**SYSTEMATICS OF NEW WORLD *CURTONOTUM* MACQUART (DIPTERA:
CURTONOTIDAE)**

A Thesis

Presented to

The Faculty of Graduate Studies

of

The University of Guelph

by

JOHN KLYMKO

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ABSTRACT

Systematics of the New World *Curtonotum* Macquart (Diptera: Curtonotidae)

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University of Guelph, 2009

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The New World species of the curtonotid genus *Curtonotum* are revised. Twenty two species in the New World are described and illustrated, 12 of which are newly described (*Curtonotum atlanticum*, *C. desperatum*, *C. papillatum*, *C. adusticrus*, *C. hunkingi*, *C. gracile*, *C. brunneum*, *C. scambum*, *C. bivittatum*, *C. floridense*, *C. flavisetum*, and *C. nigrum*). *Curtonotum nigripalpe* Hendel is proposed as a new junior synonym of *C. hendelianum* Enderlein. A key to these New World species is presented and the phylogenetic relationships between them are discussed. Two diagnosable clusters of species are left untreated at the species level (the *C. murinum* species complex including *Curtonotum murinum* Hendel, *C. coriaceum* Hendel, *C. impunctatum* Hendel, 1932 *nec impunctatum* Hendel, 1913 and *C. decumanum* Bezzi; and the *C. vulpinum* species group including *Curtonotum vulpinum* Hendel, *C. impunctatum* Hendel, 1913 *nec impunctatum* Hendel, 1932, *C. fumipenne* Hendel, 1913, and *C. simplex* Schiner). Only the former of these two clusters is treated as an operational taxonomic unit and included in the phylogenetic analysis but both groups are diagnosed and included in the key. Lectotypes are designated for *C. tumidum* Enderlein, *C. bathmedum* Hendel, *C. taeniatum* Hendel, *C. trypetipenne* Hendel and *C. apicale* Hendel.

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INTRODUCTION

Curtonotum is a genus of medium-sized flies somewhat resembling drosophilids (Figures 5-12). This relatively small genus is found in every zoogeographic region with the exception of the Australasian/Oceanic Region, with most diversity occurring in the tropics. The focus of this study is a revision of the New World species of *Curtonotum*. All New World species of Curtonotidae except those in the *Curtonotum murinum* species complex and the *Curtonotum vulpinum* species group are fully described and illustrations are provided for male and female terminalia where possible. Descriptions of 12 new species are presented. The phylogenetic relationships of the New World species are investigated for the first time.

Background

The family Curtonotidae is a small, poorly known group of acalypterate flies. Curtonotids were treated as a subfamily of the Drosophilidae by Hendel (1917, 1928, 1932), Malloch (1930), Sturtevant (1921) and Curran (1933, 1934); as a subfamily of Ephydriidae by Enderlein (1914, 1917); and as a part of Diastatidae by Duda (1924) and Okada (1960, 1966). In 1934, Duda placed them in their own family (Curtonotidae) and this has been widely accepted in later works (Hackman 1960; Hennig 1973; Tsacas 1974, 1977).

The family Curtonotidae is defined by the combination of the following characters: complete subcosta ending in costa; both humeral and subcostal breaks; confluent cells bm and dm; a large C-shaped aedeagus with an anteroventrally directed distiphallus; and a large membranous anteroventral pouch originating from the vagina,

posterior to the ventral receptacle (McAlpine 1989, pp. 1486-1487; Meier *et al.* 1997).

Three curtonotid genera are currently recognized: *Curtonotum* Macquart, *Cyrtona* Seguy, and *Axinota* van der Wulp, represented by 59 species worldwide (not including those 12 newly described herein). At least 50 new species (mostly *Cyrtona*) in the Afrotropical Region await description (Kirk-Spriggs 2008).

Biology

The habits of Curtonotidae are little known. The larvae of the Afrotropical and Palaearctic *Curtonotum simile* Tsacas and the Afrotropical *C. sahaliense* Tsacas are known to develop in locust egg pods (Greathead 1959; Kirk-Spriggs 2008) and the Afrotropical *Cyrtona albomacula* (Curran) has been reared from human feces (Greathead 1959). The Nearctic *Curtonotum helvum* (Loew) has been reared from decaying grasshopper egg pods under laboratory conditions (Meier *et al.* 1997). A specimen of an undescribed species in the *Curtonotum murinum* species complex (as defined herein) from Monsoon Valley, Tingo Maria, Peru, was “dug [as a puparium] from dirt in association with *Philanthus* nests” (E.I. Schlinger and E.S. Ross [CASC]) where it possibly developed as a kleptoparasite on the paralyzed bees with which the nest was stocked. Adults of the Afrotropical *Curtonotum quinquevittatum* Curran have been observed sheltering in mammal burrows, particularly in recently abandoned warthog burrows where their numbers can reach into the hundreds (Pollock 2002). Zimbabwean *Cyrtona* adults are found under overhangs along rivers in the dry season and in adjacent vegetation in the rainy season (Pollock 2002). The Palaearctic and Oriental species *Curtonotum anus* is known to take shelter under plants (Duda 1934) and is common along the shaded and muddy shoreline of the Jordan River in Israel (Kirk-Spriggs &

Freidburg 2007). The two Nearctic species in the family are both associated with sand - *Curtonotum helvum* found in sand dunes and *Curtonotum floridense* found in scrub habitat in Florida. Neotropical curtonotid species have been found in a variety of humid habitats, including riparian strips in the dry forests of Costa Rica, primary and secondary rainforest in Peru, and freshwater and marine shorelines in primary rainforests of Costa Rica and Ecuador. Although most Neotropical curtonotid records are from low elevation primary forests, some species have been collected at high elevations in southeast Brazil and cloud forests in Ecuador and Bolivia. Adults of Neotropical species have been found on dung baits, both in lowland forest (*i.e.* Peru) and at higher elevations (*i.e.* Bolivia). Adults have also been observed feeding on small unidentified bits of decomposing material on leaf surfaces in Ecuador (Figure 11), and often occur in association with tree falls, forest openings, and along forest paths at lower elevations. Schmitz *et al.* (2007) reported collecting over 45,000 curtonotids in the mangrove forests of Santa Catarina Island in southern Brazil using banana-baited traps hung from trees over the course of 28 trapping sessions, each 3-4 days long (I was unable to obtain specimens from this study and the species remain unidentified). Fischer (1933) used traps baited with both fruit juices (*i.e.* banana, pear, and peach) and vinegar to collect the type series of *C. punctithorax* Fischer. Tsacas (1977) noted that the African species of *Curtonotum* are also found in a range of both dry and humid habitat types and at least one species appears to be restricted to high altitudes in Angola.

The only observations of mating behaviours in curtonotids are of *Curtonotum helvum*. This species is known to copulate in the evening, with copulating pairs found on low vegetation (Meier *et al.* 1997). *Curtonotum helvum* is thought to be primarily

crepuscular or nocturnal (Meier *et al.* 1997), and specimens examined from Fort Dix, New Jersey, and the Great Sand Dunes National Monument in Saguache County, Colorado, were captured in light traps; however *C. helvum* adults are also active on open sand on overcast days. Evening observations of *C. helvum* in August 2005 (Bruce Peninsula National Park) produced no evidence of oviposition or sexual interaction; however, females were noted periodically extruding their ovipositors while stroking them with their hind legs, and periodically stroking their proboscises with their fore legs (Marshall, pers. comm.*). In October, 2008, several pairs of *C. helvum* were located in copula at dusk in the Warren Dunes State Park, Michigan, on the southeast shore of Lake Michigan (S.A. Marshall, pers. comm.*). One pair was observed walking in tandem to the base of a blade of American Beachgrass (*Ammophila breviligulata*) (Figure 5). Marshall collected the pair in a pill bottle from the grass. The pair remained in copula for 4 or 5 hours until Marshall retired for the night. By dawn the pair had separated; no oviposition was observed. *Curtonotum quinquevittatum*, a crepuscular and nocturnal Afrotropical species, has been observed exiting its daytime mammal burrow refuge in the late evening and returning to it in the early morning (Pollock 2002). In such situations *C. quinquevittatum* can occur in the hundreds. *Curtonotum simile* (of Afrotropical and Palaearctic distribution) has been collected in the night at lights, again suggesting a crepuscular or nocturnal habit (Kirk-Spriggs & Freidburg 2007). No records suggest that neotropical curtonotids are associated with burrows. At Heath River, Depto. La Paz, Bolivia, curtonotids in the *C. murinum* species complex started appearing at the branch tips of floodplain trees just before dusk and were still there as darkness fell. These were not seen at the same sites earlier in the day (S.A. Marshall, pers. comm.*).

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Curtonotum quinquevittatum and an unknown species of *Cyrtona* were found to commence ovary development in the late dry season and into the early wet season (Pollock 2002). Pollock (1996) reported *Cyrtona* to be viviparous, this based on the presence of first instar larvae in the vagina of freshly prepared specimens, and on the unique abdominal anatomy, which is not abruptly narrowed into a narrow telescopic ovipositor as in other curtonotids, but blunt-ended. The examination of several other *Cyrtona* species in this current study has shown some species lack this abdominal adaptation, thus a viviparous life history is likely not universal in the genus.

Phylogenetic relationships

Unlike *Cyrtona*, with its expanded tergite 7, and *Axinota*, with its loss of proclinate bristles and modified ventral receptacle, *Curtonotum* has no obvious apomorphies with the possible exception of the spinose costa. This condition is absent in *Cyrtona* and *Axinota*, and is generally absent in the other families within Ephydroidea (Diastatidae [including Campoechetidae] being an exception). While this condition was considered plesiomorphic for Ephydroidea by McAlpine (1989), given its scattered occurrence, its general absence in Drosophilidae (which, with Curtonotidae, is the sister group to the rest of Ephydroidea [Grimaldi 1990]), it is more likely a character that has been independently derived a few times in the Acalyptratae but only once in the Curtonotidae.

The relationships between *Curtonotum*, *Cyrtona* and *Axinota* have been briefly investigated by both Meier *et al.* (1997) and Pollock (2002), although no congruent phylogeny of the three genera has been produced. Meier *et al.* (1997) tentatively proposed *Axinota* as the sister group to *Curtonotum* plus *Cyrtona* based on the assumed plesiomorphic condition of an *Axinota* sp. spermatheca. The spermatheca in question is of

an undescribed Malagasy species, and it is characterized by its small, subspherical shape and basal invagination. This is the most common spermathecal state in Drosophilidae, the putative sister family of Curtonotidae as proposed by Grimaldi (1990), and is thus thought to represent the groundplan condition for Curtonotidae. Meier *et al.* (1997) further suggested that the presence of spinules on the spermatheca of *Cyrtona* and *Curtonotum*, (absent in examined *Axinota* and the groundplan of Drosophilidae) represents another synapomorphy for these two genera.

Pollock (2002) tentatively proposed *Cyrtona* as the sister group to *Curtonotum* and *Axinota* based on the aedeagal asymmetry and a reduction of the pregenital sclerites in *Axinota* and *Curtonotum*. Pollock considers aedeagal symmetry to be the ground plan condition for Ephydroidea and hence the asymmetry in *Axinota* and *Curtonotum* is derived. A reduction of any sclerite would intuitively be considered derived.

I prefer the interpretations of Pollock to those of Meier *et al.*, aedeagal asymmetry seeming a particularly strong synapomorphy for *Axinota* and *Curtonotum*. The spermathecae in the *Curtonotum* examined in this study and elsewhere (Tsacas 1974, 1977, Delfinado 1969) show great variability in shape and surface texture. Given their great interspecific variability, something noted even in *Axinota* where the plesiomorphic spermatheca of *Axinota* is known only from one species, spermathecae may not be the most useful structures for interpreting higher level classification within Curtonotidae. That said, Pollock's second proposed synapomorphy is a misinterpretation of characters. At least some species of both *Axinota* and *Curtonotum* possess all the pregenital sclerites present in *Cyrtona*, and indeed in many of these they are well defined. In *Cyrtona* tergite 7 is greatly expanded, but this is more likely an autapomorphy for the genus than a

plesiomorphic condition. The relationships of the three genera are further considered in phylogenetic analysis presented herein.

Research Objectives

Curtonotum is the only genus of Curtonotidae found in the New World. Though recently revised in the Oriental (Delfinado 1969) and Afrotropical (Tsacas 1977) regions, the only comprehensive revision of New World species was published by Hendel in 1913, with no new species described since 1934. Not including the species named here, there are 19 described New World species, 18 of which are Neotropical in distribution.

The 19 previously described New World species of *Curtonotum* were thought to represent about half of the biodiversity for this region (Marshall *et al.*, in press). Published descriptions are supported by very few illustrations and lack discussions of genitalia, complex structures that include important taxonomic characters. The phylogenetic relationships of New World *Curtonotum* had not been investigated prior to this study.

The objective of this study was to redescribe the valid nominal species, describe newly discovered New World taxa, provide a key for the identification of adults, and present a hypothesis of the phylogeny of the New World species. Because of the relatively large number of New World *Curtonotum* species not all could be treated in detail, as described below.

Two large, well defined diagnosable clusters of species (the *Curtonotum murinum* species complex and the *C. vulpinum* species group, as defined herein) are not dealt with to the species level. Both clusters are easily recognizable and each comes out as a single unit in the key provided below. The *Curtonotum murinum* species complex is a clade

defined by the putative synapomorphy of an expanded lower calypter. As such this species complex is treated as an operational taxonomic unit within the Neotropical *Curtonotum punctithorax* group and is included in the phylogenetic analysis. The *C. vulpinum* species group is also an easily diagnosed and readily recognised cluster of species but it lacks defining apomorphic characters and is possibly not monophyletic. This group therefore cannot be treated as an operational taxonomic unit; it is excluded from the current analysis and discussed as a species group of uncertain relationships.

MATERIALS AND METHODS

Specimens examined in this study were adults, either air-dried directly on a pin from a fresh state or critical point-dried from alcohol and glued to a pin or paper point. External characters were examined using a Leica WILD M3Z dissecting microscope. Examination of genitalia required dissection. For this, abdomens were removed and cleared in boiling 10% potassium hydroxide, then neutralized in glacial acetic acid for at least 5 minutes. Abdomens were then rinsed in water and placed in glycerine for examination on a depression slide and then stored in a microvial pinned below the corresponding specimen. Male genitalia were isolated by cutting the membrane between segments 5 and 6 (this varied somewhat depending on the specimen), separating the abdomen in two halves. Female genitalia were isolated by cutting the membrane between segments 7 and 8 (this varied somewhat depending on the specimen). Isolated female genitalia were stained in acid fuschin for 5 minutes, and then rinsed in water, to reveal lightly sclerotized internal structures as necessary.

Material was examined from the following museums (Four letter codons follow Arnett *et al.* 1993):

ABSC: Archbold Biological Station, Lake Placid, FL, USA

AMNH: American Museum of Natural History, New York, NY, USA

ANSP: Academy of Natural Sciences, Philadelphia, PA, USA

BMNH: Natural History Museum, London, United Kingdom

CASC: California Academy of Sciences, San Francisco, CA, USA

CMNH: Carnegie Museum of Natural History, Pittsburgh, PA, USA

CNCI: Canadian National Collections, Ottawa, ON, Canada

CSCA: California State Collection of Arthropods, Sacramento, CA, USA

DEBU: University of Guelph Insect Collection, Guelph, ON, Canada

EMEC: Essig Museum of Entomology, University of California, Berkeley, CA, USA

EMUS: Utah State University Insect Collection, Logan, UT, USA

HNHM: Hungarian Natural History Museum, Budapest, Hungary

INBC: Instituto Nacional de Biodiversidad, Santo Domingo de Heredia, Costa Rica

MZSP: Museu de Zoologia da Universidade de São Paulo, São Paulo, São Paulo, Brazil

NHMW: Naturhistorisches Museum Wien, Vienna, Austria

NMWC: National Museum & Gallery of Wales, Cardiff, United Kingdom

OXUM: Oxford University Museum of Natural History, Oxford, United Kingdom

ROME: Royal Ontario Museum, Toronto, ON, Canada

SMTD: Staatliches Museum für Tierkunde, Dresden, Germany

UCFC: University of Central Florida, Orlando, FL, USA

USNM: United States National Museum, Washington, DC, USA

ZMUC: Zoological Museum, University of Copenhagen, Denmark

ZSMC: Zoologische Staatssammlung, Munich, Germany

In the following descriptions pruinosity refers to very fine, dense, appressed microtrichia. The non-socketed pelage of the first flagellomere and palpus is referred to as microtrichia as it is longer and more erect than what is found elsewhere. The non-socketed pelage of female and male terminalia (including sternite 5) is referred to as microtrichia as these structures are typically viewed in a cleared state and under high magnification (at lower magnification and in non-cleared material this pelage would be pruinosity). The relatively stout, unsocketed trichia found medially on female sternite 10 in many species are referred to as spinules as they are differentiated from the adjacent, finer microtrichia. Likewise, all trichia on the distiphallus are referred to as spinules.

The measurements and ratios for each species are based on a sample of five specimens of each sex where possible. Measurements and ratios are given as a range, reflecting the range of length and shape in the specimens examined. Because the size of specimens is affected by the method with which they are dried, body length measurements should be treated as approximations. Measurements and ratios used are as follows:

1. Body length: The sum of the distance from the anterior most point of the frons to the base of the abdomen plus the distance between the base of the abdomen and the posterior margin of tergite 5. Such a combined approach was necessary to accommodate the highly humped nature of *Curtonotum*.
2. Eye height: The distance from the most ventral point of the eye to the most dorsal point of the eye, measured in lateral profile (Figure 13n).

3. Genal height: The distance from the ventral most portion of the eye to the ventral margin of the gena, measured in lateral profile (Figure 13n).
4. Frons width: The distance between the lateral margins of the frons, measured at the midpoint between the posterior ocelli and the ventral margin of the frons.
5. Frons length: The distance between the ventral margin of the frons and the posterior ocelli.

The New World *Curtonotum* are divided into species groups. The *Curtonotum anus* and *C. punctithorax* species groups (as defined herein) form are well-supported monophyletic groups. The *C. vulpinum* species group is easily diagnosed on the basis of plesiomorphic characters. No synapomorphies are known to defined this group, and therefore it may not be monophyletic. The species in this group are not treated in detail, and are treated as a species group for convenience. Some smaller, well-defined clades of cryptic species are treated as species complexes.

For previously described species with a type series but no holotype a lectotype has been designated. These lectotypes have been labeled (on red label paper) as “Lectotype, *Curtonotum* [*specific epithet* Author], designated Klymko and Marshall, 2009”. The other specimens of the type series that were available for examination and of the same species as the lectotype have been designated paralectotypes and labeled (on yellow paper) as “Paralectotype, *Curtonotum* [*specific epithet* Author], designated Klymko and Marshall, 2009”.

PHYLOGENETIC DISCUSSION

A phylogenetic analysis of the New World *Curtonotum* was conducted using *Cyrtona* and *Axinota* as outgroups. *Cyrtona* was selected to root the tree as it shows two putatively primitive states not present in *Curtonotum* or *Axinota*: greater retention of protandrial sternites (5 sensory setulae are present in *Cyrtona*, while only four are present in *Curtonotum* and *Axinota*), and a symmetrical distiphallus (the distiphallus is asymmetrical in *Curtonotum* and *Axinota*).

An undescribed species of *Cyrtona* from South Africa (labelled “*Cyrtona* sp. A” and deposited at DEBU) was used as the exemplar for *Cyrtona*. Additional material from this series of material is currently being studied by Kirk-Spriggs in his revision of *Cyrtona* (Kirk-Spriggs, pers. comm. *). Kirk-Spriggs has identified this taxon as an undescribed species. *Axinota simulans* was used as the exemplar for *Axinota*.

Two exemplars are used from the *Curtonotum murinum* species complex; the first from Costa Rica, labelled “*Curtonotum murinum* complex sp. A” and deposited at INBC, the second from Peru and Bolivia, labelled “*Curtonotum murinum* complex sp. B” and deposited at DEBU.

Species of the *Curtonotum vulpinum* species group were not treated in detail in this revision and no synapomorphy has been found to define the group as a clade (thus preventing the group from being treated as an operational taxonomic unit). Therefore it has been excluded from the phylogenetic analysis. Possible placement of species in this group is provided in the Species Accounts.

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Cladistic analysis of the character matrix in Table 1 was conducted using a heuristic search in TNT version 1.1 (Goloboff *et al.* 2008, traditional search function, 1000 replications, using tree bisection reconnection and 10 trees saved per replication selected). Characters other than 7 were coded as unordered. Analysis produced 32 equally parsimonious trees (Figure 1a-d) (CI=0.64; RI=0.84) 53 steps in length. Bremer support indices were calculated in TNT version 1.1 using the macro “bremer.run” (default settings, trees suboptimal by 50 steps retained, relative fit difference 0.50 [Figure 2]).

Relationships between, and status of, the genera *Axinota*, *Cyrtona*, and *Curtonotum*

Within Curtonotidae, *Curtonotum* and *Axinota* form a clade, exclusive of *Cyrtona*, defined by two synapomorphies: a reduction in the number of protandrial sensory setulae (character 8) and distiphallid asymmetry (character 20). The relationship between *Axinota* and *Curtonotum* is less clear. In the 32 most parsimonious trees produced, *Axinota* comes out either as the sister group of *Curtonotum* s.s. (11 trees) (Figure 3, tree 1), the sister group of *C. floridense* + *C. helvum* (the New World members of the *C. anus* species group as defined in the Phylogeny of New World *Curtonotum* [see below]) (11 trees) (Figure 3, tree 2), or the sister group of the Neotropical *Curtonotum* species considered (the *C. punctithorax* species group as defined in the Phylogeny of New World *Curtonotum* [see below]) (10 trees) (Figure 3, tree 3).

The spinose costa (character 6) is the potential synapomorphy that defines *Curtonotum* s.s. Costal spines have arisen more than once in the Ephydroidea (it also occurs in Diastatidae [including Campoechetidae]), and have been lost in at least two

species in the *C. vulpinum* species group, indicating this character is prone to both homoplasy and reversal.

A bilobed distiphallus (character 21) is a potential synapomorphy of a possible lineage made up of *Axinota* + the *C. punctithorax* group. There is great variability in distiphallus structure throughout the Curtonotidae, so the bilobed condition seems likely to have arisen multiple times and is considered to be a relatively weak synapomorphy in such a broad group of species.

A laterally expanded phallapodeme (character 17) is a potential synapomorphy linking *Axinota* to the *C. anus* species group. Unlike the distiphallus, the phallapodeme is a relatively simple structure making its modifications easier to interpret. Also unlike the distiphallus, the phallapodeme is quite uniform in the *Curtonotum punctithorax* species group, where it has a large laterally flattened “fan”. The phallapodeme of *Axinota simulans* has three well-formed lobes, very similar to condition found in *C. helvum* but different than the condition found in *C. floridense* where the distal lobe (the lobe in the same plane as the phallus) is much reduced. While the lateral lobes of the phallapodeme in *Axinota* and the *C. anus* species group may be homologous, given their very simple structure it is plausible these lateral lobes have arisen more than once, and their presence in *Axinota* and *Curtonotum* is the result of homoplasy.

Of the three phylogenetic hypotheses presented, none provide the unequivocal support needed to reject the other two. Given the great variation in distiphallic structure the *Axinota* + *C. punctithorax* species group relationship seems particularly weak. The other two phylogenetic hypotheses are both defined by relatively simple character states that either have been shown to be or likely are subject to homoplasy. While these results are

inconclusive they highlight the fact that *Curtonotum* may be paraphyletic with respect to *Axinota*, suggesting a need to redefine both genera in a study of broader scale.

Phylogeny of the New World *Curtonotum*

The differences between the 32 trees center around the placement of six taxa:

Curtonotum bathmedum, *C. bivittatum*, *C. nigrum*, *C. punctithorax*, *C. desperatum* and *Axinota simulans*. With regards to the first three species listed the following four relationships are represented in the 32 most parsimonious trees: i) *C. bathmedum* is sister group to (*C. bivittatum* + *C. nigrum* + the remainder of the Neotropical species) (6 trees); ii) *C. nigrum* forms a polytomy with (*C. bathmedum* + *C. bivittatum*) and the remainder of the Neotropical species (9 trees); iii) (*C. bathmedum* + *C. bivittatum* + *C. nigrum*) is the sister group to the remainder of the Neotropical species (9 trees); or iv) a polytomy is formed between *C. bathmedum*, *C. bivittatum*, *C. nigrum*, and the remainder of the Neotropical species (8 trees). With regards to *C. punctithorax* and *C. desperatum* the following three relationships are represented in the 32 most parsimonious trees: i) *C. desperatum* is the sister group to (*C. punctithorax* + *C. atlanticum* + *C. papillatum* + *C. hunkingi*) (11 trees); ii) *C. desperatum* and *C. punctithorax* form a polytomy with (*C. atlanticum* + *C. papillatum* + *C. hunkingi*) (11 trees); iii) *C. punctithorax*, *C. atlanticum*, *C. papillatum*, *C. hunkingi* and *C. desperatum* form a single large polytomy (10 trees).

The various placements of *Axinota simulans* are discussed in the preceding section.

Tree 24 was selected for character optimization (Figure 4). This is the preferred tree as it groups *Curtonotum bathmedum* and *C. bivittatum*, two species that share a unique female sternite 8 and are nearly indistinguishable without dissection, and *C.*

punctithorax, *C. hunkingi*, *C. papillatum*, and *C. atlanticum*, four more cryptic species that share a frons pattern unique in the New World Fauna. This tree also shows *Axinota* as the sister group of *Curtonotum*. Given that the analysis failed to definitively place *Axinota*, it is assumed for this discussion that *Curtonotum* is monophyletic with respect to other genera.

The species of New World *Curtonotum* fall into two distinct clades. The two Nearctic species, *C. helvum* and *C. floridense*, are part of a very large clade that includes most Old World *Curtonotum* species. This clade is defined by the apomorphic state of the male cerci which have an elongate, fused ventral process (character 14). Within this large clade, *C. helvum* and *C. floridense* are part of the *C. anus* species group (Kirk-Spriggs 2007). Kirk-Spriggs tentatively defined this species group with three characters: i) a short robust phallus; ii) a distiphallus with a defined apical sclerotized portion, and iii) a spinose female cercus. In this group he included *C. anus*, *C. helvum*, and (tentatively) all the Neotropical species. Given their highly derived ovipositors, *C. floridense*, *C. helvum*, and *C. anus* undoubtedly represent a clade. However, with its relatively slender basiphallus and distiphallus *C. floridense* lacks two of the three characters offered by Kirk-Spriggs to define the *C. anus* species group. Therefore the *C. anus* species group is here redefined by the following characters: i) female cerci fused to tergite 10 (character 26) but free from one another; ii) female cerci with specialized stout setae (character 29); iii) female sternite 10 invaginate posteriorly, anteriorly with laterally compressed apodeme (character 27). *Curtonotum amurensis* Ozerov and *C. maritimum* Ozerov, two species from the Far East of Russia, also possess these characters (A.L. Ozerov, pers.

comm. *), and are here included in the *C. anus* species group. The female of *C. shatalkini* Ozerov, the third *Curtonotum* species known from the far east of Russia, is unknown (Ozerov 2007), and as such this species is not included in the *C. anus* species group. The Neotropical species are here excluded—none have the highly derived sternite 10 that partially defines the *C. anus* species group. While *C. apicale* and the species in the *C. murinum* species complex have spinose female cerci (character 29), and those two taxa plus *C. trypetipenne* have tergite 10 fused to the cerci (character 26), they lack the highly derived sternite 10 of the *C. anus* species group. In all the most parsimonious trees these latter species are imbedded well within the large Neotropical clade discussed below and thus are not included in the *C. anus* species group.

The second large clade in the New World *Curtonotum* fauna is comprised of the Neotropical species here analyzed and named the *Curtonotum punctithorax* species group. This clade is defined by the presence of punctate markings on the scutum (character 2), an apically bilobed distiphallus (character 21), and spermathecal ducts that are more than 50 times as long as broad (character 30). Because none of these characters are particularly complex, they are likely more prone to homoplasy than the highly derived male cerci that define the previous clade and therefore the Neotropical clade is less firmly supported. Characters 21 and 26 are reversed in *C. bathmedum* and the *C. murinum* species complex, respectively; a bilobed distiphallus (character 21) is also present in *Axinota*.

Curtonotum nigrum, *C. bathmedum*, and *C. bivittatum* are basal to the rest of the *Curtonotum punctithorax* species group, all with the putatively plesiomorphic condition of an expanded basiphallus (character 19), and *C. bathmedum*, and *C. bivittatum* with the

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putatively plesiomorphic condition of a well-defined anterior margin of female tergite 8 (character 24). The state of this latter character is not known in *C. nigrum* as the female remains undescribed. *Curtonotum bathmedum* and *C. bivittatum* are nearly indistinguishable without dissection and form a clade defined by the highly derived sternite 8 which is heavily sclerotized and laterally dimpled posteriorly (character 25, state 2). These two species constitute the *C. bathmedum* species complex.

Curtonotum magnum and *C. adusticrus* form a polytomy with the remainder of the Neotropical species. Unlike the Neotropical species yet to be discussed, these two have retained the cuneiform setae on the anteroventral margin of their hind fifth tarsomere (character 7). *Curtonotum magnum* is an enigmatic species as it has several homoplastic characters that define or partially define other clades (an elongate posteroventral epandrial extension [character 12], a recurved medial process on the hypandrial arm [character 16], and a small recurved process on the left distiphallus lobe [character 22]). The position of *C. adusticrus* is tentative and needs to be re-assessed with the addition of female characters.

The clade including the remainder of the Neotropical species is defined by the complete loss of cuneiform setae on the anteroventral margin of the fifth tarsomere on the hind leg (character 7, state 2). These species in this clade fall into two well-defined monophyletic groups. The first group, defined by the presence of a third pair of marginal scutellar setae (character 3), the fusion of the female cerci to tergite 10 (character 26) and to one another (character 28), and the presence of stout setae on the female cerci (character 29), includes the *C. murinum* species complex, *C. apicale* and *C. trypetipenne* (characters 3 and 29 are reversed in *C. trypetipenne*). *Curtonotum apicale* and *C.*

trypetipenne form a small clade defined by the presence of setae posterior and ventral to the posterior thoracic spiracle (character 5), the loss of hypandrial arm setae (character 15), and the presence of an angular process on the phallapodeme (character 18). The *C. murinum* species complex is defined by their lobed lower calypters (character 4). The second group is defined by the complete dorsal desclerotization of female tergite 7 (character 23) and a heavily sclerotized and dorsoventrally flattened posterior margin on female sternite 8 (character 25, state 1) and includes 13 species. Within this second group *C. pantherinum*, *C. brunneum*, *C. taeniatum*, *C. tumidum* and *C. flavisetum* form a lineage defined by three homoplastic character states: the presence of a fringe of setae posterior and ventral to the posterior thoracic spiracle (character 5), elongate posteroventral epandrial extensions (character 12), and a recurved, posterior, medial process on the hypandrial arm (character 16). The *C. taeniatum* species complex is comprised of three species that are nearly indistinguishable externally: *C. taeniatum*, *C. tumidum*, and *C. flavisetum*. This species complex is defined by the medial pruinose vitta on the frons extending from the ocellar triangle to the anterior margin of the frons (character 1), and a distinct rough patch proximal to the surstyli (character 13).

The remaining 8 species are very similar externally and form a weakly supported clade defined by the presence of posteroventral epandrial lobes (character 11). This character is also present in *C. adusticrus* and *Axinota simulans*. Within this group *C. desperatum*, *C. punctithorax*, *C. atlanticum*, *C. papillatum*, and *C. hunkingi* form a five-species monophyletic group defined by the presence of a small recurved process on the left distiphallic lobe (character 22), a character also present in *C. magnum*. *Curtonotum punctithorax*, *C. atlanticum*, *C. papillatum*, and *C. hunkingi* are further defined by the

apparent partial reappearance of cuneiform setae on the posteroventral margin of the hind fifth tarsomere (character 7, state 1). While this appears to be rather weak support (and indeed the character is only present in some *C. punctithorax* specimens), these species share a common frons pattern that is unique in the New World *Curtonotum* fauna (if not the World *Curtonotum* fauna).

Table 1. Character state matrix for the New World *Curtonotum* excluding the *C. vulpinum* species group. Characters are listed in the text.

	111111111122222222223																													
Taxon	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0
<i>Cyrtona</i> sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<i>Axinota simulans</i>	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1	0	0	1	1	0	0	1	4	0	0	0	0	0
<i>C.adusticrus</i>	0	1	0	0	0	1	0	1	0	0	1	0	0	0	0	0	0	1	1	1	0	?	?	?	?	?	?	?	?	
<i>C. apicale</i>	0	1	1	0	1	1	2	1	0	0	0	0	0	1	0	0	1	1	1	1	0	0	0	0	1	0	1	1	1	
<i>C. atlanticum</i>	0	1	0	0	0	1	1	1	0	0	1	0	0	0	0	0	0	1	1	1	1	1	1	1	0	0	0	0	1	
<i>C. bathmedum</i>	0	1	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	1	0	?	0	0	2	0	0	0	0	1	
<i>C. bivittatum</i>	0	1	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	2	0	0	0	0	1	
<i>C. brunneum</i>	0	1	0	0	1	1	2	1	0	0	1	0	0	0	1	0	0	1	1	1	0	1	1	1	0	0	0	0	1	
<i>C. desperatum</i>	0	1	0	0	0	1	2	1	0	0	1	0	0	0	0	0	0	1	1	1	?	?	?	?	?	?	?	?		
<i>C. flavisetum</i>	1	1	0	0	1	1	2	1	0	0	1	1	0	0	1	0	0	1	1	1	0	1	1	1	0	0	0	0	1	
<i>C. floridense</i>	0	0	0	0	0	1	0	1	1	1	0	0	0	1	0	0	1	0	?	0	0	0	1	1	0	1	0	1	0	
<i>C. gracile</i>	0	1	0	0	0	1	2	1	0	0	1	0	0	0	0	0	0	1	1	1	0	1	1	1	0	0	0	0	1	
<i>C. hendelianum</i>	0	1	0	0	0	1	2	1	0	0	1	0	0	0	0	0	0	1	1	1	0	1	1	1	0	0	0	0	1	
<i>C. hunkingi</i>	0	1	0	0	0	1	1	1	0	0	1	0	0	0	0	0	0	1	1	1	1	1	1	1	0	0	0	0	1	
<i>C. helvum</i>	0	0	0	0	0	1	0	1	1	1	0	0	0	1	0	0	1	0	?	0	0	0	1	1	0	1	0	1	0	
<i>C. magnum</i>	0	1	0	0	0	1	0	1	0	0	1	0	0	0	1	0	0	1	1	1	0	1	3	0	0	0	0	1		
<i>C. murinum</i> complex sp. A	0	1	1	1	0	1	2	1	0	0	0	0	0	0	0	0	0	1	1	1	0	0	1	0	1	0	1	0	1	
<i>C. murinum</i> complex sp. B	0	1	1	1	0	1	2	1	0	0	0	0	0	0	0	0	0	1	1	1	0	0	1	0	1	0	1	0	1	
<i>C. nigrum</i>	0	1	0	0	1	1	0	1	0	0	0	0	0	0	0	0	0	1	1	0	?	?	?	?	?	?	?	?		
<i>C. pantherinum</i>	0	1	0	0	1	1	2	1	0	0	1	0	0	0	1	0	0	1	1	1	0	1	1	1	0	0	0	0	1	
<i>C. papillatum</i>	0	1	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0	0	0	0	1	
<i>C. punctithorax</i>	0	1	0	0	0	1	[12]	1	0	0	1	0	0	0	0	0	0	1	1	1	1	1	1	1	0	0	0	0	1	
<i>C. scambum</i>	0	1	0	0	0	1	2	1	0	0	1	0	0	0	0	0	0	1	1	1	0	1	1	1	0	0	0	0	1	
<i>C. taeniatum</i>	1	1	0	0	1	1	2	1	0	0	1	1	0	0	1	0	0	1	1	1	0	1	1	1	0	0	0	0	1	
<i>C. tumidum</i>	1	1	0	0	1	1	2	1	0	0	1	1	0	0	1	0	0	1	1	1	0	1	1	1	0	0	0	0	1	
<i>C. trypetipenne</i>	0	1	0	0	1	1	2	1	0	0	0	0	0	1	0	0	1	1	1	1	0	0	0	0	1	0	1	0	1	

List of Characters used in the Phylogenetic Analysis of the New World *Curtonotum*

The plesiomorphic state is indicated by (0) and the apomorphic state is indicated by (1).

The states of character 7 are treated as ordered.

Head

1. Frons texture, (0) uniform; (1) finely pebbled medially.

Thorax

2. Pruinosity of scutum, (0) uniform to very faintly punctate; (1) conspicuously punctuate.
3. Pairs of marginal scutellar setae, (0) two; (1) three. ("third pair" at least 0.5 times length of median pair).
4. Lower calypter, (0) unlobed; (1) lobed.
5. Fringe of setae posterior and ventral to the posterior thoracic spiracle, (0) absent; (1) present.
6. Costa, (0) non-spinose; (1) spinose.
7. Cuneiform setae on anteroventral margin of hind fifth tarsomeres, (0) present along entire margin; (1) absent distally; (2) completely absent (ordered)

Male terminalia

8. Protandrium, (0) with five sensory setulae; (1) with four sensory setulae.
9. Tergite 6, (0) present; (1) completely atrophied.
10. Sternite 6, (0) without transverse fold; (1) with transverse fold.
11. Epandrium, (0) without large posterolateral lobes; (1) with large posterolateral lobes.
12. Epandrium, (0) without elongate posteroventral extensions; (1) with elongate posteroventral extensions.

