branching points are order of key couplets; alphabetical signs are character states; n, number of characters.

- A. Wing with costal bristles strong (A=0) or weak (=1).
- D'. Conical process of male 6th abdominal sternite absent (D'=0) or present (d'=1).
- G. Surstylus developed (G=0) or absent or vestigial (g=1).
- V. Stout bristles of 2nd tarsal joint of fore leg absent (V=0) or present (v=1).

i. *cristata* species group

Wing with costal bristles weak (a), surstylus absent or vestigial (g), excluding *alocasiae* and *xenalocasiae*, stout bristles of 2nd tarsal joint of fore leg present (v), conical process of male 6th abdominal sternite present (d'). Host plants *Colocasia* and *Alocasia* (family Araceae) so far as known.

Including nine named and an unnamed species; *colocasiae* DUDA, 1924 (Burma, Thailand, Malaya n. loc.*, Java, Ceram n. loc.**, Sulawesi), *alocasiae* (OKADA, 1975) (Okinawa, Taiwan, China), *cristata* DE MEIJERE, 1914 (Java), *diconica* (TODA et OKADA, 1983) (Burma, Sri Lanka, Thailand, Java, Sulawesi), *iskandari* (OKADA, 1986) (Java), *pistilicola* (CARSON et OKADA, 1980) (Papua New Guinea), *seminigra* (DUDA, 1923) (Papua New Guinea), *stamenicola*

(CARSON et OKADA, 1980) (Papua New Guinea), *xenalocasiae* (OKADA, 1975) (Okinawa, Taiwan, China), and an unnamed species (Java: YAFUSO & OKADA, 1990).

* 5♂, 2♀, Kuala Lumpur, 3.VIII.1987 (KAWAMURA), ex *Alocasia*; ** 3♂, Wasa, 15 km S. of Wahai, 28.VIII.1987, ISKANDAR, ex *Colocasia esculenta*.

ii. *baechlii* species group

Wing with costal bristles weak (a), surstylus absent or vestigial (g), stout bristles of 2nd tarsal joint of fore leg present (v), conical process of male 6th abdominal sternite absent (D'). Host plants: *Aglaonema*, *Colocasia* and *Homalomena* (family Araceae) so far as known.

Including eight named and an unnamed species; *baechlii* (OKADA, 1986) (Malaya), *bogneri* (OKADA, 1986) (Malaya), *gigantea* (OKADA, 1987) (Java), *sulawesiana* OKADA et YAFUSO, 1989 (Sulawesi), *toshiokai* (OKADA, 1983) (Philippines), *zeylanica* (OKADA, 1986) (Sri Lanka), *xanthogaster* YAFUSO et OKADA, 1990 (Java), *heterodonta* YAFUSO et OKADA, 1990 (Java) and an unnamed species (Sulawesi; OKADA & YAFUSO, 1989).

iii. *arenga* species group

Wing with costal bristles strong (A), surstylus developed (G), stout bristles of 2nd tarsal joint of fore leg absent (V), conical process of male 6th abdominal sternite absent (D'). Host plants: *Homalomena*, *Aglaonema* (family Araceae) and *Arenga* (family Palmae) so far as known.

Including three named species: *arenga* (OKADA, 1987) (Java), *pararenga* OKADA n. sp. and *sagittata* OKADA n. sp. (Sulawesi).

Key to species of the *arenga* species group

Six diagnostic characters (F, K'', W, X, Y, Z: F as used in OKADA, 1988, others newly coined), each divided into two character states (0, 1), are used for constructing a dendrogram of relationships of the species of the *arenga* species group by means of MCD and UPGMA analyses. A key to the species is established from the dendrogram.

- F. Caudovertral corner of epandrium rectangular (F=0) or acute-angular (f=1).
- K''. Ovipositor not sinuated (K''=0) or sinuated (k''=1).
- W. Aedeagus rod-shaped (W=0) or sagittated (w=1).
- X. Arista with lower branches on distal half of arista (X=0) or on distal end (x=1).
- Y. Abdominal tergites blackish (Y=0) or yellowish (y=1).
- Z. Mesopleuron dark (Z=0) or pale (z=1).

