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**Revision of the Mexican and Central American species of  
*Mortoniella* (Trichoptera: Glossosomatidae: Protoptilinae)**

ROGER J. BLAHNIK & RALPH W. HOLZENTHAL



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## Revision of the Mexican and Central American species of *Mortoniella* (Trichoptera: Glossosomatidae: Protoptilinae)

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### Table of contents

Abstract .....	4
Introduction .....	4
Material and methods .....	5
Systematics .....	5
Taxonomic history and discussion .....	5
Structures of the male genitalia .....	8
Generic description .....	9
Species descriptions .....	11
<i>Mortoniella akantha</i> , <b>new species</b> .....	11
<i>Mortoniella anakantha</i> , <b>new species</b> .....	14
<i>Mortoniella aviceps</i> , <b>new species</b> .....	16
<i>Mortoniella brachyrhachos</i> , <b>new species</b> .....	18
<i>Mortoniella buenoi</i> , <b>new species</b> .....	19
<i>Mortoniella carinula</i> , <b>new species</b> .....	22
<i>Mortoniella caudicula</i> , <b>new species</b> .....	24
<i>Mortoniella falcicula</i> , <b>new species</b> .....	24
<i>Mortoniella florica</i> (Flint, 1974), <b>new combination</b> .....	27
<i>Mortoniella leroda</i> (Mosely, 1937), <b>new combination</b> .....	29
<i>Mortoniella meralda</i> (Mosely, 1954), <b>new combination</b> .....	31
<i>Mortoniella mexicana</i> , <b>new species</b> .....	34
<i>Mortoniella munozi</i> , <b>new species</b> .....	34
<i>Mortoniella opinionis</i> , <b>new species</b> .....	37
<i>Mortoniella pacuara</i> (Flint, 1974), <b>new combination</b> .....	39
<i>Mortoniella panamensis</i> , <b>new species</b> .....	42
<i>Mortoniella papillata</i> , <b>new species</b> .....	44
<i>Mortoniella pectinella</i> , <b>new species</b> .....	46
<i>Mortoniella propinqua</i> , <b>new species</b> .....	46
<i>Mortoniella rancura</i> (Mosely, 1954), <b>new combination</b> .....	49
<i>Mortoniella redunca</i> , <b>new species</b> .....	49
<i>Mortoniella rodmani</i> , <b>new species</b> .....	52
<i>Mortoniella rovira</i> (Flint, 1974), <b>new combination</b> .....	54
<i>Mortoniella sicula</i> , <b>new species</b> .....	56
<i>Mortoniella stilula</i> , <b>new species</b> .....	58
<i>Mortoniella tapanti</i> , <b>new species</b> .....	60
<i>Mortoniella taurina</i> , <b>new species</b> .....	62
<i>Mortoniella umbonata</i> , <b>new species</b> .....	64

Key to males of Mexican and Central American species of <i>Mortoniella</i> .....	66
Species relationships .....	68
Acknowledgments .....	71
References .....	72

## Abstract

The genus *Mexitrichia* Mosely, 1937 (27 described species) is synonymized with *Mortoniella* Ulmer, 1906 (22 described species) and a revised generic description is provided for the genus. These species are placed in 4 recognized species groups. Mexican and Central American species of *Mortoniella* are revised to include 6 species formerly placed in *Mexitrichia* and 22 new species from Costa Rica, Panama, and Mexico. New species combinations for these regional species include: *Mortoniella florica* (Flint, 1974), *M. leroda* (Mosely, 1937), *M. meralda* (Mosely, 1954), *M. pacuara* (Flint, 1974), *M. rancura* (Mosely, 1954), and *M. rovira* (Flint, 1974). New species of *Mortoniella* described here (followed by the country of provenance) include *M. akantha* (Costa Rica) *M. anakantha* (Costa Rica) *M. aviceps* (Costa Rica, Panama) *M. brachyrhachos* (Mexico), *M. buenoi* (Mexico), *M. carinula* (Costa Rica), *M. caudicula* (Costa Rica), *M. falcicula* (Mexico), *M. mexicana* (Mexico) *M. munozi* (Costa Rica, Panama), *M. opinionis* (Costa Rica), *M. panamensis* (Panama), *M. papillata* (Costa Rica), *M. pectinella* (Panama), *M. propinqua* (Costa Rica), *M. redunca* (Costa Rica), *M. rodmani* (Costa Rica), *M. sicula* (Costa Rica), *M. stilula* (Costa Rica), *M. tapanti* (Costa Rica, Panama), *M. taurina* (Costa Rica, Panama), and *M. umbonata* (Panama). Males of all known Mexican and Central American species are illustrated or reillustrated and a key is provided for males of the species.

**Key words:** Trichoptera, Glossosomatidae, Protoptilinae, *Mexitrichia*, *Mortoniella*, new synonymy, new species, new combination, caddisfly, revision, neotropics, Central America

## Introduction

This paper represents the first part of a research project to revise the species currently placed in the genus *Mexitrichia* Mosely, 1937, and is part of a larger project to completely revise the subfamily Protoptilinae of the family Glossosomatidae. Previously published papers in this series include: Blahnik & Holzenthal 2006, Holzenthal & Blahnik 2006, Robertson & Holzenthal 2005, and Robertson & Holzenthal 2006. In the present paper, all of the species of *Mexitrichia* from Central America are covered, most of them new to science. In the process, a decision was made to synonymize *Mexitrichia* with *Mortoniella* Ulmer, 1906. The similarity between the two genera has been recognized for a long time (Flint 1963), and the differences between them are much less than those ordinarily used to characterize genera of protoptiline glossosomatids. *Mortoniella* is the older name, and hence species of *Mexitrichia* will receive a new generic combination. All previously described species of *Mexitrichia* are here transferred to the genus *Mortoniella*. A comprehensive list of the species currently recognized for both genera, with literature citations and geographic distributions, is found in the Catalogue of Neotropical Caddisflies (Flint *et al.* 1999b). These species are here assigned to 4 species groups and listed in Table 1, together with the new species described in this paper. Of the 27 species formerly placed in *Mexitrichia*, 6 were described from Mexico or Central America, including the type species for the genus, *Mexitrichia leroda* Mosely, 1937. No species outside of South America have been previously placed in the genus *Mortoniella*. Mexican and Central American species transferred to *Mortoniella*, with their new combinations, include: *M. leroda* (Mosely, 1937), *M. rancura* (Mosely, 1954), *M. florica* (Flint, 1974), *M. meralda* (Mosely, 1954), *M. pacuara* (Flint, 1974), and *M. rovira* (Flint, 1974). An additional 22 new species of *Mortoniella* are described in this paper, bringing the total number of species now included in the genus to 71.

## Material and methods

Techniques and procedures used in the preparation and examination of specimens are those outlined by Blahnik & Holzenthal (2004) and Holzenthal & Andersen (2004). The terminology for male genitalia is adapted from that used by Morse (2004) for *Protoptila*, except that the term “phallic ensemble” is used for the totality of the structures including the phallic apparatus and the fused inferior appendages and short, basal rod-like appendages of the phallobase. Terminology used for specific structures of the male genitalia in *Mortoniella* is indicated in Figs. 1, 5, 12, 26, and 34 and discussed under the section “Structures of the male genitalia.” Terminology for female genitalia is found in Figs. 2 and 18. Forks present in the forewings and hind wings are given for representative species in Figs. 3, 19, and 28.

Presumptively associated females, collected at the same time and place as males and with a similar size and coloration (when apparent) are listed under the material examined for each species. This was done because previous experience has demonstrated the utility of having tentatively associated female specimens available for future associative studies. It should be noted that the large number of species co-occurring at some sites and the rather subtle differences between species makes it possible that some series of females will be found to consist of more than one species. Because of the uncertainty of association, we have deferred description of females, except for the representative species illustrated in Figs. 2 and 18, presented so that diagnostic features of the genus could be illustrated.

Illustrations were rendered in Adobe Illustrator® and representationally standardized so that similar structures in different species can be easily compared. Microsetae, which are generally distributed over all of the sclerites, and also often on intersegmental membranes, are not generally represented, except for those noticeably present on the ventral surface of the phallicata in a few species. Even when not indicated, microsetae are invariably present at the base of the phallicata (and sometimes adjoining endotheca) of all species, although usually inconspicuous and easily overlooked.

Type material is deposited in the collections of the University of Minnesota Insect Collection, St. Paul, Minnesota, USA (UMSP), the National Museum of Natural History, Smithsonian Institution, Washington, DC, USA (NMNH), the Instituto de Biología, Universidad Nacional de Autónoma de México (IBUNAM), and the Instituto Nacional de Biodiversidad, Heredia, Costa Rica (INBIO), as indicated in the species descriptions. The holotype of *M. rancura* (Mosely) was borrowed from the Natural History Museum, London, United Kingdom (NHM).

## Systematics

### Taxonomic history and discussion

The genus *Mortoniella* was established by Ulmer in 1906, based on the species *Mortoniella bilineata* from Ecuador. A second species in the genus, *M. albolineata*, was also described by Ulmer in 1907, based on a type series from Brazil that he believed to be represented by only female specimens. Mosely (1939) rejected the placement of this species in *Mortoniella* and suggested that it might belong in *Antoptila* Mosely, 1939 (now *Itauara* Müller, 1888). The species was subsequently transferred to *Mexitrichia* by Flint (1963), who discovered a male among Ulmer’s type series and designated it the lectotype for the species. Although the taxonomic basis for Ulmer’s original placement of *albolineata* in *Mortoniella* may have been weak, it can be stated that his concept of *Mortoniella* was broad enough to include species now placed in *Mexitrichia*. With the subsequent establishment of the genus *Mexitrichia* Mosely, 1937, *Mortoniella* has historically been more narrowly defined. Prior to this work, the genus *Mortoniella* included 22 species, 9 of them relatively recently described by Sykora (1999), who also reviewed the genus and placed the known species into five species groups. The

genus, as historically defined, seems to be reasonably coherent and it is likely that it constitutes a monophyletic group. Flint (1963) listed adult, larval, and pupal characters that can be used to distinguish *Mortoniella* from *Mexitrichia*. The majority of the species placed in *Mortoniella* are from Ecuador, but the distributional range of other species includes Venezuela, Colombia, Peru, Bolivia, and Argentina.

The genus *Mexitrichia* was established by Mosely in 1937, based on the species *Mexitrichia leroda* from Mexico. Mosely noted the similarity of *Mexitrichia* to *Mortoniella*. He based his new genus primarily on the absence of the apical fork of  $Cu_1$  (fork V) in the hind wing and the “widely differing” male genitalia. The genus, as previously defined, was more broadly distributed than *Mortoniella*, extending from Mexico south to Argentina, Paraguay, and southeastern Brazil. Despite Mosely’s assertion that the male genitalia of *Mexitrichia* and *Mortoniella* differ greatly, the basic morphology of the two genera, which is both complex and highly derived compared to most Trichoptera, is very similar. The male genitalia are also distinctively different from other genera of protoptilines. *Mexitrichia* and *Mortoniella*, collectively, are uniquely characterized by a prominent dorsal phallic spine emerging from the phallobase (Figs. 1A, 5A, 12A, 34A). The base of the phallic spine articulates, in most cases, with a mesally fused pair of cupped processes, interpreted here as bases of the parameres (Fig. 34A). Like the genus *Protoptila* Banks, 1904, both *Mexitrichia* and *Mortoniella* have short, articulated, rod-like appendages from the posteroventral margin of the phallobase that fit into pockets on the mesal surface of inferior appendage, themselves fused to the phallic assemblage (Fig. 1A). Unlike *Protoptila*, *Mexitrichia* and *Mortoniella* both have tergum X well developed and sternum VIII unmodified, both plesiomorphic characters.

The venational character used by Mosely to differentiate the genus *Mexitrichia* from *Mortoniella*, absence of fork V in the hind wing, would not be adequate by current cladistic standards, since one of the two character states must be plesiomorphic. The plesiomorphically defined taxon must have some other apomorphic character defining it to maintain the principle of reciprocal monophyly. Presence of fork V in the hind wing (the character state historically used to define *Mortoniella*) is a character primitive for Trichoptera in general. However, *Protoptila*, the ostensible sister taxon to *Mexitrichia* plus *Mortoniella*, also has fork V of the hind wing absent, as do a number of other genera of protoptilines. Venational reversal in *Mortoniella sensu stricto* (hereafter referred to as the *bilineata* species group, see Table 1) to a more primitive character state cannot be ruled out, considering the fact that these species tend to be larger than most species assigned to *Mexitrichia* and venational forking may be partly dependent on wing size. Presence of fork V in the hind wing may not even be perfectly consistent within the *bilineata* species group since *Mortoniella wygodzinskii* (Schmid, 1958), described from Argentina and originally placed in *Mexitrichia*, was described as lacking this character. However, a specimen of this species from Venezuela, examined by the authors, clearly had fork V of the hind wing present. It is possible that the character is inconsistent within the species, or it may have been originally misinterpreted. *Mortoniella wygodzinskii* was officially transferred from *Mexitrichia* to *Mortoniella* by Sykora (1999), based on its evident genitalic similarity to species in that genus; the similarity and the probability that *M. wygodzinskii* belongs in *Mortoniella* had been previously noted by Flint (1963). If the venational character state in the *bilineata* species group represents a character reversal, this could be used as evidence for monophyly of the genus *Mortoniella*, as historically defined. However, the possibility that the presence of fork V in the *bilineata* species group is truly primitive should not be ruled out, even if the character transformations required to make that assessment are not the most parsimonious alternative, since the diminutive size of many species of protoptiline glossosomatids makes parallel venational loss in different lineages plausible. At this point it is difficult to make a convincing case for the venational state in either *Mexitrichia* or *Mortoniella*, as historically defined, to be synapomorphic for the included taxa. The larvae of the *bilineata* species group do possess what may be an apomorphic character, a greatly thickened seta at the base of the foretarsal claw. However, given that the majority of species previously placed in *Mexitrichia* or *Mortoniella* remain unassociated, it is difficult to know whether this character is either universally found in all members of the *bilineata* species group, or exclusively restricted to this group. In general, it is not possible to apply this char-

acter in descriptions of new species, which are based on structures of adults and particularly those of the male genitalia.

Although monophyly of the *bilineata* species group seems likely, based on the similarity of the species now placed there, the species formerly placed in *Mexitrichia* are much less convincingly monophyletic. Since its original description, *Mexitrichia* expanded its scope to include rather diverse forms. Among species historically placed in *Mexitrichia*, there are at least 3 distinctive lineages (see Table 1), one characterized by the type species, *Mexitrichia leroda* (hereafter referred to as the *leroda* species group) including the majority of species now placed in the genus, one characterized by *Mexitrichia ormina* Mosely, 1939 (hereafter referred to as the *ormina* species group), including about a half dozen described species and a number of undescribed ones, and one characterized by *Mexitrichia velasquezi* Flint, 1991 (hereafter referred to as the *velasquezi* species group), currently monotypic, but including several additional undescribed species. A particularly convincing synapomorphy of the female genitalia, which tends to be very uniform among these different lineages, suggests that the *ormina* species group may be related to the *bilineata* species group. The character (Fig. 18A) is the invagination of the posteromesal margin of segment VIII almost to its anterior margin. However, not only do these species lack fork V in the hind wing, the character which distinguishes the *bilineata* species group, but they also have the further venational reduction of lacking fork III in the hind wing (absence of forks I and IV in the hind wing is universal in all species of *Mortoniella*, including those formerly placed in *Mexitrichia*). It should be noted that all of the species of the *ormina* species group are very diminutive in size and venational loss under these circumstances is not unexpected. Flint (1963) noted that there were 2 lineages within *Mexitrichia*, characterized by either presence or absence of fork III in the hind wing (M of hind wing 2-branched or 3-branched). Again, only one character state, presumably the apomorphic loss of fork III, can define a monophyletic group. It appears, however, that taxa having lost fork III also do not form a monophyletic group, since some, including *M. teutona* (Mosely, 1939), *M. unota* (Mosely, 1939), and *M. attenuata* (Flint, 1974), are clearly closely related to species of the *leroda* species group, and not at all closely related to members of the *ormina* species group. It is probable that loss of fork III occurred in at least 2 different lineages, and possibly more. A general conclusion that can be reached from this is that genera or species groups based on venational loss characters, within Protoptilinae, are difficult to defend without more convincing apomorphic characters to support them.

As an additional observation pointing to the distinctiveness of the major lineages discussed above, species in the *bilineata* species group, the *ormina* species group, and also the *velasquezi* species group share several, probably plesiomorphic character similarities of their males, consistently different in the *leroda* species group, including a more or less elongate, narrow, posteriorly directed ventral process on segment VI of the male genitalia (as opposed to a ventrally directed, subtriangular or apically rounded ventral process in the *leroda* species group), the tendency for segment IX to be widest in its ventral half (as opposed to being uniformly rounded and widest at its midpoint in the *leroda* species group), and the presence of uniform setae, undifferentiated in length, on the dorsum of tergum X (as opposed to setae that are longest near the anterior margin and progressively become shorter posteriorly in *leroda* species group). The contrasting character states in the *leroda* species group point to the likelihood that this group may be monophyletic, since it is likely that the character states it possesses are apomorphic.

The available character evidence does not support the traditional recognition of the genera *Mortoniella* and *Mexitrichia*, but does admit the possibility of several alternate taxonomic treatments. In our deliberation over how to treat these taxa, we considered the logical alternative taxonomic treatment to the one proposed here of transferring the *ormina* species group, including one species with a Central American distribution, *M. pacuara*, to *Mortoniella*, and at the same time retaining the use of *Mexitrichia* as a generic name. However, having done so, it is likely that none of the characters currently used to define *Mortoniella* would then apply—making questionable the utility of such an approach, even if the genus so defined is monophyletic. It would also defer the question of the placement of other species that could not be readily placed in either genus.

Although the male and female genitalia of *M. velasquezi* are very distinctive, establishing a third genus to accommodate it would further complicate the problems faced in future taxonomic work on the group, especially considering that it is likely that dozens, perhaps even hundreds, of additional species of the *Mexitrichia/Mortoniella* lineage remain to be discovered and described. As an example, two new species, including one described in this paper, *Mortoniella rodmani*, cannot be placed with confidence in any of these lineages, in part because females are unknown for either species. They may constitute the nucleus of an additional species group, or may represent basal taxa in the *ormina* species group, as judged by their minute size, relatively narrow forewings, and reduced hind wing venation (M vein 2-branched). More problems of this kind are likely to be encountered as additional new species are discovered. In light of this, we consider our approach of broadly defining *Mortoniella* the most practical one for facilitating future taxonomic work, and considering the large number of new species described in the current work, we also felt that it was preferable to implement the taxonomic change now. Ultimately, it will probably prove valuable to recognize each of the distinct lineages discussed above as subgenera of *Mortoniella*. We prefer to defer this until the revision of the genus is completed and a formal phylogenetic analysis is performed. However, anticipating this eventual solution, it can be confidently predicted that *Mexitrichia*, if used as a subgeneric name, would ultimately encompass all of the species described in this paper, with the exception of *Mortoniella pacuara* and *Mortoniella rodmani*, new species.

### Structures of the male genitalia

Species of *Mortoniella*, and genera of Protoptilinae in general, represent a departure from the basic morphological pattern typical of Trichoptera, mostly because of the complex fusion and modification of structures. The terminology presented represents an interpretation of structures believed to be homologous to parts in other Trichoptera, and follows that used for *Protoptila* (Holzenthal & Blahnik 2006, Morse 1988), except for the morphological features that are peculiar to *Mortoniella* itself. Perhaps more so than any other genus of Protoptilinae, the male genitalia of *Mortoniella* present an ensemble of parts that seem to be co-adapted, or that is to say, they fit together in a very specific way.

Probably these parts serve as something of an elaborate sensory mechanism. Schmid (1998) used the term “phallic apparatus” for the composite structure in Trichoptera which includes the phallobase, parameres (when present), endotheca, phallicata, and endophallic membrane, including associated spines and processes. To this assemblage, in *Mortoniella*, can be added a pair of inferior appendages, which are fused to one another, forming a single composite structure, as well as to the ventral part of the endotheca, and a pair of articulated appendages from the posteroventral part of the phallobase, of uncertain ontology or homology. We have given the term “phallic ensemble” to this composite structure. This ensemble includes a pair of sclerotized, cupped processes, which are interpreted here as basal structures of the parameres; these are generally fused to one another dorsally, forming a point of articulation or “fulcrum” for the dorsal phallic spine (Fig. 34A). This composite structure, formed by the fused bases of the parameres and dorsal phallic spine, seems to be always present and can be considered a diagnostic feature of *Mortoniella*. However, the cupped bases of the parameres are variably sclerotized in different species and sometimes not conspicuous, which accounts, in part, for what may seem an apparent lack of consistency of this structure in the accompanying illustrations. Emerging from the cupped structures is a pair of sclerotized appendages, often very elongate, with a membranous basal attachment. The term paramere spine was used for this structure in *Protoptila* (Holzenthal & Blahnik 2006), but the more general term of paramere appendage is used here, since the structure is often complexly modified, and not necessarily spine-like. Basic structures of the male genitalia found throughout the genus are diagrammed in the lateral views of Figs. 1, 5, 12, 26, and 34.

A functionally critical part of the phallic ensemble seems to be the dorsal phallic spine, which probably directly interacts with the female genitalia. The spine varies significantly among species in its shape—partic-



ularly in the inflection and shape of its apex, which are of considerable diagnostic value at the species level. It is apparent that tergum X is often modified apicomesally to accommodate the dorsal phallic spine and the shape and contour of tergum X is also a very useful character for species determinations. The dorsal phallic spine may also have a ventral protrusion that is complementary in shape to the phallicata, or articulates with it as a secondary fulcrum (Fig. 15A). The phallicata also frequently has dorsolateral processes (Fig. 34A) that seemingly function, at least partially, as a guide for the dorsal phallic spine. Alternatively, or additionally, the dorsal margin of the phallicata and/or dorsal margin of the endophallic membrane may be sclerotized and complementary in shape to the dorsal phallic spine.

An additional function of the dorsolateral processes of the phallicata, when present, seems to be to serve as guides for the paramere appendages (Fig 30A, C). Additional guides may be present as lateral protrusions or creases on the phallicata (Fig. 11A, C). The paramere appendages are often curved inward basally (Fig. 34A, C), apparently to facilitate their close juxtaposition with the lateral margin of the phallicata and to aid in their proper placement in the modified processes on the phallicata designed to accommodate them. Sometimes the paramere appendages, or their apices, also rest against protrusions on the endophallic membrane. The paramere appendages often have adorning cuticular structures, such as spines or papillae.

The last part of the phallic ensemble, characteristic of both *Mortoniella* and *Protoptila*, are the pair of articulated appendages, probably always with relatively membranous apices, emerging from the phallobase. These fit into a pair of pockets on the mesal surface of the inferior appendage. The pockets themselves may either be derived from the inferior appendage, or may represent an extension or ventral development from the cupped structures at the base of the paramere. The pockets apparently always have small curved, or sometimes elongate, lanceolate, apical spine-like processes. Sometimes the inferior appendage has more densely setose, mesally wrapped basal regions in close apposition to the lateral margins of the ventral pockets. The phallicata and endophallic membrane are thus surrounded by functionally adaptive sensory structures, including the dorsal phallic spine and setose tergum X, lateral paramere appendages, often themselves with spines or other projections, the setose inferior appendage and the articulated appendages of the phallobase, with their accompanying pockets.

A feature common to many species of *Mortoniella* is a single, usually strongly curved, apicoventral or ventral endophallic spine (Fig. 34A) and sometimes a pair of apicodorsal spines. We have interpreted the latter to be closely associated with the phallotremal opening, although not necessarily part of the phallotremal sclerite proper, and hence have given these the term phallotremal spines (Fig. 12A, C). Similar, but unsclerotized processes are present in some species. Usually the phallotremal sclerite is not evident, possibly because it is very lightly sclerotized. The apicoventral spine varies considerably in size and may be paired (but not in Central American species) or absent in some species. It is possible that it functionally serves to prevent extraction of the phallic apparatus when it is engaged, but the variability of the structure among species suggests that it has significance as a species recognition feature, possibly serving a stimulatory function within the female genitalia.

## Generic description

### Genus *Mortoniella* Ulmer

*Mortoniella* Ulmer, 1906: 95 [Type species: *Mortoniella bilineata*, by monotypy].

*Mexitrichia* Mosely, 1937: 158 [Type species: *Mexitrichia leroda*, original designation] **new synonym**.

*Paraprotoptila* Jacquemart, 1963: 342 [Type species: *Paraprotoptila armata*, by monotypy]; Flint *et al.* 1999a, as synonym of *Mexitrichia*.

Among genera of Protoptilinae, *Mortoniella* males are diagnostically defined by the presence of a single dor-

sal phallic spine, emergent from the phallobase, and by its accompanying fulcrum-like articulation, provided by the fused, sclerotized bases of the parameres (Fig. 34A). The genus *Mortoniella* is most similar to *Protoptila*. The two taxa collectively are characterized by the possession of small digitiform processes, forming articulated appendages that fit into sclerotized pockets on the mesal margin of the inferior appendages (Fig 1A; Holzenthal & Blahnik 2006, fig. 2C). No other taxa of Protoptilinae possess either these digitiform appendages or their corresponding pockets. *Mortoniella* can be additionally differentiated from *Protoptila* by the possession of a well developed tergum X, usually with the posteromesal margin distinctly invaginated (entire, or nearly so, in some members of the *bilineata* species group) and by having sternum VIII relatively unmodified [as opposed to the highly modified and posteriorly projecting sternum VIII that characterizes *Protoptila* (Holzenthal & Blahnik 2006, fig. 2A, B)]. Females are characterized by having a pair of projecting ventrolateral lobes (Figs. 2B, 18B) from the ventral margin of segment IX (absent or less distinctly developed in most *Protoptila*). The ventromesal margin of segment VIII is also usually noticeably invaginated. In most species there is an additional pair of mesal accessory lobes (Fig. 2B), extending from the distal margin of the ventrolateral lobes of sternum IX, which parallel an apicomesal structure, possibly glandular in function. Females, especially those of the *leroda* species group, often have the “glandular” structure conspicuously swollen and sclerotized or darkened apically or preapically, usually with an evident tubular structure leading to it. Females in the *bilineata* species group and the *ormina* species group are recognized by having the dorsal margin of segment VIII deeply invaginated from the posterior margin, often with a remaining mesal projection or tab (Fig. 18A).

Usually, specimens of *Mortoniella* are readily sorted from *Protoptila* by the more broadly rounded apices of their wings, except possibly for the minute species in the *ormina* species group, which differ from *Protoptila* in that the distal part of the costal margin of hind wings are not distinctly concave (Fig. 19B).

Adult. Forewing length variable, ca. 1.8–7.2 mm. Forewing with forks I, II, and III present; hind wing with fork II only, or forks II and III, or forks II, III and V (*bilineata* species group). Forewing chord with all crossveins nearly linear, often forming a conspicuous wing bar with contrasting, pale, white or whitish-brown setae; sometimes with additional whitish markings in proximal or distal part of the wing or at the apices of the major veins. Apices of forewings usually more or less rounded, less distinctly so in *ormina* species group. Color variable, usually some shade of brown, varying to nearly black or golden in some species. Spur formula 0:4:4. Segment VI with ventral process in both males and females, either subtriangular and ventrally oriented, or more elongate and posteriorly oriented, process of female either similar in shape and size to male, or somewhat reduced.

Male genitalia: Segment VIII usually short and not greatly modified, sometimes nearly synscleritous, posterior margin with elongate setae. Segment IX either evenly rounded anterolaterally (Fig. 1A), or more elongate in ventral half (Fig. 17A); segment deeply mesally excised dorsally and ventrally; posterior margin usually with staggered row of prominent setae. Tergum X projecting and setose, either cleft mesally, or nearly entire, often with apicolateral margins projecting and lobe-like. Inferior appendages fused mesally to one another and to ventral margin of phallic apparatus, either invaginated apicomesally (Fig. 30C) or with projecting apicomesal projection (Fig. 12C), often highly reduced in *bilineata* species group; mesally with pair of sclerotized pockets, each with short, hooked apical projection, or apical projection sometimes prominent and lance-like. Phallobase typically short, sometimes with short, laterally compressed dorsomesal apodeme; apicoventrally with short, projecting rod-like appendages (Fig 1A); dorsally with prominent, projecting dorsal phallic spine (Figs. 1A, 5A, 12A, 34A). Dorsal phallic spine often with base somewhat enlarged, sinuous in lateral view, or with apex strongly upturned; apex usually acute, sometimes widened or otherwise modified. Endotheca short, either membranous or nearly continuously sclerotized from phallobase to phallicata; usually with pair of prominent parameres. Parameres with bases typically forming pair of cupped and more or less mesally fused processes (Figs. 6A, C; 34A), often articulating with dorsal phallic spine; apically with pair of appendages (Fig. 1A), usually elongate and rod-like, but highly variable in length and development, membra-

nous at base, sometimes with membranous base displaced laterally. Phallicata usually tubular, variable in length and development, often with dorsolateral processes and/or dorsoventrally compressed lateral projections (Fig. 34A). Endophallic membrane variable in length and development, sometimes with balloon-like projections (Fig. 33C), or sclerotized regions, often with prominent ventral or apicoventral spine (Fig. 34A), phallotremal opening sometimes with accompanying pair of sclerotized phallotremal spines (Fig. 12A).

Female genitalia: Anterior margin of tergum VI, usually, with pair of small rounded glandular structures; anterior margin of tergum VII, sometimes, with second pair of similar glandular structures (glandular structures absent from both segments in some species). Segment VIII short, either with dorsal margin entire and unmodified (Fig. 2A), or with dorsal margin distinctly invaginated posteromesally (Fig. 18A), with or without accompanying mesal projection; ventral margin distinctly invaginated posteromesally. Segment IX usually short, sometimes nearly vertical dorsally, often distinctly projecting in *bilineata* species group; sternum with pair of projecting ventrolateral processes (Figs. 2B, 18B), usually curved and extended apically to form additional pair of ventromesal processes (Fig. 2B), paralleling a projecting ventromesal structure, possibly glandular, sclerotized apically (Fig. 2B) or preapically (Fig. 18B), often with evident tubular structure leading to it. Tergum X, short, setose, with pair of short, projecting rod-like cerci. Vaginal apparatus variable, with conspicuous cupped, keyhole sclerite.

## Species descriptions

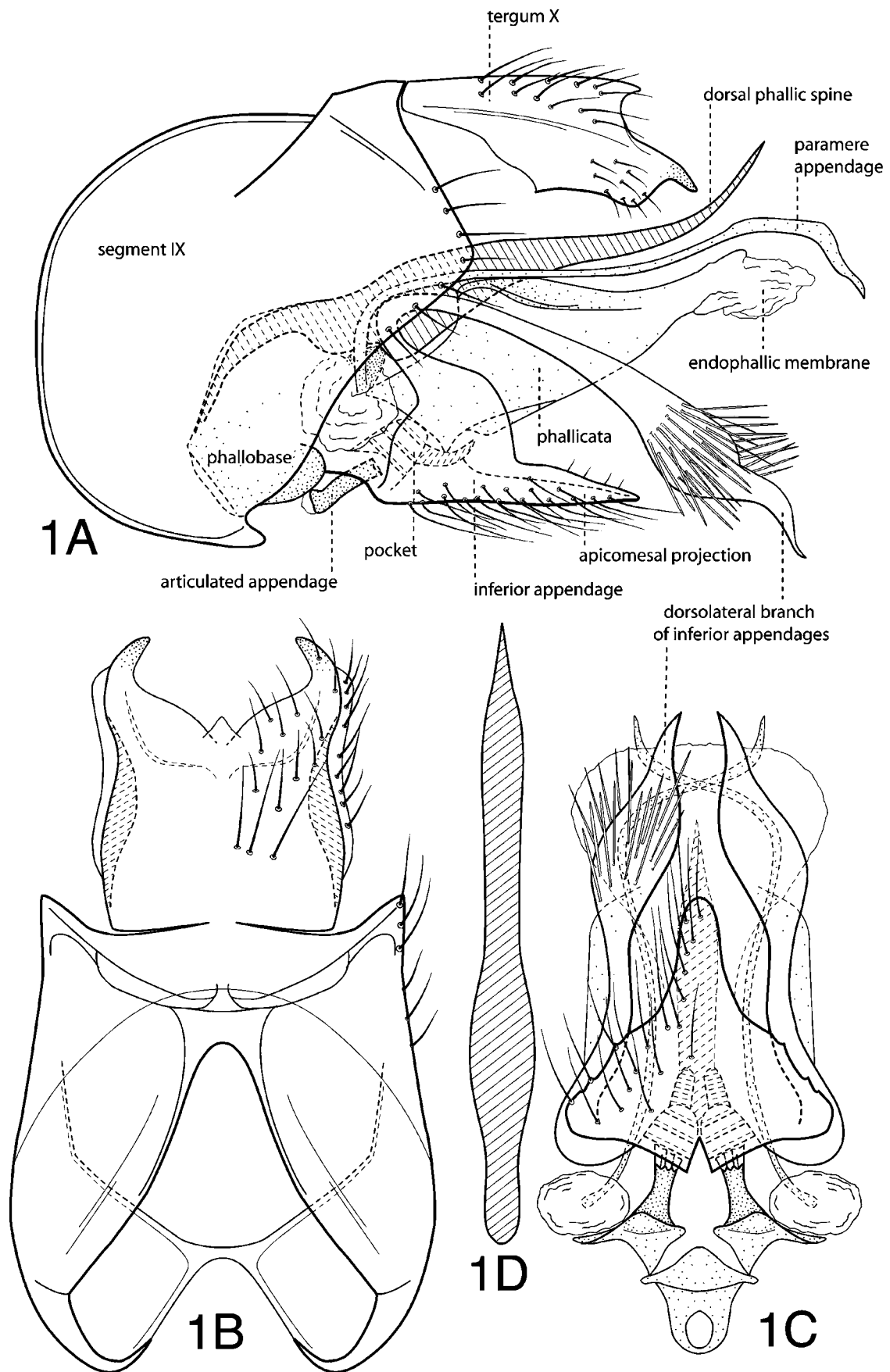
### *Mortoniella akantha*, new species

Figs. 1–3

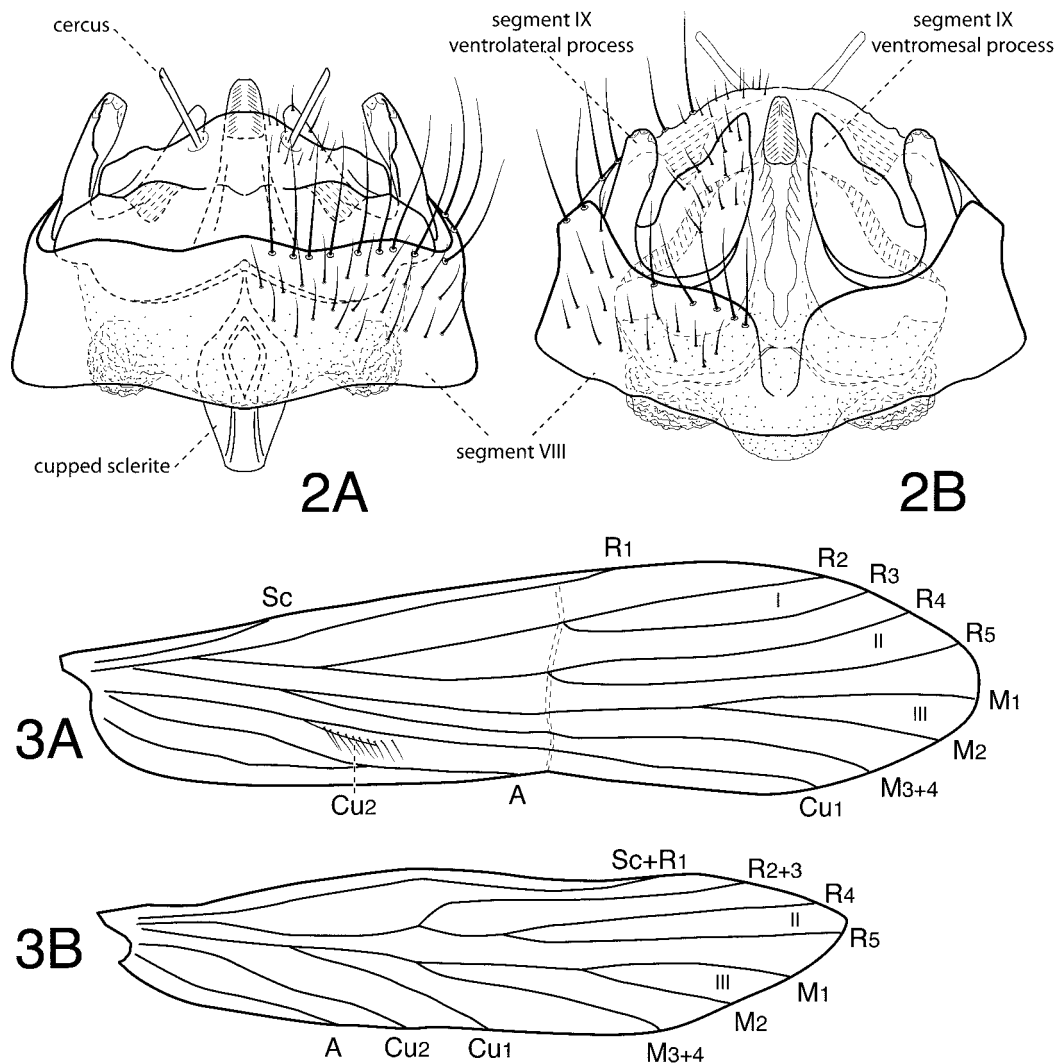
This species is very similar to both *Mortoniella tapanti*, n. sp., and *M. anakantha*, n. sp. All of these species are characterized by having an inferior appendage with a single, symmetrical apicomesal projection and also distinctive, elongate dorsolateral branches. *Mortoniella akantha* is most similar to *M. anakantha*, especially in the form of the inferior appendage. Both species have the apicomesal projection of the inferior appendage more elongate than *M. tapanti*, and the dorsolateral branches are not forked. *Mortoniella akantha* differs from *M. anakantha* in that the dorsolateral branches of the inferior appendage are distinctly widened and basket-like preapically and have the expansion densely covered with elongate bristle-like setae on both surfaces, as opposed to a few (or no) setae on a scarcely expanded process in *M. anakantha*. *Mortoniella tapanti* also has setae on the elongate dorsolateral branches of the inferior appendage, but the setae on the structure do not occur on a basket-like enlargement and are also differently arranged.

