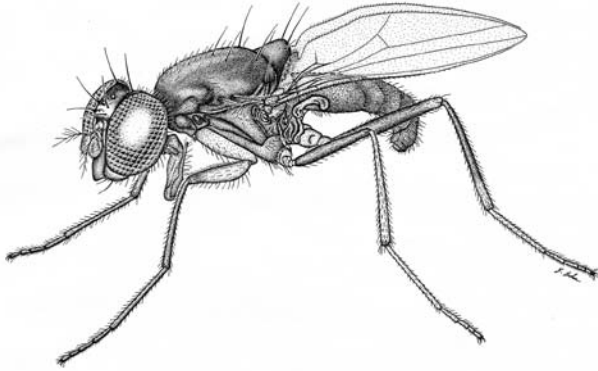




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A Revision of the Genus  
*Aulacigaster* Macquart  
(Diptera: Aulacigastridae)

*Alessandra Rung and Wayne N. Mathis*

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## ABSTRACT

Rung, Alessandra, and Wayne N. Mathis. A Revision of the Genus *Aulacigaster* Macquart (Diptera: Aulacigastridae). *Smithsonian Contributions to Zoology*, number 633, x + 132 pages, 220 figures, 18 maps, 2011.—The world's described species of the genus *Aulacigaster* Macquart, now numbering 55, are revised. New species from the Afrotropical (2 species), Neotropical (37 species), and Oriental Regions (2 species) are described, and the genus is divided into seven species groups, of which six are Neotropical. Keys to the species groups and to the known species occurring in the Afrotropical, Nearctic, Neotropical, Palearctic, and Oriental Regions are provided. Diagnoses, detailed distributional data for species of the genus, notes on the biology, and illustrations (photographs and drawings) are included to facilitate species identification. A phylogenetic analysis was performed to test the monophyly of the genus *Aulacigaster* and to discover relationships between included species, hence indicating the monophyly of the species groups. The ingroup includes a total of 24 exemplar congeners. Outgroup sampling includes exemplars from the putative sister group, *Curiosimusca*. Analyses with and without successive weighting recovered a monophyletic *Aulacigaster* and indicated clades within the genus.

Cover images: left, *Aulacigaster korneyevi*, new species (♀); right, head of *A. proxima*.

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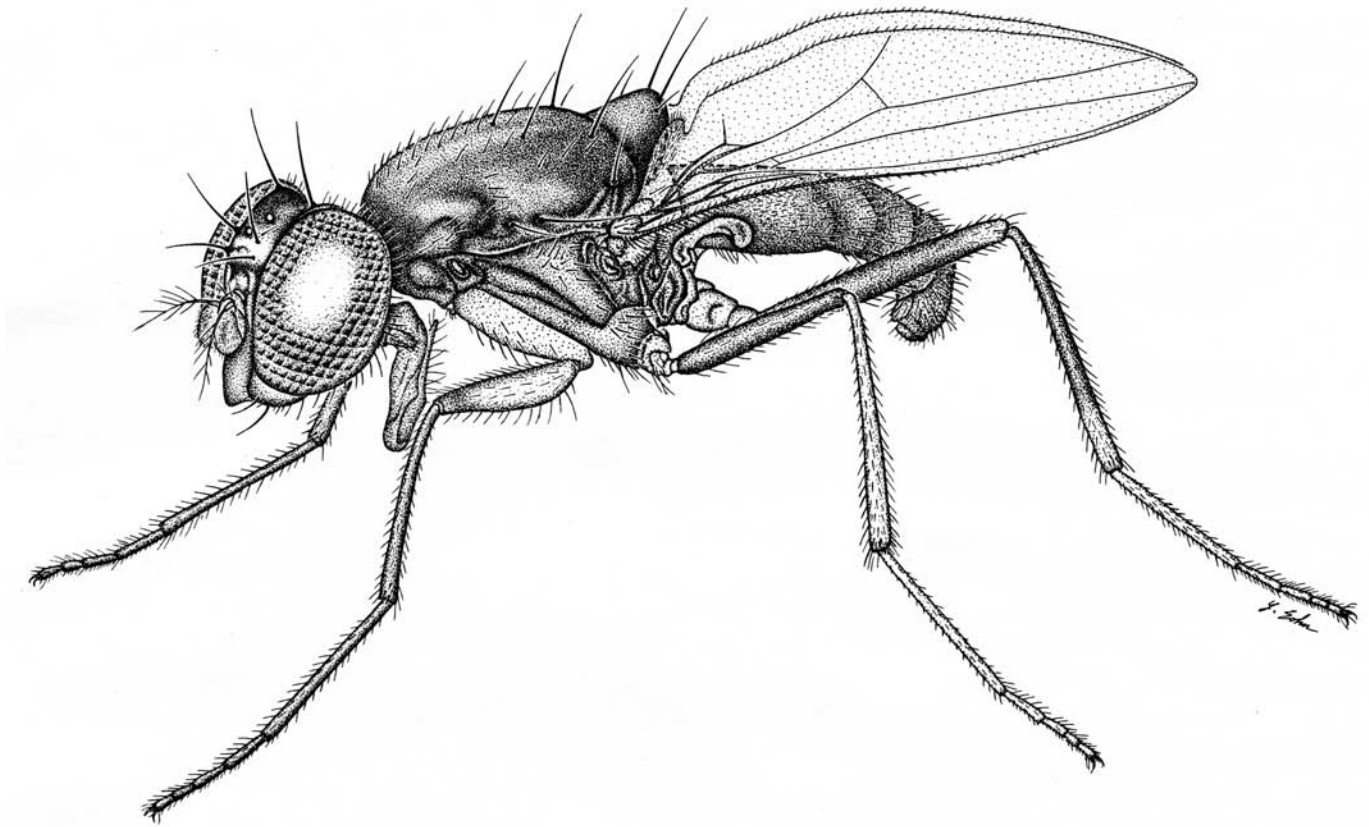
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FIGURE 1. Frontispiece of *Aulacigaster korneyevi*, new species (Costa Rica. Heredia: Santo Domingo, ♀).

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# A Revision of the Genus *Aulacigaster* Macquart (Diptera: Aulacigastridae)

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## INTRODUCTION

This revision concerns *Aulacigaster* Macquart, an obscure genus of Acalyptrate Diptera that until recently was the only included genus in the family Aulacigastridae. Until this revision, *Aulacigaster* included relatively few species that were usually associated with slime fluxes of deciduous trees (Robinson, 1953; Cole and Streams, 1970; Davis and Zack, 1978; Ferrar, 1987; Mathis and Freidberg, 1994; Hilger and Kassebeer, 2000; Papp, 2008) or with the phytotelmata of bromeliads (A. R and WNM, personal observations). Most previously described species are from temperate zones; however, we document far greater species diversity in the subtropics and tropics (Afrotropical, Holarctic, Neotropical, and Oriental Regions). The genus has received increased attention during the last decade not only because it has revealed surprising diversity and species richness, but also because of challenges that its classification and characterization have posed to systematists. The primary purposes for this revision are to (1) describe and classify the largely unknown fauna of *Aulacigaster* (Mathis and Freidberg, 1994; Baptista, 1998a) within a phylogenetic context and (2) clarify some issues concerning the phylogenetic placement and characterization of the family.