13. Distinct rough area proximal to surstyli, (0) absent; (1) present.
14. Cerci, (0) free; (1) fused ventrally.
15. Hypandrial arm, (0) with setae distally; (1) without setae distally.
16. Hypandrial arm with recurved medial process posteriorly, (0) absent; (1) present.
17. Phallapodeme, (0) laterally flattened; (1) laterally expanded.
18. Phallapodeme, (0) margin opposite "fan" convex to concave; (1) margin opposite fan with distinct angular process.
19. Basiphallus, (0) expanded basally, much broader than phallapodeme; (1) contracted basally, closely ensheathing phallapodeme.
12. Distiphallus, (0) symmetrical; (1) asymmetrical.
21. Distiphallus, (0) simple apically; (1) bilobed apically.
22. Left distiphallic lobe, (0) without small, lateral, recurved process; (1) with small, lateral, recurved process.

Female terminalia

23. Tergite 7, (0) well-sclerotized or partially desclerotized medially; (1) completely desclerotized medially.
24. Tergite 8, (0) with defined anterior margin; (1) with desclerotized anterior margin.
25. Sternite 8, (0) uniformly sclerotized; (1) dorsoventrally flattened and heavily sclerotized posteriorly; (2) heavily sclerotized and laterally dimpled posteriorly; (3) acute and heavily sclerotized posteriorly; (4) heavily dorsoventrally flattened and heavily sclerotized posteriorly, heavily sclerotized region strongly bent ventrally.
26. Tergite 10, (0) free; (1) fused to cerci.

27. Sternite 10, (0) dorsoventrally flattened throughout (1) laterally flattened proximally, with medial invagination distally.
28. Cerci, (0) free from one another; (1) fused.
29. Cerci, (0) with slender setae; (1) with specialized stout setae.
30. Length of spermathecal duct, (0) less than 40 times width; (1) more than 50 times width.

TAXONOMY

***Curtonotum* Macquart, 1844: 193 (350)**

Type species: *Musca gibba* Fabricius, 1805, by original designation. (preoccupied, = *Curtonotum taeniatum* Hendel, 1913)

Cyrtonotum Agassiz, 1847: 108, 114. (Unjustified emendation of *Curtonotum* Macquart)

Diplocentra Loew, 1862: 13. ([unnecessary] replacement name for *Curtonotum* Macquart)

Parapsinota Duda, 1924: 177. (Type species *Drosophila angustipennis* de Meijere, 1911, by monotypy)

Description of genus

Moderate to large (5 to 11 mm); grey, yellow, brown, or purplish to black; moderately to distinctively robust, hump-backed, drosophilid-like flies (Figures 5-12).

Head

1.3 to 1.7 times as high as long; width 1.7 to 2.1 times frons width. Frons quadrate to 1.5 times wider than high, edges parallel to slightly broader dorsally to slightly broader ventrally, flat to strongly bulging ventrally. One strong reclinate bristle arising (major reclinate bristle) below level of anterior ocellus, one slightly weaker proclinate bristle arising anterior to the reclinate bristle, its relative position varying between species, one very small reclinate bristle (minor reclinate bristle) between these two setae. Inner and outer vertical bristles strong, ocellar bristles subequal to outer vertical and stronger reclinate bristle, postocellar bristles weaker (Figure 14k). Back of head densely pruinose, pruinosity extending to proclinate bristle and generally onto and often anterior to ocellar triangle (Figure 34d) (frons pruinosity is absent or very limited in several species in the *C. vulpinum* species group). Frons otherwise with dull sheen and often iridescent, variously marked, and invariably with pruinose lateral margins. Face pale yellow to nearly black, moderately to densely pruinose, facial carina flat in lateral profile, sometimes bare and shiny medially (Figure 19d), this varying within and between species. Parafacial moderately to densely pruinose, narrow to very broad, width varying between species. Gena moderately to densely pruinose, similarly variable in height, often appearing duller than gena due to minute scaled texture, eye height *ca.* 3 to 20 times genal height (see Figures 13m and 19d for examples of variability). Vibrissa absent or weak to moderately strong, 9-12 very weak to weak subvibrissal setulae present. Eye bare. Prementum densely pruinose; palpus with dense fine microtrichia, pale yellow to very dark brown, elongate, slightly broader apically, weakly to moderately upcurved (this varying within species), with scattered lateral setulae; prementum bare and glossy to

densely pruinose with scattered setulae. Antennae relatively short, appressed on face, scape densely pruinose, short and stout; pedicel densely pruinose, with anterior margin bulging and distinct dorsal seam; first flagellomere with fine microtrichia, *ca.* twice as long as wide; arista basally inserted, with *ca.* 12 dorsal and 6 ventral elongate rays, ray numbers varying within species.

Thorax

Densely pruinose and dull to moderately pruinose and subshining. In all species but those in the *Curtonotum vulpinum* species group (Figures 11 and 12) and *C. helvum* (Figure 5) and *C. floridense* each scutal, postpronotal, and anepisternal seta and setula with dark spot around socket, as if each seta and setula is greasy and has stained the otherwise frosty thorax (Figures 6-10). Scutum moderately to very strongly arched (see Figures 7 and 11 for examples of variability), unmarked or with faint to strong parallel vittae; densely setulose. 2-3 postpronotal, 2 notopleural, 1 presutural supra-alar, 2 post-sutural supra-alar, 1 post-sutural intra-alar, 2 postsutural dorsocentral and 1 prescutellar acrostichal setae present. Notopleuron variously setulose. In some species several setae near wing base approach length of post-sutural supra-alars. Scutellum relatively flat, setulose on disc, with 2-3 pairs of strong marginal setae, lateral seta strongest, followed by medial and then (when present) the third seta falling between the two. Single weak proepisternal seta present. Anepisternum with 3-5 moderate to strong posterior setae and scattered setulae on posterior half. Katepisternum with one strong and usually one weaker seta, stronger seta posteroventral to weaker seta, otherwise with scattered setulae on ventral half, row of weak setulae anterior to mid coxa, 1-3 stronger setae at posteroventral corner, and dense linear tuft of setulae under mid-section of fore coxa. In some species

posterior spiracle with several setulae ventral and posterior to spiracle's dense fringe of fine pale setulae (Figure 23d). In some species meron with minute scattered setulae on ventral half.

Wing

Varying from nearly hyaline to densely infuscated and boldly patterned (Figure 36).

Costa with humeral and subcostal breaks, extending to apex of R_{4+5} , strongly spinose between R_1 and R_{2+3} (at least one species in the *C. vulpinum* species group has spines greatly reduced); subcosta complete; crossvein bm-cu absent; A_1 weak, represented by fold not reaching wing margin; cell cup present; alula width variable between species; crossvein dm-cu distal of the apex of R_1 in all New World species but those in the *Curtonotum vulpinum* species group (where it is directly posterior to or anterior of the apex of R_1) and *C. helvum* and *C. floridense* (where it posterior to the apex of R_1). Lower calypter narrow in all species but those in the *Curtonotum murinum* species complex, where it is greatly expanded; upper calypter narrow. Halter yellow-white.

Legs

Relatively long and slender, variously coloured, tibia and femora often darker toward apices. Fore coxa reaching or nearly reaching midcoxa (many species in the *C. vulpinum* species group with fore coxa much shorter, extending as little as 0.6 times the distance between fore coxa socket and mid coxa socket). Fore coxa with 2 moderate apical setae and scattered setulae; mid coxa with 2 strong lateral and several moderate medial setae and scattered medial setae; hind coxa with one moderate lateral seta and scattered setulae. Fore femur with 3-7 posterodorsal setae, proximal seta generally well separated from others, 5-6 larger setulae along apical posteroventral margin, most species with well-

defined ctenidial comb of 5-12 medium length to short and stout setae. Mid femur with 4-12 anterior setae on distal 2/3 (number varying within and between species) and 2 strong apical setae (one anterior, one posterior). Hind femur with 1-2 subapical dorsal setae (number varying within and among species). Fore tibia with subapical dorsal seta and very dense, regularly spaced transverse rows of setulae anteroventrally on apical 1/3. Mid tibia with subapical dorsal seta and several apical ventral setae on ventral margin, their number and relative strength varying between species. Hind tibia with sub-apical dorsal seta, one weak anterior apical seta and several very small apical ventral setae, and very dense, regularly spaced transverse rows of setulae posteriorly on apical 1/8. First tarsomere of fore tarsus with very dense, regularly spaced transverse rows of setulae anteroventrally on entire length, several larger ventral setae on apical 1/5, and small anterior and posterior apical setae. Second through fifth fore tarsomeres with small anterior and posterior apical setae and two ventral rows of relatively stout setae. First tarsomere of mid tarsus with two rows of widely spaced moderately long and stout setae for entire length, anteroventral and posteroventral margins with very tightly spaced row of short cuneiform setae. Second through fifth tarsomere of mid tarsus with very tightly spaced row of short cuneiform setae on anteroventral and posteroventral margins as in those of fore tarsus, the row of setulae on the anteroventral margin of the fifth tarsomere absent in some species. First and second tarsomere of hind tarsus each with very dense, regularly spaced transverse rows of setulae anteroventrally on entire length, these setulae much longer than those of the transverse rows on the fore tarsus; very tightly spaced row of short cuneiform setae on anteroventral margin, and small, anterior apical seta. Third

through fifth hind tarsomeres as in those of fore tarsus, the row of short cuneiform setulae on the anteroventral margin of the fifth tarsomere absent in some species.

Abdomen

Cylindrical, somewhat tapered apically, variously patterned, dark species usually with patterning a result of pruinosity (not visible in greasy or cleared specimens); paler species usually with pattern of pigmentation on sclerites (usually visible even in greasy or cleared specimens). Tergite 1 relatively narrow, with scattered setulae, tergite 2 with lateral row of strong setae on proximal half, bare anterior to this, otherwise with short scattered setae throughout and longer setae along posterior margin (Figure 23d). Sternites 3-5 with short scattered setulae throughout and longer setae along posterior margin. Sternite 1 very small and narrow, sternites 2-5 of various relative widths; in some species male sternite 5 modified either with an apical emargination, protuberance or specialized chaetotaxy (Figures 13d, 20c, 25d, and 27). Single pair of well-spaced sensory setulae near anterior margin of sternites 1-5, spiracles 1 through 5 in margin at approximate midpoint of each segment.

Male terminalia

Tergite 6 a dorsal band, varying among species from well defined and setulose to completely atrophied. Sternite 6 moderately to well-sclerotized, often divided along ridge in protandrium, left portion a narrow to broad band, with single sensory setulae, fused to left portion of sternite 7, area of fusion demarked by suture free of microtrichia, right portion broad, triangular, with single sensory setula (this sensory setula sometimes in margin just anterior to sclerite). Sternite 7 usually split along protandrial ridge, left portion with single sensory setula, quadrate, fused ventrally to left portion of sternite 6

and dorsally to tergite 7, both areas of fusion demarked by suture free of microtrichia, right portion a narrow to broad band anterior and fused to right portion of sternite 6, area of fusion demarked by seam, with single sensory setula. Tergite 7 moderately to well-sclerotized, varying in length. Spiracles 6 ventral to tergite 6, spiracle 7 slightly reduced in size, slightly posterodorsal of spiracle 6, on left anterior to syntergosternite 6+7 (sternite 6 + sternite 7 + tergite 7). Tergite 8 and sternite 8 lost, along with associated sensory setulae and spiracles. Hypandrium U-shaped, symmetrical, posterior transverse portion (posterior bridge) articulating with phallapodeme, lateral extensions (hypandrial arms) extending posteriorly, 2-3 setulae ventrally on each arm (Figures 13a and 13c). Postgonite fused to hypandrium, suture discernable in some species, entirely fused in others. Epandrium saddle shaped, setulose, often with elongate setae distoventrally, in some species fused ventral to surstyli (Figure 13a). Cercus separate from one another and from epandrium (Figures 15a and 15c) (except in *C. helvum*, *C. floridense* and many Old World species where cerci are fused ventrally, forming a bulbous arm [Figures 13a and 13d]). Subepandrial sclerite X-shaped in *Curtonotum helvum*, ventral and dorsal arms fusing to surstyli and posterior part of epandrium, respectively, anteriorly fusing to bridge connecting hypandrial arms (Figure 14c). Phallapodeme with broad “fan”, in Neotropical species this structure laterally flattened (Figure 15a), in the two Nearctic species this structure with basal lateral lobes (Figures 13a and 14b), articulating with hypandrium proximally, extending distally in long bent rod invaginated by, and broadly fused to, basiphallus. Basiphallus elongate, tubular, C-shaped, symmetrical except at apical junction with distiphallus. Distiphallus asymmetrical, freely articulating with basiphallus except in *C. flavisetum* where the basiphallus and distiphallus are completely fused, apex

in most species with two variously proportioned and ornamented lateral lobes.

Ejaculatory apodeme elongate, outside or just inside of basiphallus, with minute pores, their distribution varying between species.

Female terminalia

Ovipositor relatively stout to slender and elongate (compare Figures 14f and 35d).

Tergites 6 and 7 well-sclerotized, some species with varying degrees of medial desclerotization in tergite 6 or tergite 7, setulose. Sternites 6 and 7 well-sclerotized, of varying widths, with setae scattered throughout and longer setae along apical margin.

Spiracles 6 and 7 present, in membrane in anterior portion of segments 6 and 7, respectively. Sternite and tergite 8 with scattered short setulae and varying degrees of sclerotization, the anterior margin in many species indiscernible. Sternite 8 very heavily sclerotized posteriorly in many species, often forming a slightly concave distal lip devoid of setulae and microtrichia. Sternite 10 in most New World species flattened dorsoventrally, the anterior half or more relatively narrow with slightly thickened, dorsally bent anterior margin, strongly sclerotized median, and broad, setulose apical half, proximal half with large posterior-facing unsocketed spinules over thickened median, otherwise with fine posterior-facing microtrichia and scattered small setulae (Figure 23f). In *C. bathmedum* and *C. bivittatum* the narrow anterior portion is much reduced (Figures 16e and 17d), while in *C. trypetipenne* and *C. apicale* it is relatively narrow, heavily sclerotized throughout, and without spinules or microtrichia (Figures 21g and 22f). *Curtonotum helvum* and *C. floridense* are unique among New World species in having sternite 10 deeply invaginate apically, this invagination extending anteriorly into an elongate, laterally flattened, well-sclerotized, spinule and microtrichia-free anterior

portion (Figures 13i and 14i). Tergite 10 free, well-defined, and with microtrichia and setulae in some species and fused to the cerci, mostly atrophied, and free of microtrichia and setulae in others. Cercus of one of four types: free and elongate; fused with tergite 10 but free from one another, with tergite 10 forming a bridge between the two cerci (Figure 13g); fused with tergite 10 but free from one another, tergite 10 separated into right and left portions (Figure 14f); or fused with one another and tergite 10 (Figures 20b, 21e, and 22d). Cercus in the first condition with scattered elongate setulae; those in the second and third condition with recurved stout setae; those in the fourth condition usually with stout modified setae (Figures 20b and 21e). Reproductive system with large anteroventral pouch arising from the vagina posteroventral to the ventral receptacle and the two spermathecae. Ventral receptacle variously shaped, generally relatively short with a broad membranous duct, well-sclerotized “neck” and more lightly sclerotized “head” (Figure 16h). Spermathecal ducts separate, elongate, with fine spiral ridges on entire length, constricted slightly just before spermatheca. Spermatheca highly variable in shape and surface texture, in New World species varying from elongate and tubular (Figure 23g) to squat and pill-shaped (in *C. murinum* species complex, not illustrated), nearly smooth (Figure 24f) to rugose and/or tuberculate (Figure 26f).

Comments

Subepandrial sclerite examination requires separation of the epandrium and hypandrium. Given the destructive nature of this procedure, the subepandrial sclerite was not examined in any species other than *Curtonotum helvum* and for that reason was not used for species differentiation or phylogenetic analysis. A subepandrial sclerite similar to that of *C. helvum* is visible posteriorly without epandrium-hypandrium disarticulation in *C.*

floridense. This sclerite is not visible in any Neotropical species considered, likely a result of the more congested nature of their hypopygia in posterior profile.

Key to New World species of *Curtonotum*

(*Curtonotum murinum* species complex and *C. vulpinum* species group treated as single taxa)

While external characters are used as much as possible in the key, species identification should be confirmed by comparing terminalia with descriptions and figures. This is particularly true for all species that come out after couplet 15.

1. Body ground colour yellow-beige; lower calypter not lobed (as in Figure 23i); male cerci fused ventrally into elongate club (Figures 13d); female cerci separate (fused basally to tergite 10), with enlarged, stout, slightly recurved setae (Figures 13g, 14f, and 14g).....2
- Body ground colour various, if yellow-beige then lower calypter lobed (Figure 20a); male cerci separate, without ventral elongation; female cerci generally without stout setae, if stout setae present then cerci fused (Figures 20b and 21e).....3
- 2(1). Ctenidial comb absent (ctenidial setae similar to adjacent setulae) (Figure 13n); parafacial very broad (Figure 13m); distiphallus not greatly expanded (Figure 13a and 13b); spermatheca relatively squat, with elongate narrow apex, surface rugose

- or pock-marked (Figure 13j and 13l).....
-*Curtonotum floridense* Klymko and Marshall, sp. nov.
- Ctenidial comb present (ctenidial setae much stouter than adjacent setulae) (Figure 14l); parafacial moderately broad (Figure 14k); distiphallus greatly expanded (Figure 14b and 14d); spermatheca elongate, without elongate narrow apex, surface smooth, with minute spinules (Figure 14j).....*Curtonotum helvum* (Loew)
- 3(1). Body pale white-grey pruinose; lower calypter lobed (Figure 20a); female cerci fused to one another and to tergite 10, with enlarged stout setae (Figure 20b).....*Curtonotum murinum* species complex
- Body variously coloured but not as above; lower calypter without lobe (Figure 23i); female cerci separate or fused, without enlarged stout setae.....4
- 4(3). Scutal setulae without pruinose insertion haloes (Figures 11 and 12); notopleuron without setulae (Figure 12).....*Curtonotum vulpinum* species group
- Scutal setulae insertion points haloed by dark pruinosity (Figures 6-10); notopleuron with or without setulae5
- (greasy specimens of *C. bivittatum*, *C. bathmedum*, *C. nigrum*, *C. adustocrus*, and some *C. papillatum* and *C. atlanticum* could key out here. *Curtonotum bivittatum* and *C. bathmedum* can be distinguished by their unique wing patterning and bold thoracic markings [see Figures 6, 36d, 36e, and 36f]. The other four species listed are all dark brown to black in ground colour. Examination of male genitalia [with comparison to the Figures provided] is recommended for darkly pigmented, greasy specimen without

notopleural setae. Unassociated females that are darkly pigmented, greasy, and without notopleural setae may be unidentifiable.)

5(4). Frons bright yellow with two prominent brown vittae; scutum yellow with four prominent brown vittae; pleuron yellow with brown vitta along upper margin (Figure 6).....6

- Body and wing colouration variable but not as above.....7

6(5). Infuscation around M_1 proximal to crossvein dm-cu extending 0.24 to 0.45 the distance from dm-cu to r-m (Figures 36d and 36e); distiphallus with prominent keel on left side of basal 1/3, with stout spines on left side of apical 2/3, bilobed apically (Figure 16b); translucent head of ventral receptacle bulbous (Figure 16h).....*Curtonotum bivittatum* Klymko and Marshall, sp. nov.

- Infuscation around M_1 proximal to crossvein dm-cu extending 0.10 to 0.26 the distance from dm-cu to r-m (Figure 36f); distiphallus without basal keel, broad apically, with slender spines covering dorsal surface (Figures 17a and 17c); translucent head of ventral receptacle low and hemispherical (Figure 17g).....*Curtonotum bathmedium* Hendel

7(5). Wing darkly infuscated, with scattered clear windows (Figure 36h).....*Curtonotum trypetipenne* Hendel

- Wing variously patterned but without scattered clear windows.....8

- 8(7) Ground colour of head, thorax and abdomen uniformly yellow-orange; frons with broad frosted vitta extending from anterior ocellus to base of antennae (Figure 25e); wing with darkly infuscated apex (Figure 36k)9
- Ground colour of head, thorax and abdomen mostly light to dark brown (some areas of the head, such as the parafacial, and the thorax, such as the postpronotal lobe, may be paler and more yellowish than the general ground colour in some specimens); frons without broad medial pruinose vitta; wing variously patterned.....11
- 9(8) Setae at posteroventral corner of katepisternum and medially on mid coxa yellow (occasionally with one dark setae medially on mid coxa); male sternite 5 broad (Figure 25d); phallus very stout (Figure 25a); spermatheca with scattered minute broad-based spines (Figure 25h); ventral receptacle neck elongate, bent midway between base and broad head (Figure 25i).....
.....*Curtonotum flavisetum* Klymko and Marshall, sp. nov.
- One or two setae at posteroventral corner of katepisternum black (Figure 27j); at least one (usually several) medial setae on mid coxa black (Figure 27e); male sternite 5 narrow (Figure 27d); phallus elongate (Figures 26a and 27a); ventral receptacle neck squat, bent at base of broad apex (Figures 26g and 27i).....10
- 10(9) Base of distiphallus with pebbled texture, ventral lobe of distiphallus elongate, with narrow bent apex (Figures 26a and 26c); spermatheca papillose to

- papillose/rugose, papillae broad-tipped bumps (Figure 26f).....
.....*Curtonotum taeniatum* Hendel
- Ventral lobe of distiphallus stouter, without slender bent apex, base of distiphallus without pebbled texture (Figures 27a and 27c); spermatheca papillose, papillae varying from minute broad-based spines (Figure 27h) to larger broad-tipped bumps.....*Curtonotum tumidum* Enderlein
- (some female specimens of these two species are indistinguishable, see Comments under *Curtonotum taeniatum*)
- 11(8) Wing with distinct non-infuscated window at apex of r_{4+5} (Figure 36g); scutellum with 3 pairs of strong marginal setae (Figure 21a).....*Curtonotum apicale* Hendel
- Wing variously patterned but without non-infuscated window at apex of r_{3+4} ; scutellum with 2 pairs of strong marginal setae12
- 12(11) Infuscation in r_1 and r_{2+3} limited to apex, proximal margin of infuscation extending at most just proximal of level of dm-cu (Figures 36l and 36m); palpus dark brown.....13
- Wing with extensive infuscation in r_1 and r_{2+3} , this extending from apex to well proximal of level of dm-cu (often to R_1) (Figures 36e, 36i, 36j, and 36n); palpus variously coloured.....15

- 13(12) Wing apex infusate (this infuscation often quite faint), darkest around R_{2+3} ; proximal margin of infuscation distal to level of dm-cu, straight, extending to posterior margin (Figure 36l) *Curtonotum hendelianum* Enderlein
- Dark infuscation in r_1 and r_{2+3} extending to (or just proximal to) level of dm-cu, paler infuscation on posterior half of r_{3+4} and r_{2+3} diffuse, not forming straight proximal margin (Figure 36m).....14
- 14(13) Hind femur with distinct concavity on proximal half of ventral margin (Figure 29h)..... *Curtonotum scambum* Klymko and Marshall, sp. nov.
- Hind femur with straight ventral margin.....
- *Curtonotum gracile* Klymko and Marshall, sp. nov.
- 15(12) Palpus, prementum, face and frons pale brown; fringe of setulae present posterior and ventral to posterior thoracic spiracle (Figure 23d); katapisternum with single lateral seta..... *Curtonotum brunneum* Klymko and Marshall, sp. nov.
- Never with above combination of characters.....16
- 16(15) Gena very short (eye height to genal height ratio more than 16); with fringe of setulae posterior and ventral to posterior thoracic spiracle (as in Figure 23d).....
- *Curtonotum pantherinum* (Walker)
- Gena short to tall (eye height to genal height ratio less than 16); without fringe of setulae posterior and ventral to posterior thoracic spiracle.....17

- 17(16) Wing dark grey infusate throughout, darker in r_1 and anterior half of r_{2+3} (Figure 36c); abdomen black, lightly pruinose, subshiny, devoid of maculae and vittae.....
.....*Curtonotum nigrum* Klymko and Marshall, sp. nov.
- Wing with greater contrast between r_1 and anterior half of r_{2+3} and the rest of the wing; abdomen heavily pruinose, dull, variously patterned, always with medial vitta on tergites 3-5.....18
- 18(17) Palpi with orange-yellow ground colour; frons orange-yellow, with 2 lateral and usually 1 medial brown vittae (Figure 34d) (lateral vittae often much darker and somewhat expanded ventrally, all vitta sometimes inconspicuous in *C. papillatum*).....19
- Palpi dark brown to nearly black; frons variously patterned, frons not as above (except in *C. punctithorax*).....21
- 19(18) Basiphallus very elongate (Figure 34a); distiphallus with elongate, slender, straight base (Figures 34a and 34c); ventral receptacle with bulbous head and relatively long neck (Figure 34h); spermatheca densely papillose, without rugae (Figure 34g).....*Curtonotum papillatum* Klymko and Marshall, sp. nov.
- Basiphallus shorter (Figures 32a and 33b); distiphallus bowing dorsally in lateral profile and to right in dorsal profile (Figures 32a, 32c, 33b, and 33c); spermatheca rugose, rugae often with small protuberances; if ventral receptacle with bulbous head then neck shorter (Figure 33g).....20

- 20(18) Base of distiphallus broad and dorsoventrally flattened basally (Figures 32a and 32c); ventral receptacle with hemispherical head (Figure 32g).....
.....*Curtonotum atlanticum* Klymko and Marshall, sp. nov.
- Base of distiphallus relatively narrow, not dorsoventrally flattened (Figures 33b and 33c); ventral receptacle with bulbous head (Figure 33g).....
.....*Curtonotum hunkingi* Klymko and Marshall, sp. nov.
- 21(18) Frons orange-yellow, with 2 lateral and usually 1 medial brown vittae (as in Figure 34d) (lateral vittae often much darker and somewhat expanded ventrally)...
.....*Curtonotum punctithorax* Fischer
- Frons dark brown with pale medial vitta or orange brown with subtle pale medial vitta...
.....22
- 22(21) Gena very tall (eye height to gena height ratio 4.5 to 6.3) (Figure 18d); parafacial very broad (Figure 18d); face very dark brown; frons dark brown, paler medially and often laterally (Figure 18d).....*Curtonotum magnum* Malloch
- Gena shorter (eye height to gena height ratio 10.0 or greater); parafacial narrower; face and frons various.....23
- 23(22) Gena distinctly taller posteriorly; parafacial very narrow ventrally; face very dark brown (nearly black) (Figure 19d); frons dark brown, with conspicuous pale medial vitta (Figure 19d)...*Curtonotum adusticrus* Klymko and Marshall, sp. nov.

- Gena not taller posteriorly; parafacial moderately broad ventrally; face medium to dark brown (not approaching black); frons orange-brown, with subtle pale medial vitta.....24
- 24(23) Vibrissa not differentiated from subvibrissal bristles; basiphallus extremely elongate (Figure 30a); distiphallus with elongate slender base (Figures 30a and 30b).....*Curtonotum gracile* Klymko and Marshall, sp. nov.
- Vibrissa slightly longer than adjacent subvibrissals; femora and tibia with brown-yellow ground colour, apices of mid and hind femora dark brown; basiphallus much shorter (Figure 31a); distiphallus with stouter base (Figures 31a and 31c).....*Curtonotum desperatum* Klymko and Marshall, sp. nov.

SPECIES ACCOUNTS

The *Curtonotum anus* species group

The *Curtonotum anus* species group is defined by its derived ovipositor wherein sternite 8 is laterally flattened anteriorly and invaginated posteriorly, tergite 10 is fused to the cerci, and the cerci have short stout setae. This species group includes two New World species, *Curtonotum floridense* and *C. helvum*, and one Old World species, *C. anus*. The *C. anus* species group is distinguished from all New World congeners by the male cerci which fuse ventrally into an elongate, club-shaped extension, and the female cerci which have the unique combination of being separate apically and having specialized stout setae. They are the only species outside the *C. murinum* species complex that have

essentially unmarked wings and a beige ground colour and pruinosity but they differ from the *C. murinum* species complex by having only two pairs of marginal scutellar setae, an unlobed lower calypter, and no bold punctate scutal markings.

***Curtonotum floridense* Klymko and Marshall, sp. nov.**

Figure 13, 36b

Etymology

Named after the only known locality of this species - Florida.

Diagnosis

Distinguished from *C. helvum* by broader gena and parafacials (compare Figures 13l and 14c), absence of a ctenidial comb, a longer, more slender distiphallus, a female tergite 10 that is well-sclerotized medially, relatively squat rugose or pock-marked spermatheca which tapers into a narrow apex (as compared to an elongate spermatheca with very small scattered spinules), and a bulb-shaped ventral receptacle.

Description

Length: 4.0 – 6.9 mm

Head

Frons orange-beige with scattered pale and dark setulae; moderately to strongly bulging at antennal base; width 1.3 to 1.5 times length, slightly wider ventrally; lateral margin narrowly yellow-white pruinose. Ocellar triangle and narrow lateral strip yellow-white pruinose, pruinosity extending well anterior of anterior ocellus, broadly acute apically, narrow lateral strip extending from median occipital sclerite to midway between proclinate bristle and ventral margin of frons or further, proclinate bristle slightly

posterior to or at midpoint of sagittal distance from anterior ocellus to ventral margin of frons, anterior and slightly medial to major reclinate bristle; minor reclinate bristle anterior and slightly lateral or medial to major reclinate bristle. Face yellow-white pruinose, ground colour beige; vibrissa several times larger than adjacent subvibrissals. Parafacial and gena extremely broad, moderately yellow-white pruinose, ground colour beige, eye height 3.3 to 4.7 times gena height. Clypeus, palpus and prementum with beige ground colour, former two yellow-white pruinose and microtrichose, respectively, latter lightly yellow-white pruinose. Scape, pedicel and first flagellomere with beige ground colour, former two moderately white pruinose, latter densely yellow-white microtrichose, first flagellomere subequal to or distinctly longer than pedicel in length.

Thorax

Ground colour yellow beige. Scutum white pruinose proximally with two narrow pale gold-brown vittae, otherwise pale gold-brown pruinose. Scutellum pale gold-brown pruinose. Pleura white pruinose. Scutum moderately arched. Postpronotal lobe with two subequal setae (one in a specimen from Archbold Biological Station); notopleuron without setulae; scutellum with two pairs of marginal setae. Anepisternum with two large setae on posterior half, in some specimens up to three smaller setae present; katepisternum with two prominent lateral setae, anterodorsal seta relatively much weaker, linear tuft of setulae under fore coxa pale yellow. No fringe of dark setulae ventral and posterior to posterior spiracle, meron bare.

Legs

Legs pale beige in ground colour, lightly pruinose except heavily white pruinose coxae. Chaetotaxy black except for very dense, regularly spaced transverse rows of straw

coloured setulae anteroventrally on apical 1/2 of fore tibia and similar but slightly darker setulae on fore first tarsomere. Fore femur with 3-4 posterodorsal setae, ctenidial setae not differentiated from other femoral setulae; mid femur with 4-8 anterior setae, these weak and only moderately differentiated from adjacent setulae; hind femur with 1-2 subapical dorsal setae. Mid tibia with two very strong, one moderately strong, and several weaker apical ventral setae, the moderate seta posterior to the strong setae. Row of short cuneiform setae present on entire anteroventral margin of mid and hind fifth tarsomere.

Wing

Lightly grey-brown infuscated, infuscation slightly darker in narrow area of membrane around crossvein dm-cu. Alula relatively broad.

Abdomen

Ground colour yellow beige with white pruinosity. Vittae and maculae with dark brown pruinosity and ground colour. Tergite 2 with faint to well defined dark brown medial vitta, dark brown macula in anterolateral corner, additional macula lateral of median, anterior margin of latter at proximal *ca.* 1/3, posteriorly reaching margin. Tergites 3 through 5 with maculae in proximolateral corner, narrow central vitta and irregular lateral vitta, lateral markings on each tergite apostrophe-shaped (as in Figure 5).

Male terminalia

Sternite 5 broadening posteriorly, apical margin concave; tergite 6 completely atrophied; tergite 7 very narrow, dorsal length much less than 1/10 hypandrial dorsal length, membranous left laterally, not fused to left portion of sternite 7; sternite 6 well-sclerotized, with recurved, transverse flap subbasally, flap base width more than half posterior width of sternite 5, small left lateral extension fused to left portion of sternite 7;

sternite 7 separated into right and left portions, right portion broad and relatively long (as long as portion of sternite 6 posterior to flap), left portion very small, fused to small left extension of sternite 6. Epandrium relatively large, without posteroventral extension, setulose, setulae longest posteroventrally; surstylus very elongate, freely articulating with epandrium, triangular in lateral profile, with slightly upturned apex, lateral margin of apex rounded in posterior profile, posteroventral corner with inward facing acute tooth, minutely setulose ventrally. Cerci separate dorsally, setulose (longest cercal setulae shorter than longest epandrial setulae), fused to opposite cercus ventrally, forming a ventrally oriented process flat in lateral profile and expanded in posterior profile, process bare but for a few scattered setulae and two subapical elongate setulae, apex bulbous, invaginate on apical margin, with retrorse, short spinules (this fused structure often upturned in dried specimens). Hypandrium with broad-based, rounded dorsobasal projection, hypandrial arm straight, with 2-3 very long ventrally oriented setulae proximal to postgonite, fused with opposite epandrial arm distally, articulating with postgonite at level of epandrial posteroventral margin; postgonite very slender and elongate, with slightly upturned apex, equaling or slightly exceeding surstylus distally. Phallapodeme with laterally expanded basal process in place of "fan", margin opposite this process concave; basiphallus well-sclerotized and slightly expanded basally, elongate; distiphallus slender and elongate, unlobed and unornamented, composed of two heavily sclerotized plates twisted slightly more than 180°. Ejaculatory apodeme outside of basiphallus, slightly bulbous and with small pores apically, broadening basally.

Female terminalia

Sternite 5 length 2.0 to 2.7 times width, sternite 6 length 0.9 to 1.0 times width.

Ovipositor relatively stout (as in Figure 14e). Tergite 7 well-sclerotized medially. Tergite 8 and sternite 8 well-sclerotized proximally. Sternite 8 very squat, convex, without heavily sclerotized posterior margin, sparsely setulose, microtrichose throughout. Sternite 10 broad apically, the lateral margins relatively straight proximally, with scattered setulae and microtrichia, deeply invaginated medially, proximally with very heavily sclerotized apodeme, narrow laterally, broadened in dorsoventral plane, free of setulae and microtrichia. Tergite 10 greatly reduced, fused with cerci. Cerci free posterior of tergite 10, with stout setae, these longer posteriorly and laterally. Spermatheca relatively squat to moderately elongate, rugose or with small pock marks, broad basally, narrowly pointed apically. Ventral receptacle bulb-shaped, uniformly sclerotized, duct with minute transverse ridges.

Comments

This species is apparently endemic to Florida's scrub habitat.

The alula of this species appears wider than in *C. helvum*. However, it would require many wing mounts to thoroughly evaluate the variability within and between these species. This was not undertaken as it is not important to species identification given the number of good characters available to distinguish this species (see diagnosis).

The spermathecae vary in the two female specimens dissected. In the Archbold Station specimen the spermatheca is relatively squat with coarse rugae (Figure 13j), while in the Orlando specimen the spermatheca is more elongate and with pock marks (Figure 13l). In both cases the overall shape of the spermatheca is similar, both are wide basally with a

long tapering apex. The ventral receptacles of these two specimens are as described above.

Type Material

HOLOTYPE: UNITED STATES OF AMERICA. Florida: Highlands Co., Archbold Biol. Sta., Lake Placid, 1♂, 3.xi.1986, Malaise trap, "Trail 2 SSo", M. Deyrup (ABSC).

PARATYPES: UNITED STATES OF AMERICA. Florida: Highlands Co., Archbold Biol. Sta., 1♂, 6.x.1964, 1♂, 7.x.1964, 5♂, 8.x.1964, 3♂, 9.x.1964, 2♂1♀, 11.x.1964, 1♂, 12.x.1964, 1♀, 14.x.1964, all P.H. Arnaud, Jr. (all CASC); Highlands Co., Archbold Biol. Sta., Lake Placid, 1♂, 16.xi.1984, 1♂, 23.xi.1984, all Malaise trap, "Trail 2 SSo", all M. Deyrup, same data except 1♂, 14.vi.1989, Malaise trap, partly burned cutthroat grass [*Panicum abscissum*], pond, R.L. Shumate, same data except 1♀, 23.x.1998, in yellow bowl trap, west side of Lake Annie, area of chironomid and spider abundance, M. Deyrup (all ABSC); Orange Co., Orlando, U[niversity of] C[entral] F[lorida], Long Leaf Pine-Saw Palmetto, Malaise Trap, 1♂, 21.vi.1991, 1♀, 25.vi.1991, same data except Sand Pine-Rosemary Scrub, 1♂, 25.vi.1991, all S.M. Fullerton (all UCFC).

***Curtonotum helvum* (Loew)**

Figures 5, 14 and 36a

Diplocentra helvum Loew, 1862: 228

Diagnosis

Characters to distinguish *C. helvum* from *C. floridense* are provided in the diagnosis of the latter species.

Description

Similar to *C. floridense* except as follows. Length: 4.0 - 8.0 mm. Frons width 1.4 to 1.5 times frons height. Eye height 3.9 to 6.2 times gena height. Proclinate bristle slightly anterior to or at midpoint of sagittal distance from anterior ocellus to ventral margin of frons, minor reclinate bristle anterior and slightly medial to major reclinate bristle.

Parafacials moderately broad, eye height 4.0 to 6.2 times gena height. Vibrissa, very large, more than 5 times longer than adjacent subvibrissals. First flagellomere distinctly longer than pedicel. Thorax white pruinose throughout, some specimens with very dark medial and lateral vittae on scutum, medial vitta relatively narrow, on entire scutal length, lateral vittae thicker, extending from just anterior of transverse suture to posterior margin; these vittae present in ground colour only and are largely obscured by pruinosity. Fore femur with 9-12 short stout ctenidial setae. Mid tibia with two very strong, one moderately strong (in some specimens this seta relatively weak), and several weaker apical ventral setae, the moderate seta between the two strong setae, closer to the anterior strong seta; hind femur with single subapical dorsal seta.