Adult. Length of forewing: male 3.6–4.2 mm, female 4.0–4.5 mm. Forewing with forks I, II, and III, hind wing with forks II and III. Overall color light to medium brown, palps and basal part of antennal and tarsal segments darker brown, apices of tibiae, tarsal and basal antennal segments light brown. Wing bar at anastomosis distinct, marked by pale, light brown setae. Ventral process of abdominal segment VI (male) short, ventrally oriented, subtriangular, rounded to subacute apically, base about as long as length, not or very slightly constricted basally.

Male genitalia. Segment IX nearly evenly rounded anterolaterally, length greatest midlaterally, posterolateral margin forming rounded to slightly angular projection in dorsal half, narrowing ventrally; segment deeply mesally excised dorsally and ventrally, dorsal excision narrow, much less than half width of segment. Tergum X with short, subacute mesal projection and projecting lateral lobes, lateral lobes with apices narrowed, subacute, mesally curved. Inferior appendage with relatively broad, prominent, symmetrical, apically rounded apicomesal projection with elongate setae ventrally and laterally, short, sparse setae dorsally; appendage basolaterally, with prominent dorsal projection on each side, each terminating in elongate, narrow, posteriorly projected dorsolateral branch, extending past apicomesal projection of inferior appendage; apex of dorsolateral



**FIGURE 1.** *Mortoniella akantha*, new species. Male genitalia: A—lateral; B—segment IX and tergum X, dorsal; C—phallic ensemble, ventral; D—dorsal phallic spine, dorsal.



**FIGURE 2–3.** 2, *Mortoniella akantha*, new species. Female genitalia: A—dorsal; B—ventral. 3. *Mortoniella akantha*, new species. Wings, male: A—forewing; B—hind wing.

branch narrow, acute, posteriorly directed, preapically expanding to form widened basket-like area with numerous elongate bristle-like setae on both convex ventral and concave dorsal surfaces; mesal pockets of inferior appendage with apical processes short, thick, dorsally curved. Paramere appendages emerging from membranous basolateral projections, very elongate, narrow, dorsally arched basally, mesally curved apically, each appendage slightly widened in apical half or third, sinuous, ribbon-like, apex narrowed and acute. Dorsal phallic spine with basoventral bulge, apical part sinuously, dorsally curved; as viewed dorsally, with apex acute. Phallicata relatively wide basally, expanded in middle, greatly narrowed apically, basoventrally with slight bulge, dorsally with broadly rounded, explanate lateral projection on either side. Endophallic membrane short, simple, without spines.

**Holotype male:** COSTA RICA: San José: Parque Nacional Braulio Carrillo, Quebrada Sanguijuela, 10°09'36"N, 083°57'47"W, 800 m, 27.iii.1987, Holzenthal, Hamilton & Heyn (UMSP000001118) (pinned) (UMSP).

**Paratypes:** COSTA RICA: [ex. arugula herbs, intercepted at port of Miami, no additional locality information] 2.i.1994 — 1 male (pinned) (NMNH); **Alajuela:** Reserva Forestal San Ramón, Río San Lorencito & tribs., 10°12'58"N, 084°36'25"W, 980 m, 30.iii.–1.iv.1987, Holzenthal, Hamilton & Heyn — 6 males (alcohol) (UMSP); same locality, 13–16.vi.1988, C. & O. Flint, Holzenthal — 5 males, 20 females (pinned)

(NMNH), 8 males, 247 females (alcohol) (NMNH); **Cartago:** Quebrada Platanillo, ca. 5 km E Moravia de Chirripó, 09°49'16"N, 083°24'25"W, 1130 m, 6.viii.1987, Holzenthal, Morse & Clausen — 2 males (alcohol) (UMSP); **Puntarenas:** Río Cotón, in Las Alturas, 08°56'17"N, 082°49'34"W, 1360 m, 16.ii.1986, Holzenthal, Morse & Fasth — 2 males (alcohol) (UMSP); same locality, 13–14.viii.1990, Holzenthal, Blahnik & Muñoz — 4 males (alcohol)(UMSP); same locality, 18.iii.1991, Holzenthal, Muñoz & Huisman — 1 male (pinned) (UMSP); Río Bellavista, ca. 1.5 km NW Las Alturas, 08°57'04"N, 082°50'46"W, 1400 m, 15–17.vi.1986, Holzenthal, Heyn & Armitage — 1 male (alcohol) (UMSP); same locality, 8–9.iv.1987, Holzenthal, Hamilton & Heyn — 2 males (alcohol) (INBIO); same locality, 10–11.viii.1990, Holzenthal, Blahnik & Muñoz — 1 male (pinned) (UMSP); Río Guineal, ca 1 km (air) E Finca Helechales, 09°04'34"N, 083°05'31"W, 840 m, 22.ii.1986, Holzenthal, Morse & Fasth — 1 male, 4 females (pinned), 1 male (alcohol) (UMSP); same locality, 4.viii.1987, Holzenthal, Morse & Clausen — 1 male (alcohol) (UMSP); Río Singrú, ca 2 km (air) S Finca Helechales, 09°03'25"N, 083°04'55"W, 720 m, 21.ii.1986, Holzenthal, Morse & Fasth — 8 males (alcohol) (INBIO); Zona Protectora Las Tablas, Río Cotón, Sitio Cotón, 08°56'28"N, 082°47'13"W, 1460 m, 15.iv.1989, Holzenthal & Blahnik — 1 male (alcohol) (UMSP); Río Bellavista trib., Las Alturas, road to quarry, 08°57'07"N, 082°50'53"W, 1480 m, 19.iii.1991, Holzenthal, Muñoz & Huisman — 3males (pinned), 1 male (alcohol) (UMSP); **San José:** same locality and date as holotype — 1 male, 17 females (pinned) (UMSP).

**Etymology.** This species is named *M. akantha* after the Greek word *akantha*, for a thorn or prickle, and referring to the setose dorsolateral branches of the inferior appendage of this species.

#### ***Mortoniella anakantha*, new species**

Fig. 4

This species is very similar to both *Mortoniella tapanti*, n. sp., and *M. akantha*, n. sp, as discussed above. All of these species are characterized by having an inferior appendage with a single, symmetrical apicomesal projection and also distinctive, elongate dorsolateral branches. *Mortoniella anakantha* is most similar to *M. akantha*, especially in the form of the inferior appendage. Both species have the apicomesal projection of the inferior appendage more elongate than *M. tapanti*, and the dorsolateral branches are not forked. *Mortoniella anakantha* differs from *M. akantha* in that the dorsolateral branches of the inferior appendage lack preapically widened, basket-like, and setose structures, although a few scattered setae may be present. Additionally, the apices of the dorsolateral branches, in *M. anakantha*, are usually more distinctly mesally inturned than in *M. akantha*, often with an accompanying small pleated fold at the bend.

**Adult.** Length of forewing: male 3.6–4.2 mm, female 3.9–5 mm. Forewing with forks I, II, and III, hind wing with forks II and III. Overall color light to medium brown, palps and basal part of antennal and tarsal segments darker brown, apices of tibiae, tarsal and basal antennal segments light brown. Wing bar at anastomosis distinct, marked by pale, light brown setae. Ventral process of abdominal segment VI (male) short, ventrally oriented, subtriangular, rounded to subacute apically, base about as long as length, not or very slightly constricted basally.

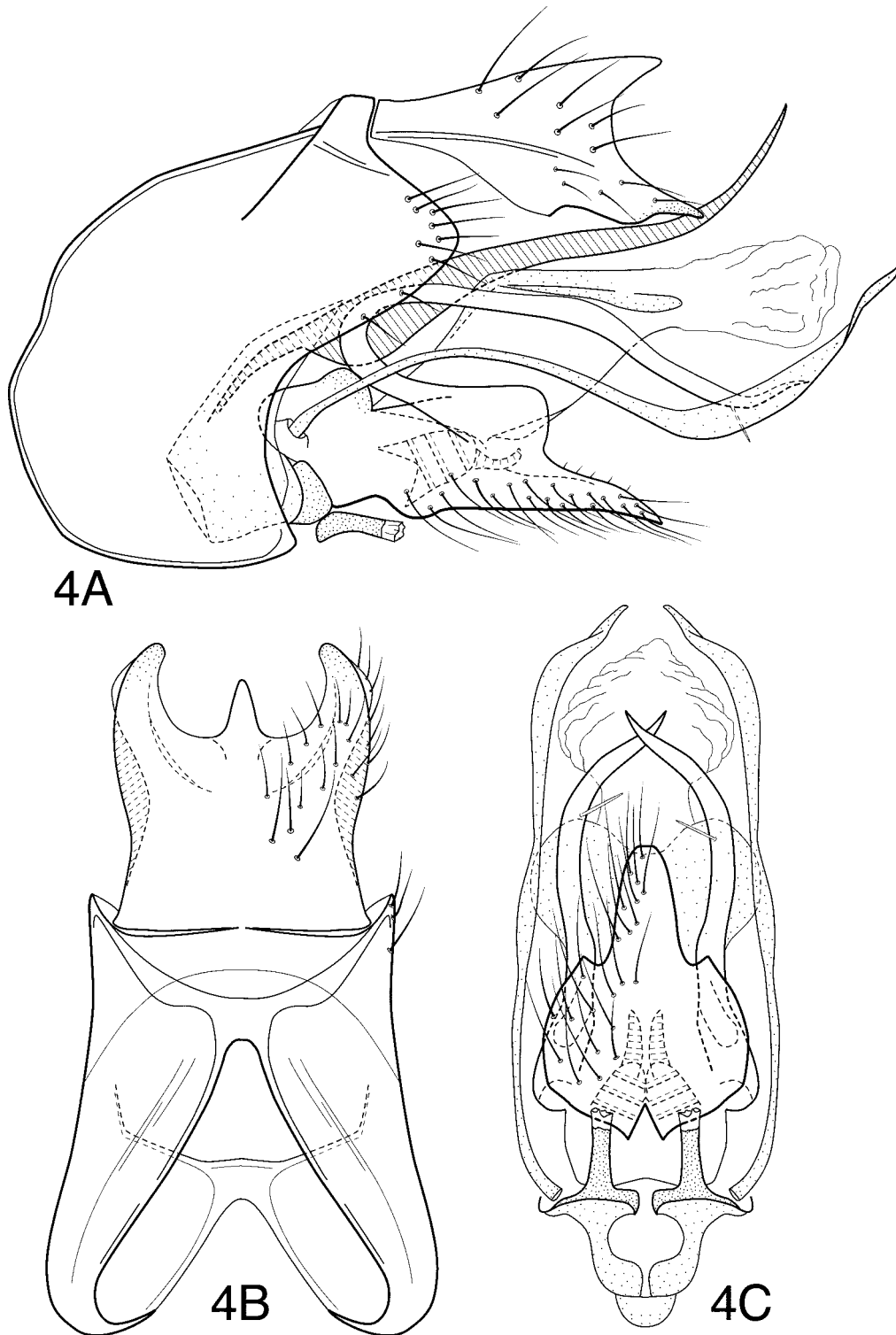
**Male genitalia.** Segment IX nearly evenly rounded anterolaterally, length greatest midlaterally, posterolateral margin forming rounded to slightly angular projection in dorsal half, narrowing ventrally; segment deeply mesally excised dorsally and ventrally, dorsal excision narrow, much less than half width of segment. Tergum X with prominent, subacute mesal projection and projecting lateral lobes, lateral lobes with apices narrowed, subacute, mesally curved. Inferior appendage with relatively broad, prominent, symmetrical, apically rounded apicomesal projection with elongate setae ventrally and laterally, short, sparse setae dorsally; appendages basolaterally, with prominent dorsal projection on each side, each terminating in elongate, narrow, posteriorly projected dorsolateral branch, extending past apicomesal projection of inferior appendage; apex of dorsolat-

eral branch narrow, acute, mesally curved, not greatly widened, with a few scattered setae or setae absent; mesal pockets of inferior appendage with apical processes short, thick, dorsally curved. Paramere appendages emerging from membranous basolateral projections, very elongate, narrow, dorsally arched basally, mesally curved apically, each appendage slightly widened in apical half or third, sinuous, ribbon-like, apex narrowed and acute. Dorsal phallic spine with basoventral bulge, apical part sinuously, dorsally curved; as viewed dorsally, with apex acute. Phallicata relatively wide basally, expanded in middle, greatly narrowed apically, basoventrally with slight bulge, dorsally with broadly rounded, explanate lateral projection on either side. Endophallic membrane short, simple, without spines.

**Holotype male: COSTA RICA: Puntarenas:** Río Bellavista trib., Las Alturas, road to quarry, 08°57'07"N, 082°50'53"W, 1480 m, 19.iii.1991, Holzenthal, Muñoz & Huisman (UMSP00000982) (pinned) (UMSP).

**Paratypes: COSTA RICA: Guanacaste:** Parque Nacional Guanacaste, Río Orosí, Estación Pitilla, 10°59'28"N, 085°25'41"W, 700 m, 22–25.v.1990, Holzenthal & Blahnik — 1 male (pinned) (UMSP); **Puntarenas:** Río Cotón, in Las Alturas, 08°56'17"N, 082°49'34"W, 1360 m, 16.ii.1986, Holzenthal, Morse & Fasth — 5 males, 8 females (pinned), 7 males (alcohol) (UMSP); same locality, 12.viii.1990, Holzenthal, Blahnik & Muñoz — 16 females (pinned), 36 males, 359 females (alcohol) (UMSP); same locality, 13–14.viii.1990, Holzenthal, Blahnik & Muñoz — 3 males, 31 females (pinned) (UMSP); same locality, 18.iii.1991, Holzenthal, Muñoz & Huisman — 1 male, 15 females (pinned), 75 males, 327 females (alcohol) (UMSP); same locality, 24.ix.1991, Muñoz & Quesada — 4 males, 54 females (pinned) (INBIO), 1 male, 60 females (alcohol) (UMSP); small spring seep to Río Cotón in Las Alturas, 8°56'17"N, 82°49'26"W, 1380 m, 14.viii.1990, Holzenthal, Blahnik & Muñoz — 21 males (alcohol) (NMNH); Río Bellavista, ca. 1.5 km NW Las Alturas, 08°57'04"N, 082°50'46"W, 1400 m, 18.ii.1986, Holzenthal, Morse & Fasth — 2 males, 18 females (pinned), 1 male (alcohol) (UMSP); same locality, 15–17.vi.1986, Holzenthal, Heyn & Armitage — 2 males (alcohol) (UMSP); same locality, 8–9.iv.1987, Holzenthal, Hamilton & Heyn — 4 males, 13 females (pinned), 8 males (alcohol) (UMSP); same locality, 2–3.viii.1987, Holzenthal, Morse & Clausen — 1 male, 15 females (pinned), 1 male (alcohol) (UMSP); same locality, 10–11.viii.1990, Holzenthal, Blahnik & Muñoz — 1 male, 25 females (pinned) (UMSP); same locality, 16–17.iii.1991, Holzenthal, Muñoz & Huisman — 4 males, 31 females (pinned) (UMSP), 22 males (alcohol) (INBIO); Río Guineal, ca 1 km (air) E Finca Helechales, 09°04'34"N, 083°05'31"W, 840 m, 22.ii.1986, Holzenthal, Morse & Fasth — 4 males (alcohol) (UMSP); same locality, 4.viii.1987, Holzenthal, Morse & Clausen — 1 male (alcohol) (UMSP); San Vito, 2 km S., Finca Las Cruces, 08°42'00"N, 083°00'00"W, 4000 m, 13–15.iii.1973 (Philadelphia Academy) — 1 male, 1 female (alcohol) (NMNH); Río Singrú, ca 2 km (air) S Finca Helechales, 09°03'25"N, 083°04'55"W, 720 m, 21.ii.1986, Holzenthal, Morse & Fasth — 1 male, 9 females (pinned), 18 males (alcohol) (UMSP); Zona Protectora Las Tablas, Río Cotón, Sitio Cotón, 08°56'28"N, 082°47'13"W, 1460 m, 15.iv.1989, Holzenthal & Blahnik — 2 males (alcohol) (UMSP); Río Bellavista trib., Las Alturas, road to quarry, 08°57'07"N, 082°50'53"W, 1480 m, 19.iii.1991, Holzenthal, Muñoz & Huisman — 12 males, 6 females (pinned) (UMSP), 6 males, 3 females (alcohol) (INBIO); **PANAMA: Chiriquí:** Boquete, brook at Hotel Fundadores, 1200 m, 29.v.1983, Spangler, Faitoute & Steiner — 1 male, 9 females (alcohol) (NMNH); Fortuna, 08°41'00"N, 082°15'00"W, 3100 m, 1.xii.1977, R.W. Flowers — 3 males, 3 females (alcohol) (NMNH); Fortuna Dam Site nr. Hornitos, 08°55'00"N, 082°16'00"W, 1050 m, 30.xi.–27.xii.1977, H. Wolda — 4 males, 1 female (alcohol) (NMNH).

**Etymology.** This species is named *M. anakantha* after the Greek word *akantha*, for a thorn or prickle, and referring to the absence of setae on the dorsolateral branches of the inferior appendage in this species, as compared to the setose processes present in *M. akantha*.



**FIGURE 4.** *Mortoniella anakantha*, new species. Male genitalia: A—lateral; B—segment IX and tergum X, dorsal; C—phallic ensemble, ventral.

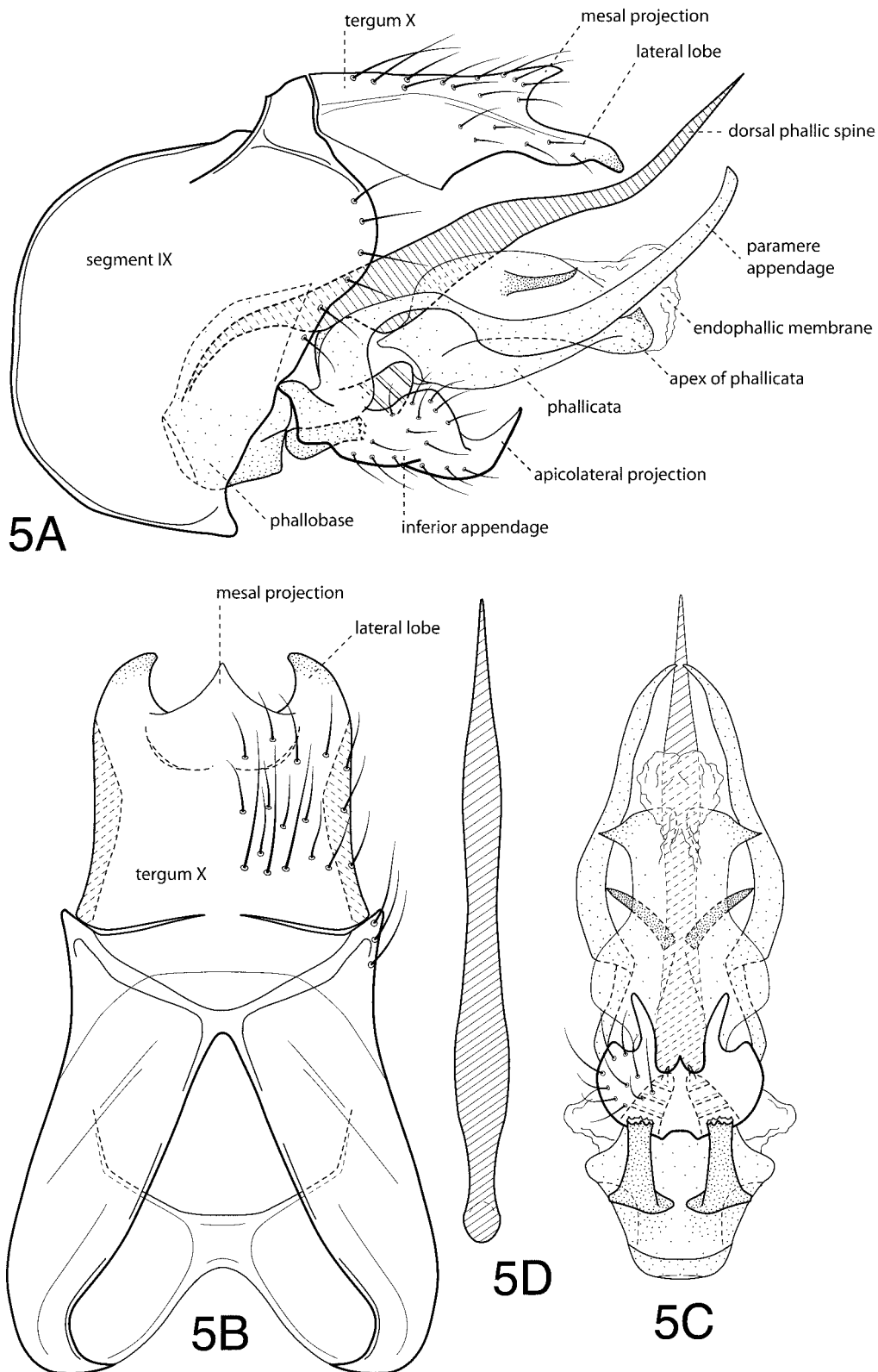
***Mortoniella aviceps*, new species**

Fig. 5

*Mortoniella aviceps* is a distinctive species, diagnosed by the acute, more or less bird-head shaped lateral lobes of the phallicata. It is probably most closely related to *M. taurina* and resembles that species in having



dorsolateral spine-like processes on the phallicata, although these are less elongate in *M. aviceps*. Both species also have paramere appendages with their apical halves distinctly widened and outwardly bowed. However, among other differences, the paramere appendages in *M. aviceps* lack spines and the endophallic membrane of this species does not have a stout, curved spine.



**FIGURE 5.** *Mortoniella aviceps*, new species. Male genitalia: A—lateral; B—segment IX and tergum X, dorsal; C—phallic ensemble, ventral; D—dorsal phallic spine, dorsal.

Adult. Length of forewing: male 3.0–3.2 mm, female 3.2–3.8 mm. Forewing with forks I, II, and III, hind wing with forks II and III. Overall color (in alcohol) medium brown. Wing bar at anastomosis not evident. Ventral process of abdominal segment VI (male) short, ventrally oriented, subtriangular, subacute apically, length slightly greater than width at base, slightly constricted basally.

Male genitalia. Segment IX nearly evenly rounded anterolaterally, length greatest midlaterally, posterolateral margin forming rounded projection in dorsal half, narrowing ventrally; segment deeply mesally excised dorsally and ventrally, dorsal excision narrow, much less than half width of segment. Tergum X with short, acute mesal projection and relatively short, projecting lateral lobes, lateral lobes with apices narrowed, subacute, mesally curved. Inferior appendage with very short, acute apicomeral projection and paired apicolateral projections, apicolateral projections relatively short, stout, distinctly dorsally curved, acute apically; basolaterally, with short, rounded projection on each side; mesal pockets of inferior appendage with apical processes short, dorsally curved. Paramere appendage with basal part wide, then much narrowed, distinctly widened, flattened and mesally curved in apical half, apex very acute. Dorsal phallic spine with basoventral bulge, apical part sinuously, dorsally curved; as viewed dorsally, with apex acute. Phallicata with apices rounded and with acute preapical, lateral projections, basoventrally with rounded, laterally explanate projections, dorsally with broadly rounded dorsal projection on either side, each with laterally protuberant spine-like process. Endophallic membrane short, simple, without spines.

**Holotype male: COSTA RICA: Alajuela:** Reserva Forestal San Ramón, Río San Lorencito & tribs., 10°12'58"N, 084°36'25"W, 980 m, 30.iii.–1.iv.1987, Holzenthal, Hamilton & Heyn (UMSP000018894) (in alcohol) (UMSP).

**Paratypes: COSTA RICA: Guanacaste:** Parque Nacional Guanacaste, Estacion Maritza, Río Tempisque, 10°57'29"N, 085°29'49"E, 550 m, 17–18.vi.1988, C. & O. Flint, Holzenthal — 1 male, 4 females (pinned), 1 male (alcohol) (NMNH); **Puntarenas:** Reserva Biologica Carara, Quebrada Bonita, 09°46'30"N, 084°36'18"W, 35 m, 11.iii.1991, Holzenthal, Muñoz & Huisman — 3 males, 11 females (alcohol) (UMSP); **PANAMA: Coclé:** El Valle, 829 m, 25.v.1983, Spangler, Faitoute & Steiner — 1 male, 3 females (pinned) (NMNH).

Etymology. This species is named *M. aviceps*, meaning bird-head, derived from Latin words *avis*, for bird, and *-ceps*, from the Latin *caput*, for head, and referring to the distinctive bird-head shaped lateral apices of the phallicata in this species.

### ***Mortoniella brachyrachos*, new species**

Fig. 6

*Mortoniella brachyrachos* is perhaps most similar to *M. florica* (Flint), resembling that species in possessing upright dorsolateral processes on the dorsal margin of the phallicata and in having a short inferior appendage without elongate apicolateral or apicomeral processes. It is distinguished from *M. florica*, and all other species, by its short, spinose paramere appendages.

Adult. Length of forewing: male 3.0–3.2 mm. Forewing with forks I, II, and III, hind wing with forks II and III. Overall color (in glycerin) light brown. Ventral process of abdominal segment VI (male) short, ventrally oriented, subtriangular, subacute apically, length slightly greater than width at base, slightly constricted basally.

Male genitalia. Segment IX nearly evenly rounded anterolaterally, length greatest midlaterally, posterolateral margin forming rounded projection in dorsal half, narrowing ventrally; segment deeply mesally excised dorsally and ventrally, dorsal excision narrow, much less than half width of segment. Tergum X with prominent, acute mesal projection and short, angularly truncate lateral lobes, subequal in length to mesal projection, lateral lobes with apices distinctly sclerotized, dorsoventrally flattened and slightly mesally curved. Inferior

appendage with weakly developed, acute apicomesal projection and short, rounded basolateral projections on each side; mesal pockets of inferior appendage with apical processes short, dorsally curved. Paramere appendages very short, dorsally curved and densely covered in apical half with short, thick spines. Dorsal phallic spine slightly enlarged basoventrally and with relatively weak apicodorsal inflection, distinctly dorsoventrally flattened; as viewed dorsally, with apex rounded. Phallicata relatively short, dorsally with explanate lateral projection on either side, each rounded and slightly elevated basally, tapering apically. Endophallic membrane with single prominent, stout, curved spine.

**Holotype male: MEXICO: Oaxaca:** Loxicha, Pluma Hidalgo, 450 m, 20.x.1982, J. Bueno-Soria (UMSP000118956) (in microvial of glycerin, on pin) (IBUNAM).

**Paratypes: MEXICO: Oaxaca:** same locality and date as holotype, 1 male (in microvial of glycerin, on pin) (IBUNAM).

Etymology. This species is named *M. brachyrhachos*, as a noun in apposition, from Greek words for short stem, referring to the short setose paramere appendages of this species.

### ***Mortoniella buenoi*, new species**

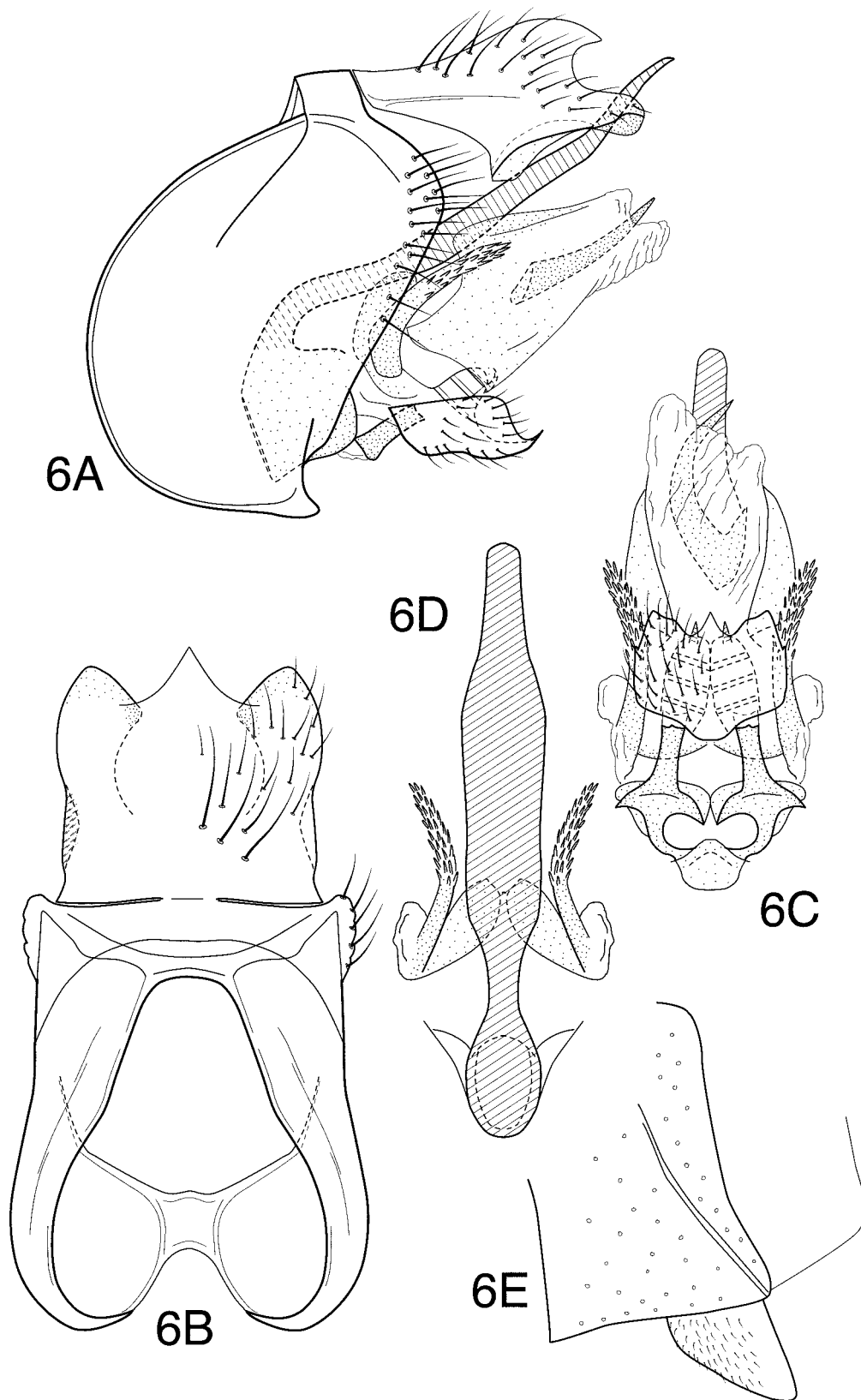
Fig. 7

*Mortoniella buenoi* is easily distinguished from any other species by the structure of the paramere appendages, which are flattened and have distinctive spines on the apical half. *Mortoniella buenoi* has some similarity to *M. leroda* and *M. rovira*, resembling both in having a tubular phallicata without conspicuously developed dorsal projections. The apicomesal projection of the inferior appendage in *M. buenoi* is similar to *M. leroda*, but is longer and more asymmetrically curled. In contrast, the spine on the endophallic membrane in *M. buenoi* is more similar to *M. rovira*, especially in being wide basally and in its general position in the phallicata when unexpanded. The distinctiveness of this character suggests a possible sister taxon relationship between these two species.

Adult. Length of forewing: male 3.2–3.7 mm. Forewing with forks I, II, and III, hind wing with forks II and III. Overall color (in glycerin) light brown. Ventral process of abdominal segment VI (male) short, ventrally oriented, rounded to subtruncate apically, distinctly constricted basally at anterior margin.

Male genitalia. Segment IX nearly evenly rounded anterolaterally, length greatest midlaterally, posterolateral margin forming rounded projection in dorsal half, narrowing ventrally; segment deeply mesally excised dorsally and ventrally, dorsal excision narrow, much less than half width of segment. Tergum X with evenly rounded mesal excision and projecting lateral lobes, lateral lobes with apices narrowed, acute, and mesally curved. Inferior appendage with distinctly asymmetrically developed apicomesal projection, apicomesal projection very narrow and strongly dorsally curled, apically tapered and acuminate; basolaterally, with short, rounded projection on each side; mesal pockets of inferior appendage with apical processes short, dorsally curved. Paramere appendages elongate, flattened and relatively wide; each appendage in apical half with 2 or 3 rows of prominent, stout spines on outer surface. Dorsal phallic spine sinuous in lateral view, bulging basoventrally in contour with dorsal margin of phallicata, apical part distinctly, sinuously, dorsally curved; as viewed dorsally, with apex very narrowly acuminate. Phallicata narrow, tubular, moderately elongate, dorsal margin somewhat concavely depressed, dorsally without projections, basoventrally with minute microsetae. Endophallic membrane short, with single prominent, curved spine, broad basally, narrow acuminate apically, dorsally projecting in repose, ventrally projecting when everted; apicodorsally with distinct paired phallostremal spines.