**HISTORICAL AND TAXONOMIC BACKGROUND.** *Aulacigaster* is currently classified in the family Aulacigastridae, superfamily Opomyzoidea (J. F. McAlpine, 1989). Characterization of Aulacigastridae differs widely among authors (see below), and up to six genera have been assigned to the family in addition to the nominate genus, *Aulacigaster*. Duda (1924) first accorded familial status to Aulacigastridae, and recent authors (Mathis and Freidberg, 1994; Papp, 1998a; Baptista, 1998b; and Hilger and Kassebeer, 2000) have adopted a monotypic characterization. A broader characterization of the family includes the genera *Cyamops* Melander, *Stenomicro* Coquillett, *Planinasus* Cresson, and a fossil

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species from Baltic amber, *Protoaulacigaster electrica* Hennig (described in 1965). Hennig (1958, 1965, 1969, 1971) first advocated this characterization, which was followed by Griffiths (1972, with the exclusion of *Stenomicro*), Teskey (1987) and J. F. McAlpine (1989). D. K. McAlpine (1978, 1983) proposed a rather different characterization that: (1) transferred the genera *Stenomicro*, *Cyamops* (1978), and *Planinasus* (1983) from Aulacigastridae to the family Periscelididae; (2) excluded *Protoaulacigaster electrica* from Aulacigastridae; and (3) described two new genera in the family, *Ningulus* (Afrotropical Region) and *Nemo* (Australian Region). Freidberg (1994) proposed the family Neminidae for *Ningulus*, *Nemo*, and his new Afrotropical genus, *Nemula*. A result of Freidberg's classification was a return to a monotypic concept for Aulacigastridae. Most recently, Evenhuis (1989, 1994a, 1994b) listed *Protoaulacigaster electrica* in *Aulacigaster*, and Roháček (1998) tentatively transferred the genus *Echidnocephalodes* Sabrosky from Anthomyzidae to Aulacigastridae. Rung et al. (2005) described the genus *Curiosimusca* in the family, with three species from the Oriental Region. The monophyly of *Aulacigaster* + *Curiosimusca* is supported by seven putative synapomorphies (Rung et al., 2005). Hennig's original concept of Aulacigastridae (see above) has been recently resurrected in a molecular phylogeny of the Opomyzoidea, using the 28S ribosomal DNA and CAD (rudimentary) genes (Winkler et al., 2010). In that analysis (which did not include exemplars of *Curiosimusca*), *Stenomicro*, *Cyamops* and *Planinasus* grouped consistently and with moderate support with the genus *Aulacigaster*.

The genus *Aulacigaster* was originally described for *A. rufitarsis* Macquart (1835), a junior synonym of *A. leucopeza* (Meigen, 1830). The genus remained monotypic for more than a century following its publication, and *A. leucopeza* was believed to occur in the Palearctic (type locality) and Nearctic Regions (Malloch and McAtee, 1924; Christianson and Ryckman, 1955; Wirth, 1965; Teskey, 1976; Davis and Zack, 1978). Hennig (1956) described the genus *Schizochroa* in Aulacigastridae for a new species, *S. melanoleuca*, from Costa Rica. Thirteen years later, Hennig (1969) added three more species to *Schizochroa*: *S. plesiomorphica* (Peru), *S. minuta* (Ecuador), and *S. ecuadoriensis* (Ecuador). D. K. McAlpine (1983) synonymized the genus *Schizochroa* with *Aulacigaster*.

Interest in the taxonomy of *Aulacigaster* has steadily escalated during the last two decades. Barraclough (1993) revised the Afrotropical fauna and described two new species, *A. africana* (South Africa) and *A. perata* (Cameroon). A year later, Mathis and Freidberg (1994) revised the Nearctic fauna, describing three new species: *A.*

*neoleucopeza* and *A. mcalpinei*, which occur sympatrically and frequently at the same flux, and *A. sabroskyi*. The latter authors (op. cit.) also noted that previous records of *A. leucopeza* for the Nearctic Region were misidentifications of *A. neoleucopeza*. Papp (1998a) briefly reviewed the Palearctic fauna of *Aulacigaster* and described two new species found in that region: *A. afghanorum* (Afghanistan) and *A. falcata* (Hungary). Papp (1998a) also reported the presence of *A. neoleucopeza* in the Palearctic Region, noting that previous distributional records of *A. leucopeza* need verification. Recently, Hilger and Kassebeer (2000) described a new species, *A. borbonica*, from specimens collected in the Afrotropical Region (island of Reunión), and Kassebeer (2001) proposed *A. pappi* from the Palearctic Region for misidentified Palearctic specimens of *A. neoleucopeza*.

Until the present study, *Aulacigaster* has included 14 valid species, although a large number of undescribed species has been reported from the Neotropical Region (Mathis and Freidberg, 1994; Baptista, 1998a). Keys are available for the Afrotropical (Barraclough, 1993), Nearctic (Mathis and Freidberg, 1994), and Palearctic (Papp, 1998a; Kassebeer, 2001) Regions.

#### METHODS AND MATERIALS

We have adopted the descriptive terminology of J. F. McAlpine (1981), with the modifications noted below. We follow Sabrosky (1983) in using the term "microtomentum" rather than pruinosity. Setae posterior to the pseudovibrissal seta are called peristomal setae. The nomenclature for structures of the male terminalia follows Cumming et al. (1995) and, for larval morphology, follows Courtney et al. (2000).

**PROCEDURES.** Label data of holotypes are quoted verbatim as they appear on the label with a slash (/) denoting the end of a label. Clarifying comments are included within brackets.

Because specimens are small, study and illustration of the male and female terminalia required use of a compound microscope. Photographs were taken with a Nikon Coolpix 9907 digital camera and an Auto-Montage Digital Imaging System7, using a Wild Photomakroskop M4007 stereomicroscope. The photographs were enhanced, formatted, and arranged in Adobe Photoshop7.

Characters and information on their states within taxa were stored in DDescriptive Language for TAXonomy (DELTA) 7 files (Dallwitz, 1980; Pankhurst, 1991). The descriptions and keys were generated using the DELTA software package (Dallwitz, 1980; Dallwitz et al., 1993).

Species descriptions are composite, including information on the holotype and other conspecific specimens. Characters used to characterize the genus and species groups are not repeated in the species descriptions. To generate such inclusive descriptions, we wrote a separate “tonath” DELTA file for the diagnosis of the genus *Aulacigaster* and species groups, and a tonath DELTA file for each of the six species groups. Species diagnostic descriptions were generated with the aid of Intkey (Dallwitz, 1980; Dallwitz et al., 1993). They distinguish each taxon in at least one respect from every other taxon in the genus.

Distribution maps were made using ESRI ArcView7 GIS 3.2 (ESRI, Redlands, Calif.). Longitude and latitude coordinates were obtained for the locality where each specimen was collected and entered into a Microsoft Excel spreadsheet. If unavailable directly from specimen labels, longitude and latitude were estimated using gazetteers and maps to determine the geographical coordinates.

