

A New Species-group of the Genus *Colocasiomyia* de Meijere (Diptera: Drosophilidae), with Descriptions of Two New Species from Eastern Malaysia and Vietnam

Farhat SULTANA¹, Masanori J. TODA¹, Masako YAFUSO², Maklarin B. LAKIM³, Maryati Bte MOHAMED⁴ and Nguyen Manh CUONG⁵

¹*Institute of Low Temperature Science, Hokkaido University, Sapporo, 060–0819 Japan*

²*Entomological Laboratory, Faculty of Agriculture, University of the Ryukyus, Nishihara, Okinawa, 903–0213 Japan*

³*Research and Education Division, Sabah Parks, P.O. Box 10626, 88806 Kota Kinabalu, Sabah, Malaysia*

⁴*Institute for Tropical Biology and Conservation, Universiti Malaysia Sabah, Permanent Campus, Sepangar Bay, Locked Bag No. 2073, 88999 Kota Kinabalu, Sabah, Malaysia*

⁵*Cuc Phuong National Park Museum, Nho Quan District, Ninh Binh Province, Vietnam*

Abstract. A new species-group of the genus *Colocasiomyia* de Meijere is established, with descriptions of two new species, *C. nigricauda* Sultana & Toda, sp. nov. and *C. erythrocephala* Sultana & Yafuso, sp. nov., found from eastern Malaysia and Vietnam. Supplementary descriptions of three known species and a key to all species of this new species-group are also provided.

Key words: Araceae, *Homalomena*, inflorescence, key, known species, *Colocasiomyia toshiokai* species-group.

Introduction

The genus *Colocasiomyia* de Meijere, 1914 is distributed from New Guinea to Sri Lanka (west) and to Ryukyu Islands (north) (Grimaldi, 1991). Adult flies of this genus are found exclusively in living fresh flowers, mostly of Araceae or of Arecaceae and Magnoliaceae, and breed on them so long as known (de Meijere, 1914; Carson & Okada, 1980; Toda & Okada, 1983; Honda-Yafuso, 1983; Okada, 1987; Okada & Yafuso, 1989; Yafuso & Okada, 1990; Yafuso, 1994; Yafuso *et al.*, 2000). Up to the present, a total of 23 species have been described. Studying 20 species of them, Okada (1990) classified them into three species-groups, the *cristata*, the *baechlii* and the *arenga* groups, based on the result of a phenetic analysis. On the other hand, Grimaldi (1991) proposed a phylogenetic hypothesis based on the result of a cladistic analysis with a matrix of 22 adult morphological characters and 20 species, which was inconsistent with Okada's classification. The *baechlii* species-group in particular was not monophyletic in Grimaldi's (1991) cladogram. Instead, three species, *C. toshiokai* (Okada, 1983), *C. xanthogaster* Yafuso & Okada, 1990 and *C. heterodonta* Yafuso & Okada, 1990, which were included in the *baechlii* group of Okada's

classification, formed a monophyletic group supported by four synapomorphies. Recently, two undescribed species that share not only the synapomorphies pointed out by Grimaldi (1991) but also several other synapomorphies with the three known species were found from eastern Malaysia and Vietnam. We establish here a new species-group comprising these five species, with descriptions of the two new species and supplementary descriptions for the three known species.

Materials and Methods

The specimens studied were preserved in 70% ethanol or dried and pinned. External morphology was observed under a stereoscopic dissecting microscope and metric characters were measured with an ocular micrometer. To observe the detailed structure of head, male legs and male and female terminalia, respective organs were detached from the body, cleared by warming in 10% KOH solution around 100°C for several minutes, and observed in a droplet of glycerol under a compound light microscope. The dried, pinned specimens were softened by warming in 70% ethanol for several minutes before dissection. Drawings were made on the basis of microscope photo-

graphs taken by a digital camera. Ordinary and scanning electron microscope photographs were taken of some characters.

The examined specimens are deposited in the following institutions: Cuc Phuong National Park Museum, Vietnam (CPNP); Faculty of Agriculture, University of the Ryukyus, Okinawa, Japan (FAUR); Institute for Tropical Biology and Conservation, Universiti Malaysia Sabah, Kota Kinabalu, Sabah, Malaysia (ITBC); Kinabalu Park, Sabah Parks, Sabah, Malaysia (KSPS); Museum Zoologicum Bogoriense, Bogor, Indonesia (MZB); National Science Museum, Tokyo, Japan (NSMT); Systematic Entomology, The Hokkaido University Museum, Hokkaido University, Sapporo, Japan (SEHU).

Description

Characters seen in all species are first described as common characters of the species-group and are not referred to in the subsequent description of each species. The descriptions for known species are supplementary to the original, not repeating the descriptions of known characters except when correction is

needed. We followed McAlpine (1981) for morphological terminology, Zhang & Toda (1992) for the definitions of measurements and indices (Table 1).

The *Colocasiomyia toshiokai* species-group

Diagnosis. First flagellomere with large, hollow organ on proximal, inner margin (Fig. 1A). Palpus with hollow, sensory organ (Figs. 1B, C). Prementum laterally with a pair of spherical bumps covered with numerous, short, stout setae (Fig. 1C). Surstylus long, basoventrally fused to epandrium and basodorsally to cercus (Fig. 2). Cercus ventrally with conspicuous elongation curved posterior (Fig. 2). Aedeagus basally with a pair of strongly sclerotized processes (Figs. 3, 4). Oviscapt with peg-like, apically round ovisensilla; anteroventral bridge absent (Fig. 5).

Description (σ^7 and ♀). Head: Occiput, ocellar triangle and fronto-orbital plate glossy, usually dark brown. Supracervical setae tapered to apex, thin, apically curved and pointed. Dorsolateral arms of tentorial apodeme divergent; dorsomedial arm shorter than 1/2 of dorsolateral arm. Frontal vittae anteriorly

Table 1. Explanation of morphological measurements and indices.

