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The Genus *Colocasiomyia* DUDA (Diptera, Drosophilidae) from Sulawesi

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Synopsis

OKADA, T. and YAFUSO 1989——The genus *Colocasiomyia* DUDA (Diptera, Drosophilidae) from Sulawesi. *Proc. Japn. Soc. syst. Zool., Tokyo*, No. 39: 48–55.

A new and an undetermined species of the genus *Colocasiomyia* DUDA associated with the flowers of *Alocasia macrorrhiza* SCHOTT are recorded from Sulawesi. The undetermined species is known only by early stages and is found in the staminate and transitional portions of the flowers, while the early stages of the new species are in the pistilate portion.

The present report deals with a new an undetermined species of the genus *Colocasiomyia* DUDA (Diptera, Drosophilidae) from Sulawesi. The collections, ecological observations and description of early stages were made by the junior author, and description of adult flies by the senior author.

Descriptions of Species

Colocasiomyia sulawesiana OKADA et YAFUSO, n. sp.

(Figs. 1–2)

Body about 2.0 mm in length. Eye purple red, piled. Antenna with 2nd joint yellowish orange, 3rd brownish black, basally pale. Arista short, pubescent. Palpus black. Ocellar triangle mat black. Ocellars inserted outside ocellar triangle. Periorbit mat black, not well demarcated. Frons quadrate, finely tuberculated, mat black, anteriorly dark yellowish brown. Face brown, laterally black. Carina large, 1/4 as broad as the greatest diameter of eye. Anterior reclinate orbital small. Vibrissa large, other orals fine. Mesoscutum mat black, with a yellowish longitudinal streak above humerus. Scutellum mat black, broader than long. Thoracic pleura black, lower half of humerus and longitudinal suture yellowish brown. Humerals 3. Acrostichal hairs in 4 rows. Prescutellars absent. Anterior dorsocentrals shorter than posteriors, equally apart from each other and from posteriors. Lateral scutellars divergent, as long as apicals, which are slightly nearer to each other than to laterals. Sterno-index 0.8, sternopleurals short. Legs brownish black, both ends of femora and tibiae yellowish. Tarsi yellow, distally

black. Second tarsal joint of fore leg protruded, with about 5 black teeth in 2 rows (Fig. 1B). Wing (Fig. 1A) hyaline, costal chaetotaxy B_1 type (HACKMAN & VÄISÄNEN, 1985). C-index 2.0; 4V-index 1.6; 4C-index 1.2; 5x-index 1.0; Ac-index 2.6; C1-bristles 2; C3-fringe obscure. Halter black, stalk yellowish brown. Abdominal tergites mat black. Abdominal sternites grayish, male 6S laterally divided, without protuberances. Male genitalia of *pistilicola* type. Ovipositor (Fig. 1F) slender, brownish black. Periphallic organs (Fig. 1C) epandrium rectangular at caudolateral corner. Cercus oval. Surstylus absent. Phallic organs (Fig. 1D) oblong, without dorsal process. Female cercus (Fig. 1E) triangular.

Egg (Fig. 1G) oblong, 0.7×0.13 mm, without filament. Third instar larva (Fig. 2A) 6–7 mm in length. Posterior spiracle with divergent stalks which are about 1/5 as long as elongated 9th abdominal segment. Cephalopharyngeal skeletons (Fig. 2C) dark; mouth hook weakly curved ventrally, with 8–10 small ventral teeth. Latticed process of pharyngeal sclerite long; dorsal wing slender. Puparium (Fig. 2B) about 4.5 mm in length, strongly convexed ventrally, pale yellowish brown, thus, young adult is seen through puparial case.