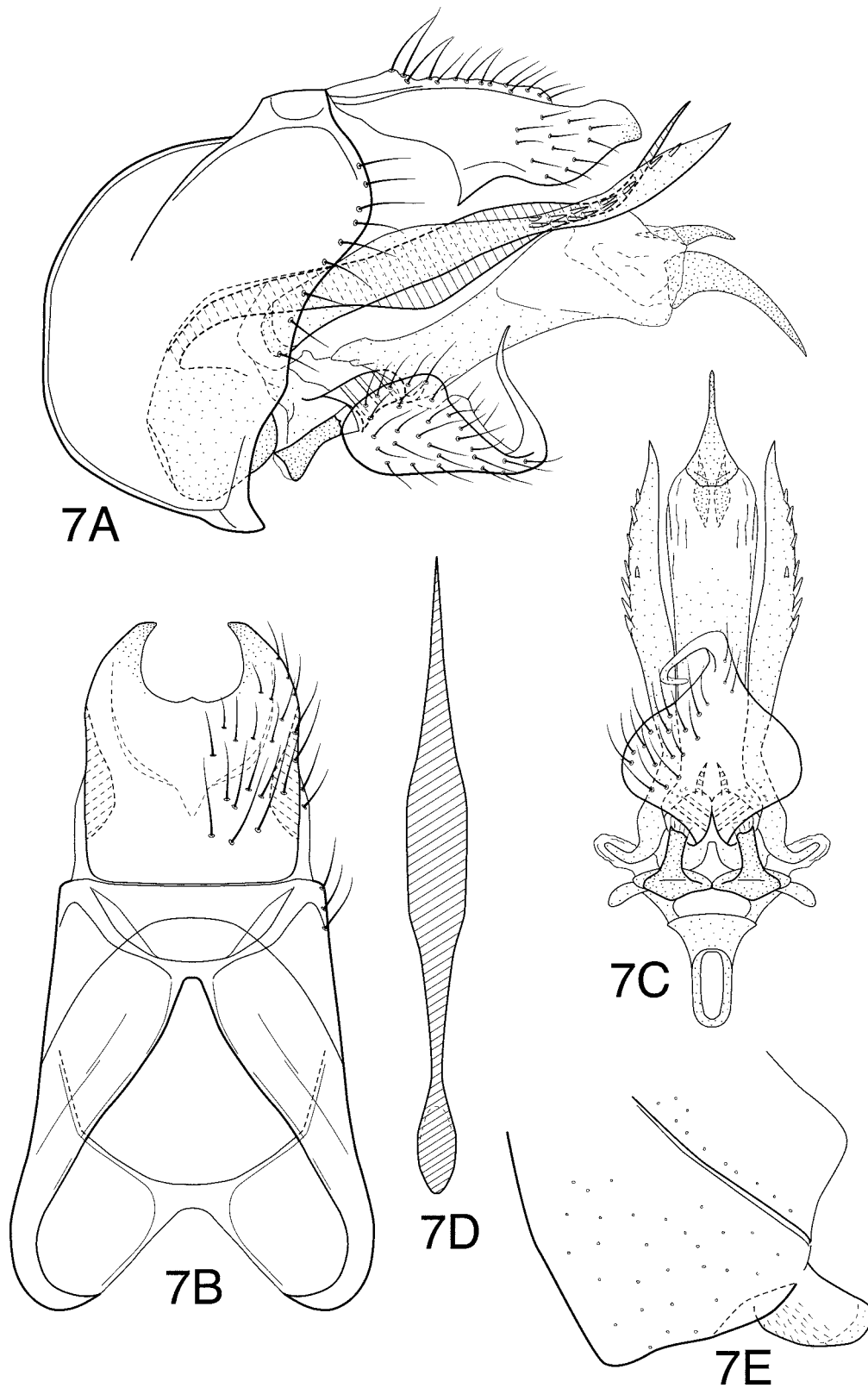
**Holotype male: MEXICO: Oaxaca:** Loxicha, Pluma Hidalgo, 450 m, 20.x.1982, J. Bueno-Soria (UMSP000118948) (in microvial of glycerin, on pin) (IBUNAM).



**FIGURE 6.** *Mortoniella brachyrachos*, new species. Male genitalia: A—lateral; B—segment IX and tergum X, dorsal; C—phallic ensemble, ventral; D—dorsal phallic spine and parameres, dorsal; E—ventral process of sternum VI, lateral.

**Paratypes: MEXICO: Oaxaca:** Candelaria de Loxicha, Finca Pacifica, 510, 2.vi.1985, E. Mariño — 9 males (alcohol) (IBUNAM); Finca Pacifica (J. Bueno-Soria) — 2 males (alcohol) (IBUNAM); Totoltepec,

15°53'51"N, 096°28'37"W, 22.xi.1985, E. Barrera — 2 males (in microvial of glycerin, on pin) (IBUNAM); same locality as holotype, 22.x.1982, J. Bueno-Soria — 2 males (in microvial of glycerin, on pin) (IBUNAM).



**FIGURE 7.** *Mortoniella buenoi*, new species. Male genitalia: A—lateral; B—segment IX and tergum X, dorsal; C—phallic ensemble, ventral; D—dorsal phallic spine, dorsal; E—ventral process of sternum VI, lateral.

Etymology. We take great pleasure in naming this species *M. buenoi*, for Joaquín Bueno-Soria, who collected the type specimen, in recognition of his contributions to the study of Neotropical Trichoptera.

***Mortoniella carinula*, new species**

Fig. 8

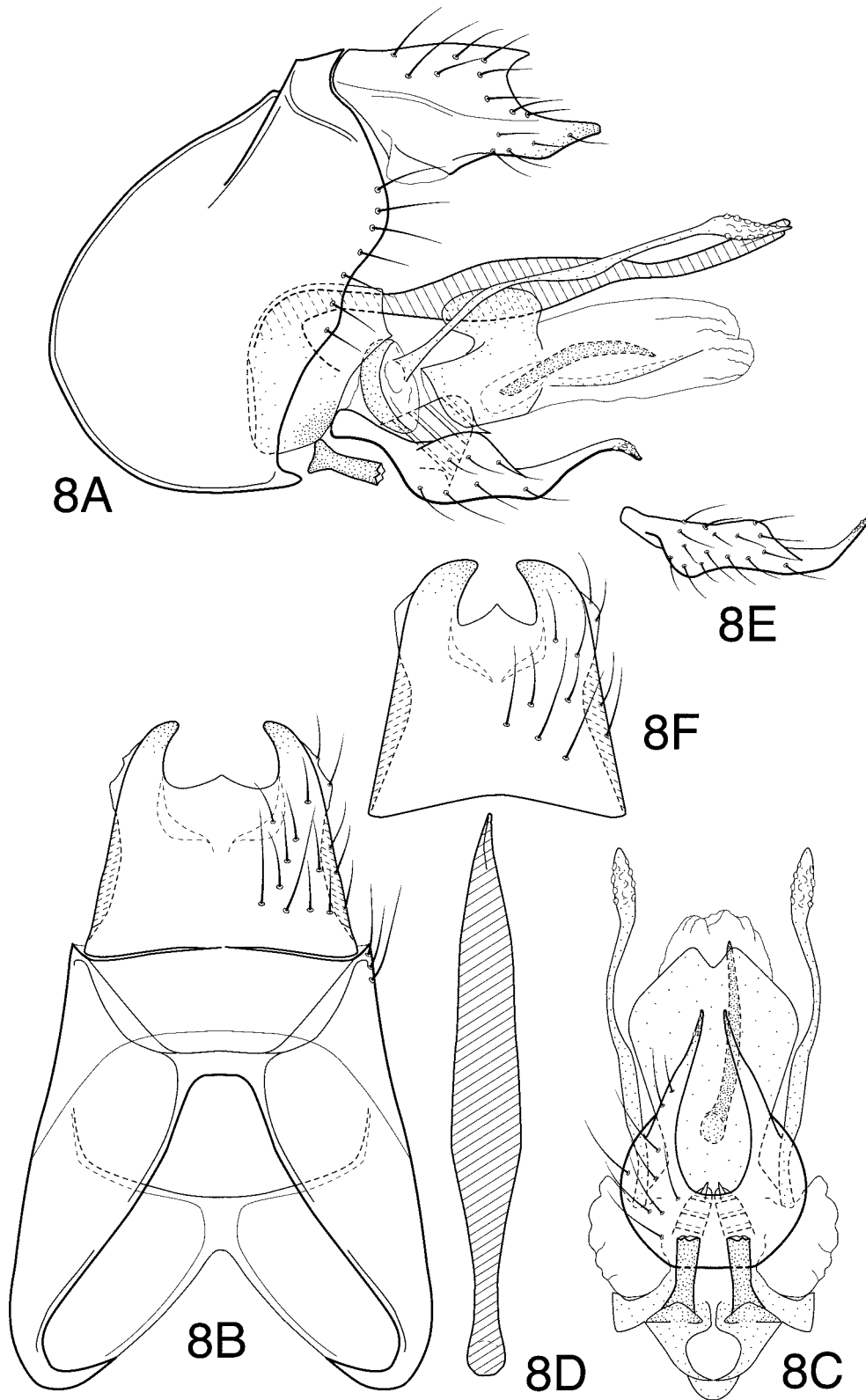
*Mortoniella carinula* is similar to a group of species, including *M. opinionis*, n. sp., *M. papillata*, n. sp., *M. redunca*, n. sp., *M. sicula*, n. sp. and *M. umbonata*, n. sp., all distinguished by the character combination of having an inferior appendage invaginated mesally and with protruding, often apically acute, apicolateral projections, and also a phallicata with well developed dorsolateral processes. Among these species, *M. carinula* is differentiated by the form of the dorsal phallic spine, which is more or less linearly extended apically, rather than being distinctly upturned, and keeled apicomeresally, making it appear slightly widened at the apex in lateral view. Some minor variation was encountered in the form of the apicolateral projections of the inferior appendage, as well as in the form of tergum X, as shown in Fig. 8.

Adult. Length of forewing: male 3.5–4.1 mm, female 3.8–4.7 mm. Forewing with forks I, II, and III, hind wing with forks II and III. Overall color medium brown, palps darker brown, apices of tibiae, tarsal and basal antennal segments light brown. Wing bar at anastomosis indistinctly marked with pale, light brown setae. Ventral process of abdominal segment VI (male) short, ventrally oriented, subtriangular, subacute apically, not constricted basally.

Male genitalia. Segment IX nearly evenly rounded anterolaterally, length greatest midlaterally, posterolateral margin forming rounded projection in dorsal half, narrowing ventrally; segment deeply mesally excised dorsally and ventrally, dorsal excision narrow, much less than half width of segment. Tergum X with short, acute apicomeresal projection and projecting lateral lobes, lateral lobes with apices narrowed, subacute, mesally curved. Inferior appendage without apicomeresal projection, apicolateral projections very narrow, elongate, apices acuminate, usually slightly ventrally recurved (Fig. 8A), sometimes nearly straight or slightly dorsally curved (Fig. 8E), extreme apex scabrous; basolaterally, with short, rounded projections on each side; mesal pockets of inferior appendage with apical processes short, dorsally curved. Paramere appendages elongate, narrow, apex widened and scabrous. Dorsal phallic spine slightly enlarged ventrally, dorsal contour sinuous, apex only slightly upturned, appearing somewhat widened due to dorsomesal carina; as viewed dorsally, with apex acute. Phallicata relatively short, dorsally with paired, upright, subquadrate processes, laterally with broadly rounded, sclerotized explanate projection on either side. Endophallic membrane with single prominent, stout, curved spine.

**Holotype male: COSTA RICA: Cartago:** Reserva Tapantí, Quebrada Segunda @ administration building, 09°45'40"N, 083°47'13"W, 1250 m, 9–10.v.1990, Holzenthal & Blahnik (UMSP000001358) (pinned) (UMSP).

**Paratypes: COSTA RICA: Cartago:** Reserva [Parque Nacional] Tapantí, Río Grande de Orosí, 09°41'10"N, 083°45'22"W, 1650 m, 18–21.iii.1987, Holzenthal, Hamilton & Heyn — 1 male (pinned) (UMSP); Quebrada Palmitos & falls, ca. 9 km (road) NW tunnel, 09°43'12"N, 083°46'48"W, 1400 m, 2–3.vi.1990, Holzenthal, Blahnik & Muñoz — 2 females (pinned) (UMSP); same locality, 1–2.viii.1990, Holzenthal, Blahnik & Muñoz — 1 male, 3 females (pinned) (NMNH); same locality, 24–25.iii.1991, Holzenthal, Muñoz & Huisman — 2 males (pinned), 1 male (alcohol) (UMSP); same locality, 21.ii.1992, Holzenthal, Muñoz & Kjer — 1 male (pinned) (UMSP); Río Dos Amigos & falls, ca. 6 km (road) NW tunnel, 09°42'14"N, 083°46'59"W, 1500 m, 4–5.viii.1990, Holzenthal, Blahnik & Muñoz — 1 male (pinned) (UMSP); waterfall, ca. 1 km (road) NW tunnel, 09°41'24"N, 083°45'36"W, 1600 m, 2–3.viii.1990, Holzenthal, Blahnik & Muñoz — 3 males, 1 female (pinned) (NMNH); same locality and date as holotype — 2 females (pinned), 1 male (alcohol) (UMSP); same locality, 23.viii.1990, Holzenthal & Huisman — 1 female



**FIGURE 8.** *Mortoniella carinula*, new species. Male genitalia: A—lateral; B—segment IX and tergum X, dorsal; C—phallic ensemble, ventral; D—dorsal phallic spine, dorsal; E—inferior appendage variation, lateral; F—tergum X variation, dorsal

(pinned) (UMSP); **Puntarenas:** Río Bellavista, ca. 1.5 km NW Las Alturas, 08°57'04"N, 082°50'46"W, 1400 m, 2–3.viii.1987, Holzenthal Morse & Clausen — 1 male, 6 females (pinned) (UMSP); **San José:** Quebrada

Caraiges, 2.5 km (road) SW La Legua, 09°44'02"N, 084°07'12"W, 1400 m, 22.i.1992, Holzenthal, Kjer & Quesada — 3 males, 4 females (pinned) (UMSP); El Salvaje, Río Tabarcia, 8 km (road) E Palmichal, 09°50'49"N, 084°07'12"W, 1650 m, 19–20.i.1992, Holzenthal, Kjer & Quesada — 6 males, 6 females (pinned) (INBIO).

Etyymology. This species is named *M. carinula*, diminutive of the Latin word *carina*, meaning keel, and referring to the projecting keeled apex of the dorsal phallic spine that is a distinctive characteristic of this species.

### ***Mortoniella caudicula*, new species**

Fig. 9

This species is most similar to *Mortoniella meralda* and *M. stilula*, n. sp, resembling these species in having an elongate, asymmetrically developed apicomesal process from the inferior appendage, a simple phallicata without dorsal processes, and in lacking an endophallic spine. It can be diagnosed from these species by having the apex of the apicomesal process of the inferior appendage acute, without scabrous apex or preapical spine, and in having the mesal projection of tergum X very elongate and produced.

Adult. Length of forewing: male 2.4–2.7 mm. Forewing with forks I, II, and III, hind wing with forks II and III. Overall color (in alcohol) medium brown. Wing bar at anastomosis not evident. Ventral process of abdominal segment VI (male) short, ventrally oriented, rounded or subtruncate apically, slightly constricted basally at anterior margin.

Male genitalia. Segment IX nearly evenly rounded anterolaterally, length greatest midlaterally, posterolateral margin forming rounded projection in dorsal half, narrowing ventrally; segment deeply mesally excised dorsally and ventrally, dorsal excision narrow, much less than half width of segment. Tergum X with very elongate, subacute apicomesal projection and projecting lateral lobes, lateral lobes with apices narrowed, acute, and mesally curved. Inferior appendage with distinctly asymmetrically developed apicomesal projection, apicomesal projection relatively elongate, very narrow and sinuously curved, apically tapered and acuminate; basolaterally, with short, rounded projection on each side; mesal pockets of inferior appendage with apical processes short, dorsally curved. Paramere appendages very elongate, narrow, incurved at base, sinuously curved outward at midlength, converging apically, apical fourth widenend and flattened, apices acuminate. Dorsal phallic spine with basoventral bulge, apical part sinuously, dorsally curved; as viewed dorsally, with apex acute. Phallicata relatively elongate, narrow, ventral apex sclerotized and projecting, dorsally without projections, basoventrally with minute microsetae. Endophallic membrane short, simple, without apicoventral spine.

**Holotype male:** COSTA RICA: **Alajuela:** Río Pizote, ca. 5 km (air) S Brasilia, 10°58'19"N, 085°20'42"W, 390 m, 12.iii.1986, Holzenthal & Fasth (UMSP000118721) (alcohol) (UMSP).

**Paratypes:** COSTA RICA: **Alajuela:** Río Pizote, ca. 5 km N Dos Rios, 10°56'53"N, 085°17'28"W, 470 m, 9.iii.1986, Holzenthal & Fasth — 1 male (alcohol) (UMSP); same locality and date as holotype — 10 males (alcohol) (UMSP); 4 males (alcohol) (NMNH).

Etyymology. This species is named *M. caudicula*, as a diminutive derived from the Latin word *cauda*, meaning tail, and referring to the sinuous tail-like apicomesal process of the inferior appendage.

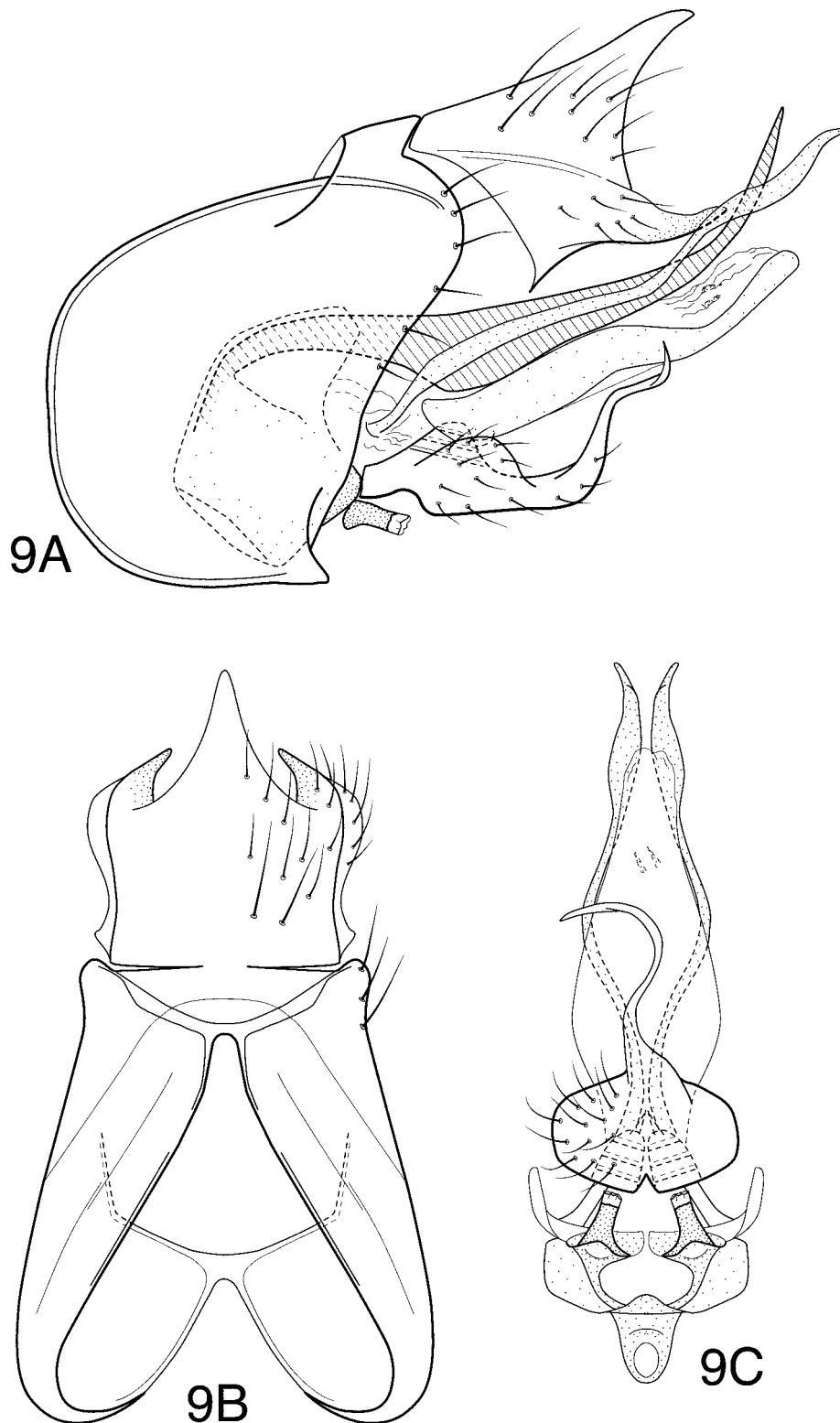
### ***Mortoniella falcicula*, new species**

Fig. 10

*Mortoniella falcicula* is a distinctive species, easily distinguished by the unique development of the inferior



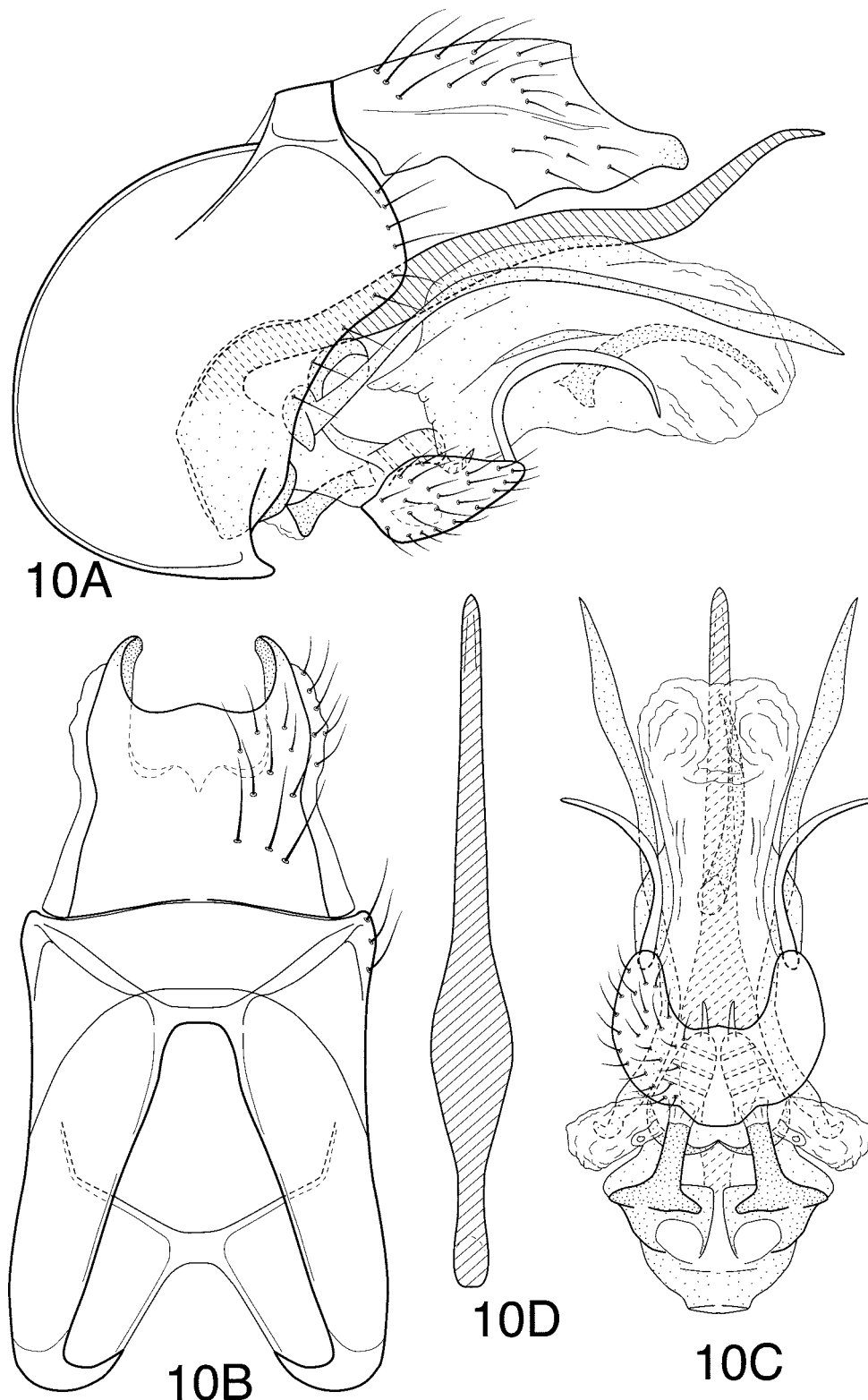
appendage, which has the apicolateral projections abruptly dorsally curved and very narrow and sickle-like. Its overall morphology relates it to the group of species discussed under *M. carinula*.



**FIGURE 9.** *Mortoniella caudicula*, new species. Male genitalia: A—lateral; B—segment IX and tergum X, dorsal; C—phallic ensemble, ventral.

Adult. Length of forewing: male 3.3–3.9 mm. Forewing with forks I, II, and III, hind wing with forks II and III. Overall color (in alcohol) medium brown. Wing bar at anastomosis not evident, crossveins pale. Ven-

tral process of abdominal segment VI (male) short, ventrally oriented, subtriangular, subacute apically, not constricted basally.



**FIGURE 10.** *Mortoniella falcicula*, new species. Male genitalia: A—lateral; B—segment IX and tergum X, dorsal; C—phallic ensemble, ventral; D—dorsal phallic spine, dorsal.

Male genitalia. Segment IX nearly evenly rounded anterolaterally, length greatest midlaterally, posterolateral margin forming rounded projection in dorsal half, narrowing ventrally; segment deeply mesally excised

dorsally and ventrally, dorsal excision narrow, much less than half width of segment. Tergum X with evenly rounded mesal excision, or with slight, suggestive, mesal projection, and projecting lateral lobes, lateral lobes with apices narrowed, subacute, mesally curved. Inferior appendage without apicomeral projection, apicolateral projections elongate, narrow, nearly uniform in width, strongly curved, abruptly dorsally projecting from base, ventrally decurved apically, apex acute; basolaterally, with margin nearly straight, without distinctly projecting process on each side; mesal pockets of inferior appendage with apical processes short, dorsally curved. Paramere appendages elongate, narrow, nearly uniform in width, apices acute. Dorsal phallic spine distinctly sinuous in lateral view, apex posteriorly projecting; as viewed dorsally, with apex subacute. Phallicata relatively wide, weakly curved, dorsally with elongate, broadly rounded projections on either side, only slightly dorsally projecting, laterally with weakly developed, rounded, dorsoventrally explanate projections. Endophallic membrane with single prominent, stout, curved spine.

**Holotype male: MEXICO: Oaxaca:** Puente Angel, Rt. 175, 1420 m, 22.x.1982, J. Bueno-Soria (UMSP000107380) (alcohol) (IBUNAM).

**Paratypes: MEXICO: Oaxaca:** same locality and date as holotype, 1 male (alcohol) (IBUNAM).

**Etymology.** This species is named *falcicula*, after the Latin *falcis*, a sickle or scythe, in reference to the sickle-like apicolateral projections of the inferior appendage of the male.

### ***Mortoniella florica* (Flint, 1974), new combination**

Fig. 11

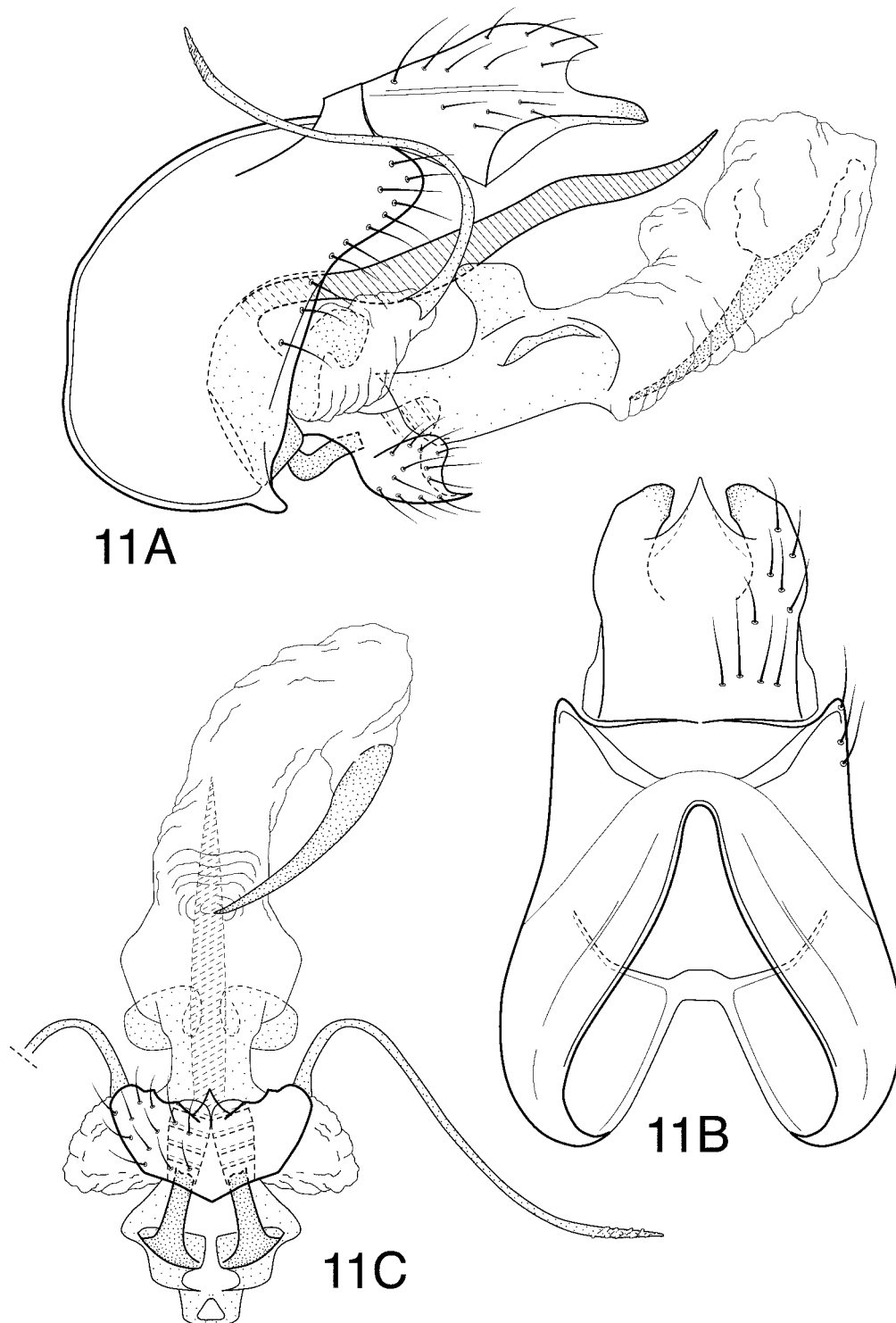
*Mexitrichia florica* Flint, 1974: 10.

*Mortoniella florica* is most similar to *M. propinqua*, both of which have a very short inferior appendage, without either pronounced apicomeral or apicolateral projections. The other character attributes of these species, particularly the presence of upright dorsolateral processes on the phallicata, relate them to the group of species discussed under *M. carinula*. *Mortoniella florica* can be distinguished from *M. propinqua* by the shape of tergum X, always with a well developed mesal projection in *M. florica* and with the apicolateral projections relatively short, wide, and distinctly dorsoventrally flattened. In *M. propinqua*, the mesal projection of tergum X is either absent or weakly developed and the apicolateral projections are distinctly elongate.

In the material available, there is some variability in *M. florica*. Variation includes the apices of the paramere appendages, which are flattened and somewhat widened in some specimens, the presence of papilla-like processes on the base of the paramere appendages in some specimens, the shape of the dorsal processes of the phallicata, which may be either rounded or subquadrate, the size of the endophallic spine, and the shape of the dorsolateral processes of the inferior appendage, which are usually short and rounded, as in the specimen illustrated, but acutely angular in specimens from Nicaragua. However, in overall morphology, and, especially in the structure of tergum X, these specimens are all very similar.

**Adult.** Length of forewing: male 2.6–3.8 mm, female 3.4–3.8 mm. Forewing with forks I, II, and III, hind wing with forks II and III. Overall color medium brown. Wing bar at anastomosis indistinctly marked with pale, light brown setae. Ventral process of abdominal segment VI (male) short, ventrally oriented, subtriangular, subacute apically, not constricted basally.

**Male genitalia.** Segment IX nearly evenly rounded anterolaterally, length greatest midlaterally, posterolateral margin forming rounded projection in dorsal half, narrowing ventrally; segment deeply mesally excised dorsally and ventrally, dorsal excision narrow, much less than half width of segment. Tergum X with prominent, acute or subacute mesal projection and projecting lateral lobes, lateral lobes moderately long, subequal in length to mesal projection, relatively wide in dorsal view, distinctly dorsoventrally flattened, slightly mesally curved, apices subacute. Inferior appendage with very short, acute apicomeral projection and short,



**FIGURE 11.** *Mortoniella florica* (Flint). Male genitalia: A—lateral; B—segment IX and tergum X, dorsal; C—phallic ensemble, ventral.

rounded basolateral projections on each side (or short, apically acute projection in specimens from Nicaragua); mesal pockets of inferior appendage with apical processes short, dorsally curved. Paramere appendages very elongate, narrow, nearly uniform in width, strongly dorsally curved at base, apices scabrous, sometimes slightly widened and flattened, bases of appendages sometimes with several short papilla-like projections. Dorsal phallic spine slightly enlarged basoventrally, weakly sinuous in contour, apex posteriorly directed, not strongly inflected; as viewed dorsally, with apex very narrowly acuminate. Phallicata relatively straight, tubu-

lar, dorsally with paired rounded to subquadrate processes, elevated basally and projecting laterally, laterally with explanate projections on either side. Endophallic membrane with single prominent, stout, curved spine.

Material examined. **MEXICO: Oaxaca:** Santa Maria de Yavesia (planta embotelladora de agua), 17°13'36"N, 096°25'35"W, 1930 m, 16.viii.2001, Bueno, Barba & Ibarra — 1 male (alcohol) (IBUNAM); **Tabasco:** Municipio Huimanguillo, Ejido Villa de Gpe., 1<sup>a</sup> secc., Cascada Cerro de las Flores, Rta. Maipasito-Carlos A. Madrazo, 17°21'39"N, 093°37'29"W, 540 m, 26.vi.1999, Bueno & Barba — 1 male (alcohol) (IBUNAM); same locality, 16.iii.2000, Bueno, Barba & Rojas — 5 males (alcohol) (IBUNAM); **Veracruz:** Río Tacolapan, Rt. 180, 25–26.vii.1966, Flint & Ortiz — 1 male (alcohol) (NMNH); Municipio Tlilapan, Arroyo Quetzalan, Los Manantiales, km 5, Rta. Orizaba-Zongolica, 18°47'25"N, 097°06'05"W, 1160 m, 17.iii.2000, Bueno, Barba & Rojas — 74 males (alcohol) (IBUNAM); 13.vii.2001, Bueno & Barba — 4 males, 2 females (pinned), 6 males (alcohol) (IBUNAM); Fortin de las Flores, 22.v.1965, Rabago — 1 male (alcohol) (NMNH); Pte. Tacolapan, E. Tejada, 4.xii.1975, C. & O. Flint — 1 male (pinned) (NMNH); Municipio Tlilapan, "Los Manantiales", km 5 Rta. Oriazaba-Zongolica, 18°47'42"N, 096°06'08"W, 30.xi.1998, Bueno & Barba — 1 male (pinned) (IBUNAM); **NICARAGUA: Zelaya:** Río Las Latas, 14°04'00"N, 084°33'00"W, 220 m, 2.vi.1998, Maes & Hernandez — 20 males (alcohol) (UMSP).

Distribution. MEXICO (Oaxaca, Tabasco, Veracruz), NICARAGUA (Zelaya).