BL	straight distance from anterior edge of pedicel to tip of abdomen
ThL	distance from anterior notal margin to apex of scutellum
WL	distance from humeral cross vein to wing apex
WW	maximum wing width
arb	dorsal branches / ventral branches of arista
FW/HW	frontal width / head width
ch/o	maximum width of gena / maximum diameter of eye
prob	proclinate orbital seta / posterior reclinate orbital seta in length
rcorb	anterior reclinate orbital seta / posterior reclinate orbital seta in length
vb	subvibrissal seta / vibrissa in length
dcl	anterior dorsocentral seta / posterior dorsocentral seta in length
presctl	prescutellar seta / posterior dorsocentral seta in length
sctl	basal scutellar seta / apical scutellar seta in length
sterno	anterior katepisternal seta / posterior katepisternal seta in length
orbito	distance between proclinate and posterior reclinate orbital setae / distance between inner vertical and posterior reclinate orbital setae
dcp	length distance between ipsilateral dorsocentral setae / cross distance between anterior dorsocentral setae
sctlp	distance between ipsilateral scutellar setae / cross distance between apical scutellar setae
C	second costal section between subcostal break and R_{2+3} / third costal section between R_{2+3} and R_{4+5}
4c	third costal section between between R_{2+3} and R_{4+5} / M_1 between r-m and dm-cu
4v	M_1 between dm-cu and wing margin / M_1 between r-m and dm-cu
5x	CuA_1 between dm-cu and wing margin / dm-cu between M_1 and CuA_1
ac	third costal section between R_{2+3} and R_{4+5} / distance between distal ends of R_{4+5} and M_1
M	CuA_1 between dm-cu and wing margin / M_1 between r-m and dm-cu
C3F	length of heavy setation in third costal section / (length of heavy setation in third costal section + length of light setation in third costal section)

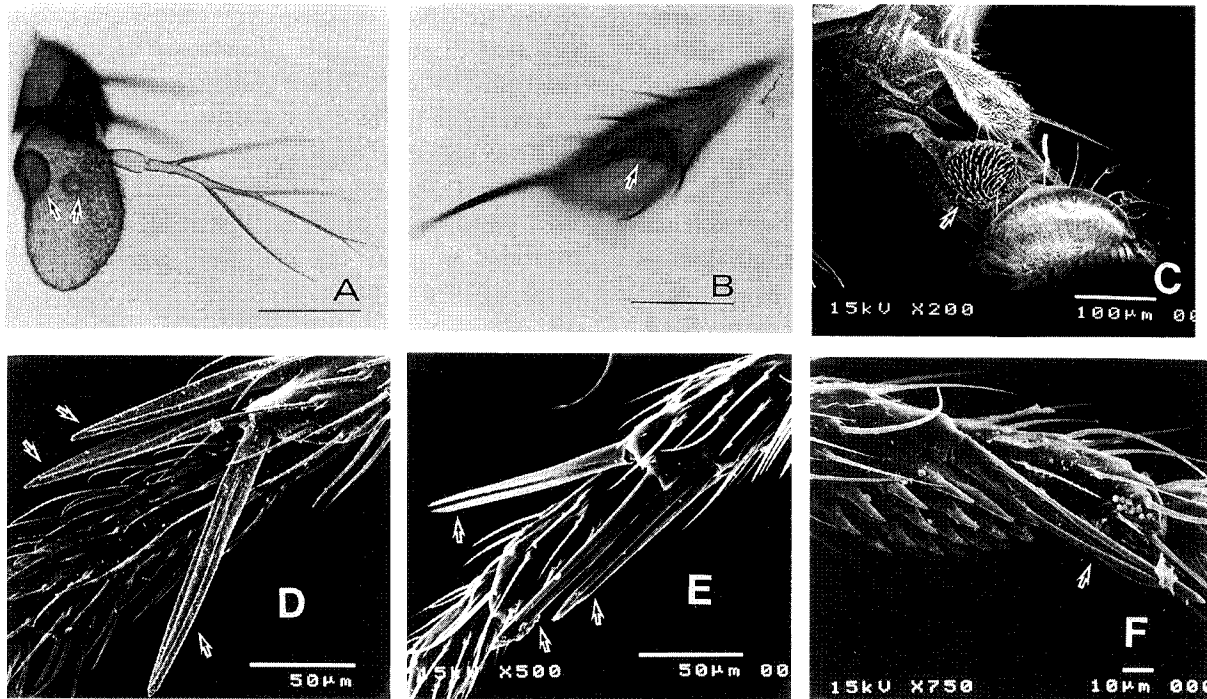


Fig. 1. A, Antenna (A), palpus (B), mouthparts (C) and fore tarsus (D-F). A, E, *Colocasiomyia nigricauda* Sultana & Toda, sp. nov. ♂ (from Poring, Mt. Kinabalu, Sabah, Malaysia); B, C, F, *Colocasiomyia heterodonta* Yafuso & Okada ♂ (from Bogor, Java, Indonesia); D, *Colocasiomyia xanthogaster* Yafuso & Okada ♂ (from Bogor, Java, Indonesia). Scales=0.1 mm in A and B.

with several, minute, interfrontal setulae. First flagellomere grayish yellow, with 1 small, internal organ (Fig. 1A). Facial carina highly elevated. Postgena grayish orange. Palpus with 1 prominent, terminal and several, short, subapical to lateromedian setae (Figs. 1B, C). Cibarium thickened on anterior margin, distinctly protruded at anterolateral corners; dorsal sclerite oval in dorsal view, nearly flat in lateral view; 4 anterior, cibarial sensilla, arranged in transverse row, situated before anterior margin of hypopharynx; medial and posterior, cibarial sensilla very long except for 2-3 most posterior sensilla; hypopharyngeal apodeme absent in anterior portion. Prementum nearly flat in lateral view (Fig. 1C). Labellum short but very wide (Fig. 1C).

Thorax: Postpronotal lobe grayish brown. Single pair of prescutellar setae present. One small seta present just below anterior, katapisternal seta.

Wings: Veins grayish yellow; crossveins not clouded; bm-cu crossvein absent; R_{2+3} nearly straight; R_{4+5} and M_1 nearly parallel. Single C_1 seta. Halter grayish yellow; basal and anterodorsal parts of knob darker than other parts.

Legs with preapical, dorsal seta on every tibia and apical seta on mid tibia. Mid and hind tarsi each with a row of cuneiform setulae along anteroventral ridge.

Male terminalia (Figs. 2-4): Epandrial, antero-

ventral corner narrowly elongated below. Cercus with pubescence except for ventral part, articulated with medial node on epandrial, caudal margin. Membrane between epandrium and cercus with pubescence dorsomedially. Hypandrium as narrow as aedeagal apodeme, without paramedian setae and pubescence, mediolaterally articulated with apex of ventral elongation of epandrium, posteriorly bifurcated. Aedeagus strongly curved ventrad, sclerotized on inner margin, articulated with aedeagal apodeme; distiphallus flexible, membranous; aedeagal apodeme rod-shaped, with short but broad, aedeagal guide.

