

THE GENUS *OMMATIUS* WIEDEMANN, *DILATIPENNIS* SPECIES GROUP (DIPTERA: ASILIDAE)

AUBREY G. SCARBROUGH AND JESSICA E. COSTANTINO

(AGS) Department of Biological Sciences, Towson University, 8000 York Road, Baltimore, MD 21252 U.S.A. (e-mail: ascarbrough@towson.edu); (JEC) Center for Conservation Research and Training, University of Hawaii, 3050 Maile Way, Gilmore Hall #408, Honolulu, HI 96822 U.S.A. (e-mail: jecostantino@smcm.edu)

Abstract.—Six species of the *dilatipennis* species group of *Ommatius* Wiedemann are reported. The species group is known only from the Oriental Region. Its members are most similar to the genus *Merodontina* Enderlein but lack the prominent ventrobasal digit on the hind femur of the male. The species group includes *O. catus*, n. sp., and *O. insectatus*, n. sp., from southeastern Asia, *O. forticulus*, n. sp., from Sarawak, *O. pictipennis* Bigot from Malaysia, *O. torulosus* Becker from Taiwan, and *O. dilatipennis* Wulp from Indonesia. *Ommatius dilatipennis* Wulp, recently transferred to *Merodontina*, is re-assigned [**revised combination**] to *Ommatius*. **Lectotypes** are designated for *O. dilatipennis* and *O. torulosus*. The *dilatipennis* species group is diagnosed. Illustrations of selected characters and a key to species are also included.

Key Words: Asilidae, *Ommatius*, *dilatipennis* species group, Oriental, new species

The Ommatiine fauna of the Oriental Region is poorly known with about 125 species in six genera. Of the latter species, most (60%) belong to the genus *Ommatius* Wiedemann. Species from this region have been collected largely in the more populated regions of China, India, Philippines, Sri Lanka, Taiwan, and Indonesia (Oldroyd 1972, 1975; Tsaras and Artigas 1994; Joseph and Parui 1998; Scarbrough and Marscia 1999; Scarbrough and Hill 2000a, b). Furthermore, no attempt has been made to group closely related species. The primary objective of this study is to characterize the *dilatipennis* species group of *Ommatius*, which is most similar to *Merodontina* Enderlein, and to assign six species to the group. *Ommatius pictipennis* Bigot and *O. torulosus* (Becker) are redescribed. *Ommatius dilatipennis* Wulp, transferred recently to *Merodontina* (Scarbrough and Hill

2000a), is returned to *Ommatius*. Lectotypes are designated for *O. dilatipennis* and *O. torulosus*. The new species are described and illustrations of significant characters useful for identifying the species are included. A key separating the six species is also included.

METHODS AND MATERIALS

The descriptive terminology and acronyms of museums follow McAlpine (1981) and Arnett et al. (1993), respectively. Specimens for this study were obtained via loans from curators and/or studied during visits at the following museums: Ben Burgge, Zoologische Museum, Amsterdam (ZMAN); Neil Evenhuis, Bernice P. Bishop Museum, Honolulu (BPBM); David Grimaldi, American Museum of Natural History, New York (AMNH); Darren Mann, Oxford University Museum of Natural History, Oxford, U.K.

(UMO); Frank Menzel, Deutsches Entomologisches Institut, Müncheberg, Germany (DEI); E. J. van Neiukerken and C. van Achterberg, Nationaal Natuurhistorischen Museum ("Naturalis"), Leiden (RMNH); Mark O'Brian, University of Michigan, Museum of Zoology, Ann Arbor, (UMMZ); Thomas Pape, Museum of Zoology, University of Copenhagen (ZMUC); Gary Steck, Florida State Collection of Arthropods, Gainesville (FSCA); and F. Christian Thompson, USDA, Systematic Entomology Laboratory, Washington, D.C. (USNM). Dissections of the terminalia and preparation of illustrations follow Scarbrough and Marascia (1999) and Scarbrough (2002b). Descriptions of new species are composites of all specimens examined. In recording label data of specimens, an ~ symbol denotes data present on a second label. Square brackets are used for additional information not present on labels. Only confirmed distribution records are included under each species covered herein. Structures in illustrations are labeled only for the first species and are not repeated for comparable structures of the following species. Illustrations of the terminalia in dorsal and ventral positions are accompanied by a single scale line. An asterisk (*) denotes a syntype.

Ommatius Wiedemann, *dilatipennis*
species group

Diagnosis.—The *dilatipennis* species group is characterized by its similarity to *Merodontina* Enderlein, especially in the strong costal dilation being on the apical half of the wing and the acutely pointed R₁ cell (Figs. 1–7) in males and the long, slender body and legs which lack stout ventral bristles. It differs from *Merodontina* in the absence of a prominent, ventrobasal, digitate process on the hind femur of the male.

KEY TO THE *OMMATIUS DILATIPENNIS*
SPECIES GROUP

1. Femora and tarsi entirely black to brown 2
- Femora and tarsi partly yellow 3
2. Epandrium slender apically, apex acutely

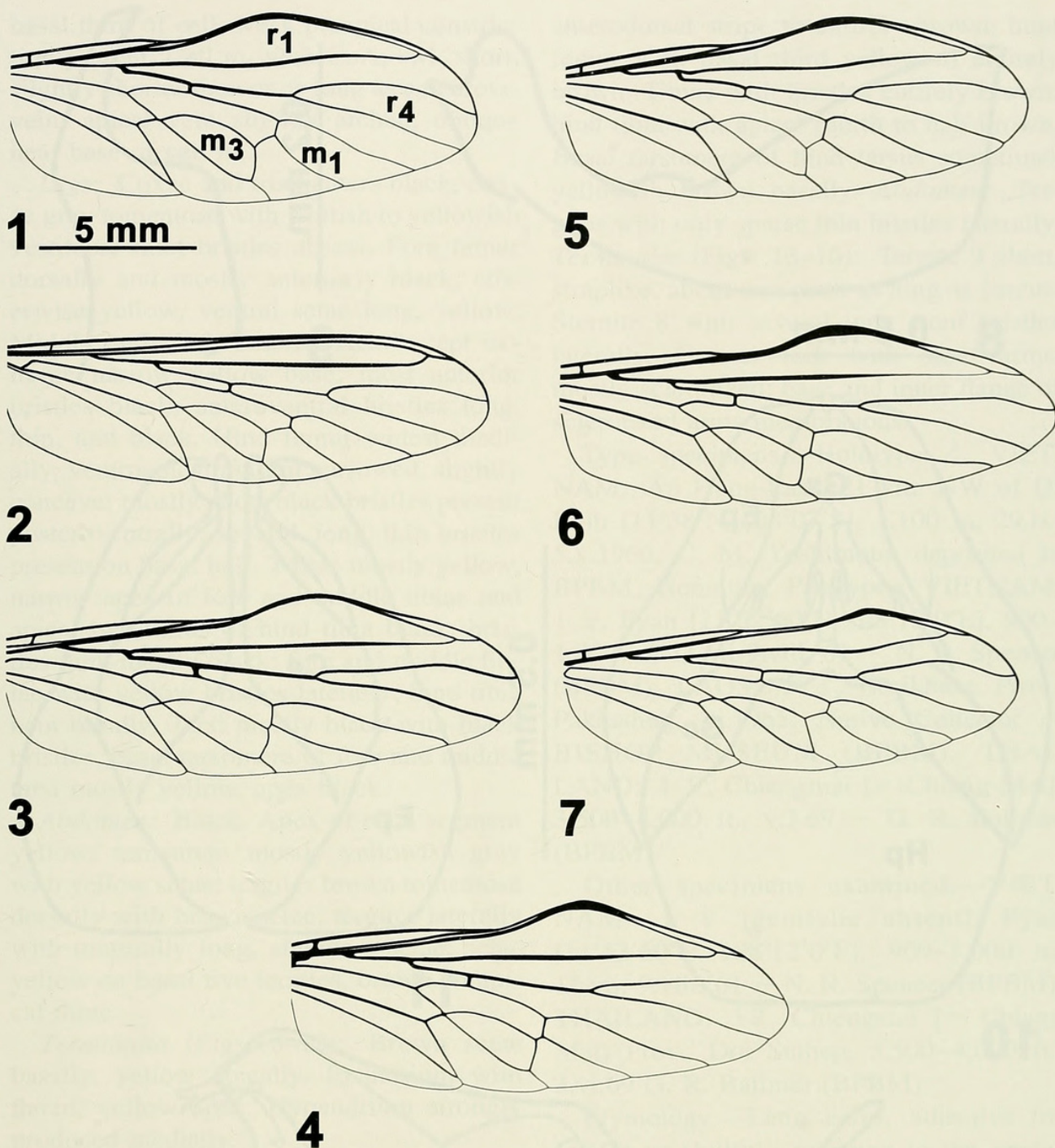
- pointed; hypandrium with only black vestiture, terminalia otherwise as in Figs. 29–33; Malaysia *pictipennis* Bigot
- Epandrium wide apically, podiform with a rounded base ventrally and an pointed toe dorsally; hypandrium broadly rounded apically; Indonesia (Java, Sumatra), Philippines, Malaysia (Sarawak, Sabah) *dilatipennis* Wulp
3. Dorsal postocular bristles short, apex of longest just before posterior margin of compound eye; scutellar bristles yellow 4
- Dorsal postocular bristles long, apex of longest well before posterior margin of compound eye; scutellar bristle brown 5
4. Large, robust species (28.0 mm); postocular bristles yellow; wide angles of tergites 2–5 yellow to reddish yellow; epandrium slender apically, apex round, terminalia as in Figs. 17–21; Malaysia (Sarawak) *forticulus*, n. sp.
- Smaller, slender species (13.4–17.8 mm); postocular bristles usually brown; tergites 2–5 brown, margins narrowly yellow; epandrium capitate apically, terminalia as in Figs. 34–40; Taiwan *torulosus* (Becker).
5. Middle femur mostly yellow; terminalia as in Figs. 22–28; Thailand *insectatus*, n. sp.
- Middle femur mostly black, terminalia as in Figs. 8–16; Thailand, Laos, Vietnam *catus*, n. sp.