Male terminalia

Sternite 5 similar to *C. floridense*, though not as deeply invaginate posteriorly; tergite 6 completely atrophied; tergite 7 relatively narrow, dorsal length slightly more than 1/10 hypandrial dorsal length, extending on left nearly to, but free of, left margin on sternite 7; sternite 6 well-sclerotized, with transverse fold on posterior half (similar to flap in *C. floridenis* but more posterior, only slightly raised, not forming leaf), small left lateral extension fused to left portion of sternite 7; sternite 7 separated into right and left portions, right portion broad and relatively long (as long as portion of sternite 6 posterior

to fold), left portion very small, fused to small left extension of sternite 6. Epandrium relatively large, setulose, setulae longest posteroventrally; surstylus very elongate, articulating with epandrium, triangular in lateral profile, with slightly upturned apex, lateral margin straight on distal half in posterior profile, posteroventral corner with inward facing obtuse tooth, minutely setulose ventrally. Cercus separate dorsally, setulose (longest cercal setulae shorter than longest hypandrial setulae), fused to opposite cercus ventrally, forming a ventrally oriented process flat in lateral profile and expanded in posterior profile, process bare but for a few scattered setulae, apex bulbous, invaginate or rounded on apical margin, with slightly recurved, short stout spinules (this fused structure often upturned in dried specimens). Hypandrium with broad-based, rounded dorsobasal projection, posterior bridge extending slightly ventrally, hypandrial arm relatively straight, with single elongate ventrally oriented setulae on dorsal projection proximal to postgonite, fused with opposite epandrial arm distally, articulating with postgonite at level of epandrial posteroventral margin; postgonite very slender and elongate, with straight to slightly upturned apex, equaling or slightly exceeding surstylus apically. Phallapodeme "fan" with longitudinal leaf as well as two divergent proximal leaves, these three leaves sharing a common axis, margin opposite this process concave; basiphallus well-sclerotized basally, relatively stout, expanded apically; distiphallus relatively large, contracted subapically, composed of two heavily sclerotized plates, ventral plate extending from base to *ca.* 2/3s distance to apex, dorsal plate extending to apex, bifurcate distal of subapical contraction. Ejaculatory apodeme outside of basiphallus, slightly bulbous and with small pores apically, broadening basally.

Female terminalia

Similar to *C. floridense* except as follows. Sternite 5 length 1.2 to 2.0 times width, sternite 6 length 0.6 to 0.7 times width. Sternite 8 moderately densely setulose. Sternite 10 broad apically, lateral margins broadly rounded. Tergite 10 with medial break. Spermatheca very elongate, with very small scattered spinules. Ventral receptacle with bulbous apex and flanged base, with slightly heavier sclerotization basally, duct with fine transverse wrinkles.

Comments

The transverse fold in male sternite 6 is similar to the male sternite 6 flap in *C. floridense* but it is more posterior, only slightly raised, and does not form a leaf. In both species the sensory setulae are located just anterior of the transverse feature, suggesting that the folds are homologous although the anterior portion of sternite 6 is much more expanded in *C. helvum* than in *C. floridense*.

Material Examined

UNITED STATES OF AMERICA. "Waq", 1♂, viii.1913 (USNM). **DISTRICT OF COLUMBIA:** Washington, 1♂2♀, 18.viii.1907, W.L. McAtee (USNM). **COLORADO:** Saguache Co., Great Sand Dunes National Monument, Light, 8,000', 2♂, (1 male dissected) 11.viii.1976, D. Gwynne (USNM). **CONNECTICUT:** Cansan, 1♂1♀, 28.viii.1952, 1♀, 29.viii.1952, A. Stone (USNM). **ILLINOIS:** Chicago, 3♂7♀ (USNM); Chicago, Edgewater, 1♀ (USNM). **INDIANA:** LaFayette, 8♂8♀, 1.viii.1922, 1♂, 1.viii.1922, E.W. Stafford, 2♂, 25.vi.1922, 3♂, 4.viii.1922, 1♂6♀, 4.viii.1922, E.W. Stafford, 1♂1♀, 6.vii.1922, 1♂, 20.vii.1922, 1♂, 21.viii.1916, 1♂, 13.viii.1915, 1♂,

8.vii.1915, 1♂, 14.vii.1915, 2♀, 30.vii.1915, 4♀, 20.vii.1922, 1♀, 17.vi.1922, 1♀, 6.viii.1916, 1♀, 13.vii.1922, 1♀, 21.viii.1916 (all USNM); "MichiganCv", 1♂, 5.ix.1917, J.M. Aldrich (USNM). **GEORGIA:** "S. Georgia", 1♀, Morrison (USNM).

MASSACHUSETTS: Wood's Hole, on apple, 1♂, 15.viii.1917 (USNM); Horseneck Beach, 1♀, 3.viii.1896, 1♀, 10.viii.1896, Hough (USNM), Wood's Hole, 1♀, 24.vii.1901, 1 sex unknown, 9.viii.1899 (USNM); Pasque Island, 8.viii.1954 (USNM); Mas[sachusetts?], 1♂, 1 sex unknown (USNM); Plymouth Co., Myles Standfish State Forest, Barrets Pond, 1♀, 11.ix.1982 (DEBU). **MARYLAND:** Cabin John, 1♂, 27.vii.1916, 4♂1♀, 29.vii.1916, W.L. McAtee (USNM); Hyattsville, 1♂, vii, N. Banks (USNM); Chesapeake Beach, 1♀, ix.1906 (USNM); Marshall Hall, 3.viii.1917, W.L. McAtee (USNM); Beltsville, 1♂4♀, 6.vii.1916, F.R. Cole (EMEC); 1♂, W.L. McAtee (USNM); Glen Echo, 1♂, 23.vii, J.R. Malloch (USNM). **MICHIGAN:** East Lansing, 2♂, 4.viii.1941, C. Sabrosky, 1♂1♀, 27.vii.1941 (USNM); Pentwater, 4♂1♀, 9.vii.1936, C.W. Sabrosky (USNM); Presque Isle Co., 1♂, 19.vii.1942, C.W. Sabrosky (USNM); Hart, 2♂, 14.vii.1942 (USNM); Livingston Co., E.S. George Reserve, 1♂6♀, (1male1female dissected) 23.vi.1943, G. Steyskal, E.S. George Reserve, 3♂, 25.vi.1943, G. Steyskal, E.S. George Reserve, Field, 1♀, 10.vii.1957, U.N. Lanham (all USNM); Grand Traverse Co., Williamsburg, 1♂, 24.viii.1960, G.C. Eickwort (USNM); Wexford Co., 1♂, 23.viii.1960, R.A. Scheibner (USNM); Barry Co., Yankee Springs Game Area, 1♂, 15.vi.1960, G.C. Eickwort (USNM); Wexford Co., Woodward Lake, 23.viii.1960, R.J. Snider (USNM); Ingham Co., 1♀, 4.viii.1949, R. Namba (USNM); Dexter, 1♀, E.G. Anderson, 14.ix.1924 (USNM); Warren Dunes, Beach, 1♀, 13.v.1952 (USNM).

MISSISSIPPI: "A.M.C.", 1♀, 26.vi.1920 (USNM); Oxford Co., 3♀, 15.vii.1945

(CNCI); Lafayette Co., 1♂, vi.1934, 1♀, vii.1945, 1♀, v-vi.1962, all F.M. Hull (all CNCI). **NORTH CAROLINA:** 2♀ (USNM). **NEBRASKA:** Fremont, 1♂, 30.vi.1900 (USNM). **NEW JERSEY:** Rancocas Park, 1♀, 2.viii.1927, R.S. Lehman (USNM); Haddonfield, 1♀, 3.viii.1927, R.S. Lehman (USNM); Riverton, 2♂, 12.vii.1908 (ANSP), 1♀, 6.ix.1927, C.H. Ballou (USNM); Riverton, 10♂5♀, (1 female dissected) 12.vii.1908, 1♂, 20.ix.1904, 1♂, 13.vi.1909, 1♀, 18.vii.1909 (all USNM); Fort Dix, Wrightstown, Light Trap, 1♂, 19-15.vii.1962 (USNM); Burlington Co, Oswego Lk., 2♀, 30.viii.1974, Malaise, Menke and Miller (USNM); Lakehurst, Wrangle Brook Rd., 1♀, 30.viii.1956, C.B. Knowlton Jr. (USNM); Pemberton, 2♀, 11.vii.1909 (USNM); Malaga, 1♀, 20.vii.1909, G.M. Greene (USNM); Clementon, 1♀, 29.vii.1906 (USNM); Glassboro, 1♀, 11.vii.1963, G.R. Glase (USNM); Bullock, 1♀, 16.vii.1932 (USNM); Medford, 24♂25♀, 12.viii.1902 (ANSP), 1♀, 5.ix.1904 (CASC), 5♂2♀ 5.ix.1904 (ANSP); Cape May, 1♀, 30.vi.1909 (ANSP); Trenton, 9.viii.1908 (ANSP); Pemberton, 1♂1♀, 8.vii.1907 (ANSP); Burlington Co., Mount Misery Brook and area, 6.4 km E of junction Highways 70 and 72, 39°55'11"N, 74°31'24"W, 38 m, 3♀, 9.vii.1993, J. Gelhaus, M. Livingston, N. Welch, 3♂2♀, 16.vii.1993, 2♀, 29.viii.1993, J. Gelhaus, same data except 6.5 km E of junction Highways 70 and 72, 39°55'11"N, 74°31'24"W, 38 m, 2♀, 26.viii.1993, J.K. Gelhaus (all ANSP); Calvert Co., Port Republic, 1♀, 3.viii.1998, 2♂1♀, 5.viii.1998, all D.M. Wood (all CNCI). **NEW MEXICO:** Espanola, 3♀, 11.viii.1953, W.B. Heed (AMNH). **NEW YORK:** Oak Island, 2♀, vii (USNM); Ithaca, 1♀ (USNM); Long Island, Riverhead, 1♂, 24.viii.1954; Long Island, Montauk, 1♀, 23.vii.1932, A.L. Melander (USNM). **OHIO:** Kent, 1♀, 1.viii.1964, B.A. Foote, 1♂, 8.viii.1967, D. Trelka (all CMNH). **PENNSYLVANIA:** Germantown, 1♀, 2.vii.1908,

(USNM); Swarthmore, 3 ♀, 18.vii.1909, E.T. Cresson (ANSP). **VIRGINIA:** Virginia Beach, 1 ♂ 1 ♀, 13.viii.1913, F.K. Knap, 1 ♀, vii, F.K. Knap (all USNM); Fairfax Co., Black Pond, 1 ♂, 19.vi.1919, W. Middleton (USNM); Chain Bridge, 1 ♀, 20.viii.1922, J.R. Malloch (USNM); Fairfax Co., Scott's Run, 1 ♂, 21.vii.1963, D.C. & K.A. Rentz (CASC). **CANADA. ALBERTA:** Lethbridge, 1 ♂, 17.viii.1929 (CNCI); "M. bervies"?, 1 ♂, 8.ix.1924, H.L. Seamans (CNCI). **MANITOBA:** Treesbank, 1 ♂, 10.viii.1929, G.F. Manson (CNCI); Bald Head Hills, 13 miles N Glenboro, 17 ♂ 14 ♀, 9.viii.1958, R.L. Hurley (CNCI); Victoria Beach, 1 ♀, 8.viii.1926, N. Criddle (CNCI). **ONTARIO:** Toronto, 1 ♂, 9.viii.1933, H.S. Parish (USNM); Bruce Co., Tobermory, Dorcas Bay, 1 ♂, 27.viii.1996, 1 ♀, 28.viii.2005, same data plus sand dune, 45°11.66'N, 81°35.04'W, 2 ♂ 1 ♀, 19-24.viii.1997, Malaise, 1 ♀, 2.viii.1999, 2 ♂ 1 ♀, 2-25.viii.1999, all S.A. Marshall (DEBU); Manitoulin Island, Providence Bay, dunes, 45°39'41"N, 82°15'40"W, 1 ♂ 2 ♀, 7.viii.2003, S.A. Marshall (DEBU); Manitoulin Island, Portage Bay, 45°45'N, 82°32'W, dunes, 1 ♂ 1 ♀, 6.viii.2003, S.A. Marshall (DEBU); Manitoulin Island, Carter Bay, 7 ♀, 1.viii.2002, S.A. Marshall (DEBU), same data plus 45°36'23"N, 82°8'27"W, dunes, 2 ♀, 1.viii.2003, S.M. Paiero, 1 ♀, 8.viii.2003, S.A. Marshall, 3 ♂ 1 ♀, 28.viii.2003, S.A. Marshall, same data except open dunes, 1 ♂ 2 ♀, 6-8.viii.2003, yellow pans, S.A. Marshall (DEBU); Bruce Co., Inverhuron Provincial Park, 44°18'N, 81°35'W, dunes, 1 ♂ 5 ♀, 22.viii.2003, M. Buck (DEBU); Lambton Co., Pinery Provincial Park, 1 ♀, 13.vii.1979, Dael Morris, 2 ♀, 12.ix.1981, K.N. Barber, 5 ♀, 14.vii.1980, 1 ♂ 1 ♀, 19.viii.1980, K.N. Barber, 1 ♂ 2 ♀, 7.viii.1995, K.H. Stead, same data plus beach dunes, 1 ♂ 1 ♀, 17.vii.1982, S.A. Marshall, same data except Dunes Campground, beach dunes, 1 ♀, 14.ix.2001, S.M. Paiero, same data except 500m south of Picnic Area 9 on second dune, blacklight trap,

1♀, J. & A. Skevington, G. Vogg, same data except Dunes Beach, grass and poplar sand dunes, 5♀, 17.vii.1977, D. Maddison, same data except Burley Beach, dunes, 2♂, 25.vii.2001, M. Buck, same data except Carolinian Trail parking lot, 43°14'15"N, 81°52'31"W, grassy sandy area, 1♂, 26.vii.2001, sweeps, M. Buck, same data except Riverside Trail, 1♂, 3.viii.1994, J. Skevington (all DEBU); Kent Co., Rondeau Provincial Park, South Point Trail, east parking lot, dunes, 42°15'42"N, 81°50'49"W, 1♂, 16.vii.2003, D. Cheung, same data except near east parking lot, oak savanna, 42°15'42"N, 81°50'49"W, 1♀, 3-16.vi.2003, Malaise, Marshall et al., 1♀, 29.vi-14.viii.2003, S.M. Paiero and S.A. Marshall, 1♂, 29.vii.2003, S.A. Marshall, 2♂, 16-29.vii.2003, Malaise, S.A. Marshall, same data except dunes, 1♂1♀, 20.vii.2004, D.K.B. Cheung, 2♂, 9-10.viii.2003, yellow pans, M. Buck (all DEBU); Kent Co., Rondeau Provincial Park, Visitor Centre, 42°46'50"N, 81°50'38"W, mercury vapour light, 1♀, 16.vii.2003, O. Lonsdale (DEBU); Haldimand-Norfolk Region, Manestar Tract, 6 km NNW St. Williams, 42°42'17"N, 80°27'38"W, 1♂3♀, 24.viii.2005, J. Klymko (DEBU); Lambton Co., Port Franks, Richmond Subdivision, wet meadow, 2♂3♀, 1.ix.1994, J. Skevington, same data except Karner Blue Sanctuary, 1♀, 8-15.viii.1996, Malaise, J. Skevington (DEBU); Lambton Co., Port Franks, 1♀, 25.viii.1994, A. Rider (DEBU); Lambton Co., Port Franks, Watson Property near L-Lake, 1♀, 8-12.vii.1996, Malaise, 1♀, 6.viii.1996, 3♂1♀, 7-14.viii.1996, pans, 1♂3♀, 14-19.viii.1996, Malaise, J. Skevington, 1♀, 19-26.viii.1996, pans, 1♂, 26.viii-3.ix.1996, Malaise, J. Skevington, 3♂1♀, 31.vii-6.viii.1996, pans, all J. Skevington (DEBU); Presquile Provincial Park, pannes, 1♀, 5.viii.2001, Malaise, P. Careless (DEBU); Sauble Beach, 6♂7♀, 9.viii.1983, 7♂8♀, 10.viii.1983, same data plus vegetation near sand, 1♀, 23.vii.2005, M. Bergeron

(DEBU); Pelham, 1♀, 30.vii.1923, W.A. Ross (DEBU); Long Point, 1♂2♀, 23.vii.1983, J.E. Corrigan (DEBU); Ipperwash, 14.vii.1980, K.N. Barber (DEBU); Point Pelee National Park, 1♀, 30.vii.1920, N.K. Bigelow (CNCI), 1♀, 31.vii.1978, W.A. Attwater, 1♂, 7.vii.1980, D.L. Krailo, 1♂, 22.vii.1981, K.N. Barber, 1♂1♀, 9.viii.1980, K.N. Barber, 1♀, 17.viii.1980, K.N. Barber, 1♀, 18.viii.1980, K.N. Barber, 2♀, 7.vii.1982, K.N. Barber, 3♀, 9.vii.1982, K.N. Barber, 5♂3♀, 11.vii.1982, K.N. Barber (DEBU); Sandbanks Provincial Park, 12♂19♀, 3.ix.1980, 16♂38♀, 29.viii.1981 (1♀ "reared from egg ovip. 8.ix.1981/placed with hopper eggs/pupa 29.ix.1981/adult ♀ 28.x.1981"), all K.N. Barber (DEBU); Dyers Bay, 1♂, 16.viii.1953, D.H. Pengelly (DEBU); Penetang, 1♂, 1.viii.1955, J.G. Chillcott (CNCI); Prince Edward Co., Outlet Beach, 42♂70♀, 13.viii.1968, 5♂7♀, 14.viii.1968, all J.R. Vockeroth (all CNCI); St. Thomas, 1♀, 1.viii.1924, H.S.D. (CNCI).

The *Curtonotum vulpinum* species group

Figures 11 and 12

Diagnosis

Species in the *Curtonotum vulpinum* species group can be distinguished from all Neotropical congeners by the absence of dark haloes around the insertion points of scutal setulae and setae. They are distinguished from *C. helvum* and *C. floridense* by infuscated wings (wing patterns vary but none are nearly devoid of infuscation as in *C. helvum* and *C. floridense*), their unfused male cerci and their female cerci which are not fused to tergite 10 and lack of stout setae. This species group includes four described species (*Curtonotum vulpinum* Hendel, *Curtonotum impunctatum* Hendel, 1913 *nec impunctatum*

Hendel, 1932, *C. fumipenne* Hendel, 1913 and *C. simplex* Schiner) and at least seven undescribed species.

Comments

While these species are easily attributed to this group on the basis of diagnostic plesiomorphic characters, no synapomorphy is known to define the *C. vulpinum* species group. Though species in the *C. vulpinum* species group were not analyzed, they would likely come out basal to or within the *C. punctithorax* species group. While they lack the punctuate markings that partially define this clade, most morphospecies examined have both a bilobed distiphallus and elongate spermathecal ducts, and all have at least one of these two characters.

Species within this group range from southern Mexico to northeastern Bolivia.

The *Curtonotum punctithorax* species group

Diagnosis

Members of the *Curtonotum punctithorax* species group are characterized by a boldly punctuate scutum. Most species in this clade also have a bilobed distiphallus and elongate (more than 50 times as long as broad) spermathecal ducts. This clade includes all Neotropical species except those in the *C. vulpinum* species group (see Comments above).

***Curtonotum nigrum* Klymko and Marshall, sp. nov.**

Figures 15 and 36c

Etymology

From Latin, *niger*, meaning black, referring to the very dark overall colouration of this species.

Diagnosis

The combination of an entirely grey-brown infusate wing and an abdomen devoid of maculae and vittae distinguish *Curtonotum nigrum* from all New World congeners. It is also the only species that has an essentially bivalved right distiphallic lobe (created by a deep invagination on the left margin of the lobe).

Description

Based on holotype.

Length: 5.8 mm

Head

Frons dark brown with pale medial vitta and pinkish purple iridescence (especially in lateroventral corner, iridescence visible only from oblique angle), scattered dark setulae, moderate bulge ventrally, width 1.3 times height, parallel sided, lateral margin narrowly silver pruinose. Ocellar triangle and narrow lateral strip brown grey pruinose, pruinosity of ocellar triangle not extending anterior of anterior ocellus, lateral pruinose strip extending nearly to midpoint between proclinate bristle and ventral margin of frons.

Proclinate bristle at *ca.* midpoint of sagittal distance between anterior ocellus and ventral margin of frons, directly anterior to major reclinate bristle; minor reclinate bristle anterior and medial to major reclinate bristle. Face silver pruinose with dark brown ground

colour; vibrissa *ca.* twice as long as adjacent subvibrissals. Parafacial and gena narrow, former densely silver pruinose, latter moderately so, ground colours yellow-brown to dark brown, respectively, eye height 14.7 times gena height. Clypeus, palpus, and prementum with dark brown ground colour, former two silver pruinose and microtrichose, respectively, latter bare and shiny. Scape and pedicel with orange-brown ground colour and silver pruinosity, first flagellomere densely silver microtrichose, with orange-brown ground colour on apical *ca.* 1/4, otherwise dark brown.

Thorax

Silver pruinose with dark brown ground colour throughout (except scutellum, where pruinosity is brown), ground colour paler around postpronotal lobe, anterior spiracle, base of wings and margin of scutellum. Scutum moderately arched, each scutal, postpronotal, and anepisternal seta and setula with dark spot around socket. Scutum with two faint pairs of narrow dark vittae, medial pair running entire scutal length, lateral pair evident only posterior of transverse suture. Postpronotal lobe with three setae, center seta *ca.* 0.6 times length of posterior seta, anterior seta smaller still; notopleuron without setulae; scutellum with two pairs of marginal setae. Left anepisternum with three subequal large setae on posterior half, right anepisternum with two large and two moderate setae on posterior half (this asymmetrical condition is almost certainly an individual aberration and the condition of the right anepisternum is most likely typical); katepisternum with single prominent lateral seta (two setulae in the native position of the second lateral seta suggest that two lateral setae may be typical in this species, katepisternal chaetotaxy is only visible on the left side as the right katepisternum is damaged by the pin); linear tuft

of setulae under fore coxa dark brown. Area below and behind posterior spiracle bare (without fringe of setulae); meron bare.

Legs

Ground colour of coxae, tibiae, femora and tarsomeres 4 and 5 medium brown, that of tarsomeres 1-3 ivory but for medium brown apices. Coxae densely silver pruinose, legs otherwise lightly so. Chaetotaxy black except for very dense, regularly spaced transverse rows of setulae anteroventrally on apical 1/2 of fore tibia and similar setulae on fore first tarsomere, these dark brown. Fore femur with 4 posterodorsal setae; ctenidial setae 5, relatively long and thick; mid femur with 5-6 anterior setae (5 on right femur, 6 on left); hind femur with single subapical dorsal seta. Mid tibia with two strong, 1-2 moderate (one on right tibia, two on left), and several weak apical ventral setae, one moderate seta between the large setae, second moderate seta (when present) posterior to the large setae. Row of cuneiform setae present on entire anteroventral margin of mid and hind fifth tarsomeres.

Wing

Alula relatively narrow. Costal cell, r_1 , and anterior half of r_{2+3} dark brown infusate, wing otherwise grey-brown infusate.

Abdomen

Moderately grey pruinose with purple-black ground colour. Tergites devoid of maculae and vittae.

Male terminalia

Sternite 5 truncate posteriorly, well-sclerotized; tergite 6 moderately well-sclerotized, small area of desclerotization dorsally on posterior margin; tergite 7 moderately well-

sclerotized, relatively long, dorsal length *ca.* 0.5 times dorsal epandrial length; sternite 6 folded over but not separated by protandrial ridge, broad, more heavily sclerotized proximally on left; sternite 7 separated into right and left portions, right portion length *ca.* 1/4 length of adjacent portion of sternite 6. Epandrium relatively large, with scattered setulae (in no areas these particularly long), moderately large posterolateral lobe; surstylus laterally articulating and medially fused with epandrium, anterolaterally elongate with flat ventral margin, bending posteriorly around postgonite, with ventrally produced rounded lobe, minutely setulose medially, area adjacent to postgonite slightly concave. Cercus elongate, ventral and dorsal margin flat, angled posteroventrally, longest cercal setulae shorter than long subequal to longest epandrial setulae. Hypandrium with narrow based, elongate, antrorse dorsobasal lobe, posterior bridge produced ventrally and posteriorly, hypandrial arm with slight dorsal bend at posterior margin of epandrium, with two venteromedially oriented setulae proximal to postgonite, broadly fused to opposite hypandrial arm distally; postgonite minutely setulose, with upturned acute apex. Phallapodeme with relatively large, somewhat posteriorly bulging "fan", margin opposite fan flat basally and convex distally; basiphallus well-sclerotized basally, expanded over entire length, relatively stout; distiphallus relatively large, base elongate, bowed ventrally, expanded distally in posterior profile, distiphallus bilobed, lobes subequal in length, left lobe perpendicular to axis of phallus, heavily sclerotized along lateral margin to apex, ventral margin moderately sclerotized, lobe otherwise membranous, apex truncate, lateral corner with well-sclerotized, apically bulbous fingerlike projection, medial lobe with 3 membranous apically acute fingerlike projections, right lobe in same plane as phallus, with short fine spinules dorsomedially on proximal half, lobe deeply

invaginate along left margin, thus composed of two valves, these with broadly rounded margins, ventral lobe moderately sclerotized, dorsal lobe weakly sclerotized. Ejaculatory apodeme within basiphallus, elongate, broadening and with small pores basally.

Female terminalia

Unknown.

Type Material

HOLOTYPE: BRAZIL. Parana: Curitiba, 30 km SE BR277, 1♂, 6.ii.1990, S.A. Marshall (MZSP).

The *Curtonotum bathmedum* species complex

Diagnosis

This species complex is defined by a highly derived female sternite 8 wherein the posterior margin is heavily sclerotized and laterally dimpled. The two species in this complex, *Curtonotum bathmedum* and *C. bivittatum* are nearly indistinguishable without dissection, though are easily distinguished from all other congeners by either of the following characters: distinct parallel dark brown vittae on an otherwise dark yellow frons and prominent dark brown scutal vittae on an otherwise orange-yellow thorax.

***Curtonotum bivittatum* Klymko and Marshall, sp. nov.**

Figures 16, 36d and 36e

Etymology

From Latin, *bis*, meaning two, and *vitta*, meaning stripe, referring to the two bold vittae of the frons that continue onto the scutum.

Diagnosis

Curtonotum bivittatum can be distinguished from most *C. bathmedium* specimens by the more extensive infuscation around M_1 proximal to crossvein dm-cu: in *C. bivittatum* infuscation extends 0.24 to 0.45 the distance from dm-cu to r-m, in *C. bathmedium* infuscation extends between 0.10 to 0.26 the distance from dm-cu to r-m, thus the infuscation along M_1 , dm-cu, and CuA_1 often forming a zig-zag. The two species can be definitively distinguished by the distiphalli – in *C. bivittatum* the distiphallus is elongate, with a coarse spinose dorsal ridge on distal 2/3s (Figures 16a and 16b), in *C. bathmedium* the distiphallus shorter, with a broad finely spinose apex (Figures 17a and 17c), by the ventral receptacles – in *C. bivittatum* the ventral receptacle has a bulbous, subspherical head (Figure 16h), in *C. bathmedium* the ventral receptacle has a hemispherical head (Figure 17g).

Description

Length: 5.9 – 8.8 mm

Head

Frons dark yellow with two prominent brown vittae and sparsely scattered minute black setulae, with white sheen over vittae (only visible from oblique angle), large bulge ventrally, lateral margins shiny silver pruinose, width 1.0 - 1.1 times height, parallel sided to slightly wider ventrally. Ocellar triangle and narrow strip on either side of frons gold pruinose, pruinosity of ocellar triangle not extending anterior of anterior ocellus, narrow pruinose strip extending just ventral of proclinate bristle. Proclinate bristle at *ca.* 1/3 sagittal distance from anterior ocellus to ventral margin of frons, anterior and in some specimens slightly medial to major reclinate bristle; minor reclinate bristle *ca.* midway

between proclinate and major reclinate bristles. Face silver pruinose with pale yellow ground colour; vibrissa no larger than adjacent subvibrissals. Parafacial very broad, silver pruinose with pale yellow ground colour; gena brown-yellow, only lightly pruinose, bare and shiny medially, eye height 8.3 to 10.8 times gena height. Clypeus and palpus with pale yellow ground colour, former gold pruinose, latter with gold microtrichia; prementum lightly gold pruinose, with yellow ground colour. Antennae with orange-yellow ground colour, scape and pedicel gold pruinose, setulae on scape black, on pedicel black dorsally and dark orange or black ventrally, first flagellomere with gold microtrichia, ground colour slightly darker on apical 1/4 to 1/3.

Thorax

Scutum moderately arched, with orange-yellow ground colour, dull gold pruinose with two pairs of prominent brown vitta; medial vitta appearing as continuation of vitta on frons, broadening distally, extending onto scutellum, lateral vitta anteriorly on medial portion of postpronotal lobe and notopleuron, broken at transverse suture, posteriorly more medial, between medial and transverse vitta an additional short vitta on postsutural area. Setulae and setae on gold pruinose areas with dark haloes around insertion points. Postpronotal lobe with two prominent setae, anterior seta *ca.* 2/3s length of posterior seta; notopleuron without setulae, scutellum with two pairs of marginal setae. Laterally with vitta from lateral portion of postpronotal lobe to base of wing, otherwise subshiny, with yellow ground colour and moderate gold pruinosity. Anepisternum with three prominent setae and two or three lesser setae on posterior half; katapisternum with single prominent lateral seta; linear tuft of setulae under fore coxa yellow. Area below and behind posterior

spiracle bare (without fringe of setulae); meron bare (two or three minute orange setulae sometimes present).

Legs

Ground colour yellow except where noted, coxae densely silver pruinose, legs otherwise lightly so, subshiny. Chaetotaxy black except for very dense, regularly spaced transverse rows of setulae anteroventrally on apical 1/3 of fore tibia and similar setulae on fore first tarsomere, the former gold-yellow, the latter slightly darker. Fore femur with 3-5 posterodorsal setae, ctenidial setae hardly differentiated from adjacent setulae (as such count not possible); mid femur with 5-6 anterior setae; hind femur with single anterodorsal seta. Mid tibia brown anterodorsally for entire length, with 2 prominent and 1-2 moderate apical ventral setae, one moderate seta posterior to the two prominent setae, its size variable (though always present), in some specimens nearly as long as prominent setae, in others *ca.* 1/2 as long, an additional moderate seta often present between the two prominent setae; hind tibia occasionally brown anterodorsally for entire length, often brown at apex. Row of short cuneiform setae present on anteroventral margin of mid and hind fifth tarsomere.

Wing

Alula very narrow. Non-infuscated areas with yellow tinge. Costal cell, r_1 , and anterior half of r_{2+3} dark brown infuscated, r_{2+3} broadly dark brown infuscated apically; r_{4+5} medium to dark brown infuscated apically, and posteriorly along margin from apex to between crossveins dm-cu and r-m, the proximal limit of this infuscation at between 0.24 to 0.45 the distance from dm-cu to r-m; m1 broadly medium brown infuscated along margin, infuscation paler distally, dm broadly medium brown infuscated along distal

margin, anterior margin opposite infuscation in r_{4+5} , and posterior margin to level of r-m; cua_1 broadly medium brown infuscated along anterior margin to level of r-m.

Abdomen

Gold pruinose, ground colour yellow, markings produced by changes in ground colour and pruinosity. Posterior *ca.* 1/4 of tergites 2-4 yellow-brown, darker toward posterior margin (this present on tergite 5 in some specimens), tergites 3-5 with dark brown medial vitta (this much broader posteriorly on each tergite).

Male terminalia

Sternite 5 truncate posteriorly, with small invaginate area of weak sclerotization, this invagination free of setulae. Tergite 6 broad, setulose in some specimens; tergite 7 weakly sclerotized, short, dorsal length slightly more than 1/10 dorsal epandrial length; sternites 6 and 7 weakly sclerotized, folded over but not interrupted at protandrial fold; sternite 6 broad, more heavily sclerotized ventrally on left; sternite 7 relatively long, length of right portion *ca.* 0.6 times length of right portion of sternite 6. Epandrium relatively large, setulose (in no one area these particularly long), with area of fusion below cerci, area of fusion with distinct bulge in lateral profile; surstylus narrow, posterior margin flat, articulating laterally with and medially fused to epandrium, hind margin straight, mediodistal corner acute, minutely setulose above and below. Cercus stout, ventral margin flat, broadly rounded posteriorly, longest cercal setulae longer than longest epandrial setulae. Hypandrium with low, broad-based, acute posterodorsal lobe, posterior bridge produced ventrally and posteriorly, hypandrial arm straight in lateral profile, broadly fused distally to opposite hypandrial arm, with 4-5 posteroventrally oriented small setulae inserted on small ventral projection just posterior of epandrial

posterior margin, postgonite straight, sparsely and minutely setulose distally, occluded by or slightly exceeding surstylus ventrally. Phallapodeme with large “fan”, margin opposite fan concave; basiphallus moderately to broadly expanded and well-sclerotized basally, moderately to strongly tapered distally; distiphallus composed of two elongate heavily sclerotized process lateral of one another, these connected by membrane, separated into two lobes on distal *ca.* 1/4, basal 1/3 of left lobe broad and flaring to left, apical 2/3 narrow and well-sclerotized except apical membranous expansion, with stout marginal spines (at apex spines limited to ventral face of membranous expansion), right lobe broader, smooth, distal 1/4 bulbous and somewhat membranous, otherwise well-sclerotized, with fine small spinules at apex. Ejaculatory apodeme within or at proximal edge of basiphallus, elongate, expanded and with small pores basally.

Female terminalia

Sternite 5 length 2.2 to 2.5 times width, sternite 6 length 0.8 to 1.0 times width.

Ovipositor stout. Tergite 7 well-sclerotized medially; tergite 8 well-sclerotized proximally; sternite 8 weakly so. Sternite 8 varying somewhat in relative length, contracted distally, distal *ca.* 1/6 a very heavily sclerotized nub with lateral dimples, its dorsoventral height subequal to its width, extent of microtrichosity and setulation on nub variable. Sternite 10 broad, roughly pentagonal. Cerci relatively squat. Spermatheca elongate, apically rounded and often broad-based, surface variable, some with low dense protuberances, others with network of fine raised ridges, some intermediate. Ventral receptacle with well-sclerotized squat neck, its margins somewhat concave, apex bulbous, subspherical, lightly sclerotized, duct finely wrinkled longitudinally.

Comments

The two female specimens from Costa Rica have more heavily marked wings (Figure 36e), shorter and less shiny gena (eye height 13.8 to 14.0 times gena height), fewer and stronger subvibrissals (subvibrissal seta number and relative strength variable in other *Curtonotum bivittatum*, but in no other specimens are they as few or strong), setulae posterior to posterior spiracle, and no moderate seta posterior to the most posterior major apical ventral seta on the mid tibia. Their ventral receptacles are similar to other *Curtonotum bivittatum*, their spermathecae are coarsely papillose, and in one specimen the apex is acute. These two specimens may represent an additional undescribed species, but until males are examined this is difficult to say with certainty – the differences listed could represent regional variation. Therefore these two specimens are here treated as *C. bivittatum*, but are not treated as paratypes.

Type Material

HOLOTYPE: ECUADOR. Napo: Jatun Sacha Res., 6km E Misahualli, 450m, SOL trail, 1°4'S, 77°37'W, 1♂, 30.iv-8.v.2002, S.A. Marshall (DEBU).

PARATYPES: ECUADOR: Napo: Jatun Sacha Res., 6km E Misahualli, 450m, 1°4'S, 77°37'W, 3♀, 30.iv-8.v.2002, S.A. Marshall, 1♀, 6.v.2002, M. Buck, same data plus SOL trail, 2♀, 30.iv-8.v.2002, S.A. Marshall, same data minus SOL trail plus dung baits on logs, 1♂3♀, 5.v.2002, O. Lonsdale (all DEBU); Misahualli near Tena, 1♂1♀, 6-19.x.2001 (UTAH). **Orellana:** Tiputini Biodiversity Station, near Yasuni National Park, 0°37'55"S, 76°8'39"W, 220 m – 250 m, Lot 2016, Transect 2, Station 7, fogging in terra firme forest, 1♂, T.L. Erwin *et al.* 9.ii.1999 (USNM); Puerto Orellana, Rio Tiputini, 0°38.2'S, 76°8.9'W, 1♀, 12-26.viii.1999, W.N. Mathis, A. Baptista, M. Kotrba (USNM);

Coca, Napo River, 250m, 2♀, v.1965, L. Pena (CNCI). **Pastaza:** Tzapino, 32 km NE of Tewaeno, Malaise trap, 1♀, 20-23.v.1976, J. Cohen, Ecuador-Peace Corps-Smithsonian Institution Aquatic Insect Survey (USNM). **COLOMBIA. Cauca:** Gorgona Island, 2.59°N, 78.20°W, 3♂1♀, vii.1924, L.E. Cheeseman, St. George Expedition, British Museum 1925-573 (BMNH).

Other Material Examined. COSTA RICA. Cartago: La Suiza, 1♀, 14.iv.1924, 1♀, 2.ix.1924, all P. Schild (all USNM).

***Curtonotum bathmedium* Hendel**

Figures 17 and 36f

Curtonotum bathmedium Hendel, 1913: 628

Curtonotum bathymedum, error; Malloch, 1930: 325

Diagnosis

Characters to distinguish *Curtonotum bathmedium* from *C. bivittatum* are provided under the diagnosis of that species.