Remarks. Toda *et al.* (in press) redefined the Okada's (1990) *baechlii* group as comprising two known species, *C. baechlii* (Okada, 1986) and *C. bogneri* (Okada, 1986), and 12 undescribed species found from Sabah in Borneo. Relationships among the *toshiokai* group, the revised *baechlii* group and a few others having been included in Okada's (1990) *baechlii* group will be dealt with elsewhere in a more comprehensive study on the phylogeny of the whole *Colocasiomyia*.

Colocasiomyia toshiokai (Okada)

(Figs. 2A, 3A, B, 5A)

Drosophilella toshiokai Okada, in Toda & Okada, 1983: 173.

Colocasiomyia toshiokai: Okada, 1988: 36.

Diagnosis. Surstylus sinuated, as thin as, but longer than ventral elongation of cercus (Fig. 2A). Oviscapt with patch of pubescence (Fig. 5A).

Description (σ^7 and ♀). Head: Supracervical and postocular setae 4–5 and 16–17 per side, respectively. Space between antennal sockets narrower than half of socket width; arista with 1 or 2 ventral branches. Facial carina as long as pedicel and 1st flagellomere combined, about half as broad as 1st flagellomere. Hollow, sensory organ of palpus rudimentary, small, shallow. Medial and posterior, cibarial sensilla 3–4 and 4–5 per side, respectively. Labellum with 11 pseudotracheae.

Thorax: Postpronotal lobe with 3 prominent setae; middle longest. Additional pair of dorsocentral setae absent; anterior, dorsocentral setae situated just beside transverse suture. Thoracic pleura grayish brown.

Legs: Foreleg 2nd tarsomere apically with 3 stout, black spines slightly shorter than 3rd and 4th tarsomeres combined.

Male terminalia (Figs. 2A, 3A, B): Epandrium with pubescence except for anterior margin and ventral portion, bearing 7–8 setae near dorsal to lateral margin and 4 setae near base of surstylus. Surstylus rounded at apex, with 4 minute setulae submedially to apically. Cercus with 14–15 setae; ventral elongation with about 4 minute setulae on ventrosubapical to apical margin. Hypandrium apically fused to parameres. Paramere about 2/3 as long as aedeagus, strongly curved ventrad, tapering distally, apically round and bearing 2 minute sensilla. Aedeagus tapering distally, truncate at apex; distiphallus protruding like long tube from dorsosubapical portion of aedeagus; aedeagal apodeme as long as aedeagus.

Female terminalia: Oviscapt (Fig. 5A) with 1–2 peg-like, apically round ovisensilla near medial, ventral margin; 1 pointed, lateral ovisensillum on subapical, mesal surface, and 4 and 1 long setae on apical, large and small projections, respectively.

Measurements: ThL=0.59–0.62 mm (in 2 σ^7), 0.69–0.75 mm (in 2 ♀); WL=1.15–1.18 mm (σ^7), 1.28–1.32 mm (♀); WW=0.52–0.54 mm (σ^7), 0.56–0.59 mm (♀).

Indices: FW/HW=0.56–0.59, orbito=0.75–1.00.

Specimens examined. The Philippines: Surigao, Mindanao, 1 σ^7 (holotype), 3 σ^7 , 3 ♀ (paratypes), 17.VII.1981, leg. Toshioka (NSMT).

Remarks. Okada described, “. . . second tarsal joint of fore leg apically with 2 long stout unequal black bristle, . . . Ovipositor (Fig. 3-H) . . . apically pointed and segmented” (Toda & Okada, 1983). Examining the type specimens, however, we confirmed that the

second tarsomere of foreleg bears three spines at apex and that the oviscapt is apically not segmented but protruded (Fig. 5A) as described above. Moreover, Okada noted in the original description that this species was collected from an inflorescence of *Colocasia esculenta* (Linnaeus) Schott, but later corrected the host plant name as *Homalomena* sp. based on the information from the collector, Dr. S. Toshioka (Okada, 1986).

Colocasiomyia xanthogaster Yafuso & Okada

(Figs. 1D, 2B, 3C, D, 5B)

Colocasiomyia xanthogaster Yafuso & Okada, 1990: 138.

Diagnosis. Additional pair of dorsocentral setae present before transverse suture, about 2/3 as long as anterior dorsocentrals. Abdominal tergites yellow. Surstylus strongly curved downward, rounded at apex (Fig. 2B). Aedeagus apically narrow and clawed (Fig. 3C).

Description (σ^7 and ♀). Head: Supracervical and postocular setae 2–3 and 11–14 per side, respectively. Frontal vittae mat, orange gray. Space between antennal sockets broader than half of socket width; pedicel orange yellow; arista with 1 or 2 ventral branches. Facial carina prominently raised on lower margin, as long as pedicel and 1st flagellomere combined, only slightly narrower than 1st flagellomere. Gena grayish orange, anteriorly darker. Palpus grayish brown. Medial and posterior, cibarial sensilla 6 and 4 per side, respectively. Labellum with 17–18 pseudotracheae.

Thorax: Postpronotal lobe with 3 prominent setae; upper most shortest, middle longest. Scutum glossy, dark brown. Anterior dorsocentrals behind transverse suture. Basal and apical, scutellar setae convergent, but apicals not cruciate. Thoracic pleura grayish yellow, except for ventral and posterior portions tinged darker.

Legs: Foreleg 2nd tarsomere with 3 stout spines slightly shorter than 3rd and 4th tarsomeres combined (Fig. 1D).

Abdomen: Sternites pale yellow.

