COPESTYLUM CIRCUMDATUM (WALKER) (DIPTERA: SYRPHIDAE): REDESCRIPTION OF A NEOTROPICAL FLOWER FLY, WITH LECTOTYPE DESIGNATIONS, AND NEW SYNONYMS

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ABSTRACT: Copestylum circumdatum (Walker) (Diptera: Syrphidae) is redescribed. Lectotypes are designated for two names and one new synonym is proposed (Volucella mus Williston 1888 = circumdatum Walker 1857).

KEY WORDS: Diptera, Syrphidae, Copestylum, Neotropics, lectotype, synonyms.

Copestylum circumdatum is a widespread species in the Neotropics, which breeds in bromeliads. This species has recently been reared by workers and does appear in biodiversity inventory samples. The proper name for this species has been confused, as there is unrecognized but extensive variation in adult characters, as well as confusion about prior named concepts. We redescribe the species, propose the appropriate name and synonyms for this species, and designate lectotypes as necessary. The critical male genitalia characters are figured. The biology of the species and description of the immature stages will be published by Graham Rotheray and Geoffroy Hancock.

The format, methodology, terminology, and other aspects of this paper follow our general standards, which are enumerated in detail in our prior publications (see Marinoni and Thompson, 2004). Author FCT maintains a system of informal nomenclature for “morpho-species.” When we know that something represents a species, but do not know the name, we either assign a Year-Sequence number, such as 73-2, or a CR-sequence for the Costa Rican Biodiversity inventory project. These numbers are all represented by vouchers here at the Smithsonian Institution, and these numbers are provided to users, just like names. These numbers get published sometimes and are used, for example, in database, such as INBio’s ATTA system. Hence, author FCT reports them in his papers when the identity was finally resolved. On the Literature Cited, the bracketed codes at the end of each citation represent precise dates of publication. The format of those codes is [year.month.day]. The question mark means unknown. This practice is becoming more common amongst dipterists.

Copestylum Macquart is undoubtedly the largest genus of flower flies in the World. While in terms of the number of species described to date, Cheilosia Meigen, a mainly old world (Palaeartic) taxon, contains some 410 species, the

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Mailed on August 25, 2004
New World endemic group, *Copestylum*, contains 315 described species, as well as more than 100 known, but currently undescribed species.

The current concept of *Copestylum* is very broad and covers a diverse array of adult forms, essentially any New World species with a plumose arista and bristles (see Thompson (1999) for a key to the Neotropical genera; Vockeroth and Thompson (1987) for a key to Nearctic genera). Most of the species fall into a number of well defined groups based on adult characters. While *C. circudatum* does not fall into a group defined by autamorphies, the species does belong to a phenetic group defined by the following shared character states: Cell R1 broadly open apically; bristles all black; scutellum with a pre-apical depression, but without basolateral flattened, rugose areas; scutum without any pre-scutellar bristles; anepisternum bare anteriorly, and katepimeron bare. *Copestylum circumdatum* differs from all other species in this group by the following combination of characters; face with median black vitta, broadly yellow laterally; legs partially pale, usually with coxae yellow; scutum generally black (not entirely pale), scutellum pale along base and marginally; calypter with margin and fringe black. Closely related species are diagnosed below.

**Copestylum circumdatum** (Walker, 1857)

(Figures 1-5)


*Volucella mus* Williston, 1888: 274. Type-locality: Brazil, Mato Grosso, Chapada. Lectotype ♀ AMNH here designated. Kertész 1910: 195 (citation); Sack 1921: 137 (Bolivia, biology, immatures, fig. 10 (puparium), fig. 11c (anterior spiracular process); Curran 1926: 52 (key ref.), 1930: 7 (key ref.), 1934: 380 (key ref.), 1939: 2 (key ref.); Fluke 1957: 76 (catalog citation).