Description

Similar to *C. bivittatum* except as follows. Length: 5.8-9.0 mm. Frons width 1.0 – 1.2 times frons height. Eye height 6.4 - 7.1 times gena height. Setulae on pedicel black dorsally and dark orange ventrally. Proximal limit of infuscation along posterior margin on r_{4+5} at between 0.10 to 0.26 the distance from dm-cu to r-m, thus the infuscation along M_1 , dm-cu, and CuA_1 often forming a zig-zag.

Male terminalia

Sternite 5 truncate posteriorly, with small invaginate area of weak sclerotization, this invagination free of setulae. Tergite 6 well-sclerotized, often with 1 or 2 setulae; tergite 7 moderately long, dorsally *ca.* 0.4 times as long as dorsal epandrial length. Sternites 6 and 7 weakly sclerotized, folded over but not interrupted at protandrial fold; sternite 6 broad, more heavily sclerotized ventrally on left; sternite 7 relatively long, length of right portion *ca.* 0.5 times length of right portion of sternite 6. Epandrium relatively large, setulose (in no one area these particularly long), with area of fusion below cerci, area of fusion with distinct bulge in lateral profile; surstylus laterally articulating with and medially fused to epandrium, narrow, hind margin concave, mediodistal corner acute, setulose above and below. Cercus stout, ventral margin flat, broadly rounded posteriorly, longest cercal setulae longer than longest epandrial setulae. Hypandrium with low, broad-base, rounded basodorsal projection, hypandrial arm straight in lateral profile, fused distally to opposite hypandrial arm, with 2 posteroventrally oriented small setulae inserted on small ventral projection just posterior of epandrial posterior margin, postgonite a small, bare ventral oriented nub not projecting beyond surstylus.

Phallapodeme with large, slightly posteriorly projecting "fan", margin opposite fan blade concave; basiphallus broadly expanded and well-sclerotized basally, gradually tapering; distiphallus base short, apically narrowing, with small broad flat projection distally on right, apex with two small sclerotized projections on right, otherwise broad, densely covered in spines on membranous dorsal surface, ventral surface smooth, sclerotized medially. Ejaculatory apodeme within base of basiphallus, elongate, slightly expanded and with small pores basally.

Female terminalia

Similar to *C. bivittatum* except as follows. Sternite 5 length 2.8 to 3.1 times width, sternite 6 length 0.8 to 0.9 times width. Sternite 10 roughly pentagonal (as in Figure 16e) or tapering and rounded posteriorly (Figure 17d), posterior margin bending slightly dorsally, median and proximal margin with slightly heavier sclerotization. Ventral receptacle with hemispherical head.

Type Material

Hendel's (1913) type series included 8 specimens from Peru. Two female cotypes from this type series have been examined. One of these was labeled as *Typus* by Hendel, and is designated the lectotype, while the other was labeled *cotypus* by Hendel, and is designated the paralectotype. A lectotype has been designated to avoid any confusion surrounding the definition of *C. bathmedum* should the original type series prove to be made of more than one species.

LECTOTYPE: PERU. Huánuco: "Pachitea Münd.", 150m, 1♀, 4.xi.1903 (SMTD).

PARALECTOTYPE: PERU. Ucayali: "Ucayalifl" [Ucayali River], Unini, 1♀, 19.x.1903 (SMTD).

Other Material Examined

PERU. Ucayali : Urubambafl [Urubamba River], Umahuankilia, 1 specimen (sex unknown due to Psocoptera damage), 19.ix.1903 (SMTD); Meshagua, Urubambafl, 1♀, 3.x.1903, 1♀, 7.x.1903, 1♀, 13.x.1903 (all SMTD); Middle Rio Ucayali, 1♂, 6.xi.1923 (F6174) (AMNH). **Huánuco:** Pachitea-Münd., 150m, 1♀, 24.xi.1903 (SMTD). **Madre de Dios:** 1 specimen (sex unknown due to Psocoptera damage), iii.1903, O. Garlepp (SMTD); Avispas, 400m, 1♂1♀, 20-30.ix.1962, 1♀, 1-15.x.1962, all L. Pena (all CNCI);

Manu, Rio Manu, Pakitza, 250m, 12°7'S, 70°58'W, 3♂3♀, 9-23.ix.1988, A. Freidberg (USNM). **Cuzco:** Quincemil, 1♂2♀, 13-31.viii.1962, L. Pena (CNCI); Madre de Dios, **BOLIVIA: Beni:** Rurrenabaque, Rio Beni, 1♀, x, W.M. Mann, Mulford Biological Exploration 1921-1922 (USNM); Palos Blancos, Alto Beni, 600m 1♂1♀, 11-15.i.1976, L.E. Pena (CNCI); Las Juntas, 1♀, x.1913, Steinbach (CMNH). **La Paz:** Heath River Wildlife Centre, ~21km SSW Puerto Heath, 12°40'S, 68°42'W, 2♂, 29.iv-12.v.2007, S.M. Paiero (DEBU).

***Curtonotum magnum* Malloch**

Figure 18

Curtonotum magnum Malloch 1930: 326

Diagnosis

The only Neotropical *Curtonotum* species with the following combination of characters: dark brown to black palpi and prementum, dark brown face (sides paler), dark brown frons with pale medial vitta, and eye height to gena height ratio less than 7.

Description

Length: 6.8 - 9.6 mm.

Head

Frons dark orange-brown with paler, diffuse medial vitta and lateral margins and subtle purple to green iridescence (this more pronounced ventrolaterally, visible only from oblique angle), scattered pale setulae, heavy bulge at antennal base, width 1.3 to 1.4 times length, parallel sided, lateral margin narrowly silver pruinose. Ocellar triangle and narrow lateral strip pruinose, pruinosity extending anterior to anterior ocellus in some specimens,

in such cases its margin rounded, narrow pruinose strip extending from median occipital sclerite, nearly reaching ventral margin of frons (rather diffuse anterior of proclinate bristle). Proclinate bristle at *ca.* 1/3 to 1/4 sagittal distance between anterior ocellus and ventral margin of frons, anterior and slightly lateral to major reclinate bristle; minor reclinate bristle anterior and slightly medial to major reclinate bristle. Face silver pruinose, ground colour dark brown to black, yellow-brown lateral of frontogenal suture; vibrissa subequal to adjacent subvibrissals, in some specimens the second most dorsal somewhat enlarged. Parafacial and gena very broad, moderately silver pruinose, ground colour medium brown; eye height 4.5 to 6.3 times gena height. Clypeus, palpus and prementum dark brown to black, clypeus silver pruinose, palpus two silver microtrichose, latter bare and shiny. Scape and pedicel moderately silver pruinose with orange-brown ground colour; first flagellomere with dark brown ground colour on apical *ca.* 3/4 to 2/3 (some specimens this entirely dark), otherwise orange-brown, densely silver microtrichose.

Thorax

Ground colour dark brown, light brown pruinose on scutum, scutellum medium brown pruinose with narrow light brown medial vitta, grey-brown pruinose on pleura. Scutum moderately arched, each scutal, postpronotal, scutellar and anepisternal seta and setula with dark spot around socket. Scutum with two pairs of narrow vittae, medial pair running entire length, broadening slightly posteriorly and extending onto scutellum, lateral pair indistinct anterior of transverse suture. Postpronotal lobe with three setae, anterior-most *ca.* 1/2 size of other two; notopleuron setulose; scutellum with two pairs of marginal setae. Anepisternum with four large subequal setae on posterior half, anterior to

these an additional moderately large seta; katapisternum with two prominent lateral setae, anterodorsal seta relatively weak, linear tuft of setulae under fore coxa orange-brown. Area below and behind posterior spiracle bare (without fringe of setulae); meron bare.

Legs

Legs orange-yellow to orange-brown in ground colour, coxae heavily grey pruinose, legs otherwise lightly so. Chaetotaxy black except for very dense, regularly spaced transverse rows of setulae anteroventrally on apical 1/2 of fore tibia and similar setulae on fore first tarsomere, these dark brown. Fore femur with 6-7 posterodorsal setae and 6-8 moderately stout ctenidial setae; mid femur with 5-7 anterior setae; hind femur with one subapical dorsal seta. Mid tibia with two very strong, two moderately strong, and several weaker apical ventral setae, one moderately strong seta between the strong setae, other moderately strong seta posterior to these. Row of short cuneiform setae present on entire anteroventral margin of mid and hind fifth tarsomere.

Wing

Similar to *C. atlanticum* except as follows. Most specimens without pale area in r_1 distal to costal cell. Specimen from Est. Biol. Boraceia with r_1 lightly brown infuscated, otherwise without markings. Several specimens narrowly brown infusate in membrane around M_1 and CuA_1 .

Abdomen

Ground colour dark brown, grey pruinose except where noted. Tergite 2 brown pruinose dorsally on posterior *ca.* 1/4, this tapering to posterior margin medially. Tergites 3-5 with narrow brown pruinose medial vitta, brown pruinose dorsal band on posterior *ca.* 1/4 of tergites 3 and 4 and posterior *ca.* 1/5 of tergite 5. Series from Ouro Preto with with

narrow lateral brown pruinose vitta on tergites 3, 4, and 5 (one female specimen with lateral vitta on tergite 3 and 4 only) and slightly broader posterior bands.

Male terminalia

Sternite 5 well-sclerotized apically, apical margin truncate; tergite 6 moderately well-sclerotized, desclerotized medially, tergite 7 relatively wide, dorsal length *ca.* 0.7 epandrial dorsal length; sternites 6 and 7 separated into right and left portions, sternite 6 broad and well-sclerotized, left portion more heavily sclerotized proximally; right portion of sternite 7 a narrow band; length *ca.* 1/5 length of right portion of sternite 6. Epandrium relatively small, with pair of long, bare (free of setulae and microtrichia) posteroventral extensions (these connected dorsally by weakly sclerotized membrane), epandrium otherwise setulose, with scattered more elongate setulae (these longest posteroventrally); surstylus elongate, articulating laterally and fused medially with epandrial extension, lateral and distal margin rounded, medial margin concave, setulose dorsally and marginally, area adjacent to postgonite concave. Hypandrium with narrow based, apically narrowing, posteriorly bent dorsobasal lobe, posterior bridge produced ventrally and posteriorly, arm bent *ca.* 90° at junction with epandrium, ventrally bowed proximal of bend, relatively straight posterior to bend, with 3 lateroventrally oriented setulae posterior on apical half, apically separate from opposite hypandrial arm; postgonite with broadly rounded lateral margin, medially margin with acute, recurved apical point, ventromedial surface with leaf-like, ventromedially oriented, rounded lobe, this lobe overlapping with lobe of opposite postgonite. Phallapodeme with relatively large, anteriorly bulging “fan”, margin opposite fan concave; basiphallus very elongate, weakly sclerotized basally; distiphallus base elongate, apex bilobed, left lobe slightly longer, at 45° angle from to

perpendicular to plane of phallus, ventrally well-sclerotized nearly to apex, lateral margin well-sclerotized to sharply pointed well-sclerotized recurved process, apex narrowing, with coarse scaled texture dorsally; right lobe in same plane as phallus, well-sclerotized medially nearly to apex, rounded apically, dorsally with fine elongate spinules, ventral surface with fine scaled texture apically. Ejaculatory apodeme outside of basiphallus, broadening and with small pores basally.

Female terminalia

Ovipositor slender (as in Figure 35h). Sternite 5 length 1.8 to 1.9 times width, sternite 6 length 1.1 to 1.2 times width. Tergite 7 well-sclerotized medially. Tergite 8 weakly sclerotized proximally, sternite 8 moderately so. Sternite 8 with convex surface, without heavily sclerotized tip, without microtrichia in very narrow band along posterior margin. Sternite 10 heavily sclerotized and with antrorse spinules medially, area of sclerotization flaring proximally, proximal margin with slight dorsal bend, profile narrow on posterior half, broader on anterior half. Spermatheca elongate, broadest at midpoint, base rounded, apex pointed, surface densely covered in coarse papillae, with a somewhat swept orientation. Ventral receptacle straight, 3x longer than wide, with basal sclerotized ring occupying basal 1/3, apical 1/3 bulbous. Duct with fine longitudinal wrinkles.

Type Material

HOLOTYPE: BRAZIL. Rio de Janeiro: Alto Itatiaia, Serra do Itatiaia, 7150', 1♀, E.G. Holt Collector (Type No 43443, USNM).

Other Material Examined

BRAZIL. Rio de Janeiro: Alto Itatiaia, 2000m, 1♂, iii.1941, R.C. Shannon & L. Gomes (USNM); Nova Friburgo, Muri Pico São João, 1♀, 10.iii.1990, S.A. Marshall (DEBU).

Mato Grosso: Itatiaia, 1800m, 1♀, 25-27.iv.1996, faeces-trap, Pont (NMWC); Ouro Preto, 2♂3♀, 12-13.iv.1968, F.C. Val (MZSP); ~100 km SW Barbacena, Instituto Estadua de Florestas, Parque Florestal do Ibitipoca, 1♂1♀, 12.ii.1990, Marshall and Costa (DEBU). **São Paulo:** Campos do Jordão, 1♂, xii.1935, F. Lane, 1♀, 3.i.1936, F. Lane, 1♂, 6.i.1936, F. Lane, 1♂2♀, 22.i.1936, F. Lane, 1♂, i.1948, F. Lane, 1♂1♀, 1952, M.A.V. d'Andretta Janeiro, 1♀, iii.1952, H. Brandão (all MZSP); Estación Biologica Boraceia, 1♀, 6.xii.1967, Travassos F. and Kuhlmann (MZSP).

***Curtonotum adusticrus* Klymko and Marshall, sp. nov.**

Figure 19

Etymology

From Latin, *adustus*, meaning swarthy, and *crus*, meaning leg, referring to the dark legs of this species.

Diagnosis

Distinguished from all congeners by the combination of a wing with extensive dark infuscation in r_1 and r_{2+3} and around dm-cu, a dark brown palpus and face, a moderately tall gena (eye height to gena height ration is 9.0 to 10.6) that is distinctly taller posteriorly, a very strong vibrissa, and dark brown legs.

Description

Length 6.0 to 8.0 mm

Head

Frons dark brown with pale brown-yellow medial vitta and faint blue-green iridescence (visible only from oblique angle), with scattered dark setulae, slight bulge ventrally,

width 1.3 to 1.4 times height, slightly narrower ventrally, lateral margin silver pruinose. Ocellar triangle and narrow lateral strip gold pruinose, pruinosity of ocellar triangle not extending anterior of anterior ocellus, lateral pruinose strip extending from median occipital sclerite to slightly posterior of midpoint between proclinate bristle and anterior margin of frons. Proclinate bristle *ca.* $1/3$ to $2/5$ sagittal distance between anterior ocellus to ventral margin of frons, anterior to major reclinate bristle; minor reclinate bristle anterior and medial to major reclinate bristle. Face with dark brown ground colour, yellow-brown lateral of frontogenal suture, frontal carina bare and shiny; vibrissa *ca.* two (Sao Paulo specimen) to several (Rio de Janeiro specimen) times longer than adjacent subvibrissals. Parafacial and gena relatively narrow, former with brown-yellow ground colour and dense silver pruinosity, latter with darker ground colour and sparser pruinosity, eye height 9.0 to 10.6 times gena height, gena taller posteriorly. Clypeus, prementum, and palpus dark brown in ground colour, clypeus silver pruinose, palpus brown microtrichose, prementum sparsely silver pruinose laterally, otherwise bare and shiny. Scape and pedicel silver pruinose with orange-brown ground colour, first flagellomere silver microtrichose, ground colour orange-brown on proximal *ca.* $1/5$, otherwise dark brown.

Thorax

Light brown pruinose dorsally (except dark brown pruinose scutellum), purple-grey pruinose laterally. Scutum moderately arched, each scutal, postpronotal, and anepisternal seta and setula with dark brown spot around socket. Scutum with two pairs of brown vittae, medial pair narrow, visible on entire length, lateral pair wider, evident from midpoint of presutural area to posterior margin. Postpronotal lobe with four setae, these

progressively longer posteriorly; notopleuron without setulae; scutellum with two pairs of marginal setae. Anepisternum with 2 strong and 3 moderate setae (in Rio de Janeiro specimen 4 dorsal most setae subequal in size); katepisternum with one prominent lateral seta; linear tuft of setulae under fore coxa medium brown. Area below and behind posterior spiracle bare (without fringe of setulae); meron bare.

Legs

Coxae densely purple-grey pruinose, legs otherwise lightly so. Chaetotaxy black except for very dense, regularly spaced transverse rows of setulae anteroventrally on apical 1/2 of fore tibia and similar setulae on fore first tarsomere, these dark brown. Ground colour of first and second tarsomeres pale yellow with dark brown apices, leg ground colour otherwise dark brown. Fore femur with 5-7 posterodorsal setae, 6-7 ctenidial setae, these relatively short and stout; mid femur with 6-8 anterior setae; hind femur with single subapical dorsal seta (Rio de Janeiro specimen with two on right). Mid tibia with two strong, two moderate and several weak apical ventral setae, first moderate seta between the strong setae, second posterior to them. Row of cuneiform setae present on entire anteroventral margin of mid and hind fifth tarsomeres.

Wing

As in *C. papillatum* except as follows. Alula relatively narrow. Costal cell dark brown, r_1 without area of light infuscation distal to costal, membrane around M_1 and CuA_1 narrowly medium brown infusate.

Abdomen

Ground colour dark brown. Tergite 1 lightly grey pruinose, visible only from oblique view. Tergite 2 dark brown pruinose on distal *ca.* 1/4, otherwise grey pruinose. Tergite 3

and 4 with pair of oblong, transversely oriented, widely separated, grey pruinose maculae on proximal half, otherwise dark brown pruinose. Tergite 5 similar to tergite 3 and 4, but maculae much larger, their medial margins closer together, lateral margins extending nearly to margins, and posterior margin at *ca.* 4/5 distance from anterior margin to posterior margin.

Male terminalia

Sternite 5 truncate posteriorly, well-sclerotized along posterior margin; tergite 6 poorly sclerotized, desclerotized medially; tergite 7 relatively long, dorsal length *ca.* 0.6 times epandrial dorsal length; sternite 6 and 7 separated into right and left portions, sternite 6 broad, well-sclerotized, left portion more heavily sclerotized along proximal margin; right portion of sternite 7 short, *ca.* 1/2 as long as right portion of sternite 6. Epandrium relatively small, with moderate posterolateral lobe, scattered setulae including several scattered greatly enlarged setae, well-sclerotized connection ventral of cerci; surstylus laterally articulating and medially fused with epandrium, posteriorly bending medially around postgonite, minutely setulose on medial face and proximally on medial margin, in lateral profile posteroventral margin nearly flat, posterior most extreme tightly rounded, in posterior profile venterolateral margin tightly rounded, ventral margin flat, medial margin concave. Cercus short to slightly elongate, posterior margin straight, sloping, ventral margin concave, longest setulae much shorter than longest epandrial setulae. Hypandrium with broad-based rounded-truncate dorsobasal lobe, posterior bridge ventrally and anteriorly produced, hypandrial arm relatively straight, with 3-4 ventrally and ventromedially oriented setulae proximal to postgonite, not fused to opposite hypandrial arm apically (no connection discernable in intact hypandrium-epandrium

complex); postgonite minutely setulose dorsally, with broadly rounded medially oriented lobe on medial margin nearly reaching to slightly overlapping with similar lobe of opposite postgonite, and smaller, more acute, dorsally setulose, upturned, apical process. Phallapodeme with relatively large, anteriorly bulging "fan", margin opposite fan convex basally, concave distally; basiphallus elongate, weakly sclerotized basally, slightly expanded apically; distiphallus base moderately elongate, bowed slightly to left, contracted apically, apex bilobed, left lobe longer, at *ca.* 45° angle from axis of phallus, heavily sclerotized ventrally on lateral half and along lateral margin on basal *ca.* 2/3s, sclerotized area on lateral margin with incurving tooth distolaterally, otherwise membranous, ventral surface slightly pebbled, dorsal margin with fine spinules distally (these occurring to base in specimen from Cantareira Chapadão, Brazil), apex broad, rounded, right lobe well-sclerotized ventrally on medial half and along medial margin to apex, otherwise membranous, ventral surface smooth, dorsally with fine spinules basally (these occurring to apex in specimen from Cantareira Chapadão, Brazil), tapering apically. Ejaculatory apodeme outside of basiphallus, elongate, pointed apically, with small pores medially, expanded basally.

Female terminalia

Unknown.

Type Material

HOLOTYPE: BRAZIL. Rio de Janeiro: Itatiaia, 1200 m, 1♂, ii.1941 (USNM).

PARATYPE: BRAZIL. São Paulo: Serra da Cantareira, Chapadão, 1♂, 4.1946, Barreto (MZSP).

The *Curtonotum murinum* species complex

Figures 10 and 20

Diagnosis

Species in the *Curtonotum murinum* species complex can be distinguished from all congeners by their lobed lower calypter. They are also the only Neotropical species that are beige in ground colour with white grey pruinosity.

Comments

The lobed lower calypter distinguishing species in this group is an unequivocal synapomorphy, making the group a well defined clade. The species group includes four described species (*Curtonotum murinum* Hendel, *C. coriaceum* Hendel, *C. impunctatum* Hendel, 1932 *nec impunctatum* Hendel, 1913 and *C. decumanum* Bezzi), and at least 9 undescribed species ranging from southern Arizona to northern Argentina. Five of the six *Heleomyza gibba* Fabricius cotypes also belong to a species in this species group (refer to the discussion under *Curtonotum taeniatum* for more information on *Heleomyza gibba*). Most species in this group are superficially similar and the examination of male terminalia is required for species identification.

In addition to the lobed lower calypter, several other characters are useful for identification of this group. All species have three pairs of marginal scutellar setae (as in Figure 21a) and female cerci and tergite 10 fused and with stout short setae (Figure 20b), two characters otherwise only known in *C. apicale* (in this species the cerci have distinctly flattened marginal setae on the cerci) (Figure 21e). In addition, all but two Central American species in the group have a distinct posteroventral patch of short stout

setae on male sternite 5 (Figure 20c), a character not seen elsewhere in New World

Curtonotum.

Species in this complex range from Arizona to northern Argentina.

***Curtonotum apicale* Hendel**

Figures 21 and 36g

Curtonotum apicale Hendel, 1913: 621

Diagnosis

Curtonotum apicale is unique in several characters. It is the only *Curtonotum* species outside of the *C. murinum species complex* that has three pairs of marginal setae on the scutellum; the only *Curtonotum* species outside of the *C. murinum species complex* that has female cerci fused and with stout setae; and the only species outside the *C. vulpinum* species group besides *C. trypetipenne* that has a distinct pale “window” at the apex of r_{3+4} .

Description

Length: 5.0-6.3mm

Head

Frons yellow-brown, darker laterally, slightly narrower ventrally, width 1.4 to 1.5 times height, with scattered pale setulae and moderate bulge ventrally. Ocellar triangle and narrow strip on either side of frons dull grey pruinose, lateral margins narrowly shiny silver pruinose, pruinosity on ocellar triangle not extending anterior of anterior ocellus, narrow pruinose strip extending from median occipital sclerite to half way between insertion of proclinate bristle and ventral margin of frons. Proclinate bristle at midpoint of

sagittal distance between anterior ocellus and ventral margin of frons, lateral to major reclinate bristle; minor reclinate bristle anterior to and slightly medial of major reclinate (in some specimens minor reclinate bristle almost directly medial of proclinate bristle). Face shiny silver pruinose, ground colour dark brown; vibrissa slightly larger than adjacent subvibrissals. Parafacial silver pruinose with light brown ground colour, moderately broad; gena light brown with dark patch directly below eye, only lightly pruinose, eye height 7.8 – 8.8 times gena height. Clypeus silver pruinose, ground colour dark brown; palpus and prementum very dark brown, former with silver microtrichia, latter lightly silver pruinose. Antennae with yellow-brown ground colour, scape and pedicel lightly silver pruinose, first flagellomere with silver microtrichia, darker in ground colour on apical 2/3.

Thorax

Silver pruinose with dark brown ground colour throughout, paler around postpronotal lobe, anterior spiracle, base of wings and margin of scutellum. Scutum strongly arched, each scutal, postpronotal, scutellar and anepisternal seta and setula with dark spot around socket. Scutum with four very subtle parallel dark vittae (best seen without magnification). Postpronotal lobe with 3-5 prominent setae (most specimens with 3, anterior-most smallest, middle *ca.* twice as long, posterior *ca.* 3-4 times as long); notopleuron setulose; scutellum with three pairs of marginal setae, the second pair from the median relatively weak. Anepisternum with three setae on posterior half; katepisternum with two setae, anterolateral seta weak; linear tuft of setulae under fore coxa straw coloured. Fringe of dark setulae present around ventral margin of posterior spiracle; meron bare.

Legs

Coxae densely silver pruinose, legs otherwise lightly so. Chaetotaxy black except for very dense, regularly spaced transverse rows of setulae anteroventrally on apical 1/3 of fore tibia and similar setulae on fore first tarsomere, these dark brown. Coxae dark brown in ground colour. Fore femur dark brown in ground colour, with 4-5 posterodorsal setae and 6-7 relatively slender and elongate ctendial setae; mid femur medium to dark brown in ground colour, with 4-6 anterior setae; hind femur dark brown on apical 1/4 to 1/3, otherwise yellow-brown in ground colour, with single subapical dorsal seta. Fore tibia brown-yellow in ground colour; mid tibia brown-yellow in ground colour, darker on apical *ca.* 1/5, with 2 strong and 1 intermediate, and several small ventral apical setae, the intermediate seta between the two strong setae; hind tibia brown-yellow, darker on apical *ca.* 0.15. Tarsi yellow-brown, anteroventral margins of mid and hind fifth tarsomere without short cuneiform setae.

Wing

Alula relatively broad. Non-infuscated areas of wing clear, thus strongly contrasting with infuscated areas. Costal cell and portions of r_1 and r_{2+3} below costal cell dark brown infuscated; r_1 and anterior half of r_{2+3} dark brown infuscated from just proximal of midpoint between crossveins r-m and dm-cu to distal edge. R_{2+3} , R_{4+5} medium-brown infuscated distally, infuscation extending proximally along M_1 to proximal of dm-cu, R_{4+5} with distinct clear patch at apex. Broadly dark grey-brown infuscated around crossvein dm-cu; m_1 otherwise light brown infuscated along margin and broad apical area, dm otherwise medium brown infuscated along CuA_1 in apical half.

Abdomen

Ground colour dark brown, silver pruinose except where noted. Tergite 1 dull grey pruinose; tergite 2 dull grey pruinose medially, tergites 3 through 5 with dark brown medial vitta. Tergites 2 through 5 dark brown pruinose on distal half (on tergite 2 this lateral to the grey pruinose medial vitta), dark brown area tapering to posterior margin on lateral face of each tergite. Tergites 1 through 5 with pruinosity darker toward lateral margin (visible only ventrally).

Male terminalia

Sternite 5 well-sclerotized, truncate posteriorly; tergite 6 moderately sclerotized, tergite 7 well-sclerotized, dorsal length *ca.* 0.8 times epandrial dorsal length; sternites 6 and 7 well-sclerotized, separated into right and left portions; sternite 6 broad, right portion with large acutely pointed knob on right, left portion more heavily sclerotized proximally; sternite 7 relatively long, slightly shorter than right portion of sternite 6. Epandrium relatively large, with scattered setulae (in no area these particularly long; surstylus fused to epandrium, broadly rounded with slightly pointed apex in lateral profile, with rounded concavity in posterior margin and ventral surface just lateral of postgonite, minutely setulose ventral and dorsally. Cercus squat, slightly pointed posteriorly on ventral half, longest cercal setulae longer than longest epandrial setulae. Hypandrium with narrow based, antrorse dorsobasal lobe, posterior bridge produced ventrally and anteriorly, epandrial arm narrowing distally, bowed dorsally, broadly fused distally with opposite hypandrial arm, without setulae; postgonite elongate, minutely setulose and with slight dorsal bend apically. Phallapodeme with relatively narrow, elongate, anteriorly bulging “fan”, margin opposite fan convex with subacute point; basiphallus weakly sclerotized

basally, relatively stout; distiphallus relatively large, base elongate, expanded distally in lateral profile, bowed to left, apex bilobed, left lobe longer, nearly perpendicular to axis of phallus, extending dorsally, well-sclerotized ventrally on proximal half, otherwise membranous, apex with three acute fingerlike projections, ventral-most smallest projection with minute antrorse, broad-based stout spinules, middle projection of intermediate length, with similar spinules, dorsal-most projection longest, smooth, right lobe heavily sclerotized ventrally on proximal half and on left margin, otherwise membranous, left margin with two acute teeth, apically rounded. Ejaculatory apodeme just outside of basiphallus, elongate, with small pores medially, broadening slightly basally.

Female terminalia

Sternite 5 length 0.9 times width, sternite 6 length 0.5 times length. Ovipositor relatively stout. Tergite 6 desclerotized medially; tergite 7 well-sclerotized medially. Tergite 8 and sternite 8 weakly sclerotized proximally, though proximal edge of tergite 8 discernable. Sternite 8 truncate posteriorly, without apical area of heavy sclerotization. Sternite 10 with narrow, spinule-free, dorsoventrally flattened apodeme extending well into space between and sternite 8. Tergite 10 and cerci fused, with short stout setae medially and flattened plate-like setae laterally, these largest at apex. Spermatheca elongate, base rounded with irregular bumps, apex with large bumps, surface with coarse wrinkles. Ventral receptacle with basal half heavily sclerotized, distal half less heavily sclerotized, neck conical, apex bent, bulbous, duct with very fine transverse ridges.

Type Material

Hendel's (1913) type series included 8 specimens from Peru. Four cotypes (2♂1♀, 1 sex unknown [abdomen missing]) from this type series have been examined. The male is labeled as *typus* by Hendel, and is designated the lectotype, while the others were labeled *cotypus* by Hendel, and are designated as paralectotypes. A lectotype has been designated to avoid any confusion surrounding the definition of *C. apicale* should the original type series prove to be made of more than one species.

LECTOTYPE: PERU. Junín: Chanchamayo, 1♂, 14.i.1904 (SMTD).

PARALECTOTYPES: PERU. Huánuco: "Pachitea Münd.", 150m, 1♂, 22.xi.1902, 1♀, 20.xi.1903, 1 specimen (sex unknown as abdomen is missing), 26.xi.1903 (SMTD).

Other Material Examined

PERU. Madre de Dios : Manu Nat. Pk., Cocha Cashu Biol. Stat. 380m, 1♂, 31.viii-1.ix.1986, D.C. Darling (ROME); Manu, Rio Manu, 250m, Pakitza, 12°7'S, 70°58'W, 1♂1♀, 9-23.ix.1988, A. Freidberg (USNM). **Huánuco:** Monsoon Valley, Tingo Maria, 1♂, 10.X.1954, E.I. Schlinger & E.S. Ross (CASC). **Ucayali:** Previsto, 850m, 1♂, 18.vii.1965, J. Schunke (BMNH). **ECUADOR: Napo:** Misahuali, 1♂, 28.xi.1976, P.M. Turner (USNM).

***Curtonotum trypetipenne* Hendel**

Figures 22 and 36h

Curtonotum trypetipenne Hendel 1913: 620

Diagnosis

Distinguished from congeners by its extensively infuscated wing with scattered transparent maculae; it is also the only species where female cerci are fused but without stout setae.

Description

Length: 3.8-5.8 mm

Head

Frons dark brown with narrow medial yellow-brown vitta and green iridescence (iridescence visible only from oblique angle); with scattered dark setulae, slight bulge ventrally, width 1.3 to 1.5 times height, slightly narrower ventrally, lateral margin silver pruinose. Ocellar triangle and narrow lateral strip dull grey pruinose, pruinosity of ocellar triangle not extending anterior of anterior ocellus, lateral pruinose strip extending from median occipital sclerite to slightly anterior of proclinate bristle to *ca.* midpoint between anterior proclinate bristle and ventral margin of frons. Proclinate bristle at or slightly posterior to midpoint of sagittal distance from anterior ocellus to ventral margin of frons, anterior to and medial of major reclinate bristle, minor reclinate bristle anterior to and medial of major reclinate bristle. Face silver pruinose with dark brown ground colour, flat in lateral profile; vibrissa *ca.* twice as long as adjacent subvibrissals. Parafacial and gena narrow, silver pruinose, dark brown in ground colour, eye height 15.7 to 19.0 times gena height. Clypeus, palpus and prementum with dark brown ground colour, former two

densely silver pruinose and microtrichose, respectively, latter lightly silver pruinose.

Scape and pedicel with orange-brown ground colour and silver pruinosity, first

flagellomere densely silver microtrichose, with orange-brown ground colour of proximal *ca.* 1/2, otherwise dark brown.

Thorax

Silver pruinose with dark brown ground colour throughout (except scutellum, where pruinosity is brown). Scutum strongly arched, each scutal, postpronotal, and anepisternal seta and setula with dark brown spot around socket, these largely confluent on scutum, especially posteriorly. Scutum with pair of narrow vittae over entire length, these indistinct in most specimens. Postpronotal lobe with three setae, center seta *ca.* 0.75 times length of posterior most seta, anterior seta much smaller, sometimes greatly reduced; notopleuron setulose; scutellum with two pairs of marginal setae. Anepisternum with three strong (and often one moderate) setae on posterior half; katepisternum with 2 prominent lateral setae, anterodorsal seta smaller than posteroventral seta; linear tuft of setulae under fore coxa dark brown. Fringe of black setulae present ventral and posterior of posterior spiracle; meron bare.

Legs

Coxae dense silver pruinose, legs otherwise lightly so. Chaetotaxy black except for very dense, regularly spaced transverse rows of setulae anteroventrally on apical 1/2 of fore tibia and similar setulae on fore first tarsomere, these dark brown. Coxae with dark brown ground colour. Fore femur with dark brown ground colour, 4-6 posterodorsal setae, ctenidial setae 6-8, of equal length and only slightly thicker than adjacent setulae; mid femur with dark brown ground colour, with 4-6 anterior setae; hind femur ground colour

dark brown on apical 2/5, otherwise yellow-white, with single subapical dorsal seta.

Tibiae with yellow-white ground colour, slightly darker on proximal and distal 1/3s, mid tibia with 2 strong, one moderate and several weak ventral apical setae, the moderate seta between the strong setae. Mid and hind fifth tarsomeres without short cuneiform setae on anteroventral margin.

Wing

Alula relatively narrow. Dark brown infuscate, infuscation paler on posterior half, with scattered transparent maculae.

Abdomen

Ground colour dark brown. Tergite 1 lightly silver pruinose laterally, otherwise lightly brown pruinose. Tergites 2-4 lightly brown pruinose on wide medial vitta and posterior *ca.* 1/3, otherwise lightly silver pruinose; tergite 5 similar, but brown pruinose on posterior *ca.* 1/4.

Male terminalia

Sternite 5 truncate posteriorly, with slight desclerotization along hind margin; tergite 6 moderately sclerotized, desclerotized medially; tergite 7 well-sclerotized, relatively narrow, dorsal length slightly greater than 0.1 times dorsal length of epandrium; sternites 6 and 7 well-sclerotized, separated into right and left portions; sternite 6 broad, right portion with large bulge on right, left portion more heavily sclerotized proximally; sternite 7 relatively long, slightly shorter than right portion of sternite 6. Epandrium relatively large, with scattered setulae (in no areas these particularly long); surstylus large, articulating laterally with and fused medially to epandrium, broadly rounded in lateral and posterior profile, with rounded concavity ventral surface adjacent to

postgonite, setulose ventral and dorsally. Cercus stout, ventral margin flat, posterior margin broadly rounded, longest cercal setulae equal to or slightly longer than longest epandrial setulae. Hypandrium with narrow based, slightly antrorse dorsobasal lobe, posterior bridge produced ventrally and posteriorly, hypandrial arm relatively straight, without setulae, free distally; postgonite minutely setulose dorsally, with slight dorsal bend apically. Phallapodeme with relatively narrowly, elongate, anteriorly bulging “fan”, margin opposite fan convex with subacute point; basiphallus weakly sclerotized basally, relatively stout; distiphallus relatively large, base elongate, bowed to left, apex bilobed, right lobe heavily sclerotized on ventral margin on proximal half, otherwise membranous, apex with 2 acute fingerlike projections on left, these with antrorse, short stout spinules, with one long fingerlike and one broader projection on right, these smooth, right lobe moderately sclerotized and with honeycomb texture ventrally, basally and on left margin near base more heavily sclerotized, left margin with heavily sclerotized acute tooth and moderately sclerotized rounded projection (the former more proximal), otherwise membranous, dorsally and marginally with variable amounts of fine spinules, distal margin broadly rounded. Ejaculatory apodeme just outside of basiphallus, elongate, with small pores medially, broadening basally.

Female terminalia

Sternite 5 length 1.0 times width. Sternite 6 length 0.5 to 0.6 times width. Ovipositor relatively stout (as in Figure 14e). Tergite 6 weakly sclerotized medially, particularly on proximal half. Tergite 7 sclerotized throughout. Tergite 8 and sternite 8, though proximal edge of Tergite 8 discernable. Sternite 8 truncate posteriorly, without apical area of heavy sclerotization. Sternite 10 with narrow, spinule free, dorsoventrally flattened apodeme

extending well into space between tergite 8 and sternite 8. Tergite 10 and cerci fused. Spermatheca elongate, base rounded with irregular protuberances, apex with large protuberances, surface with coarse wrinkles. Ventral receptacle with basal half heavily sclerotized, distal half less heavily sclerotized, neck conical, apex bent, saucer-shaped, apical surface concave with convex projection centrally, duct with fine transverse wrinkles.

Type Material

Hendel's (1913) type series included 10 specimens from Peru. Six cotypes (1♂5♀) from this type series have been examined. A female specimen was labeled *typus* by Hendel, and is designated the lectotype, while the others were labeled *cotypus* by Hendel, and are designated the paralectotypes. A lectotype has been designated to avoid any confusion surrounding the definition of *C. trypetipenne* should the original type series prove to be made of more than one species.