Male terminalia (Figs. 2B, 3C, D): Epandrium pubescent except for anterior margin and ventral portion, with 4–6 setae near dorsal to lateral margin and 4–6 setae near base of surstylus. Surstylus as long as, but broader than ventral elongation of cercus, with 2–3 upright, claw-like prensisetae and 1–2 minute setulae apically and 1 small seta on ventrosubapical margin. Cercus with 18 setae; ventral elongation with 4 minute setulae at apex. Hypandrium apically fused

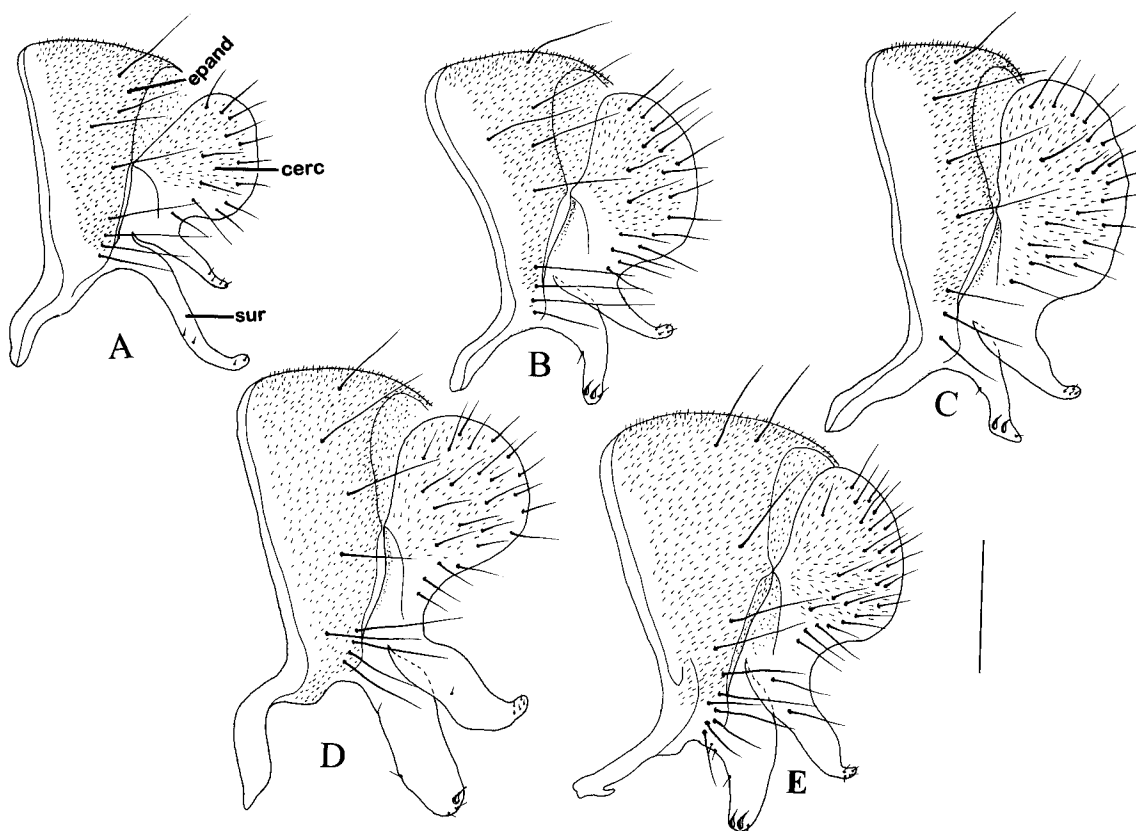


Fig. 2. Periphallallic organs. A, *Colocasiomyia toshiokai* (Okada) ♂ (a paratype from Surigao, Mindanao, the Philippines); B, *Colocasiomyia xanthogaster* Yafuso & Okada ♂ (from Bogor, Java, Indonesia); C, *Colocasiomyia nigricauda* Sultana & Toda, sp. nov. ♂ (a paratype from Poring, Mt. Kinabalu, Sabah, Malaysia); D, *Colocasiomyia erythrocephala* Sultana & Yafuso, sp. nov. ♂ (a paratype from Cuc Phuong, Vietnam); E, *Colocasiomyia heterodonta* Yafuso & Okada ♂ (from Poring, Mt. Kinabalu, Sabah, Malaysia). Scale=0.1 mm. cerc=cercus, epand=epandrium, sur=surstylus.

to parameres. Paramere about half as long as aedeagus, nearly straight, gradually narrowing distally, apically round and with 4 minute sensilla. Distiphallus protruding like long tube from dorsosubapical portion of aedeagus; aedeagal apodeme slightly longer than aedeagus.

Female terminalia: Oviscapt (Fig. 5B) with 1–2 peg-like, apically round ovisensilla near submedial, ventral margin, 1 pointed, lateral ovisensillum on subapical, mesal surface, 4 long setae on large, apical projection and 1 long seta at dorsosubapical corner.

Measurements: ThL=0.69–0.85 mm (in 5♂), 0.66–0.89 mm (in 4♀); WL=1.65–1.81 mm (♂), 1.71–1.98 mm (♀); WW=0.75–0.85 mm (♂), 0.72–0.85 mm (♀).

Indices: FW/HW=0.55–0.67, prorb=0.60–0.84, orbito=0.57–0.83, dcp=0.82–1.00, sctlp=1.22–1.42.

Specimens examined. Indonesia: Bogor, Java, 3.XI.1988, 1♂ (holotype), 1♀ (allotype), ex inflorescence of *Homalomena* sp., leg. M. Yafuso (NSMT); 1♀ (paratype), ex inflorescence of *Homalomena pendula* (Bl.) Bakh. f., 1♀ (paratype), ex inflorescence of

Aglaonema pictum (Roxb) Kunth (NSMT); 5♂, 3♀, 27.XII.1999, ex inflorescence of *Aglaonema infogium* Schott (MZB: 2♂, 1♀; FAUR: 1♂, 1♀; SEHU: 2♂, 1♀).

Remarks. Yafuso & Okada (1990) did not illustrate the caudoventral elongation of cercus in their Fig. 2D. Examining the type specimens, however, we confirmed the presence of such an elongation also in this species as shown in Fig. 2B.

Colocasiomyia nigricauda Sultana & Toda, sp. nov. (Figs. 1A, E, 2C, 3E, F, 5C)

Diagnosis. Additional pair of dorsocentral setae present before transverse suture, about 3/4 as long as anterior dorsocentrals. Abdominal tergites nearly entirely dark brown to black, except for yellow, narrow, anterior margin and small, anteromedian portion of each tergite. Surstylus gently curved downward, apically triangular (Fig. 2C). Aedeagus shaped like thick claw apically (Fig. 3E).