*Copestylum CR-43* (Fig. 2). Face shiny, yellow with a dark brown medium vitta ventrad to antenna and narrowly brown laterally, white pilose; gena brown except yellow medially, [thus there is a broad brown vitta from eye margin to oral margin partially on face and gena], short white pilose posteriorly; lunule yellow except narrowly brown along posterior margin; frontal triangle yellow, white pilose; frons yellow except for a triangular brown macula dorsal to lunule on ventral 1/2 or less; vertical triangle black, black pilose; vertex dark brown, shiny, black pilose; occiput black except yellow on ventral 1/5, white pollinose, white pilose except black on dorsal 1/8; antennae yellow to orange, black pilose; basoflagellomere elongate, about three times as long as width; aristae orange on basal 2/3, dark apically, with black rays.

**Thorax** (Fig. 3). Postpronotum yellow, white pilose; scutum bluish black except broadly yellow laterally, except notopleuron brownish laterally, narrowly yellow anterior scutellum in females, some individual also with yellow lateral areas mesial to wing with brown vitta, white pilose with intermixed black pile; bristles black, 2 notopleurals, 3 supra-alars with anterior most weak, about 1/2 size of posterior supra-alar, 3 postalar callars, no pre-scutellars, 3 marginal scutellars, one anepisternal; scutellum with apicomedial depression, yellow, with a narrow transverse brown fascia, black pilose
except bare on the depression, with three pairs of long marginal bristles; pleuron generally brown to blackish, white pilose, yellow on propleuron, posterior anepisternum, and anterior anepimeron; katepimeron bare; plumula yellow; halter white; calypter pale basally, becoming dark apically, with brown to blackish margin and fringe. Wing: hyaline except stigma dark brown and costal margin slightly brownish, microtrichose except bare base of cell C, basal 2/3 of cell R, anterobasal 3/4 of cell BM, all of cell CuP except apex, and on anal lobe anterior to vein A2; alula trichose; Cell r1 closed at wing margin or before, with or without very short petiole. Legs: dark brown to black, brown and black pilose except procoxa white pilose.

**Abdomen** (Fig. 4). Brown to bluish-black with yellow maculae, shiny; 1st tergum yellow, white pilose; 2nd tergum yellow laterally and on basal 1/3, dark elsewhere, yellowish-white pilose on basal 1/3, black pilose elsewhere; 3rd and 4th terga bluish-black except with large basal yellow maculae on basal 1/2 and broadly separated medially by about medial 1/4 and yellow laterally or sublateral-ly, black pilose except yellow pilose on maculae (males) or on basal 1/3 (females); sternae brownish to bluish-black except yellow laterally on 1st through 3rd sternae, white pilose except black pilose on 4th sternum (♂♂) or apical 2/3 (♀♀); genitalia (Fig. 5) black, black pilose; cercus semi-circular; postcercal area only slightly sclerotized; surstyli approximately triangular; aedeagus rectangular; 9th sternum with a single apicolateral bristle, with large lateral oval membranous area; superior lobe slightly arcuate; lingular area only slightly concave.

Figs 1-4. *Copestylum circumdatum* (Walker): (1) Adult, lateral view; (2) head, lateral view; (3) thorax, dorsal view; (4) abdomen, dorsal view.
Variation. As is usual with *Copestylum* species, color develops and darkens after the adult emerges. Freshly emerged adults (young specimens) appear paler and more brownish, whereas older ones are more yellow and bluish-black. Also, some individuals have more extensive pale areas.

Examination of specimens of *C. circumdatum* indicates that the extent of yellow coloration on the scutum is a factor of age and individuals. Freshly emerged specimens have the scutum extensively pale, so as to have a large triangular macula anterior to the scutellum and the lateral margins of the scutum broadly yellow. In older individuals, the scutum becomes darker so that the triangular macula is reduced to a transverse fascia and the lateral margins become more narrowly pale (dark areas expand).
Types. *Temnocera circumdata* Walker was described from an unspecified number of specimens from the “Valley of Amazon” in the Saunders’ collection, which was ultimately donated to the Natural History Museum, London. A single specimen remains there and is labeled as follows: Holotype (red circular NMH type label); Cotype (green circular BMNH type label); “Amazon, 66.53;” “Temnocera circumdata Wlk” [E. Austen’s hand]; and “Brazil, Amazon, H. W. Bates, 66.53.” This specimen is here designated as lectotype to fix the concept of the name and assure the consistent future interpretation of this name.