LECTOTYPE: PERU. Ucayali: "Ucayalifl" [Ucayali River], Unini, 1♀, 21.x.1903 (SMTD).

PARALECTOTYPES: PERU. Ucayali: Meshagua [Mishagua], Urubambafl [Urubamba River], 1♀, 26.ix.1903, 1♂, 27.ix.1903 (SMTD). **Pasco:** Pichis, Puerto Bermudes, 1♀, 10.xii.1903, 1♀, 15.xii.1903 (SMTD). **Cusco:** Umahuankilia, Urubambafl [Urubamba River], 1♀, 19.ix.1903 (SMTD).

Other Material Examined

ECUADOR. Napo: Misahuali, nr. Tena, 3♂5♀ (plus one sex unknown), 6-19.x.2001, C. Brammer (UTAH); same information except Mal. tr., 3♀ (UTAH); Tipulini Biodiversity

Station, 216m, 00°37'55"S 076°08'39"W, insecticidal fogging of mostly bare green leaves, some with covering of lichenous or bryophytic plants, 8.ii.1999, T.L. Irwin *et al.* 1♀, Lot 2027, Transect #3, 1♂, Lot 2031, Transect #4 (USNM); Jatun Sacha Res., 6km E Misahualli, 450m, 1°4'S 77°37'W, 1♂, varzea, 30.iv-8.v.2002, S.A. Marshall, 1♀, 2.v.2002, M. Buck, 1♂1♀, 3.v.2002, M. Buck, 1♀, 5.v.2002, O. Lonsdale, 1♂, 6.v.2002, O. Lonsdale (DEBU); Limoncocha, 0°24'S 76°40'W, 250m, 2♀, 9-16.iii.1976, G.E. Shewell (CNCI); Puerto Misahualli, 350m, 1♀, ii.1983, M.J. Sharkey (DEBU); Tena, 1♂, ii.1983, M.J. Sharkey (DEBU); Huahua Sumaco, km 44 on Hollin-Loreto rd., Mal. tr., 1♂2♀, 14.xii.1989, 3♂2♀, 15.xii.1989, 1♀, 16.xii.1989, 3♂1♀, 17.xii.1989, 4♂2♀, 20.xii.1989, 1♂6♀, 21.xii.1989, 1♀, 22.xii.1989, 1♂, 23.xii.1989, M.&J. Wasbauer, H. Real (CSCA); Coca, Napo R., 250m, 3♂2♀, v.1965, L. Pena (CNCI). **Orellana:** Rio Tiputini, 0°38.2'S 76°8.9'W, 7♂6♀, 12-26.viii.1999, W.N. Mathis, A. Baptista, M. Kotrba (USNM); Reserva Etnica Waorani, 1km S. Onkone Gare Camp, Transect Ent., Fogging in terra firme forest, T.L. Irwin *et al.*, 1♂, 216.3m, 00°39'25.7"S 76°27'10.8", Trans. 4, Sta. 4, Lot #1434, 5.ii.1996, 1♀, 216.3m, 00°39'25.7"S 76°27'10.8", Trans. 5, Sta. 1, Lot #1441, 7.ii.1996, 1♀, 220m, 00°39'26"S 76°27'11"W, Trans. 7, Sta. 9, Lot #1469, 8.ii.1996, 1♀, 216.3m, 00°39'25.7"S 76°27'10.8", Trans. 4, Sta. 10, Lot #1560, 21.vi.1996, 1♂, 220m, 00°39'26"S 76°27'11"W, Trans. 9, Sta. 7, Lot #1607, 23.vi.1996, 1♂, 220m, 00°39'26"S 76°27'11"W, Trans. 4, Sta. 5, Lot #1555, 21.vii.1996 (USNM); same data except hand collected, 1♂, 220m, 00°39'26"S 76°27'11"W, Trans. 10, Lot #1514, 13.ii.1996 (USNM); nr Yasuni National Park, Tiputini Biodiversity Station, 1♂1♀, 220-250m, 00°37'55"S 76°08'39'W, Trans. 6, Sta. 9, Lot # 2058, 7.ii.1999, 1♀, 220-250m, 00°37'55"S 76°08'39"W, Trans. 2, Sta. 1, Lot # 2010, 9.ii.1999 (USNM),

Zamora-Chinchipe: Yanzaza, 1♂3♀, 18.vi.1976, A. Langley *et al.*, Ecuador-Peace Corps-Smithsonian Institution Aquatic Insect Survey (USNM); Jumboe R., 1200m, 2♂1♀, 1-2.iv.1965, L. Pena (CNCI). **Pastaza:** Pompeya, Napo R., 2♂1♀, 14-22.v.1965, L. Pena (CNCI). **PERU. Madre de Dios:** Madre de Dios, Manu, Rio Manu, 250m, Pakitza, 12°7'S, 70°58'W, 1♂1♀, 9-23.ix.1988, A. Freidberg (USNM); Rio Tambopata Reserve, 30km SW Puerto Maldonado, 12°12'S 69°16'W, 290m, 1♂, 19.ix-10.x.1984, D.A. Grimaldi (USNM); Avispas, 400m, 1♀, 10-20.ix.1962, 1♂, 1-15.x.1962, L. Pena (CNCI); 1♀, O. Garlepp (SMTD); Avispas, 400m, 1♀, 20-30.ix.1962, 1♂, 1-15.x.1962, L. Pena (CNCI). **Huánuco:** Monsoon Valley, Tingo Maria, E.I. Schlinger & E.S. Ross, 1♀, 18.ix.1954, 1♂1♀, 23.ix.1954, 1♂, 9.x.1954, 2♀, 10.x.1954, 1♂, 19.x.1954, 1♂, 29.xi.1954 (CASC); 24mi. W of Yurac, 1♂, 28.ix.1954 (CASC); Tingo Maria, 1♀, 21.x.1946, 2200ft (AMNH); "Pebas", 1♀ (ZMUC). **BRAZIL. Amazonas:** Benjamin Constant, Rio Javary, 1♂, 25.i-15.ii.1942, Angus Rabaut (USNM). **BOLIVIA. Cochabamba:** Villa Tunari, ex. along trails in tourist park, near 16°58.39'S 65°23.79'W, ~320m, 1♀, 5.ix.2000, S.D. Gaimari (CSCA). **COLOMBIA. La Cuajira:** Conejo, R. San Miguel, 76°53'W, 0°15'N, 1♀, 1-3.vi.1963, L. Pena (CNCI).

***Curtonotum brunneum* Klymko and Marshall, sp. nov.**

Figures 23 and 36i

Etymology

From Latin, *brunneus*, meaning brown, referring to the overall brown color of this species.

Diagnosis

Distinguished from New World congeners by the combination of extensive infuscation in r_1 and r_{2+3} , an abdomen with medium brown ground colour which is adorned with pale tan and dark brown pruinosity, a single lateral katepisternal seta, and a fringe of setulae posterior and ventral to posterior thoracic spiracle.

Description

Length: 7.8 – 11.3 mm

Head

Frons pale brown, with paler medial vitta, moderate bulge ventrally and sparsely scattered pale setulae, width 1.3 to 1.5 times length, parallel sided to slightly wider ventrally, lateral margins narrowly yellow-white pruinose. Ocellar triangle and narrow strip on either side of frons pale yellow pruinose, pruinosity of ocellar triangle extending anterior of anterior ocellus, apex rounded (in some forming an acute point), narrow pruinose strip extending from median occipital sclerite nearly to midpoint between proclinate bristle and ventral margin of frons. Proclinate bristle insertion at 1/3 sagittal distance between anterior ocellus and ventral margin of frons, ventral to and slightly lateral of major reclinate bristle; minor reclinate bristle anterior to and slightly medial of major reclinate bristle. Face yellow-white pruinose, ground colour pale yellow; vibrissa much larger than adjacent subvibrissals. Parafacial yellow-white pruinose with pale yellow ground colour, narrowing slightly ventrally; gena with slightly darker ground colour, only slightly pruinose, eye height 6.3 to 7.0 times gena height. Clypeus with pale yellow ground colour and pruinosity, palpus and prementum with orange-yellow ground colour, former with pale yellow microtrichia, latter lightly pale yellow pruinose. Scape

and pedicel yellow-white pruinose, with pale brown ground colour; first flagellomere silver microtrichose, ground colour pale brown, slightly darker on apical half.

Thorax

Gold-yellow pruinose with pale brown ground colour throughout. Scutum strongly arched, each scutal, postpronotal, scutellar and anepisternal seta and setula with dark spot around socket. Scutum with four narrow dark vittae, medial pair starting *ca.* level of notopleuron, broadening posteriorly, extending onto scutellum, lateral pair starting posterior to transverse suture, broadening posteriorly. Postpronotal lobe with three setae, anterior seta *ca.* 1/2 length of middle seta, middle seta *ca.* 2/3 length of posterior seta, often an additional small seta posterior to posterior seta; notopleuron setulose, scutellum with two pairs of marginal setae. Anepisternum with five large setae on posterior half, second and fourth dorsal longest; katapisternum with one prominent lateral seta; linear tuft of setulae under fore coxa dark brown. Fringe of dark setulae present ventral and posterior to posterior spiracle, meron bare.

Legs

Legs pale yellow in ground colour, coxae heavily yellow-white pruinose, legs otherwise lightly so. Chaetotaxy black except for very dense, regularly spaced transverse rows of setulae anteroventrally on apical 1/2 of fore tibia and similar setulae on fore first tarsomere, the former gold-brown, the latter slightly darker. Fore femur with 4-5 posterodorsal seta, 8-11 relatively short and stout ctenidial setae; mid femur brown on apical *ca.* 1/10, with 8-12 anterior setae; hind femur brown on apical *ca.* 1/9, with one subapical dorsal seta. Mid tibia brown on apical *ca.* 0.15, with three strong ventral apical

setae, a fourth fairly strong apical seta slightly posterior to these. Mid and hind fifth tarsomere without short cuneiform setae on anteroventral margin.

Wing

Alula relatively narrow. Non-infuscated areas of wing with yellow tinge. Costal cell yellow-brown infuscated, r_1 below proximal *ca.* 2/3s of costal cell grey infuscated, r_1 otherwise dark brown infuscated, this much paler and yellower just distal of costal cell; r_{2+3} dark brown infuscated on anterior half on distal *ca.* 3/4s and in broad distal area; r_{4+5} narrowly brown infuscated distally along anterior and posterior margin; membrane around dm-cu narrowly dark brown infuscated.

Abdomen

Ground colour brown, darker apically. Where tergites pale brown pruinose setulae and marginal setae with dark haloes around points of insertion, this particular conspicuous on tergites 3 and 4. Tergite 1 brown from above, with yellow-white pruinosity visible from oblique angle. Tergite 2 dorsally with broad pale tan triangular pruinose patch along anterior margin, visible only from oblique angle in some specimens, the apex nearly reaching posterior margin, laterally pale tan pruinose to lateral margin, otherwise medium to dark brown pruinose (hind margin in some specimens narrowly medium to dark brown to lateral margins). Tergite 3 dorsally with two small pale tan pruinose maculae along anterior margin visible only from an oblique angle, extending *ca.* 1/3 distance to hind margin, laterally pale tan pruinose to lateral margin, posterior margin medium to dark brown pruinose. Tergite 4 similarly patterned, the two pruinose maculae larger, extending to past midpoint, and more heavily pruinose. Tergite 5 with broad dark brown pruinose medial vitta, dark brown pruinose along posterior margin, otherwise tan pruinose.

Male terminalia

Distal margin of sternite 5 truncate, well-sclerotized; tergite 6 weakly sclerotized; tergite 7 relatively long, dorsal length 0.8 times epandrial dorsal length; sternite 6 and 7 moderately sclerotized, bent over but not broken along protandrial ridge, sternite 6 broad more heavily sclerotized proximally on left, right portion of sternite 7 relatively narrow, *ca.* 1/4 length adjacent portion of sternite 6. Epandrium relatively small, setulose, longest of these dorsal, with elongate, bare (free of setulae and microtrichia) posteroventral extensions, these fused to one another below cerci by moderately sclerotized membrane; surstylus medially fused and laterally articulating with epandrium, with scattered minute dorsal and ventral setulae, lateral margin rounded, medial margin with stout, obtuse, subapical projection. Cercus stout, ventral margin flat, posterior margin sloping ventrally, longest cercal setulae shorter than longest epandrial setulae. Hypandrium with low, broad-based, rounded dorsobasal projection, posterior bridge ventrally and posteriorly produced, hypandrial arms, bending *ca.* 45° at junction with epandrium, distally with two medial lobes, proximal lobe retrorse, distal most lobe abutting with opposite epandrial arm, lateral margin strongly contracted distally, 2 or 3 ventrally oriented setulae present on distolateral corner; postgonite with sharply pointed apex, its tip equal with margin of surstyli, scattered minute dorsal setulae, with slight, subapical angular dorsal projection. Phallapodeme with large posteriorly bulging “fan”, margin opposite fan convex basally, concave distally; basiphallus weakly sclerotized basally, extremely elongate; distiphallus base elongate, left margin of base convex, right margin slightly concave, apex with two elongate apical lobes, left lobe longer, membranous dorsally with fine spinules dorsally on right, well-sclerotized ventrally to apex, with short broad-based spinules (appearing

scaled) proximally on right, right lobe membranous dorsally, with fine spinules, well-sclerotized ventrally on proximal *ca.* 2/3s, with coarse pebbled texture. Ejaculatory apodeme outside of basiphallus, elongate, slightly thicker and with small pores basally.

Female terminalia

Sternite 5 length 2.7 to 3.1 times width, sternite 6 length 1.6 to 2.0 times width.

Ovipositor slender (as in Figure 35h). Tergite 6 desclerotized medially on proximal half.

Tergite 7 desclerotized medially. Sternite and tergite 8 weakly sclerotized proximally.

Sternite 8 narrow, apex heavily sclerotized, acuminate, tip rounded to quadrate, flattened in lateral profile. Sternite 10 heavily sclerotized and with antrorse spinules medially, area of sclerotization flaring proximally, proximal margin with slight dorsal bend, profile narrow on posterior half, broader on anterior half. Spermatheca very elongate, base quadrate, surface coarsely and densely papillose. Ventral receptacle with basal 1/3 broad and heavily sclerotized, apical 2/3s bent 90°, less heavily sclerotized, tapering toward bulbous apex. Neck narrow, minutely roughened, inserted centrally into concavity at base of ventral receptacle.

Type Material

HOLOTYPE: BOLIVIA. La Paz: 8 km S Chulumani, Apa Apa, 1950-2100m, 1♂, 24.iii.2001, S.D Gaimari (USNM).

PARATYPES: BOLIVIA. La Paz: 8 km S Chulumani, Apa Apa, 1950-2100m, 16°22'S 67°30.4'W, 10♂2♀, 10.iii.2001, 6♂1♀, 23.iii.2001, 3♂3♀, 24.iii.2001, S.D Gaimari (USNM); Apa Apa, 8km S Chulumani, 1960m, 16°22'S 67°30.4'W, 4♂2♀, 9-10.iii.2001, W.N. Mathis (USNM); Sud Yungas, nr. Chulumani, Apa Apa Res., lower trail, 2° forest, 16°22'22"S 67°30'13"W, 1700-2000m, 2♂, 1-3.iv.2001, A.L. Norrbom (USNM);

Chulumani, Apa Apa Res., 2000m, 16°21'15"S 67°30'21"W, 3♂5♀, 1.iv.2001, S.A.

Marshall (DEBU). **Pando:** Cobija, Reserva San Sebastian Tahuamanu, disturbed

Amazon forest, 11°24'27"S 69°01'04"W, 1♂2♀, 21.xii.2003, ex. carrion baited pitfall

trap, D.J. Mann, A.C. Hamel (OXUM). **PERU. Junin:** Chanchamayo, 1300m, 1♂1♀,

14.v.1948, J.M. Schunke (USNM).

***Curtonotum pantherinum* (Walker)**

Figures 24 and 36j

Heleomyza pantherinum Walker 1849: 1090

Curtonotum salinum Curran 1934: 440

Diagnosis

Distinguished from congeners by the combination of extensively infuscated r_1 and r_{2+3} , margins of crossvein dm-cu, dark brown to black palpi, prementum, and frons (with paler medial vitta), and an eye height to gena height ratio over 16.

Description

Length: 5.6 – 8.3 mm

Head

Frons dark brown, with poorly defined paler medial vitta, green iridescence (visible only from oblique angle), mild to moderate bulge ventrally, 1.4 to 1.5 times as wide as long, slightly narrower ventrally, lateral margins narrowly silver pruinose. Ocellar triangle and narrow strip on either side of frons dull grey pruinose, pruinosity of ocellar triangle extending anterior of anterior ocellus in some specimens, its margin rounded, narrow pruinose strip extending from median occipital sclerite to just past insertion of proclinate

bristle, proclinate bristle at midpoint of sagittal distance between anterior ocellus and ventral margin of frons, anterior and lateral to major reclinate bristle; minor reclinate bristle anterior to and slightly medial of major reclinate bristle. Face shiny silver pruinose, ground colour light to medium yellow-brown; vibrissa much larger than adjacent subvibrissals. Parafacial silver pruinose with light brown ground colour, narrowing ventrally; gena with dark brown ground colour, only lightly pruinose, eye height 18.4 to 20.0 times gena height. Clypeus silver pruinose with medium brown ground colour, palpus and prementum with very dark brown ground colour, palpus brown microtrichose, prementum lightly silver pruinose. Scape and pedicel silver pruinose, with orange-brown ground colour, first flagellomere with orange-brown ground colour on proximal 1/4 to 1/3, otherwise dark brown, silver microtrichose.

Thorax

Silver pruinose with dark purplish brown ground colour throughout, paler around postpronotal lobe, anterior spiracle, base of wings and margin of scutellum. Scutum strongly arched, each scutal, postpronotal, scutellar and anepisternal seta and setula with dark spot around socket, these becoming confluent posteriorly on scutum and scutellum, the degree of this variable between specimens. Scutum with two posteriorly broadening narrow dark vittae, these extending onto scutellum. Postpronotal lobe with three prominent setae, anterior-most shortest, *ca.* 1/2 length of middle seta, posterior-most intermediate, *ca.* 3/4 of middle seta length, occasionally an additional smaller seta present anterior to anterior-most seta; notopleuron setulose; scutellum with two pairs of marginal setae. Anepisternum with three prominent setae and two or three small setae on posterior half; katepisternum with two setae, anterolateral seta weak. Fringe of dark setulae present

ventral and posterior to posterior spiracle, minute setulae present on ventral half of meron.

Legs

Coxae densely white pruinose, legs otherwise lightly so, tan in ground colour except where noted. Fore femur with 4-6 posterodorsal setae, 5-9 short and moderately stout tendential setae; mid femur brownish on apical *ca.* 1/6, with 4-6 anterior setae; hind femur brownish on apical *ca.* 1/6, with 1-2 subapical dorsal setae. Mid tibia with 2 strong, 2 moderate, and several weak apical ventral setae, one moderate between the two strong setae, the other moderate posterior to the two strong setae. Anteroventral margins of mid and hind fifth tarsomeres without short cuneiform setae.

Wing

Alula moderately broad. Costal cell and area of r_1 below costal cell dark brown infuscated; r_1 otherwise dark brown infuscated except for small patch distal of costal cell; r_{2+3} dark brown infuscated on anterior half starting at level of clear patch in r_1 , broadly medium brown infuscated at apical margin. dm-cu with broad grey-brown border, M_1 and CuA_1 with faint brown borders.

Abdomen

Dark brown in ground colour, purple-silver pruinose except where noted. Tergite 2 with large diffuse dark brown pruinose medial vitta, dark area extending laterally along posterior margin. Tergites 3-5 with narrower, better defined dark brown pruinose medial vitta. Tergite 3 dark brown on posterior half of dorsal face, tergites 4 and 5 dark brown on posterior *ca.* 1/3 of dorsal surface, the anterior margins of these brown patches bowing anteriorly on tergites 3 and 4, thus forming broken lateral vitta, these narrowly connected

to anterior margin in some specimens. Brown patches on tergites 3-5 tapering to the hind margin, extending to lateral margins in some specimens (especially on tergites 4 and 5). Small dark brown patch along anterior margin of tergites 3 and 4 opposite the bow in the margin of the posterior brown patches, further adding to appearance of interrupted lateral vitta, in some specimens these not visible (presumably obscured by posterior margin of adjacent tergite).

Male terminalia

Sternite 5 with posterior margin truncate, well-sclerotized. Tergite 6 moderately sclerotized, desclerotized dorsally, tergite 7 well-sclerotized, relatively long, dorsal length *ca.* 0.4 to 0.5 times epandrial dorsal length. Sternite 6 bent over but not broken along protandrial ridge, well-sclerotized and broad, more heavily sclerotized proximally; sternite 7 separated into right and left portions, right portion slightly shorter than adjacent area of sternite 6. Epandrium relatively small, proximal margin slightly invaginate dorsally, setulose, 2-3 distoventral setulae long and thick, with elongate bare (free of setulae and microtrichia) posteroventral extension, these fused to one another by weakly sclerotized membrane; surstylus articulating with epandrium, broadly rounded posteriorly, medial margin concave, area opposite postgonite concave, with scattered minute setulae dorsally and ventrally. Cercus elongate, ventral margin flat, posterodorsal margin rounded, longest cercal setulae shorter than longest epandrial setulae.

Hyandrium with low, rounded, broad-based anterodorsal projection, posterior bridge extending slightly ventrally, hyandrial arm elongate, bending ventrally more than 45° at junction with epandrium, with 2 venterolaterally oriented setulae posterior to bend, distally with two small medial lobes, proximal most lobe retrorse, distal most lobe

abutting with opposite epandrial arm; postgonite with scattered minute dorsal setulae, in lateral profile with low, angular, subapical dorsal projection. Phallapodeme with large “fan”, margin opposite fan straight to convex basally, concave distally; basiphallus weakly sclerotized basally, very elongate; distiphallus base elongate, straight and parallel sided, apex bilobed, left lobe slightly longer, orientation slightly to left of phallic axis, well-sclerotized on medial margin, otherwise membranous, ventrally with finely scaled texture, dorsally smooth, right lobe oriented slightly right of phallic axis, well-sclerotized ventrally nearly to apex, otherwise membranous, with fine scaled texture ventrally on left, otherwise smooth, with fine spinules dorsally apically. Ejaculatory apodeme outside of basiphallus, elongate, slightly thicker and with small pores basally.

Female terminalia

Sternite 5 length 4.0 to 4.2 times width, sternite 6 length 1.7 to 1.8 times width.

Ovipositor slender (as in Figure 35h). Tergite 6 desclerotized medially on proximal *ca.*

1/2. Tergite 7 desclerotized medially. Sternite 8 truncate posteriorly, with slightly

concave surface posteriorly, heavily sclerotized distal *ca.* 1/6, area of sclerotization

sharply demarked and free of microtrichia. Tergite 8 and sternite 8 weakly sclerotized

proximally. Sternite 10 heavily sclerotized and with antrorse spinules medially, area of

sclerotization flaring proximally, proximal margin with slight dorsal bend, profile narrow

on posterior half, broader on anterior half. Spermatheca slender and elongate with apex

acute, minutely papillose. Ventral receptacle with heavily sclerotized flared “collar” at

neck base, neck elongate, more or less parallel sided, bent forward, head bulbous,

minutely roughened, duct finely wrinkled longitudinally.

Comments

The holotype of this species could not be located. It is not at the British Museum of Natural History (Kirk-Spriggs, pers. comm.^{*}), the museum where it was housed when described by Walker (1849), nor at any other major museums where previous curtonotid workers worked (NHMW, HNHM, USNM, AMNH, OXUM).

The identity of Walker's holotype is ambiguous. He described a species that has "head tawny, with two pitchy stripes on the crown from the eyelets to the base of each feeler" (*i.e.* two dark vittae on the frons), "sucker black, clothed with tawny hairs; palpi black, beset with black setae", "disk of face pitchy", "tawny legs", "wings brown, darker on the foreborder from the middle to the tip", and "lower crossvein clouded with brown". *Curtonotum magnum* and *C. adusticrus* have very dark faces, black mouthparts, and wings that could fit Walker's description, however only one, *C. magnum*, has tawny (yellow-brown) legs (the femora and tibiae of *C. adusticrus* are dark brown). The frons of *C. magnum* is orange-brown with paler (though very diffuse) medial vitta and lateral margins, and as such could be interpreted as having "two pitchy stripes", though they are not well defined. A fairly conspicuous character in *C. magnum* that Walker did not mention in his description is the four vittae on the scutum. Walker's specimen was in good condition (the dark haloes around the bases of setulae were visible, these are inconspicuous in greasy specimens), so it seems unlikely that they would be overlooked.

In addition, Walker's holotype was collected in Pará, Brazil. The 21 specimens of *C. magnum* examined from this study were collected at six localities in southeastern Brazil, well away from Para.

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Hendel (1913) redescribed *C. pantherinum* as a species with a waxy yellow face, dark brown mouthparts, pale ochre legs with darkened apices on the tibiae and femora, and similar wing patterning. He also indicated the gena was quite narrow (half as wide as the first flagellomere) and that the species had dark markings posterolaterally on the tergites that extended anteriorly to midpoint or beyond.

C. salinum Curran was synonymized with *C. pantherinum* “as accepted by Hendel” by Malloch (1930). It is curious to note that Malloch designated *C. salinum* a junior synonym of *C. pantherinum* in 1930 based on his examination of *C. salinum* paratypes deposited at USNM, four years before Curran formally described the species. Stranger still, Curran makes no note of Malloch’s opinion in his 1934 paper, although he must surely have been aware of Malloch’s statement as he cited Malloch’s 1930 publication when discussing *C. hendeli* (see Comments under *C. hendelianum*). The holotype and allotype of *C. salinum* at AMNH as well as the paratypes housed at the AMNH have been examined and in light of their very narrow gena, pale faces, dark mouthparts, and abdominal patterning similar to what Hendel describes they are almost certainly synonymous with Hendel’s concept of *C. pantherinum*, as no other species examined in this study possess all those characters.

While Walker’s original description agrees reasonably well with *C. magnum* it is missing any mention of scutal vittae and it is from a locality well separated from the locality of the *C. pantherinum* holotype. Therefore its synonymy with that species is not certain. The only way this situation could be fully resolved would be through the examination of Walker’s type specimen. Given that ambiguity still exists around the true identity of *C. pantherinum* and there is some possibility that Walker’s type specimen(s)

may be refound, I chose to continue to treat *C. pantherinum* as the senior synonym of *C. salinum*. This is the solution that provides the most taxonomic stability (avoids designating a new junior synonym and elevating a current junior synonym to a valid species), while allowing for the situation to be easily amended should Walker's specimens resurface.

Material Examined

Brazil: "Brasilien", 1♂ (SMTD); Monat, 1♂, iv.1935, P. Sandig (USNM). **Bahia:** 1♂ (NMWC). **Pará:** 1♂ (BMNH); Aldeia Coraci, 11km W Canindé, Rio Gurupí, 4♂2♀, 10-20.iv.1963, 3♂, 16-26.iv.1963, B. Malkin (MZSP); bôca do Cuminá,-Miri Oriximiná, 16♂4♀, 19-26.i.1968, Exp. Perm. Amaz. (MZSP); Candidé, Rio Gurupí, 10♂8♀, v.1963, R. Malkin, 2♂, v.1963, Malkin & Pinheiro, 2♂1♀, iv.1963, Pinheiro & Malkin, 1♂, 27.ii.1966, R. Malkin, 1♂, 7-15.iv.1963, R. Malkin, 3♂2♀, 2-30.v.1963, R. Malkin (MZSP); Faz. Taperinha, prox. Santarém, 6♂1♀, 29.xii.1967-9.i.1968, 2♂, 1-11.ii.1968, Exp. Perm. Amaz. (MZSP); Oriximiná, 1♂, 12-13.i.1968, Exp. Perm. Amaz. (MZSP); Fordlândia, 1♂, ii.1957, Pereira & Machado (MZSP); Belém, 2♂, Martinez, ix.1955 (MZSP); Castanhal, 1♂, viii.1952, T. Dobzhansky (USNM); Utingo Belem, 1♂1♀ (shared pin), on foliage, v.1924, C.H.T. Townsend (USNM); 2♂, Baker (CASC); Santarém, 20♂4♀ (CMNH (Acc. No. 2966)); Benevides, 1♂, x.1918, S.M. Klages (CMNH (Acc. No. 6174)); "Near Para", 3♂2♀, H.B. Merrill (USNM); Braganza, 1♀, H.B. Merrill (USNM); Rio Xingu Camp, 52°22'W, 3°39'S, ca. 60 km S. Altamira, 1♂, 8-12.x.1986, P. Spangler & O. Flint (USNM). **Rio de Janeiro:** Mangaritiba, 1♀, viii.1938-ii.1939, R.C. Shannon (USNM). **Rondonia:** 62km SE Ariquemes, 7♂5♀, 13-25.iv.1992, W.J. Hanson (UTAH), same data except 1♂1♀, 7-18.xi.1995 (UTAH), same data except

3♂, 8-20.xi.1994 (UTAH), same data except 180m, 1♂, 17-24.iii.1989 (UTAH); same data except 3♂2♀, 15-22.iii.1991, W. Hanson & G. Bohart (UTAH); Fazenda Rancho Grande, 62km S. Ariquemes, 165m, 10°32'S, 62°48'W, 4♂, 12-22.xi.1991, E.M. Fisher (CSCA). **São Paulo:** Barueri, 1♀, 15.i.1966, K. Lenko (MZSP). **Amazonas:** Maués, 6♂, xii.1936 (MZSP); Manacapuru, 9♂2♀, 10.1936 (MZSP); Manaus, 1♀, viii.1969, Machado & Pezeiza (MZSP). **GUYANA.** 2♂, 1908, K.S. Wise (BMNH). Parrish, 1♂1♀, J.M. Aldrich (USNM); Mallali, 2♂ (BMNH). **Cuyuni-Mazaruni:** Bartica, 1♂ (USNM), 1♀, 9.v.1901, 7♂1♀, 10.v.1901 (ANSP), 2♂, 11.v.1901 (ANSP), 1♂, 21.vi.1901, J.M. Aldrich (USNM), 1♂, 8.iv (USNM); Kartabo, 1♀, vi.1922, M.D. Haviland (BMNH), 2♂1♀, 28.vii.1924, S. Crawford (CMNH); 1♂, vi.1922, 3♂1♀, vii.1922, 3♂1♀; viii.1922, 1♂1♀, ix.1922, M.D. Daviland (BMNH), roadside, 2♂, 17.ix.1937, Richards and Smart (BMNH); Cuyuni R., 3 mls. from Kartabo, high forest, 6♂1♀, Richards and Smart, 20.ix.1937 (BMNH); Mazaruni, low forest, 2° growth, 1♀, 15.viii.1937, 1♂1♀, 25.viii.1937, 1♀, 26.ix.1937, Richards and Smith (BMNH); same data except, high forest, 3♂2♀, 13.viii.1937, 1♂, 24.viii.1937, Richards and Smith (BMNH); Essequibo R., Moraballi Cr., 1♂, trail, 21.viii.1929, 2♂, dark forest, 29.viii.1929, 1♂, swamp, 9.ix.1929, 1♀, 2.x.1929, 1♂, dark forest, 1♀, trail, 1♂, dark forest, 9.x.1929, 1♀, 10.x.1929, 2♀, Wallaba forest, 19.x.1929, 1♂, dark forest, 1.xi.1929, 1♂1♀, dark forest, 6.xi.1929, 1♂, Wallaba forest, 7.xi.1929, 1♂, swamp, 11.xi.1929, Oxford University Expedition (BMNH); Essequibo R., Monkey Jump, 1♂, 9.x.1929, Oxf. Univ. Expedn. (BMNH). Kartabo, 1♂, 15.vii.1926, 1♂, 9.viii.1926 (CMNH); Kartabo, Bartica Dist., 1♀, 10.v.1924 (USNM), same data except 1♂1♀ (shared pin), x.1920 (USNM); Mazaruni-Potaro Dist., Kartabo Pt, 1♂, 27.xii.1983, W.E. Steiner & J. Byrd (USNM). **Barima-**

Waini: Canister Falls, Cattle trail survey, 1♂, xi.1919, 1♀, vi.1920, A.A. Abraham (BMNH). **Upper Takutu-Upper Essequibo:** Rupununi Dist., Kurupukari, Essequibo Riv., E. side, Primary Rainforest, 200ft, 5♂1♀, 6-16.x.1990, H. Hubley (ROM), **Upper Takutu-Upper Essequibo:** Waranama, 1♀, 13.xi.1936, Ogilvie (USNM). **Demerara-Mahaica:** Ceiba (ca. 40 km S. Georgetown), 6°29.9'N, 58°13.1'W, 2♂1♀, 13.iv.1994, W.N. Mathis (USNM), **Potaro-Siparuni:** Kangaruma, 2♂, 18.viii.1911 (USNM); Kaieteur, Tuheit Tr., high forest, 1♂1♀, 1.ix.1937, Richards and Small (USNM).

VENEZUELA. Amazonas: R. Mavaca Camp, 65°06'W, 2°2'N, 150m, 14♂4♀, 16-27.iii.1989, D.A. Grimaldi (AMNH). **Bolívar:** Akuriman, Gran Sabana, 1♀, xi-xii.1940, P. Anduze (USNM). **Falcón:** Rio Grande Res. Sta., 26km E El Palmar, 700ft, rainforest, 24-25.iii.1978, J.B. Heppner (USNM); **Mérida:** 1♀ (ZMUC). **SURINAME:**

Brokopondo: 1♀, 30.i.1969, L. & C.W. O'Brien (USNM). **Sipaliwini:** Raleigh, Vallen-Voltzberg Res., Voltzberg Camp, 90m, 6♂, 29.i-13.ii.1982, J. Carpenter & D. Trail (USNM). **BOLIVIA. Pando:** Cachuela Esperanza, 1♂, 1921-1922 (iii), W.M. Mann (USNM); **Beni:** Beni-Gebiet, Guayaramerin, 150m, 1♂, 10.v.1954, 2♂, 12.v.1954, all W. Forster (all ZSMC). **PERU: Madre de Dios:** Manu, Rio Manu, Pakitza, 250m, 12°7'S, 70°58'W, 3♂1♀, 9-23.ix.1988, A. Freidman (USNM), same data except 11°56'S, 71°18'W, fogging canopy at plot 1, 1♂, 21.ix.1989, T. Irwin *et al.* (ANSP); Los Amigos Biol. Stn., 24♂16♀, 2-14.vi.2006, Paiero & Klymko (DEBU).

The *Curtonotum taeniatum* species complex

This species complex is defined by the presence of a roughened frontal vitta extending from the anterior ocellus to the ventral margin of the frons and a patch of rough texture

proximal to the surstyli, the former character allowing species in this complex to be easily distinguished from all congeners. Besides *C. bathmedum* and *C. bivittatum*, the three species in the complex, *C. flavisetum*, *C. tumidum* and *C. taeniatum* are also the only yellow-orange species outside of the *C. vulpinum* species group. They can be easily distinguished from *C. bathmedum* and *C. bivittatum* by the absence of highly contrasting vittae on the frons and scutum and the very different wing patterning (compare Figures 36k and 36d).

***Curtonotum flavisetum* Klymko and Marshall, sp. nov.**

Figure 25

Etymology

From Latin, *flavus*, meaning yellow, and *seta*, meaning bristle, referring to the yellow setae of the mid coxa of this species.

Diagnosis

Curtonotum flavisetum specimens can be distinguished from most *C. taeniatum* and *C. tumidum* specimens by the pale yellow prominent seta at the posteroventral corner of the katepisternum (black in other two species) and the almost complete absence of dark setae medially on the mid coxa; one specimen from Cachuela Esperanza, Bolivia, and Matto Grosso, Brazil, have a single dark seta medially on both mid coxae; otherwise in all specimens available these setae are entirely pale yellow (in the other two species there are generally more than three dark setae medially on the mid coxa). Males can be readily distinguished by their expanded and densely setulose sternite 5 and very stout phallus,

females can be distinguished by their ventral receptacle which has a more elongate neck.

Description

Length: 9.8 – 9.9 mm

Head

Frons orange-yellow, slightly to much darker medially, with scattered dark setulae, moderate bulge ventrally, width 1.3 to 1.4 times length, parallel sided, lateral margin narrowly silver pruinose. Ocellar triangle, broad medial vitta, and narrow lateral strip pruinose, former two with white pruinosity, latter with yellow-white pruinosity, pruinosity of ocellar triangle confluent with medial vitta, narrow lateral strip extending from median occipital sclerite to just beyond proclinate bristle. Proclinate bristle at *ca.* 1/5 to 1/3 sagittal distance from anterior ocellus to ventral margin of frons, anterior and slightly lateral to major reclinate bristle; minor reclinate bristle anterior and slightly medial to major reclinate bristle. Face silver pruinose, ground colour pale to medium yellow-brown; vibrissa slightly to much larger than adjacent subvibrissals, vibrissa and several subvibrissals yellow-orange. Parafacial and gena moderately broad, former silver pruinose, latter yellow pruinose, ground colour of both pale to medium yellow-brown, eye height 9.5 to 11.1 gena height. Clypeus, palpus and prementum with orange-yellow ground colour, former two densely gold pruinose and microtrichose, respectively, latter lightly gold pruinose. Scape, pedicel and first flagellomere with orange-yellow ground colour, former two very lightly silver pruinose, latter densely yellow-white microtrichose. Setulae on pedicel black dorsally, orange ventrally.