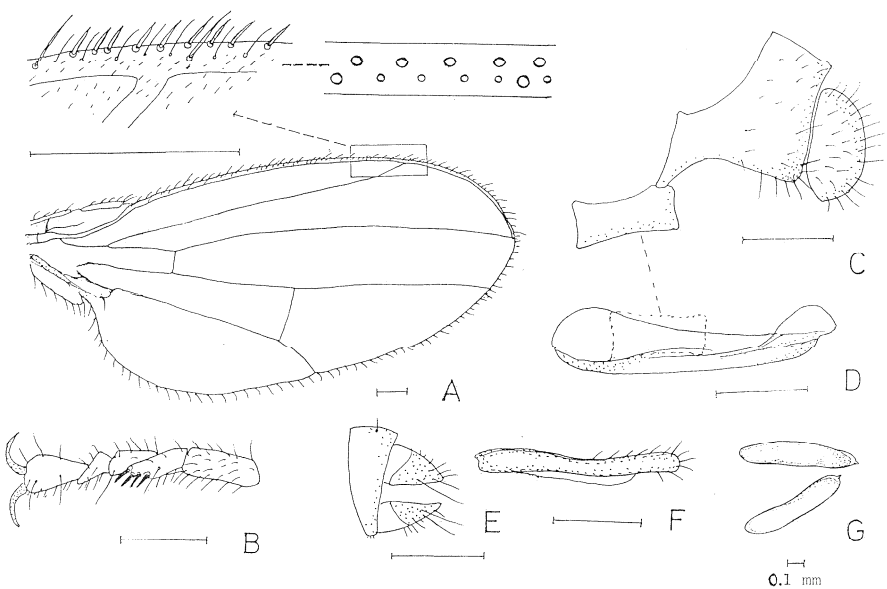

Fig. 1. *Colocasiomyia sulawesiana* n. sp.——A, wing, with costal chaetotaxy; B, tarsi of fore leg; C, periphallic organs; D, phallic organs; E, female cercus; F, ovipositor; G, eggs. Scale ~~1 mm for eggs,~~ 0.1 mm ~~for other figs.~~

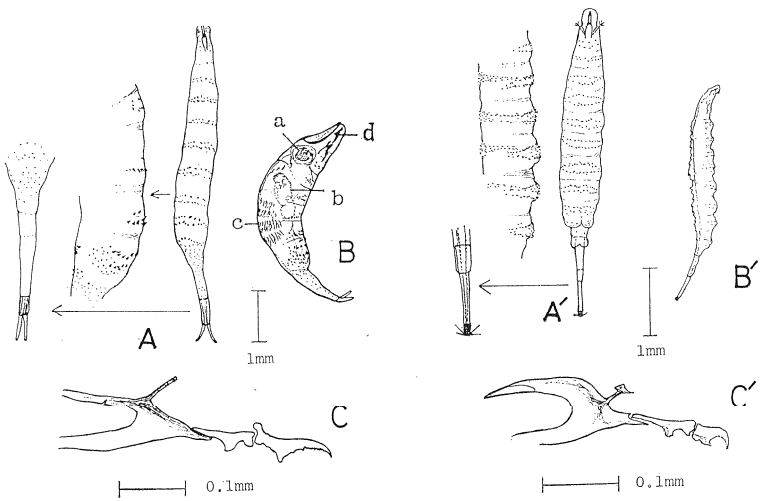

Fig. 2. A–C, *Colocasiomyia sulawesiana* n. sp.——A′–C′, *C.* sp. A, A′, 3rd instar larva; B, puparium; B′, 2nd instar larva; C, C′, cephalopharyngeal skeletons of the 3rd instar larva. a–e, adult features seen through puparium; a, compound eye; b, costal bristles of the fore wing; c, abdominal dorsal bristles; d, mouth hook of the 3rd instar larva.

Holotype ♂, Pang, Sulawesi, 5. XII. 1987 (YAFUSO); paratypes, 6♂, 9♀ incl. 1♀ allotype, same data as holotype; 7♂, 1♀, Pangli, Tana Traja, Sulawesi, 4. XII. 1987 (YAFUSO); 3♂, Ujung Pandang, Sulawesi, 6. XII. 1987 (YAFUSO). All ex flowers of *Alocasia macrorrhiza* SCHOTT (Araceae). Type series is deposited in the National Science Museum (Nat. Hist.), Tokyo.

Relationships. This species resembles *C. zeylanica* (OKADA) in having male 6S without projections, aedeagus without basal process and paramere absent, but differs from *zeylanica* in costal chaetotaxy of B_1 type (B_2 in *zeylanica*), surstylus absent, ovipositor slender and second tarsal joint of fore leg with about 4 teeth (2 in *zeylanica*). The number and arrangement of the teeth are as in *C. colocasiae* (DUDA).