### ***Mortoniella leroda* (Mosely, 1937), new combination**

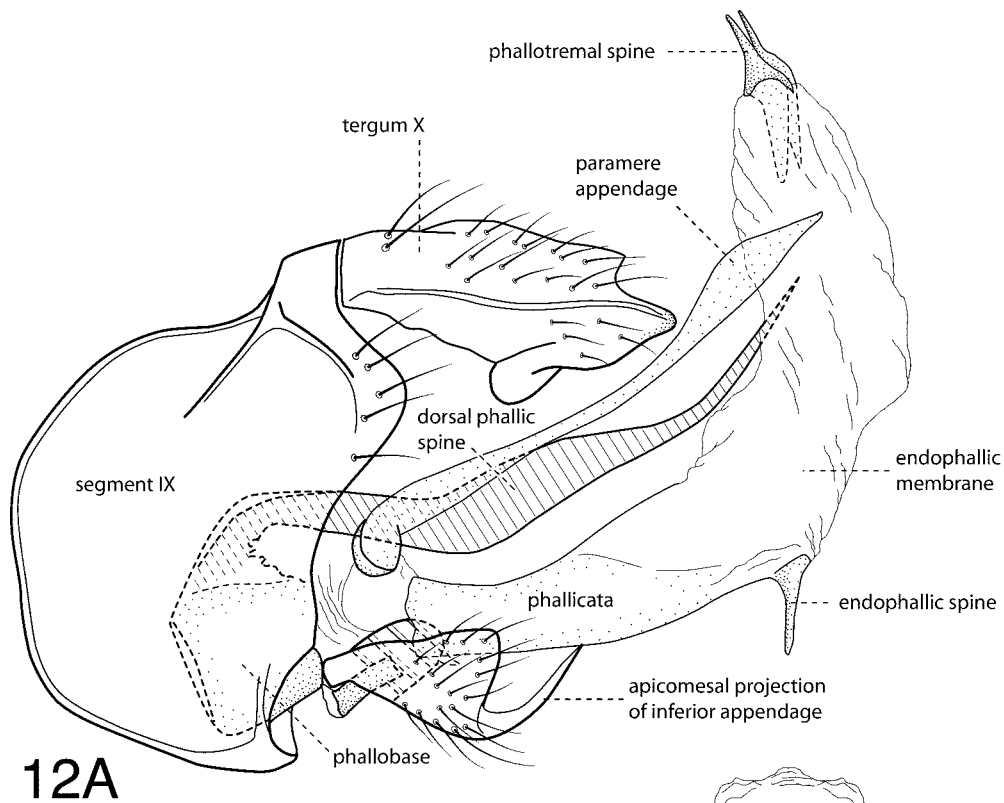
Fig. 12

*Mexitrichia leroda* Mosely, 1937: 158.

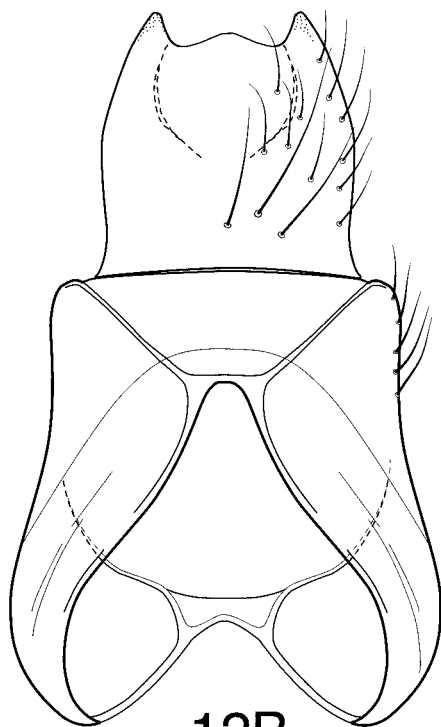
*Mortoniella leroda* is superficially most similar to, and most likely to be confused with *M. mexicana*, n. sp. It differs in a number of details, including the much shorter apicolateral processes of tergum X, the distinctly asymmetrically curved apicomesal process of the inferior appendage, and the possession of distinct, paired phallosomal spines, as well as a short ventral endophallic spine, both absent or inconspicuous in *M. mexicana*.

Adult. Length of forewing: male 3.0–3.4 mm. Forewing with forks I, II, and III, hind wing with forks II and III. Overall color (in alcohol) medium brown. Wing bar at anastomosis not evident. Ventral process of abdominal segment VI (male) short, ventrally oriented, rounded to subtruncate apically, not or only slightly constricted basally.

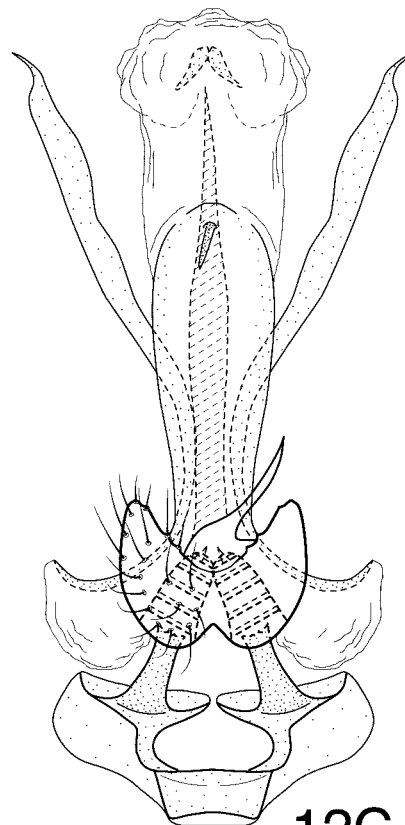
Male genitalia. Segment IX nearly evenly rounded anterolaterally, length greatest midlaterally, posterolateral margin forming rounded projection in dorsal half, narrowing ventrally; segment deeply mesally excised dorsally and ventrally, dorsal excision narrow, much less than half width of segment. Tergum X with slightly produced mesal projection, or mesal margin nearly evenly excised, and projecting lateral lobes; lateral lobes short, subacute apically, slightly mesally curved. Inferior appendage with distinctly asymmetrically developed apicomesal projection, apicomesal projection narrow, relatively short, tapering and acuminate apically; basolaterally, with short, acute or subacute projections on each side; mesal pockets of inferior appendage with apical processes short, dorsally curved. Paramere appendages elongate, narrow, bases somewhat enlarged and cupped, incurving from membranous basolateral lobes, distinctly flattened over much of length, somewhat wider in distal half, acuminate apically. Dorsal phallic spine slightly enlarged basoventrally, articulating with depression in dorsal margin of phallicata, distinctly upturned apically; as viewed dorsally, with apex very narrowly acuminate. Phallicata tubular, with slight depression dorsally, sclerotized region extended ventrally, basoventrally with minute microsetae, dorsally without projections. Endophallic membrane elongate, ventrally with short spine near apex of phallicata, apicodorsally with distinct paired phallosomal spines.



12A



12B



12C

**FIGURE 12.** *Mortoniella leroda* (Mosely). Male genitalia: A—lateral; B—segment IX and tergum X, dorsal; C—phallic ensemble, ventral.

Material examined. **HONDURAS:** Rancho Chiquito, SE Flores, 2–3.viii.1967, O.S. Flint — 1 male (alcohol) (NMNH); **Copan:** Sesesmil/Quebrada, 5 km N Copan, 15.vii.1989, D.L. Lentz — 1 male (alcohol)

(NMNH); **Olancho**: Río Agua Amarilla, Pacayal, 5 km S El Carbon, 27.vii.1989, D.L. Lentz & Lopez 1 male (alcohol) (NMNH); **MEXICO: Chiapas**: El Triunfo, 1985, H. Velasco — 2 males (alcohol) (IBUNAM); Finca La Prusia, 30 km E de Mapastepec, 21.i.1985, H. Velasco — 1 male (in microvial of glycerin, on pin), 8 males (alcohol) (IBUNAM).

Distribution. MEXICO (Chiapas), HONDURAS (Copan, Olancho).

### ***Mortoniella meralda* (Mosely, 1954), new combination**

Fig. 13

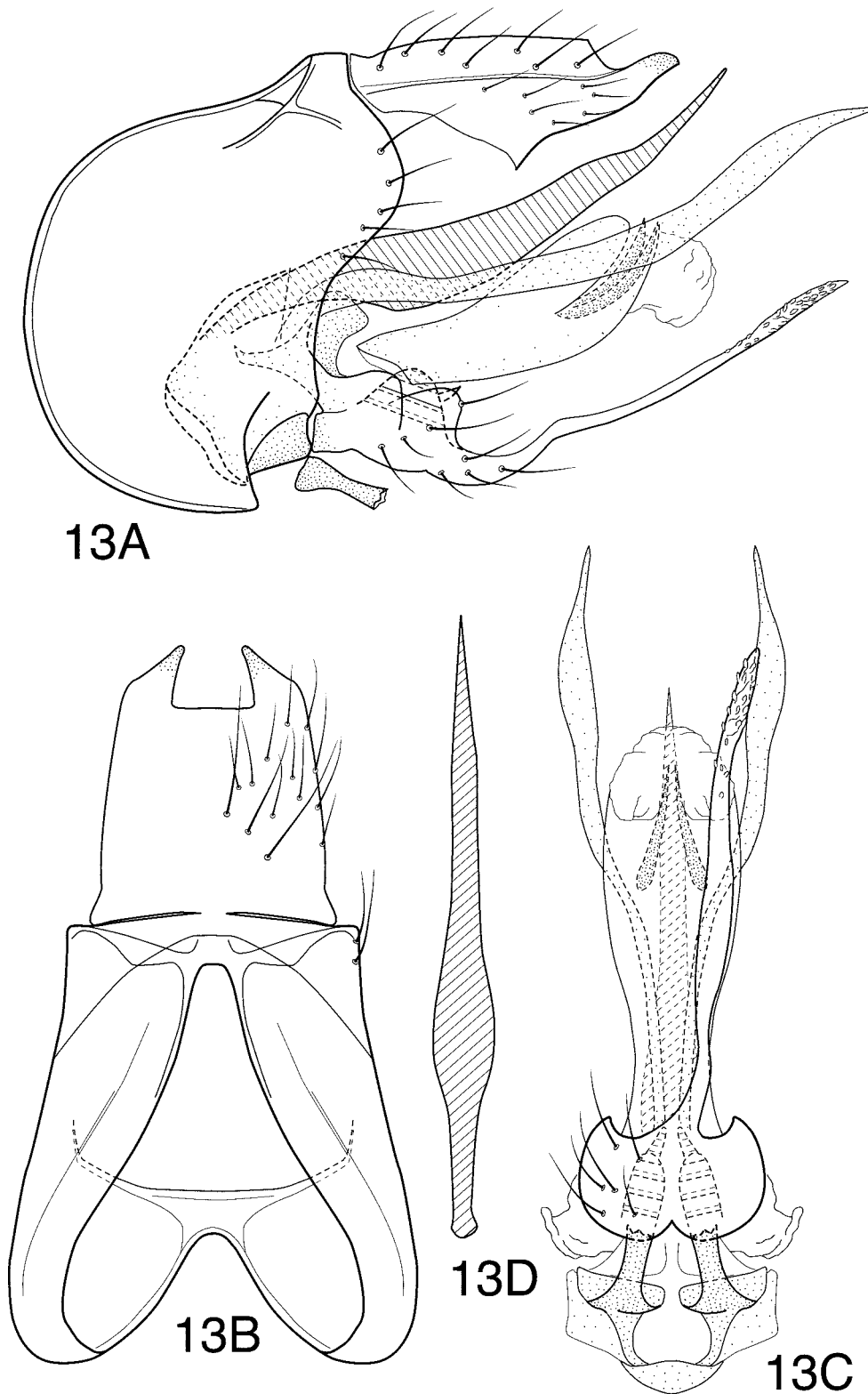
*Mexitrichia meralda* Mosely, 1954: 342.

*Mortoniella meralda* is most similar to *M. panamensis*, n. sp. and *M. simla* Flint, all of which have an inferior appendage with an elongate, asymmetrically developed apicomesal projection with a scabrous apex. *Mortoniella simla* is easily distinguished by the presence of dorsal processes on the phallicata. Both *M. meralda* and *M. panamensis* have a simple phallicata, without dorsolateral processes and both lack an endophallic spine, although they do have paired spine-like phallostremal spines. *Mortoniella meralda* can be distinguished from *M. panamensis* by its much more elongate paramere appendages and in the more nearly linearly projecting apicomesal projection of the inferior appendage, with a less inflated apex.

Adult. Length of forewing: male 3.4–3.9 mm, female 3.5–3.7 mm. Forewing with forks I, II, and III, hind wing with forks II and III. Overall color medium brown, palps and basal part of antennal and tarsal segments darker brown, apices of tibiae, tarsal and basal antennal segments light brown. Wing bar at anastomosis indistinctly marked with pale, light brown setae. Ventral process of abdominal segment VI (male) short, ventrally oriented, rounded to subtruncate apically, not or only slightly constricted basally.

Male genitalia. Segment IX nearly evenly rounded anterolaterally, length greatest midlaterally, posterolateral margin forming rounded projection in dorsal half, narrowing ventrally; segment deeply mesally excised dorsally and ventrally, dorsal excision narrow, much less than half width of segment. Tergum X with slightly produced mesal projection, or mesal margin nearly evenly excised, and projecting lateral lobes; lateral lobes short, subacute apically, slightly mesally curved. Inferior appendage with distinctly asymmetrically developed apicomesal projection, apicomesal projection very elongate, narrow, nearly uniform in width, strongly curved at base, apex scabrous and nearly linearly projecting; basolaterally, with short, rounded projection on each side; mesal pockets of inferior appendage with apical processes short, dorsally curved. Paramere appendages elongate, narrow, bases somewhat enlarged and cupped, incurving from membranous basolateral lobes, distinctly flattened over much of length, somewhat wider in distal half, acuminate apically. Dorsal phallic spine slightly enlarged basoventrally, conforming to depression in dorsal margin of phallicata, distinctly upturned apically; as viewed dorsally, with apex very narrowly acuminate. Phallicata tubular, with slight depression dorsally, sclerotized region extended ventrally, basoventrally with minute microsetae, dorsally without projections. Endophallic membrane without ventral spine, but with distinct paired apical phallostremal spines, spines relatively short, but somewhat variable in length.

Material examined. **COSTA RICA: Alajuela**: Río Pizote, ca. 5 km N Dos Rios, 10°56'53"N, 085°17'28"W, 470 m, 9.iii.1986, Holzenthal & Fasth — 5 males (alcohol) (UMSP); Río Pizote, ca. 5 km (air) S Brasilia, 10°58'19"N, 085°20'42"W, 390 m, 12.iii.1986, Holzenthal & Fasth — 14 males (alcohol) (UMSP); Quebrada Honda, 5.4 km (road) S Crucero, 10°18'40"N, 084°14'42"W, 650 m, 12.ii.1992, Holzenthal, Muñoz & Kjer — 1 male (alcohol) (UMSP); **Cartago**: Lago Orosi, 1.9 km SE Ujarrás, 09°49'26"N, 083°49'30"W, 980 m, 29.i.1986, Holzenthal, Morse & Fasth — 1 male, 1 female (pinned) (UMSP); Río Reventazón, CATIE along Sendero Espaveles, 09°53'35"N, 083°39'04"W, 500 m, 22.iii.1991, F. Muñoz-Quesada — 1 male, 38 females (pinned), 2 males, 58 females (alcohol) (UMSP); Turrialba, 26.viii.1972, G.F. & S. Hevel — 1 male,



**FIGURE 13.** *Mortoniella meralda* (Mosely). Male genitalia: A—lateral; B—segment IX and tergum X, dorsal; C—phallic ensemble, ventral; D—dorsal phallic spine, dorsal.

21 females (alcohol) (NMNH); **Guanacaste:** Río Los Ahogados, Río Los Ahogados, 11.3 km ENE Quebrada Grande, 10°51'54"N, 085°25'23"W, 470 m, 7.iii.1986, Holzenthal & Fasth — 2 males (alcohol) (UMSP); Quebrada Garcia, 10.6 km ENE Quebrada Grande, 10°51'43"N, 085°25'41"W, 470 m, 8.iii.1986, Holzenthal



& Fasth — 3 males (alcohol) (UMSP); Río Tizate, 7.2 km NE Cañas Dulces, 10°46'23"N, 085°26'56"W, 275 m, 28.vi.1986, Holzenthal, Heyn & Armitage — 2 males (alcohol) (UMSP); Río Aguacate, 0.5 km E Aguacate, 10°33'54"N, 084°56'20"W, 590 m, 16.ii.1992, Holzenthal, Muñoz & Kjer — 1 male, 9 females (alcohol) (UMSP); **Heredia**: Estación Biología La Selva, Quebrada Sura, 10°26'13"N, 084°00'36"W, 50 m, 20–21.vi.1986, Holzenthal, Heyn & Armitage — 7 males (alcohol) (UMSP); **Puntarenas**: Río Ceibo, route 2 ca. 6 km W rd to Buenos Aires, 09°08'56"N, 083°22'37"W, 250 m, 20.ii.1986, Holzenthal, Morse & Fasth — 3 males (alcohol) (UMSP); Río Guineal, ca 1 km (air) E Finca Helechales, 09°04'34"N, 083°05'31"W, 840 m, 22.ii.1986, Holzenthal, Morse & Fasth — 4 males (alcohol) (UMSP); Río Singrú, ca 2 km (air) S Finca Helechales, 09°03'25"N, 083°04'55"W, 720 m, 21.ii.1986, Holzenthal, Morse & Fasth — 47 males (alcohol) (UMSP); **GUATEMALA**: Río Matapa, 10 km SE Esquintla, 275 m, 5–6.iii.1970, E.J. Fee — 1 male, 2 females (alcohol) (NMNH); **Suchitepéquez**: Cuyotenango, 30.xii.1965, J.M. Campbell — 2 males, 10 females (alcohol) (NMNH); 10–20.vi.1966, Flint & Ortiz — 4 males, 34 females (alcohol) (NMNH); **HONDURAS**: Francisco Morazán, El Zamorano, 14°01'00"N, 087°01'59"W, 28–29.i.1966, G.F. Freytag — 13 males, 16 females (alcohol) (NMNH); **MEXICO**: Aisén, Municipio Progreso, arroyo 5.8 km al N de Tlatlaquitepec, 28.vi.1996, Rojas & Gaviño — 2 males (alcohol) (IBUNAM); **Chiapas**: Cacahuatan, Unión Juárez, Río Mixcum, 23.iii.1985, H. Velasco — 1 male (pinned) (IBUNAM); Tapachula, Tuxtla Chica, 24.iii.1985, J. Bueno-Soria — 1 male (alcohol) (IBUNAM); San José la Victoria, Cacahuatan, 27.iii.1984, A. López — 1 male (alcohol) (IBUNAM); Tapachula-Union Juan, Puente Colombo, 1.iii.1985, H. Velasco — 1 male (alcohol) (IBUNAM); **Chihuahua**: Riito, Hwy 16, 10 mi E of Yepachic, 28.vi.1987, Kondratieff & Baumann — 2 males, 1 female (alcohol) (NMNH); **México**: Temascaltepec, Real de Arriba, 8 Jun 1988, A. Cadena — 1 male (alcohol) (IBUNAM); same locality, 16.ii.1990, A. Rojas — 3 males (alcohol) (IBUNAM); same locality, 15.iii.1991, Rojas & Gaviño — 1 male (alcohol) (IBUNAM); same locality, 26.iv.1991, Rojas & Gaviño — 1 male (alcohol) (IBUNAM); Valle de Bravo, Hotel Montiel, 8.iii.1977, J. Bueno-Soria — 62 males, 20 females (alcohol) (IBUNAM); Valle de Bravo, Río Velo de Novia, 9.iii.1977, J. Bueno-Soria — 3 males (alcohol) (IBUNAM); Temascaltepec, 2.ii.1979, J. Bueno-Soria — 4 males (alcohol) (IBUNAM); same locality, 27.xii.1981, H. Velasco — 1 male (pinned) (IBUNAM); same locality, 29.i.1982, H. Velasco — 1 male (pinned) (IBUNAM); same locality, 30.i.1982, H. Velasco — 2 males (pinned) (IBUNAM); **Michoacán**: Carapan, Rt. 15 Km. 431 m, 16.vii.1966, Flint & Ortiz — 1 male (pinned) (NMNH); P. N. Morelos, nr. Morella, 14.vii.1966, Flint & Ortiz — 1 male (pinned) (NMNH); **Nuevo Leon**: Santiago, Cola de Caballo, 27.v.1985, Bueno & Contreras — 4 males (in microvial of glycerin, on pin) (IBUNAM); Raíces Río Ramos, 25°15'00"N, 100°02'00"W, 25.v.1985 (Contreras & Quiroz) — 1 male (pinned) (IBUNAM); **Puebla**: a 20 km Zacatlan, 2 May 1987, J. Bueno-Soria — 2 males (alcohol) (IBUNAM); 30 km N Xicotepec, Río Esperanza, 24.iii.1977, J. Bueno-Soria — 2 males (pinned) (IBUNAM); **Tabasco**: Municipio Huimanguillo, Est. 10, Arroyo Las Flores, Villa de Gpe. 2 Secc. Los Chimalapas, km 5 +920 carr, Malpasito-Caños A. Madrazo, 17°22'03"N, 093°36'15"E, 25.iii.1998, Bueno & Barba — 5 males (alcohol) (IBUNAM); **Veracruz**: Río Tacolapan, Rt. 180, 25–26.vii.1966, Flint & Ortiz — 7 males, 60 females (alcohol) (NMNH); Municipio Tlilapan, Arroyo Quetzalan, Los Manantiales km 5 Rta. Orizaba-Zongolica, 18°47'25"N, 097°06'05"W, 1160 m, 17.iii.2000, Bueno, Barba & Rojas — 2 males, 1 female (alcohol) (IBUNAM); Tebanca, 15 km S.E. Estacion de Biología Los Tuxtlas, 18°23'00"N, 095°00'00"W, 3.iii.1988, Barba & Barrera — 2 males (pinned), 6 males (alcohol) (IBUNAM); Los Tuxtlas Biological Station, Los Tuxtlas area, Río Palma, above La Palma, 7–14.v.1981, C. & O. Flint — 1 male, 7 females (alcohol) (NMNH); Los Tuxtlas area, Río Palma, below La Palma, 5.v.1981, C. & O. Flint, Holzenthal — 2 males (alcohol) (NMNH); Barranca de Metlac, ca. Fortín de las Flores, 30.iii.1976, J. Bueno-Soria — 2 males (alcohol) (IBUNAM); Río Tlacotalpan, Km 551, 23.vii.1966, Flint & Ortiz — 2 males, 2 females (alcohol) (IBUNAM); Catemaco, Tebanca, 18°25'00"N, 095°07'00"W, 3.iii.1988, R. Barba, et al. — 9 males (in microvial of glycerin, on pin) (IBUNAM); Los Tuxtlas, Río La Palma, 14.v.1988, Bueno & Barba — 5 males (alcohol) (IBUNAM); same locality, 5.ix.1988, Fernandez & Barba — 6 males (alcohol) (IBUNAM); same locality 2.vi.1989, R. Barba — 4 males (alcohol) (IBUNAM);

1.viii.1989, Barba & Fernandez — 11 males (alcohol) (IBUNAM); Río Tacolapa, Route to Los Tuxlas, 28.vii.1978, J. Bueno-Soria — 1 male (alcohol) (IBUNAM); Tlapacoyan, Río Tomata, 25.v.1985, R. Barba — 1 male (pinned) (IBUNAM); **NICARAGUA: Zelaya:** Río Las Latas, 14°04'00"N, 084°33'00"W, 220 m, 2.vi.1998, Maes & Hernandez — 1 male (alcohol) (UMSP).

Distribution. MEXICO (Chiapas, Chihuahua, México, Michoacán, Nuevo Leon, Puebla, Tabasco, Veracruz) GUATEMALA (Suchitepéquez), HONDURAS, NICARAGUA (Zelaya), COSTA RICA (Alajuela, Cartago, Guanacaste, Heredia, Puntarenas).

### ***Mortoniella mexicana*, new species**

Fig. 14

*Mortoniella mexicana* is superficially most similar to, and most likely to be confused with *M. leroda*. It differs in a number of details, including the much longer apicolateral processes of tergum X, the nearly symmetrical apicomeres of the inferior appendage, and the absence of endophallic and phallosomal spines.

Adult. Length of forewing: male 2.9–4.0 mm, female 3.0–3.8 mm. Forewing with forks I, II, and III, hind wing with forks II and III. Overall color (in alcohol) light brown. Wing bar at anastomosis not evident. Ventral process of abdominal segment VI (male) short, ventrally oriented, rounded or subtruncate apically, slightly constricted basally at anterior margin.

Male genitalia. Segment IX nearly evenly rounded anterolaterally, length greatest midlaterally, posterolateral margin forming rounded projection in dorsal half, narrowing ventrally; segment deeply mesally excised dorsally and ventrally, dorsal excision narrow, much less than half width of segment. Tergum X with evenly rounded mesal excision and projecting lateral lobes, lateral lobes elongate, sclerotized, acute or subacute apically, distinctly mesally curved. Inferior appendage with symmetrically developed apicomeres, apicomeres narrow, relatively short, tapering and acuminate apically; basolaterally, with short, apically acute projection on each side; mesal pockets of inferior appendage with apical processes short, dorsally curved. Paramere appendages relatively elongate, narrow, somewhat flattened and widened distally, sinuously curved, apices acute. Dorsal phallic spine sinuous in lateral view, bulging basoventrally in contour with dorsal margin of phallicata, apical part distinctly, sinuously, dorsally curved; as viewed dorsally, with apex acute. Phallicata tubular, with slight depression dorsally, sclerotized region extended ventrally, ventrally with minute microsetae, dorsally without dorsolateral processes. Endophallic membrane short, simple, without spines.

**Holotype male: MEXICO: Puebla:** Patla, 16.iv.1975, J. Bueno-Soria (UMSP000118661) (alcohol) (NMNH).

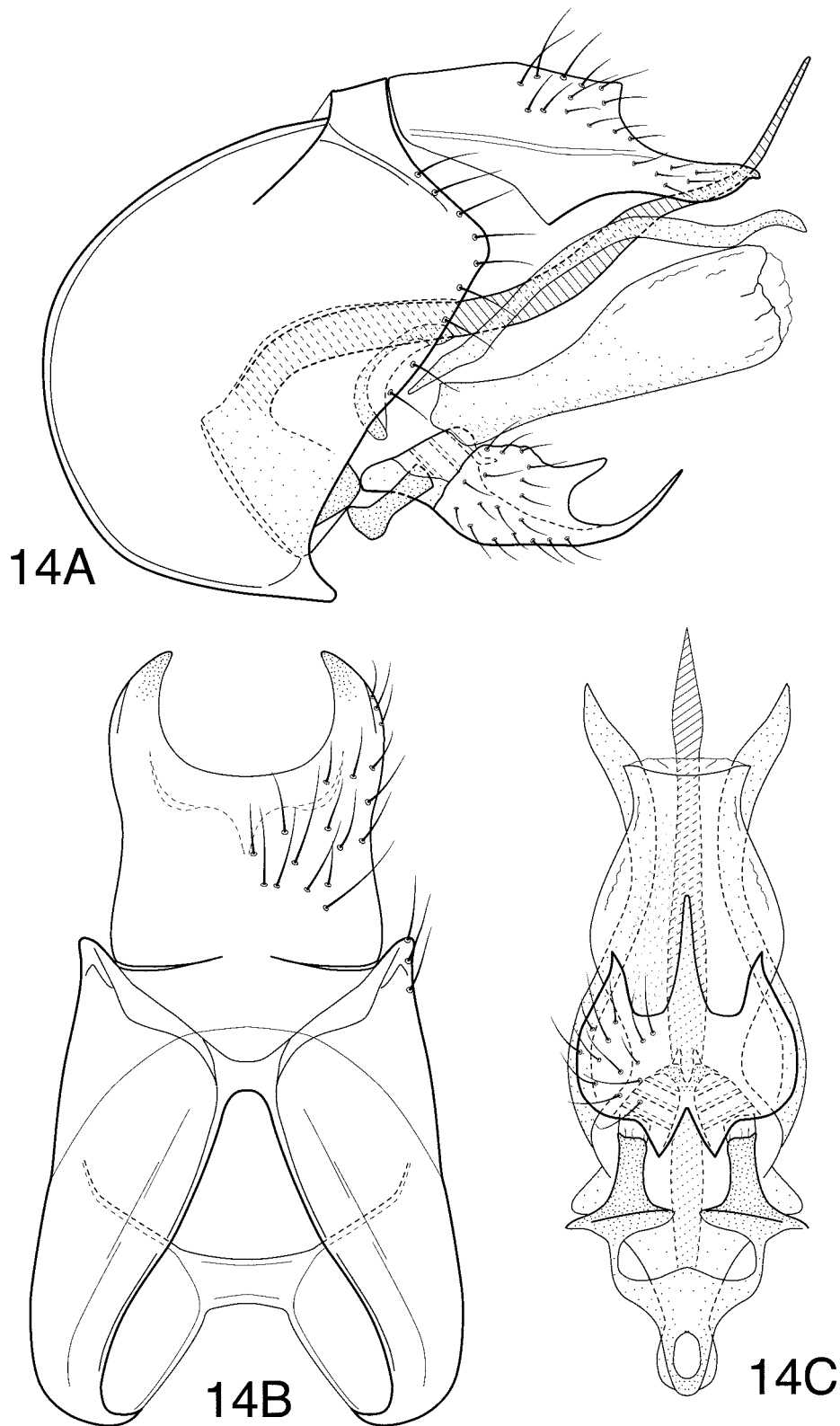
**Paratypes: MEXICO: Puebla:** same locality and date as holotype — 5 males, 79 females (alcohol) (IBUNAM), 2 males, 5 females (alcohol) (NMNH); same locality, 13.vii.1975, J. Bueno-Soria — 1 male (alcohol) (IBUNAM); same locality, 19.i.1977, J. Bueno-Soria — 3 males (alcohol) (IBUNAM); same locality, 23.iii.1977, J. Bueno-Soria — 14 males, 2 females (alcohol) (IBUNAM); Río Pita, Huauchinango-Tlaxcalan Tongo, 23.i.1985, J. Bueno-Soria — 1 male (alcohol) (IBUNAM); **Veracruz:** Tlapacoyan, Río Tomata, 3.iv.1984, H. Velasco — 2 males (in microvial of glycerin, on pin) (IBUNAM).

Etyymology. This species is named *M. mexicana* for its country of origin.

### ***Mortoniella munozi*, new species**

Fig. 15

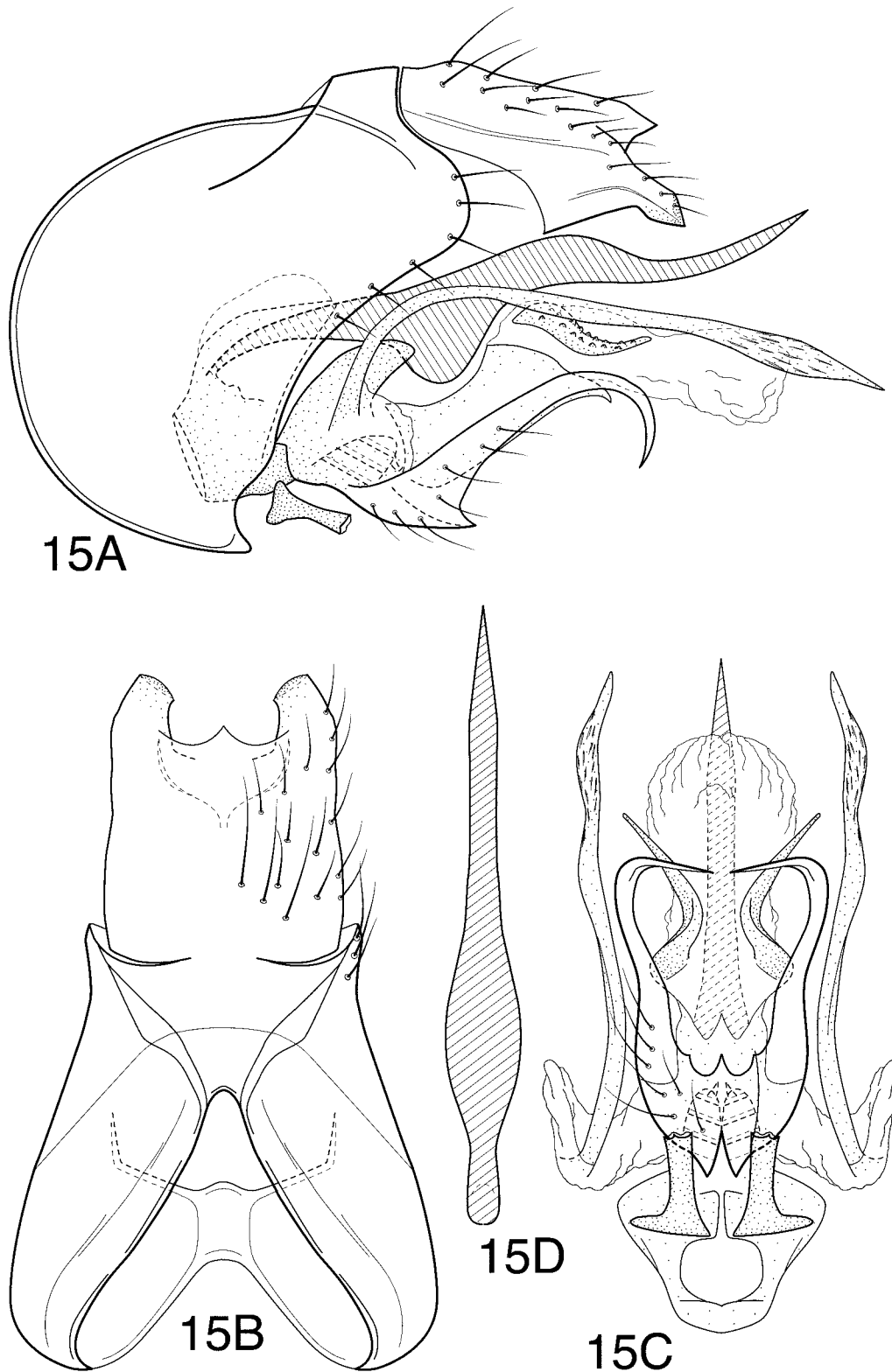
This species is distinctive and diagnosed by several characters considered together. Its most unusual character is the form of the dorsal phallic spine, which is enlarged basally and conforms with a correspondingly curved



**FIGURE 14.** *Mortoniella mexicana*, new species. Male genitalia: A—lateral; B—segment IX and tergum X, dorsal; C—phallic ensemble, ventral.

basal part of the phallosome. Other useful characters for diagnosing this species include the form of the inferior appendage, which is divided mesally and has the lateral apices narrowed and distinctly downcurved, the sclerotized dorsolateral spines at the base of the endophallic membrane, and the subtruncate lateral lobes of

tergum X. *Mortoniella elongata* (Flint) also has the apices of the inferior appendage strongly curved downward, but this species has paired, rounded dorsal processes on the phallicata (not evident on the original illustration) and also has a prominent curved endophallic spine.



**FIGURE 15.** *Mortoniella munozi*, new species. Male genitalia: A—lateral; B—segment IX and tergum X, dorsal; C—phallic ensemble, ventral; D—dorsal phallic spine, dorsal.

Adult. Length of forewing: male 3.5–3.7 mm. Forewing with forks I, II, and III, hind wing with forks II and III. Overall color medium brown, palps and basal part of antennal and tarsal segments darker brown, apices of tibiae, tarsal and basal antennal segments light brown. Wing bar at anastomosis distinct, marked by pale, light brown setae. Ventral process of abdominal segment VI (male) short, ventrally oriented, subtriangular, subacute apically, length slightly greater than width at base, slightly constricted basally.