Thorax

Ground colour orange-yellow, gold pruinose on scutum, medium brown pruinose on scutellum, white pruinose on pleura. Scutum moderately arched, each scutal, postpronotal, scutellar and anepisternal (at least on dorsal half) seta and setula with dark spot around socket. Scutum with pair of narrow vittae for entire length, these quite faint and best seen in low magnification under good lighting. Postpronotal lobe with three setae, anterior and posterior setae *ca.* 1/2 length of central seta, posterior seta sometimes somewhat reduced; notopleuron setulose; scutellum with two pairs of marginal setae. Anepisternum with three or four large subequal setae and three or four smaller setae on posterior half; katepisternum with one prominent lateral seta; linear tuft of setulae under fore coxa pale yellow; setae in posteroventral corner pale yellow. Fringe of pale yellow setulae ventral and posterior of posterior spiracle; minute setulae present on ventral half of meron.

Legs

Legs pale orange-yellow in ground colour, coxae heavily white pruinose, legs otherwise lightly so. Setulae of fore coxa orange-yellow, often several larger black setae in posterolateral corner. Mid coxa medially with pale yellow setae (single specimens from Cachuela Esperanza, Bolivia, and Matto Grosso, Brazil, with single dark seta on both mid coxae). Chaetotaxy of femora, tibia and tarsi black except for scattered pale setulae on ventral surface of femora, including all setulae on the anterior surface of fore femur (both dorsal of and proximal to the tendinal comb), and very dense, regularly spaced transverse rows of setulae anteroventrally on apical half of fore tibia and similar setulae on fore first tarsomere, these dark orange-brown. Fore femur with 3-5 posterodorsal setae, 6-8

moderately stout black ctenidial setae, these contrasting with adjacent pale setulae; mid femur with 5-7 anterior setae; hind femur with two subapical dorsal setae. Mid tibia with two very strong, one moderately strong, and several weaker apical ventral setae, the moderately strong seta between the strong setae. Mid and hind fifth tarsomeres without short cuneiform setae on anteroventral margins.

Wing

Similar to *C. tumidum*.

Abdomen

Ground colour orange-yellow. Tergite 1 lightly gold pruinose, best seen from oblique angle, tergite 2 similar, ground colour and pruinosity very slightly darker apically.

Tergite 3 with slightly darker ground colour and pruinosity on medial vitta, this vitta narrow proximally, abruptly widening to cover dorsal surface on the posterior half, otherwise slightly gold pruinose. Tergite 4 with moderately dark brown central vitta (darker posteriorly), this vitta narrow proximally, abruptly broadening to cover dorsal surface on distal *ca.* 1/3, otherwise moderately gold pruinose. Tergite 5 similar to tergite 4 except medial vitta darker, wider anteriorly, and abruptly broadening on distal *ca.* 1/4, gold pruinosity denser.

Male terminalia

Sternite 5 broad, with dense yellow setulae, posterior margin truncate, with deeply invaginate area of desclerotization on posterior margin, area of desclerotization without setulae; tergite 6 moderately well-sclerotized, with area of desclerotization dorsally on proximal half, tergite 7 relatively long, dorsal length *ca.* 1.7 times epandrial dorsal length; sternite 6 and 7 separated into right and left portions, sternite 6 long, moderately

well-sclerotized, left portion more heavily sclerotized along proximal margin; right portion of sternite 7 relatively short, *ca.* 0.3 times length of right portion of sternite 6. Epandrium relatively small, with scattered setulae, these longest in posteroventral corner, very long, bare (free of microtrichia and setulae) posteroventral extensions, these fused medially posterior to cerci, posterior edge of sclerotization ending at distinct rough patch proximal to surstyli; surstylus relatively small, separated from epandrium by sclerotized rough patch, ventral face and margins setulose, slightly concave directly opposite of postgonite ventrally, lateral margins setulose dorsally, in lateral profile ventral margin flat, with slight dorsal bend on distal half, sharp dorsal bend distally, posteroventral margin concave, in posterior profile lateral margin broadly rounded, tightly rounded apically, distal margin concave, medial margin concave. Cercus elongate, posteroventrally produced, ventral margin concave, longest cercal setulae much longer than longest epandrial setulae. Hypandrium with low, rounded dorsobasal lobe, posterior bridge projecting slightly ventrally, hypandrial arm bending more than 90° at hind margin of epandrium, with deep invagination on ventral margin at bend, 2 ventrolaterally oriented setulae distal to bend and anteriorly oriented process on medial margin distally, not fused apically to opposite hypandrial arm; postgonite minutely setulose dorsally, with small, venteromedial projection at apex. Phallapodeme with large, anteriorly bulging “fan”, margin opposite fan convex basally, concave distally; basiphallus weakly sclerotized basally, very thick, moderately elongate, with laterally expanded dorsal lobe distally; distiphallus fused to basiphallus, base moderately short, laterally compressed, distiphallus bilobed, their bases stacked dorsoventrally, ventral lobe extending to left perpendicular to axis of phallus, longer than dorsal lobe, well-sclerotized on distal

margin, with coarse pebbled texture, pointed apically, dorsal lobe extending posteriorly in plane of phallus, well-sclerotized dorsally below loose dorsal membrane, with fine pebbled texture throughout, pointed apically. Ejaculatory apodeme outside of basiphallus, expanded and with small pores basally.

Female terminalia

Sternite 5 length 2.3 to 2.6 times width, sternite 6 length 1.5 times width. Ovipositor slender (as in Figure 35h). Tergite 7 desclerotized medially. Sternite 8 length *ca.* 2.8 to 3.0 times width, heavily sclerotized in apical half, apex with slightly concave surface, rounded/truncate in profile, with broad marginal area free of microtrichia. Tergite 8 and sternite 8 weakly sclerotized proximally. Sternite 10 heavily sclerotized and with antrorse spinules medially, area of sclerotization with flared proximal margin and with slight dorsal bend, profile narrow on posterior half, broader on anterior half. Ventral receptacle with heavily sclerotized elongate neck and reflexed, lightly sclerotized donut-shaped apex, bend at midway point between neck base and donut-shaped apex, duct with fine longitudinal wrinkles. Spermatheca elongate with small clear cap at tip, papillose, papillae minute broad-based spines.

Comments

One male specimen from Matto Grosso, Brazil, has the right vibrissa black and left vibrissa (or at least the base of this seta that remains) yellow-orange, and one greasy specimen from Cachuela Esperanza, Bolivia, appears to have a very darkly pigmented head. Three other specimens from the same locality have varying amounts of dark brown to black colouration in the ground colour of the clypeus, prementum and palpus. In two of these specimens these markings are quite mottled and asymmetrical. Given the

species' propensity to darken when greasy and variable amounts of dark colouration in the other specimens it is assumed these dark markings are an artifact of preservation and not natural markings. A female specimen from Matto Grosso, Brazil, has dark brown (not black) setulae on the anteroventral face of the fore femur.

Type Material

HOLOTYPE: BRAZIL. Mato Grosso: Villa Mutinho, 1♂, 1.iv.1922, J.H. Williamson (USNM).

PARATYPES: BOLIVIA. Beni: Beni-Gebiet, Guayaramerin, 150m, 1♀, 10.v.1954, 1♂1♀, 15.v.1954, 3♂. 17.v.1954, all W. Forster (all ZSMC). **Pando:** Cachuela Esperanza; 1♂3♀ (and 1 sex unknown), iii, W. Mann, Mulford Biological Exploration 1921-1922 (USNM). **BRAZIL. Mato Grosso:** Villa Mutinho, 1♀, 1.iv.1922, J.H. Williamson (USNM).

***Curtonotum taeniatum* Hendel**

Figure 26

Curtonotum taeniatum Hendel 1913: 629

Musca gibba Fabricius, 1805: 297. Preocc. Müller 1776.

Diagnosis

Characters to distinguish this species from *C. flavisetum* are provided in the diagnosis of that species.

No external characters have been found to reliably distinguish *Curtonotum taeniatum* from *C. tumidum*. *Curtonotum tumidum* often has pale setulae on the anterior face of the fore femur dorsal of the ctenidial comb (both species have varying amounts of

pale setulae proximal of the ctenidial comb), pale vibrissae, and very few dark medial setae on the mid coxae, whereas no *C. taeniatum* specimen examined has pale setulae dorsal of the ctenidial comb (in one specimens they are dark brown), only a few have a pale vibrissa (none have both vibrissae pale), and only one has fewer than three dark setae on each mid coxa. Too few specimens have been examined to say whether these small differences in chaetotaxy color can reliably separate these species, and it is possible that these two species will prove to be indistinguishable without examination of terminalia.

Males of *C. taeniatum* can be distinguished from *C. tumidum* by the relatively stout ventral distiphallic lobe (this lobe is very elongate and apically bent in *C. tumidum*; compare Figures 26a and 26c with 27a and 27c). Identification of females is more problematic, as discussed in the Comments section below.

Description

Similar to *C. flavisetum* except as follows. Length: 7.0 to 9.8 mm. Frons width 1.3 – 1.4 times frons height. Eye height 10.3 to 16.7 times gena height. Vibrissa much larger than adjacent subvibrissals, all subvibrissals usually black (in some specimens a few of these are pale), two male specimens from Madre de Dios, Peru, and the two specimens from Cururipe, Bahia, Brazil, each with one (either the right or the left) vibrissa orange-yellow. Scutum often with pair of lateral vittae, extending from posterior of transverse suture to posterior margin. Postpronotal lobe often with additional moderately long seta anterior to three prominent setae. Anepisternum with three very large and 2-5 moderate setae on posterior half. Prominent seta at posteroventral corner of kataposternum, and usually 1-2 adjacent setae, black. Mid coxa with at least 3 dark setae medially, usually many more.

Setulae on the anterior face of fore femur dorsal of the ctenidial comb black or dark brown, several setulae proximal to the ctenidial comb yellow.

Male terminalia

Sternite 5 narrow, with sparse yellow and black setulae, posterior margin truncate and well-sclerotized (as in Figure 27d); tergite 6 poorly sclerotized, desclerotized medially, tergite 7 relatively long, dorsal length *ca.* 0.9 times epandrial dorsal length; sternite 6 and 7 separated into right and left portions, sternite 6 moderately long, left portion moderately sclerotized, more heavily sclerotized along proximal margin, right portion moderately sclerotized; right portion of sternite 7 relatively long, slightly shorter than right portion of sternite 6, with narrow connection on right to right ventral margin of tergite 7 (this connection posterior to right spiracle 7). Epandrium relatively small, with scattered setulae, 1-2 in posteroventral corner often very long and thick, long, bare (free of microtrichia and setulae) posteroventral extensions, these fused medially posterior to cerci, posterior margin of sclerotization ending at distinct rough patch proximal to surstyli; surstylus relatively small, separated from epandrium by sclerotized rough patch, ventral face and margins minutely setulose, slightly concave directly opposite of postgonite ventrally, in lateral profile ventral margin rounded, with sharp dorsal bend distally, posterodorsal margin slightly rounded, in posterior profile lateral margin slightly rounded, posteroventral margin concave on distal half, medial margin slightly concave. Cercus elongate, ventral margin flat, dorsal margin ventrally sloping, longest cercal setulae longer than all epandrial setulae but the enlarged posterolateral setulae (when present). Hypandrium with low, slightly angular dorsobasal lobe, posterior bridge ventrally produced, hypandrial arm bending *ca.* 45° at hind margin of epandrium, with 2

ventrolaterally oriented setulae distal to bend and anteriorly oriented process on medial margin distally, not fused to opposite hypandrial arm apically; postgonite with low subapical dorsal process, minutely setulose dorsally. Phallapodeme with large “fan”, margin opposite fan convex basally, concave distally, basiphallus weakly sclerotized basally, elongate, straightening apically; distiphallus base short, ventrally projecting, with wrinkles and coarse pebbled texture dorsally, apex bilobed, lobe bases stacked dorsoventrally, ventral lobe much longer than dorsal lobe, with ventrally produced, moderately sclerotized process with short, broad-based antrorse spinules, otherwise elongate, extending slightly left, heavily sclerotized on right margin, otherwise membranous, with broad-based, antrorse spinules on right, and fine spinules basally on left, apex bent ventrally and to left, dorsal lobe well-sclerotized dorsally, sclerotized area with short, erect, fine spinules, otherwise smooth, membranous, apex acute. Ejaculatory apodeme outside of basiphallus, expanded and with small pores basally.

Female Terminalia

Similar to *C. flavisetum* except as follows. Sternite 5 length 2.6 to 3.6 times width, sternite 6 length 1.3 to 1.9 times width. Sternite 8 *ca.* 2.5 and 3.2 times longer than wide. Ventral receptacle neck squat, bent at base of donut-shaped apex, duct with fine longitudinal wrinkles. Spermatheca papillose to papillose/rugose, papillae broad tipped bumps.

Comments

One female specimen from Cururipe, Bahia, Brazil, has only one dark seta on its left mid coxa and two dark setae on its right mid coxa. This specimen is identified as *C. taeniatum* as it has a single dark seta in the posteroventral corner of each katapisternum, its ventral

receptacle has a short “neck”, its spermathecae are coarsely papillose, and its sternite 8 is 2.5 times longer than wide. Additionally, it was collected in the same locality and year (though one month later) as a male *C. taeniatum* specimen.

Most other female specimens examined fit well into the descriptions given for the three species in the *C. taeniatum* group. Some overlap likely exists between *C. taeniatum* and *C. tumidum* sternite 8 proportions and spermatheca texture. Additionally, precise ventral receptacle shape varies somewhat within specimens of these two species, and it is plausible some materials could overlap with the shape found in *C. flavisetum*. A female specimen from Fazenda Rancho Grande, Rondonia, Brazil, has an elongate sternite 8 (length/width = 3.3), coarsely papillose spermatheca, and a fairly elongate and bent ventral receptacle neck (though not as elongate as in the specimens of *C. flavisetum*). This specimen has dark vibrissae, a dark seta at the posteroventral corner of the katepisternum, numerous dark mid coxal setae, and a mix of pale and dark setulae on the anterior surface of the fore femur. This specimen cannot be confidently identified as either *C. tumidum* or *C. taeniatum* and, since it is not associated with any male specimens, it has been left unidentified. This problem specimen suggests that the genital characters used to discern females in this complex might have some overlap between species, however this can only be resolved through more extensive sampling.

Curtonotum taeniatum Hendel is a junior synonym of *Musca gibba* Fabricius. The type series of *Musca gibba* Fabricius consists of at least five cotypes, one of which is a female agreeing with *C. taeniatum* Hendel. This specimen is here designated the *Musca gibba* Fabricius lectotype. The other four *Musca gibba* cotypes are apparently all of one

other species (A. Kirk-Spriggs, pers. comm.*), and photographs of one of these cotypes show clearly that it is of a rather distinct but undescribed species in the *C. murinum* species complex (I have seen specimens of the same species from Brazil, Surinam, Guyana, and Venezuela). The *Musca gibba* Fabricius – *Curtonotum taeniatum* Hendel synonymy was first noted by Malloch (1930). He indicated that *C. taeniatum* agreed with the female cotype of *M. gibba* housed at the Copenhagen Museum and he therefore treated *Curtonotum gibbum* as the senior synonym. Malloch commented that the species has a “whitish-dusted central vitta”, a reference almost certainly to the finely pebbled medial frontal vitta unique to the *C. taeniatum* species complex, so while it is not indicated that Malloch examined the type series of *C. taeniatum*, it certainly appears that he knew what the species looked like. This synonymization was followed by Curran (1934) and Wirth (1975), though Wirth did not indicate which name was the junior and which name was senior. *Musca gibba* was preoccupied by Müller 1776, and as such *Curtonotum taeniatum* is now the valid name for *Musca gibba* Fabricius (Thompson & Pont 1993).

While this synonymy has been accepted by multiple authors, none have scrutinized its legitimacy. There are two factors that have to be considered in assessing this synonymy; i) whether or not *C. taeniatum* and *M. gibbum* are actually the same species; and ii) Hendel’s 1933 rebuttal where he rejected the synonymy.

Given that the *M. gibba* Fabricius lectotype is an undissected female, it is possible it could be synonymous with *C. tumidum*. *Curtonotum flavisetum* can be discounted as the lectotype because the lectotype has a black posteroventral katepisternal seta, mostly black medial mid coxa setae, and “reddish brown black” setulae on the anterior face of

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the fore femur (Kirk-Spriggs, pers. comm.*). Dissecting the lectotype may allow for more definitive identification, however given the variability of female genitalic structures there is the potential that even the examination of these structures would not deliver conclusive results. Locality cannot be used to provide evidence of the identity of the lectotype as the locality of the *M. gibba* Fabricius specimen is simply South America. Thus there is no evidence suggesting *M. gibba* is more likely synonymous with *C. tumidum* than *C. taeniatum* and therefore there is no reason to consider the synonymy incorrect.

Hendel (1933) refuted the synonymization of *C. taeniatum* with *M. gibba*. In his retort he asserted that the first detailed redescription of *M. gibba* was provided by Wiedemann (1830), that Wiedemann's redescription should be used to identify *M. gibba*, and that Wiedemann's redescription does not agree with *C. taeniatum*. Hendel acknowledged that the *Musca gibba* type series is a mixture of species, and he contended that Wiedemann (1830) alluded to this by mentioning a second variety of *M. gibba* at the end of his *M. gibba* redescription. Hendel stated it is this second variety that Malloch is synonymizing with *C. taeniatum*, and that even if *C. taeniatum* is synonymous with a female specimen in the Fabricius type series, *C. taeniatum* should still be accepted as a new species as it was only a variety mentioned by Wiedemann, not the species that Wiedemann describes in detail. Based on his own examination of material at Vienna, Hendel stated that the specimens upon which Wiedemann based his description are a mixture of three species: *C. taeniatum* plus two additional species, one of which is from Brazil. Hendel maintained that his interpretation of *M. gibba* is based on the detailed description that Wiedemann provided and that he used the specimens from Brazil as examples.

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While there is logical reasoning in Hendel's rebuttal, it was certainly not evident in his original treatment (Hendel 1913) that he was describing a second species from the *M. gibba* type series. What is also not clear is whether or not Hendel ever actually saw the Fabricius type series, and whether or not the specimens from Brazil that Wiedemann identified as *M. gibba* and upon which Hendel based his description of *M. gibba* actually agree with any of the specimens in the Fabricius type series.

Malloch's (1930) decision to synonymize *C. taeniatum* with *M. gibba* may have been disagreeable to Hendel, but it was certainly not done in error. Malloch made it clear that it is the female type specimen which agrees with *C. taeniatum*, and that there is second species in the Fabricius type series that does not agree with *C. taeniatum*. Malloch contended that it is *C. taeniatum* that Wiedemann (1830) described, pointing out that Wiedemann described the frons as having a pair of blackish spots on the anterior margin. Specimens of *C. taeniatum* examined in this work do not have dark markings on the frons, and in those that do it is assumed to be staining. Other parts of Wiedemann's description, such as the blackish brown scutum and yellowish femora and tibiae with brown apices, do not match *C. taeniatum*, and strongly suggest that Hendel was correct in arguing that Wiedemann's description did not refer to *C. taeniatum*. However, just what Wiedemann was describing is a moot point as Malloch synonymized *C. taeniatum* with a female in Fabricius' type series, a synonymy that, as mentioned above, is likely correct.

Several emails and a written letter have been sent to Dr. P. Sehnal, the curator of the Diptera collection at NHMW, to arrange a loan of their *Curtonotum* but I have yet to receive a response. Examination of the specimens that Hendel and Wiedemann are referring to would certainly help clarify the situation.

Given the information currently available and the fact that Curran (1934), Wirth (1975) and Thompson & Pont (1993) followed Malloch's 1930 synonymization of *C. taeniatum* and *Musca gibba*, it seems most appropriate to continue to treat *C. taeniatum* as a junior synonym of, and valid name for, *Musca gibba* Fabricius.

Type Material

The Fabricius' type series consists of five specimens. As described above, one female agreeing with *C. taeniatum* Hendel, the other four specimens agreeing an undescribed species in the *C. murinum* species complex (Kirk-Spriggs, pers. comm.*). The former specimen is designated as the lectotype to avoid any further confusion regarding the definition of *M. gibba* Fabricius. The *C. taeniatum* Hendel type series includes 3 specimens from Peru, one male and two females. Hendel (1913) only mentions the two female specimens, however it is the male specimen that bears a "typus" label (the two female specimens do not bear any "typus" or "cotypus" labels (Kirk-Spriggs, pers. comm.*). The male specimen is designated as the lectotype, the female specimens paralectotypes. A lectotype of *C. taeniatum* Hendel has been designated to avoid any confusion surrounding the definition of *C. taeniatum* Hendel should the original type series prove to be made of more than one species.

***Musca gibba* Fabricius**

LECTOTYPE: "M. gibba[,] ex Am:mer:Schidt" (ZMUC). We have seen only photos provided by A. Kirk-Spriggs.

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***Curtonotum taeniatum* Hendel**

LECTOTYPE: PERU. Ucayali: Urubambafl [Urubamba River], Umahuankilia, 1♂, 19.ix.1903 (SMTD). We have seen only photos provided by A. Kirk-Spriggs.

LECTOPARATYPES: PERU. Ucayali: Urubambafl [Urubamba River], Umahuankilia, 1♀, 16.ix.1903, 1♀, 19.ix.1903 (SMTD).

Other Material Examined

BRAZIL. Rondônia: 62km SE Ariquemes, 1♀, 15-22.iii.1991, W. Hanson, 1♂, 13-25.iv.1992, 1♂, 7-18.xi.1995, W.J. Hanson (all UTAH); Fazenda, Rancho Grande, 62km S. Ariquemes, 165m, 10°32'S, 62°48'W, 1♂, 12-22.xi.1991, E.M. Fisher (CSCA); Brazil: Brazilian Amazons, 1♂, 1915 (BMNH); **Bahia:** Cururipe, 1♂1♀, 13.x.1930, R.C. Shannon (USNM). **PERU.** Iquitos, 2♂ (both F6098), 1923 (AMNH); Rio Tapiche, 1♂, iii.1928, 2♂, xi.1928, (all F6154) (AMNH). **Madre de Dios:** Rio Tambopata Reserve, 30 air km SW of Puerto Maldonado, 290m, 5♂, 1-26.xi.1982, E.S. Ross (CASC); Manu, Rio Manu, Pakitza, 250m, 12°7'S, 70°58'W, 3♂3♀, 9-23.ix.1988, A. Freidberg (USNM); Tambopata Wildlife Reserve, 30 km SW Puerto Maldonado, 12°50'S, 69°20'W, 290m, 1♀, 12-31.viii.1982, J.J. Anderson (USNM); Los Amigos Biol. Stn., 11♂3♀, 2-14.vi.2006, Paiero & Klymko (DEBU). **BOLIVIA. Santa Cruz:** Province del Sara, 450m, 2♂, iv.1909, J. Steinbach (CMNH); Puerto Suárez, 1♂, 1909, Steinbach (CMNH) **Cochabomba:** Villa Tunari, "Orquidario", 16°59.64'S, 65°26.40'W, 325m, ex: on vegetation, 1♂, 6.ix.2000, S.D. Gaimari (CSCA). **La Paz:** Tumupasa, 1♀, xii, W. Mann, Mulford Biological Exploration 1921-1922 (USNM).

***Curtonotum tumidum* Enderlein**

Figures 27 and 36k

Curtonotum tumidum Enderlein, 1917: 68

Diagnosis

Characters to distinguish this species from *C. flavisetum* and *C. taeniatum* are discussed under the diagnoses of those species.

Description

Similar to *C. flavisetum* except as follows. Length: 9.0 to 10.0 mm. Frons width 1.3 to 1.4 times frons height. Eye height 10.3 to 13.0 times gena height. Vibrissa much larger than adjacent subvibrissals, vibrissa and subvibrissals usually black, though vibrissa and several subvibrissals often orange-yellow. Scutum often with pair of lateral vittae, extending from posterior of transverse suture to posterior margin. Postpronotal lobe often with additional moderately long seta anterior to three prominent setae. Anepisternum with three large and 2-5 moderate setae on posterior half. Prominent seta at posteroventral corner of katepisternum, and usually 1-2 adjacent setae, black. Mid coxa usually with at least 3 dark setae medially, though several specimens with only one or two. Setulae on anterior face of fore femur dorsal of ctenidial comb usually black, though in several specimens these pale, several pale setulae present proximal to ctenidial comb.

Wing

Alula very narrow. Non-infuscated areas of wing with yellow to yellow-brown tinge, this quite strong in costal cell, r_1 and r_{2+3} . r_1 light to dark brown infuscate on anterior 1/3 to 2/3s from just distal of R_1 apex to apex, apex with broad dark brown infuscate area; r_{2+3} with broad dark brown infuscate area subapically, narrow band of non-infuscation

running through area of infuscation on posterior half, infusate area posterior to this medium brown; r_{3+4} medium brown at apex along anterior and posterior margin, m_1 similarly medium brown infusate along anterior margin, membrane around $dm-cu$ broadly grey-brown infusate.

Male terminalia

Sternite 5 narrow, with sparse yellow setulae, posterior margin truncate and well-sclerotized; tergite 6 well-sclerotized, setulose medially, tergite 7 relatively long, dorsal length *ca.* 0.5 times epandrial dorsal length; sternite 6 and 7 separated into right and left portions, sternite 6 moderately long, left portion moderately well-sclerotized, more heavily sclerotized along proximal margin, right portion weakly sclerotized; right portion of sternite 7 relatively long, subequal in length to right portion of sternite 6, with narrow connection on right to right ventral margin of tergite 7 (this connection posterior to right spiracle 7). Epandrium relatively small, with scattered setulae, 1-2 in posteroventral corner very long and thick, moderately long, bare (free of microtrichia and setulae) posteroventral extensions, these fused medially posterior to cerci, posterior edge of sclerotization ending at distinct rough patch proximal to surstyli; surstylus separated from epandrium by sclerotized rough patch, proximal sclerotization margin of surstylus separated from epandrium by rough patch, ventral face and margins setulose, slightly concave directly opposite of postgonite ventrally, in lateral profile ventral margin flat, with slight dorsal bend on distal half, sharp dorsal bend distally, dorsal margin concave, in posterior profile lateral margin broadly rounded, tightly rounded apically, posteroventral margin concave on distal half, medial margin slightly concave. Cercus slightly elongate, ventral margin flat, dorsal margin broadly rounded. Hypandrium with

low, slightly angular dorsobasal lobe, posterior bridge projecting slightly ventrally and posteriorly, hypandrial arm bending less than 90° at hind margin of epandrium, with 2 ventrolaterally oriented setulae distal to bend and anteriorly oriented process on medial margin distally, not fused to opposite hypandrial arm apically; postgonite setulose dorsally, with one apical and one subapical dorsal projection. Phallapodeme with large “fan”, margin opposite fan convex basally, concave distally, basiphallus weakly sclerotized basally, elongate; distiphallus base short and stout, tapering slightly apically, apex bilobed, lobe bases stacked dorsoventrally, ventral lobe slightly longer, ventral lobe extending slightly to left, well-sclerotized on dorsal margin, with moderately sclerotized, antrorse process ventrally at base, lobe otherwise membranous, with fine antrorse spinules on left, and broad-base, antrorse stout spinules on right, apex pointed, dorsal lobe well-sclerotized dorsally and on left, area of sclerotization with dense, fine, short erect spinules, otherwise membranous and smooth, apex rounded. Ejaculatory apodeme outside of basiphallus, expanded and with small pores basally.

Female terminalia

Similar to *C. flavisetum* except as follows. Sternite 5 length 2.9 to 3.1 times width, sternite 6 length 1.3 to 1.6 times width. Sternite 8 *ca.* 3.3 to 4.0 times longer than wide. Ventral receptacle neck squat, bent at base of donut-shaped apex, duct with fine longitudinal wrinkles. Spermatheca papillose, papillae varying from minute broad-based spines to larger broad tipped bumps.

Type Material

Enderlein (1917) listed five type specimens of *C. tumidum*, two females deposited at the Stettiner Zoologischen Musuem, and two male and one female specimens deposited at

the Hungarian National Museum. L. Papp (HNHM) confirmed that the specimens at Budapest are still present. One male specimen is designated the lectotype; the other two specimens the paralectotypes. A lectotype has been designated to avoid any confusion surrounding the definition of *C. tumidum* should the original type series prove to be made of more than one species.

Type Material

LECTOTYPE: SURINAME. 1♂ (HNHM). We have seen only photos provided by G. Lengyel (HNHM).

PARALECTOTYPES: SURINAME. ♂1♀ (HNHM).

Other Material Examined

Unknown Country: "S. America", 1♂ (ZMUC). **BRAZIL. São Paulo:** Serra da Neblina, Rio Tucano, 230m, AM, 1♂, 4.xii.1965, E. Dente (MZSP). **Amazonas:** Maues,

Worontzow, 2♂1♀, ii.1937 (MZSP); Manacapuru, 2♂1♀, x.1936 (MZSP). **Mato**

Grosso: Utiariti, Rio Papagio, Mt, 1♂, x.1966, 1♂, xi.1966, Lenko and Pereira (MZSP).

COLOMBIA. Meta: Rio Guayuriba, 1♂, selva, 1♀, L. Richter, xii.1946 (AMNH).

PERU. Loreto: Pebas, 1♂ (ZMUC); Iquitos, 3♂, 1923, 1♂, 6.iii.1924, 1♂, 15.iii.1924 (AMNH); 15km W Iquitos, 1♂, 16.ii.1984 (USNM). **Amazonas:** Rio Santiago, 1♂,

27.ix.1924, 1♀, 20.xi.1924 (AMNH). **Huánuco:** Over Monzon R., 850m, 1♂,

10.vi.1964, J. Schunke (BMNH). **GUYANA. Potaro-Siparuni:** Kaieteur Falls, 5°10.5'N,

59°28.9'W, 7♂1♀, 21-24.viii.1997, W.M. Mathis (USNM); Kaieteur, 1♂, 25.vii.1911,

1♂1♀, 14.viii.1911 (AMNH); Kaieteur, high forest, 1♂, 13.viii.1937, 1♂, 16.viii.1937,

3♂, 3.ix.1937, 2♂1♀, 7.ix.1937, savannah, 2♂, 5.ix.1937, all Richards and Smith (all

BMNH). **Cuyuni-Mazaruni:** Bartica, Bartica District, 2♂ (AMNH); Kartabo, Bartica Dist., 1♂, 21.v.1924 (AMNH), 1♂, 1921 (CASC), same data plus Tropical Research Station, New York Zoological Society, no. 20935, 1♂, 1920, (AMNH), same data except no. 20469, 1♂, (AMNH); Kartabo, Bartica Dist., "Peruuni Trail", 1♂, 23.vi.1922 (CASC). **Barima-Waini:** Canister Falls, Cattle Trail Survey, 1♂, vi.1920, A.A. Abraham (BMNH). **Upper Takutu-Upper Essequibo:** Rupini Dist., Kurupukari, E side Essequibo R., 1° rainforest, 200', 1♀, 6-16.x.1990, ROM 905036, L.D. Coote (ROME); **Mazaruni-Potaro:** Waratuk Falls, Potaro River, 1° rainforest, 300', 1♀, 1.x.1990, ROM 905028, L.D. Coote (ROME). **BRAZIL. Pará:** 1♂ (BMNH). **Rondônia:** 62km SE Ariquemes, 1♂2♀, 17-24.iii.1989, 1♀, 8-20.xi.1994, 1♀, 7-18.xi.1995, all W.J. Hanson (all UTAH); **Amazonas:** Manacapuru, 2♂, x.1936 (MZSP). **ECUADOR. Zamora-Chinchi:** Jumboe R., 1200m, 1♂1♀, 1-2.iv.1965, L. Pena (CNCI). **Napo:** Puerto Misahualli, 1♂, 14.vii.1978, G.J. Umphrey (DEBU), 350m, 1♂; ii.1983, M. Sharkey (CNCI). **Pastaza:** Mera (2km E), 1♂, 20.v.1977, P.J. Spangler & D.R. Givens (USNM). **SURINAM. Sipaliwini:** Raleigh Vallen-Voltzberg Res., Voltzberg Camp, 90m, 1♂, 29.i-13.ii.1982, J. Carpenter & D. Trail (USNM).

***Curtonotum hendelianum* (Enderlein)**

Figure 28 and 361

Diplocentra hendeliana Enderlein, 1917: 71

Curtonotum nigripalpe Hendel, 1936: 90 **Syn. Nov.**

Diagnosis

The only *Curtonotum* species with wing infuscation limited to apical 1/3 to 1/4 and in membrane around crossvein dm-cu (Figure 36l).

Description

Length 7.7 – 8.2 mm

Head

Frons dark brown with pale medial vitta and (usually) broadly pale lateral margins, purple iridescent (visible from oblique angle), with mild to moderate bulge ventrally and sparsely scattered pale setulae, width 1.2 to 1.4 times length, slightly narrower ventrally, lateral margins narrowly silver pruinose. Ocellar triangle and narrow strip on either side of frons grey pruinose, pruinosity of ocellar triangle not extending anterior of anterior ocellus, narrow pruinose strip extending from median occipital sclerite to just past insertion of proclinate bristle. Proclinate bristle inserted just dorsal of midpoint in sagittal distance between anterior ocellus and ventral margin of frons, ventral and (in some specimens) slightly medial of major reclinate bristle; minor reclinate bristle ventral and slightly medial of major reclinate bristle. Face silver pruinose, ground colour light brown; vibrissa subequal to slightly larger than adjacent subvibrissals. Parafacial relatively narrow, silver pruinose with light to medium brown ground colour, narrowing slightly ventrally; gena with slightly darker ground colour, only slightly pruinose, eye height 11.0 to 16.0 times gena height. Clypeus silver pruinose, with light to dark brown ground colour, distinctly darker laterally; palpus and prementum dark brown, former silver microtrichose, latter bare, shiny. Scape and pedicel with orange-brown ground colour,

silver pruinose, first flagellomere orange-brown on proximal *ca.* 1/5, otherwise dark brown to black, densely white microtrichose.

Thorax

Purple-grey pruinose everywhere but scutellum, scutellum dark brown pruinose, ground colour dark brown dorsally, paler laterally. Scutum strongly arched, each scutal, postpronotal, scutellar and anepisternal setae and setulae with dark spot around insertion point, these confluent posteriorly. Scutum with two very faint narrow vittae (visible only under good light without magnification). Postpronotal lobe with two setae, in most specimens an additional relatively elongate seta present anterior and posterior to these. Scutellum with two pairs of marginal setae. Notopleuron setulose; anepisternum with three prominent setae and two or three smaller setae on posterior half; katepisternum with two prominent lateral setae; linear tuft of setulae under fore coxa orange. Area below and behind posterior spiracle bare (without fringe of setulae); meron with several minute setulae arranged in a loose dorsoventrally oriented row on ventral half.

Legs

Coxae densely silver pruinose, legs otherwise lightly so, ground colour yellow-brown, fore femur darker, mid tarsi pale yellow. Chaetotaxy black except for very dense, regularly spaced transverse rows of setulae anteroventrally on apical 1/2 of fore tibia and similar setulae on fore first tarsomere, these gold-brown. Fore femur with 5-6 posterodorsal setae, 5-6 relatively short and stout ctenidial setae; mid femur slightly darker on apical *ca.* 1/8 (this very subtle in some specimens), with 4-6 anterior setae; hind femur slightly darker on apical *ca.* 1/8 (this very subtle in some specimens), with single subapical dorsal seta. Mid tibia with two very strong, 1-2 moderately strong, and

several weaker apical ventral setae, more prominent moderate seta between two strong setae, additional moderate seta (when present) posterior to these. Mid tarsomeres 1 to 3 orange-brown apically, mid tarsomeres 4 and 5 orange-brown throughout; mid and hind fifth tarsomere without of short cuneiform setae on anteroventral margin.

Wing

Alula relatively broad. Non-infuscated areas of wing with pale grey tinge. Membrane around dm-cu narrowly brown infuscated. Apical *ca.* 1/3 to 1/4 faintly brown infuscated; this much darker around R₂₊₃, anterior margin of area of infuscation straight.

Abdomen

Ground colour dark brown. Tergite 1 very lightly grey pruinose, pruinosity visible only from oblique angle; tergite 2 dark brown pruinose dorsally, purple-grey pruinose laterally, this purple-grey pruinosity tapering to and extending narrowly along anterior margin dorsally; anterior margin; tergite 3 purple-grey pruinose on proximal *ca.* 1/3, with narrow brown pruinose medial vitta, pruinosity tapering nearly to posterior margin on lateral face, otherwise dark brown pruinose; tergite 4 with purple-grey pruinosity on proximal *ca.* 1/2, with relatively broad medial and relatively narrow lateral dark brown pruinose vittae, grey pruinosity tapering nearly to posterior margin lateral of lateral vitta, otherwise dark brown pruinose; tergite 5 with relatively dark brown pruinosity on medial vitta and posterior *ca.* 1/3, otherwise purple-grey pruinose. Tergites 2 through 5 with brown pruinosity in anterolateral corner, broadly so in tergite 5.

Male terminalia

Apical margin of sternite 5 truncate, setulose and well-sclerotized to margin (sometimes small area of weak sclerotization present along distal margin); tergite 6 weakly

sclerotized, desclerotized dorsally on posterior margin; tergite 7 relatively narrow, dorsal width *ca.* 1/3 dorsal width of epandrium; both sternite 6 and 7 well separated into right and left portions, sternite 6 and left portion of sternite 7 broad and uniformly well-sclerotized, left portion on sternite 6 more heavily sclerotized proximally, right portion of sternite 7 *ca.* 1/2 length of right portion of sternite 6. Epandrium relatively large, with large posterolateral lobe (particularly evident in posterior profile), setulose, longest of these on posterior margin of lateral lobe (1-2 setae on posterior lobe quite thick); surstylus articulating laterally and fused medially with epandrium, rounded ventrally and concave posteriorly in lateral profile, laterally rounded in posterior profile, medial margin with acute medial process, minutely setulose on ventral margin and medial surface, area adjacent to postgonite concave. Cercus stout, posterior margin rounded, ventral margin flat, longest cercal setulae shorter than longest epandrial setulae. Hypandrium with broad quadrate dorsobasal lobe, posterior bridge produced ventrally, arm with pair of short ventromedially oriented setulae proximal to postgonite, broadly fused distally to opposite hypandrial arm; postgonite narrowing into blunt apex, obscured by surstylus in lateral profile. Phallapodeme with small, somewhat quadrate "fan", margin opposite fan convex basally, concave distally, basiphallus very elongate, weakly sclerotized basally; distiphallus base elongate and parallel sided, apex bilobed, lobes of subequal length, left lobe at base *ca.* 45° from axis of phallus, bending posteriorly before midpoint, with well-sclerotized region ventrally nearly to apex and along lateral margin on proximal half, this ending at short stout membranous lateral lobe, otherwise membranous, with fine spinules on left margin, apex narrow, right lobe straight, in same axis as phallus, with well-sclerotized region ventrally on basal *ca.* 2/3, otherwise membranous, with fine spinules

dorsally and fine pebbled texture ventrally, with slight contraction subapically.