Colocasiomyia sp.

(Fig. 2)

Larva (Fig. 2A′–C′) very similar to that of *C. stamenicola* (CARSON et OKADA) in having body hooklets very fine, caudal abdominal segments ending in short posterior spiracles. First instar larva about 0.9 mm in length. Cephalopharyngeal skeletons white, opaque. Dorsal and ventral

hooklets of body pale. Second instar larva (Fig. 2B′) 1–2.8 mm in length. Dorsal abdominal hooklets about 26, which look like white scales in lateral view. Cephalopharyngeal skeletons opaque. Third instar larva (Fig. 2A′) about 3.5 mm in length. Cephalopharyngeal skeleons (Fig. 2C′) dark, distinct. Mouth hook strongly curved ventrally, with 5–7 small ventral teeth.

Collection data of larvae. 50, Benteng, 3. XII. 1987; 1, Rapang, 3. XII. 1987; 190, Pangli, 4. XII. 1987; 11, Pana, 5. XII. 1987. All ex spadices of *Alocasia macrorrhiza*, col. by YAFUSO.

Ecological Observations

I. *Material and methods*

Collections were made in South Sulawesi, Indonesia, 3–6. XII. 1987. The spadices of five species belonging to five genera of the family Araceae were taken from a lots of gardens from Ujung Pandang (near sea level) to Tana Traja (about 800 m alt.), at a distance of about 350 km.

When a young spadix of Stage II (Fig. 4) was found, the entire

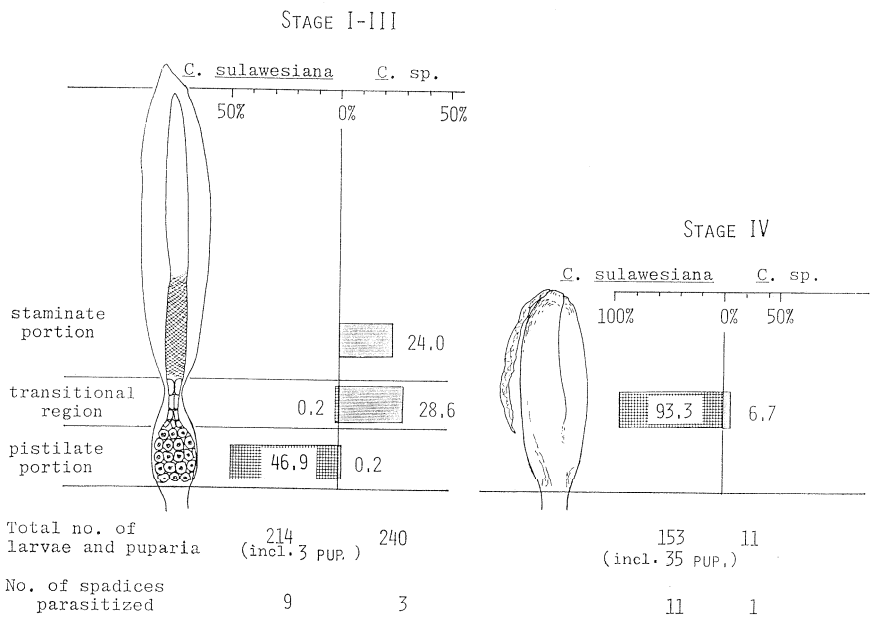

Fig. 3. Microallopatric distribution of the larvae andpuparia of *Colocasiomyia sulawesiana* n. sp. and *C.* sp., in young (Stage I-II,, Fig. 4) and old (Stage IV, Fig. 4) spadices of *Alocasia macrorrhiza* in S. Sulawesi.

Table 1. Host selectivity of *Colocasiomyia sulawesiana* and *C.* sp. in South Sulawesi.

Plant	No. of spadices examined	No. of spadices parasitized
Alocasia macrorrhiza	54	25
Xanthosoma sagittifolium	7	—*
Caladium bicolor	16	0
Diffenbachia sp.	2	0
Potos sp.	1	0

* No adult fly was found. But the evidence of the absence of *Colocasiomyia* larvae could not be obtained because the inflorescences decayed too much to be examined.

spadix was imprisoned with a small gauze net, and all of the adult flies resting in the flower were aspirated without loss. Individual spadices of Stage I–IV were put into 70% alcohol and dissected into three parts to examine for eggs, larvae and puparia.