Male genitalia. Segment IX nearly evenly rounded anterolaterally, length greatest midlaterally, posterolateral margin forming rounded projection in dorsal half, narrowing ventrally; segment deeply mesally excised dorsally and ventrally, dorsal excision narrow, much less than half width of segment. Tergum X with short, acute mesal projection and projecting lateral lobes, lateral lobes with apices angularly truncate, distinctly sclerotized and dorsoventrally flattened, slightly mesally curved. Inferior appendage with very short, acute apico-mesal projection; basolaterally, with elongate, narrow, posteriorly directed projections on each side, projections acute apically, strongly ventrally and mesally reflexed; mesal pockets of inferior appendage with apical processes short, dorsally curved. Paramere appendages elongate, narrow, nearly uniform in width, emerging from membranous lateral lobes, dorsally curved from base, base slightly flattened, apex acute, textured with elongate, adpressed, scale-like spines in apical half. Dorsal phallic spine with distinct bulge ventrally, conforming to dorsal margin of phallicata, dorsal margin sinuous, apex distinctly dorsally curved; as viewed dorsally, with apex acute. Phallicata tubular, dorsal margin distinctly concave; with acute, paired, scabrous processes emerging from posterodorsal margin, their bases less sclerotized. Endophallic membrane short, simple, without spines.

**Holotype male: COSTA RICA: Cartago:** Río Chitaría, rt 10, 10 km NW Río Reventazón, 09°55'12"N, 083°36'14"W, 740 m, 21.iii.1991, Holzenthal, Muñoz & Huisman (UMSP000000503) (pinned) (UMSP).

**Paratypes: COSTA RICA: Cartago:** same locality and date as holotype — 2 males (pinned), 4 males, 31 females (alcohol) (UMSP); Río Reventazón, CATIE along Sendero Espaveles, 09°53'35"N, 083°39'04"W, 500 m, 22.iii.1991, F. Muñoz-Quesada — 1 male (alcohol) (UMSP); km 10 Turrialba-Siquirres, 1400 m, 27.iv.1984, Bueno & Barrera — 2 males (pinned) (IBUNAM); **PANAMA: Chiriquí:** Fortuna, 08°41'00"N, 082°15'00"W, 3100 m, 1.xii.1977, R.W. Flowers — 1 male (alcohol) (NMNH); Fortuna Dam Site nr. Hornitos, 08°55'00"N, 082°16'00"W, 1050 m, 30.xi–27.xii.1977, H. Wolda — 1 male (alcohol) (NMNH).

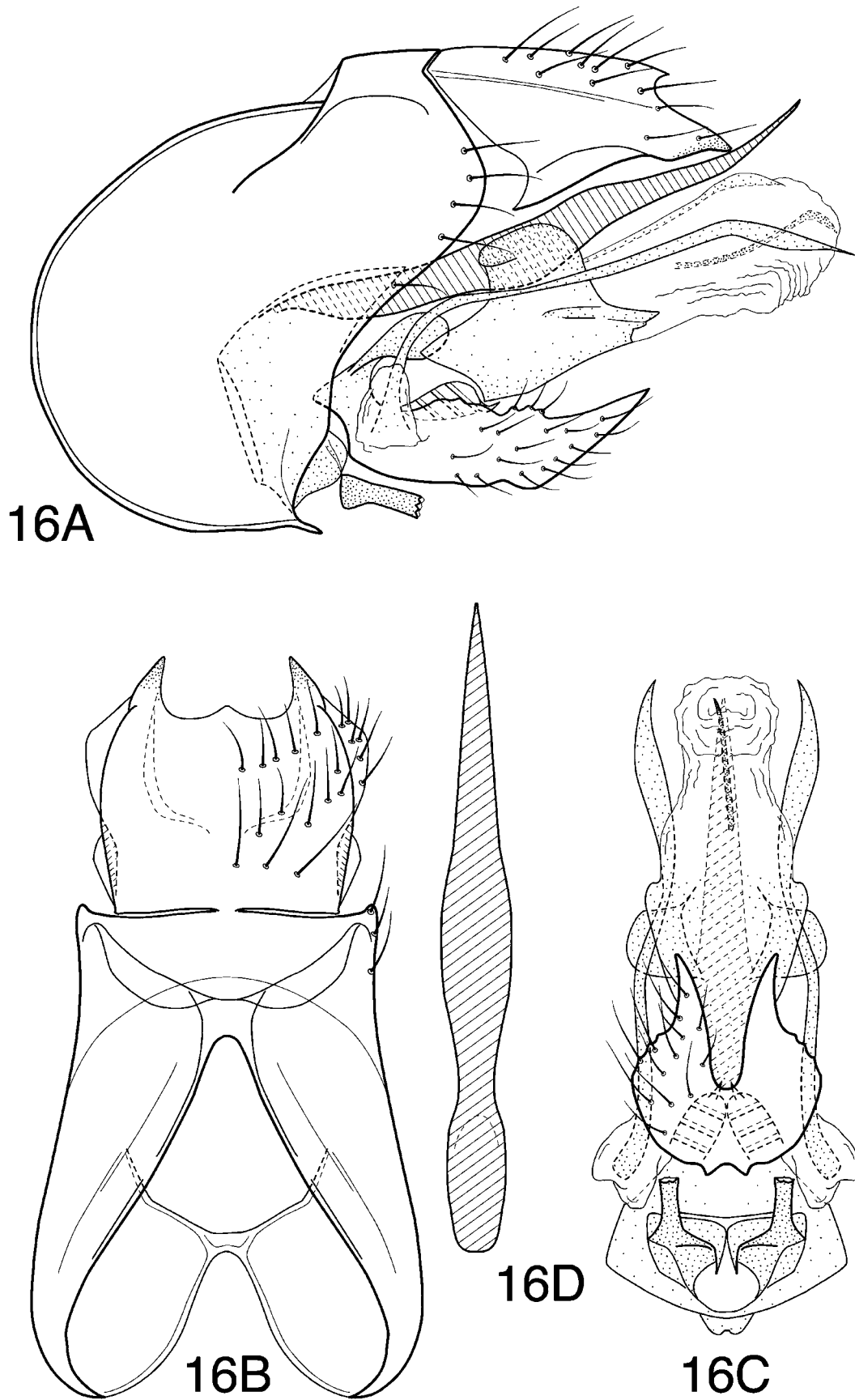
Etymology. We take great pleasure in naming this species *M. munoz* for Fernando Muñoz-Quesada, in recognition of his contributions to the study of Neotropical Trichoptera, and in particular for his participation in the Costa Rican biodiversity project that resulted in the accumulation of most of the new species described in this paper.

### ***Mortoniella opinionis*, new species**

Fig. 16

As previously discussed, *Mortoniella opinionis* is similar to a group of species, including *M. carinula*, *M. papillata*, n. sp., *M. redunca*, n. sp., *M. sicula*, n. sp., and *M. umbonata*, n. sp., all distinguished by the character combination of having the inferior appendage invaginated mesally and with protruding, often apically acute, apicolateral projections, and also a phallicata with well developed dorsolateral processes. Among these species, *M. opinionis* is most similar to *M. sicula*, particularly in the overall shape of the dorsal phallic spine, the very slender endophallic spine, and by lacking scabrous apices on the paramere appendages. *Mortoniella opinionis* can be distinguished from *M. sicula* by the shape of the inferior appendage, which has the apicolateral processes much thicker, and not as narrow and attenuate apically. It also seems to lack minute spines on the venter of the paramere appendages.

Adult. Length of forewing: male 4.0–4.2 mm, female 4.0 mm. Forewing with forks I, II, and III, hind wing with forks II and III. Overall color dark brown, palps and basal part of antennal and tarsal segments



**FIGURE 16.** *Mortoniella opinionis*, new species. Male genitalia: A—lateral; B—segment IX and tergum X, dorsal; C—phallic ensemble, ventral; D—dorsal phallic spine, dorsal.

darker brown, apices of tibiae, tarsal and basal antennal segments light brown. Wing bar at anastomosis distinct, marked by pale, light brown setae. Ventral process of abdominal segment VI (male) short, ventrally oriented, subtriangular, subacute apically, not constricted basally.

**Male genitalia.** Segment IX nearly evenly rounded anterolaterally, length greatest midlaterally, posterolateral margin forming rounded projection in dorsal half, narrowing ventrally; segment deeply mesally excised dorsally and ventrally, dorsal excision narrow, much less than half width of segment. Tergum X with short, acute mesal projection and projecting lateral lobes, lateral lobes short, subacute apically, slightly mesally curved. Inferior appendage without apicomeral projection, apicolateral projections prominent, wide basally, narrowing and acute apically; appendages basolaterally with margins nearly straight, lacking prominent projections on each side; mesal pockets of inferior appendage with apical processes short, dorsally curved. Paramere appendages elongate, narrow, nearly uniform in width, slightly enlarged apically, emerging from membranous lateral lobes, strongly dorsally curved, apices acute and posteriorly directed. Dorsal phallic spine slightly enlarged basoventrally, weakly sinuous in lateral view, apex posteriorly directed, not strongly inflected; as viewed dorsally, with apex acute. Phallicata relatively short, dorsally with prominent, paired, rounded to subquadrate processes, projecting dorsally and laterally, laterally with dorsoventrally flattened, explanate projections. Endophallic membrane moderately elongate, with very narrow endophallic spine, curved at apex.

**Holotype male: COSTA RICA: Cartago:** Reserva Tapantí, Quebrada Palmitos & falls, ca. 9 km (road) NW tunnel, 09°43'12"N, 083°46'48"W, 1400 m, 2–3.vi.1990, Holzenthal, Blahnik & Muñoz (UMSP000000938) (pinned) (UMSP).

**Paratypes: COSTA RICA: Cartago:** same locality and date as holotype — 2 females (pinned) (UMSP); same locality, 24–25.iii.1991, Holzenthal, Muñoz & Huisman — 2 males (pinned) (UMSP); **Puntarenas:** Río Bellavista, ca. 1.5 km NW Las Alturas, 08°57'04"N, 082°50'46"W, 1400 m, 8–9.iv.1987, Holzenthal Hamilton & Heyn — 2 males (alcohol) (UMSP).

**Etymology.** This species is named *M. opinionis*, from the Latin word *opinio*, meaning conjecture or belief, in reference to our belief that this species, which is very close to *M. sicula* n. sp., constitutes a distinct species.

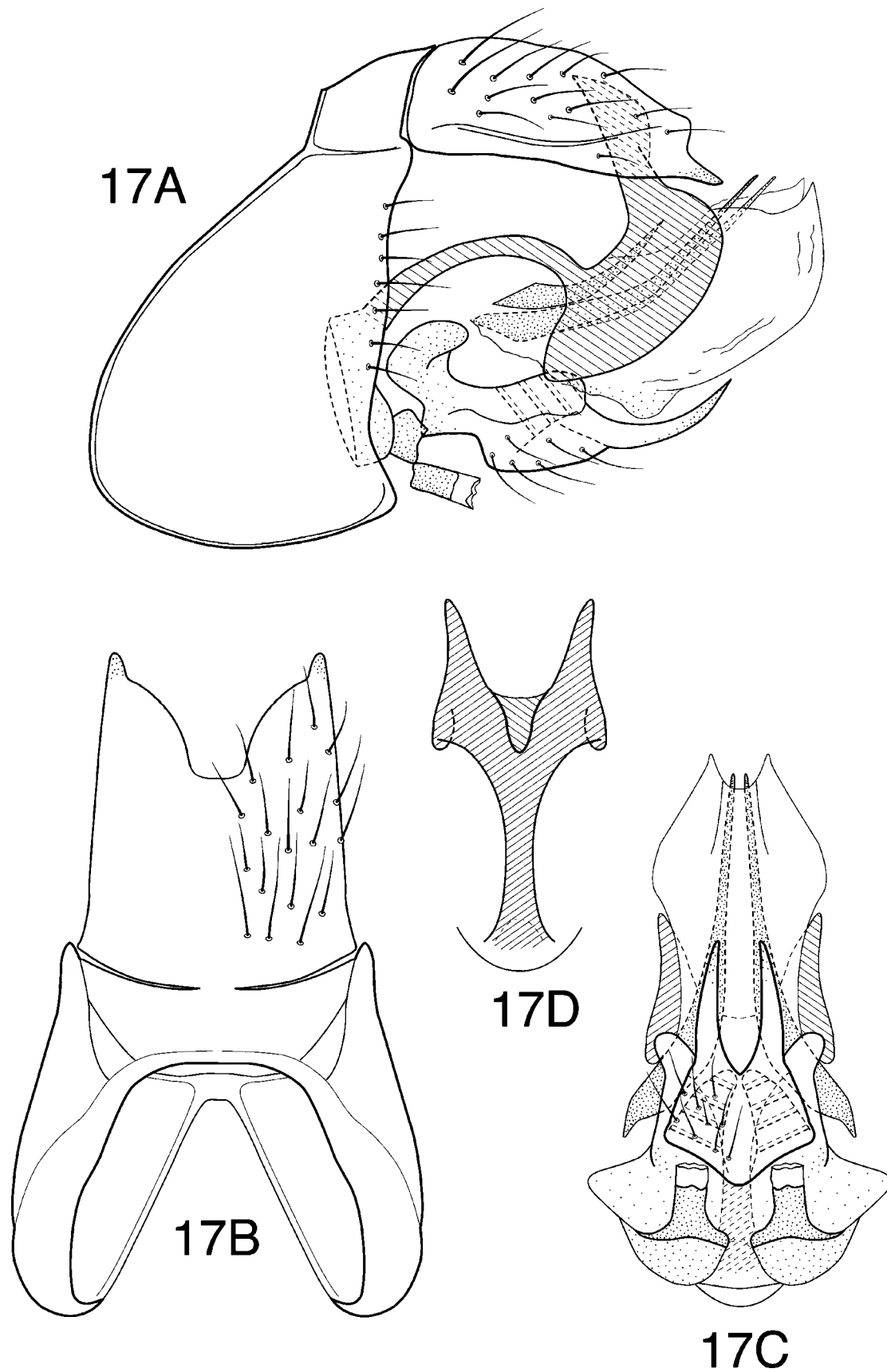
### ***Mortoniella pacuara* (Flint, 1974), new combination**

Figs. 17–19

*Mexitrichia pacuara* Flint, 1974: 11.

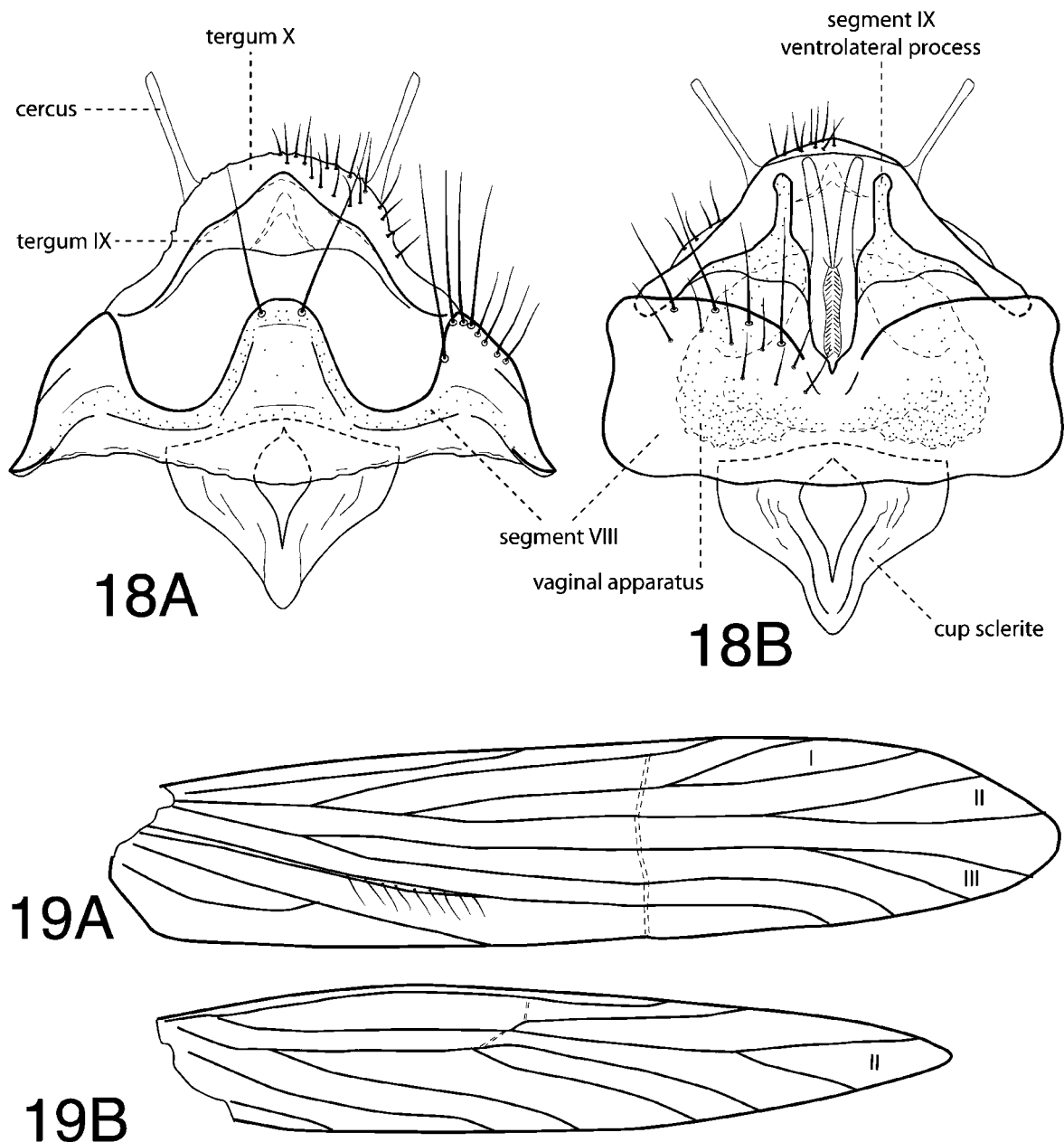
This species is distinctly different from any other Central American species and is a member of the *ormina* group, designated here, with described species also including *M. ormina* (Mosely, 1939) *M. catarinensis* (Flint, 1974), *M. macarenica* (Flint, 1974), *M. aries* (Flint, 1963) and *M. aequalis* (Flint, 1963). There are a number of additional, undescribed species. All of the species have the lateral margins of the dorsal phallic spine at least somewhat explanate and the apex strongly upturned and widened. While several species in this group have the lateral margins of the phallic spine distinctly projecting, in no other species are these projections so distinctly produced and saddle-shaped as *M. pacuara*. The short spine-like paramere appendages and endophallic spine of *M. pacuara* are also distinctive.

**Adult.** Length of forewing: male 2.0 mm, female 2.2–2.9 mm. Forewing with forks I, II, and III, hind wing with fork II only. Overall color fuscous, nearly black, apices of tibiae, tarsal and basal antennal segments lighter brown. Wing bar at anastomosis prominent, marked by white setae; forewing also marked with small white spot in basal part of wing and another in apical half of wing, near costal margin, and wing veins at apices of wings marked by small white spots. Forewing subacute and distinctly narrowed apically. Ventral process of abdominal segment VI (male) elongate, narrow, curved, posteriorly oriented.



**FIGURE 17.** *Mortoniella pacuara* (Flint). Male genitalia: A—lateral; B—segment IX and tergum X, dorsal; C—phallic ensemble, ventral; D—dorsal phallic spine, dorsal.





**FIGURE 18–19.** 18, *Mortoniella pacuara* (Flint). Female genitalia: A—dorsal; B—ventral. 19. *Mortoniella pacuara* (Flint). Wings, male: A—forewing; B—hind wing.

Male genitalia. Segment IX rounded anterolaterally, length greatest in ventral half, posterolateral margin nearly linear; segment deeply mesally excised dorsally and ventrally, dorsal excision wide, more than half width of segment. Tergum X angularly cleft mesally to about half length of segment, apicolateral margins subacute. Inferior appendage without apicomesal projection; mesal pockets of inferior appendage with elongate, projecting apically acute projections, appearing as apicolateral projections from ventral margin of inferior appendage. Paramere appendages short, curved, spine-like, tapering from base to apex, apices acute. Dorsal phallic spine with apex very abruptly upturned and somewhat widened, apex subacute as viewed dorsally, laterally with distinctive saddle-like projections. Phallicata very short, ventrally sclerotized, nearly membranous dorsally. Endophallic membrane with short, curved, apically acute spine, about half length of paramere appendages.

Material examined. **COSTA RICA: Cartago:** Pejibaye, 22–24.iii.1987, W.E. Steiner — 1 male (alcohol)

(NMNH); **Limón:** Reserva Biológica Hitoy-Cerere, Río Cerere, Est. Miramar, 09°40'16"N, 083°01'41"W, 90 m, 23–24.iii.1987, Holzenthal, Hamilton & Heyn — 5 males (alcohol) (UMSP); Río General, Pacuare, 10°06'00"N, 083°28'00"W, 1.vii.1967, Flint & Ortiz — 4 males, 3 females (alcohol) (NMNH); Río Telire and small trib., SE Suretka, 09°33'14"N, 082°53'31"W, 48 m, 1.ii.1986, Holzenthal, Morse & Fasth — 6 males, 17 females (pinned) 16 males (alcohol) (UMSP); Río Uatsi, ca. 8 km (air) W Bribri, 09°37'12"N, 082°54'00"W, 60 m, 25.iii.1987, Holzenthal, Hamilton & Heyn — 3 males (alcohol) (UMSP); **Puntarenas:** Río Ceibo, route 2 ca. 6 km W rd to Buenos Aires, 09°08'56"N, 083°22'37"W, 250 m, 20.ii.1986, Holzenthal, Morse & Fasth — 11 males (alcohol) (UMSP); Río Singrú, ca 2 km (air) S Finca Helechales, 09°03'25"N, 083°04'55"W, 720 m, 21.ii.1986, Holzenthal, Morse & Fasth — 22 males (alcohol) (UMSP); **San José:** Río General, 1 mi. S San Isidro, 1.vii.1967, P.J. Spangler — 74 males, 27 females (alcohol) (NMNH).

Distribution. COSTA RICA (Cartago, Limón, Puntarenas, San José), COLOMBIA (Valle).

### *Mortoniella panamensis*, new species

Fig. 20

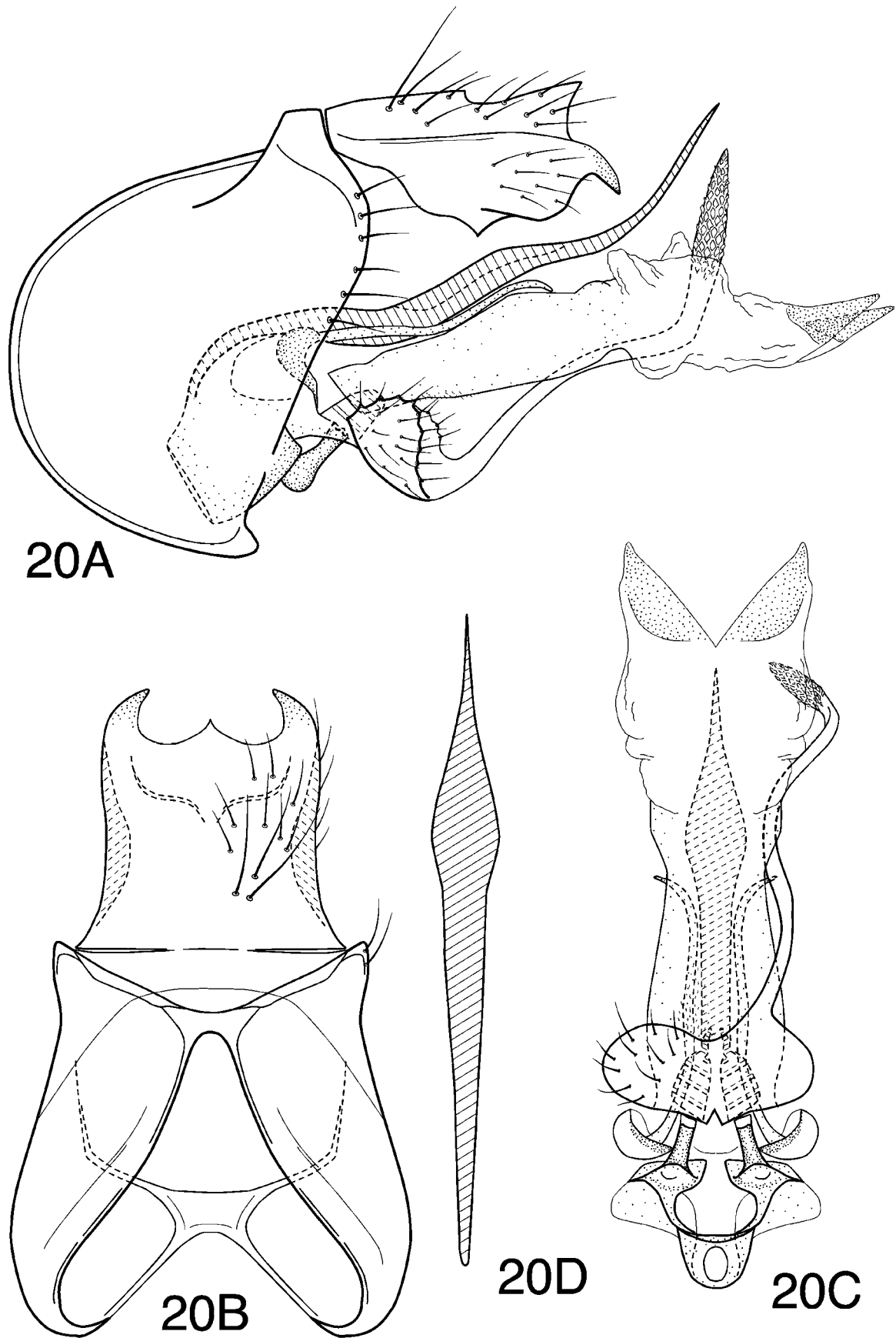
As discussed previously, *Mortoniella panamensis* is most similar to *M. meralda* (Mosely) and *M. simla* (Flint), all of which have an inferior appendage with an elongate, asymmetrically developed apicomesal projection with a scabrous apex. Among these, *M. simla* is easily distinguished by the presence of dorsolateral processes on the phallicata. Both *M. panamensis* and *M. meralda* have a simple phallicata, without dorsolateral processes and both lack an endophallic spine, although they do have paired phallosomal spines. *Mortoniella panamensis* can be distinguished from *M. meralda* by its much shorter paramere appendages and by its more sinuous and apically inflated apicomesal projection of the inferior appendage.

Adult. Length of forewing: male 2.5 mm. Forewing with forks I, II, and III, hind wing with forks II and III. Overall color medium brown, palps lightly darker, apices of tibiae, tarsal and basal antennal segments whitish, pale brown. Wing bar at anastomosis not evident. Ventral process of abdominal segment VI missing from specimen.

Male genitalia. Segment IX nearly evenly rounded anterolaterally, length greatest midlaterally, posterolateral margin forming slightly rounded projection in dorsal half, narrowing ventrally; segment deeply mesally excised dorsally and ventrally, dorsal excision narrow, much less than half width of segment. Tergum X with short, acute mesal projection and relatively short, projecting lateral lobes, lateral lobes with apices narrowed, subacute, mesally curved. Inferior appendage with distinctly asymmetrically developed apicomesal projection, apicomesal projection very elongate, narrow, very sinuously curved at base and near apical third, apex somewhat inflated and scabrous; appendage basolaterally, with short, rounded projection on each side; mesal pockets of inferior appendage with apical processes short, dorsally curved. Paramere appendages relatively short, narrow, uniform in width, slightly curved apically, apices acute. Dorsal phallic spine sinuous in lateral view, apex distinctly upturned; as viewed dorsally, with apex very narrowly acuminate. Phallicata relatively straight, tubular, slightly constricted basally, with evident minute microsetae basoventrally, dorsally without projections. Endophallic membrane without ventral spine.

**Holotype male: PANAMA: San Blas:** Río Carti Grande, 2 km W Nusagandi, 5.iii.1985, Flint & Louton (UMSP000118632) (pinned) (NMNH).

Etymology. This species is named *Mortoniella panamensis* for its country of origin.



**FIGURE 20.** *Mortoniella panamensis*, new species. Male genitalia: A—lateral; B—segment IX and tergum X, dorsal; C—phallic ensemble, ventral; D—dorsal phallic spine, dorsal.

### *Mortoniella papillata*, new species

Fig. 21

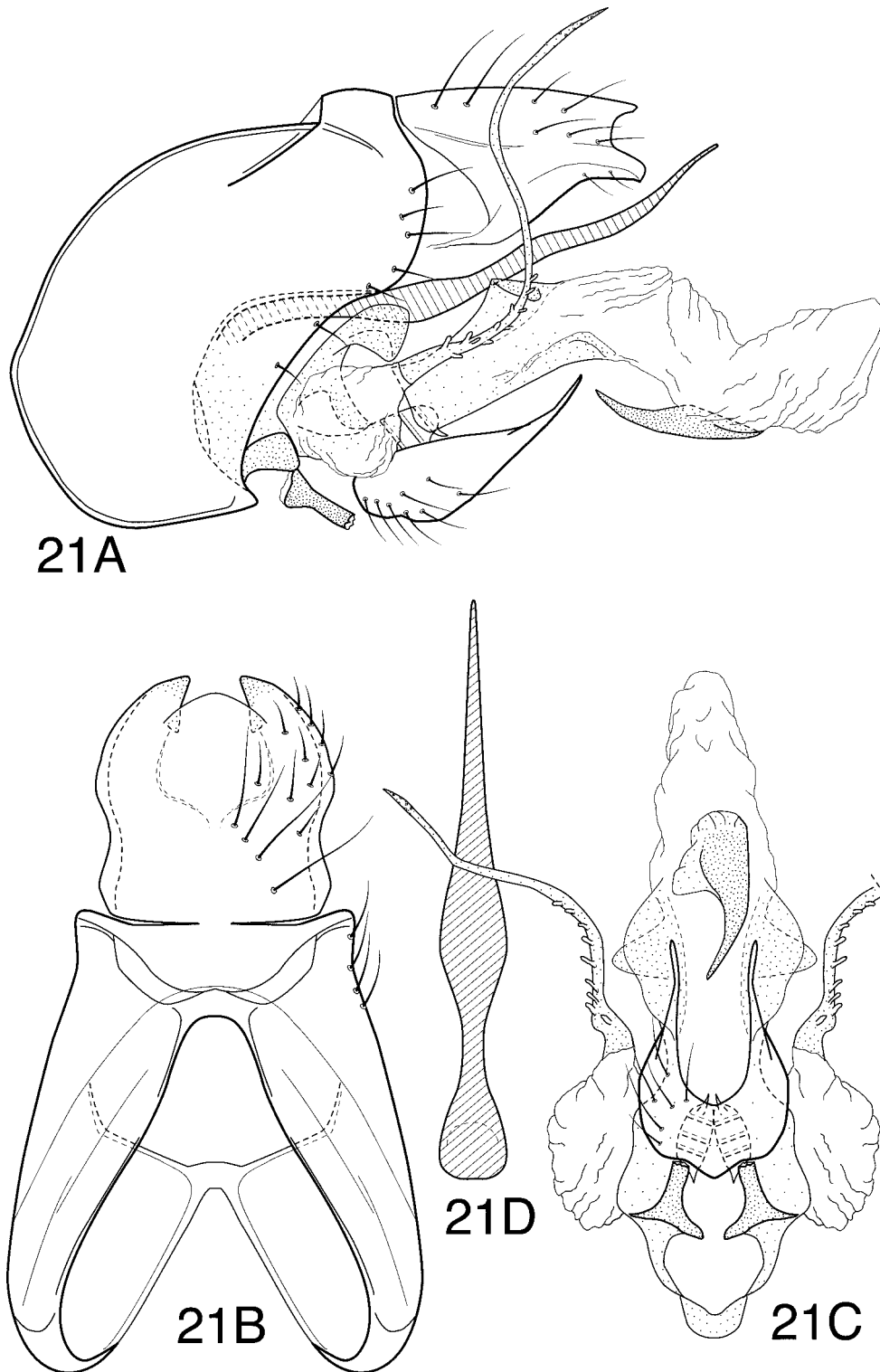
As previously discussed, *Mortoniella papillata* is similar to a group of species, including *M. carinula*, *M. opinionis*, *M. redunca*, n. sp., *M. sicula*, n. sp., and *M. umbonata*, n. sp., all distinguished by the character combination of having an inferior appendage invaginated mesally and with protruding, often apically acute, apicolateral projections, and also a phallicata with well developed dorsolateral processes. Among these species, *M. papillata* is most diagnostically recognized by the papillate projections on the base of the paramere appendages. Other characters, in combination, that are useful in distinguishing this species from others in the group are the shape of the inferior appendage, which has the apicolateral projections broad basally and very narrowly acuminate apically, the prominent, basally thick endophallic spine, the shape of tergum X, which has a broad mesal projection and dorsoventrally flattened lateral projections, and the form of the dorsal phallic spine, which is sinuous in lateral view and narrowly acuminate apically. Papillate projections on the paramere appendage, although fewer in number and less pronounced, are sometimes present in *M. florica* (Flint), but that species lacks the elongate apicolateral projections of the inferior appendage that characterizes the members of the group discussed above.

Adult. Length of forewing: male 2.8–3.3 mm, female 2.8–4.0 mm. Forewing with forks I, II, and III, hind wing with forks II and III. Overall color dark brown. Wing bar at anastomosis indistinctly marked with pale, light brown setae. Ventral process of abdominal segment VI (male) short, ventrally oriented, rounded to subtruncate apically, not or only slightly constricted basally.

Male genitalia. Segment IX nearly evenly rounded anterolaterally, length greatest midlaterally, posterolateral margin forming rounded projection in dorsal half, narrowing ventrally; segment deeply mesally excised dorsally and ventrally, dorsal excision narrow, much less than half width of segment. Tergum X with broad, apically obtuse mesal projection extending from lateral lobes, lateral lobes relatively short and broad, distinctly dorsoventrally flattened, apices sclerotized and blunt. Inferior appendage without apicomeral projection, apicolateral projections broad basally, tapering, acuminate apically; appendage with margins undeveloped basolaterally, lacking prominent projections on each side; mesal pockets of inferior appendage with apical processes short, dorsally curved. Paramere appendages very elongate, narrow, emerging from membranous lateral projections, strongly bowed near base; basal half of each appendage with numerous papillate projections, apical half very narrow, apex somewhat scabrous, acute. Dorsal phallic spine slightly enlarged basoventrally, weakly sinuous in lateral view, apex posteriorly directed, not strongly inflected; as viewed dorsally, with apex narrowly acuminate. Phallicata relatively straight, tubular, dorsolaterally with paired processes, elevated basally, projecting laterally apically; laterally with broadly rounded, explanate, projections. Endophallic membrane with single prominent, stout, curved spine.

**Holotype male: COSTA RICA: Guanacaste:** Parque Nacional Guanacaste, ca. 0.7 km N Est. Maritza, 10°57'36"N, 085°30'00"E, 550 m 31.viii.1990, Huisman & Quesada (UMSP000001321) (pinned) (UMSP).

**Paratypes: COSTA RICA: Guanacaste:** Parque Nacional Guanacaste, Río San Josecito, 10°55'19"N, 085°28'12"W, 960 m, 28–29.vii.1987, Holzenthal, Morse & Clausen — 2 males (pinned) (UMSP); Río Tempisquito, Maritza, 10°57'29"N, 085°29'49"W, 550 m, 19–20.vii.1987, Holzenthal, Morse & Clausen — 1 male (pinned) (UMSP); same locality, 30–31.viii.1990, Huisman, Blahnik & Quesada — 13 males, 8 females (pinned) (UMSP); Estacion Maritza, Río Tempisquito, 10°57'29"N, 085°29'49"E, 550 m, 17–18.vi.1988, C. & O. Flint, Holzenthal — 1 male (pinned), 5 males, 8 females (alcohol) (NMNH); Río Tempisquito Sur, Maritza, 10°57'00"N, 085°28'48"W, 600 m, 30–31.viii.1990, Huisman & Quesada — 19 males, 15 females (alcohol) (UMSP); Río Orosí, Estación Pitilla, 10°59'28"N, 085°25'41"W, 700 m, 22–25.v.1990, Holzenthal & Blahnik — 1 male, 1 female (pinned) (UMSP); unnamed trib., 0.7 km N Pitilla, 10°57'36"N, 085°30'00"W, 550 m, 31.viii.1990, Huisman & Muñoz — 12 males, 23 females (pinned) (UMSP).