TAXA

Ommatius catus Scarbrough and
Costantino, new species
(Figs. 1–2, 8–16)

Male.—Black body, femora extensively black. Body 17.5–18.9 mm; wing 16.0–16.4 mm. *Head*: Face yellow tomentose, vestiture abundant, mostly yellow; one or two brownish-yellow bristles present; FHWR 1.0:8.8. Palpus and proboscis white to yellowish setose. Antenna black setose; flagellum slightly longer than scape or pedicel, about twice as long as wide. Frons dark brown tomentose, mostly yellow setose. Ocellar tubercle black setose, longest seta subequal to basal three antennal segments combined; five or six black postocular bristles, longest with apex about half distance toward ocellar tubercle.

Thorax: Brown tomentose dorsally, narrow sides and posterior brownish yellow to yellowish gray; setae short, mostly black; three black dorsocentral and four lateral

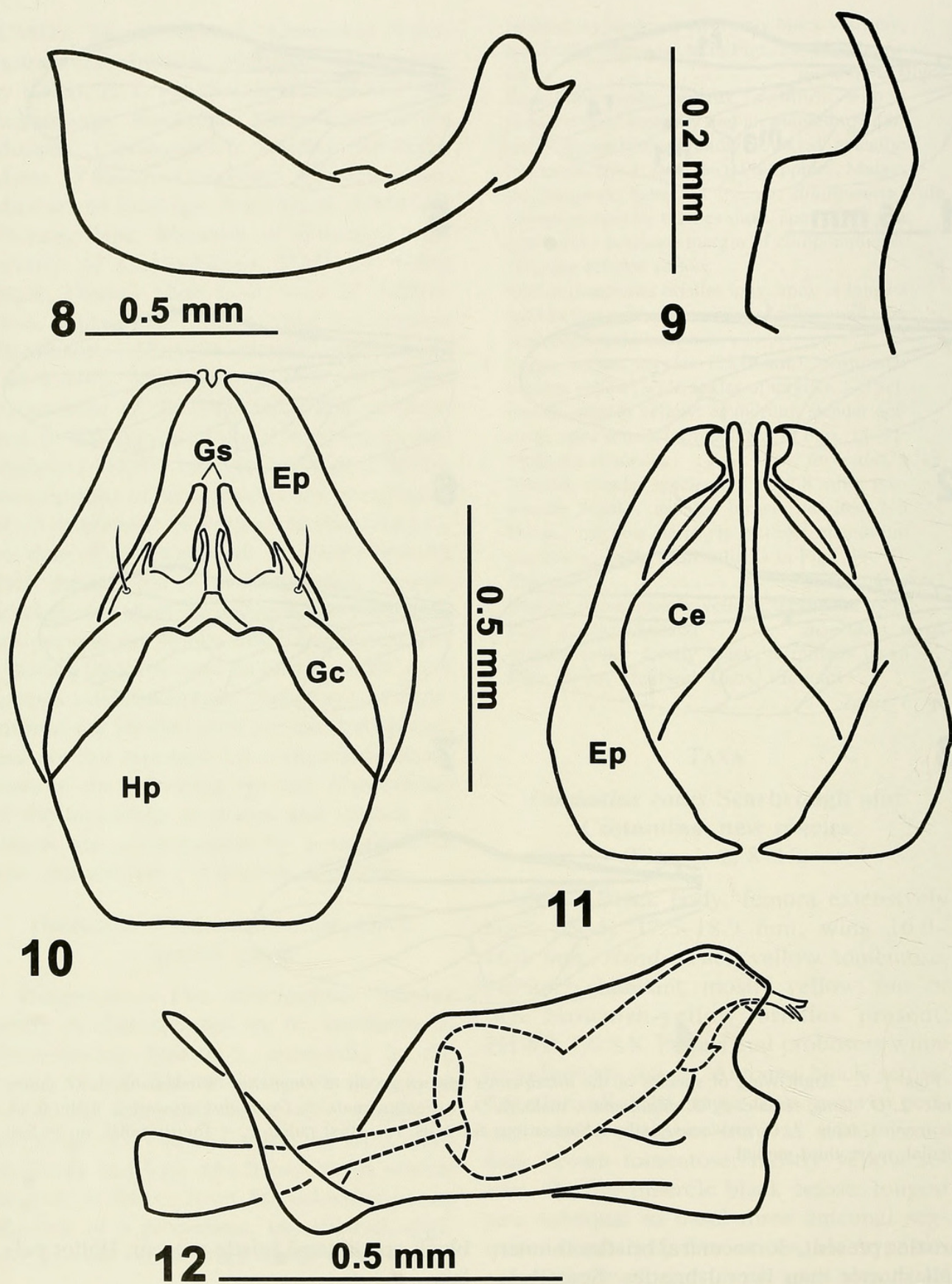


Figs. 1–7. Right wing of species of the *dilatipennis* species group of *Ommatius* Wiedemann. 1, *O. catus*, male. 2, *O. catus*, female. 3, *O. dilatipennis*, male. 4, *O. forticulus*, male. 5, *Ommatius insectatus*, male. 6, *O. pictipennis*, male. 7, *O. torulosus*, male. Abbreviations for cells: r_1 = first radial, r_4 = fourth radial, m_1 = first medial, m_3 = third medial.

bristles present, dorsocentral bristles thinner and shorter than lateral bristles. Scutellum dull yellowish gray tomentose, setae mixed yellow and black, mostly yellow; two marginal bristles and preapical groove present. Pleuron yellow to yellowish-gray tomentose; setae and most bristles yellowish; thin,

black anepimeral bristle present. Halter yellow.

Wing (Fig. 1): Surface brownish, anterior half darkest. Cell r_4 triangular, base wide, just beyond apex of cell d. Crossvein r-m short, well before middle of cell d. Cell m_1 with narrow base, about third as wide as



Figs. 8–12. Male terminalia of *Ommatius catus*. 8, Left epandrium. 9–10, Dorsal and ventral views. 11, Gonostylus. 12, Aedeagus, lateral view. Abbreviations: Ce = cercus, Ep = epandrium, Hp = hypandrium, Gc = gonocoxite, Gs = gonostylus.

basal third of cell; weak preapical constriction present. Cell m_3 with $CuA_1 + M_3$ short, slightly shorter than or as long as r-m crossvein; apical vein slightly arched, oblique near base of cell m_1 .

Legs: Coxae and trochanters black; coxae gray tomentose with whitish to yellowish vestiture, stout bristles absent. Fore femur dorsally and mostly anteriorly black, otherwise yellow, ventral setae long, yellow. Middle and hind femora black except extreme narrow yellow base; most anterior bristles black; anteroventral bristles long, thin, and black. Hind femur widest medially, ventroapical margin narrowed, slightly concave; mostly short black bristles present posteroventrally; several, long, thin bristles present on basal half. Tibiae mostly yellow, narrow apex of fore and middle tibiae and apical two-thirds of hind tibia black; bristles thin, mostly black; fore and middle tibiae with yellow bristles laterally; hind tibia bent basally. Tarsi mostly black with black bristles; basal tarsomere of fore and middle tarsi mostly yellow, apex black.

Abdomen: Black. Apex of each segment yellow; tomentum mostly yellowish gray with yellow setae; tergites brown tomentose dorsally with brown setae; tergites laterally with unusually long, abundant setae, setae yellow on basal five tergites, brown on apical three.

Terminalia (Figs. 8–12): Brown setae basally, yellow apically. Epandrium with flared, yellow apex. Hypandrium strongly produced medially.

Female.—Differs from male as follows. Body 14.1–19.1 mm; wing 13.1–16.0 mm. *Head:* Face with 5–6 brown bristles, sometimes absent; face 1/9.8 as wide as head. Frons yellow setose. Anepimeral bristle yellow or brown. *Wing* (Fig. 2): Normal, without strong costal dilation, dark corrugated anterior cells; cell r_4 wide basally, well beyond apex of cell d; r-m crossvein at or just before middle of cell d; cell m_1 with sides diverging to wing margin. *Legs:* Femora color variable; fore and middle femora yellow except dorsum and narrow

anterodorsal stripe to entirely brown; hind femur with basal third yellow to entirely brown. Tibiae with bristles entirely brown; hind tibia with apical fourth to half brown. Basal tarsomere of hind tarsus sometimes yellowish brown basally. *Abdomen:* Tergites with only sparse thin bristles laterally. *Terminalia* (Figs. 13–16): Tergite 9 short, straplike, about one-sixth as long as cercus. Sternite 8 with several long stout bristles laterally. Genital fork with stout arms, mostly sclerotized; base and inner flange of sclerotized arms membranous.

Type specimens.—Holotype ♂, VIETNAM: Ap Hung-Lam, 21 km. NW of Di Linh [11°38'N 108°07'S], 1,100 m, 29.ix-5.x.1960, C. M. Yoshimoto, deposited in BPBM, Honolulu. Paratypes: VIETNAM: 1 ♀, Fyan [11°52'60"N 108°12'0"E], 900–1,000 m, 11.vii-9.viii.'61 ~ N. R. Spencer (BPBM). LAOS: 1 ♂, Borikhane Prov., Pakkading, vi.1965, Native Collector ~ BISHOP MUSEUM (BPBM). THAILAND: 1 ♀, Chiangmai [= Chiang Mai], 3,500–4,000 ft., v.3.69 ~ G. R. Ballmer (BPBM).

Other specimens examined.—VIETNAM: 1 ♀ [genitalia absent], Fyan [11°52'60"N 108°12'0"E], 900–1,000 m, 11.vii-9.viii.'61 ~ N. R. Spencer (BPBM). THAILAND: 1 ♀, Chiangmai [= Chiang Mai] Prov., Doi Suthep, 3,500–4,000 ft., 3.vi.69 G. R. Ballmer (BPBM).

Etymology.—Latin *catus*, adjective for 'crafty or skillful', referring to the predatory behavior of asilids.

Distribution.—Laos, Thailand, Vietnam.

Remarks.—The largely black middle and hind femora, wing venation (Figs. 1–2), the brown apical two-thirds of the hind tibia, and terminalia (Figs. 8–16) distinguish *O. catus* from congeners. The basally curved hind tibiae and the presence of a flat, spur-like, apical bristle are similar to *O. insecatus* but it is distinguished from that species by the combined characters of the terminalia.