Description (♂ and ♀). Head: Eye brownish red,

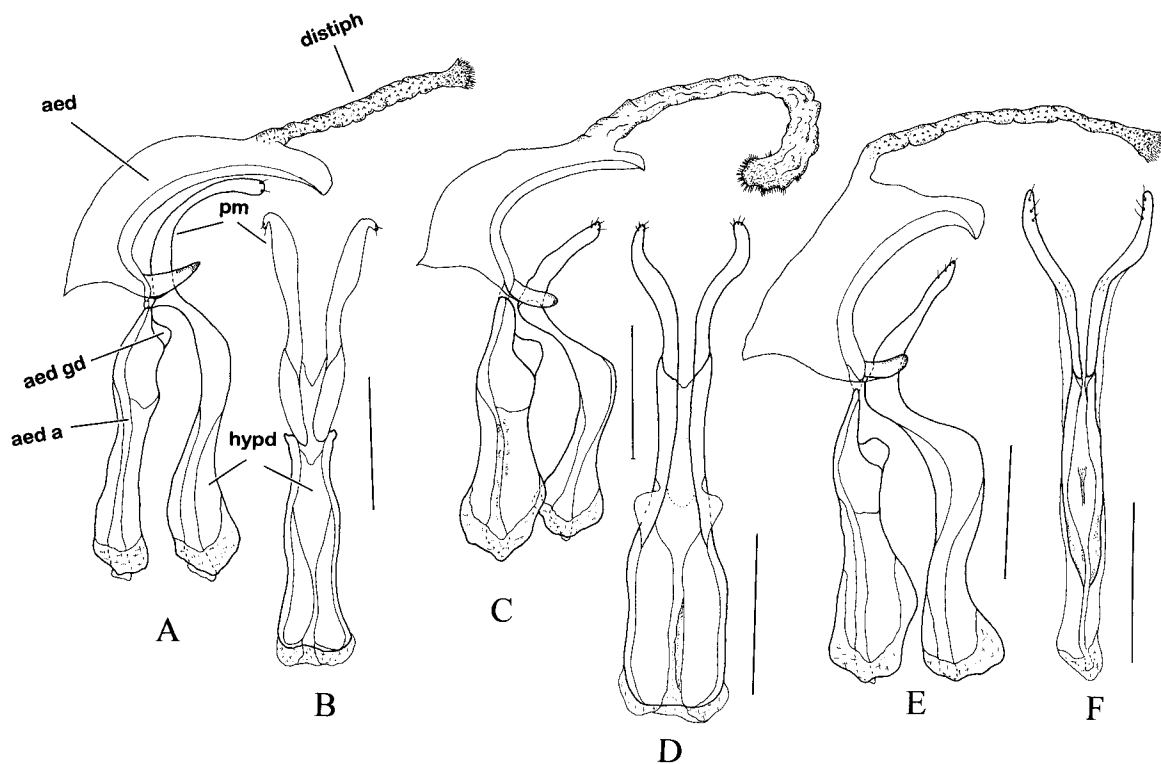


Fig. 3. Phallic organs in lateral view (A, C, E), and hypandrium and parameres in ventral view (B, D, F). A, B, *Colocasiomyia toshiokai* (Okada) ♂ (a paratype from Surigao, Mindanao, the Philippines); C, D, *Colocasiomyia xanthogaster* Yafuso & Okada ♂ (from Bogor, Java, Indonesia); E, F, *Colocasiomyia nigricauda* Sultana & Toda, sp. nov. ♂ (a paratype from Poring, Mt. Kinabalu, Sabah, Malaysia). Scales=0.1 mm, aed=aedeagus, aed a=aedeagal apodeme, aed gd=aedeagal guide, distiph=distiphallus, hypd=hypandrium, pm=paramere.

with sparse setulae. Supracervical and postocular setae 2–5 and 11–13 per side, respectively. Frontal vittae mat, orange gray. Space between antennal sockets broader than half of socket width; pedicel orange yellow; arista with 2 dorsal and 1 ventral branches and small terminal fork (Fig. 1A). Face grayish yellow; carina prominently raised on lower margin, as long as pedicel and 1st flagellomere combined, only slightly narrower than 1st flagellomere. Gena grayish orange, with large, brown patch anteriorly. Palpus grayish brown. Clypeus grayish orange. Medial and posterior, cibarial sensilla 4–7 and 4–8 per side, respectively. Labellum with 14–16 pseudotracheae.

Thorax: Postpronotal lobe with 3 prominent setae: upper most shortest, middle longest. Scutum glossy, dark brown. Anterior dorsocentrals behind transverse suture. Acrostichal setulae in 2 rows. Scutellum black. Basal and apical, scutellar setae convergent, but apicals not cruciate. Thoracic pleura pale grayish yellow, except for ventral and posterior portions tinged darker.

Wing hyaline, apically somewhat fuscous. Costal vein anteriorly with stout, densely arranged setulae

only.

Legs pale yellow, except for dark gray, terminal tarsomeres. Foreleg 2nd tarsomere with 3 stout spines slightly longer than 3rd and 4th tarsomeres combined (Fig. 1E). Fore-, mid- and hindleg 1st tarsomeres as long as 2, 4 and 3 succeeding tarsomeres combined, respectively.

Abdomen: Tergites glossy. Sternites pale grayish brown.

Male terminalia (Figs. 2C, 3E, F): Epandrium with pubescence except for anterior margin and ventral portion, bearing 3–4 setae near dorsal to lateral margin and 3–4 setae near base of surstylus. Surstylus as long and broad as ventral elongation of cercus, with 2 upright, claw-like prensisetae and 1 minute setula apically and 1 minute setula on ventrosubapical margin. Cercus with 17–22 setae; ventral elongation with 3–4 minute setulae at apex. Hypandrium apically fused to paramere. Paramere about 2/3 as long as aedeagus, nearly straight, gradually narrowing distally, slightly pubescent on basal, inner surface, apically pointed, with 3–4 sensilla arranged linearly on subapical to apical portion. Distiphallus protruding like long tube from dorsosubapical portion of aede-

gus; aedeagal apodeme slightly longer than aedeagus.

Female terminalia: Oviscapt (Fig. 5C) with 2–3 peg-like, apically round ovisensilla on subapical, ventral margin to subapical, mesal surface, 1 apically pointed, lateral ovisensillum on dorsosubapical, mesal surface, 4 long setae on large, apical projection and 1 similar at dorsosubapical corner.

Measurements: BL=2.37 mm in holotype (range in 5♂ and 8♀ paratypes: 2.24–2.57 in ♂, 2.31–3.00 in ♀); ThL=0.82 mm (0.72–0.85 in ♂, 0.85–0.95 in ♀); WL=1.68 mm (1.58–1.71 in ♂, 1.65–1.88 in ♀); WW=0.75 mm (0.66–0.85 in ♂, 0.72–0.89 in ♀).