The following ratios are used in the descriptions (two males and two females were measured for each species, when available; cases to the contrary are indicated under the appropriate species description):

1. Scutal ratio: the greatest length of scutum divided by the greatest width of scutum.
2. Head ratio: the greatest length of head divided by the greatest height of head.

**PHYLOGENETIC ANALYSIS.** The phylogenetic analysis was performed to test the monophyly of the species groups proposed in this study and their relationships to each other. The monophyly of the genus *Aulacigaster* and its sister group relationship to *Curiosimusca* have been discussed in a former contribution (Rung et al., 2005). Readers should consult this paper for a list and discussion of putative synapomorphies. To accomplish our goals, an analysis including all of the component species of the genus was unnecessary. We opted, therefore, the exemplar method for selecting taxa (Yeates, 1995). At least two exemplars representing each species group were included in the analysis. If the monophyly of a group seemed doubtful, we included additional exemplars from that group. This procedure was used with the *leucopeza*, *femorata*, and *ecuadoriensis* groups. Twenty-four exemplar species were included in the ingroup (see Appendix 1). The outgroup was selected from the genus *Curiosimusca*, the sister group of *Aulacigaster*.

New and traditional morphological characters were combined in a quantitative phylogenetic analysis. We endeavored to include characters that seemed independent and informative at the generic and species group levels. Only characters that showed obvious discrete variation

were included. Characters were coded for the analysis as either binary (17 characters) or qualitative multistate (7 characters).

Analyses were done by using PAUP 4.0 (Swofford, 2002). The matrix was initially analyzed with a branch-and-bound search, with all characters unordered and equally weighted. Following initial parsimony analysis, successive weighting (Farris, 1969) was applied by using Farris' (1989) rescaled consistency index, an approach that gives highest weight to characters that have the least amount of homoplasy for the given set of trees.

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ABSF	Archbold Biological Station, Lake Placid, Florida (Dr. Mark Deyrup)
AMNH	American Museum of Natural History, New York, New York (Dr. David A. Grimaldi)
CAS	California Academy of Sciences, San Francisco, California (Dr. Paul H. Arnaud, Jr.)
CNC	Canadian National Collection, Ottawa, Ontario, Canada (Dr. Jeffrey M. Cumming and Mr. Bruce Cooper)
CSCA	California State Collection of Arthropods, Sacramento, California (Dr. Stephen D. Gaimari)
DEI	Deutsches Entomologisches Institut, Müncheberg, Germany (Dr. Frank Menzel and Joachim Ziegler)
EPNE	Escuela Politécnica Nacional, Quito, Ecuador (Mr. Adrián E. Troya)
GWMP	George Washington Memorial Parkway, National Park Service, Turkey Run, McLean, Virginia (Mr. Brent W. Steury)
HNHM	Hungarian Natural History Museum, Budapest, Hungary (Dr. László Papp)
INBio	Instituto Nacional de Biodiversidad, Santo Domingo, Heredia, Costa Rica (Mr. Manuel Zumbado)

- MHNJP Museo de Historia Natural “Javier Prado,”  
Universidade Nacional Mayor de San Mar-  
cos, Lima, Peru (Dr. Gerardo Lamas)
- MNRJ Museu Nacional do Rio de Janeiro, Rio de  
Janeiro, Brazil (Dr. Márcia Souto Couri)
- MZUSP Museu de Zoologia da Universidade de São  
Paulo, São Paulo, Brazil (Dr. Francisca do  
Val and Dr. Carlos Lamas)
- NMSA Natal Museum, Pietermaritzburg, South  
Africa (Dr. David A. Barraclough)
- TAU Tel Aviv University, Tel Aviv, Israel (Dr.  
Amnon Freidberg)
- UCLA University of California, Los Angeles, Cali-  
fornia (Dr. Henry A. Hespenheide)
- USU Utah State University insect collection,  
Logan, Utah (Dr. James Pitts)
- USNM former United States National Museum,  
collections in the National Museum of  
Natural History, Smithsonian Institution,  
Washington, D.C.
- UZMC Universitetets Zoologiske Museum, Copen-  
hagen (Dr. Thomas Pape)
- UGE University of Guelph, Guelph, Canada  
(Drs. Stephen A. Marshall and Matthias  
Buck)
- ZMB Museum für Naturkunde, Humboldt-  
Universität, Berlin, Germany (Dr. Joachim  
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## SYSTEMATICS

### Genus *Aulacigaster* Macquart

*Aulacigaster* Macquart, 1835:579. Type species: *Aulacigaster rufitarsis* Macquart, 1835 (= *Diastata leucopeza* Meigen, 1830), by mono-



typy.—Schiner, 1863:269–270 [review, synonymy].—Duda, 1934:1–5 [revision, Palearctic fauna].—Wirth, 1965:823 [Nearctic catalog].—Papavero, 1967:91 [Neotropical catalog].—Teskey, 1976:12 [Diptera associated with trees]; 1987:891–894 [Manual of Nearctic Diptera].—Sabrosky, 1977:230 [Oriental catalog].—Papp, 1984:61 [Palearctic catalog]; 1998a:225–234 [revision, Palearctic species]; 1998b:279–284 [Manual of Palearctic Diptera].—Barracough, 1993:331–342 [revision, Afrotropical species].—Mathis and Freidberg, 1994:586–591 [Nearctic species].—Bächli, 1998:288 [checklist, Switzerland]; Bächli et al., 1999:119–122 [checklist, Greece, Italy, Switzerland].—Hilger and Kassebeer, 2000:167–172 [new species, Réunion].—Kassebeer, 2001:23–32 [review, new species, western Palearctic Region].

*Apotomella* Dufour, 1846:455. Type species: *Apotomella impressifrons* Dufour, 1846 [= *Diastata leucopeza* (Meigen, 1830)], by monotypy.—Schiner, 1863:269 [synonymy with *Aulacigaster*].

*Ampycophora* Wahlberg, 1847:261. Type species *Ampycophora tarsata* Wahlberg, 1847 [= *Diastata leucopeza* (Meigen, 1830)], by monotypy.—Schiner, 1863:269 [synonymy with *Aulacigaster*].

*Sephanilla* Rondani, 1874:276. Type species: *Sephanilla sertulata* Rondani, 1874 [= *Diastata leucopeza* Meigen, 1830]], by original designation (p. 246).—Mathis and Freidberg, 1994:585 [synonymy with *Aulacigaster*].

*Aulacogaster* Oldenberg, 1914:30 [unjustified emendation for *Aulacigaster*].

*Schizochroa* Hennig, 1956:151–152. Type species: *Schizochroa melanoleuca* Hennig, 1956, by original designation.—D. K. McAlpine, 1983:58 [synonymy with *Aulacigaster*].

**DESCRIPTION.** Adult: Coloration: Body predominantly dark brown to black. Cervix gray microtomentose. Frons often with anterior 1/4–1/2 yellowish in ground color or bearing a transverse, large, orange band. Scutum typically bearing microtomentum; ventral half of thoracic pleura in some species white to pale yellow. Wing usually mostly hyaline, partly infusate with brown in many species, rarely mostly brown infusate.