Ommatius dilatipennis Wulp,
revised combination
 (Fig. 3)

Ommatius dilatipennis Wulp, 1872: 261.

Lectotype ♂, [RMNH]. Type locality: Indonesia, Java. Hull 1962: 436; Oldroyd 1975: 132, catalog.

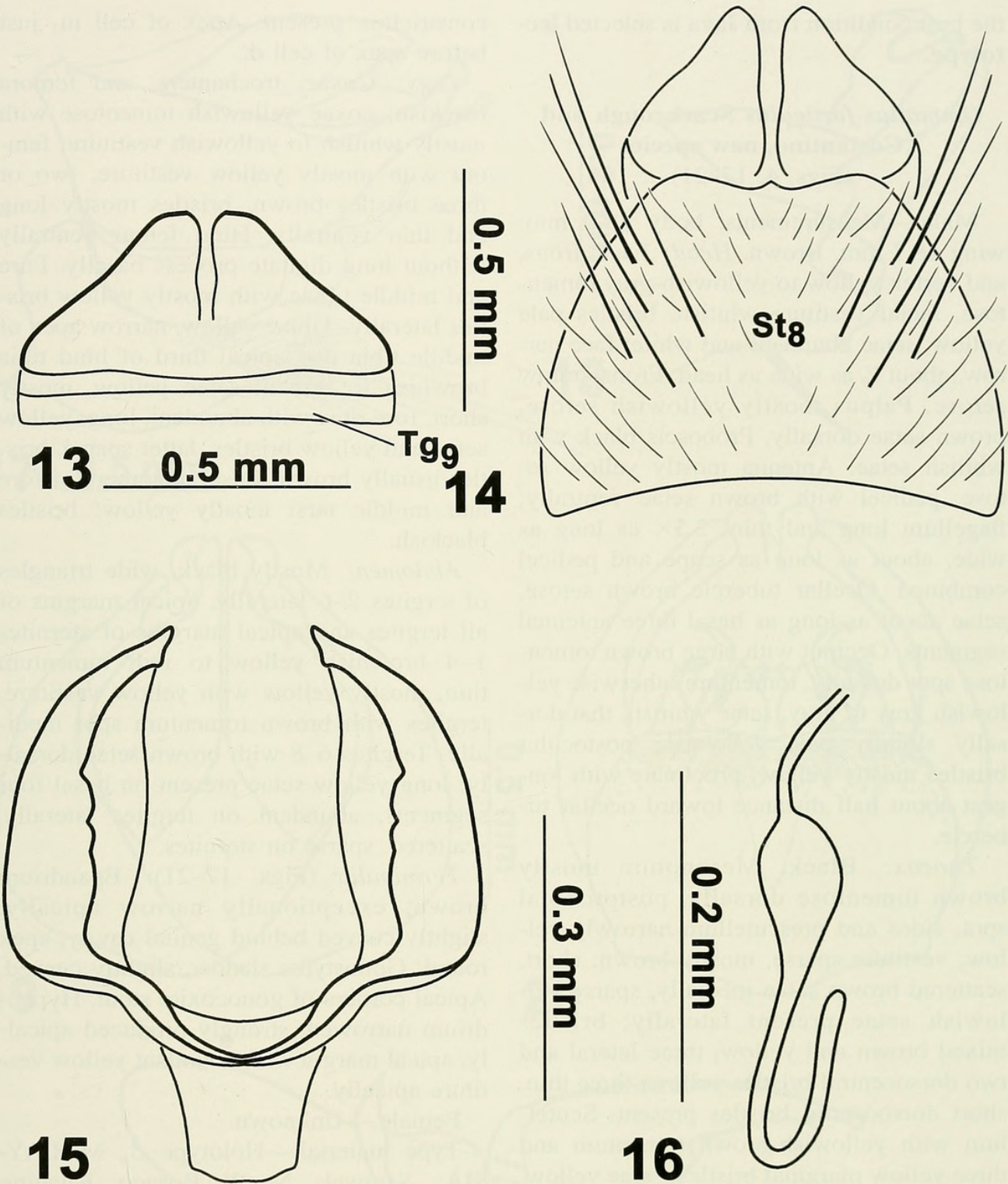
Merodontina dilatipennis: Scarbrough and Hill 2000a: 93, combination.

Specimens examined.—INDONESIA: Java, 1 ♂, 1 ♀, Nederlands Indie, Java 1,800'–2,400', TJIAJOENAN, SOEKA-NEGARA, eind okt. 1941, J.M.A.V. Groenedael (ZMAN); 2 ♀, Nederlands Indie, W. Java 1,800', DJAMPANG TENGAH, 18, 25.v.1939, J.M.A.V. Groenedael (ZMAN); 1 ♂, same label data except x.1941, J.M.A.V. Groenedael (ZMAN); 1 ♂, E. Jacobson, Genoeng, Oengaran Java, xii.1909, *Ommatius dilatipennis*, Getekend (ZMAN); 4 ♀, Batoerrden, G. Slam. Java, 3, 14.vi.1928, F. C. Drescher (ZMAN); 3 ♂, 2 ♀, Batoerrden, G. Slam. Java, 29.vii.1928, F. C. Drescher (ZMAN); 1 ♂, Java, Jacobson (ZMAN); 1 ♀, Doeters V. Leerwon, Geenoeng Oengaran, Mei 1910, *Ommatius dilatipennis*, det. de Meijere (ZMAN); 1 ♂* [good condition, LECTO-TYPE], Diard [collector], Java, *Ommatius dilatipennis* Wulp, coll. F.M.d.v. Wulp [round label] ~ syntype [red label] (RMNH); 1 ♂* [poor condition], Diard [collector], Java, *Ommatius dilatipennis* Wulp, coll. F.M. Wulp [round label] ~ syntype [red label] (RMNH); 1 ♀* [poor condition], Muller [collector], Java [round label] ~ *Ommatius dilatipennis*, v. d. Wulp ~ syntype [red label] (RMNH); 1 ♂* [poor condition], Muller [collector], Java [round label] ~ *Ommatius dilatipennis*, v. d. Wulp ~ syntype [red label] (RMNH); 1 ♀* [good condition], Blume [collector], Java [round label] ~ *Ommatius dilatipennis* v. d. Wulp ~ syntype [red label] (RMNH); 1 ♀, W. Java, Djampang, Tengeh, 300–600 m, 4.i.1940, coll. N. Groenendaal ~ *Ommatius dilatipennis* v. d. W. [Wulp], det. H. Overbeck 1967 (RMNH); Sumatra: 1 ♀, 69/27,

Edw. Jacobson, Suban Ajam, Sum. 7.1916, Getekend (ZMAN); 1 ♀, Muller, Sumatra ~ *Ommatius dilatipennis* v.d.w., coll. F.M. v.d. Wulp (RMNH); 1 ♀, 69, 26 ~ Edw. Jacobson, Buban Ajam, Sum. 7.1916 ~ *Ommatius dilatipennis* v.d. Wulp, det. de Meijere (RMNH). MALAYSIA: Sabah, 1 ♂, British North Borneo, Tawau [4°17'30"N 117°54'14"E], Quoin Hill, Cocoa Res. Sta. malaise trap, 6.ix.1962, Y. Hirashima (BPBM); Sarawak, 1 ♂, 1 ♀, Nauga Pelagus nr. Kapit 180–585 m, 7–14.viii.'58, T. C. Maa (BPBM); 1 F [abdomen missing], Muller, Borneo ~ *Ommatius dilatipennis* v.d.w., Coll. F.M.v.d. Wulp (RMNH); Sarawak, 1 ♂, 1 ♀, Bau District, Pangkalan Tabang, 300–450 m, 7–8.ix.'58, T. C. Maa (BPBM). PHILIPPINES: 1 ♂, Mindanao, Lanao, Butig Mts., 24 km NE of Butig, 1,080 m, 2,180 m, 21.vi.1958, in jungle, along stream, H. E. Milliron (BPBM); 1 ♀, Palawan, Tarumpitao Pt., 3.vi.1958, jungle clearing, H. E. Milliron (BPBM); 1 ♀, Palawan, Brooke's Pt., Macagua, 75 m, 7.iv.1962, M. Thompson (BPBM); 1 ♀, Palawan, Mouth of Malabangan River, 28.v.1958, jungle clearing, H. E. Milliron (BPBM); 1 ♀, Mindanao, Surigao, L. Mainit, 23.xi–1.xii.1959, C. H. Yoshimoto (BPBM); 1 ♀, Mindanao Is., Agusan del Norte, Cabadbaran, Belang-Balang Forest Road, 1.iv.1963 H. M. Cullamar (UMMZ).

Remarks.—In addition to the characters in the key, the black setose palpus, entirely black femora and tarsi, wing venation (Fig. 3), and combined characters of the terminalia (see Figs. 4–15, Scarbrough and Hill 2000a), especially the dorsally pointed foot-like apex of the epandrium, distinguish it from congeners.

Scarbrough and Hill (2000a) assigned *O. dilatipennis* to the *insula* species group of *Merodontina* based on the similarity of the characters of the wings, legs, and terminalia. Furthermore, the digitate process on the hind femur of males from Borneo and Sarawak was minute with a bristle at its apex. Thus, we assumed the digitate process was a variable character in that genus. However,



Figs. 13–16. Female terminalia of *Ommatius catus*. 13, Tergite 9 and cercus. 14, Sternite 8. 15, Genital fork. 16, Spermatheca. Abbreviations: Tg₉ = tergite 9, St₈ = sternite 8.

further study of type material from Java and new material from Indonesia proved this assumption incorrect. Here we return *O. dilatipennis* to *Ommatius* and assign it to the *dilatipennis* species group.

Box number 39 in RMNH has seven

specimens of *O. dilatipennis* of which five have syntype labels (*). All have some parts missing, varying degrees of [insect] damage, and their bodies are partly covered by fungus. To fix and stabilize the current concept of the name, the syntype male in

the best condition from Java is selected **lectotype**.