**FIGURE 21.** *Mortoniella papillata*, new species. Male genitalia: A—lateral; B—segment IX and tergum X, dorsal; C—phallic ensemble, ventral; D—dorsal phallic spine, dorsal.

Etymology. This species is named *M. papillata*, from the Latin word *papilla*, referring to a nipple, teat, or bud, for the short papillate projections from the base of the paramere appendages of this species.

### ***Mortoniella pectinella*, new species**

Fig. 22

*Mortoniella pectinella* is similar to the group of species discussed under *M. carinula*, and also to *M. florica* and *M. propinqua*, n. sp., resembling them in having a phallicata with upright dorsolateral processes and in lacking a prominent apicomesal projection on the inferior appendage. The short, apically rounded inferior appendage distinguishes *M. pectinella* from the *M. carinula* group of species and the structure of the paramere appendages, with a row of apical spines is diagnostic for the species

Adult. Length of forewing: male 3.7 mm. Forewing with forks I, II, and III, hind wing with forks II and III. Overall color (in alcohol) medium brown. Ventral process of abdominal segment VI (male) short, ventrally oriented, subtriangular, subacute apically, not constricted basally.

Male genitalia. Segment IX nearly evenly rounded anterolaterally, length greatest midlaterally, posterolateral margin forming rounded projection in dorsal half, narrowing ventrally; segment deeply mesally excised dorsally and ventrally, dorsal excision narrow, much less than half width of segment. Tergum X with broad, apically obtuse mesal projection, extending from lateral lobes, lateral lobes relatively elongate, sclerotized and acute apically, mesally curved. Inferior appendage without apicomesal projection; basolaterally, with margin nearly straight, without distinctly projecting process on each side; mesal pockets of inferior appendage with apical processes short, dorsally curved. Paramere appendages elongate, narrow, nearly uniform in width, emerging from membranous lateral projections, slightly widened basally, apical third of each appendage with spaced series of short spines on ventral margin. Dorsal phallic spine with distinct bulge ventrally, dorsal margin weakly sinuous in lateral view, apex not strongly inflected; as viewed dorsally, with apex acute, spine prominently widened near middle. Phallicata relatively short, tubular, dorsolaterally with prominent, paired, subquadrate processes, elevated basally and projecting laterally; phallicata laterally with broadly rounded, explanate, dorsoventrally flattened projections. Endophallic membrane moderately elongate, sclerotized basodorsally, with single prominent, strongly curved spine.

**Holotype male: PANAMA: Chiriquí:** Fortuna Dam Site nr. Hornitos, 1050 m, 8°55'N, 82°16'W, 8–14.xi.1978, H. Wolda, (UMSP0001188658) (alcohol) (NMNH).

Etymology. This species is named *M. pectinella*, as a diminutive of the Latin word *pecten*, meaning a comb, and referring to the somewhat comb-like arrangement of spines at the apex of the paramere appendage of this species.

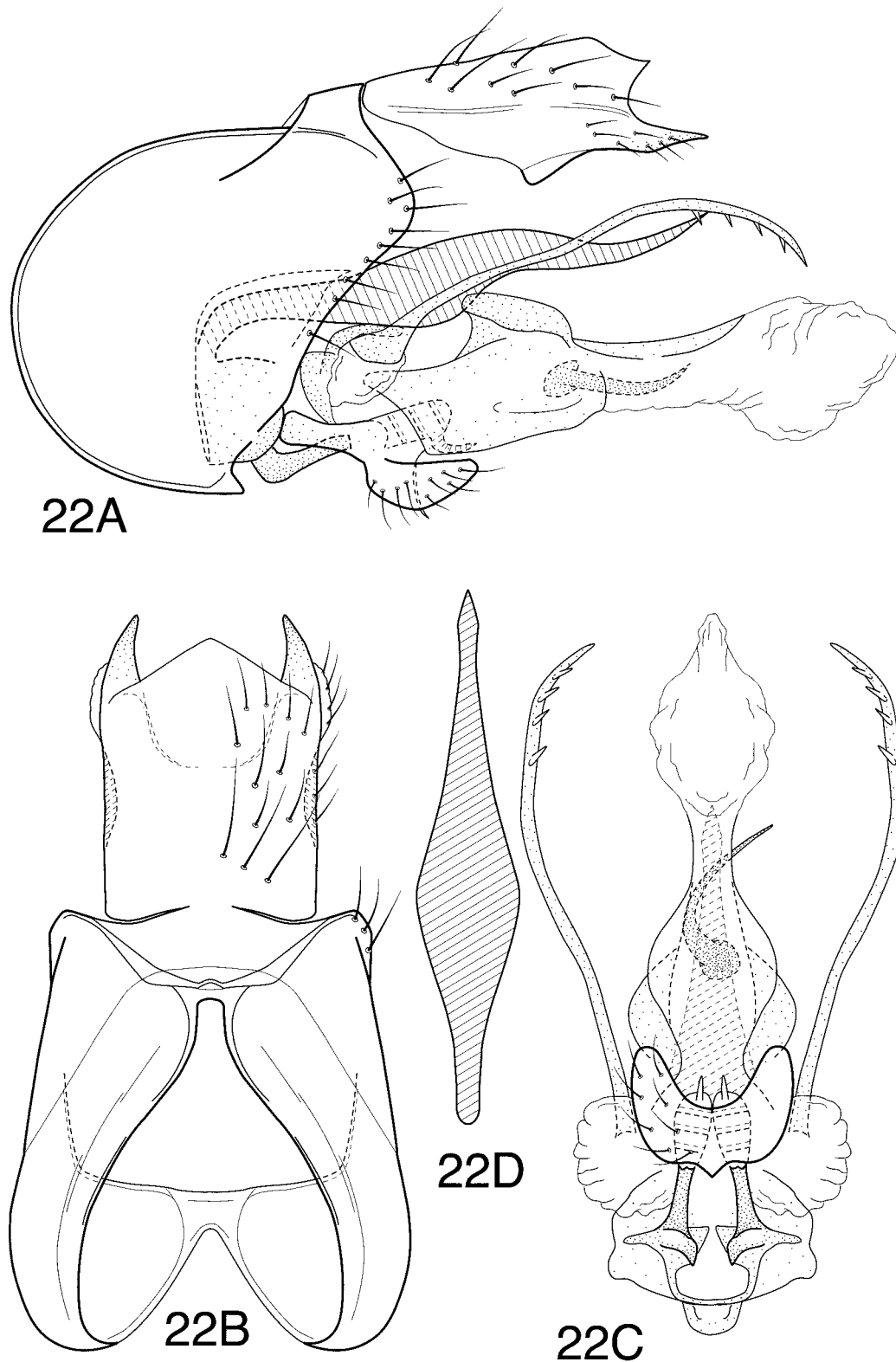
### ***Mortoniella propinqua*, new species**

Fig. 23

*Mortoniella propinqua* is most similar to *M. florica*, resembling that species in having a very short inferior appendage, without protruding apicolateral projections, a phallicata with upright, rounded to subtruncate dorsolateral processes, and paramere appendages with scabrous apices. It is readily distinguished by the different development of tergum X, which has very elongate lateral lobes and a mesal projection that is either very weakly developed or absent.

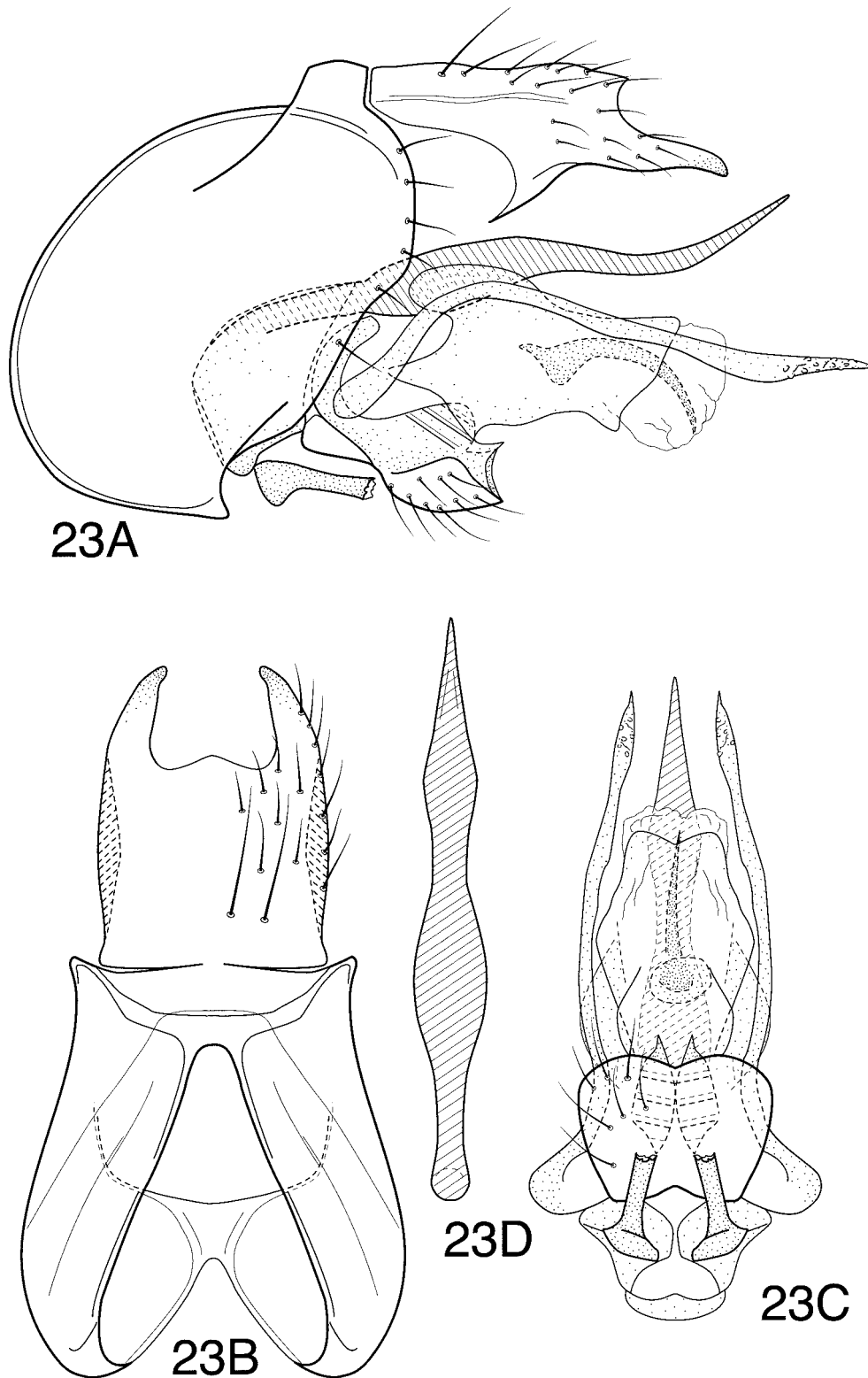
Adult. Length of forewing: male 3.1–4.0 mm, female 3.8–4.0 mm. Forewing with forks I, II, and III, hind wing with forks II and III. Overall color dark brown, palps darker brown, apices of tibiae, tarsal and basal antennal segments light brown. Wing bar at anastomosis indistinctly marked with pale, light brown setae. Ventral process of abdominal segment VI (male) short, ventrally oriented, subtriangular, subacute apically, not constricted basally.

Male genitalia. Segment IX nearly evenly rounded anterolaterally, length greatest midlaterally, posterolateral margin forming rounded projection in dorsal half, narrowing ventrally; segment deeply mesally excised



**FIGURE 22.** *Mortoniella pectinella*, new species. Male genitalia: A—lateral; B—segment IX and tergum X, dorsal; C—phallic ensemble, ventral; D—dorsal phallic spine, dorsal.

dorsally and ventrally, dorsal excision narrow, much less than half width of segment. Tergum X without or with very weakly developed mesal projection and projecting lateral lobes, lateral lobes elongate, dorsoventrally flattened, slightly mesally curved, distinctly sclerotized, apex subacute. Inferior appendage very short,



**FIGURE 23.** *Mortoniella propinqua*, new species. Male genitalia: A—lateral; B—segment IX and tergum X, dorsal; C—phallic ensemble, ventral; D—dorsal phallic spine, dorsal.

without apicomesal or apicolateral projections; basolaterally, with short, subacute projection on each side; mesal pockets of inferior appendage with apical processes short, dorsally curved. Paramere appendages moderately elongate, narrow, nearly uniform in width, dorsally curved from base, scabrous apically, apices acute. Dorsal phallic spine slightly enlarged basoventrally, contour weakly sinuous in lateral view, apex slightly dor-



sally inflected; as viewed dorsally, with apex acute. Phallicata relatively short, dorsally with prominent, paired, dorsally protuberant, projections on either side, each more or less rounded and laterally explanate; lateral margin of phallicata slightly projecting. Endophallic membrane with single prominent, stout, curved spine.

**Holotype male: COSTA RICA: San José:** Parque Nacional Braulio Carrillo, Quebrada Sanguijuela, 10°09'36"N, 083°57'47"W, 800 m, 27.iii.1987, Holzenthal, Hamilton & Heyn (UMSP000001384) (pinned) (UMSP).

**Paratypes: COSTA RICA: Alajuela:** Río Peje & falls, ca. 1 km SE San Vicente, 10°16'37"N, 084°23'17"W, 1450 m, 14–15.ii.1992, Holzenthal, Muñoz & Kjer — 1 male, 3 females (pinned), 5 males, 3 females (alcohol) (UMSP), 2 males, 1 female (alcohol) (NMNH).

Etymology. This species is named *M. propinqua* from the Latin word *propinquus*, meaning near or neighboring, and referring to the close similarity of this species to *M. florica*.

### ***Mortoniella rancura* (Mosely, 1954), new combination**

Fig. 24

*Mexitrichia rancura* Mosely, 1954: 345.

This species is most readily diagnosed by the unique wing-like appendages of the phallicata. The short, apically invaginated inferior appendage and relatively short paramere appendages are useful ancillary characters. The species is only known from the type specimen, with the genitalia mounted as a slide preparation, in a more or less dorsoventral orientation. An illustration of the lateral view is found in the original description, which was used, in part, in the following description.

Adult. Length of forewing: male 4.0 mm. Forewing with forks I, II, and III, hind wing with forks II and III. Color (wing setae) brown. Wing bar at anastomosis lacking pigmentation, distinctly evident. Ventral process of abdominal segment VI (male) short, ventrally oriented, subtriangular, subacute apically, not constricted basally.

Male genitalia. Segment IX nearly evenly rounded anterolaterally, length greatest midlaterally, posterolateral margin forming rounded or slightly angular projection in dorsal half, narrowing ventrally; segment deeply mesally excised dorsally and ventrally, dorsal excision narrow, much less than half width of segment. Tergum X with acute mesal projection and projecting lateral lobes, lateral lobes with apices narrowed, acute, and mesally curved. Inferior appendage short, concave apicomesally, without apicomesal projection; basolaterally, with rounded projection on each side; mesal pockets of inferior appendage with apical processes short, dorsally curved. Paramere appendages relatively short, emerging from membranous lateral projections, sinuously incurved, apices slightly expanded, acute. Dorsal phallic spine weakly sinuous in lateral view, apex nearly linearly projecting, not strongly upturned; as viewed dorsally with apex acute. Phallicata with distinct inflection, dorsally with apicolateral, setose, wing-like projections. Endophallic membrane with single prominent curved spine.

Material examined. **MEXICO:** Barranca, 24.ii.1931, A. Dampf — male holotype (slide mount) (NHM).

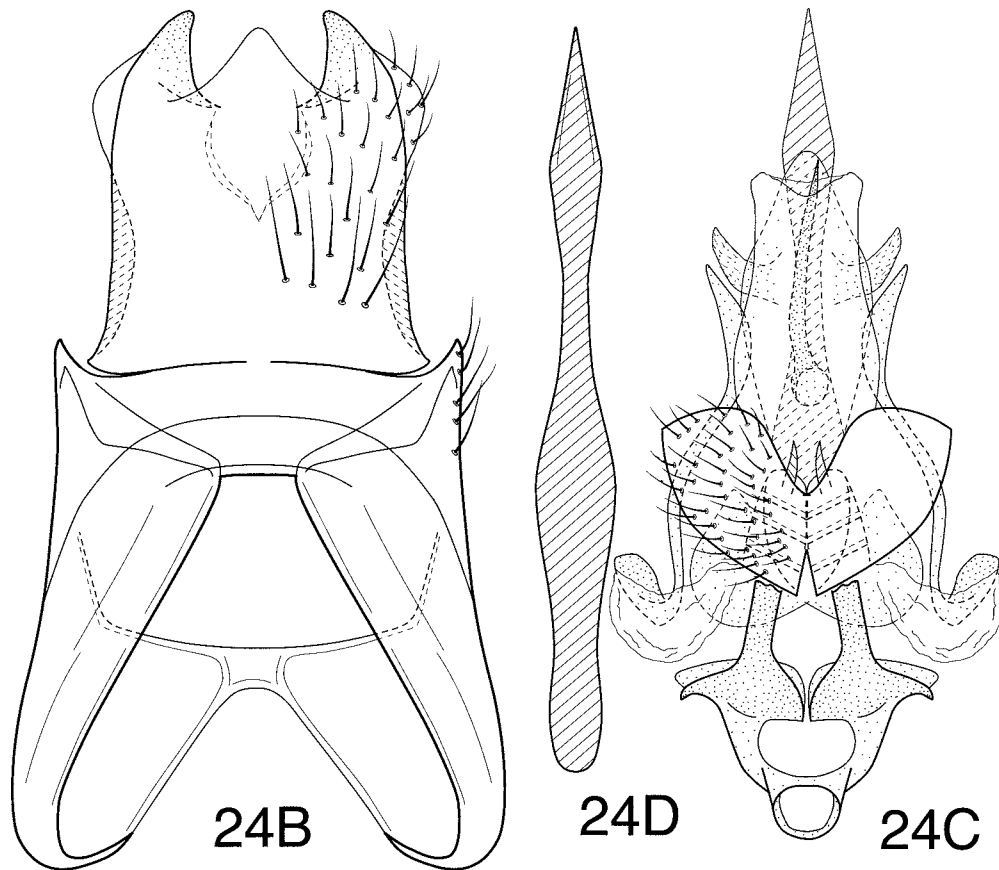
Distribution. MEXICO (Nuevo Leon).

### ***Mortoniella redunca*, new species**

Fig. 25

As previously discussed, *Mortoniella redunca* is similar to a group of species, including *M. carinula*, *M. opinionis*, *M. papillata*, *M. sicula*, n. sp., and *M. umbonata*, n. sp., all distinguished by a combination of characters,

including inferior appendage invaginated mesally and with protruding, often apically acute, apicolateral projections, and also a phallicata with well developed dorsolateral processes. Among these species, *M. redunca* is recognized by the unique structure of its dorsal phallic spine, which has the apex formed into a characteristic downward hook. The paramere appendages of this species are somewhat variable in length, but tend to be shorter than in most of the other species in this group; the apices are scabrous. Other useful characters to note are that the endophallic spine is less curved than in most members of this group and the apicomasal process of tergum X is scarcely developed.

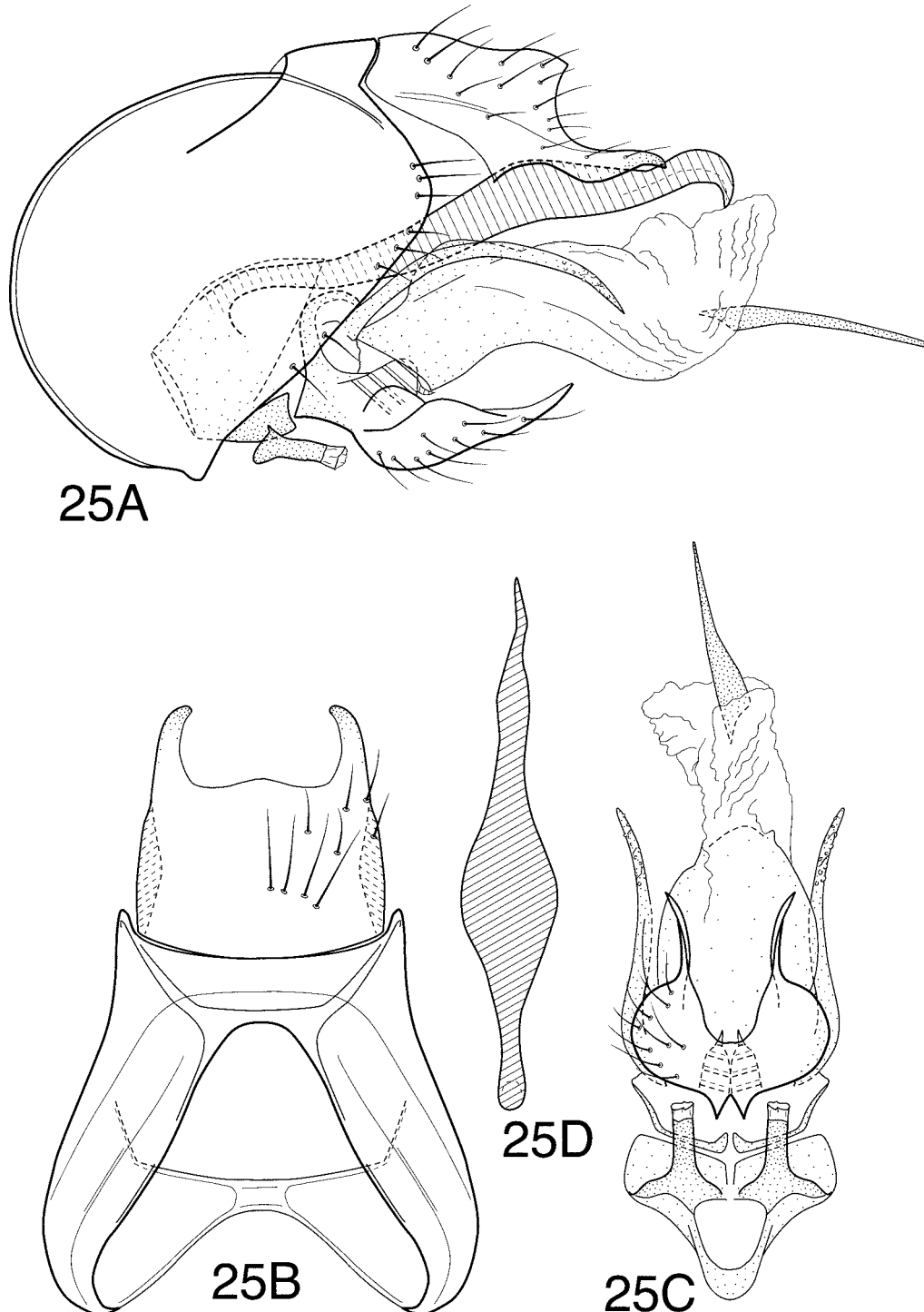


**FIGURE 24.** *Mortoniella rancura* (Mosely). Male genitalia: B—segment IX and tergum X, dorsal; C—phallic ensemble, ventral; D—dorsal phallic spine, dorsal.

Adult. Length of forewing: male 3.2–3.8 mm, female 3.8–4.7 mm. Forewing with forks I, II, and III, hind wing with forks II and III. Overall color medium brown, palps darker brown, apices of tibiae, tarsal and basal antennal segments light brown. Wing bar at anastomosis indistinctly marked with pale, light brown setae. Ventral process of abdominal segment VI (male) short, ventrally oriented, subtriangular, subacute apically, not constricted basally.

Male genitalia. Segment IX nearly evenly rounded anterolaterally, length greatest midlaterally, posterolateral margin forming rounded projection in dorsal half, narrowing ventrally; segment deeply mesally excised dorsally and ventrally, dorsal excision narrow, much less than half width of segment. Tergum X without, or with very weakly developed, mesal projection and projecting lateral lobes, lateral lobes elongate, narrow as viewed dorsally, sclerotized and subacute apically, slightly mesally curved. Inferior appendage without apicomasal projection, apicolateral projections elongate, tapering, acuminate, apices slightly dorsally curved; appendage nearly linear basolaterally, only slightly projecting on each side; mesal pockets of inferior appendage with apical processes short, dorsally curved. Paramere appendages nearly uniform in width, dorsally curved from base, posteriorly directed apically, apices with scabrous development, apex acute. Dorsal phallic

spine distinctive in shape, dorsal margin sinuous, apex, in lateral view, distinctly widened and hooked downward; as viewed dorsally, with apex narrowed, nearly acute, sometimes slightly asymmetrically curved. Phallicata relatively short, ventral margin distinctly curved and produced, dorsolaterally with prominent, paired, processes on either side, each more or less rounded and laterally explanate. Endophallic membrane with single prominent spine, sometimes sharply curved at base, apex nearly straight.



**FIGURE 25.** *Mortoniella redunca*, new species. Male genitalia: A—lateral; B—segment IX and tergum X, dorsal; C—phallic ensemble, ventral; D—dorsal phallic spine, dorsal.

**Holotype male:** COSTA RICA: Alajuela: Río Toro, 3.0 km (road) SW Bajos del Toro, 10°12'14"N, 084°18'58"W, 1530 m, 3–4.ix.1990, Holzenthal, Blahnik & Huisman (UMSP000001261) (pinned) (UMSP).

**Paratypes: COSTA RICA: Alajuela:** same locality and date as holotype — 11 males, 20 females (pinned), 10 males (alcohol) (UMSP); same locality, 11.ii.1992, Holzenthal, Muñoz & Kjer — 1 male, 3 females (pinned) (INBIO), 4 males, 2 females (alcohol) (UMSP); **Puntarenas:** Río Cotón, in Las Alturas, 08°56'17"N, 082°49'34"W, 1360 m, 16.ii.1986, Holzenthal, Morse & Fasth — 3 males (alcohol) (UMSP); Río Bellavista, ca. 1.5 km NW Las Alturas, 08°57'04"N, 082°50'46"W, 1400 m, 18.ii.1986, Holzenthal, Morse & Fasth — 2 males (pinned) (NMNH); same locality, 8–9.iv.1987, Holzenthal, Hamilton & Heyn — 1 male (alcohol) (UMSP); same locality, 2–3.viii.1987, Holzenthal, Morse & Clausen — 3 males, 1 female (pinned), 1 male (alcohol) (UMSP); same locality, 10–11.viii.1990, Holzenthal, Blahnik & Muñoz — 2 males, 51 females (pinned), 2 males (alcohol) (UMSP); same locality, 16–17.iii.1991, Holzenthal, Muñoz & Huisman — 3 males, 2 females (pinned), 37 males (alcohol) (UMSP); Zona Protectora Las Tablas, Río Cotón, Sitio Cotón, 08°56'28"N, 082°47'13"W, 1460 m, 15.iv.1989, Holzenthal & Blahnik — 1 male (alcohol) (UMSP); **San José:** Río Chirripó Pacífico, 9.5 km NE Rivas, 09°28'12"N, 083°35'28"W, 1370 m, 23.ii.1986, Holzenthal, Morse & Fasth — 1 male, 4 females (pinned), 12 males (alcohol) (UMSP).

Etymology. This species is named *M. redunca*, from the Latin word *reduncus*, meaning curved back, and referring to the recurved apex of the dorsal phallic spine of this species.

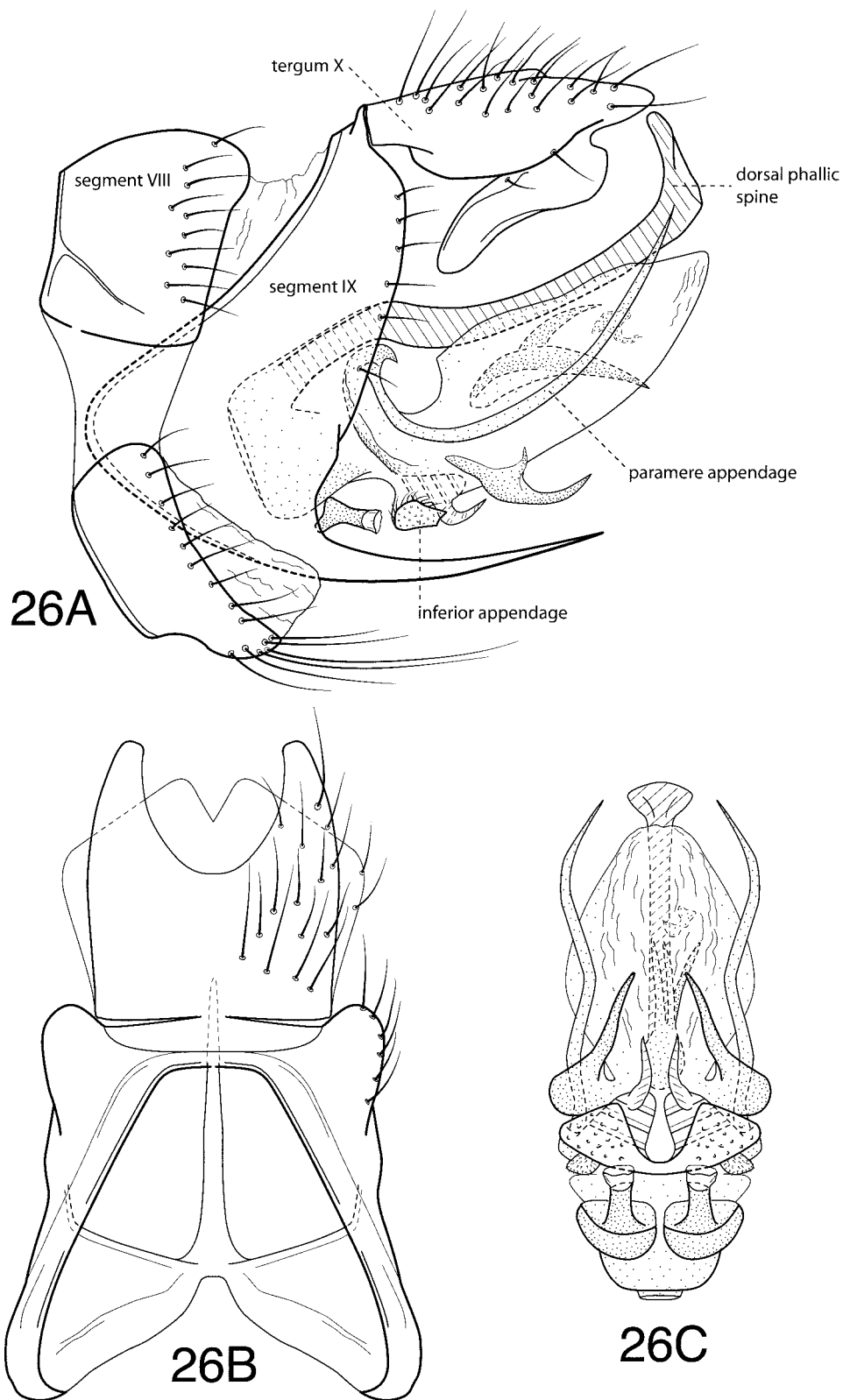
### ***Mortoniella rodmani*, new species**

Figs. 26–28

*Mortoniella rodmani* can be easily identified by the elongate spine-like ventral process from the ventral margin of segment IX, a character unique within the subfamily Protoptilinae. It does not seem to be close to any other described species in the genus, and is not easily referable to either the *bilineata* or *leroda* species groups. Several characters, such as the very reduced inferior appendage, strongly upturned apex of the dorsal phallic spine, diminutive size, and the venation of the wings, are suggestive of a relationship with the *ormina* species group (see Table 1). However, it lacks several of the diagnostic features of this group and its placement here is not certain.

Adult. Length of forewing: male 2.6 mm. Forewing with forks I, II, and III, hind wing with fork II only. Overall color very dark brown. Wing bar at anastomosis prominent, marked by white setae, bar somewhat interrupted. Ventral process of abdominal segment VI (male) longer than wide, subacute apically, posteriorly oriented.

Male genitalia. Segment IX rounded anterolaterally, length greatest in ventral half, posteroventral margin with elongate, spine-like process, posterolateral margin nearly linear; segment deeply mesally excised dorsally and ventrally, dorsal excision wide, about half width of segment. Tergum X with evenly rounded mesal excision and projecting lateral lobes, lateral lobes tapering, rounded apically, slightly mesally curved; ventral margin of tergum X with anteriorly directed, sclerotized process, visible as mesally notched structure as viewed dorsally. Inferior appendage very short and reduced, concavely excised mesally; mesal pockets of inferior appendage with apical processes short, robust, dorsally curved. Paramere appendages moderately elongate, narrow, simple in structure, ventrally curved at based, apices acute and posterodorsally directed. Dorsal phallic spine more or less uniform in width, apex abruptly, strongly, dorsally curved; as viewed dorsally, with apex distinctly widened and rounded. Phallicata short, dorsal margin with extended sclerotization in contact with dorsal phallic spine, basoventrally with pair of highly sclerotized, curved, posteriorly directed spines. Endophallic membrane relatively short, with paired, rounded membranous lobes (everted structure) posterior to sclerotized dorsal extension of phallicata and apicoventral spine; spine strongly sclerotized and curved, emerging from elongate, paired sclerites on endophallic membrane, appearing as tripartite structure when retracted (Fig. 26C).



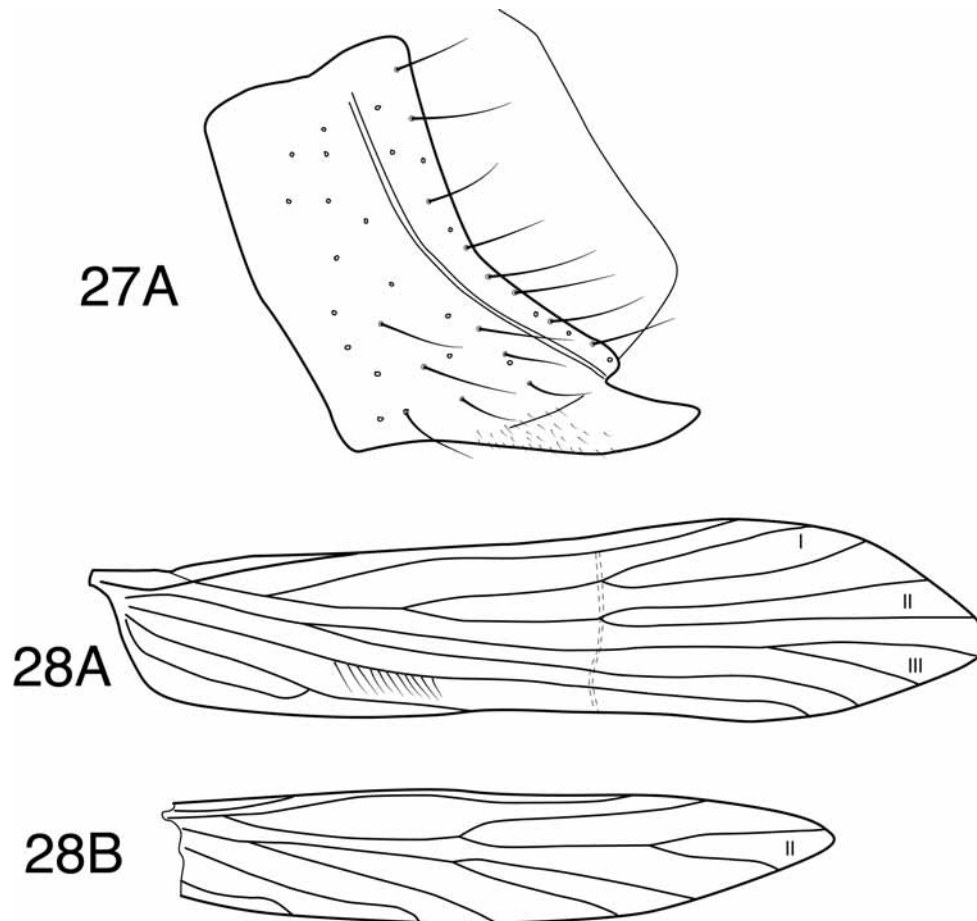
**FIGURE 26.** *Mortoniella rodmani*, new species. Male genitalia: A—lateral; B—segment IX and tergum X, dorsal; C—phallic ensemble, ventral.