II. *Results and discussion*

1. The plants of Araceae parasitized by *Colocasiomyia*

Various species of the family Araceae were found growing in the gardens or along roads of horticultural yards in the country sites. In total, 80 spadices of five species belonging to five genera of Araceae were examined, of which 54 were giant taro, *Alocasia macrorrhiza* SCHOTT. This plant was common and abundant in gardens. All of the eggs, larvae, puparia as well as adult flies were found associated with the spadices of *A. macrorrhiza*, while none in four other species of Araceae (Table 1). Twenty five out of 54 examined spadices were found parasitized, of which 21 were parasitized by *C. sulawesiana* only, one by *C.* sp. only, and three served as breeding sites for the two species together. Flowering plants provided all stages of flowers at least in December in South Sulawesi (Fig. 4).

2. Microallopatric distribution between the larvae of the two species

The larvae of the two species of *Colocasiomyia* exibited a distinct habitat segregation between species (Fig. 3). The stamenicolous species (*C.* sp.) occupied the staminate portion and transitional region exclusively. Among 131 larvae obtained there, only one was *C. sulawesiana*. On the other hand, in the examination of the pistilate portion, *C. sulawesiana* occupied 99.1% of the total number of the larvae. Although such trend agreed with that so far known in other synhospitalic couples (CARSON & OKADA, 1980; TODA, 1980; HONDA-YAFUSO, 1983), microallopatric distribution between the Sulawesian couple in a host

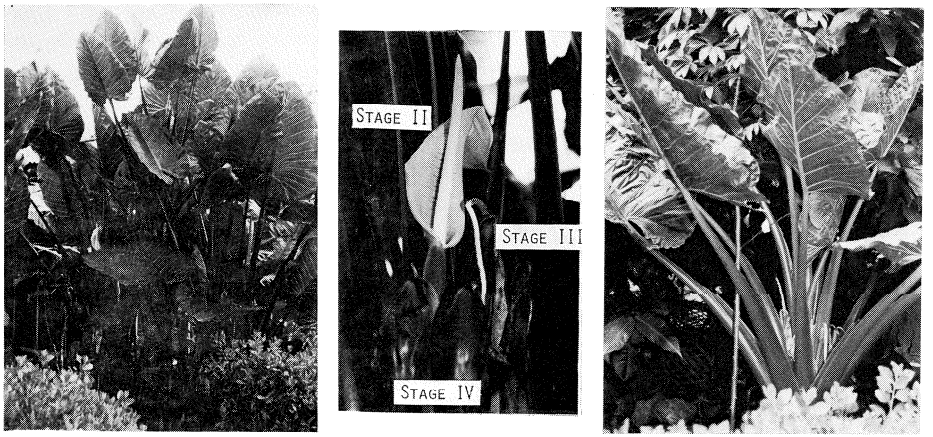

Fig. 4. *Alocasia macrorrhiza*. Left, cultivar of the right specimens; middle, some developmental stages of the spadices. Stage I, buds, not seen in this picture; stage II, young spadix; stage III, staminate portion decays or withers, no fly visits the spadices; stage IV, staminate portion drops off, pistilate portion is swollen; stage V, fruit ripens and spathe opens, not seen in this photo.

spadix was much more distinct than in others.

3. Interspecific difference in polulation structure

Population structures of the two species of *Colocasiomyia* were compared in relation to the developmental stages of the host spadices (Fig. 5). The young spadices at Stage I did not attract *Colocasiomyia*; one larva of *C. sulawesiana* found in this stage may be an exception. This is unlike *Colocasia esculenta* SCHOTT in Papua New Guinea, in which the inflorescences at Stage I attracted adult flies (CARSON & OKADA, 1980).

Colocasiomyia sp. No adult fly of this stamenicolous species was found in the young flowers at Stage II. Neither egg nor puparium was collected in the spadices at any stage. On the other hand, the larvae were abundantly included in the spadices at Stage III. They were in the proportion of 94.8% 1st and 2nd instar larvae to 5.2% 3rd instar larvae. A part of the 1st and 2nd instar larvae were collected from a spadix at Stage IV.