**Morphology:** Body robust (scutal ratio 1.10–1.35), or elongate (scutal ratio 1.50–1.75).

**Head:** Higher than long (head ratio less than 0.9) or longer than high (head ratio higher than 1.1); face completely sclerotized, often protuberant, easily visible in lateral view; gena narrow, usually less than 1/3 the width of 1st flagellomere. First flagellomere round, oval or triangular; arista unsegmented, often rayed (appearing naked under low magnification in some species), zigzagged on apical 2/3, dorsal and ventral rays alternating; basal 1/3 of arista naked or bearing a double row of long rays dorsally; ocellar seta, when present, minute; medial vertical setae typically slightly convergent, seta at most 3/4 length of lateral vertical seta; fronto-orbital setae 2, in some species with posterior seta medial to and almost horizontally aligned with anterior seta; setulae between fronto-orbital setae 1–2, one

proclinate; intrafrontal seta absent; peristomal vestiture typically consisting of weaker setae posterior to pseudovibrissal seta.

**Thorax:** Anepisternum bearing 1–2 setae along posterior margin; scutellar setae 2, apical pair of setae nearly parallel, curved posteriorly. Cell dm flat, lacking a longitudinal crease or fold; crossvein r-m basal to middle of combined cell dm + bm; subcosta partially fused with vein R<sub>1</sub> apically.

**Male abdomen and terminalia:** Pregenital segment large, at least twice as long as tergite 5. Abdominal sternites slightly increasing in width posteriorly. Surstylus fused with epandrium; cerci separate or partially fused; subepandrial sclerite with caudal portion attached to cerci and proximal portion attached to hypandrial bridge; hypandrium bearing a lateral, anterior apodeme at base of each gonopod, halves of hypandrium connected posteriorly by a narrow bridge above phallapodeme; gonopods fused to hypandrium, forming a shovel-like structure, gonopodal halves connected posteroventrally, each bearing a posterior lobe or process and one to a few central setae; phallapodeme cuneiform with asymmetrical posterolateral projections; phallus short, partially sclerotized; parameres inconspicuous.

**Female abdomen and terminalia:** Postabdomen distinctly shorter than preabdomen. Three spermathecae present, often with ventral digitiform projections.

**Immatures:** Described for *A. leucopeza* (Robinson, 1953) and *A. africana* (Papp, 2008). **Egg:** Oval in dorsal and lateral views, length 0.35–0.59 mm, width 0.15–0.22 mm. Flattened, hatching strip demarcated by a flanged edge. Chorion covered with honeycomb reticulations and longitudinal ribs. **Third-instar larva:** Subcylindrical, amphipneustic, bearing a long, partially retractile terminal respiratory tube; integument white, almost transparent, covered with minute spicules and sensory setae, or smooth; cephaloskeleton slender with well-developed mandible bearing 2 pairs of accessory teeth; hypopharyngeal and tentoropharyngeal sclerites separate; 3 thoracic and 8 abdominal segments well produced; abdominal segments with ventral creeping pads bearing minute spicules; last abdominal segment with a small perianal pad; anterior spiracles small, retracted into a pair of deep, narrow pockets; posterior spiracles on apex of respiratory tube, joined at their base, bifurcating posteriorly. **Puparium:** Light brown, oval in shape, with prothoracic spiracle completely everted.

**DISTRIBUTION.** Worldwide, excluding Australasian and Oceanic Regions. The Neotropical fauna is considerably more diverse than other regional faunas and herein includes 41 species, of which 37 are described in this paper. Of the seven species groups that we recognize in the genus, six are exclusively found in Neotropics, and

based on the sampling of specimens now available, most Neotropical species are apparently endemic or of restricted distribution. The genus has not been well sampled in the Neotropics, however, and many more species are likely to be discovered there.

**BIOLOGY.** Information in the literature on the natural history of the genus *Aulacigaster* pertains to species of the *leucopeza* group only. Adults and immatures are peculiar to weeping wounds and sap fluxes of deciduous trees (Robinson, 1953; Teskey, 1976; Ferrar, 1987). A group of species (here named “the *bromeliae* group”) inhabits bromeliads in the Neotropical Region. Larvae of these species are fully aquatic and probably feed on decaying organic matter.

In addition to weeping wounds, some adults of *Aulacigaster* were collected on freshly cut logs. We also collected numerous adults, sometimes of more than one species, by sweeping between the shaded buttresses of ceiba trees in the Neotropics. A few species have been collected on Heliconiaceae leaves.

#### IMPLICIT ATTRIBUTES

Unless indicated otherwise, the following attributes are implicit throughout the descriptions, except where the characters concerned are inapplicable.

**ADULT.** Coloration: Occiput mostly subshiny to dull; anterior portion of frons without a microtomentose band; facial band absent. Scutum uniformly microtomentose; thoracic pleura uniformly black. Wing hyaline.

Abdomen completely dark brown to black; pregenital segment mostly polished.

**Morphology:** Body robust, scutal ratio 1.1–1.35.

**Head:** Vertex nearly straight between compound eyes; medial portion of frons not depressed; margins of eye closer together at ventral portion of frons than at vertex; 1st flagellomere round; arista long, distinctly zigzagged on apical 2/3 and bearing short hairs, basal 1/3 of arista naked; face completely sclerotized; gena in lateral view a narrow ridge circumventing ventral margin of eye; clypeus stout, 1.5–2.5 times longer than wide; palpus short, length about half that of 1st flagellomere. Cephalic setae not elongated; ocellar seta present; medial vertical setae present, convergent; fronto-orbital setae transversely aligned; peristomal vestiture consisting mostly of one strong and a few weak setae following pseudovibrissal seta.

**Thorax:** Thoracic setae not elongated; costa of male not bearing relatively strong, conspicuous spines.

**Legs:** Hind trochanter of male without a ventral tuft of setae; hind femur of male and female unmodified, without ventral spines; hind femur of male without a conspicuous lobe and ventral spines; hind tibia of male and female with a rounded, posteroventral projection, without apicodorsal setae.

**Male abdomen and terminalia:** Abdominal sternites slightly increasing in width posteriorly; sternites 3–5 unmodified, with posterior margin straight; cerci separate; halves of hypandrium connected by a narrow bridge above phallapodeme.