***Ommatius forticulus* Scarbrough and Costantino, new species**

(Figs. 4, 17–21)

Male.—Measurements, body 28.0 mm; wing 18.7 mm. Brown. **Head:** Face, frons, and vertex yellow to yellowish-gray tomentose, facial vestiture whitish, bristles pale yellow, setae abundant and white; face narrow, about $\frac{1}{9}$ as wide as head. Frons yellow setose. Palpus mostly yellowish setose, brown setae dorsally. Proboscis black with whitish setae. Antenna mostly yellow setose, pedicel with brown setae ventrally; flagellum long and thin, $2.5\times$ as long as wide, about as long as scape and pedicel combined. Ocellar tubercle brown setose, setae about as long as basal three antennal segments. Occiput with large brown tomentose spot dorsally, tomentum otherwise yellowish gray to gray, setae whitish, that dorsally slightly pale yellowish; postocular bristles mostly yellow, proclinate with longest about half distance toward ocellar tubercle.

Thorax: Black. Mesonotum mostly brown tomentose dorsally, postpronotal spot, sides and prescutellum narrowly yellow; vestiture sparse, mostly brown; short, scattered brown setae medially, sparse yellowish setae present laterally; bristles mixed brown and yellow, three lateral and two dorsocentral bristles yellow; three thin, short dorsocentral bristles present. Scutellum with yellowish-brown tomentum and three yellow marginal bristles; setae yellow. Pleuron yellow tomentose with sparse yellow setae and bristles; anepimeral bristle present. Halter dull yellow, club dull brown.

Wing (Fig. 4): Cell R_1 immediately behind costal dilation brown, apical half of wing only slightly brownish with brown microtrichia. Crossvein r-m well before middle of cell d. Base of m1 about half as wide as that at basal third, weak preapical

constriction present. Apex of cell m_3 just before apex of cell d.

Legs: Coxae, trochanters, and femora blackish; coxae yellowish tomentose with mostly whitish to yellowish vestiture; femora with mostly yellow vestiture, two or three bristles brown, bristles mostly long and thin ventrally. Hind femur ventrally without long digitate process basally. Fore and middle tibiae with mostly yellow bristles laterally. Tibiae yellow, narrow apex of middle tibia and apical third of hind tibia brownish to brown; setae yellow, mostly short, fore tibia with abundant, long, yellow setae and yellow bristles, latter sparse, bristles usually brown. Basal tarsomere of fore and middle tarsi mostly yellow; bristles blackish.

Abdomen: Mostly black, wide triangles of tergites 2–6 laterally, apical margins of all tergites and apical margins of sternites 1–4 brownish yellow to red; tomentum thin, mostly yellow with yellow vestiture; tergites with brown tomentum spot medially. Tergites 6–8 with brown setae dorsally; long yellow setae present on basal four segments, abundant on tergites laterally, scattered, sparse on sternites.

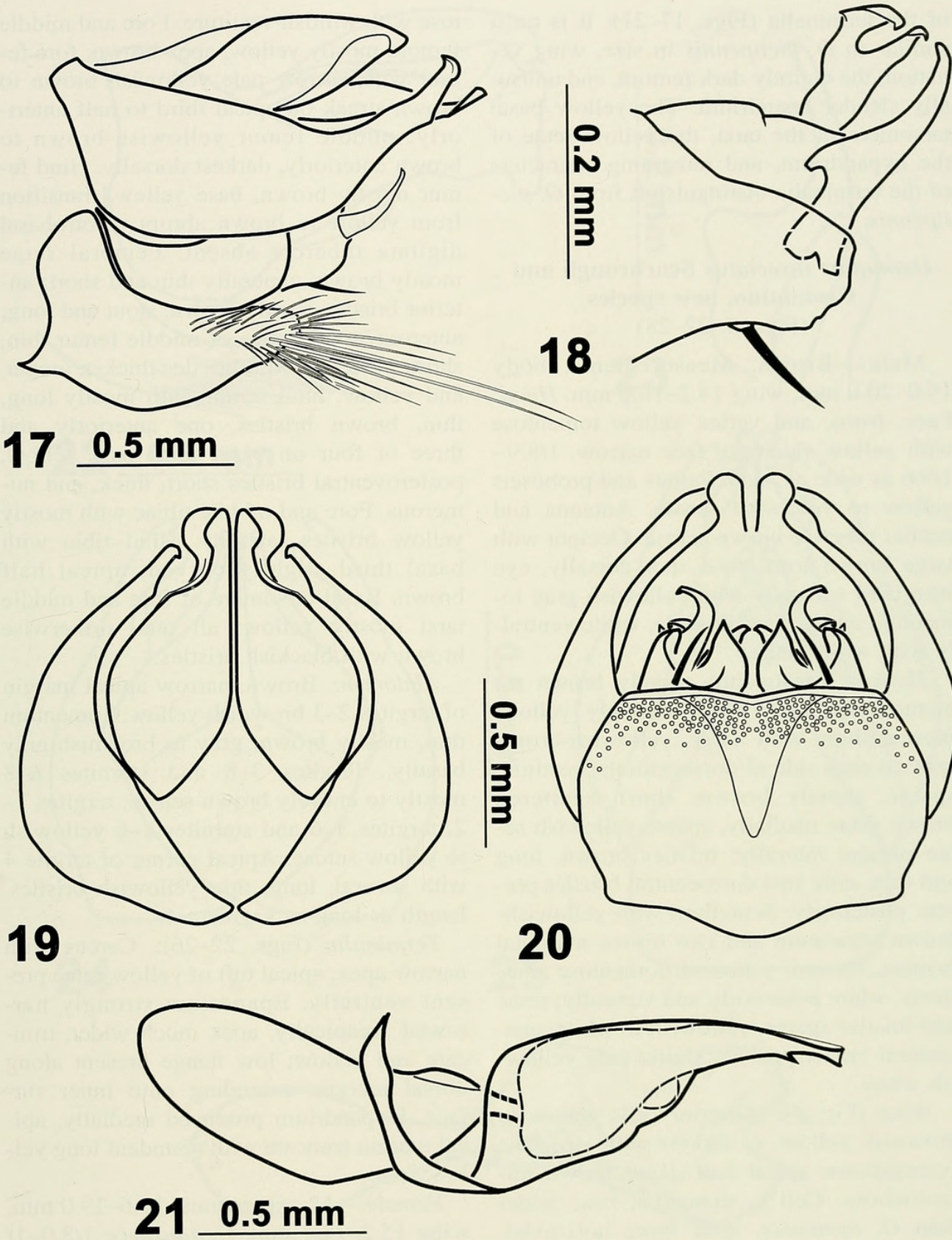
Terminalia (Figs. 17–21): Epandrium brown, exceptionally narrow apically, slightly curved behind genital cavity, apex round. Gonostylus slender, slightly curved. Apical corners of gonocoxite stout. Hypandrium narrowed, strongly produced apically, apical margin with abundant yellow vestiture apically.

Female.—Unknown.

Type material.—Holotype ♂, MALAYSIA: Sarawak, N. W. Borneo, Kuching [$1^{\circ}32'N$ $110^{\circ}20'E$], coll. 18.v.03, Pres. 1908 by the Sarawak Museum ~ Kuching [$1^{\circ}32'N$ $110^{\circ}20'E$], 18.v. 1903 ~ 1908, 1447, deposited in UMO.

Etymology.—Latin *forticulus*, an adjective for 'quite bold, rather brave', referring to the flies hunting habits.

Remarks.—*Ommatius forticulus* is easily recognized from congeners by the characters in the key and the combined characters



Figs. 17–21. Male terminalia of *Ommatius forticulus*. 17, Lateral view. 18, Gonostylus. 19–20, Dorsal and ventral views. 21, Aedeagus, lateral view.

of the terminalia (Figs. 17–21). It is most similar to *O. pictipennis* in size, wing venation, the entirely dark femora, and unusually slender epandrium. The yellow basal tarsomere of the tarsi, the yellow setae of the hypandrium, and remaining characters of the terminalia distinguish it from *O. pictipennis*.

***Ommatius insectatus* Scarbrough and Costantino, new species**

(Figs. 5, 22–28)

Male.—Brown. Measurements, body 19.0–20.0 mm, wing 14.2–16.0 mm. **Head:** Face, frons, and vertex yellow tomentose with yellow vestiture; face narrow, $1/8.9$ – $1/9.6$ as wide as head. Palpus and proboscis yellow to yellowish setose. Antenna and ocellar tubercle brown setose. Occiput with large brown tomentose spot dorsally, eye margined narrowly with yellowish gray tomentum and yellowish setae, white ventrally with white setae.

Thorax: Mesonotum mostly brown tomentose dorsally, sides narrowly yellow, prescutellum with large yellowish-brown spot on each side of dorsocentrals; vestiture sparse, mostly brown; short, scattered brown setae medially, sparse yellowish setae present laterally; bristles brown, long and thin, only two dorsocentral bristles present posteriorly. Scutellum with yellowish-brown tomentum and two brown marginal bristles. Pleuron yellowish tomentose anteriorly, white posteriorly and ventrally; setae and bristles sparse, yellowish to white; anepimeral bristle present. Halter pale yellowish white.

Wing (Fig. 5): Anterior cells yellow to brownish yellow, r_1 darkest with strongest corrugations; apical half dense brown microtrichose. Cell r_4 triangular, base wider than *O. auricular*, apex more horizontal, only slightly angled posteriorly at wing margin. Crossvein well before middle of cell d. Cell m_1 narrow basally, about $2/5$ as wide as basal third. Cell m_3 strongly arched dorsally, CuA_1+M_3 about as long as r-m.