Indices: arb=2/1 (2/1), FW/HW=0.57 (0.55–0.68), ch/o=0.56 (0.34–0.56), prorb=0.86 (0.62–0.88), rcorb=0.13 (0.09–0.25), vb=0.22 (0.13–0.28), dcl=0.66 (0.63–0.87), sctl=0.70 (0.52–0.72), sterno=0.66 (0.46–0.78), orbito=0.71 (0.33–0.71), dcp=0.88 (0.82–1.00), sctlp=1.10 (1.00–1.15), C=1.83 (1.94–2.13), 4c=1.19 (1.09–1.25), 4v=1.64 (1.48–1.78), 5x=2.00 (1.45–1.88), ac=3.36 (2.69–3.00), M=0.60 (0.48–0.62), C3F=0.16 (0.11–0.17).

Holotype. ♂, Malaysia: Poring, Mt. Kinabalu, Sabah, 11.III.2000, [ex inflorescence of *Homalomena*

sagittifolia Schott], leg. M. J. Toda (KSPS).

Paratypes. Malaysia: 8♂, 11♀, same data as holotype; 4♂, 5♀, Ulu Senagang, Crocker Range, Sabah, 18.X.1999, [ex inflorescence of *H. sagittifolia*]; 1♀, Park Headquarters, Mt. Kinabalu, Sabah, 22.X.1999, [ex inflorescence of *Homalomena insignis* N. E. Br.], leg. M. J. Toda (KSPS: 3♂, 5♀; ITBC: 3♂, 4♀; FAUR: 3♂, 4♀; SEHU: 3♂, 4♀).

Distribution. Malaysia (Sabah).

Remarks. This species is most similar to *C. xanthogaster* in having the additional pair of dorsocentral setae, the straight paramere and the apically clawed aedeagus, but distinguished from it by the diagnostic characters (in *C. xanthogaster*: abdominal tergites mostly yellow; surstylus apically round; aedeagus apically narrow).

Etymology. Referring to the mostly black abdomen.

***Colocasiomyia erythrocephala* Sultana & Yafuso, sp. nov.**

(Figs. 2D, 4A, B, 5D)

Diagnosis. Foreleg 2nd tarsomere apically with 3

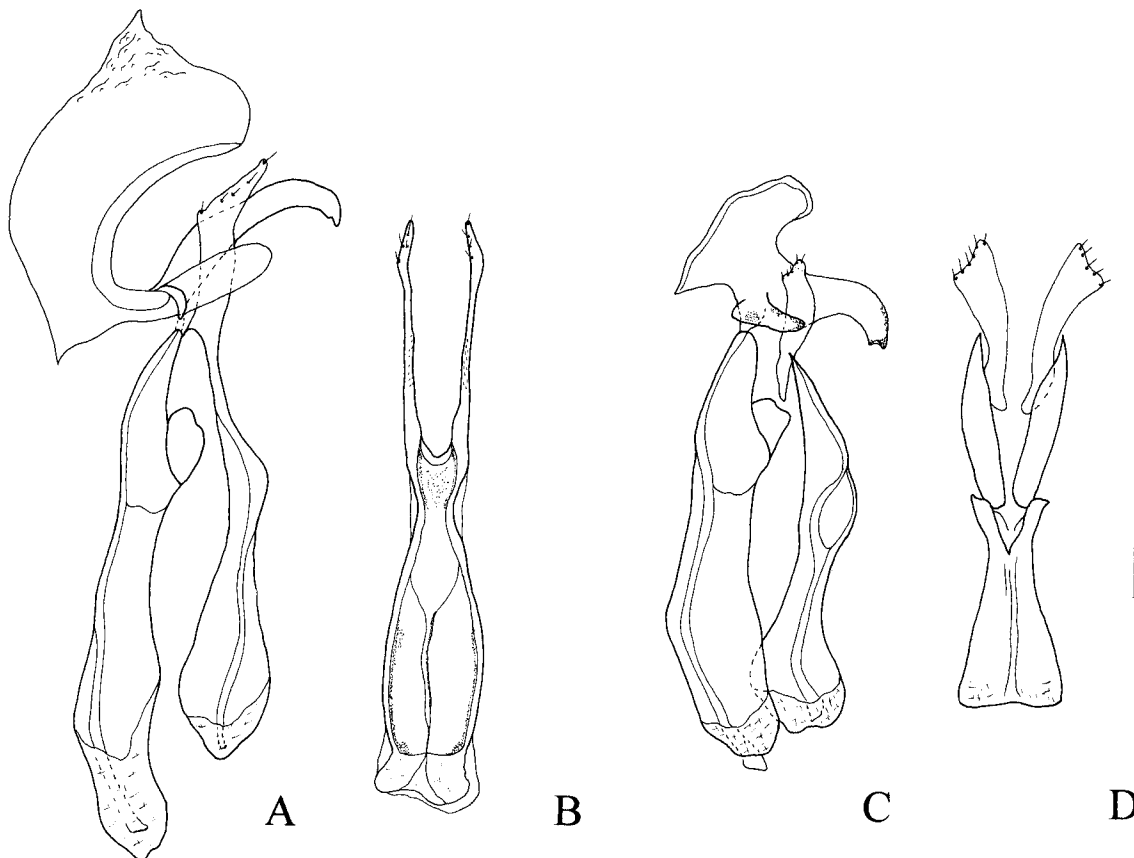


Fig. 4. Phallic organs in lateral view (A, C), and hypandrium and parameres in ventral view (B, D). A, B, *Colocasiomyia erythrocephala* Sultana & Yafuso, sp. nov. ♂ (a paratype from Cuc Phuong, Vietnam); C, D, *Colocasiomyia heterodonta* Yafuso & Okada ♂ (from Poring, Mt. Kinabalu, Sabah, Malaysia). Scale=0.1 mm.

stout spines slightly longer than 3rd and 4th tarsomeres combined. Surstylus straight, as long as but slightly broader than ventral elongation of cercus, rounded at apex (Fig. 2D). Aedeagus broad, apically thick and rounded, with beak-like projection between a pair of strongly sclerotized, basal processes (Fig. 4A).

Description (σ^7 and ♀). Head: Eye purple red, with sparse setulae. Ocellar triangle grayish brown. Supracervical and postocular setae 4–5 and 11–13 per side, respectively. Frontal vittae orange gray. Space between antennal sockets narrower than half of socket width; pedicel orange yellow; arista with 2 dorsal and 2 ventral branches and small, terminal fork. Face grayish yellow; carina as long as pedicel and 1st flagellomere combined, only slightly narrower than 1st flagellomere. Palpus grayish brown. Clypeus grayish orange. Medial and posterior, cibarial sensilla 2–4 and 3 per side, respectively. Labellum with 13–16 pseudotracheae.