#### Key to the Neotropical Species Groups and Species of *Aulacigaster* Macquart

1. Body robust, scutal ratio 1.1–1.35 [Figures 9, 64, 100, 161] ..... 2  
Body elongate, scutal ratio 1.5–1.75 [Figures 40, 107] ..... 32
2. Arista relatively long, bearing short to long rays on apical 2/3 [Figures 4, 204, 206–207, 209–214] ..... 3  
Arista relatively short, appearing naked under low magnification [Figures 186, 216]; frons orange on medial portion, infusate with brown laterally (Neotropical species of the *leucopeza* group) ..... 4
3. Arista distinctly zigzagged, bearing short rays on apical 2/3, naked on basal 1/3; 1st flagellomere round, not decumbent [Figures 206–207, 209–214]; clypeus stout, 1.5–2.5 times longer than wide [Figure 33] ..... 6  
Arista bearing alternate rays on apical portion, appearing zigzagged; basal 1/3 of arista straight, with a double row of dorsal rays; rays of arista long [Figure 4]; 1st flagellomere elongate, decumbent [Figures 4, 11, 21, 203–204]; clypeus elongate, 3.5–5.5 times longer than wide [Figure 21] (the *bromeliae* group) ..... 27
4. Frons bearing a horizontal, unusually large orange band extended beyond base of anterior ocellus medially [Figure 185]; face in lateral view dorsoventrally projected, ventral portion of face not receded; facial band unusually wide, ~1/3 length of 1st flagellomere [Figure 186] ..... *A. L2*, undescribed species  
Frons at most with a narrow, orange-brown transverse band [as in Figures 215, 217, 219]; ventral portion of face receded [Figure 216] ..... 5
5. Frons yellowish-orange on central portion, merging with black along lateral margins [Figure 215]; facial band absent [Figures 215–216] ..... *A. spangleri*, new species  
Frons with a transverse, narrow, orange-brown band; facial band present ..... *A. L1*, undescribed species

6. Frons mostly brown, at most with anterior margin pale, yellowish [Figures 207, 209]; anepisternum mostly polished . . . . 7  
Frons with anterior 1/3–1/2 yellowish in ground color (yellowish portion of frons invested with dense microtomentum, silver under certain angles) [Figure 213]; anepisternum mostly dull (the *pleiomorphica* group) . . . . . 18
7. Abdomen with syntergite 1+2 whitish [Figure 101]; mesofrons with a delicate, transverse veil of microtomentum anterior to lower fronto-orbital setae, but not silver [Figure 209]; hind femur and tibia of male and female not modified, without conspicuous ventral spines (the *grimaldii* group) . . . . . 8  
Abdomen with a whitish to yellowish region on syntergite 1+2, sometimes extending to tergite 3 [Figure 62]; hind femur and tibia of male and female modified, bearing tiny, conspicuous ventral spines [Figure 71]; hind femur of male often strong, bearing a basal lobe [Figures 66, 70–71, 74, 77, 81–82, 86, 91, 96] (the *femorata* group) . . . . . 9
8. Face and legs mostly yellow [Figures 100, 102] . . . . . *A. grimaldii*, new species  
Face and legs mostly brown . . . . . *A. angusta*, new species
9. Fore tarsus mostly brown, only basitarsomere yellow; scutellum often very weakly raised [Figure 64] . . . . .  
. . . . . *A. bella*, new species  
Fore tarsus mostly yellow (at most with apical and subapical tarsomere brown); scutellum moderately raised (angle with scutum less than 135°) . . . . . 10
10. Wing clear, at most with apex infusate [Figures 80, 85, 93] . . . . . 11  
Posterior half of wing infusate with brown . . . . . *A. unifasciata*, new species
11. Hind femur completely yellow [Figure 86] . . . . . 12  
Hind femur at least partially brown [Figures 91–92] . . . . . 15
12. Hind tibia yellowish, at most very faintly brown infusate on basal third . . . . . 13  
Hind tibia brown to black on central portion, base and apex yellowish . . . . . *A. lobata*, new species
13. Lobe on hind femur of male subrectangular, followed by a concavity . . . . . *A. erwini*, new species  
Lobe on hind femur of male cylindrical or triangular, not followed by a concavity [Figures 74, 81–82] . . . . . 14
14. Postpronotum yellow to brownish; lobe on hind femur of male approximately cylindrical [Figures 81–82]; less densely microtomentose flies, usually without large microtomentose regions on mesofrons and mesonotum . . . . .  
. . . . . *A. irwini*, new species  
Postpronotum brown, concolorous with mesonotum; lobe on male hind femur approximately triangular [Figure 74]; more densely microtomentose flies, usually with a large medial microtomentose region on the mesofrons and microtomentum over mesonotum reaching anterior dorsocentral seta . . . . . *A. formosa*, new species
15. Hind femur with dark mark on apical 1/3–1/2 [Figure 92]; fore femur yellowish . . . . . 16  
Hind femur dark brown on apical 3/5 [Figure 91]; fore femur yellow basally, apex darkened . . . . . *A. nigritibia*, new species
16. Hind femur of male without a conspicuous lobe [Figure 92]; hind tibia yellowish . . . . . *A. peruana*, new species  
Hind femur of male with a conspicuous lobe [Figures 70–71, 77]; hind tibia yellowish, often with brown to black mark on central portion . . . . . 17
17. Hind femur of male with a basoventral lobe followed by a distinct concavity; lobe approximately rectangular [Figures 70, 71]; postpronotum mostly polished . . . . . *A. femorata*, new species  
Hind femur of male with a basoventral lobe followed by a slight concavity; lobe approximately triangular [Figure 77]; postpronotum microtomentose over ventral and anterior margins, otherwise polished . . . . . *A. guyana*, new species
18. Ocellar tubercle mostly polished . . . . . *A. trifasciata*, new species  
Ocellar tubercle dull microtomentose . . . . . 19
19. Hind tibia without apical ventral seta . . . . . 20  
Hind tibia with strong, dark, apical ventral seta [Figure 152] . . . . . 25
20. Facial band absent . . . . . 21  
Facial band present (sometimes very inconspicuous, delimited as a transversely wrinkled band mostly lacking microtomentum) [Figure 213] . . . . . 22
21. Frons white-microtomentose stripe not bordered posteriorly by a conspicuous velvety-black stripe . . . . . *A. erika*, new species  
Frons white-microtomentose stripe bordered posteriorly by a conspicuous velvety-black stripe [as in Figures 135, 213] . . . . .  
. . . . . *A. bifasciata*, new species
22. Facial band delimited as a transversely wrinkled band on dorsal portion of face, but mostly lacking microtomentum; cerci of male and female not fused . . . . . *A. belize*, new species