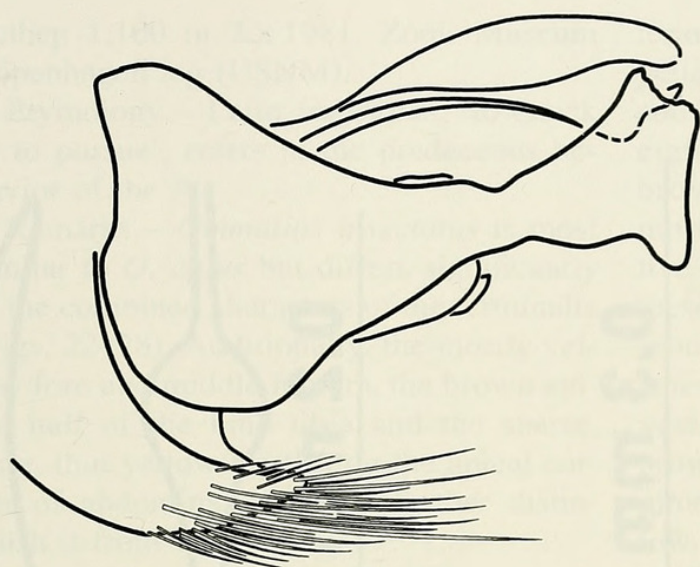
Legs: Coxae dark brown, whitish tomen-

tose with whitish vestiture. Fore and middle femora mostly yellow, apex brown; fore femur with narrow pale yellowish brown to brown streak on apical third to half anteriorly; middle femur yellowish-brown to brown anteriorly, darkest dorsally. Hind femur mostly brown, base yellow, transition from yellow to brown abrupt; ventrobasal digitate tubercle absent. Femoral setae mostly brown, generally thin and short; anterior bristles mostly brown, stout and long; anteroventral bristles of middle femur thin, short, posteroventral bristles thicker, longer, and yellow; hind femur with mostly long, thin, brown bristles, one anteriorly and three or four on basal third pale yellow, posteroventral bristles short, thick, and numerous. Fore and middle tibiae with mostly yellow bristles laterally. Hind tibia with basal third slightly curved, apical half brown. Basal tarsomere of fore and middle tarsi mostly yellow; all tarsi otherwise brown with blackish bristles.

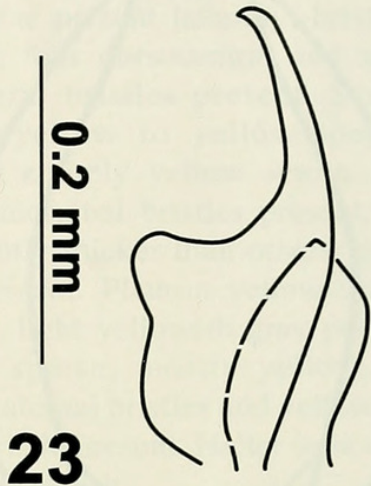
Abdomen: Brown, narrow apical margin of tergites 2–3 brownish yellow. Tomentum thin, mostly brown, gray to brownish-gray basally. Tergites 3–8 and sternites 6–8 mostly to entirely brown setose; tergites 1–2, tergites 3–6 and sternites 1–6 yellowish to yellow setose. Apical corner of tergite 4 with several, long, thin yellowish bristles, length as long as segment 4.

Terminalia (Figs. 22–26): Cercus with narrow apex, apical tuft of yellow setae present ventrally. Epandrium strongly narrowed preapically, apex much wider, truncate and yellow; low flange present along dorsal margin, extending onto inner surface. Hypandrium produced medially, apical margin truncate with abundant long yellow setae.

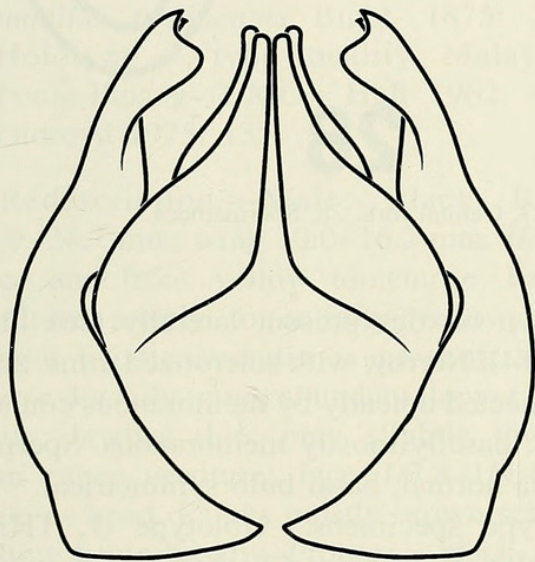
Female.—Measurements, 16.6–19.0 mm, wing 15.2–15.4 mm. **Head:** Face $1/8.0$ – $1/9.3$ as wide as head. Flagellum about as long as scape and pedicel combined. **Thorax:** Mesonotum with postpronotal spot, sides, and posteriorly brownish yellow tomentose; three dorsocentral bristles present. **Wing:** Similar to *catus* (see Fig. 2). Brown-



22 0.5 mm

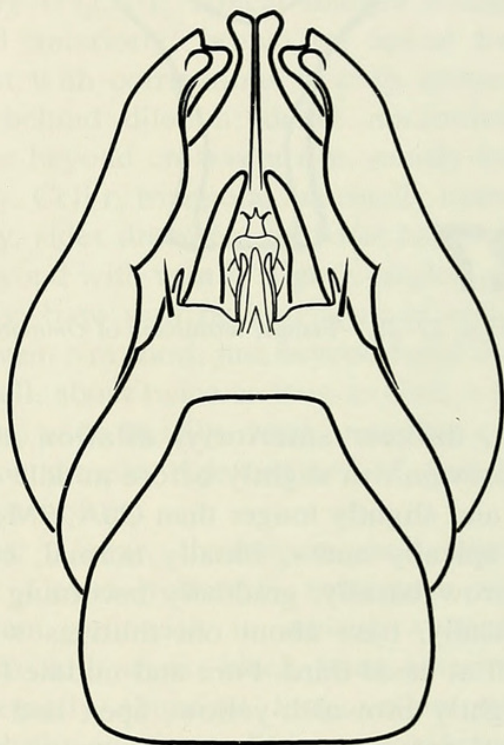


23

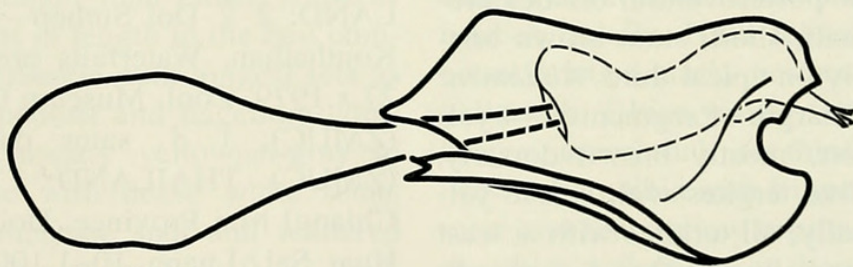


24

0.5 mm

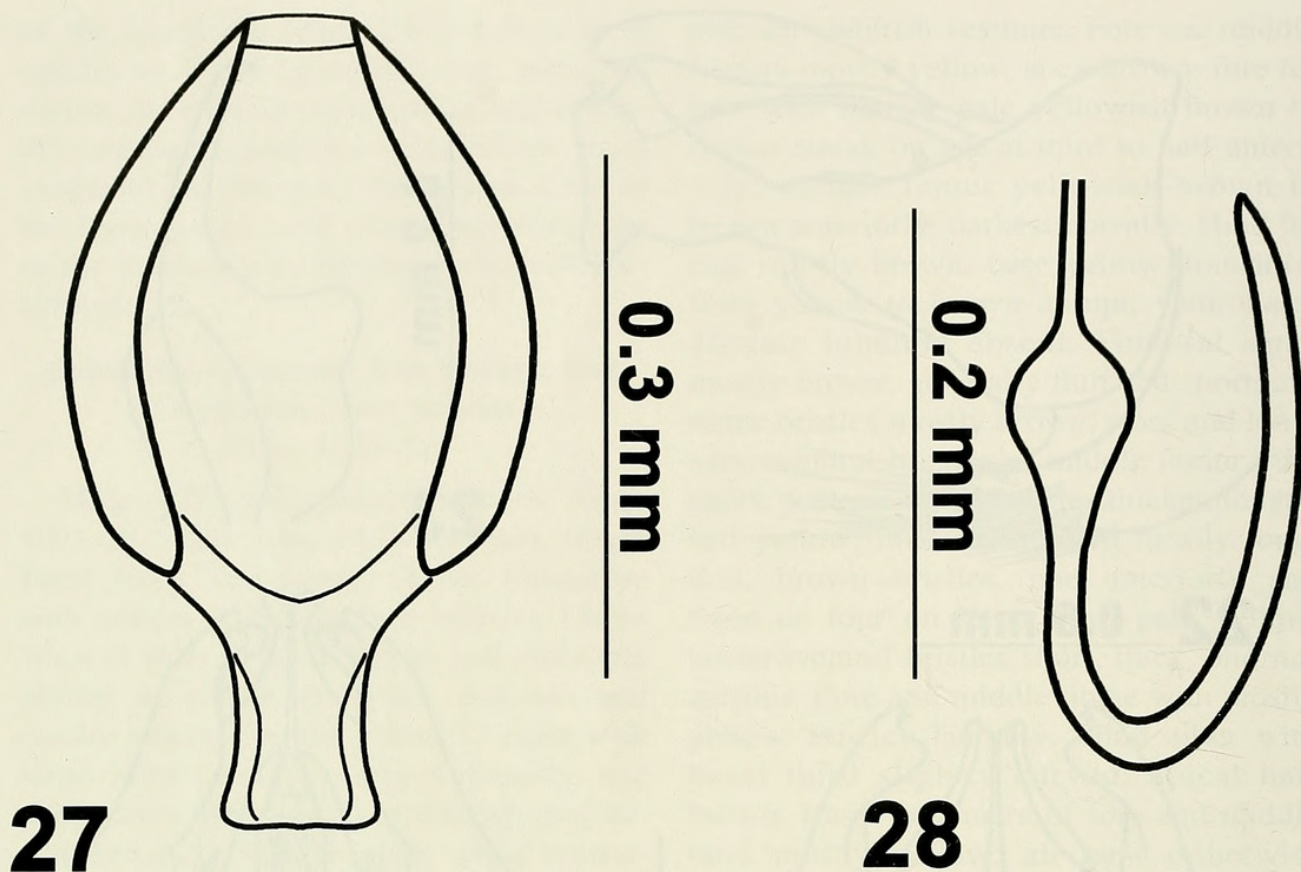


25



26 0.5 mm

Figs. 22–26. Male terminalia of *Ommatius insectatus*. 22, Lateral view. 23, Gonostylus. 24–25, Dorsal and ventral views. 26, Aedeagus, lateral view.