**Holotype male:** COSTA RICA: Guanacaste: Parque Nacional Rincón de la Vieja, Quebrada Zopilote, 10°45'54"N, 085°18'32"W, 785 m, 3.iii.1986, Holzenthal (UMSP000018904) (alcohol) (UMSP).

**Paratypes:** COSTA RICA: Guanacaste: Parque Nacional Guanacaste, Estación Maritza, Río Tempis-

quito Sur, 10°57'00"N, 085°28'48"W, 600 m, 30.viii.1990, Huisman & Quesada — 1 male (pinned), 3 males (alcohol) (UMSP); Parque Nacional Guanacaste, Estación Maritza, Río Tempisquito, 10°57'29"N, 085°29'49"W, 550 m, 30–31.viii.1990, Huisman, Blahnik & Quesada — 1 male (alcohol) (UMSP); Parque Nacional Guanacaste, Estación Pitilla, Río Orosí, 10°59'28"N, 085°25'41"W, 700 m, 19–20.vi.1988, C.M. & O.S. Flint, Holzenthal — 1 male (pinned) (NMNH).

**Etymology.** We take great pleasure in naming this species for Dr. James Rodman for his unfailing support of biodiversity research, and especially for his role in establishing the NSF sponsored PEET program, which provided the funding for this research.



**FIGURE 27–28.** *Mortoniella rodmani*, new species. **27**, Ventral process of sternum VI (male), lateral. **28**, Wings, male: A—forewing; B—hind wing.

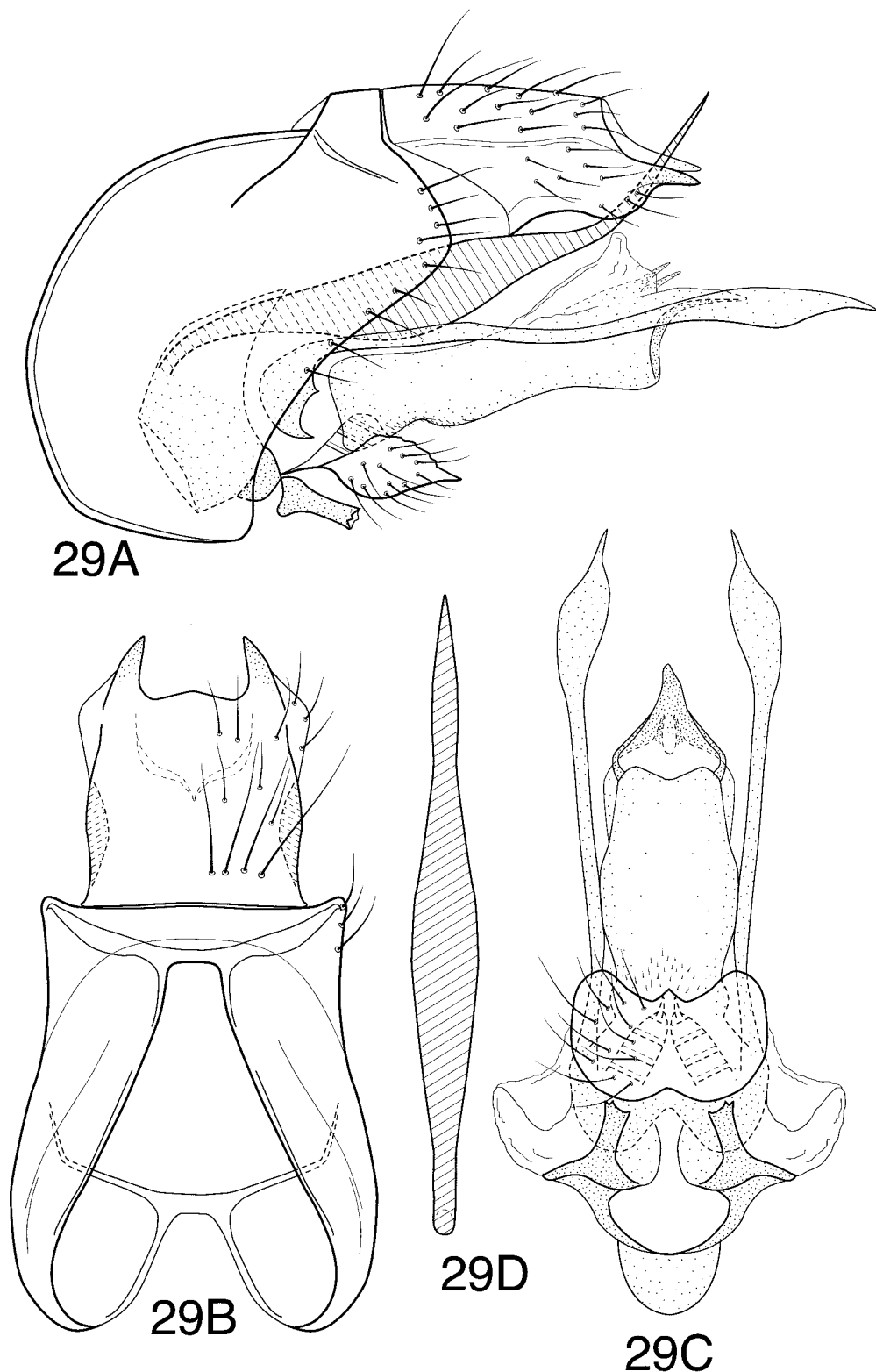
***Mortoniella rovira* (Flint, 1974), new combination**

Fig. 29

*Mexitrichia rovira* Flint, 1974: 10.

*Mortoniella rovira* is the only Central American species with a very short inferior appendage, without protruding apicomeral or apicolateral projections, that also lacks paired dorsolateral processes on the phallicata. The most diagnostic and distinctive character of *M. rovira* is the endophallic spine, which projects from the apicodorsal margin of the phallicata and is flattened and very wide basally. *Mortoniella rovira* is probably most similar to *M. mexicana* and *M. buenoi*, and especially to the latter, which has a somewhat similar endophallic spine. However, both of these species differ from *M. rovira* in having an apicomeral projection on

the inferior appendage. Additionally, *M. mexicana* differs in lacking an endophallic spine and *M. buenoi* has distinct spines on the apical part of the paramere appendages.



**FIGURE 29.** *Mortoniella rovira* (Flint). Male genitalia: A—lateral; B—segment IX and tergum X, dorsal; C—phallic ensemble, ventral; D—dorsal phallic spine, dorsal.

Adult. Length of forewing: male 3.1–3.3 mm, female 3–3.5 mm. Forewing with forks I, II, and III, hind wing with forks II and III. Overall color medium brown, palps and basal part of antennal and tarsal segments

darker brown, apices of tibiae, tarsal and basal antennal segments light brown. Wing bar at anastomosis distinct, marked by pale, light brown setae. Ventral process of abdominal segment VI (male) short, ventrally oriented, rounded or subtruncate apically, slightly constricted basally at anterior margin.

Male genitalia. Segment IX nearly evenly rounded anterolaterally, length greatest midlaterally, posterolateral margin forming rounded projection in dorsal half, narrowing ventrally; segment deeply mesally excised dorsally and ventrally, dorsal excision narrow, much less than half width of segment. Tergum X without or with very weakly developed mesal projection and projecting lateral lobes, lateral lobes with apices narrowed, acute, and mesally curved, preceded by distinct lateral carina. Inferior appendage with very short, acute apicomesal projection and short, rounded basolateral projections on each side; mesal pockets of inferior appendage with apical processes short, dorsally curved. Paramere appendages very elongate, narrow, bases somewhat enlarged and cupped, incurving from membranous basolateral lobes; stem of each appendage narrow, somewhat wider preapically, abruptly narrow and acuminate apically. Dorsal phallic spine with distinct bulge ventrally, conforming with dorsal margin of phallicata, dorsal margin sinuous, apex distinctly dorsally curved; as viewed dorsally, with apex acute. Phallicata relatively straight, tubular, basoventrally with microsetae. Endophallic membrane with prominent curved spine, spine with base very wide and flattened, with apex projecting as extension of dorsal margin of phallicata (characteristic, but possibly unexpanded condition).

Material examined. **COSTA RICA: Puntarenas:** Río Guineal, ca 1 km (air) E Finca Helechales, 09°04'34"N, 083°05'31"W, 840 m, 22.ii.1986, Holzenthal, Morse & Fasth — 34 males (alcohol) (UMSP); same locality, 4.viii.1987, Holzenthal, Morse & Clausen — 1 male, 9 females (pinned), 10 males (alcohol) (UMSP); Río Singrí, ca 2 km (air) S Finca Helechales, 09°03'25"N, 083°04'55"W, 720 m, 21 ii.1986, Holzenthal, Morse & Fasth — 2 males, 6 females (pinned), 290 males (alcohol) (UMSP).

Distribution. COSTA RICA (Puntarenas), PANAMA (Chiriqui).

### *Mortoniella sicula*, new species

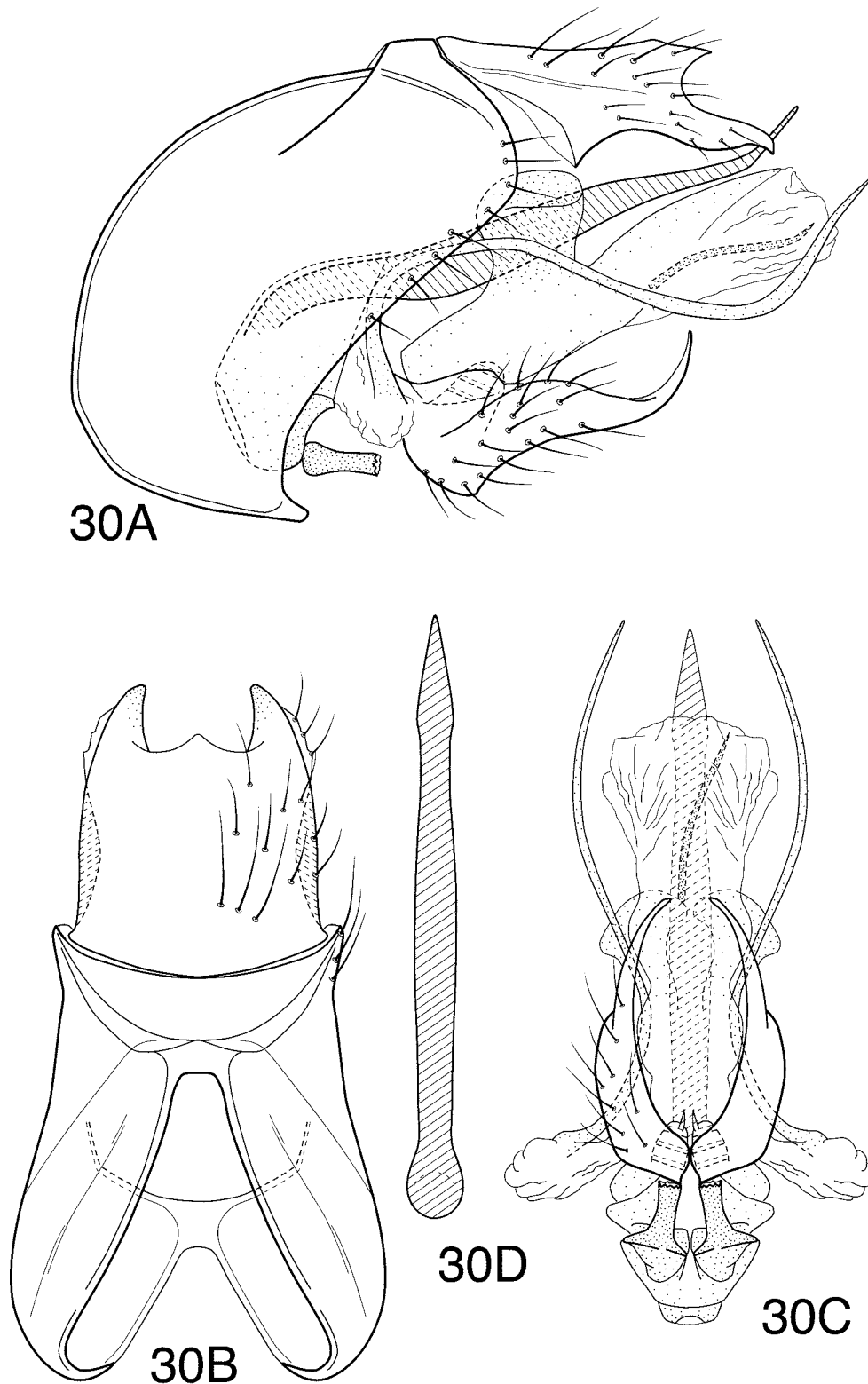
Fig. 30

As previously discussed, *Mortoniella sicula* is similar to a group of species, including *M. carinula*, *M. opinionis*, *M. papillata*, *M. redunca*, and *M. umbonata*, n. sp., all distinguished by having their inferior appendage invaginated mesally and with protruding, often apically acute, apicolateral projections, and also a phallicata with well developed dorsolateral processes. Among these species, *M. sicula* is probably most closely related to *M. opinionis*, resembling it in having a very narrow endophallic spine and a dorsal phallic spine that is relatively simple in structure, with its dorsal margin sinuous and apex slightly upturned. *Mortoniella sicula* can be distinguished from *M. opinionis* by the very narrow attenuate apicolateral projections of the inferior appendage. The very fine, seta-like spines on the basoventral surfaces of the paramere appendages is also distinctive for this species, but these are so small that they could be easily overlooked.

Adult. Length of forewing: male 2.8–3.4 mm, female 3.3–3.6 mm. Forewing with forks I, II, and III, hind wing with forks II and III. Overall color (in alcohol) medium brown. Wing bar at anastomosis indistinctly marked with pale, light brown setae. Ventral process of abdominal segment VI (male) short, ventrally oriented, subtriangular, rounded to subacute apically, base about as long as length, not or very slightly constricted basally.

Male genitalia. Segment IX nearly evenly rounded anterolaterally, length greatest midlaterally, posterolateral margin forming rounded projection in dorsal half, narrowing ventrally; segment deeply mesally excised dorsally and ventrally, dorsal excision narrow, much less than half width of segment. Tergum X with short, acute mesal projection and relatively short, projecting lateral lobes, lateral lobes with apices narrowed, subacute, mesally curved. Inferior appendage without apicomesal projection, apicolateral projections elongate, tapering, acuminate, apices distinctly dorsally curved; appendage nearly linear basolaterally, with very slight





**FIGURE 30.** *Mortoniella sicula*, new species. Male genitalia: A—lateral; B—segment IX and tergum X, dorsal; C—phallic ensemble, ventral; D—dorsal phallic spine, dorsal.

projections on each side; mesal pockets of inferior appendage with apical processes short, dorsally curved. Paramere appendages very elongate, narrow, nearly uniform in width, emerging from membranous lateral lobes, strongly dorsally curved from base, posteriorly projecting apically; ventral margin of each appendage at inflection with scattered, minute, seta-like spines. Dorsal phallic spine slightly enlarged basoventrally, weakly

sinuous in lateral view, apex distinctly, but not strongly, dorsally inflected; as viewed dorsally, with apex acute. Phallicata relatively straight, tubular, dorsolaterally with prominent, paired, subquadrate processes, each bent and laterally projecting in apical part. Endophallic membrane with very narrow, elongate, linear spine.

**Holotype male: COSTA RICA: Guanacaste:** Parque Nacional Guanacaste, Río Tempisque, Estación Maritza, 10°57'29"N, 085°29'49"W, 550 m, 13–16.vii.1992, Muñoz (INBIOCRI000513579) (pinned) (UMSP).

**Paratypes: COSTA RICA: Guanacaste:** Parque Nacional Rincón de la Vieja, Río Negro, 10°45'54"N, 085°18'47"W, 810 m, 3.iii.1986, Holzenthal & Fasth — 1 male (alcohol) (UMSP); Parque Nacional Guanacaste, Río Tempisque Sur, Maritza, 10°57'00"N, 085°28'48"W, 600 m, 30.viii.1990, Huisman & Quesada — 15 males, 6 females (alcohol) (UMSP); same locality and date as holotype — 8 males, 4 females (pinned) (UMSP), 6 males, 2 females (pinned) (INBIO); same locality, 30–31.viii.1990, Huisman, Blahnik & Quesada — 3 males, 2 females (alcohol) (NMNH).

**Etymology.** This species is named *M. sicula*, diminutive for the Latin word *sica*, meaning dagger, and referring to the elongate, narrow, dagger-like apicolateral projections of the inferior appendage.

### ***Mortoniella stilula*, new species**

Fig. 31

This species is most similar to *Mortoniella meralda* and *M. caudicula*, resembling them in having an elongate, asymmetrically developed apicomesal projection from the inferior appendage, elongate paramere appendages without scabrous apices, a simple phallicata without dorsolateral processes, and in lacking a ventral endophallic spine. The most diagnostic feature of *M. stilula* is the small preapical spine on the apicomesal projection of the inferior appendage. Although the preapical projection is slightly inflated apically, it lacks the scabrous development that characterizes *M. meralda*.

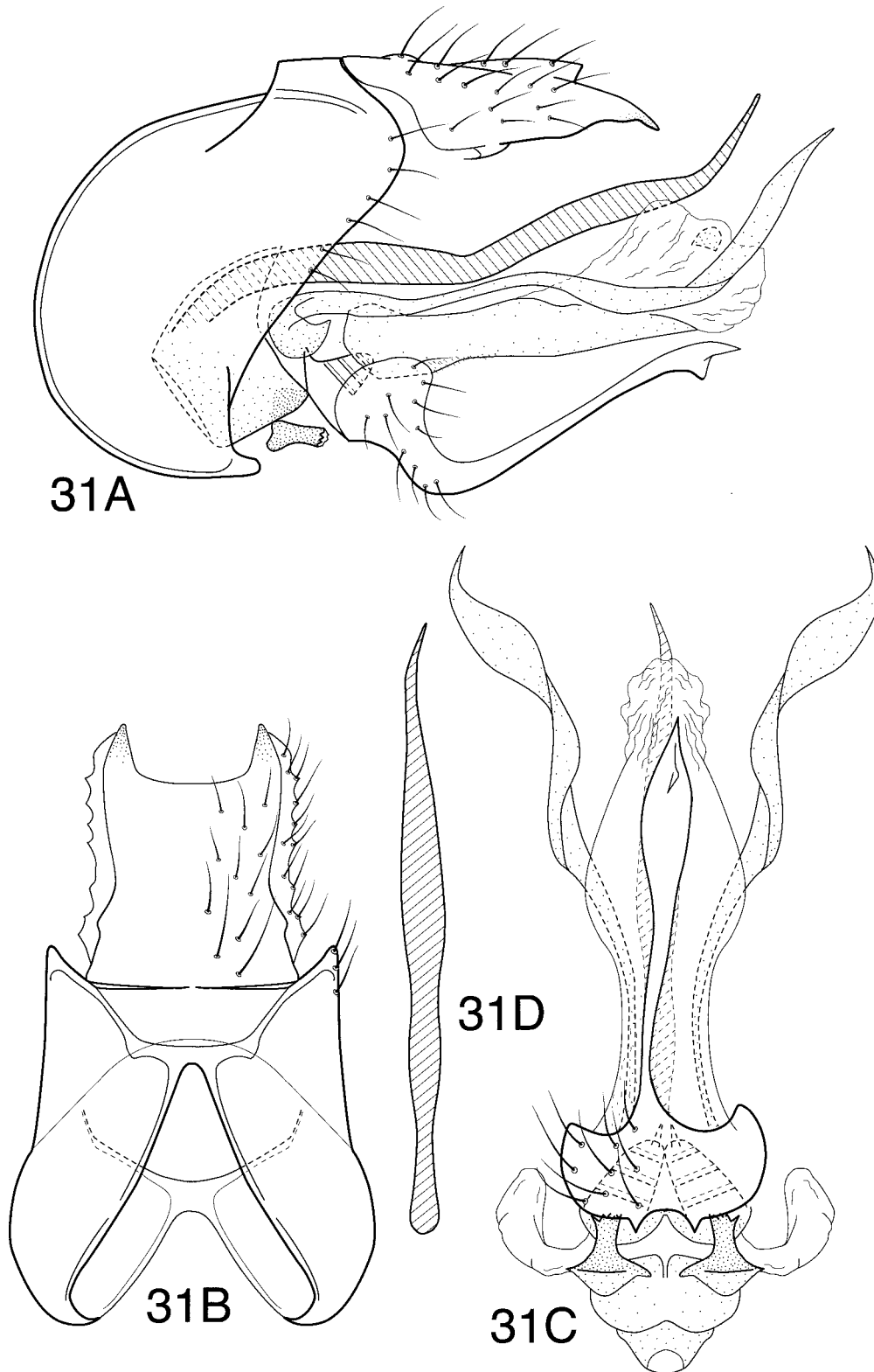
**Adult.** Length of forewing: male 2.4–2.8 mm, female 2.6–2.8 mm. Forewing with forks I, II, and III, hind wing with forks II and III. Overall color (in alcohol) light brown. Wing bar at anastomosis indistinctly marked with pale, light brown setae. Ventral process of abdominal segment VI (male) short, ventrally oriented, rounded or subtruncate apically, slightly constricted basally at anterior margin.

**Male genitalia.** Segment IX nearly evenly rounded anterolaterally, length greatest midlaterally, posterolateral margin forming rounded projection in dorsal half, narrowing ventrally; segment deeply mesally excised dorsally and ventrally, dorsal excision narrow, much less than half width of segment. Tergum X with apicomesal margin nearly linear, laterally with projecting lobes; lateral lobes with apices narrowed, acute, and mesally curved. Inferior appendage with distinctly asymmetrically developed apicomesal projection, apicomesal projection elongate, narrow, slightly widened preapically, apex acute; ventral margin of apicomesal projection with short, acute, preapical projection; appendage, basolaterally, with short, rounded projection on each side; mesal pockets of inferior appendage with apical processes short, dorsally curved. Paramere appendages elongate, narrow, bases somewhat enlarged and cupped, incurving from membranous basolateral lobes; stem of each appendage narrow, somewhat wider preapically, abruptly narrowed and acuminate apically. Dorsal phallic spine sinuous in lateral view, apex distinctly upturned; as viewed dorsally, with apex very narrowly acuminate. Phallicata relatively straight, tubular, basoventrally with microsetae, dorsolaterally without projections. Endophallic membrane without ventral spine.

**Holotype male: COSTA RICA: Heredia:** Río Bijagual, on road to Magsasay, 10°24'29"N, 084°04'34"W, 140 m, 12.ii.1986, Holzenthal, Morse & Fasth (UMSP0000118892 (alcohol) (UMSP).

**Paratypes: COSTA RICA: Heredia:** La Selva Field Station near Puerto Viejo, 21–28.iii.1988, Steiner, Hill, Swearingen & Mitchell — 1 male, 3 females (alcohol) (NMNH); same locality, 21–24.viii.1999, D. &

M. Davis — 2 males, 16 females (alcohol) (NMNH); Estación Biología La Selva, Río Puerto Viejo, 10°26'24"N, 084°00'43"W, 30 m, 19.vi.1986, Holzenthal, Heyn & Armitage — 1 male (alcohol) (INBIO); same locality and date as holotype, Holzenthal, Morse & Fasth — 2 males (alcohol) (UMSP); Parque Nacional Braulio Carrillo, Río Peje, Est. Magsasay, 10°24'07"N, 084°03'00"W, 130 m, 25–26.viii.1990, Holzenthal, Blahnik & Huisman — 1 male, 50 females (alcohol) (UMSP).



**FIGURE 31.** *Mortoniella stilula*, new species. Male genitalia: A—lateral; B—segment IX and tergum X, dorsal; C—phallic ensemble, ventral; D—dorsal phallic spine, dorsal.

***Mortoniella tapanti*, new species**

Fig. 32

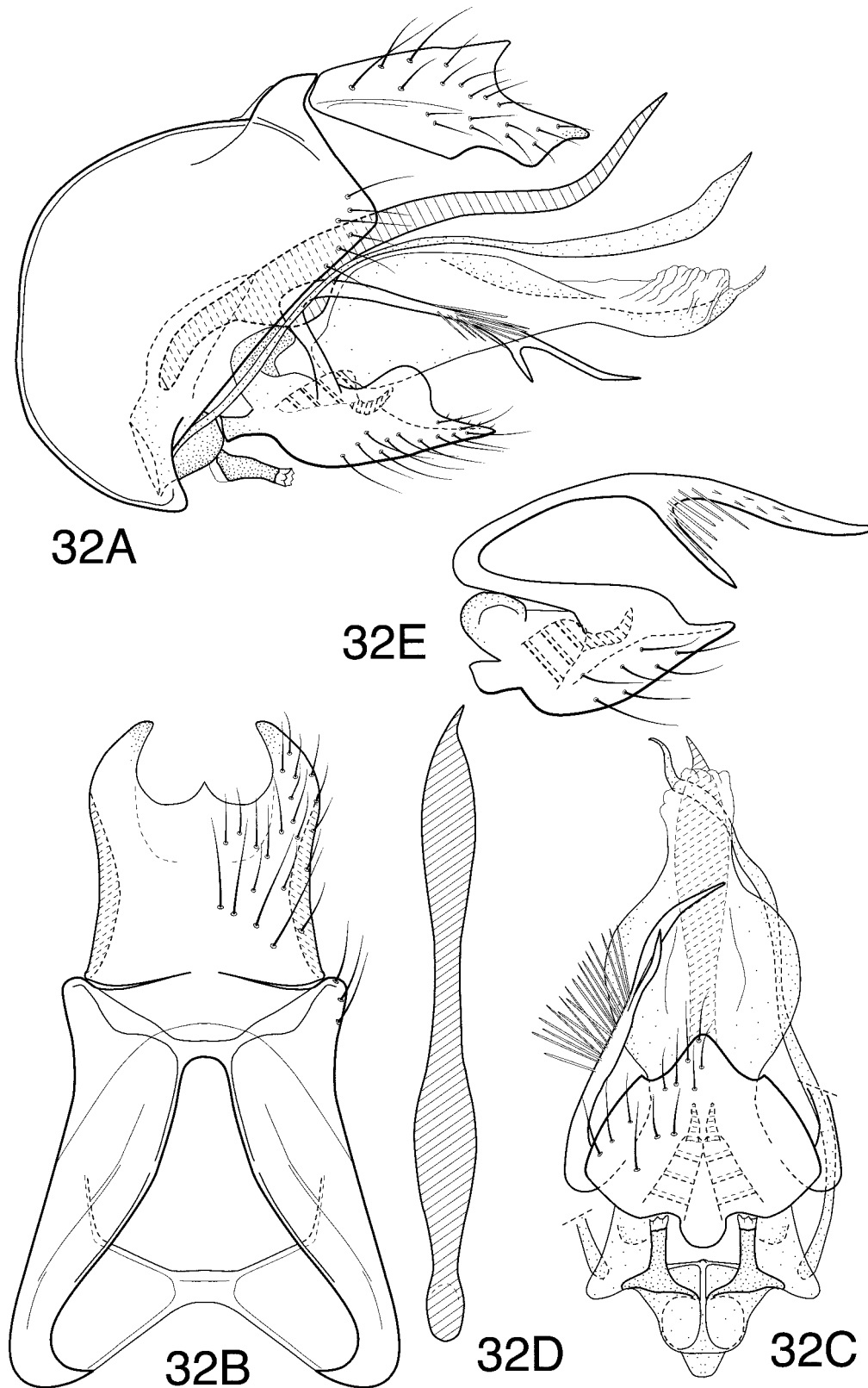
*Mortoniella tapanti* is similar to both *M. akantha* and *M. anakantha*. All of these species are characterized by having an inferior appendage with a single, symmetrical apicomesal projection and also distinctive, elongate dorsolateral branches. *Mortoniella tapanti* can be distinguished from either of the other two species by having the apicomesal projection of the inferior appendage much shorter and by having the dorsolateral branches of the inferior appendage forked. The position of the fork and the arrangement of elongate setae along the dorsolateral branches varies somewhat in this species, as indicated in Fig. 32A and E.

Adult. Length of forewing: male 4.7–5.0 mm, female 5–5.6 mm. Forewing with forks I, II, and III, hind wing with forks II and III. Overall color light to medium brown, palps and basal part of antennal and tarsal segments darker brown, apices of tibiae, tarsal and basal antennal segments light brown. Wing bar at anastomosis distinct, marked by pale, light brown setae. Ventral process of abdominal segment VI (male) short, ventrally oriented, subtriangular, rounded to subacute apically, base about as long as length, not or very slightly constricted basally.

Male genitalia. Segment IX nearly evenly rounded anterolaterally, length greatest midlaterally, posterolateral margin forming rounded to slightly angular projection in dorsal half, narrowing ventrally; segment deeply mesally excised dorsally and ventrally, dorsal excision narrow, much less than half width of segment. Tergum X with short, acute mesal projection and projecting lateral lobes, lateral lobes with apices narrowed, subacute, mesally curved. Inferior appendage with short, symmetrical, apically rounded apicomesal projection bearing elongate setae ventrally and laterally, short, sparse setae dorsally; appendage basolaterally, with prominent dorsal projection on each side, each terminating in elongate, narrow, posteriorly projected dorsolateral branch, extending past apicomesal projection of inferior appendage; dorsolateral branch distinctly forked in apical half and bearing numerous elongate bristle-like setae, either linearly arranged or grouped in region of fork; mesal pockets of inferior appendage with apical processes short, thick, dorsally curved. Paramere appendages emerging from membranous basolateral projections, very elongate, narrow, dorsally arched basally, mesally curved apically; each appendage slightly widened in apical half or third, sinuous, ribbon-like, apex narrowed and acute. Dorsal phallic spine with basoventral bulge, apical part sinuously, dorsally curved. Phallicata relatively wide basally, expanded in middle, greatly narrowed apically, basoventrally with slight bulge, dorsally with broadly rounded, explanate lateral projection on either side. Endophallic membrane short, simple, without spines.

**Holotype male: COSTA RICA: Cartago:** Reserva [Parque Nacional] Tapantí, Quebrada Palmitos & falls, ca. 9 km (road) NW tunnel, 09°43'12"N, 083°46'48"W, 1400 m, 2–3.vi.1990, Holzenthal, Blahnik, Muñoz (UMSP000000758) (pinned) (UMSP).

**Paratypes: COSTA RICA: Alajuela:** Río Agrio, ca. 3.5 km NE Bajos del Toro, 10°14'35"N, 084°16'44"W, 1290 m, 20.viii.1990, Holzenthal, et al. — 1 female (pinned) (NMNH); Río Toro, 3.0 km (road) SW Bajos del Toro, 10°12'14"N, 084°18'58"W, 1530 m, 3–4.ix.1990, Holzenthal, Blahnik & Huisman — 3 males, 111 females (pinned), 1 male (alcohol) (UMSP); Quebrada Latas, 8.9 km NE Bajos del Toro, 10°16'08"N, 084°15'36"W, 1030 m, 6.ix.1990, Holzenthal, Blahnik & Huisman — 2 females (pinned) (UMSP); Reserva Bosque Nubosa Monte Verde, Río Peñas Blancas, 10°18'00"N, 084°44'24"W, 950 m, 1.iii.1986, Holzenthal & Fasth — 1 male, 5 females (alcohol) (UMSP); **Cartago:** Reserva Tapantí, Río Grande de Orosí, 09°41'10"N, 083°45'22"W, 1650 m, 18–21.iii.1987, Holzenthal, Hamilton & Heyn — 1 male, 30 females (pinned) (UMSP); same locality, 15–16.vii.1987, Holzenthal, Morse & Clausen — 5 males, 46 females (pinned), 10 males (alcohol) (UMSP); same locality, 7–8.vi.1988, C & O Flint, Holzenthal — 1 male, 7 females (pinned), 3 males, 24 females (alcohol) (NMNH); Reserva Tapantí, Quebrada Palmitos & falls, ca. 9 km (road) NW tunnel, 09°43'12"N, 083°46'48"W, 1400m, 8–9.vi.1988, C. & O. Flint, Holzenthal — 4 males, 8 females (pinned), 12 males, 43 females (alcohol) (NMNH); same locality, 2–3.vi.1990,



**FIGURE 32.** *Mortoniella tapanti*, new species. Male genitalia: A—lateral; B—segment IX and tergum X, dorsal; C—phallic ensemble, ventral; D—dorsal phallic spine, dorsal; E—inferior appendage variation, lateral.

Holzenthal, Blahnik & Muñoz — 5 males, 38 females (pinned), 3 males (alcohol) (UMSP); same locality, 1–2.viii.1990, Holzenthal, Blahnik & Muñoz — 20 males, 25 females (pinned) (UMSP); same locality, 24–

25.iii.1991, Holzenthal, Muñoz & Huisman — 8 males, 17 females (pinned) — 6 males, 12 females (alcohol) (UMSP); same locality, 21.ii.1992, Holzenthal, Munoz & Kjer — 5 males, 44 females (pinned) (INBIO); waterfall, ca. 1 km (road) NW tunnel, 09°41'24"N, 083°45'36"W, 1600 m, 24.iii.1991, Holzenthal, Muñoz & Huisman — 4 males, 9 females (pinned) (UMSP); Quebrada Segunda @ administration building, 09°45'40"N, 083°47'13"W, 1250 m, 9–10.v.1990, Holzenthal & Blahnik — 4 males, 33 females (pinned), 6 males (alcohol) (UMSP); same locality, 23.viii.1990, Holzenthal & Huisman — 1 female (pinned) (UMSP); **Puntarenas:** Río Bellavista, ca. 1.5 km NW Las Alturas, 08°57'04"N, 082°50'46"W, 1400 m, 10–11.viii.1990, Holzenthal, Blahnik & Muñoz — 1 male (alcohol) (UMSP); Zona Protectora Las Tablas, Río Cotón, Sitio Cotón, 08°56'28"N, 082°47'13"W, 1460 m, 15.iv. 1989, Holzenthal & Blahnik — 2 males (alcohol) (UMSP); **San José:** Río Chirripó Pacífico, 9.5 km NE Rivas, 09°28'12"N, 083°35'28"W, 1370 m, 23.ii.1986, Holzenthal, Morse & Fasth — 2 males, 3 females (pinned) (UMSP), 14 males (alcohol) (INBIO); Río Parrita Chiquito, rt. 12, 6.5 km SW jct. rt. 2, 09°42'11"N, 083°58'12"W, 1990 m, 10.iv.1987, Holzenthal, Hamilton & Heyn — 1 male (pinned) (UMSP); El Salvaje, Río Tabarcia, 8 km (road) E Palmichal, 09°43'12"N, 083°46'48"W, 1650 m, 19–21.i.1992, Holzenthal, Kjer & Quesada — 1 male, 1 female (pinned) (UMSP); **PANAMA: Chiriquí:** Volcán Chiriquí, 08°51'N, 082°35'W, 23.vi.1999, W. Reeves — 12 males, 20 females (alcohol) (UMSP).

Etymology. This species is named *M. tapanti* because the majority of the type specimens were collected from Parque Nacional Tapantí, a remarkable and nearly pristine preserve that is also the type locality for a number of other caddisfly species.