- Facial band more distinct, gray or golden microtomentum over brown mark, on dorsal portion of face [as in Figure 142]; cerci of male partially fused [Figure 144] . . . . . 23
23. Hind femur yellow; surstylus approximately triangular, apex strongly pointed, surface concave [Figure 159] . . . . .  
 . . . . . *A. rufifemur*, new species  
 Hind femur at least partially dark; surstylus not as above [Figures 132, 136, 143, 146] . . . . . 24
24. Vertex mostly polished, microtomentum restricted to a narrow area posterior to ocellar tubercle and, in some specimens, around vertical seta; ventral portion of face not bulbous, difficult to see in lateral view; surstylus approximately rectangular, in lateral view approximately “boat-shaped” [Figure 132]. . . . . *A. albifacies*, new species  
 Vertex mostly dull microtomentose, shiny spot, when present, reaching at most halfway to eye margin; ventral portion of face bulbous, easily seen in lateral view [Figure 141]; surstylus keel-shaped, with one subapical seta [Figures 143, 146] . . . . .  
 . . . . . *A. conspicua*, new species
25. Hind trochanter of male without a ventral tuft of setae; surstylus folded ventrally to epandrium, difficult to discern [Figure 136] . . . . . *A. atriseta*, new species  
 Hind trochanter of male with a ventral tuft of setae [Figures 148, 149]; surstylus conspicuous in lateral view [Figures 154, 155] . . . . . 26
26. Hind trochanter of male with a ventral, yellowish tuft of setae not born on a projection [Figure 149]; surstylus with apex approximately foot-shaped, with 2 subterminal setae and 2 basal, marginal setae [Figure 155] . . . . . *A. proxima*, new species  
 Hind trochanter of male with a ventral, black tuft of setae born on a projection [Figure 148]; surstylus approximately triangular, with a terminal seta and 2 basal, marginal setae [Figure 154] . . . . . *A. plesiomorphica* (Hennig)
27. Medial portion of frons slightly depressed from ptilinal suture to base of ocellus [Figure 19] . . . . . 28  
 Medial portion of frons deeply depressed, often velvety black [Figures 14, 22, 203] . . . . . 30
28. Ocellar seta absent . . . . . *A. serrana*, new species  
 Ocellar seta present, though minute . . . . . 29
29. Antenna infusate on dorsal margin; medial vertical seta present [Figure 19] . . . . . *A. tibanae*, new species  
 Antenna infusate on dorsal half; medial vertical seta absent [as in Figure 22] . . . . . *A. lopesi*, new species
30. Fronto-orbital plate completely brown to dark brown [Figure 22]; ocellar tubercle mostly polished; katapisternum mostly polished; medial vertical seta absent [Figure 22] . . . . . 31  
 Fronto-orbital plate yellowish in ground color; medial vertical seta present [Figure 203]; ocellar tubercle microtomentose, subshiny; katapisternum mostly microtomentose (some specimens with a polished area dorsally) . . . . .  
 . . . . . *A. bromeliae*, new species
31. Vertex mostly or entirely polished; costa of male not bearing conspicuous spines [Figure 13] . . . . . *A. kormeyevi*, new species  
 Vertex with small polished spot extended from ocellus to at most 1/3 distance to eye margin; costa of male bearing a few tiny, but conspicuous spines [Figure 24] . . . . . *A. vespertina*, new species
32. Thoracic pleura uniformly black (the *minuta* group) [Figure 107] . . . . . 33  
 Thoracic pleura white to pale yellow on ventral half; legs white to pale yellow [Figures 40, 49] (the *ecuadoriensis* group)  
 . . . . . 39
33. Wing hyaline, at most with apex very slightly infusate [as in Figure 116]; lobe on hind femur of male, when present, not appearing “sac-like” [Figures 108, 128, 131] . . . . . 34  
 Wing infusate with brown, at least on apical 2/3 of cells  $r_{2+3}$  and  $r_{4+5}$  [Figure 114], lobe on hind femur of male appearing “sac-like,” with a few marginal setae on apex [Figures 112–113, 122, 124] . . . . . 37
34. Antenna not infusate dorsally; hind tarsus with basal tarsomere brown, apical tarsomere yellowish . . . . .  
 . . . . . *A. nigritarsa*, new species  
 Antenna infusate along dorsal margin; hind tarsus yellowish . . . . . 35
35. Hind femur mostly dark brown . . . . . *A. minuta* (Hennig)  
 Hind femur mostly yellowish, apex brown infusate, or yellowish-brownish, but never dark brown [Figure 108] . . . . . 36
36. Hind femur of male with a small, inconspicuous lobe . . . . . *A. costaricana*, new species  
 Hind femur of male with a basoventral lobe followed by a distinct concavity [Figure 108] . . . . .  
 . . . . . *A. appendiculata*, new species
37. Hind femur almost completely brown, at most with a narrow yellow area basally [Figure 121]; scutellum slightly raised, completely microtomentose, or dull microtomentose on posterior portion, anterior portion shiny; lobe on hind femur of

- male either not followed by a concavity [Figure 124], or followed by a strong concavity [Figures 121–122] . . . . . 38
- Hind femur mostly brown, yellow on basal 1/3–1/2; scutellum very weakly raised (making almost no angle with the scutum), dull microtomentose on lateral margins and apex, disk bright shiny; lobe on hind femur of male followed by a weak concavity [Figures 112–113] . . . . . *A. condylura*, new species
38. Lobe on hind femur of the male ovoid, with apical setae only, and followed by a strong concavity [Figures 121–122] . . . . . *A. curvata*, new species
- Lobe on hind femur of the male approximately foot-shaped, with apical and posterior marginal setae, not followed by a concavity [Figure 124] . . . . . *A. gaimarii*, new species
39. First flagellomere round [Figures 26, 59] . . . . . 40
- First flagellomere triangular [Figures 32, 50, 206] . . . . . 41
40. Face mostly white [as in Figure 33]; vertex completely dark-brown; wing mostly brown, infuscate; hind femur of male with lobe . . . . . *A. stenoptera*, new species
- Face white dorsally, brown on ventral 1/3–1/2 [Figure 27]; vertex with yellow mark interrupted behind ocellar tubercle [Figure 28]; wing mostly brown infuscate, with a transverse hyaline spot not reaching cell  $r_{2+3}$  [Figure 29]; hind femur of male without lobe . . . . . *A. aenigma*, new species
41. Face brown on ventral 1/4–1/3 [Figure 42]; hind femur of male without lobe [Figure 43] . . . . . *A. fastidiosa*, new species
- Face mostly white or grey, if brown infuscation present, only laterally on ventral 1/4 [Figure 33]; hind femur of male without [as in Figure 43] or with [Figure 36] lobe . . . . . 42
42. Wing with apical 2/3 of cells  $r_1$  and  $r_{2+3}$  brown infuscate [Figure 52]; hind femur of male without a conspicuous lobe [as in Figure 43]; female abdomen with sternites uniformly sclerotized and membranous region between tergites and sternites dark-brown [Figure 55] . . . . . *A. melanoleuca* (Hennig)
- Wing with apical half mostly brown; hind femur of male with a basal lobe [Figure 36]; female abdomen with sternites less sclerotized medially and membranous region between tergites and sternites pale [Figure 35] . . . *A. ecuadoriensis* (Hennig)

## THE BROMELIAE GROUP

FIGURES 1–25, 203–204, MAPS 1–2

**DIAGNOSIS.** The *bromeliae* group is distinguished from other species groups by the following combination of characters: Stout, medium-sized flies, body length 2.6–4.0 mm. Coloration and vestiture: Occiput typically with medial occipital sclerite polished; mesofrons mostly dark brown; antenna often invested with whitish, pubescent setulae or macropubescence; face polished, brown to black. Anepisternum often polished. Wing often bearing a central brown mark.

### Morphology:

**Head:** Typically higher than long (head ratio less than 0.9); vertex obviously excavated between compound eyes; medial portion of frons slightly to broadly depressed, deep. Margins of eye closer together at vertex than at level of antenna; 1st flagellomere oval, decumbent; arista long, with a double row of dorsal rays on basal 1/3, and alternate rays on apical 2/3; face in lateral view projected dorsoventrally, ventral portion of face not receded; gena in lateral view projected at level of anteroventral margin of eye, approximately triangular in shape, thereafter following ventral margin of eye as a narrow ridge; clypeus elongate,

3.5–5.5 times longer than wide; ocellar seta often present, minute; fronto-orbital setae with posterior seta slightly internal to and almost transversely aligned with anterior seta; medial vertical seta, when present, nearly cruciate; peristomal area typically with 1 strong seta immediately behind pseudovibrissal seta, followed by 2–3 weaker setae and other setulae.