Figs. 27–28. Female terminalia of *Ommatius insectatus*. 27, Genital fork. 28, Spermatheca.

ish, darkest anteriorly, dilation absent; crossvein r-m slightly before middle of cell d, and slightly longer than $CuA_1 + M_3$; cells r_1 apically and r_4 basally normal; cell m_1 narrow basally, gradually becoming wider apically, base about one-third as wide as cell at basal third. Fore and middle femora slightly brownish-yellow, apex and apical third anteriorly with narrow streak brown. Hind femur with basal third yellow; five or six long yellow posteroventral bristles present on basal half, short, stout brown bristles present only on apical third. *Abdomen*: Narrow apical margin of segments 1–4 yellow, setae short, mostly brown dorsally, basal four or five tergites with sparse yellow setae laterally; all tergites with at least brown setae medially, tergites 5–8 mostly to entirely brown setose; most sternites with only short, sparse yellow setae; sternites 6–8 brown setose; apical three tergites sparsely tomentose, blue reflections present. *Terminalia* (Figs. 27–28): Tergite 9 narrow, straplike; sternite 8 simple, several long

brown bristles present laterally (see Figs. 13–14). Narrow with sclerotized arms, arms connected apically by membranous connection; basally mostly membranous. Spermatheca normal, basal bulb symmetrical.

Type specimens.—Holotype ♂, THAILAND: Chiang [= Chiang] Mai Province, Doi Suthep N. P.: Konthathan, 6–700 m 30.ix.1981, Zool. Museum Copenhagen leg, deposited in ZMUC. Paratypes: THAILAND: 2 ♀ Doi Suthep—Pui Natn. Park, Konthathan, Waterfalls area, 600 m, 20–27.x.1979, Zool. Museum Copenhagen leg. (ZMUC); 1 ♂, same data as holotype (ZMUC). THAILAND: 1 ♀, Chiang [= Chiang] Mai Province, Doi Inthanon N. P.: Huai Sai, Luang 10–1,100 m, 14.x.1981, Zool. Museum Copenhagen leg. (USNM); THAILAND: 1 ♂ Chiang [= Chiang] Mai Province, Doi Inthanon N. P.: Siripum 12–1,300 m 5.x.1981, Zool. Museum Copenhagen leg. (ZMUC). THAILAND: 1 ♂, Chiang [= Chiang] Mai Province, Doi

Suthep 1,100 m 2.x.1981, Zool. Museum Copenhagen leg (USNM).

Etymology.—Latin *insectatus*, 'to attack or to pursue', refers to the predaceous behavior of the fly.

Remarks.—*Ommatius insectatus* is most similar to *O. catus* but differs significantly in the combined characters of the terminalia (Figs. 22–28). Additionally, the mostly yellow fore and middle femora, the brown apical half of the hind tibia and the sparse, long, thin yellow bristles on the apical corner of abdominal tergite 4 further distinguish it from *O. catus*.

Ommatius pictipennis Bigot
(Figs. 6, 29–33)

Ommatius pictipennis Bigot, 1875: 246.

Holotype ♂, type locality: Malaysia, Pulo-Pinang (UMO); Hull 1962: 436; Oldroyd 1975: 135.

Redescription.—Male: Black. Body 13.9–24.7 mm; wing 10.0–16.2 mm. **Head:** Face and frons yellow tomentose. Facial vestiture mostly to entirely yellow, one brown bristle sometimes present; setae sparse dorsally, more abundant, longer ventrally; bristles thin, only slightly thicker than other vestiture; face 1/7.8–1/9.4 as wide as head. Palpus mostly brown setose, yellow ventrobasally. Proboscis black, yellowish setae. Antenna, frons, and ocellar tubercle brown setose. Antenna brown; flagellum with narrow base yellow, 2.5× as long as wide, longer than either scape or pedicel, subequal in length to the two combined. Ocellar tubercle with longest seta as long as scape, pedicel and flagellum combined. Occiput mostly yellowish-gray to white tomentose with dense white setae, large brown tomentose spot and scattered brown setae present dorsally; 10–12 long, thin, brown postocular bristles present, longest with apex just before or above ocellar tubercle.

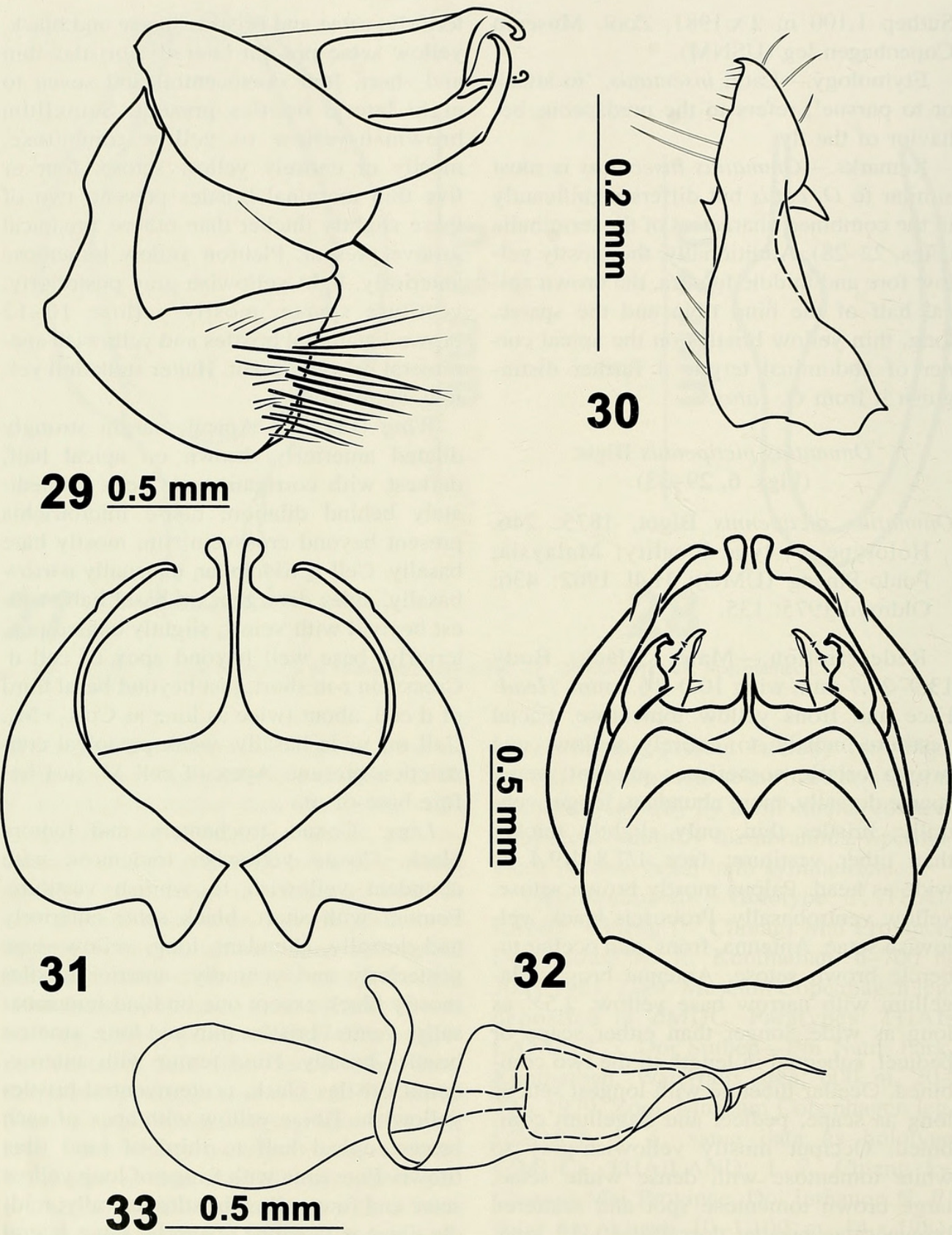
Thorax: Black. Mesonotum brown tomentose dorsally, narrowly brownish-yellow to yellow tomentose laterally and pos-

teriorly; setae and bristles sparse and black, yellow setae present laterally; bristles thin and short, four dorsocentral and seven to eight lateral bristles present. Scutellum brownish-yellow to yellow tomentose, mostly or entirely yellow setose, four or five thin marginal bristles present, two of these slightly thicker than others; preapical groove present. Pleuron yellow tomentose anteriorly, light yellowish gray posteriorly; vestiture sparse, mostly yellow, 10–12 brown katatergal bristles and yellowish anepimeral bristle present. Halter stalk dull yellow, knob reddish.

Wing (Fig. 6): Apical margin strongly dilated anteriorly; brown on apical half, darkest with corrugations in cells immediately behind dilation; dense microtrichia present beyond crossvein r-m, mostly bare basally. Cell r_4 triangular, unusually narrow basally, sides divergent on basal half, widest beyond with vein r_4 slightly angled posteriorly; base well beyond apex of cell d. Crossvein r-m short, just beyond basal third of d cell, about twice as long as $CuA_1 + M_3$. Cell m_1 wide basally, weak preapical constriction present. Apex of cell M_3 just before base of m_1 .

Legs: Coxae, trochanters, and femora black. Coxae yellowish tomentose with abundant yellowish to whitish vestiture. Femora with short, black setae anteriorly and dorsally, abundant, long, yellow setae posteriorly and ventrally; anterior bristles mostly black except one on hind femur basally; ventral bristles thin and long, stoutest bristles basally. Hind femur with anteroventral bristles black, posteroventral bristles yellowish. Tibiae yellow with apex of each brown, apical half to third of hind tibia brown. Fore tibia with fringe of long yellow setae and four yellow bristles laterally; middle tibiae with fringe of shorter setae, lateral bristles brown. Tarsi black with black bristles; basal tarsomere of fore tarsus with fringe of long yellow setae.

Abdomen: Black with narrow apical margin of most segments dull red to brownish yellow; tomentum mostly brown, dense



Figs. 29–33. Male terminalia of *Ommatius pictipennis*. 29, Lateral view. 30, Gonostylus. 31–32, Dorsal and ventral views. 33, Aedeagus, lateral view.

and slightly grayish laterally on basal three or four tergites and sternites, thin on apical four or five tergites color with slight bluish reflections; tergites mostly black setose, long, yellowish to white setae present on tergites 1–4 laterally and basal 5 sternites; sternites 6–8 with long, erect, black setae.