Colocasiomyia sulawesiana. Contrary to *C.* sp., all developmental stages were found in *sulawesiana* population. This species parasitized spadices not only of Stage III and IV but of Stage II. Eight eggs were included altogether within a spadix at Stage II which harbored eight females. The larvae and puparia were found in the spadices at Stage

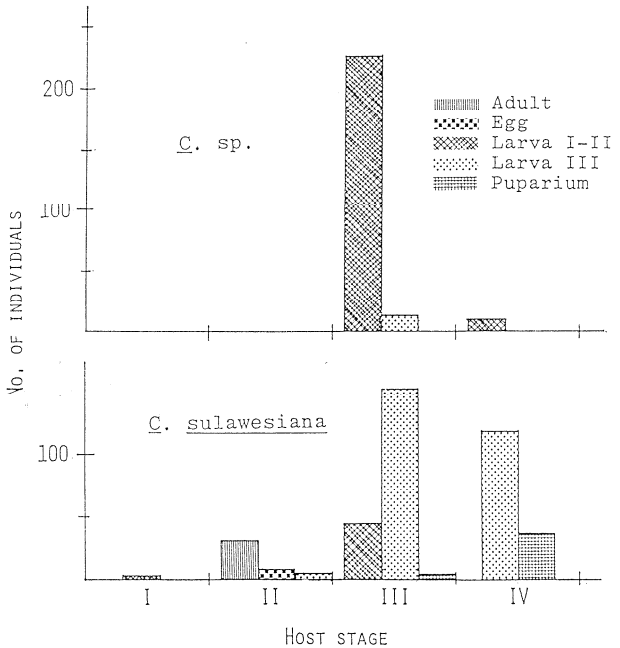

Fig. 5. Populaiion structure of *Colocasiomyia* sp. and *C. sulawesiana* n. sp. in relation to the developmental stage of the host spadix.

III and IV. The individual numbers summed up for the 1st and 2nd instar larvae were 44 (12.5%), whereas the 3rd instar larvae occupied the greater part of the population (76.2%). In spite of a large number of the 3rd instar larvae, the puparia were unexpectedly small in the number, 38 (10.8%).

These results suggest the interspecific difference in the life histories. The females of *C.* sp. may visit the host spadix later than the females of *C. sulawesiana*, and may oviposit on the spadix at late Stage II or early Stage III. The larvae may complete their 2nd instar period within the spadix at Stage III and then drop from the plant on the ground together with the remnant of the upper part of the spadix. The death rate of the 3rd instar larvae may greatly increase in dry season, because the staminate portion and the spathe may soon wither and fall down on the ground or may still remain on the stalk of the host plant instead of decaying. Such a dry condition could not be accepted by drosophilid larvae. Thus, it is considered that the 3rd instar period of the stamenicolous species might be very short, adaptive for limited supply of larval breeding site. The 3rd instar larvae of this species should emigrate for pupation from the withering spadix under litter or in the ground.

The great abundance of the 3rd instar larvae of *C. sulawesiana* suggests relatively long period of this instar. In fact, the larvae of *C. sulawesiana* were much larger than those of *C.* sp. as shown in Fig. 2. The larvae of this period may spend enough long time to be well grown within the pistilate portion being protected by the hard spathe, which gives them an aquatic condition even in the dry season. The large number of the 3rd instar larvae may be the cumulative number of the individuals coming to the 3rd instar for a few weeks.

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摘　　要

岡田豊日（東京都世田谷区豪徳寺 2-30-18）・屋富祖昌子（琉球大学農学部）——スラウェシのタロイモショウジョウバエ属.

1987年12月スラウェシ南部で，クワズイモ（*Alocasia macrorrhiza*）の花からタロイモショウジョウバエの2種（*Colocasiomyia sulawesiana* n. sp. および *C.* sp.）が得られた．両種の幼虫から成虫にいたる生活史を比較検討した．花中の幼虫の分布を調べた結果，*C. sulawesiana* は雌花部に，*C.* sp. は雄花部および中間部に，顕著なすみわけが行われていることが確認された．サトイモ科の他の4種の花も調べたが，それらには幼虫が発見されなかった.

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