**Thorax:** Costal vein of male often with a few minute (sometimes inconspicuous) spines on the apical 1/3; subcosta partially fused with vein  $R_1$  apically, terminating at costal vein.

**Male abdomen and terminalia:** Surstylus slender, digitiform, posteroventral or posterior; subepandrial sclerite consisting of paired, ribbon-like sclerites separate by a membranous, central region. Gonopods short, wide, with 3–4 central setulae and a posterior lobe or process. Cercus typically bearing a few axial and apical strongly developed setae.

**DISTRIBUTION.** Neotropical: Brazil, Costa Rica, Ecuador.

**BIOLOGY.** Species of this group are rare in collections, although specimens are conspicuous and relatively easy to collect on leaves of bromeliads that have large basal “cups,” where water accumulates. In Brazil, adults are apparently present throughout the year, although in

fewer numbers during the winter (Jun–Aug). Larvae are fully aquatic and can be easily found near the bases of the bromeliad leaflets, where they probably feed on decaying organic matter.

**DISCUSSION.** Species of the *bromeliae* group can be easily identified by external characters, such as coloration and the shape of the concavity of the medial portion of the frons, the microtomentum coverage of the vertex, and the presence/absence of a medial vertical seta and ocellar seta. Additionally, characters of the male terminalia are very useful to distinguish the males.

The *bromeliae* group, which is exclusively Neotropical, includes six new species that are described here. Most species are from South America, but one, *A. korneyevi*, occurs in Central America (Costa Rica).

### ***Aulacigaster bromeliae*, new species**

FIGURES 2–8, 203–204, MAP 1

**DIAGNOSIS.** This species is distinguished from congeners by the following combination of characters: Fronto-orbital plate yellowish in ground color; medial portion of frons broadly depressed, concave.

**DESCRIPTION.** Coloration and vestiture: Vertex mostly densely microtomentose; ocellar tubercle scarcely microtomentose; frons with fronto-orbital plate yellowish in ground color, depressed portion of frons appearing velvety; mesofrons with a pair of silver microtomentose marks; antenna pale yellow to yellowish, infusate along dorsal margin or infusate on dorsal half; palpus brownish. Scutellum dull microtomentose; postpronotum concolorous with mesonotum, mostly polished; katepisternum mostly microtomentose, with a polished area dorsally; halter mostly white. Wing with a central, brown mark. Fore coxa yellow, fore femur yellowish, fore tibia brown, fore tarsus mostly brown to dark brown, yellowish on basal 1/3–1/2 of basitarsomere or completely brown to dark brown; mid coxa brown to black, mid femur brown, mid tibia yellowish or with basal portion brown to dark brown, apical portion yellowish, mid tarsus yellowish, apical and subapical tarsomere brownish to dark brown (apical and subapical); hind coxa yellow, hind femur brown, hind tibia brown to dark brown, hind tarsus yellowish, apical tarsomere brown to black. Male abdomen subshiny to dull; female abdomen bright shiny, or with dense microtomentum medially, lateral margins of tergites nearly polished.

#### **Morphology:**

**Head:** Figures 4, 203–204. Medial portion of frons depressed, deep; ocellar seta hair-like, minute;

medial vertical seta weak, less than half length of lateral vertical seta.

**Thorax:** Figures 2–3. Acrostichal setae in 1 row; scutellum slightly raised (angle with scutum approximately 135°), approximately triangular, apex relatively pointed. Costa of male bearing relatively strong, conspicuous spines.

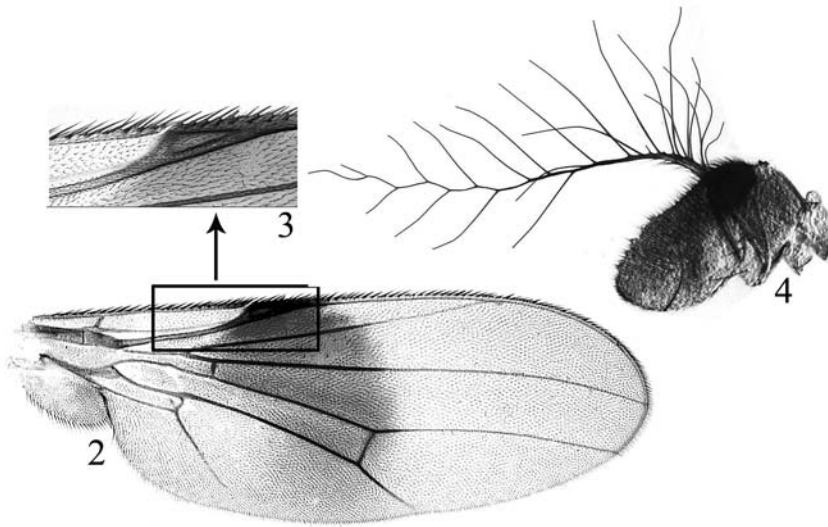
**Male abdomen and terminalia:** Figure 5. Surstylus about 1/3–1/2 length of basal margin of epandrium, posterior to posteroventral, digitiform; anterior process of gonopod about 2/3 length of basal margin of epandrium, well developed; posterior process of gonopod weakly differentiated, lobelike; cercus narrow, digitiform, bearing several long and well-developed setae.

**Female abdomen and terminalia:** Figure 6. Spermathecae with ventral digitiform projections.

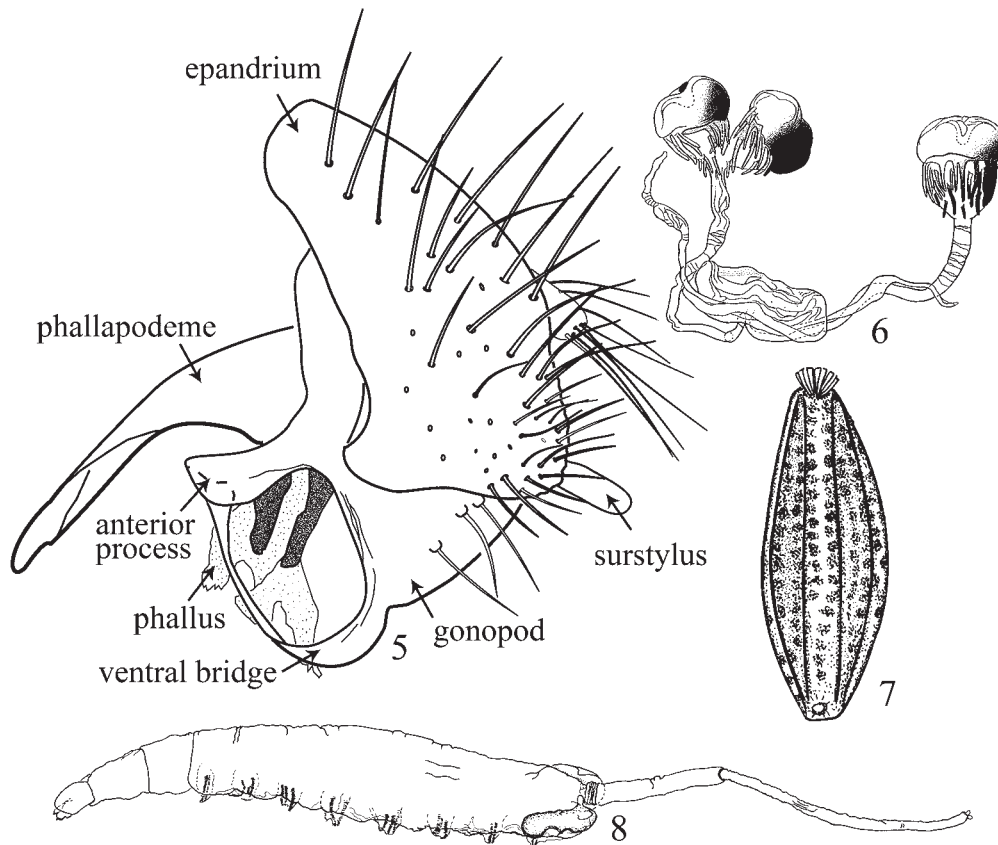
**Measurements:** Body length 2.6–3.4 mm. Wing length 2.4–3.0 mm, wing width 0.9–1.0 mm.