Key

- 1. Ovipositor not sinuated (K''), caudoventral corner of epandrium acute-angular (f), aedeagus sagittated (w), arista with lower branches on distal end (x), abdominal tergites yellowish (y), mesopleuron dark (Z) *sagittata*
- Ovipositor sinuated (k''), caudoventral corner of epandrium rectangular (F), aedeagus rod-shaped (W), abdominal tergites blackish (Y), mesopleuron pale (z) 2
- 2. Arista with lower branches on distal half (X) *arenga*
- Arista with lower branches on distal end (x) *pararenga*

III. Abdominal coloration adaptive to microenvironments

Nothing is known about ecology of the two new species, except that they were collected simultaneously. It is, however, suggested that they inhabit as a synhospitolic couple the flowers of probably *Palmae*. Because, the related species, *C. arenga*, is known to be associated with the flowers of *Arenga pinnata* MERRILL (family *Palmae*) in Java. Furthermore, it is plausible that *C. sagittata*,

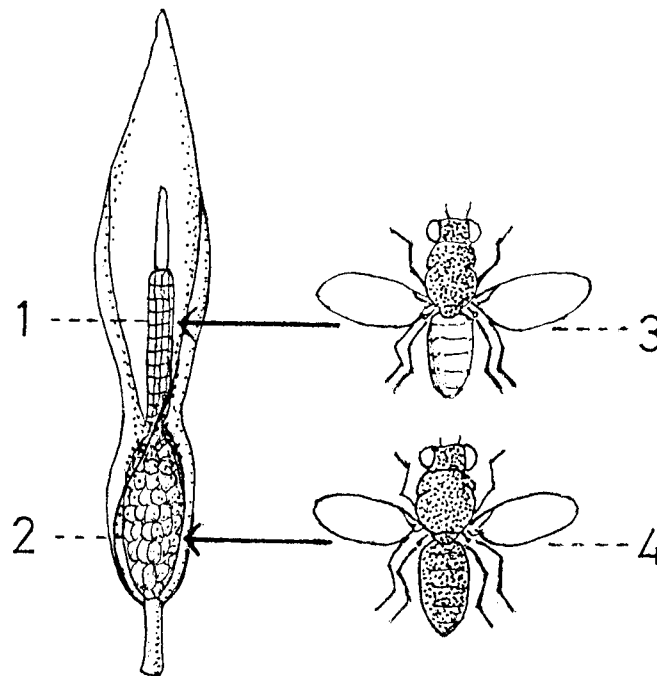


Fig. 3. Abdominal color adaptation of synhospitolic couple of *Colocasiomyia* to the microenvironments of host flowers (*Colocasia*). 1. staminate flower, 2. pistillate flower, 3. stamencilous species, 4. pistilicolous species.

having dark abdominal tergites, is pistilicolous. Because, some known stamencolous species such as *C. colocasiae* of northern area (Burma, Thailand) and *C. stamencicola* have abdominal tergites paler than in their pistilicolous partners, *C. diconica* and *C. pistilicola* (Fig. 3).

The paler abdominal color in the stamencolous species (Fig. 3, 3) should be more adaptive to the relatively open or light microenvironment of staminate flower (Fig. 3, 1) and the darker abdominal color in the pistilicolous species (Fig. 3, 4) to the darker microenvironment of pistillate flower (Fig. 3, 2). Synhospitalic couple from Java, *C. xanthogaster* and *C. heterodonta*, also have a similar relationship. There are, however, exceptional cases in which both stamencolous and pistilicolous species have dark abdominal tergites, e.g., in couples of *C. alocasiae* and *C. xenalocasiae* and *C. colocasiae* from Malaya, Java and Sulawesi and *C. diconica*.

Acknowledgements

My sincere thanks are due to Dr. H. KURAHASHI of National Institute of Health, Tokyo, Dr. D. T. ISKANDAR of Bandung Institute of Technology and Mr. F. KAWAMURA of the University of the Ryukyus for providing me with material.

摘 要

岡田豊口（東京都）——タロイモショウジョウバエ属 (*Colocasiomyia*) (双翅目ショウジョウバエ科) の種群創設とスラウェシ産 2 新種の記載および共寄主種の体色の微環境への適応。

タロイモショウジョウバエ属 *Colocasiomyia* に 3 種群, すなわち *cristata* 種群, *baechlii* 種群, *arenga* 種群, を創設し, スラウェシ産の 2 新種 *C. sagittata*, *C. pararenga* を記載した。また共寄主種の腹部色彩の微環境への適応現象を考察した。

References

- OKADA, T. 1980. Synhospitalic evolution of the genus *Drosophilella* DUDA (Diptera, Drosophilidae), with description of a new species from Okinawa and Taiwan. *Kontyû, Tokyo*, 48: 218-225.
- 1988. Taxonomic note on *Colocasiomyia cristata* DE MEIJERE (Diptera, Drosophilidae) with genetic synonymy. *Proc. Japan. Soc. syst. Zool.*, (37): 34-39.
- OKADA, T. and M. YAFUSO 1989. The genus *Colocasiomyia* DUDA (Diptera, Drosophilidae) from Sulawesi. *Proc. Japan. Soc. syst. Zool.*, (39): 48-55.
- YAFUSO, M. and T. OKADA 1990. Complicated routes of the synhospitalic pairs of the genus *Colocasiomyia* in Japan with descriptions of two new species (Diptera, Drosophilidae). *Esakia*, Special Issue 1: 137-150.