Terminalia (Figs. 29–33): Epandrium narrow and hooked on apical half, apex clawlike. Gonostylus (Fig. 30). Gonocoxite with enlarged, birdlike process laterally and median spinelike process medially. Hypandrium strongly enlarged in lateral view, with abundant black setae and bristles. Aedeagus narrow apically; pair of short, clawlike ventral processes present.

Female: Unknown.

Specimens examined.—MALAYSIA: Holotype ♂ (UMO); 1 ♂, [Kuala Selangor 3°23'22"N 101°17'06"E] Selangor Templar Park, 1.ix.1961, L. W. Quate (BPBM).

Remarks.—*Ommatius pictipennis* is recognized from congeners by the combined characters of the male terminalia (Figs. 29–33) especially the long, narrow, clawlike epandrium, shape of the gonostylus, lateral birdlike process of the gonocoxite, and abundant black vestiture of the hypandrium.

The holotype male is in fair condition, missing only the left wing, right leg, and hind left tarsus. The body is partially covered with fungus and debris, especially the terminalia. The data labels are as follows: 1) circular label with red border and the word 'holotype'; 2) white label with *Ommatius pictipennis* J. Bigot [in script], and the number '783 in Bigot Coll.'; and the UMO type label, Type Dip 289, *Ommatius pictipennis* Bigot, Hope Dept Oxford. The species was described from a single male specimen from Poulo-Pinang, Malaysia.

Ommatius torulosus (Becker)
(Figs. 7, 34–40)

Ommatinus torulosus Becker 1925: 124.

Lectotype ♂, DEI. Type localities: Taiwan: Kankau.

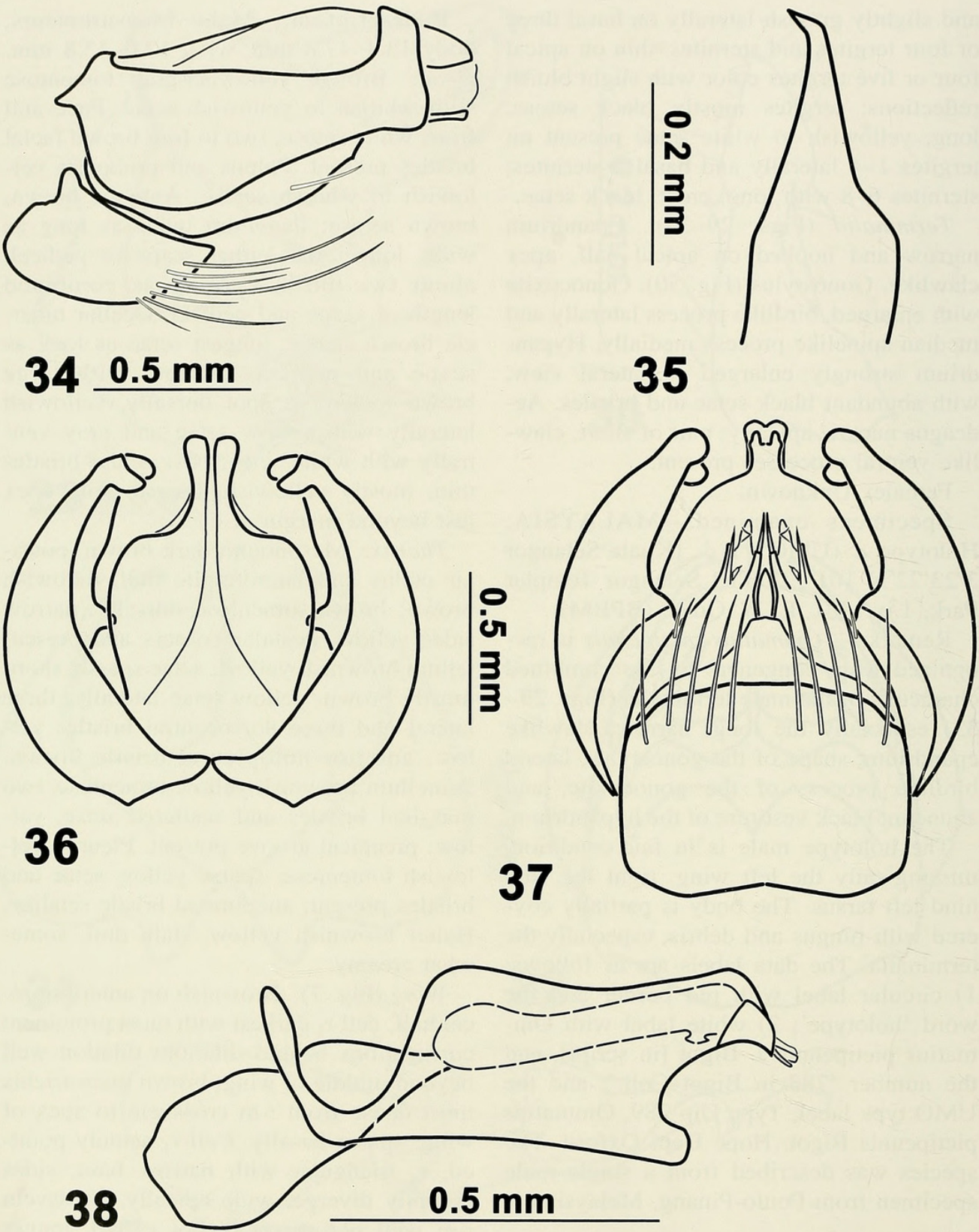
Ommatius torulosus: Hull 1962: 436; Oldroyd 1975: 135, catalog.

Redescription.—Male: Measurements, body 13.4–17.8 mm, wing 12.0–13.8 mm. *Head*: Brown, yellowish-gray tomentose with whitish to yellowish setae. Face and frons white setose, two to four brown facial bristles present. Palpus and proboscis yellowish to whitish setose. Antenna brown, brown setose; flagellum twice as long as wide, longer than either scape or pedicel, about two-thirds as long as combined length of scape and pedicel. Ocellar tubercle brown setose, longest setae as long as scape and pedicel. Occiput with large brown tomentose spot dorsally, yellowish laterally with yellow setae and gray ventrally with white setae; post ocular bristles thin, mostly yellowish, longest with apex just beyond margin of eye.

Thorax: Mesonotum dark brown, postalar callus and laterotergite dull yellowish brown; brown tomentose dorsally, narrow sides yellow, postalar corners and prescutellum brownish yellow; setae sparse, short, mostly brown, yellow setae laterally; three lateral and three dorsocentral bristles yellow, anterior notopleural bristle brown. Scutellum brownish-yellow tomentose, two marginal bristles and scattered setae, yellow; preapical groove present. Pleuron yellowish tomentose, sparse yellow setae and bristles present; anepimeral bristle setalike. Halter brownish yellow, stalk dull, somewhat creamy.

Wing (Fig. 7): Brownish on anterior apical half, cell r_1 darkest with most prominent corrugations behind dilation; dilation well beyond middle of wing; brown microtrichia most dense from r-m crossvein to apex of wing, sparse basally. Cell r_1 acutely pointed, r_4 triangular with narrow base, sides abruptly diverge, wide apically. Crossvein r-m well before middle of cell d, longer than CuA_1+M_3 . Cell m_1 narrow basally, about third as wide as that at basal third, narrowly constricted preapically. Cell m_3 wide, apex angular; m-m long with cell dorsally well before base of m_1 .

Legs: Coxae and trochanters brown, former grayish tomentose with whitish setae



Figs. 34–38. Male terminalia of *Ommatius torulosus*. 34, Lateral view. 35, Aedeagus. 36–37, Dorsal and ventral views. 38, Aedeagus.

and yellowish bristles. Fore and middle femora mostly yellow, slightly brownish yellow anteriorly, darkest dorsally and apically, mostly short brown setae present, much longer yellow setae ventrally, bristles mostly yellow and thin, one or two brown bristles present anteriorly. Hind femur brown, narrow base yellow, mostly long,

thin, yellow bristles present ventrally. Tibiae mostly yellow, narrow apices of anterior two and apical third to half of posterior tibia brown; bristles mostly brown, two or three yellow bristles present on fore tibia laterally. Basal tarsomere of fore and middle tibiae mostly yellow; remaining tarsomeres of all tarsi brown with brown bristles.

Abdomen: Blackish, narrow apical margin of segments light to dull brownish yellow; tomentum sparse, mostly brown with brown setae; grayish to brownish-gray tomentum on basal segments; long yellowish setae most abundant on tergites 1–3 or 4 laterally, scattered and less abundant on sternites 1–4, generally sparse; sternites 6–8 entirely brown setose, mixed yellow and brown on sternite 5.

Terminalia (Figs. 34–38): Brown, brown setose. Apex of epandrium capitate, rectangular, about 3× higher than long, brownish yellow. Hypandrium broad apically with rounded apical corners, row of six long, slender, yellowish bristles present.

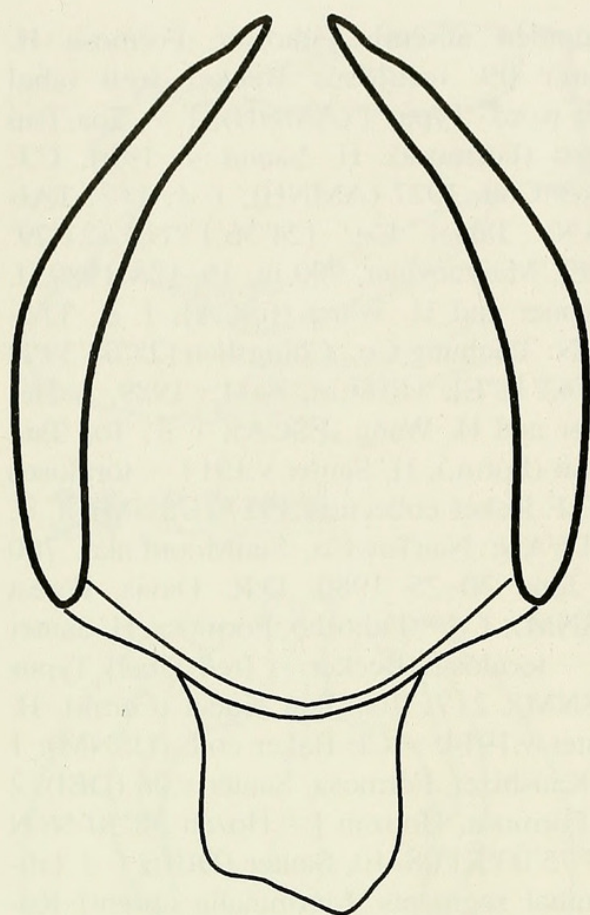
Female: Differs from male as follows. Measurements, body 13.8–18.6 mm; wing 12.0–14.6 mm. **Head:** Antenna brown setose; ocellar setae about as long as scape and pedicel combined. **Thorax:** Yellow. **Wing:** Costal margin straight, without a dilation; apex of cell r_1 wide, not acutely pointed apically. **Legs:** More yellow than male, basal third of hind femur yellow. Tarsal bristles entirely brown; hind tarsus with basal half of metatarsomere yellowish brown. **Abdomen:** Yellowish to yellowish brown tomentose with mostly yellow vestiture; apical segments and narrow middle of basal tergites with brown vestiture. **Terminalia** (Figs. 39–40): Tergite 9 straplike. Sternite 9 simple, brown vestiture, abundant long thin bristles laterally. Genital fork with stout, brown arms, fork basally membranous. Spermatheca carrot-shaped, base slightly bulbous, sides gradually narrowed apically, apex narrow, not acutely pointed, duct attached apically.