*Volucella mus* Williston was described from eleven specimens collected by H. H. Smith in “Chapada, Brazil.” A number of specimens agreeing with this data are now found in the American Museum of Natural History, having been donated by Williston’s family, and another two syntypes are found in the Cornell University Collection. Of these specimens a male labeled “Chapada,” “Type, No., A. M. N. H.” [red], “S. W. Williston Collection,” “Am. Mus. Nat. Hist., Dept. Invert. Zool., No. 19921,” “Volucella, mus, Williston” [red-bordered determination label] “Lectotype, Volucella mus, Williston, Design. Thompson 2002” and in the American Museum of Natural History is here designated as lectotype to fix the concept of the name and assure the consistent future interpretation of this name.

**Distribution.** Costa Rica, Panama, Suriname, Trinidad, Colombia, Brazil (Bahia, Mato Grosso, Parán, Santa Catarina), Peru, Paraguay, Bolivia, Argentina.


Curran (1926, 1930, 1934, 1939), the last worker to publish comprehensive keys of the group now called *Copestylum*, did not recognize the name *C. cir-
cumdata Walker, as he only worked from specimens previously identified in the collection of his museum. He simply ignored the descriptions of other species by earlier authors. While Williston did attempt to decipher the species described by earlier authors, he apparently was unable to recognize that Walker's description of C. circumdata was the same as the species he described as mus. In terms of current taxonomy, there is a species called mus by Curran, whose senior synonym is C. circumdata Walker.

In the last published key to Copestylum species (Curran, 1939), C. circumdatum runs to couplet #35, mus, if the coxae are considered yellow (couplet #28), otherwise it runs to couplet #45, contumax. Copestylum contumax (Curran, 1939) is known from a unique male specimen which has "unusually large" male genitalia. Copestylum circumdatum has small, normal-sized male genitalia, also the male frontal triangle is not produced and the facial tubercle is white pilose, not black (contumax). This species differs from musana (Curran, 1930) in having the anepimeron extensively yellow and entirely yellow pilose, not black and black pilose (musana).

**Footnote.** This species is similar to the species named obscurior by Curran and so cataloged by Fluke (1957: 78). However, due to an ignorance of Latin, this epithet became incorrectly changed to obscurius in the Neotropical Diptera catalog (Thompson, et alia 1976: 80).

**ACKNOWLEDGMENTS**

We thank Richard Vane-Wright and Nigel Wyatt, the Natural History Museum (formerly the British Museum (Natural History), London (BMNH); E. Richard Hoebeke and James K. Liebherr, Cornell University, Ithaca, New York (CU); David A. Grimaldi, the American Museum of Natural History, New York (AMNH); Nelson Papavero and Francisca C. do Val, Museu de Zoologia da Universidade de São Paulo, São Paulo (MZUSP); J. Richard Vockeroth, Canadian National Collection, Agriculture Canada, Ottawa (CNC) for permission to study material in their care. Other museum acronyms used in the text are USNM for the Smithsonian National Museum of Natural History, Washington, and DZUP for Departamento de Zoologia, Universidade de Federal do Paraná, Curitiba. Taina Litwak prepared the figures of the male genitalia. The junior thanks the Samuel Wendell Williston Diptera Research Fund for providing support for her visits to the Smithsonian Institution.

We also thank Drs. Michael Pogue, Allen Norrbom, and Michael Schauff of the Systematic Entomology Laboratory, USDA, Washington, District of Columbia; and Wayne N. Mathis of National Museum of Natural History, Smithsonian Institution, Washington, District of Columbia, for their critical review of the manuscript.

This study resulted from an investigation of the flower fly fauna of southeastern Brazil. The junior author initiated the faunal survey of this area, doing the preliminary sorting and identification to morphospecies. The senior author is responsible for the taxonomy, recognizing that there is a single widespread species masquerading under various names. Together, we prepared this manuscript.

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