Ejaculatory apodeme outside of basiphallus, with slight expansion and small pores basally.

Female terminalia

Ovipositor slender (as in Figure 35h). Sternite 5 length 1.8 to 2.3 times width, sternite 6 length 1.3 to 1.4 times width. Tergite 7 desclerotized medially. Tergite 8 and sternite 8 weakly sclerotized proximally. Sternite 8 with broad heavily sclerotized marginal area on apical *ca.* 1/2, sclerotized area free of microtrichia, posterior surface slightly concave, posterior margin broadly rounded to nearly truncate. Sternite 8 heavily sclerotized distally, slightly concave, heavily sclerotized area without setulae or microtrichia. Sternite 10 heavily sclerotized medially, the apical 0.5 arrow-shaped. Proximal edge heavily sclerotized, bent dorsally. Spermatheca slender and very elongate, with coarse rugae and minute, sparsely scattered papillae. Ventral receptacle with conical heavily sclerotized neck and bent, dish shaped, weakly sclerotized head, duct with minute longitudinal wrinkles.

Comments

Photographs of the *C. nigripalpe* holotype (NHMW) clearly show the diagnostic wing patterning of *C. hendelianum* and as such it is here treated as a junior synonym.

Curran designated male and female cotypes of this species (deposited at AMNH), as well as at two least paratypes (both male, deposited at CASC) under the unpublished name *Curtonotum varipennis*. The information associated with these specimens (locality, date, sexes) and their appearance matches the collection information and description given by Curran for *C. hendeli* (Curran 1934: 441-442). It seems likely Curran changed

his mind about the identity of specimens, and rather than describe them as a new species, he misattributed them to (though never relabeled them as) *C. hendeli*.

Type Material

A female specimen of *C. nigripalpe* Hendel labeled as the holotype was photographed by S. A. Marshall during a 2001 visit to NHMW. In this photograph the diagnostic wing pattern of *C. hendelianum* is visible. Several emails and a written letter have been sent to Dr. P. Sehnaal, the curator of the Diptera collection at NHMW, to borrow this specimen for further study and to find out if the other seven male specimens of the type series are also present, but no response has been received.

***Curtonotum hendelianum* Enderlein**

HOLOTYPE: SURINAM. 1♀ (HNHM). We have seen only photographs provided by G. Lengyel (HNHM).

***Curtonotum nigripalpe* Hendel**

HOLOTYPE: BRAZIL. Pará: Belem, 1♀, 11-26.v.1927, Czerny (NHMW).

Other Material Examined

Unknown country - "Amaz", 1♂1♀ (same pin), Sladen (CNCI). **GUYANA:** 1♂, 1908, K.S. Wise (BMNH). **Cuyuni-Mazaruni:** Mazaruni, low forest, 2° growth, 1♂, 16.viii.1937, 1♀, 23.viii.1937, 1♂, 25.viii.1937, 1♀, 18.ix.1937, 1♀, 26.ix.1937, all Richards and Smart (all BMNH). **Potaro-Siparuni:** Kaieteur, savannah & environs, 1♀, ix.1937, Richards and Smart (BMNH); Kaieteur Falls, 5°10.5'N, 59°28.9'W, 1♀, 21-24.viii.1997, W.N. Mathis (USNM); Essequibo R., Moraballi Cr., Wallaba forest, 1♂, 7.xi.1929, Oxf. Univ. Expedn. (BMNH); Kartabo, 1♂, 3.viii.1924, S. Crawford (CMNH). **BRAZIL. Amazonas:** Manaus, 2♀, 3.ix.1962, K. Henko (MZSP); 26 km N. Manaus,

1♀, 4-9.xi.1991, E.M. Fisher (CSCA). **Rondania:** 7 km NE Costa Marques, 1♂, 5-30.vi.1987, Malaise, T. Klein (USNM). **Pará:** Canindé, Rio Gurupi, 1♂, 2-30.v.1963, B. Malkin (MZSP). **SURINAM. Paramaribo:** 1♂, 4.ix.1943, D.G. Hall (USNM).

***Curtonotum scambum* Klymko and Marshall, sp. nov.**

Figure 29 and 36m

Etymology

From Latin, *scambus*, meaning bowlegged, referring to the bent hind femora of this species.

Diagnosis

Curtonotum scambum can be distinguished from congeners outside of the *C. vulpinum* species group by the basal bend in the hind thorax. The extent of infuscation apically in r_1 and r_{2+3} is also more limited than in wings of similarly marked species except *C. gracile*, its proximal margin at or just anterior of level of crossvein dm-cu.

Description

Matches description for *C. hendelianum* except as follows. Length 6.3 – 8.1 mm. Frons with dark brown ground colour extending to lateral margin, iridescence purple or green, width 1.3 to 1.4 times length, parallel sided to slightly narrower ventrally. Proclinate bristle ventral to major reclinate bristle, minor reclinate bristle ventral and medial to major reclinate bristle. Face and parafacial ground colour medium brown, parafacial slightly broader, eye height 12.0 to 17.5 gena height. Clypeus with medium brown ground colour, prementum lightly grey pruinose. Legs yellow-orange, grey pruinose throughout, ctenidial setae 6-8, mid and hind femora without darkened apices, hind femur

with ventral concavity on proximal half, with 1-2 subapical dorsal setae. Area of dark brown infuscation apically in r_1 and anterior $1/3$ to $1/2$ of r_{2+3} , the anterior margin of this infuscation at or slightly proximal of the level of crossvein dm-cu; r_1 otherwise dark brown infusate on anterior $1/4$ to $1/2$ to level of crossvein r-m; r_{2+3} lightly brown infusate in broad apical area, membrane around r_{4+5} and m_1 narrowly brown infusate. Tergite 3 and 4 with broad medial and lateral vittae, these wider on tergite 4; brown pruinosity not limited to anterolateral corners, extending to posterior margin and along anterior margin in tergite 5 (nearly to medial vitta in some specimens).

Male terminalia

Sternite 5 often with invaginate area of weak sclerotization on distal margin (this absent in 1 male from Iquitos, Peru), weakly sclerotized area without setulae; tergite 6 weakly sclerotized, somewhat desclerotized medially; tergite 7 very short, dorsal length less than $1/15$ epandrial dorsal length; both sternite 6 and 7 well separated into right and left portions, right and left portion of sternite 6 broad and well-sclerotized, right portion slightly bulging on left, left portion more heavily sclerotized proximally; right portion of sternite 7 relatively long, subequal in length to right portion of sternite 6. Epandrium relatively large, with large posterolateral lobe (particularly evident in posterior profile), with scattered setulae (longest of these on posterior margin of lateral lobe); surstylus laterally articulating with and medially fused to epandrium, broadening distally, lateral margin rounded in posterior profile, distomedial corner bending ventrally, exposing ventral face in posterior profile, minutely setulose marginally and medially; area adjacent to postgonite concave. Cercus longer than high, ventral margin flat, posterior margin broadly rounded, longest cercal setulae shorter than longest epandrial setulae.

Hypandrium with broad, somewhat peaked dorsobasal lobe, posterior bridge produced ventrally and slightly posteriorly, arm with slight dorsal bend bent then strong ventral bend within hypandrium, with 1-2 medially oriented setulae proximal to postgonite, broadly fused distally (point of fusion demarked by a suture); postgonite narrowing into slightly upturned minutely setulose apex, obscured by surstylus in lateral profile.

Phallapodeme with relatively small, anteriorly bulging "fan", margin opposite fan convex basally, concave distally; basiphallus very elongate, weakly sclerotized basally, slightly S-shaped in dorsal profile subapically, broadening slightly apically; distiphallus base elongate, flattened and twisted, broad narrow edge flaring ventrally and to left, apex bilobed, lobes of subequal length, left lobe at base at *ca.* 45° angle from phallus axis, bending distally at midpoint, with ventral sclerotized region bifurcate basally, left portion short, right portion elongated, extending *ca.* 3/4 distance to apex, membranous portion broad, with scaly texture ventrally and fine spinules dorsally, right lobe narrowly sclerotized, sclerotization extending *ca.* 3/4 distance to apex, otherwise membranous, dorsal surface with fine short spinules. Ejaculatory apodeme outside of basiphallus, with slight expansion and small pores basally.

Female terminalia

Ovipositor slender and elongate (as in Figure 35h). Sternite 5 length 1.7 to 2.4 times width, sternite 6 length 1.6 to 1.7 times width, tergite 6 slightly desclerotized medially 1/3 or less on proximal half. Tergite 7 desclerotized medially. Tergite 8 and sternite 8 weakly sclerotized proximally. Sternite 8 with broad heavily sclerotized margin area on apical half, heavily sclerotized area without setulae or microtrichia, surface slightly concave apically, weakly arrow shaped. Ventral receptacle with broad-based conical neck

and bent, concave dish-shaped apex, duct with minute longitudinal wrinkles.

Spermatheca elongate, rugose, with minute scattered protuberances, the relative length and density of protuberances varying within species.

Type Material

HOLOTYPE: PERU. Loreto: Iquitos, 1, iii-iv.1934, R.C. Shannon (USNM).

PARATYPES: PERU: Loreto: Callicebus Res. Station, Mishana, Rio Nanay, 25 km SW Iquitos, tropical west forest, 120 m, 1♂1♀, 10-17.i.1980, J.B. Heppner (USNM); Iquitos, 2♂6♀, iii-iv.1934, R.C. Shannon (USNM).

***Curtonotum gracile* Klymko and Marshall, sp. nov.**

Figure 30

Etymology

From Latin, *gracilis*, meaning slender, referring to the elongate slender basiphallus of this species.

Diagnosis

Distinguished from all congeners by the combination of a wing with extensive dark infuscation in r_1 and r_{2+3} and around dm-cu, a dark brown palpus and medium to dark brown face, a moderately tall gena (eye height to gena height ratio is 10.5 to 12.0), an orange-brown frons free of vittae, and a vibrissa that is no longer than adjacent subvibrissae.

Description

Length: 7.0 to 8.5 mm

Head

Frons orange-brown with greenish purple iridescence (visible only from oblique angle), with scattered pale setulae, moderate bulge ventrally, width 1.3 to 1.4 times height, parallel sided, lateral margin silver pruinose. Ocellar triangle and narrow lateral strip gold pruinose, pruinosity not extending anterior of anterior ocellus, lateral pruinose strip extending from median occipital sclerite to slightly anterior of proclinate bristle.

Proclinate bristle *ca.* 2/5s sagittal distance between anterior ocellus and ventral margin of frons, anterior to major reclinate bristle; minor reclinate bristle anterior and medial to major reclinate bristle. Face with dark to medium brown ground, colour paler lateral of frontogenal suture, frontal carina flat in lateral profile, vibrissa subequal in length to adjacent subvibrissals. Parafacial moderately broad, gena relatively narrow, former densely silver pruinose with brown-yellow ground colour, latter lightly pruinose, ground similar, slightly darker posteriorly, eye height 10.5 to 12.0 times gena height. Clypeus silver pruinose with medium brown ground colour; palpus brown microtrichose with dark brown ground colour; prementum with dark brown ground colour, lightly silver pruinose laterally, bare and shiny medially. Scape and pedicel silver pruinose with orange-brown ground colour; first flagellomere silver microtrichose, ground colour orange-brown on proximal *ca.* 1/3, otherwise dark brown.

Thorax

Colouration of and patterning in pruinosity difficult to assess due to somewhat degraded nature of the two specimens available. Specimens in better condition may differ from this description. Grey pruinose (except grey-brown pruinose scutellum). Scutum moderately arched, each scutal, postpronotal, and anepisternal seta and setula with grey-brown spot

around socket. Scutum with two pairs of lateral vitta, these well defined posteriorly, their extent impossible to assess with specimens available. Postpronotal lobe with 5 setae, anterior 2 and posterior setae relatively weak, two strong setae subequal in length. Anepisternum with 2-3 strong and 1-2 moderate setae (female specimen with 2 strong and 2 moderate, male specimen with 3 strong and 1 moderate); katepisternum with two prominent lateral setae, anterodorsal seta relatively weak, linear tuft of setulae under fore coxa orange-yellow. Area below and behind posterior spiracle bare (without fringe of setulae); minute setulae on ventral half of meron present.

Legs

Coxae densely grey pruinose, legs otherwise lightly so. Chaetotaxy black except for very dense, regularly spaced transverse rows of setulae anteroventrally on apical 1/2 of fore tibia and similar setulae on fore first tarsomere, these dark brown. Ground colour of legs orange-yellow, femora slightly darker of apical *ca.* 1/3. Fore femur with 5 posterodorsal setae, 5-7 ctenidial setae, these relatively thick and subequal in length to adjacent setulae; mid femur with 6-8 anterior setae; hind femur with single subapical dorsal seta. Mid tibia with 2 strong, one moderate, and several weak ventral apical setae, the moderate seta between the strong setae. Mid and hind fifth tarsomeres without short cuneiform setae on anteroventral margin.

Wing

As in *C. atlanticum* except as follows. Costal cell pale brown infuscate, proximal limit of area of dark brown infuscation in r_1 and r_{2+3} at *ca.* 2/3s distance from R_1 apex to level of dm-cu in male specimen, to just proximal to level of dm-cu in female specimen.

Abdomen

Grey pruinose except where noted, ground colour dark brown. Tergite 1 lightly pruinose, visible only from oblique angle. Tergite 2 medium brown pruinose dorsally on posterior *ca.* 1/2. Tergite 3 brown pruinose dorsally on distal *ca.* 2/3s, with narrow lateral and moderately broad medial brown vittae. Tergite 4 similar to tergite 3 but brown pruinose dorsally on distal *ca.* 2/5s, lateral vitta moderately broad. Tergite 5 similar to tergite 3 but brown pruinose of dorsal *ca.* 1/5 and without lateral vitta (small indentation present laterally on anterior margin of dorsal brown pruinose area).

Male terminalia

Sternite 5 truncate posteriorly, with slight desclerotized invagination on posterior margin, area of desclerotization setulose; tergite 6 moderately well-sclerotized, desclerotized medially; tergite 7 relatively short, dorsal length *ca.* 0.3 times epandrial dorsal length; sternite 6 and 7 separated into right and left portions, sternite 6 broad, well-sclerotized, left portion more heavily sclerotized along proximal margin; right portion of sternite 7 short, *ca.* 1/3 as long as right portion of sternite 6. Epandrium relatively small, with large posterolateral lobes (particularly evident in posterior profile, scattered setulae (longest on posterolateral lobe); surstylus laterally articulating and medially fused with epandrium, posteriorly bending medially around postgonite, minutely setulose on medial face and ventral margin, ventral face concave adjacent to postgonite, in lateral profile posteroventral margin slightly concave, posterior margin flat, in posterior profile medial margin straight, parallel to medial margin of opposite surstylus. Cercus stout, ventral margin flat, posterior margin broadly rounded, longest cercal setulae shorter than longest epandrial setulae. Hypandrium with broad-based, triangular dorsobasal lobe, posterior

bridge projecting anteroventrally, hypandrial arm with slight dorsal bend at posterior margin of epandrium, with two venteromedially oriented setulae proximal to postgonite, broadly fused apically to opposite hypandrial arm; postgonite with medial margin straight, apex upturned, minutely setulose dorsally. Phallapodeme with relatively large, anteriorly bulging "fan", margin opposite fan convex basally, concave distally; basiphallus weakly sclerotized basally, extremely elongate; distiphallus base very slender, straight, and elongate, bowed slightly dorsally, apex bilobed, left lobe longer, at *ca.* 45° angle from axis of phallus, well-sclerotized medially on ventral face on proximal half, ventral face otherwise moderately sclerotized and with pebbled texture, well-sclerotized on dorsolateral margin on basal 1/3, this sclerotized plate sharply pointed and incurved apically, ventrolateral margin with serrate with moderately well-sclerotized, with antrorse teeth (these occluded in dorsal profile by somewhat inflated, membranous dorsal surface), dorsal face membranous, with patch of broad-based, stout spinules on distal half and fine spinules on proximal half, apex broadly rounded, right lobe well-sclerotized medially on ventral face on proximal half, ventral face otherwise lightly sclerotized, with pebbled texture, dorsal surface moderately sclerotized medially, otherwise lightly sclerotized, with pebbled texture, contracted subapically, apex a rounded knob. Ejaculatory apodeme in single available male specimen apparently lost during dissection.

Female abdomen

Ovipositor slender and elongate (as in Figure 35h). Sternite 5 length 2.4 times width, sternite 6 length 1.6 times width. Tergite 6 desclerotized medially on proximal *ca.* 1/3. Tergite 7 desclerotized medially. Tergite 8 and sternite 8 weakly sclerotized proximally.

Sternite 8 broadly pointed at apex, with extensive heavy sclerotization on posterior half, area of heavy sclerotization free of microtrichia. Sternite 10 elongate, distal half broad, heavily sclerotized along proximal edge, proximal edge bent dorsally; band of heavy sclerotization medially, this area with larger microtrichia. Spermatheca elongate, very finely rugose with minute protuberances scattered along raised ridges. Ventral receptacle with squat, well-sclerotized, oblique neck, bent at base of head, head a circular disk, duct with minute transverse wrinkles.

Type Material

HOLOTYPE: BRAZIL. Pará: Cachimbo, 1♂, x.[1]955, Pe. Pereira (MZSP).

PARATYPE: BRAZIL. Pará: Cachimbo, 1♀, x.[1]955, Pe. Pereira (MZSP).

***Curtonotum desperatum* Klymko and Marshall, sp. nov.**

Figure 31

Etymology

From Latin, *desperatus*, meaning without hope, referring to the rather desperate nature of the single known specimen, and calling attention to the need for more intensive collecting of Curtonotidae and other lesser known insect families.

Diagnosis

Because of the very greasy state of the single specimen available, colouration, particularly that of pruinosity, is difficult to assess. As such this diagnosis is quite conservative in its use of colour characters.

Can be distinguished from all congeners but *C. punctithorax*, *C. atlanticum*, *C. papillatum*, *C. hunkingi*, *C. gracile* by the combination a dark brown thoracic and

abdominal ground colour, extensive infuscation in r_1 and r_{2+3} , two lateral katapisternal setae, yellow-brown legs and clypeus, moderately tall gena (eye height to gena height ratio 11.0) and brown face. Can be presumably be distinguished from *C. atlanticum*, *C. papillatum*, and *C. hunkingi* by its palpi which are dark brown, conspicuously darker than the clypeus, and from those three species plus *C. punctithorax* by its frons which appears to lack dark brown medial and lateral vittae. Can be distinguished from *C. gracile* by the darkened apices of its mid and hind femur (this character not present in the two specimens of *C. gracile* available), its shorter basiphallus, less elongate distiphallus base, and the presence of a recurved lateral process on the left distiphallic lobe.

Description

Based on holotype.

Length: 8.0 mm

Head

Head of holotype greasy, obscuring true colour of pruinosity. Frons dark brown, with slightly paler medial vitta and greenish purple iridescence, especially in lateroventral corner (iridescence visible only from oblique angle), scattered pale setulae, slight bulge ventrally, width 1.3 times height, parallel sided, lateral margin narrowly pruinose. Ocellar triangle and narrow lateral strip pruinose, pruinosity of ocellar triangle extending anterior of anterior ocellus, its apical margin an acute point, lateral pruinose strip extending from median occipital sclerite to *ca.* 1/4 distance from proclinate bristle to ventral margin of frons. Proclinate bristle at *ca.* 2/5 sagittal distance from anterior ocellus to ventral margin of frons (right proclinate bristle missing [including socket] on holotype), anterior to and slightly lateral of major reclinate bristle, minor reclinate bristle anterior to and medial of

major reclinate bristle. Face pruinose, with dark brown ground colour, slightly convex; vibrissa slightly longer than adjacent subvibrissals. Parafacial and gena narrow, pruinose, ground colour yellow-brown, gena darker posteriorly, eye height 11.0 times gena height. Clypeus with yellow-brown ground colour, microtrichose, palpus and prementum with dark brown ground colour, former microtrichose, surface condition of latter indiscernible due to greasing. Scape and pedicel pruinose with orange-brown ground colour, first flagellomere densely microtrichose, with orange-brown ground colour on basal *ca.* 1/4, otherwise dark brown.

Thorax

Pruinosity colour largely obscured by greasing, ground colour dark brown. Scutum moderately arched, dark spots present around bases of setulae and setae on at least the scutum, likely elsewhere. Postpronotal lobe with two setae, posterior seta knocked off on both sides, on right side a third smaller anterior seta present; notopleuron setulose; scutellum with two pairs of marginal setae. Anepisternum with two subequal large setae and four smaller setae on posterior half; katepisternum with two lateral setae, anterodorsal seta much smaller than posterodorsal; linear tuft of setulae under fore coxa dark brown. Area below and behind posterior spiracle bare (without fringe of setulae); minute setulae present on ventral half of meron present.

Legs

Holotype missing right fore and mid leg below the coxae, left fore and mid tarsi and left tarsomeres 2-5, left mid tibia glued onto plastic stage on which specimen is mounted. Colour of pruinosity obscured by grease. Ground colour brown-yellow mid and hind femur brown on apical *ca.* 1/10 and 1/5, respectively. Chaetotaxy black except for very

dense, regularly spaced transverse rows of setulae anteroventrally on apical 1/2 of fore tibia, these dark brown. Fore femur with 6 posterodorsal setae, ctenidial setae 9, only slightly thicker than adjacent setulae; mid femur with 5 anterior setae; hind femur with single subapical dorsal seta. Mid tibia with two strong, two moderate, and several weak apical ventral setae. One moderate seta between the large setae, second weaker moderate seta posterior to the large setae. Row of cuneiform setae absent on entire anteroventral margin of hind (and presumably mid) fifth tarsomeres.

Wing

As in *C. atlanticum* except as follows. Wing with grey-brown tinge, costal cell dark brown infusate.

Abdomen

Holotype abdomen greasy but for small patches on tergites 4 and 5, as such colour of pruinosity and subsequently patterning largely indiscernable. Ground colour dark brown. Tergite 4 grey pruinose laterally, posterior margin brown pruinose, not enough pruinosity present to discern lateral or medial vittae. Tergite 5 largely grey pruinose with broad brown pruinose medial vitta and brown pruinosity on distal *ca.* 1/4. If lateral vitta present on tergite 5 then very narrow, though preservation of pruinosity too poor to discern this with confidence.

Male terminalia

Sternite 5 with slight invaginate area of weak sclerotization on distal margin, weakly sclerotized area without setulae, posterior margin truncate; tergite 6 moderately sclerotized, desclerotized dorsally; tergite 7 relatively long, dorsal length *ca.* 0.5 times dorsal epandrial length; sternite 6 and 7 folded over but not broken along protandrial fold,

sternite 6 broad, well-sclerotized, left portion more heavily sclerotized along proximal margin, right portions of sternite 7 large, nearly as long as adjacent portion of sternite 6. Epandrium relatively small, with large posterolateral lobe (particularly evident in posterior profile), scattered setulae (these longest on posteroventral lobe); surstylus laterally articulating and medially fused to epandrium, broadly rounded posteriorly in lateral profile, posterodorsal corner angular, medial margin (in posterior profile) and ventral face with concavity adjacent to postgonite, minutely setulose laterally on posterior half and ventrally. Cercus stout, with ventral margin flat, longest cercal setulae shorter than longest epandrial setulae. Hypandrium with broad-based, proximally rounded and distally tapering dorsobasal lobe, posterior bridge slightly produced ventrally and anteriorly, arm bent dorsally within epandrium, with one ventromedially and one ventrally oriented setula proximal to postgonite, ventrally oriented setula more distal, broadly fused apically to opposite hypandrial arm; postgonite occluded by surstylus in lateral profile, minutely setulose dorsally at apex, with cleft in posterior margin. Phallapodeme with relatively large, anteriorly bulging "fan", margin opposite fan convex basally, concave distally; basiphallus very elongate, weakly sclerotized basally, with subapical ventral bulge, bending slightly to right then to left (hence lateral margins parallel) distal of bulge; distiphallus base relatively straight and elongate, tapering apically in dorsal profile, bowing slightly dorsally in lateral profile, apex bilobed, left lobe nearly perpendicular to axis of phallus basally, distal 2/3s posteriorly bent, longer than right, with retrorse, spinose moderately sclerotized process on lateral margin, ventral half well-sclerotized ventrally, smooth, lightly sclerotized dorsally, with elongate erect spinules, distal half moderately sclerotized throughout, smooth dorsally, ventrally with

broad-based, short, antrorse spinules, apex rounded, right lobe straight, moderately sclerotized dorsally (especially medially), weakly sclerotized ventrally, with pebbled texture throughout, left basal corner with short fine spinules swept to left, apex rounded. Ejaculatory apodeme outside of basiphallus, elongate, pointed apically, with small pores on basal 2/3s.

Female terminalia

Unknown.

Type Material

HOLOTYPE: BRAZIL. “59.57 Vigors Coll.”, 1♂ (BMNH).

***Curtonotum atlanticum* Klymko and Marshall, sp. nov.**

Figure 32

Etymology

In reference to the Atlantic forest, the only known habitat of this species.

Diagnosis

Distinguished from congeners but *C. papillatum*, *C. hunkingi*, *C. punctithorax*, and possibly *C. desperatum* (this species is included here due to the degraded state of the only specimen available) by its orange-yellow frons with prominent brown medial and lateral vittae. To distinguish this species from the latter two species see their diagnoses. To distinguish this species from *C. papillatum* and *C. hunkingi* see Comments below.

Description

Length: 7.5-8.3 mm

Head

Frons orange-yellow with prominent dark brown medial and lateral vittae and faint blue-green iridescence (visible only from oblique angle), medial vitta narrow, diffuse at dorsal and ventral ends, lateral vittae between medial vitta and orbital setae, convergent and much more strongly pigmented ventrally, with scattered pale setulae, moderate bulge ventrally, width 1.2 to 1.4 times height, slightly narrower ventrally, lateral margin silver pruinose. Ocellar triangle and narrow lateral strip gold pruinose, pruinosity of ocellar triangle extending anterior of anterior ocellus, anterior margin rounded or acutely pointed, lateral pruinose strip extending from median occipital sclerite to slightly anterior of proclinate bristle. Proclinate bristle *ca.* 1/4 to 1/3 sagittal distance from anterior ocellus to ventral margin of frons, anterior and slightly lateral to major reclinate bristle; minor reclinate bristle anterior and medial to major reclinate bristle. Face silver pruinose, ground colour pale brown-yellow, facial carina often with darker ground colour; vibrissa *ca.* twice as long as adjacent subvibrissals. Parafacial and gena moderately broad, former silver pruinose with pale orange-yellow ground colour, latter yellow-brown pruinose with brown ground colour, eye height 6.4 to 10.7 times gena height. Clypeus silver pruinose, with orange-yellow ground colour; palpus silver microtrichose, ground colour slightly darker than clypeus; prementum medium to dark brown, sparsely silver pruinose laterally. Scape and pedicel silver pruinose with orange-yellow ground colour; first flagellomere silver microtrichose, with orange ground colour on proximal *ca.* 1/3 to 1/2, otherwise orange-brown.

Thorax

Ground colour medium to dark brown, scutum light brown pruinose; scutellum dark brown pruinose medially, light brown pruinose laterally; pleuron purple-grey pruinose. Scutum moderately arched, each scutal, postpronotal, and anepisternal seta and setula with dark brown spot around socket. Scutum with 2 pairs of narrow vittae, these visible only near posterior margin, their anterior margin at *ca.* midpoint between posterior scutal margin and transverse suture. Postpronotal lobe with three setae, center seta *ca.* 0.75 times length of posterior seta, anterior seta much smaller, sometimes additional small seta present posterior to these; notopleuron setulose or bare; scutellum with two pairs of marginal setae. Anepisternum with 2 strong and 2-4 moderate setae on posterior half; katepisternum with 2 prominent lateral setae, anterodorsal seta weaker than posteroventral seta; linear tuft of setulae under fore coxa orange-yellow. Area below and behind posterior spiracle bare (without fringe of setulae); minute setulae on ventral half of meron present.

Legs

Coxae densely silver pruinose, legs otherwise lightly so. Chaetotaxy black except for very dense, regularly spaced transverse rows of setulae anteroventrally on apical 1/2 of fore tibia and similar setulae on fore first tarsomere, these medium brown. Legs with brown-yellow ground colour, all tibiae, femora, and tarsomeres 1 and 2 dark brown at apex, tarsomeres 3-5 dark brown throughout (specimens from Teresopolis, Brazil, with relatively dark tibiae and femora). Fore femur with 4-6 posterodorsal setae, 6-7 ctenidial setae, these relatively thick and subequal in length to adjacent setulae; mid femur with 4-6 anterior setae; hind femur with single subapical dorsal seta. Mid tibia with two strong,

one moderate and several weak apical ventral setae, the moderate seta between the strong setae. Row of cuneiform setae present on proximal 1/3 to entire anteroventral margin of mid tarsomere and proximal *ca.* 2/3s of hind tarsomere.

Wing

Alula relatively broad. Non-infuscated areas of wing with yellow to yellow-brown tinge. Costal cell dark to medium brown infuscate, r_1 dark brown infuscate, infuscation paler and yellower distal of costal cell (as in Figure 36n), the size of this pale area varying somewhat between specimens (in specimens from Teresopolis, Brazil, r_1 is dark brown infuscate throughout); r_{2+3} dark brown infuscate on anterior half, infuscation starting distal of r-m (as in Figure 36n) (in specimens from Teresopolis, Brazil, area of infuscation starts at level of r-m), pale brown in broad distal area; membrane around crossvein dm-cu narrowly brown infuscate.

Abdomen

Ground colour dark brown, grey pruinose except where noted. Tergite 2 brown pruinose dorsally on posterior *ca.* 1/3; tergite 3, brown pruinose dorsally on posterior *ca.* 1/2 to 1/4, with medial and lateral brown pruinose vittae, grey pruinose to posterior margin lateral of lateral vitta; tergite 4 similar to tergite 3 but narrowly brown pruinose along posterior margin lateral of lateral vitta; tergite 5 similar to tergite 4 but brown pruinose dorsally only on posterior 1/6 to 1/3. In tergites 3-5 the grey maculae isolated by the lateral and medial vittae fainter than other area of grey pruinosity on the abdomen, and with a purple cast.

Male terminalia

Sternite 5 with invaginate area of weak sclerotization on distal margin, weakly sclerotized area setulose, posterior margin truncate; tergite 6 weakly to moderately sclerotized, desclerotized dorsally; tergite 7 relatively long, dorsal length *ca.* 0.6 times epandrial dorsal length; both sternite 6 and 7 well separated into right and left portions, right and left portion of sternite 6 broad and well-sclerotized, left portion more heavily sclerotized proximally; right portion of sternite 7 a well-sclerotized relatively broad band, only slightly shorter than right portion of sternite 6. Epandrium moderately large, with large posterolateral lobe (particularly evident in posterior profile), scattered setulae (in no area are these particularly long); surstylus laterally articulating with and medially fused to epandrium, nearly quadrate in lateral profile, distomedial corner angular and slightly recurved and medial margin concave in posterior profile, with minute setulae dorsally and ventrally, area adjacent to postgonite concave. Cercus stout, with ventral margin flat or slightly concave, longest cercal setulae subequal to longest epandrial setulae.

Hypandrium with broad-based and broadly rounded dorsobasal lobe, posterior bridge produced ventrally produced, arm relatively straight, with 2-3 ventromedially oriented setulae proximal to postgonite, broadly fused distally; postgonite narrowing distally, medially margin with broad medial process abutting with adjacent postgonite, with small cleft in lateral profile on distal margin, minutely setulose dorsally, obscured by surstylus in lateral profile. Phallapodeme with relatively small, anteriorly bulging "fan", margin opposite fan convex basally, concave distally; basiphallus very elongate, weakly sclerotized basally, straightening slightly distally in lateral profile, with subapical concavity on left in posterior profile and slight to moderate apical bulge; distiphallus base

elongate, broad and dorsoventrally flattened on proximal 2/3s, bowed dorsally in lateral profile, S-shaped in dorsal profile, narrowing distally, apex bilobed, left lobe slightly longer, nearly perpendicular to axis of phallus basally, apical 2/3s bent posteriorly, with narrow, heavily sclerotized area on ventral surface, this extending to *ca.* midpoint, moderately sclerotized on proximal half of lateral margin, lobe otherwise lightly sclerotized, bending distally at midpoint, with recurved process on left lateral margin at bend, ventral surface with very broad base spinules, apex broadly rounded; right lobe in same axis as phallus, straight, moderately sclerotized and with fine pebbled texture ventrally, with broad moderately sclerotized region dorsally, with short stout spinules dorsally and fine elongate spinules on right and left, apex broadly rounded. Ejaculatory apodeme outside of basiphallus, rod shaped, with small pores on basal *ca.* 2/3s.

Female terminalia

Ovipositor slender and elongate (as in Figure 35h). Sternite 5 length 1.6 to 1.8 times width, sternite 6 length *ca.* 1.1 to 1.2 times width, tergite 6 desclerotized medially on proximal half, tergite 7 desclerotized medially. Tergite 8 and sternite 8 weakly sclerotized proximally. Sternite 8 nearly truncate apically, distal 1/3 heavily sclerotized, especially marginally, area of heavy sclerotization without microtrichia or setulae. Sternite 10 heavily sclerotized and with antrorse spinules medially, area of sclerotization flaring proximally, proximal margin with slight dorsal bend, profile narrow on posterior half, broader on anterior half. Spermatheca elongate, surface with moderate ridges, in some specimens these forming protuberances. Ventral receptacle flared basally, neck heavily sclerotized with concave margins, apex lightly sclerotized, hemispherical, duct finely wrinkled longitudinally.

Comments

Curtonotum hunkingi, *C. atlanticum* and *C. papillatum* can only be identified with confidence through the examination of male genitalia. While slight differences exist in the range of head dimensions and seta numbers given in the descriptions, there is so much interspecific overlap and intraspecific variability that these characters are not diagnostic. Some external characters that may of use for distinguishing these species are discussed here, but, given the very limited number of localities for each species, the variability within each is not well known and may prove to render external characters relatively useless. While in the specimens available there are differences in the spermathecae and ventral receptacles, it is likely that the full range of variation within these structures is not represented in the small number of specimens available (*e.g.* only one specimen in *C. hunkingi* and four in *C. atlanticum* [one of these left undissected]), and therefore caution should be taken when identifying female specimens not associated with males.

The frontal vittae are less well defined (the medial vitta is often absent) and less pronounced ventrally in *C. papillatum* than in the other two species. The anterior margin of the ocellar triangle pruinosity is always acutely pointed in *C. papillatum*; this condition is present in some *C. atlanticum* specimens and none of the *C. hunkingi* specimens. The extent of the scutal vittae is also variable between these species. In *C. atlanticum* both pairs of vittae extend from the posterior margin to the midpoint between posterior margin and transverse suture. In *C. papillatum* the extent of the medial pair is variable, in some specimens they extend to the level of the postpronotal lobe, in others they are as limited as in *C. atlanticum*; the lateral pair extends nearly to the transverse suture. In *C. hunkingi* the medial pair extends to level of postpronotal lobe, but the lateral pair is as limited as in

C. atlanticum (as mentioned in description, this is based on a single specimen). However, in all three of these species these vittae are very faint, especially anteriorly, and therefore can be difficult to assess. The relative extent of cuneiform setae appears to vary between species, with *C. hunkingi* having the most, *C. papillatum* having the least, and *C. atlanticum* falling somewhere between, but there is much overlap in the specimens examined, and the extent of overlap will likely increase as more specimens become available.

Curtonotum atlanticum females can be distinguished from *C. papillatum* and *C. hunkingi* by the ventral receptacle which lacks the bulbous head found in the latter two species. *Curtonotum papillatum* females can be distinguished from *C. hunkingi* by their densely papillose spermatheca without any rugae and a ventral receptacle with a longer, and more heavily sclerotized neck (relative to the head).

Male *C. papillatum* can be most easily distinguished from *C. atlanticum* and *C. hunkingi* by the more elongate basiphallus and straight and slender distiphallus base (compare Figures 34a and 34c to Figures 32a, 32c, and 33b, and 33c). *Curtonotum atlanticum* can be distinguished from *C. hunkingi* by the basally broad and dorsoventrally flattened distiphallus (compare Figures 32a and 32c with Figures 33b, and 33c).

Type Material

HOLOTYPE: BRAZIL. São Paulo: Campos do Jordão, 1♂, i.1948, F. Lane (MZSP).

PARATYPES: BRAZIL. Rio de Janeiro: Itatiaia, Maromba, 1♂, i.1948, C. d'Andretta (MZSP); Teresópolis, Parque Nacional da Serra dos Orgaos, 1300-1700m, trail to Pedra do Sino, 1♂1♀, 25.i.1990, S.A. Marshall (DEBU). **São Paulo:** Campos do Jordão, 1♂1♀, 4.i.1936, 1♂, 6.i.1936, 2♂1♀, i.1948, all F. Lane (MZSP).