### ***Mortoniella taurina*, new species**

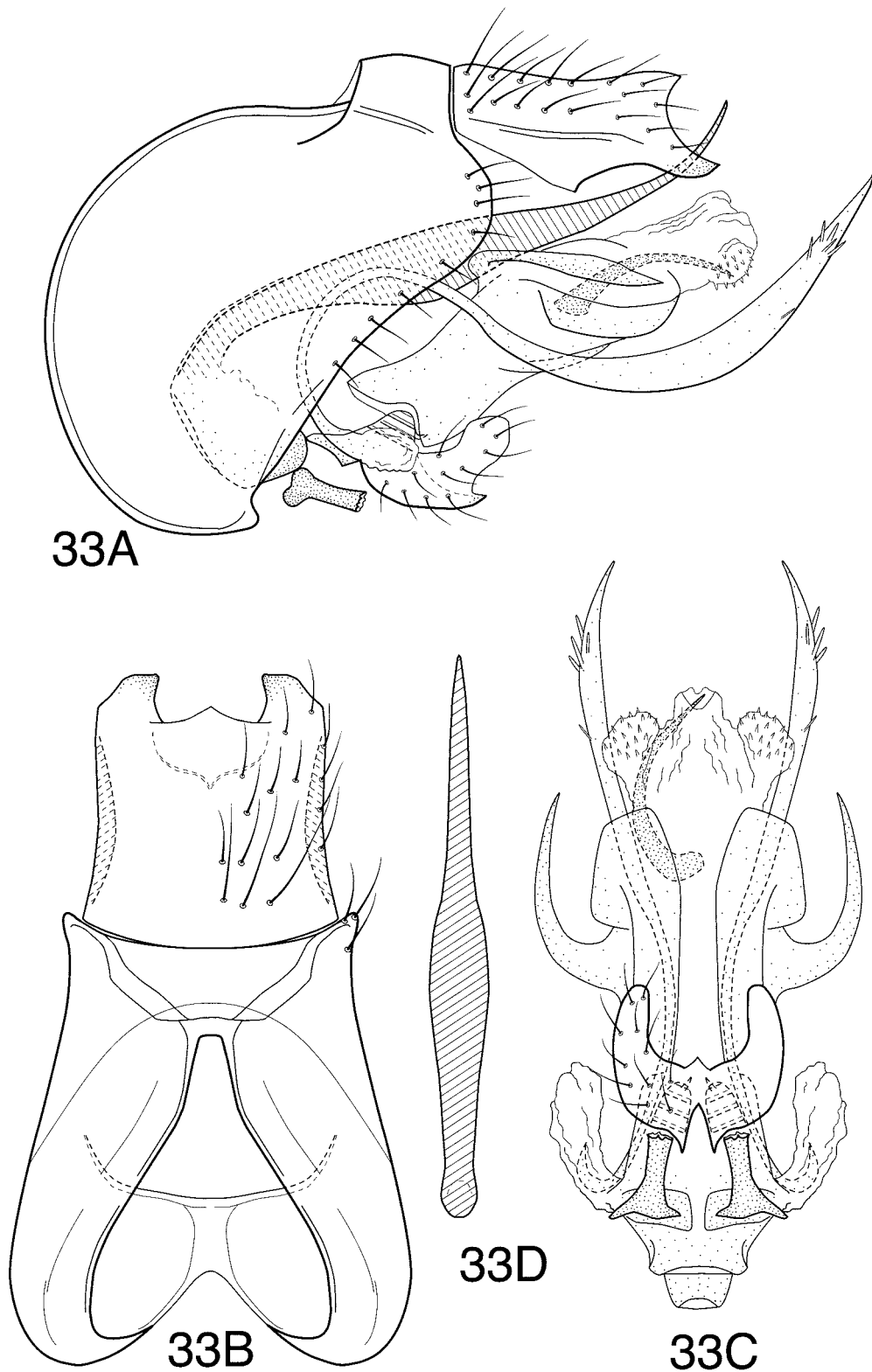
Fig. 33

*Mortoniella taurina* is a distinctive species, most similar to *M. aviceps*. Both species have spine-like processes on the dorsolateral margin of the phallicata, but these are much more prominent in *M. taurina*, and constitutes its most diagnostic character. Both species also have the apical half of the paramere appendages widened and bowed outward, but *M. taurina* differs in having sparse, but clearly evident spines near the apex of the structure. *Mortoniella taurina* also differs in that the apicolateral projections of the phallicata are subtruncate, rather than acute, the inferior appendage is differently shaped, and the endophallic membrane bears a prominent curved spine and also has a pair of membranous dorsolateral lobes with minute spines, both absent in *M. aviceps*.

Adult. Length of forewing: male 3.7–3.9 mm. Forewing with forks I, II, and III, hind wing with forks II and III. Overall color (in alcohol) medium brown. Wing bar at anastomosis not evident, crossveins pale. Ventral process of abdominal segment VI (male) short, ventrally oriented, subtriangular, subacute apically, length slightly greater than width at base, slightly constricted basally.

Male genitalia. Segment IX nearly evenly rounded anterolaterally, length greatest midlaterally, posterolateral margin forming rounded projection in dorsal half, narrowing ventrally; segment deeply mesally excised dorsally and ventrally, dorsal excision narrow, much less than half width of segment. Tergum X without or with very weakly developed mesal projection and projecting lateral lobes, lateral lobes relatively short and broad, distinctly dorsoventrally flattened, apices subtruncate. Inferior appendage with very short, acute apicomeral projection and relatively short, apically rounded basolateral projections on each side; mesal pockets of inferior appendage with apical processes short, dorsally curved. Paramere appendages elongate, narrow basally, wider in apical half, emerging from membranous lateral lobes; each appendage strongly dorsally curved at base, apical half bowed outward and posteriorly directed, preapically with small number of distinct spines, apex acute. Dorsal phallic spine with distinct bulge ventrally, dorsal margin weakly sinuous in lateral view, apex slightly upturned; as viewed dorsally, with apex narrowly acuminate. Phallicata relatively straight, tubular, dorsally with prominent, paired, spine-like projections, laterally with explanate, dorsoventrally flat-

tened, rounded to subquadrate projections. Endophallic membrane relatively short, with small spinous apico-lateral lobes and prominent, slender, curved spine.



**FIGURE 33.** *Mortoniella taurina*, new species. Male genitalia: A—lateral; B—segment IX and tergum X, dorsal; C—phallic ensemble, ventral; D—dorsal phallic spine, dorsal.

**Holotype male: COSTA RICA: Cartago:** Quebrada Platanillo, ca. 5 km E Moravia de Chirripó, 09°49'16"N, 083°24'25"W, 1130 m, 6.viii.1987, Holzenthal, Morse & Clausen (alcohol) (UMSP).

**Paratypes: COSTA RICA: Cartago:** same locality and date as holotype, Holzenthal, Morse & Clausen — 1 male (alcohol) (UMSP); **PANAMA: Chiriquí:** Fortuna Dam Site nr. Hornitos, 08°55'00"N, 082°16'00"W, 1050 m, 19–25.x.1977, H. Wolda — 1 male (alcohol) (NMNH); same locality, 9–15.xi.1977, H. Wolda — 1 male (alcohol) (NMNH).

Etymology. This species is named *M. taurina*, as a derivative of the Latin word *taurus*, meaning bull, and referring to the somewhat horn-like dorsolateral processes of the phallicata of this species.

### ***Mortoniella umbonata*, new species**

Fig. 34

As previously discussed, *Mortoniella umbonata* is similar to a group of species, including *M. carinula*, *M. opinionis*, *M. papillata*, *M. redunca*, and *M. sicula*, all distinguished by having the inferior appendage invaginated mesally and with protruding, often apically acute, apicolateral projections, and also a phallicata with well developed dorsolateral processes. The apicolateral projections of the inferior appendage in *M. umbonata* are not as elongate as in the other species of this group, but more so than in either *M. propinqua* or *M. florica* which are otherwise similar in structure to members of this group. Among all of these species, *M. umbonata* is distinctively characterized by the paired, rounded, sclerotized processes extending from the lateral margin of the phallicata to the basoventral margin of the endophallic membrane.

Adult. Length of forewing: male 3.8–4.0 mm. Forewing with forks I, II, and III, hind wing with forks II and III. Overall color (in alcohol) light brown. Wing bar at anastomosis not evident, crossveins pale. Ventral process of abdominal segment VI (male) short, ventrally oriented, rounded or subtruncate apically, slightly constricted basally at anterior margin.

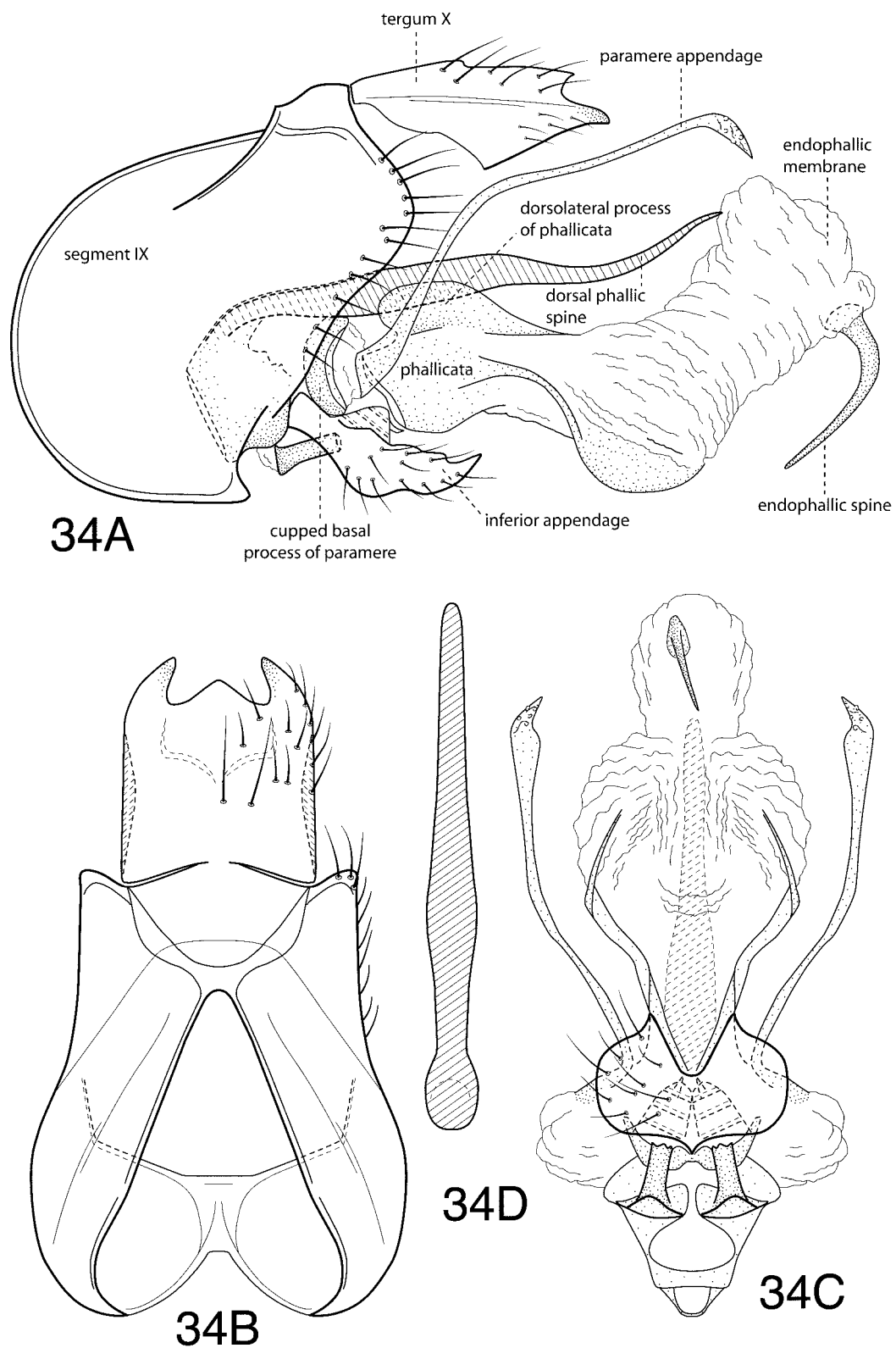
Male genitalia. Segment IX nearly evenly rounded anterolaterally, length greatest midlaterally, posterolateral margin forming rounded projection in dorsal half, narrowing ventrally; segment deeply mesally excised dorsally and ventrally, dorsal excision narrow, much less than half width of segment. Tergum X with short, subacute mesal projection and projecting lateral lobes, lateral lobes short, subacute apically, slightly mesally curved. Inferior appendage without apicomeral projection, apicolateral projections short, stout, slightly dorsally curved apically, apices acute; appendage basolaterally, with margins undeveloped, lacking prominent projections on each side; mesal pockets of inferior appendage with apical processes short, dorsally curved. Paramere appendages very elongate, narrow, nearly uniform in width, slightly enlarged and scabrous apically, emerging from membranous lateral lobes, apices acute and slightly ventrally deflected. Dorsal phallic spine weakly sinuous in lateral view, apex distinctly upturned; as viewed dorsally, with apical half narrowed, apex rounded. Phallicata short, tubular, basal part relatively wide, dorsally with prominent, paired, rounded, dorsally protuberant projections on either side, laterally with sclerotized ridges, extending apicoventrally to form paired, rounded, umbonate processes. Endophallic membrane moderately elongate, with broadly rounded, membranous lobes dorsally, apicoventrally with single prominent, slender, curved spine.

**Holotype male: PANAMA: Chiriquí:** Guadalupe Arriba, 08°52'26"N, 082°33'13"W, 12–18.ix.1984, H. Wolda (UMSP000118656) (alcohol) (NMNH).

**Paratypes: PANAMA: Chiriquí:** same locality as holotype, 12–18.ix.1984, H. Wolda — 1 male (alcohol) (NMNH); same locality, 6–12.xi.1985, H. Wolda — 1 male (alcohol) (NMNH).

Etymology. This species is named *M. umbonata*, from the Latin word *umbo*, a rounded protuberance, in reference to the paired ventral protuberances on the apicoventral margin of the phallicata, the most distinctive and diagnostic feature of this new species.





**FIGURE 34.** *Mortoniella umbonata*, new species. Male genitalia: A—lateral; B—segment IX and tergum X, dorsal; C—phallic ensemble, ventral; D—dorsal phallic spine, dorsal.

## Key to males of Mexican and Central American species of *Mortoniella*

- 1 Dorsal phallic spine with prominent saddle-like lateral extensions; apex widened, upturned and recurved (Fig. 17A, D) ..... *M. pacuara* (Flint)
- Dorsal phallic spine without saddle-like lateral extensions ..... 2
- 2(1) Segment IX with spine-like ventral process (Fig. 26A) ..... *M. rodmani*, new species
- Segment IX without spine-like ventral process ..... 3
- 3(2) Inferior appendage with distinct apicomesal projection (Figs. 1C, 12C) ..... 4
- Inferior appendage without apicomesal projection (Fig. 8C), or with apicomesal projection very short, much shorter than apicolateral projections (Fig. 5C) ..... 13
- 4(3) Lateral margins of inferior appendage with elongate dorsolateral branches (Fig. 1A, C); apicomesal projection of inferior appendage broad, rounded apically, symmetrically tapered (Fig. 1C) (Costa Rica) ..... 5
- Lateral margins of inferior appendage without elongate dorsolateral branches; apicomesal projection of inferior appendage narrow, acute or subacute apically, usually asymmetrically curved (Figs. 12C, 13C) ..... 7
- 5(4) Dorsolateral branches of inferior appendage bifid apically, with elongate setae laterally (Fig. 32A, E); apicomesal projection of inferior appendage short (Fig. 32C) ..... *M. tapanti*, new species
- Dorsolateral branch of inferior appendage not bifid apically (Fig. 1A), with elongate setae or not; apicomesal projection of inferior appendage more elongate (Fig. 1C) ..... 6
- 6(5) Dorsolateral branches of inferior appendage only slightly broadened, with no or only a few scattered setae (Fig. 4A, C) ..... *M. anakantha*, new species
- Dorsolateral branches of inferior appendage distinctly broadened preapically, forming basket-like processes, each with brush of elongate setae on interior and exterior surfaces (Fig. 1A, C) ..... *M. akantha*, new species
- 7(4) Apicomesal projection of inferior appendage very elongate, apex distinctly scabrous (Fig. 13A, C); phallicata without dorsolateral processes and endophallic membrane without unpaired apical spine .. 8<sup>1</sup>
- Apicomesal projection of inferior appendage not scabrous, relatively short (Fig. 12C) to distinctly elongate (Fig. 31C); phallicata and endophallic membrane variable ..... 9
- 8(7) Paramere appendage elongate, extending beyond dorsal phallic spine; apicomesal projection of inferior appendage more linearly projecting, apex less distinctly enlarged (Fig. 13A) ..... *M. meralda* (Mosely)
- Paramere appendage short and narrow, much shorter than dorsal phallic spine; apicomesal projection of inferior appendage more sinuous, apex distinctly, bulbously enlarged (Fig. 20A) ..... *M. panamensis*, new species
- 9(7) Paramere appendage relatively broad, with scattered short, thick spines on apical half (Fig. 7A, C); ventral spine of endophallic membrane present, prominent, curved (Fig. 7A) .... *M. buenoi*, new species
- Paramere appendage without spines; ventral spine of endophallic membrane present only in *M. leroda*, in which it is short and straight (Fig. 12A) ..... 10
- 10(9) Apicomesal projection of inferior appendage relatively short (sometimes lightly sclerotized and difficult to see) (Figs. 12A, C; 14A, C) (Mexico) ..... 11
- Apicomesal projection of inferior appendage more elongate and distinctly sclerotized (Figs. 9A, C; 31A, C) (Costa Rica) ..... 12
- 11(10) Tergum X with lateral lobes elongate, mesal margin deeply incised (Fig. 14B); apicomesal projection

1. *M. simla* (Flint), not currently known from Central America, might eventually be found there. It can be distinguished from both *M. meralda* and *M. panamensis* by the possession of prominent, paired dorsolateral processes on the phallicata, scabrous apices on the paramere appendages, and presence of an unpaired, ventral endophallic spine (but note that short, paired phallosomal spines are present in all of these species).

- of inferior appendage symmetric, or nearly so (Fig. 14C); endophallic membrane without ventral spine (Fig. 14A); phallostremal spines absent, or apparently so.....*M. mexicana*, new species
- Tergum X with lateral lobes much shorter, mesal margin weakly incised or with slight mesal projection (Fig. 12B); apicomeral projection of inferior appendage asymmetrically curled (Fig. 12C); endophallic membrane with short, straight spine near apex of phallicata (Fig. 12A); phallostremal spines present .....
- ..... *M. leroda* (Mosely)
- 12(10) Tergum X with very prominent mesal projection; apicomeral projection of inferior appendage sinuous, narrow throughout and without preapical ventral projection (Fig. 9A, C)..... *M. caudicula*, new species
- Tergum X without mesal projection; apicomeral projection of inferior appendage less sinuous, widening preapically and with a preapical ventromesal projection (Fig. 31A, C) .....
- ..... *M. stilula*, new species
- 13(3) Inferior appendage short (Fig. 11A), apicolateral projections, if present, short and rounded or slightly angled, not distinctly projecting (dorsolateral projections short and acute in specimens of *M. florica* from Nicaragua—see diagnosis) .....
- ..... 14
- Inferior appendage more elongate, apicolateral projections on either side of mesal invagination with apices projecting and acute (Figs. 5A, C: 30A, C).....20
- 14(13) Phallicata with projecting dorsal apex containing dorsally curved and distinctively flattened and widened endophallic spine; phallicata without upright dorsolateral processes; tergum X only slightly projecting mesally; paramere appendages without spines or scabrous apices (Fig. 29) .....
- ..... *M. rovira* (Flint)
- Phallicata without projecting dorsal apex, endophallic spine prominent and curved, not flattened basally or contained within dorsal apex of phallicata (Fig. 10A); phallicata usually with upright dorsolateral processes (Fig. 11A) (elongate, spine-like, or reduced in some species); tergum X with distinct mesal projection (Fig. 11B); paramere appendages usually with spines or scabrous apices (Fig. 11A, C) (appendages simple in *M. rancura*).....15
- 15(14) Phallicata with distinctive dorsal, setose, wing-like lateral processes; paramere appendages shorter than phallicata, without spines or scabrous apices (Fig. 24C) (Mexico) .....
- .....*M. rancura* (Mosely)
- Phallicata without setose lateral processes; paramere appendages short or elongate, always with spines (Fig. 33A, C) or scabrous apices (Fig. 11A, C).....16
- 16(15) Paramere appendages very short, the apical halves with many short spines (Fig. 6A, C, D) (Mexico)....
- ..... *M. brachyrhachos*, new species
- Paramere appendages elongate or very elongate, with spines few in number (Fig. 22A, C) or apices scabrous (Fig. 23A, C) .....
- .....17
- 17(16) Phallicata with dorsolateral processes modified into distinctive spine-like processes; paramere appendages distinctly widened apically, with scattered apical spines (Fig. 33A, C)..... *M. taurina*, new species
- Phallicata with prominent, upright, rounded dorsolateral processes (Fig. 22A); paramere appendages tubular, nearly uniform in width throughout length or slightly widened preapically, with or without apical spines .....
- .....18
- 18(17) Paramere appendage with row of short spines near apex (Fig. 22A, C)..... *M. pectinella*, new species
- Paramere appendage without spines, apex scabrous (Fig. 23A, C) .....
- .....19
- 19(18) Tergum X with lateral lobes distinctly produced, mesal projection not or only slightly developed (Fig. 23B) (Costa Rica).....*M. propinqua*, new species
- Tergum X with lateral lobes shorter, distinctly dorsoventrally flattened, mesal projection always distinctly produced (Fig. 11B) (Mexico to Nicaragua)..... *M. florica* (Flint)
- 20(13) Apicolateral margins of phallicata with outward projecting, bird-head shaped processes; dorsolateral margins of phallicata with spine-like processes; paramere appendage with apical part widened and bowed outward, without spines or scabrous apex (Fig. 5A, C)..... *M. aviceps*, new species
- Apicolateral margins of phallicata not forming bird-head shaped processes; dorsolateral margins of phallicata with spine-like processes only in *M. munozii* (Fig. 15A, C); paramere appendage nearly uni-

form in width, with or without spines or scabrous apex .....	21
21(20) Apicolateral projections of inferior appendage strongly down-turned (Figs. 10A; 15A).....	22
- Apicolateral projections of inferior appendage either nearly straight or up-turned (Fig. 25A) [sometimes slightly down-turned in <i>M. carinula</i> (Fig. 8A)] .....	23
22(21) Apicolateral projections of inferior appendage abruptly dorsally arched and narrowed, appearing sickle-like (Fig 10A); dorsal phallic spine without pronounced ventral protrusion; dorsolateral processes of phallicata elongate, broadly rounded; endophallic spine prominent, curved; apices of lateral lobes of tergum X not subtruncate (Fig. 10) (Mexico).....	<i>M. falcicula</i> , new species
- Apicolateral projection of inferior appendage gradually narrowed and downcurved (Fig. 15A); phallic spine with pronounced ventral protrusion; dorsal processes of phallicata somewhat rugose and spine-like (apparently separated from phallicata proper); endophallic spine absent; apices of lateral lobes of tergum X subtruncate (Fig. 15) (Costa Rica, Panama).....	<i>M. munozi</i> , new species <sup>1</sup>
23(21) Apex of dorsal phallic spine distinctively down-turned (Fig. 25A); paramere appendages short or moderate in length, curved, apices scabrous .....	<i>M. redunca</i> , new species
- Apex of dorsal phallic spine not down-turned (Fig. 21A); paramere appendages elongate, with or without scabrous apices .....	24
24(23) Dorsal phallic spine projecting nearly straight, apex keeled mesally, appearing widened in lateral view; paramere appendages with apices scabrous (Fig. 8A, D).....	<i>M. carinula</i> , new species
- Dorsal phallic spine more sinuous, apex not keeled and not appearing widened in lateral view (Fig. 34A); paramere appendages with or without scabrous apices .....	25
25(24) Phallicata with distinctive, paired, sclerotized ventrolateral protrusions; inferior appendage relatively short (Fig. 34A).....	<i>M. umbonata</i> , new species
- Phallicata without paired, sclerotized ventrolateral protrusions; inferior appendage more elongate (Fig. 21A).....	26
26(25) Endophallic spine large, curved, and prominent; dorsolateral processes of phallicata less distinctly developed; paramere appendages with papillate basal projections and scabrous apices (Fig. 21A, C).....	<i>M. papillata</i> , new species
- Endophallic spine narrow, fine, not strongly curved (Fig. 30A, C); dorsolateral processes of phallicata distinctly developed, forming large, upright, rounded protrusions; paramere appendages without scabrous apices, basally with or without fine spines, but distinct papillate projections not present in material examined .....	27
27(26) Inferior appendage with apicolateral projections very narrow and upturned; paramere appendages with short projecting spines along basoventral margin (Fig. 30A, C).....	<i>M. sicula</i> , new species
- Inferior appendage stouter, apicolateral projections thicker and less upturned; paramere appendages without basoventral spines (Fig. 16A, C).....	<i>M. opinionis</i> , new species

## Species relationships

Our studies of species relationships within the genus *Mortoniella* indicate that the species from Mexico and Central America fall into several apparent species groups. All of the species of *Mortoniella*, except *M. pacuara* and *M. rodmani*, belong in the *leroda* species group (see Table 1). *Mortoniella pacuara* belongs in the *ormina* species group, as discussed in the species diagnosis for that species. Other species included in the

1. *M. elongata* (Flint), with apicolateral projections of the inferior appendages strongly downcurved, would key out here. It is currently only known from Colombia, but might eventually be found in Central America. It differs from *M. munozi* in having paired rounded to subtruncate dorsolateral processes on the phallicata and in possessing a stout, curved endophallic spine.

*ormina* species group are listed in Table 1. It is possible that *M. rodmani* also belongs in this species group, as discussed in its diagnosis, but it is a very distinctive species and we have placed it *incertae sedis*. In general, species in the *ormina* species group are recognized by being very minute in size, with the wings much narrower than most *Mortoniella* species. The M of the hind wing is 2-branched (lacking apical forks III and IV), a character also found in some members of the *leroda* species group, but those members of the *leroda* species group from Central America all seem to have M of the hind wing 3-branched (fork III present). Abdominal segment IX in the *ormina* species group is rounded anteriorly, but reaches its greatest length in the ventral half of the segment; the dorsomesal excision is wide (by more than half the width of the segment). The ventral process of abdominal segment VI tends to be elongate and posteriorly directed in males, similar, but much shorter in females. Males typically have the apex of the dorsal phallic spine upturned and enlarged apically and the lateral margin of the spine explanate (dramatically so in *M. pacuara*).

**TABLE 1.** *Mortoniella* species groups (Trichoptera: Glossosomatidae: Protoptilinae).

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***leroda* species group**

- Mortoniella akantha*, **new species**  
*Mortoniella albolineata* Ulmer, 1907  
*Mortoniella anakantha*, **new species**  
*Mortoniella armata* (Jacquemart, 1963) **new comb.**  
*Mortoniella atenuata* (Flint, 1963) **new comb.**  
*Mortoniella aviceps*, **new species**  
*Mortoniella bolivica* (Schmid, 1958) **new comb.**  
*Mortoniella brachyrachos*, **new species**  
*Mortoniella buenoi*, **new species**  
*Mortoniella carinula*, **new species**  
*Mortoniella caudicula*, **new species**  
*Mortoniella elongata* (Flint, 1963) **new comb.**  
*Mortoniella falcicula*, **new species**  
*Mortoniella florica* (Flint, 1974) **new comb.**  
*Mortoniella leei* (Flint, 1974) **new comb.**  
*Mortoniella leroda* (Mosely, 1937) **new comb.**  
*Mortoniella limona* (Flint, 1981) **new comb.**  
*Mortoniella macuta* (Botosaneanu, 1998) **new comb.**  
*Mortoniella meralda* (Mosely, 1954) **new comb.**  
*Mortoniella mexicana*, **new species**  
*Mortoniella munozi*, **new species**  
*Mortoniella opinionis*, **new species**  
*Mortoniella panamensis*, **new species**  
*Mortoniella papillata*, **new species**  
*Mortoniella pectinella*, **new species**  
*Mortoniella pocita* (Flint, 1983) **new comb.**  
*Mortoniella propinqua*, **new species**  
*Mortoniella punensis* (Flint, 1983) **new comb.**  
*Mortoniella rancura* (Mosely, 1954) **new comb.**  
*Mortoniella reduunca*, **new species**  
*Mortoniella rovira* (Flint, 1974) **new comb.**  
*Mortoniella sicula*, **new species**  
*Mortoniella simla* (Flint, 1974) **new comb.**  
*Mortoniella spinulata* (Flint, 1991) **new comb.**  
*Mortoniella stilula*, **new species**  
*Mortoniella tapanti*, **new species**  
*Mortoniella taurina*, **new species**  
*Mortoniella teutona* (Mosely, 1939) **new comb.**  
*Mortoniella umbonata*, **new species**  
*Mortoniella unota* (Mosely, 1939) **new comb.**

#### ***bilineata* species group**

*Mortoniella angulata* Flint, 1963  
*Mortoniella apiculata* Flint, 1963  
*Mortoniella argentinica* Flint, 1974  
*Mortoniella bifurcata* Sykora, 1999  
*Mortoniella bilineata* Ulmer, 1906  
*Mortoniella chicana* Sykora, 1999  
*Mortoniella denticulata* Sykora, 1999  
*Mortoniella enchrysa* Flint, 1991  
*Mortoniella flinti* Sykora 1999  
*Mortoniella foersteri* (Schmid, 1964)  
*Mortoniella hodgesi* Flint, 1963  
*Mortoniella iridescens* Flint, 1991  
*Mortoniella paraenchrysa* Sykora, 1999  
*Mortoniella paralineata* Sykora, 1999  
*Mortoniella quinuas* Harper & Turcotte, 1985  
*Mortoniella roldani* Flint, 1991  
*Mortoniella santiaga* Sykora, 1999  
*Mortoniella similis* Sykora, 1999  
*Mortoniella squamata* Sykora, 1999  
*Mortoniella tranquilla* Martynov, 1912  
*Mortoniella unilineata* Sykora, 1999  
*Mortoniella wygodzinskii* (Schmid, 1958)

#### ***ormina* species group**

*Mortoniella aequalis* (Flint, 1963) **new comb.**  
*Mortoniella aries* (Flint, 1963) **new comb.**  
*Mortoniella catarinensis* (Flint, 1974) **new comb.**  
*Mortoniella macarenica* (Flint, 1974) **new comb.**  
*Mortoniella ormina* (Mosely, 1939) **new comb.**  
*Mortoniella pacuara* (Flint, 1974) **new comb.**

#### ***velasquezi* species group**

*Mortoniella velasquezi* (Flint 1991) **new comb.**

#### **Incertae Sedis**

*Mortoniella guairica* (Flint, 1974) **new comb.**  
*Mortoniella rodmani*, **new species**

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The *leroda* species group of *Mortoniella*, as defined here, include species in which the anterolateral margin of segment IX of the male is nearly evenly rounded and with a narrow dorsomesal excision (much less than half the width of the segment). The ventral process of abdominal segment VI is short and ventrally deflected (rounded to subacute apically) and not very different in structure in males and females. The setae of tergum X tend to be rather distinctly graduated, from long to short (or shorter) from the anterior of the segment to its posterior and posterolateral margins. Most of the members of the *leroda* species group from Mexico and Central America can be placed into two distinctive, and probably closely related subgroups, referred to here as the *florica* and *leroda* subgroups. The *florica* subgroup is characterized by species that have the apicomeresal margin of the inferior appendage invaginated, or very weakly projecting, prominent rounded or subtruncate dorsolateral processes on the phallicata (and usually also dorsoventrally flattened lateral expansions on the phallicata), and a single, prominent, curved endophallic spine. Most of these species also have the paramere appendages elongate, narrow and with their apices scabrous or bearing spines or papillate structures along their length (although a couple of species have the paramere appendages shortened). The majority of the species also have the apicomeresal margin of tergum X forming a distinct, acute projection. Species clearly belonging in the *florica* subgroup include: *M. florica*, *M. propinqua*, *M. brachyrhachos*, *M. falcicula*, *M. pectinella*, *M. carinula*, *M. opinionis*, *M. papillata*, *M. redunca*, *M. sicula*, and *M. umbonata*. *Mortoniella*

*elongata* (Flint, 1963), an extralimital taxon from Colombia, also belongs in this subgroup. A distinctive group of species within the *florica* subgroup (including *M. carinula*, *M. opinionis*, *M. papillata*, *M. redunca*, *M. sicula*, and *M. umbonata*) has the apicolateral projections of the inferior appendage acutely produced.

The *leroda* subgroup (of the *leroda* species group) includes species with a tubular phallicata, lacking dorsolateral processes, a narrow, asymmetrically developed apicomesal projection on the inferior appendage (symmetrical only in *M. mexicana*), and usually conspicuously sclerotized, short, paired, phallosomal spines. The endophallic spine is absent in most species (small and basoventrally located in *M. leroda*). Most of these species have a tergum X with a weakly developed mesal projection, or the mesal margin may be nearly linear. Species belonging in the *leroda* subgroup include: *M. leroda*, *M. mexicana*, *M. meralda*, *M. panamensis*, *M. caudicula*, and *M. stilula*. *Mortoniella buenoi* also has most of the features of this group, but possesses a well-developed endophallic spine. As discussed in the species descriptions, there is some indication that *M. buenoi* may be related to *M. rovira*, although *M. rovira* lacks the asymmetric apicomesal projection of the inferior appendage that characterizes the other species of this group. Because of their overall similarity to members of this group, these latter two species are provisionally placed within the *leroda* subgroup.

*Mortoniella simla* (Flint, 1974), an extralimital taxon from Trinidad and Venezuela, greatly resembles *M. meralda*, especially in possessing an inferior appendage with an unusually elongate, asymmetrical, and scabrous apicomesal projection. A close relationship between the two would make *M. simla* a member of the *leroda* subgroup and this is where we believe it should be placed. However, it almost perfectly combines characters of the *leroda* and *florica* subgroups. Character similarities to the *florica* subgroup include the presence of dorsolateral processes on the phallicata (and also lateral expansions on the same structure, scabrous apices on its paramere appendages, and a distinct endophallic spine). An endophallic spine is absent from *M. meralda*, *M. panamensis*, *M. caudicula*, and *M. stilula*, which most resemble *M. simla*, but it is present in several of the species of the *leroda* subgroup discussed above. The overall intermediacy of *M. simla* suggests a relationship between the *florica* and *leroda* subgroups, or possibly the occurrence of genetic exchange at some point in the divergence of the two lineages.

A third subgroup of the *leroda* species group can be recognized among the Central American species, including *M. akantha*, *M. anakantha*, and *M. tapanti*, characterized by a broad symmetrical apicomesal projection of the inferior appendage and elongate dorsolateral branches from the same structure. These species also lack an endophallic spine. This group is referred to here as the *akantha* subgroup.

The four remaining Central American species in the *leroda* species group, *M. aviceps*, *M. taurina*, *M. munozi*, and *M. rancura* are distinctive enough so that it is difficult to place them in any of the above subgroups, but the overall character similarity of all of these species seems to be closest to the *florica* subgroup. All are characterized by some sort of dorsolateral processes, either on or apical to the phallicata, although not of the distinctive form characteristic of the *florica* subgroup, and inferior appendage with the mesal margin invaginated or forming a very short process. Other characters, including the presence or absence of an endophallic spine, are variable among the species. Because these species cannot be clearly placed in one of the above subgroups, and lack the morphological coherence necessary to group them together, we leave them for now as unplaced in the subgroups discussed for the *leroda* species group. However, their close relationship to other regional species of this species group seems likely.

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