Specimens examined.—TAIWAN: 1 ♂*

[abdomen absent], Fuhosho, Formosa H. Sauter 09, torulosus Becker [red label with word 'Typus'] (AMNH); 1 ♀, Toa Tsui Kutsu (Formosa), H. Sauter v. 1914, C.F. Baker Coll. 1927 (AMNH); 1 ♂, 1 ♀, TAIWAN: Taipei Co. [24°56'13"N 121°29'50"E], Maiyueyuan, 900 m, 16–17.v.1989, J. Heppner and H. Wang (FSCA); 1 ♂, TAIWAN: Taichung Co., Chingshan [25°08'39"N 121°43'18"E], 1,100 m, 8–11.v.1989, J. Heppner and H. Wang (FSCA); 1 ♂, Toa Tsui Kutsu (Form.), H. Sauter v.1914 ~ torulosus ~ C.F. Baker collection 1927 (USNM); 1 ♀, TAIWAN: NanTowCo, SunMoonLake, 760 m, June 20–25 1980, D.R. Davis, Forest (USNM); 1 ♂*, Fuhosho, Formosa, H. Sauter 09 ~ torulosus Becker ~ [red label] Typus (USNM); 2 ♀, Toa Tsui Kutsu (Form.), H. Sauter v.1914 ~ CF Baker coll. (USNM); 1 ♀, Kanshizei, Formosa, Sauter v.08 (DEI); 2 ♀, Formosa, Hoozan [= Hoozan 38°50'56"N 125°75'03"E] 08–10, Sauter (DEI); 1 ♂ [abdominal segments 4-terminalia absent] Kosempo, Formosa, Sauter v.12 (DEI); 1 ♂ Kosempo, Formosa, Sauter v.12 (DEI); 2 ♂ Toa Tsui Kutsu (Form.), H. Sauter v.1914 (DEI); 1 ♂, Toa Tsui Kutsu, Formosa, H. Sauter v.1914 (DEI); 1 ♂, Tappani, Formosa, H. Sauter (DEI); 2 ♂*, 1 ♀ *[abdomen absent], Koshun [= Heng-Chun 22°2'15"N 120°49'24"E], Formosa, Sauter iii.07 09 (DEI); 1 ♂*, Fuhosho, Formosa, H. Sauter x.09 (DEI); 1 ♂*, Kankau (Koshun [= Heng-Chun 22°2'15"N 120°49'24"E]), Formosa, H. Sauter 1912 (DEI); 1 ♂* [**lectotype**], Kankau (Formosa), H. Sauter vi.1912 (DEI).

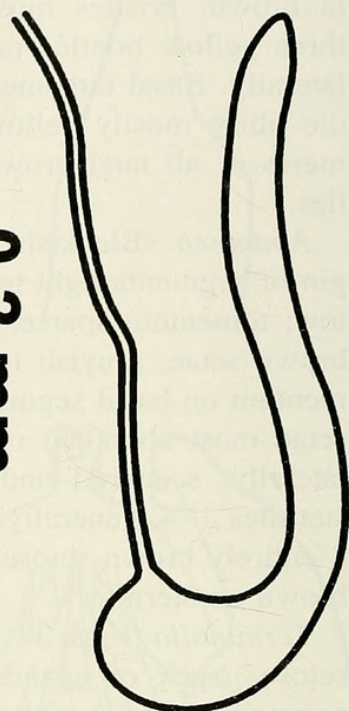
Remarks.—*Ommatius torulosus* is distinguished by the characters in the key, the small, slender body, yellow vestiture of the mesonotum, and characters of the terminalia (Figs. 34–40).

Becker (1925) listed 25 males and 21 females in the syntype series collected from Koshun, Kankau, Fuhosho, Tou-Tsui Kutsu, and dates of 1909 and 1912. Eleven males and five females present in DEI have red syntype labels. However, three of these females [Formosa, Hoozan 08–10, Sauter or



39

0.3 mm



0.2 mm

40

Figs. 39–40. Female terminalia of *Ommatius torulosus*. 39, Genital fork. 40, Spermatheca.

Kanshize, Formosa, Sauter v.08] and seven males [Kosempo, Formosa, Sauter v.12, Toa Tsui Kutsu (Formosa) H. Sauter v. 1914, Tappani?, Formosa, H. Sauter] have collecting locations and dates differing from that reported by Becker. Additionally, one male and three females in the AMNH and USNM have similar labels, often with red syntype labels [Toa Tsui Kutsu (Formosa) H. Sauter v. 1914 C.F. Baker Coll.]. Only the 8 specimens[*] in the AMNH, DEI, and USNM with label data that correspond to that reported by Becker are here considered a part of the original syntype series. To fix and stabilize the current concept of the name, the syntype male with the label 'Kankau (Formosa), H. Sauter vi.1912 (DEI)' is selected **lectotype**.

ACKNOWLEDGMENTS

For the loan of specimens, we are indebted to the curators listed in the methods

section. We also thank Darren Mann and Frank Menzel for loans of the types of *Ommatius pictipennis* Bigot and *O. torulosus* (Becker), respectively. AGS thanks Darren Mann, David Grimaldi, F. Christian Thompson, E. J. van Neiuken, C. van Achterberg, Ben Burgge, and Gary Steck for hospitality and assistance during his visits to their institutions. JC acknowledges support from NSF-REU grant BBI 0097478. We also thank the anonymous referees for their helpful comments.

LITERATURE CITED

- Arnett, R. H. Jr., G. A. Samuelson, and G. M. Nishida. 1993. The Insect and Spider Collections of the World. 2nd Edition. E. J. Brill, Gainesville, Florida, 220 pp.
- Becker, T. 1925. H. Sauter's Formosa-Aushaute: Asilinae III. (Diptera) Entomologische Mitteilungen 14: 62–85, 123–139, 240–250.
- Bigot, 1875. Diptères nouveaux ou peu connus. 4^e par-

- tie (1). V. Asilides exotique nouveaux. Annales de la Société Entomologique de France (5)5: 237–248.
- Hull, F. M. 1962. Robber flies of the world. The genera of the family Asilidae. United States National Museum Bulletin No. 224, 907 pp.
- Joseph, A. N. T. and P. Parui. 1998. The fauna of India and adjacent countries, Diptera (Asilidae). Part I. Zoological Survey of India, Calcutta, 278 pp.
- McAlpine, J. F. 1981. Morphology and terminology—Adults, pp. 9–63. In McAlpine, J. F., B. V. Peterson, G. E. Shewell, H. J. Teskey, J. R. Vockeroth, and D. M. Wood, eds. Manual of Nearctic Diptera. Vol. 1. Agriculture Canada. Monograph 27, 674 pp.
- Oldroyd, H. 1972. Robber flies (Diptera: Asilidae) of the Philippine Islands. Pacific Insects 14: 201–337.
- . 1975. Family Asilidae, pp. 99–156. In Delfinado, M. D., and D. E. Hardy, eds. A Catalog of Diptera of the Oriental Region. Volume 2. University of Hawaii Press, Honolulu.
- Scarbrough, A. G. and H. N. Hill. 2000a. The *Insula* species group of *Merodontina* Enderlein (Diptera: Asilidae). Studia dipterologica 7: 93–108.
- Scarbrough, A. G. and H. N. Hill. 2000b. Ommatiine robber flies (Diptera: Asilidae) from Sri Lanka. Oriental Insects 34: 341–407.
- Scarbrough, A. G. and C. G. Marascia. 1999. Synopsis of the Oriental and Australian species of *Emphysonera* Schiner (Diptera: Asilidae). Deutsche Entomologische Zeitschrift 46:203–229.
- Tsacas, L. & J. Artigas. 1994. Le Genre *Cophinophora* Hull, 1958 (Diptera: Asilidae), A repartition subcosmopolite inhabituelle. Annales de la Société Entomologique de France (Nouvelle Série) 30: 447–479.
- Wulp, F. M. van der. 1872. Bijdrage tot de Kennis der Asiliden van den Oost-Indischen Archipel. Tijdschrift voor Entomologie 15: 129–279.



Scarborough, Aubrey Glen and Costantino, Jessica E. 2005. "The genus *Ommatius* wiedemann, *Dilatipennis* species group (Diptera: Asilidae)." *Proceedings of the Entomological Society of Washington* 107, 789–807.

View This Item Online: <https://www.biodiversitylibrary.org/item/100258>

Permalink: <https://www.biodiversitylibrary.org/partpdf/40835>

Holding Institution

Smithsonian Libraries and Archives

Sponsored by

Smithsonian

Copyright & Reuse

Copyright Status: In copyright. Digitized with the permission of the rights holder.

Rights Holder: Entomological Society of Washington

License: <http://creativecommons.org/licenses/by-nc-sa/3.0/>

Rights: <https://biodiversitylibrary.org/permissions>

This document was created from content at the **Biodiversity Heritage Library**, the world's largest open access digital library for biodiversity literature and archives. Visit BHL at <https://www.biodiversitylibrary.org>.