Thorax: Postpronotal lobe with 3 prominent setae: upper shortest, middle longest. Scutum glossy, yellowish brown. Additional pair of dorsocentral setae absent; anterior dorsocentrals behind transverse suture. Acrostichal setulae in 2 rows. Scutellum dark brown. Basal and apical, scutellar setae divergent.

Wing: Costal vein anteriorly with stout, densely arranged setulae only.

Legs grayish yellow, except for dark gray coxae, femora and tibia of mid- and hindlegs.

Abdomen: Tergites glossy, nearly entirely yellowish brown to dark brown. Sternites yellowish brown.

Male terminalia (Figs. 2D, 4A, B): Epandrium pubescent all over, with 4 setae near dorsal to lateral margin and 4 setae near base of surstylus. Surstylus with 1 upright, claw-like preniseta and 2 minute setulae apically and 2 small setae on subapical to proximal, ventral margin. Cercus with 25 setae; ventral elongation with 5 minute setulae at caudoventral apex and 1 small seta on mesal surface. Hypandrium apically fused to paramere. Paramere about 2/3 as long as aedeagus, nearly straight, pubescent on basal, inner surface, gradually narrowing distally, apically pointed, with 4–5 sensilla arranged linearly on subapical to apical portion. Distiphallus very short; aedeagal apodeme slightly longer than aedeagus.

Female terminalia: Oviscapt (Figs. 5D) with 2 peg-like, apically round ovisensilla on subapical, ventral margin to subapical, mesal surface, 1 pointed, lateral ovisensillum on dorsosubapical, mesal surface, 3 long and 1 small setae on large, apical projection and 1 long seta on small projection at dorsosubapical corner.

Measurements: BL=2.01 mm in holotype (range in 9 σ^7 and 8 ♀ paratypes: 1.48–2.11 in σ^7 , 1.98–2.17 in

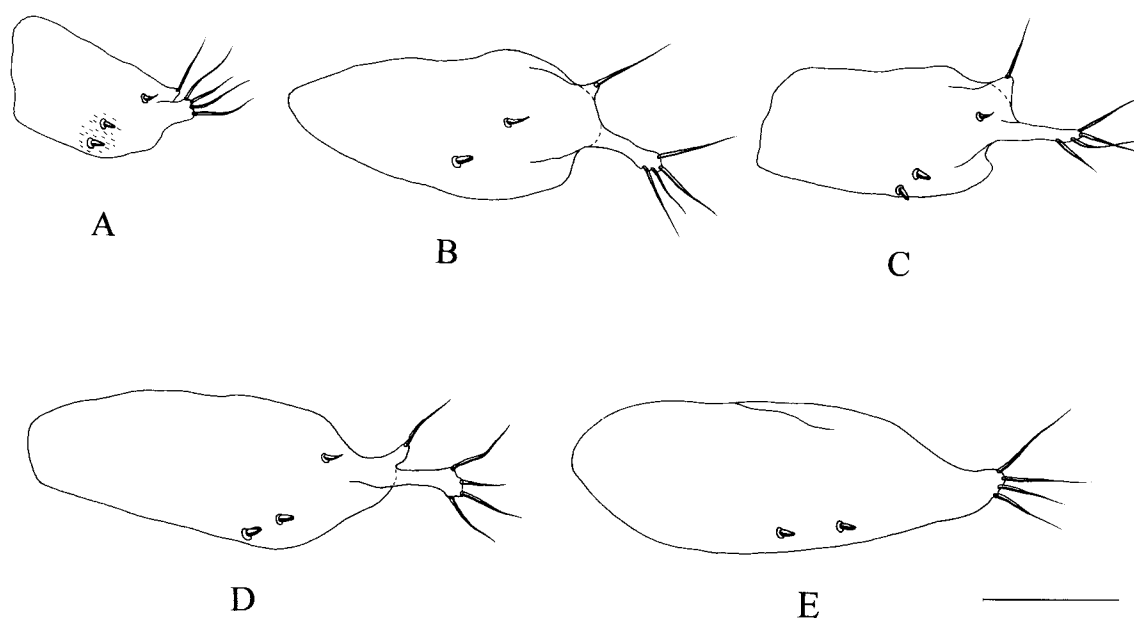


Fig. 5. Oviscapt in lateral view. A, *Colocasiomyia toshiokai* (Okada) ♀ (a paratype from Surigao, Mindanao, Philippines); B, *Colocasiomyia xanthogaster* Yafuso & Okada ♀ (from Bogor, Java, Indonesia); C, *Colocasiomyia nigricauda* Sultana & Toda, sp. nov. ♀ (a paratype from Poring, Mt. Kinabalu, Sabah, Malaysia); D, *Colocasiomyia erythrocephala* Sultana & Yafuso, sp. nov. ♀ (a paratype from Cuc Phuong, Vietnam); E, *Colocasiomyia heterodonta* Yafuso & Okada ♀ (from Ulu Senangang, Crocker Range, Sabah, Malaysia). Scale=0.1 mm.

♀); ThL=0.75 mm (0.59–0.75 in ♂, 0.66–0.82 in ♀); WL=1.45 mm (1.32–1.81 in ♂, 1.41–1.81 in ♀); WW=0.62 mm (0.60–0.75 in ♂, 0.69–0.79 in ♀).

Indices: arb=2/2 (2/2), FW/HW=0.58 (0.52–0.78), ch/o=0.50 (0.45–0.61), prorb=0.84 (0.71–0.87), rcorb=0.15 (0.08–0.19), vb=0.25 (0.10–0.27), dcl=0.66 (0.54–0.72), sctl=0.82 (0.68–0.90), sterno=0.72 (0.50–0.72), orbito=0.57 (0.30–0.57), dcp=0.71 (0.66–0.93), sctlp=1.14 (1.11–1.35), C=1.93 (1.74–2.25), 4c=1.25 (1.14–1.37), 4v=2.04 (1.60–2.00), 5x=1.37 (1.33–2.14), ac=3.33 (2.66–3.41), M=0.50 (0.50–0.62), C3F=0.13 (0.12–0.24).