***Curtonotum hunkingi* Klymko and Marshall, sp. nov.**

Figure 33

Etymology

In honour of Mr. J. Hunking, a high school biology teacher that inspired the author to pursue studies in biology.

Diagnosis

See diagnosis of *C. atlanticum*.

Description

Length: 8.0 mm

Similar to *C. atlanticum* except as follows. Frons width 1.2 to 1.3 times frons height, parallel sided to slightly narrower ventrally, pruinosity of ocellar triangle extending anterior of anterior ocellus, anterior margin rounded. Proclinate bristle *ca.* 0.29 to 0.30 sagittal distance from anterior ocellus to ventral margin of frons. Eye height 7.4 to 10.7 times gena height. Palpus ground colour similar to or slightly darker than clypeus colour. Medial pair of scutal vittae extending anteriorly to base of postpronotal lobe (this is based solely on male Sta. Catarina, Brazil, specimen, other two specimens with greasy thoraxes). 6-10 ctenidial setae present. Hind femur with two subapical dorsal setae in specimen from Parana, Brazil. Row of cuneiform setae present on proximal 3/4s to entire anteroventral margin of mid tarsomere and proximal *ca.* 3/4s of hind tarsomere.

Male terminalia

Sternite 5 with invaginate area of weak sclerotization on distal margin, weakly sclerotized area setulose, posterior margin truncate; tergite 6 well-sclerotized, with

desclerotized break on right side dorsally; tergite 7 relatively broad, dorsal width *ca.* 0.4 to 0.8 times epandrial dorsal width; both sternite 6 and 7 well separated into right and left portions, right and left portion of sternite 6 broad and well-sclerotized, left portion more heavily sclerotized proximally; right portion of sternite 7 a well-sclerotized relatively broad band, subequal in length to right portion of sternite 6. Epandrium moderately large, with large posterolateral lobe (particularly evident in posterior profile), scattered setulae (in no area are these particularly long), distinctly longer ventrally than dorsally in lateral profile; surstylus laterally articulating with and medially fused to epandrium, broadly rounded posteriorly in lateral profile, with small concavity on posterior margin, in posterior profile medial margin with sharp obtuse point, minutely setulose medially and ventrally, area adjacent to postgonite concave. Cercus stout, with ventral margin flat to slightly concave, longest cercal setulae shorter than longest epandrial setulae.

Hypandrium with broad-based and broadly rounded to triangular dorsobasal lobe, arm relatively straight, with 2-3 ventromedially oriented setulae on ventral projection at base of postgonite, these on pronounced ventral lobe, broadly fused distally; medial margin of postgonite with broad medial process abutting with adjacent postgonite, apex slightly upturned in lateral profile, minutely setulose dorsally. Phallapodeme with relatively small, anteriorly bulging "fan", margin opposite fan convex; basiphallus very elongate, weakly sclerotized basally, straightening, with subapical concavity on left in posterior profile; distiphallus base slender and elongate, bowing slightly to left, bowing dorsally in lateral profile, apex bilobed, left lobe perpendicular to axis of phallus basally, apical 2/3s bent posteriorly, with narrow, heavily sclerotized area on ventral surface, this extending to or beyond midpoint, moderately sclerotized on lateral margin to base of recurved

process, lobe otherwise lightly sclerotized, dorsal surface with fine spinules, ventral surface with very broad base spinules extending to serrate distolateral margin, apex broadly rounded; right lobe straight, in same axis as phallus, lightly sclerotized ventrally, with pebbled texture, with broad moderately sclerotized region dorsally, with short fine spinules dorsally (these longer laterally) and pebbled texture laterally, apex rounded. Ejaculatory apodeme outside of basiphallus, rod shaped, with small pores on basal *ca.* 2/3s, slightly broader distally.

Female terminalia

Ovipositor slender and elongate (as in Figure 35h). Sternite 5 length 2.0 times width, sternite 6 length 1.1 times width. Tergite 6 and tergite 7 desclerotized medially. Tergite 8 and sternite 8 weakly sclerotized proximally. Sternite 8 broadening posteriorly, with extensive heavy sclerotization along margins of posterior half, area of heavy sclerotization free of microtrichia. Sternite 10 elongate, distal half broad, heavily sclerotized along proximal edge, proximal edge bent dorsally, band of heavy sclerotization medially, this area with larger microtrichia. Spermatheca finely rugose, the raised rugae with small papillae. Ventral receptacle with squat, oblique neck and large globose head, neck moderately sclerotized, head lightly so, duct with minute longitudinal wrinkles.

Comments

The frons markings on the two Sta. Catarina, Brazil, specimens are somewhat fainter than what is typical in *C. atlanticum*, however in both specimens it appears the frons may have darkened somewhat in preservation. The sole female specimen available for study was collected at the same locality and in the same month and year as one of the two male

specimens. The medial area of desclerotization of tergite 6 in the female specimen narrows distally. In *C. atlanticum* and *C. papillatum* tergite 6 is only desclerotized on the proximal half. Given that the amount of such desclerotization varies somewhat between specimens in these other two species, it is not known if the condition seen in this single specimen is aberrant or represents what is typical of the species; until more specimens are available this character is not considered diagnostic. *Curtonotum atlanticum* lacks a bulbous head on the ventral receptacle; its head is at most broadly rounded (three specimens examined). *Curtonotum papillatum* females (six specimens examined) have densely papillose spermatheca without any rugae and a ventral receptacle with a longer, more heavily sclerotized neck (relative to the head).

Type Material

HOLOTYPE: BRAZIL. Parana: Bocaiúva do Sul, 25°08'S, 49°04'W, 100m, 1♂, xi.1965, F. Plaumann (USNM).

PARATYPES: BRAZIL. Santa Catarina: Florianópolis, 1♂1♀, xii.1957, J. Lane (MZSP).

***Curtonotum papillatum* Klymko and Marshall, sp. nov.**

Figures 34 and 36n

Diagnosis

When medial and lateral frontal vittae are pronounced *C. papillatum* is very similar to *C. atlanticum*, *C. hunkingi*, and *C. punctithorax*. In such instances refer to diagnosis of *C. atlanticum*. Specimens with the medial frontal vitta absent and the lateral frontal vitta faint can be distinguished from congeners (besides the three aforementioned species) by

the following combination of characters: wing with extensive dark infuscation in r_1 and r_{2+3} and around dm-cu, palpus and clypeus with orange-yellow ground colour (former often slightly darker) and two lateral katepisternal setae.

See diagnosis of *C. atlanticum*.

Etymology

From Latin, *papilla*, meaning nipple, referring to the very papillose spermathecae of this species.

Description

Length 6.8 to 9.7 mm.

Similar to *C. atlanticum* except as follows. Frons with two convergent, relatively faint vitta flanking ocellar triangle, extending anteriorly to antennae bases (some specimens with similar medial vitta), width 1.2 to 1.4 times length, pruinosity of ocellar triangle extending anterior of anterior ocellus, its margin an acute point, proclinate bristle at *ca.* $1/3$ distance from anterior ocellus to ventral margin of frons. Eye height 9.0 to 13.6 times gena height. First flagellomere with orange ground colour, orange-brown on apical *ca.* $1/2$. Thoracic ground colour medium brown. Scutum with four narrow vittae (more or less absent in some specimens), the medial pair broader posteriorly, in some specimens extending from posterior margin to level of postpronotal lobe, in others visible only posteriorly, lateral pair extending nearly to transverse suture, often a small dark spot present anterior to transverse suture. Postpronotal lobe with two setae, anterior seta *ca.* $3/4$ times length of posterior seta, in some specimens an additional relatively elongate seta exists anterior and posterior to these. Legs with brown-yellow ground colour, all tibiae, femora, and tarsomeres 1 and 2 medium to dark brown at apex (this quite subtle in

some specimens), tarsomeres 3-5 medium to dark brown throughout. Fore femur somewhat darker on distal *ca.* 1/3 in some specimens, with 5-6 posterodorsal setae, 6-8 ctenidial setae; mid femur with 5-8 anterior setae. Row of short cuneiform setae present on proximal 1/3 to entire length of anteroventral margin of mid fifth tarsomere and proximal 1/3 to 1/2 on hind fifth tarsomere. Tergites 3-5 brown pruinose dorsally on posterior *ca.* 1/2, 2/5, and 1/5 to 3/10, respectively. In some specimens lateral vitta interrupted on tergite 5. Tergites 3-5 narrowly brown pruinose laterally along posterior margin.

Male terminalia

Sternite 5 with invaginate area of weak sclerotization on distal margin, weakly sclerotized area setulose, posterior margin truncate; tergite 6 moderately to well-sclerotized; tergite 7 relatively narrow, dorsal length *ca.* 0.1 times epandrial dorsal length; sternite 6 broad and well-sclerotized, barely separated into right and left portions, left portion more heavily sclerotized proximally; sternite 7 well separated into right and left portions, right portion relatively long, subequal in length to right portion of sternite 6. Epandrium relatively small, bulging ventrally in lateral profile, with large posterolateral lobe (particularly evident in posterior profile), scattered setulae (in no area are these particularly long); surstylus laterally articulating and medially fused to epandrium, posteriorly pointed in lateral profile, in dorsal profile ventral margin rounded, medial margin with sharp acute point, minutely setulose ventrally and dorsally, area adjacent to postgonite concave. Cercus stout, with ventral margin flat to slightly concave, longest cercal setulae shorter than longest epandrial setulae. Hypandrium with very broad-based, flat-topped dorsobasal lobe, arm relatively straight, with 2-3 ventromedially oriented

setulae proximal to postgonites, broadly fused distally; medial margin of postgonite with broad medial process abutting with adjacent postgonite, apex slightly upturned, minutely setulose dorsally. Phallapodeme with relatively small, anteriorly bulging "fan", margin opposite fan convex basally, concave distally; basiphallus very elongate, weakly sclerotized basally, straightening and broadening slightly distally, with slight subapical concavity on left; distiphallus long, straight, slightly tapering base, apically bilobed, left lobe nearly perpendicular to plane of phallus basally, bending posteriorly on distal 2/3s, much longer than right, with narrow heavily sclerotized area on ventral surface, this not reaching midpoint, moderately sclerotized on lateral margin to recurved process, recurved process with extremely fine, sparse, stout antrorse spinules, ventral surface on distal half moderately sclerotized, lobe otherwise lightly sclerotized, dorsal surface with fine spinules, ventral surface with short broad-based spinules (appearing scaled), these extending to lateral margin resulting in serration, apex narrow, rounded, right lobe straight, in same axis as phallus, with broad moderately sclerotized region ventrally, otherwise lightly sclerotized, dorsally short fine spinules, ventral face with pebbled texture, apex broadly rounded. Ejaculatory apodeme outside of basiphallus, rod-shaped, elongate with pointed apex and small pores on basal 2/3s.

Female terminalia

Ovipositor slender and elongate (as in Figure 35h). Sternite 5 length 1.4 to 1.9 times width, sternite 6 length 1.0 to 1.3 times width. Tergite 6 desclerotized medially on proximal 1/3 or less, tergite 7 desclerotized medially. Sternite 8 broadly heavily sclerotized marginally on posterior half, posterior margin truncate. Tergite 8 and sternite 8 weakly sclerotized proximally. Sternite 10 heavily sclerotized and with antrorse

spinules medially, area of sclerotization flaring proximally, proximal margin with slight dorsal bend, profile narrow on posterior half, broader on anterior half. Spermatheca elongate, densely papillose. Ventral receptacle weakly s-shaped, heavily sclerotized proximally, apex weakly sclerotized, semi-spherical, duct with minute longitudinal wrinkles.

Comments

One female from Rio de Janeiro is quite dark overall, with thoracic ground colour dark brown. The single male specimen labeled "Costarica" is here interpreted as being from Costa Rica, Mato Grosso do Sul, Brazil. It is not assumed to indicate the country Costa Rica as *C. papillatum* is otherwise only known from southeast Brazil.

Type Material

HOLOTYPE: BRAZIL. Rio de Janeiro: Alto da Boa Vista, 1♂, iii.1940 (USNM).

PARATYPES: BRAZIL. Mato Grosso do Sul: Costarica, 1♂ (SMTD). **Rio de Janeiro:** 3♂2♀, x-xii.1937-i.1938, 1♂2♀, i.1939, 5♂1♀, ix.1938, same data plus Yellow Fever Service, M.E.S. Brazil, 2♂1♀, ix.1938, 4♂3♀ (+ 1 sex unknown), x.1938, all R.C. Shannon (all USNM); 1♀, iv.1938, 5♂2♀, ix.1938, 2♂3♀, x.1938, all Serviço Febre Amarela, M.E.S., Brasil (all MZSP); Mangaratiba, 2♂1♀, viii.1938, Serviço Febre Amarela, M.E.S., Brasil (MZSP); Jurassal, Angra, 1♂, x.1934, L. Travassos and Lopes (MZSP). **São Paulo:** Cubatão, 2♂, 15.ii.1935, Pereira, Martinez, Werner, d'Andretta (MZSP). **Espírito Santo:** 6♀, iv.1969, N. Papavero (MZSP).

***Curtonotum punctithorax* Fischer**

Figure 35

Curtonotum punctithorax Fischer 1933: 88

Diagnosis

Distinguished from congeners but *C. atlanticum*, *C. papillatum*, *C. hunkingi*, and possibly *C. desperatum* (this species is included here due to the degraded state of the only specimen available) by its orange-yellow frons with prominent brown medial and lateral vittae. To distinguish this species from *C. desperatum* see the diagnosis of that species. Of the remaining species it is the only one with highly contrasting maculae on tergites 3-5 that extend nearly to the hind margin and palpi that are conspicuously darker than the clypeus.

Description

Length: 6.8 - 9.0 mm

Head

Frons orange-brown, with pink or green iridescence (visible from oblique angle), narrow medial and broader lateral vittae, these medium brown, lateral vittae medial of narrow pruinose strip, with scattered dark setulae, moderate bulge ventrally, width 1.3 to 1.4 times length, slightly broader ventrally, lateral margin narrowly silver pruinose. Ocellar triangle and narrow lateral strip yellow grey pruinose, pruinosity of ocellar triangle extending slightly anterior of anterior ocellus, anterior margin rounded or with dull point, lateral pruinose strip extending from median occipital sclerite to just anterior of proclinate bristle. Proclinate bristle at *ca.* 1/3 sagittal distance between anterior ocellus and ventral margin of frons, anterior and slightly lateral to major reclinate bristle; minor

reclinate bristle anterior and slightly medial to major reclinate bristle. Face silver pruinose, ground colour pale yellow-brown; vibrissa *ca.* twice as large as adjacent subvibrissals. Parafacial and gena moderately broad, former densely silver pruinose, latter moderately so, ground colours pale yellow-brown and medium brown, respectively, eye height 5.0 to 6.2 times gena height. Clypeus, palpus and prementum with yellow-brown, dark brown and medium brown ground colours, respectively, former two silver pruinose and microtrichose, respectively, latter sparsely so. Scape, pedicel and first flagellomere with orange-brown ground colour, latter brown on apical *ca.* 1/2; former two silver pruinose, latter densely yellow-white microtrichose.

Thorax

Ground colour medium brown, paler ventrally, grey pruinose. Scutum moderately arched, each scutal, postpronotal, scutellar (laterally) and anepisternal seta and setula with dark spot around socket. Scutellum grey pruinose laterally, brown pruinose medially, with indistinct narrow pale medial vitta. Postpronotal lobe with three setae, center seta *ca.* 0.5 times length of posterior seta, anterior seta smaller still; notopleuron setulose; scutellum with two pairs of marginal setae. Anepisternum with 2 large subequal setae and 2 smaller setae on posterior half (Tacuarembó, Uruguay specimen with 3 large subequal setae and single smaller seta on left anepisternum); katepisternum with two prominent lateral setae, anterodorsal seta much smaller than posteroventral seta; linear tuft of setulae under fore coxa orange-yellow. Area below and behind posterior spiracle bare (without fringe of setulae); minute setulae present on ventral half of meron.

Legs

Legs with orange-yellow ground colour, coxae heavily white pruinose, legs otherwise lightly so. Chaetotaxy black except for very dense, regularly spaced transverse rows of setulae anteroventrally on apical 1/2 of fore tibia and similar setulae on fore first tarsomere, these gold-brown. Fore femur with 5-6 posterodorsal setae and 7-10 relatively long and thick ctenidial setae; mid femur with 4-6 anterior setae; hind femur with single subapical seta. Mid tibia with 2 strong, 1 moderate, and several weaker apical ventral setae, the moderate seta between the strong setae. Row of cuneiform setae absent on anteroventral margin of mid and hind fifth tarsomeres in most specimens, in a few specimens present on proximal 1/3 to 3/4s of both mid and hind tarsomeres.

Wing

Similar to *C. atlanticum* except as follows. Costal cell medium brown infusate.

Abdomen

Ground colour medium brown. Tergite 1 grey pruinose; tergite 2 with broad, diffuse brown pruinose medial vitta, brown pruinose dorsally on posterior *ca.* 1/3, otherwise grey pruinose; tergites 3-5 with dark brown pruinosity and ground colour along lateral margin, dorsally on posterior *ca.* 1/4 to 1/8, 1/8 to 1/10, and narrowly along posterior margin, respectively, and on relatively narrow lateral and medial vittae.

Male terminalia

Sternite 5 truncate posteriorly, with invaginate area of weak sclerotization on distal margin, weakly sclerotized area without setulae; tergite 6 poorly sclerotized, desclerotized dorsally; tergite 7 relatively long, dorsal length *ca.* 0.4 times dorsal epandrial length; sternite 6 and 7 separated into right and left portions, sternite 6 broad, well-sclerotized, left portion more heavily sclerotized along proximal margin; right

portion of sternite 7 large, nearly as long as right portion of sternite 6. Epandrium relatively small, with large posterolateral lobe (particularly evident in posterior profile), scattered setulae (these longest on posteroventral lobe); surstylus moderately large, laterally articulating and medially fused with epandrium, in lateral profile ventral margin rounded, posterior margin concave, in posterior profile lateral margin rounded, medial margin and medial face concave adjacent to postgonite, with narrow, elongate medially oriented process dorsal of postgonite, minutely setulose on ventral margin and medial face. Cercus stout, with ventral margin concave, longest cercal setulae subequal to longest epandrial setulae. Hypandrium with broad-based rounded dorsobasal lobe, hypandrial arm bent slightly ventrally posterior to concavity on ventral margin within epandrium, with one ventromedially and one ventrally oriented setulae just posterior to invagination, the latter lateral of the former, hypandrial arm broadly fused apically to opposite hypandrial arm; postgonite occluded by surstylus in lateral profile, dorsally minutely setulose, with short lateral apical dorsal process. Phallapodeme with relatively large, anteriorly bulging "fan", margin opposite fan convex basally, concave distally; basiphallus moderately elongate, weakly sclerotized basally, expanded and with slight left bend apically, rounded bulge on right at apex; distiphallus base elongate, with large, flat, left bending flat process on distal half, contracted apically, apex bilobed, lobes subequal in length, left lobe relatively straight, nearly perpendicular to plane of phallus, moderately sclerotized on narrow band ventrally on proximal half, heavily sclerotized on lateral margin to retrorse, spinose moderately sclerotized process, heavily sclerotized nearly to margin ventrally on distal half, otherwise membranous, ventrally smooth, dorsally with sparse, fine elongate spinules, apex rounded, with small subapical, broad-

cased projection on right, right lobe moderately sclerotized medially on ventral surface, well-sclerotized dorsally on left to midpoint from near base to midpoint or further, ventral surface and lateral margins with pebbled texture, dorsally with dense, fine spinules, apex broadly rounded. Ejaculatory apodeme outside of basiphallus, elongate, pointed apically, slightly expanded and with small pores on basal half.

Female terminalia

Ovipositor slender and elongate. Sternite 5 length 1.8 to 2.0 times width, sternite 6 length 1.3 to 1.5 times width. Tergite 7 desclerotized medially. Sternite 8 with broad heavily sclerotized marginal area on apical *ca.* 1/2, sclerotized area free of microtrichia, posterior surface slightly concave, posterior margin broadly rounded to slightly pointed. Sternite and tergite 8 poorly sclerotized posteriorly. Sternite 10 heavily sclerotized and with antrorse spinules medially, area of sclerotization flaring proximally, proximal margin with slight dorsal bend, profile narrow on posterior half, broader on anterior half. Ventral receptacle with base oblique, neck well sclerotized, narrowing distally, poorly sclerotized cap expanded, its margins reflexed into hood over apex of neck, duct with fine transverse wrinkles. Spermatheca elongate, densely rugose, with thinly scattered papillae.

Type Material

Two paratypes have been examined for the purposes of this study. Fischer (1933) based his description on 75 specimens he collected in Bairro da Avenida Paulista, São Paulo, Brazil, between 14.xii.1932 and 14.ii.1933. Given that the type series is from a single location and a relatively short window of time it is unlikely to represent more than one species, and as such examination of the holotype, which was deposited in Fischer's personal collection, was not necessary.

Paratypes: BRAZIL. São Paulo: Capital, 1♂, 30.i.1933, 1♀, 5.ii.1933, all C.R. Fisher (all USNM).

Other Material Examined

BRAZIL. Santa Catarina: Nova Teutônia, 300-500m, 27°11'S, 52°23'W, 1♂, 27.i.1957, 1♂, 12.iii.1959, 1♀, 15.xii.1959, 1♀, 19.xii.1959, 1♂, 21.xii.1959, 1♀, 22.i.1960, 1♂, 29.i.1960, 1♂, 11.i.1961, 1♀, iii.1963, 1♀, i.1965, 2♂2♀, ii.1965, 3♂, i.1966, 1♂1♀, ii.1966, 1♀, xii.1966, 2♂, i.1967, 3♀, iii.1968, F. Plaumann (all CNCI), same data except 1♂, i.1969 F. Plaumann (USNM); Nova Teutônia, 27°11'S, 52°23'W, 1♂, 9.xii.1936, 2♂, 2.ii.1937, 2♂, 2.iv.1937, 1♂, 16.xi.1938, 3♂1♀, 4.i.1939, 1♀, i.1937, 1♀, 2.i.1937, 1♀, 6.i.1937, 2♀, 9.i.1937, 1♀, ii.1937, 3♀, i-ii.1937, 1♀, 4.i.1939, all F. Plaumann (all BMNH); Nova Teutônia, 1♂, iv.1967, F. Plaumann (MZSP); Rio das Antas, 2♂2♀, A. Camargo, i.1953, 1♂2♀, Camargo & Dente, i.1953 (MZSP). **São Paulo:** Faz. do Bonito, Serra da Bocaina, S. Jose do Barreiro, 1♂, 1.i-10.ii.1960, Vulcano (Sao Paulo). **URUGUAY. Tacuarembó:** 40 km NW Tacuarembó, 1♀, 10-16.ii.1963, J.K. Bouseman (USNM). **PARAGUAY. Guairá:** Villarica, 2♂, xii.1936, 2♂, ix.1938, all F. Schade (all USNM).

Species incertae sedis

***Curtonotum hendeli* Malloch**

Curtonotum hendeli Malloch, 1930: 325

Type Locality: Brazil.

Comments

Malloch (1930) contended that Hendel, in his comprehensive treatment of the Neotropical Curtonotidae (Hendel 1913), misidentified a previously undescribed species as *C. gibbum*. Malloch proposed *Curtonotum hendeli* as a nom. nov. for this misidentified species, and indicated that in addition to the specimens examined by Hendel, there are several specimens of this species at the USNM.

In Hendel's 1933 response to Malloch, Hendel maintained that the specimens he used for his description of *C. gibbum* sensu Hendel were indeed *C. gibba*, and Hendel therefore declared the nom. nov. *C. hendeli* unnecessary. Hendel (1913) indicated that his description of *C. gibbum* was based on specimens at NHMW from Brazil and that they are some of the same specimens that Wiedemann (1830) used in his redescription of *Musca gibba*. As mentioned in the Comments under *C. taeniatum*, the *M. gibba* type series is comprised of two species, a female specimen that is synonymous with *C. taeniatum*, and four other specimens of a species in the *C. murinum* species complex. Hendel stated that based on his examination of the Wiedemann specimens in Vienna, Wiedemann had treated three separate species as *C. gibbum*: *C. taeniatum*, *C. pantherinum*, and a third species represented by the specimens from Brazil that Hendel treated as *C. gibbum*. Hendel chose this third species to be *C. gibbum* because it best fit Wiedemann's 1830 description. What is not clear is whether or not Hendel ever saw any of the Fabricius type series, and whether or not Wiedemann's specimens are actually synonymous with species in the Fabricius type series. Hendel did show some familiarity with the Fabricius type series, as he mentioned that it is of five specimens, that they are

of multiple species, and that one of them (but not the one that Wiedemann based his description on) was synonymous with *C. taeniatum*.

Hendel's description of *C. gibbum* cannot be unequivocally assigned to any of the species treated in this revision, and as such the identity of Hendel's *C. gibbum* is unclear. Several emails and a written letter have been sent to Dr. P. Sehnal, the curator of the Diptera collection at NHMW, to confirm that the "Brazil specimens" exist and arrange a loan of the material but I have yet to receive a response. It is clear however that Hendel's *C. gibbum* is likely not synonymous with the second species in the *Musca gibba* type series. This is evident from the dichotomous key in Hendel's 1913 revision. In this key he separates *C. murinum* and *C. gibbum* by their tergal markings, indicating the former has quadrate yellow pruinose tergal maculae that are punctate, and the latter has rounded, weak blue-grey pruinose tergal maculae. All species in the *C. murinum* species complex, including the second species represented in the *M. gibba* type series, would certainly key out as *C. murinum*.

As mentioned, Malloch indicated that several *C. hendeli* specimens were present at the USNM. All the specimens currently housed at the USNM have been examined as part of this revision, and no specimens labelled *C. hendeli* have been found. The only specimens found that both predate Malloch's publication and potentially fit Hendel's description of *C. gibbum* are the *C. hendelianum* specimens that Curran had labeled with the manuscript name "*C. varipennis*" (see Comments under *C. hendelianum*). It is plausible that Curran had communications with Malloch regarding the identity of those specimens, thus leading him to treat them as *C. hendeli*. However, even if those specimens are indeed the ones that Malloch identified as *C. hendeli*, it is not certain that

these are actually synonymous with Hendel's *C. gibbum*. The fact that Hendel later redescribed *C. hendelianum* as *C. nigripalpe* (Hendel 1936) suggests they are not, as it is unlikely that Hendel would redescribe the species he treated as *C. gibbum*.

Until the specimens at NHMW can be examined, *C. hendeli* must be treated as a species *incertae sedis*.

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Schulz, Hamm.

Figure 1a. Trees 1-8 of the 32 most parsimonious trees generated from the phylogenetic analysis using TNT version 1.1 (Goloboff *et al.* 2008). Length = 52 steps, CI = 0.64, RI = 0.84.

Figure 1b. Trees 9-16 of the 32 most parsimonious trees generated from the phylogenetic analysis using TNT version 1.1 (Goloboff *et al.* 2008). Length = 52 steps, CI = 0.64, RI = 0.84.

Figure 1c. Trees 17-24 of the 32 most parsimonious trees generated from the phylogenetic analysis using TNT version 1.1 (Goloboff *et al.*, 2008). Length = 52 steps, CI = 0.64, RI = 0.84.

Figure 1d. Trees 25-32 of the 32 most parsimonious trees generated from the phylogenetic analysis using TNT version 1.1 (Goloboff *et al.* 2008). Length = 52 steps, CI = 0.64, RI = 0.84.

Figure 2. Nelson consensus tree showing Bremer supports.

Tree 1

Tree 2

Tree 3

■ Synapomorphy
□ Homoplasy

Figure 3. Three most parsimonious phylogenetic trees showing the phylogeny of *Cyrtona*, *Axinota*, and the *Curtonontum anus* and *Curtonotum punctithorax* species groups.

Figure 4. Phylogeny of the New World *Curtonotum*, excluding the *C. vulpinum* species group. Selected from one of the 32 most parsimonious trees shown in Figure 1a-d. Character numbers above boxes refer to the characters in Table 1; numbers below boxes refer to character state.

Figure 5. *Curtonotum helvum* (Loew) in copula (Warren Dunes State Park, Michigan, United States).

Figure 6. *Curtonotum bivittatum* Klymko and Marshall sp. nov. (Jatun Sacha Reserve, Napo, Ecuador).

Figure 7. Undescribed species in the *Curtonotum murinum* species complex (Dominical, Puntarenas, Costa Rica).

Figure 8. *Curtonotum trypetipenne* Hendel 1913 (Yasuni National Park, Orellano, Ecuador).

Figure 9. *Curtonotum brunneum* Klymko and Marshall, sp. nov. (Apa Apa Reserve, La Paz, Bolivia).

Figure 10. *Curtonotum pantherinum* (Walker) (Los Amigos Biological Station, Madre de Dios, Peru).

Figure 11. Undescribed species in *Curtonotum vulpinum* species group on unidentified piece of decomposing material (Yasuni National Park, Orellano, Ecuador).

Figure 12. *Curtonotum impunctatum* Hendel 1913 nec *impunctatum* Hendel, 1932 (Yasuni National Park, Orellano, Ecuador).

Figure 13. *Curtonotum floridense* Klymko and Marshall, sp. nov. a) Male terminalia, left lateral. b) Distiphallus, dorsal. c) Hypandrium, ventral.

Figure 13. *Curtonotum floridense* Klymko and Marshall, sp. nov. d) Male terminalia, posterior. e) Sternite 5, ventral. f) Sternite 6, right, oblique.

Figure 13. *Curtonotum floridense* Klymko and Marshall, sp. nov. g) Ovipositor, dorsal. h) Female sternite 8, ventral. i) Female sternite 10, ventral.

Figure 13. *Curtonotum floridense* Klymko and Marshall., sp. nov. j) Spermatheca (Archbold). k) Spermatheca (Orlando). l) Ventral receptacle. m) Head, anterior. n) Fore femur, anterior.

Figure 14. *Curtonotum helvum* (Loew). a) Male terminalia, posterior. b) Male terminalia, left lateral. c) Hypandrium and subepandrial sclerite, posterior. d) Distiphallus, dorsal.

Figure 14. *Curtonotum helvum* (Loew). e) Ovipositor, left lateral. f) Ovipositor, dorsal. g) Sternite 8, ventral. h) Sternite 10, ventral. i) Ventral receptacle. j) Spermatheca.

Figure 14. *Curtonotum helvum* (Loew). k) Head, anterior. l) Fore femur, anterior.

Figure 15. *Curtonotum nigrum* Klymko and Marshall, sp. nov. a) Male terminalia, left lateral. b.) Distiphallus, dorsal. c) Male terminalia, posterior.

Figure 16. *Curtonotum bivittatum* Klymko and Marshall, sp. nov. a) Male terminalia, left lateral. b) Male terminalia, posterior. c) Distiphallus, dorsal.

Figure 16. *Curtontum bivittatum* Klymko and Marshall, sp. nov. d) Ovipositor, left lateral. e) Sternite 10, ventral. f) Sternite 8, ventral. g) Spermatheca. h) Ventral receptacle.

Figure 17. *Curtonotum bathmedum* Hendel. a) Male terminalia, left lateral. b) Male terminalia, posterior. c) Distiphallus, dorsal. d) Sternite 8, ventral. e) Sternite 10, ventral. f) Spermatheca. g) Ventral receptacle.

Figure 18. *Curtonotum magnum* Malloch. a) Head, anterior. b) Male terminalia, left lateral. c) Distiphallus, dorsal. d) Male terminalia, posterior.

Figure 18. *Curtonotum magnum* Malloch. e) Female sternite 8, ventral. f) Female sternite 10, ventral. g) Spermatheca. h) Ventral receptacle.

Figure 19. *Curtonotum adustocrus* Klymko and Marshall, sp. nov. a) Male terminalia, left lateral. b) Distiphallus, dorsal. c) Male terminalia, posterior. d) Head, anterior.

Figure 20. *Curtonotum near murinum* Hendel. a) Habitus, left oblique view. b) Ovipositor, dorsal. c) Male sternite 5, ventral.

Figure 21. *Curtonotum apicale* Hendel. a) Scutellum, dorsal. b) Male terminalia, left lateral. c) Male terminalia, posterior. d) Distiphallus, dorsal.

Figure 21. *Curtonotum apicale* Hendel. e) Tergite 8 and tergite 10 + cerci, dorsal. f) Sternite 8, ventral. g) Sternite 10, ventral. h) Spermatheca. i) Ventral receptacle.

Figure 22. *Curtonotum trypetipenne* Hendel. a) Male terminalia, left lateral. b) Male terminalia, posterior. c) Distiphallus, dorsal. d) Ovipositor, dorsal. e) Female sternite 8, ventral. f) Female sternite 10, ventral. g) Spermatheca. h) Ventral receptacle.

Figure 23. *Curtonotum brunneum* Klymko and Marshall, sp. nov. a) Male terminalia, left lateral. b) Male terminalia, posterior. c) Distiphallus, dorsal. d) Thorax, left lateral, with hind spiracle enlarged.

Figure 23. *Curtonotum brunneum* Klymko and Marshall, sp. nov. e) Female sternite 8, ventral. f) Female sternite 10, ventral. g) Spermatheca. h) Ventral receptacle. i) Left lateral, oblique.

Figure 24. *Curtonotum pantherinum* (Walker). a) Male terminalia, left lateral. b) Male terminalia, posterior. c) Distiphallus, dorsal. d) Female sternite 8, ventral. e) Female sternite 10, ventral. f) Spermatheca. g) Ventral receptacle.

Figure 25. *Curtonotum flavisetum* Klymko and Marshall, sp. nov. a) Male terminalia, left lateral. b) Male terminalia, posterior. c) Distiphallus, dorsal. d) Male sternite 5, ventral.

Figure 25. *Curtonotum flavisetum* Klymko and Marshall, sp. nov. e) Head, anterior. f) Sternite 8, ventral. g) Sternite 10, ventral. h) Spermatheca. i) Ventral receptacle.

Figure 26. *Curtonotum taeniatum* Hendel. a) Male terminalia, left lateral. b) Male terminalia, posterior. c) Distiphallus, dorsal. d) Female sternite 8, ventral. e) Female sternite 10, ventral. f) Spermatheca. g) Ventral receptacle.

Figure 27. *Curtonotum tumidum* Enderlein. a) Male terminalia, left lateral. b) Male terminalia, posterior. c) Distiphallus, dorsal. d) Male sternite 5, ventral. e) Fore femur, anterior.

Figure 27. *Curtonotum tumidum* Enderlein. f) Female sternite 8, ventral. g) Female sternite 10, ventral. h) Spermatheca. i) Ventral receptacle. j) Lower thorax, left lateral.

Figure 28. *Curtonotum hendelianum* Enderlein. a) Male terminalia, left lateral. b) Male terminalia, posterior. c) Distiphallus, dorsal. d) Female sternite 8, ventral. e) Female sternite 10, ventral. f) Spermatheca. g) Ventral receptacle.

Figure 29. *Curtonotum scambum* Klymko and Marshall, sp. nov. a) Male terminalia, left lateral. b) Male terminalia, posterior. c) Distiphallus, dorsal. d) Female sternite 8, ventral. e) Female sternite 10, ventral. f) Spermatheca. g) Ventral receptacle. h) Hind femur, anterior.

Figure 30. *Curtonotum gracile* Klymko and Marshall, sp. nov. a) Male terminalia, left lateral. b) Male terminalia, posterior. c) Distiphallus, dorsal. d) Sternite 8, ventral. e) Sternite 10, ventral. f) Ventral receptacle. g) Spermatheca.

Figure 31. *Curtonotum desperatum* Klymko and Marshall, sp. nov. a) Male terminalia, left lateral. b) Male terminalia, posterior. c) Distiphallus, dorsal.

Figure 32. *Curtonotum atlanticum* Klymko and Marshall, sp. nov. a) Male terminalia, left lateral. b) Male terminalia, posterior. c) Distiphallus, dorsal. d) Female sternite 8, ventral. e) Female sternite 10, ventral. f) Spermatheca. g) Ventral receptacle.

Figure 33. *Curtonotum hunkingi* Klymko and Marshall, sp. nov. a) Male terminalia, posterior. b) Male terminalia, left lateral. c) Distiphallus, dorsal. d) Female sternite 8, ventral. e) Female sternite 10, ventral. f) Spermatheca. g) Ventral receptacle.

Figure 34. *Curtonotum papillatum* Klymko and Marshall, sp. nov. a) Male terminalia, left lateral. b) Male terminalia, posterior. c) Distiphallus, dorsal. d) Head, anterior.

Figure 34. *Curtonotum papillatum* Klymko and Marshall, sp. nov. e) Female sternite 8, ventral. f) Female sternite 10, ventral. g) Spermatheca. h) Ventral receptacle.

Figure 35. *Curtonotum punctithorax* Fischer. a) Male terminalia, left lateral. b) Distiphallus, dorsal. c) Male terminalia, posterior. d) Female sternite 8, ventral. e) Female sternite 10, ventral. f) Spermatheca. g) Ventral receptacle. h) Ovipositor, left lateral.

Figure 36. Wing. a) *Curtonotum helvum* (Loew). b) *Curtonotum floridense* Klymko and Marshall, sp. nov. c) *Curtonotum nigrum* Klymko and Marshall, sp. nov. d) *Curtonotum bivittatum* Klymko and Marshall, sp. nov. e) *Curtonotum bivittatum* Klymko and Marshall, sp. nov. (Costa Rica). f) *Curtonotum bathmedum* Hendel. g) *Curtonotum apicale* Hendel.

Figure 36. Wing. h) *Curtonotum trypetipenne* Hendel. i) *Curtonotum brunneum* Klymko and Marshall, sp. nov. j) *Curtonotum pantherinum* (Walker). k) *Curtonotum tumidum* Enderlein. l) *Curtonotum hendelianum* Enderlein. m) *Curtonotum scambum* Klymko and Marshall, sp. nov. n) *Curtonotum papillatum* Klymko and Marshall, sp. nov.