Holotype. ♂, Vietnam: Cuc Phuong, 19.VI.2000, [ex inflorescence of *Homalomena* sp.], leg. M. Yafuso (SEHU).

Paratypes. 14♂, 15♀, same data as holotype (CPNP: 5♂, 5♀; FAUR: 4♂, 5♀; SEHU: 5♂, 5♀).

Distribution. Vietnam.

Remarks. This species has three stout, long spines on the second tarsomere of foreleg as well as the foregoing three species, but is distinguished from them by the beak-like projection at the base of aedeagus and the broad surstylus.

Etymology. Referring to the reddish head.

Colocasiomyia heterodonta Yafuso & Okada, 1990

(Figs. 1B, C, F, 2E, 4C, D, 5E)

Colocasiomyia heterodonta Yafuso & Okada, 1990: 140.

Diagnosis. Foreleg 2nd tarsomere with 1 long, stout spine apically and many small, tooth-like ones arranged in irregular rows (Fig. 1F). Paramere gently sinuated, broadened distally, truncate apically (Figs. 4C, D). Aedeagus about half as long as aedeagal apodeme (Fig. 4C). Oviscapt apically tapering, without distinct projection (Fig. 5E).

Description (♂ and ♀). Head: Eye with sparse setulae. Supracervical and postocular setae 1–2 and 10–14 per side, respectively. Frontal vittae mat, orange gray. Space between antennal sockets broader than half of socket width; pedicel orange yellow; arista with 3–4 dorsal and 2 ventral branches. Facial carina slightly shorter than pedicel and 1st flagellomere combined, only slightly narrower than 1st flagellomere. Gena grayish brown. Palpus grayish brown. Medial and posterior, cibarial sensilla 3 and 3–5 per side, respectively. Labellum with 11 pseudotracheae.

Thorax: Postpronotal lobe with 2 prominent setae: upper one longer. Scutum glossy, dark brown. Additional pair of dorsocentral setae absent; anterior dorsocentrals just beside transverse suture. Apical, scutellar setae not cruciate.

Abdomen: Sternites grayish yellow.

Male terminalia (Figs. 2E, 4C, D): Epandrium pubescent except for anterior margin and ventral portion, with 2–7 setae near dorsal to lateral margin and 8–12 setae near base of surstylus. Surstylus gently curved downward, truncate at tip, as long as, but broader than ventral elongation of cercus, with 2 upright, claw-like prenisetae and 1 minute setula apically and 3 small setae on medial to proximal, ventral margin. Cercus with 26–32 setae; ventral elongation with 4 minute setulae at hooked apex and 1–2 long setae proximally. Hypandrium apically articulated with paramere. Paramere basally articulated with aedeagal guide, about half as long as aedeagus, with 6 minute sensilla apically. Aedeagus basally with strongly sclerotized, beak-like projection; distiphallus very short.

Female terminalia: Oviscapt (Fig. 5E) with 2–3 peg-like, apically round ovisensilla near submedial, ventral margin and 4 long setae apically.

Measurements: ThL=0.75–0.92 mm (in 8♂), 0.79–0.95 mm (in 5♀); WL=1.51–1.81 mm (♂), 1.65–1.88 mm (♀); WW=0.72–0.82 mm (♂), 0.75–0.89 mm (♀).

Indices: FW/HW=0.60–0.74, prorb=0.55–0.78, orbito=0.50–0.78, dcp=0.83–1.00, sctlp=1.00–1.25.

Specimens examined. Indonesia: Bogor, Java, 3.XI.1988, 1♂ (holotype), 1♀ (allotype), ex inflorescence of *Homalomena* sp., leg. M. Yafuso (NSMT); 1♂ (paratype), ex inflorescence of *H. pendula*; 1♂ (paratype), ex inflorescence of *A. pictum* (NSMT); 8♂, 5♀, 27.XII.1999, ex inflorescence of *A. infogium* (MZB: 3♂, 2♀; FAUR: 2♂, 1♀; SEHU: 3♂, 2♀). Malaysia: 4♂, 2♀, Poring, Mt. Kinabalu, Sabah, 11.III.2000, ex inflorescence of *H. sagittifolia*; 1♀, Ulu Senagang, Crocker Range, Sabah, 18.X.1999, ex inflorescence of *H. sagittifolia* (KSPS: 2♂, 1♀; ITBC: 1♂, 1♀; SEHU: 1♂, 1♀).

Remarks. This species is unique in the dentition on the second tarsomere of foreleg among the members of the *toshiokai* group, but somewhat similar to the foregoing species, *C. erythrocephala*, in having the beak-like projection at the base of aedeagus and the broader surstylus. Yafuso & Okada (1990) did not illustrate the surstylus in their Fig. 2I, although they described that the surstylus is triangular in shape. Examining the type specimens, however, we confirmed the surstylus to be the process elongated and gently curved downward from the caudoventral corner of epandrium as shown in Fig. 2E.

Key to Species of the *C. toshiokai* Species-group

1. Foreleg 2nd tarsomere with 3 long, stout spines apically. 2
 - Foreleg 2nd tarsomere with 1 long, stout spine apically and many small, tooth-like spines arranged in irregular rows.
 - *C. heterodonta* Yafuso & Okada
2. Additional pair of dorsocentral setae present. . . 3
 - Additional pair of dorsocentral setae absent. . . 4
3. Abdominal tergites mostly yellow; surstylus rounded at apex; paramere about 1/2 as long as aedeagus; aedeagus apically narrow.
 - *C. xanthogaster* Yafuso & Okada
 - Abdominal tergites mostly dark brown to black; surstylus triangularly pointed at apex; paramere about 2/3 as long as aedeagus; aedeagus apically broad. . . *C. nigricauda* Sultana & Toda, sp. nov.
4. Three stout spines on foreleg 2nd tarsomere slightly shorter than 3rd and 4th tarsomeres combined; anterior, dorsocentral setae situated just beside transverse suture; surstylus and ventral elongation of cercus narrower than ventral elongation of epandrium; aedeagus without beak-like projection basally; oviscapt with small patch of pubescence. *C. toshiokai* (Okada)
 - Three stout spines on foreleg 2nd tarsomere slightly longer than 3rd and 4th tarsomeres combined; anterior, dorsocentral setae behind transverse suture; surstylus and ventral elongation of cercus broader than ventral elongation of epandrium; aedeagus with beak-like projection basally; oviscapt without pubescence.
 - *C. erythrocephala* Sultana & Yafuso, sp. nov.

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