**Immatures:** Figures 7–8. Egg whitish, oval in shape, dorsoventrally flattened; chorion delicately sculptured. *Larva* (3rd instar): Length 6.6–7.5 mm. Slender, subcylindrical, elongate, slightly tapering anteriorly; integument almost transparent, smooth; abdomen with 2 pairs of lateral sensory hairs on segments 1–7; ventral creeping pads bearing spines arranged in rows as follows: a pair of rows on segments 1 and 8, 2 pairs on remaining segments; 8th segment bearing a respiratory process and also a pair of lateral fleshy lobes; anterior spiracle retractable into a pair of narrow pockets, and bearing 23–26 pairs of twig-like processes, plus additional bulbs on their apical part. Respiratory tube with posterior spiracle separate apically, bearing 3 long bristle-like interspiracular processes each. Cephaloskeleton (no figure available) well developed, large; tentopharyngeal sclerite fully sclerotized, with prominent ventral groove and a weak dorsal bridge. Mandible well developed, with 2 pairs of accessory teeth. **Puparium:** Length 5.6–6.4 mm; width 2.0–3.3 mm. Light brown, oval in shape, tapered towards apex. Posterior respiratory tube strongly retracted. Prothoracic spiracles extruded into a pair of 1.1–1.2 mm long horns each with approximately 23–26 pairs of twig-like papillae.

**TYPE MATERIAL.** The holotype male is labeled “BRAZIL. Rio de Janeiro: Ilha da Marambaia 23°03.6'S, 43°59.1'W, 4 Sep 2000, D. & Wayne N. Mathis/HOLOTYPE ♂ *Aulacigaster bromeliae* Rung & Mathis MZUSP [red].” The holotype is double mounted (minuten in a block of plastic), is in excellent condition, and will be deposited in the MZUSP. Paratypes are as follows: same label data as the holotype (1♂, 1♀; MZUSP;



FIGURES 2–4. Digital photographs of *Aulacigaster bromeliae*, new species (male) (the *bromeliae* group, Neotropical Region): (2) right wing, dorsal aspect; (3) enlargement of costal section, dorsal aspect; (4) left antenna, medial aspect. Not all to the same scale.



FIGURES 5–8. Illustrations of *Aulacigaster bromeliae*, new species (the *bromeliae* group, Neotropical Region): (5) epandrium and internal genitalic structures (male), lateral aspect; (6) spermathecae, ventral aspect; (7) egg, dorsal aspect; (8) first-instar larva, lateral aspect. Not all to the same scale.

3♂, 2♀; USNM). BRAZIL. Rio de Janeiro: Rio de Janeiro: Maricá (22°55.1'S, 42°29.1'W), 27 Feb 1995, A. Baptista, L. Lopez (3♂; MNRJ) (3♂; USNM).

**TYPE LOCALITY.** Brazil. Rio de Janeiro: Ilha da Marambaia (23°03.6'S, 43°59.1'W).

**OTHER SPECIMENS EXAMINED.** BRAZIL. Rio de Janeiro: Guaratiba (22°58'S, 42°48'W), 1990, A. and R. Baptista (1♂, 3♀; MNRJ); Petrópolis, Retiro (22°30.6'S, 43°11.1'W), 10 May 1984, H. S. Lopes (2♀; MNRJ); Teresópolis, Parque Nacional da Serra dos Órgãos (22°27.9'S, 42°59.6'W), 28 Dec–Jul 1990, 1996, A. and R. Baptista (3♂, 1♀; MNRJ, USNM); Rio de Janeiro (22°54'S, 43°14'W; em broméia), 1 Jan–1 Sep 1934, H. S. Lopes (1♂, 2♀; MNRJ); 20 Oct 1991, A. and R. Baptista (3♀; MZUSP); Gávea (22°59'S, 43°14.7'W), 3 Mar 1935, H. S. Lopes (1♂; MNRJ); Jardim Botânico do Rio de Janeiro (22°58'S, 43°13.5'W), 27 Sep–20 Dec 1990, 1991, R. Tibana (4♂, 4♀; MZUSP); Recreio dos Bandeirantes (23°01.1'S, 43°28.1'W), 23–30 Sep 1974, R. Tibana (2♂, 2♀; MNRJ). Santa Catarina: Ilhota, Morro do Baú (26°54'S, 48°49.6'W; em bromélia), 26–27 Jan 1990, A. Chaves, R. Baptista (1♂, 2♀; MNRJ). São Paulo: Salesópolis (23°33.9'S, 45°51.8'W; em bromélia), 1–3 Mar 1992, A. and R. Baptista (1♂, 2♀; MZUSP).

**Immature forms.** *Puparium.* BRAZIL. Rio de Janeiro: Rio de Janeiro, Recreio dos Bandeirantes (23°01.1'S, 43°28.1'W), Sep 1974, R. Tibana (5, MNRJ); 29 Aug 1978, R. Tibana (1, MNRJ). *Larva.* BRAZIL. Rio de Janeiro. Rio de Janeiro, Recreio dos Bandeirantes, Sep 1974, R. Tibana (7, MNRJ).

**DISTRIBUTION.** (Map 1) Neotropical: Brazil (Rio de Janeiro, Santa Catarina, São Paulo).

We have collected immatures and adults of this species on the following species of bromeliads: *Neoregellia cruenta* (R. Graham) L. B. Smith, *Vriesea* spp., and *Canistrum lindenii* (Regel) Mez. This species occurs in bromeliads near the maritime coast of the Atlantic Forest.

**ETYMOLOGY.** The specific epithet, *bromeliae*, refers to a plant genus of the family Bromeliaceae, in general recognition of the larval habitat of this species.

**REMARKS.** *Aulacigaster bromeliae* is similar to *A. vespertina* and *A. korneyevi* in the shape of the medial portion of the frons, which is deeply depressed and has a pair of silvery microtomentose marks. Besides the characters given in the key and diagnosis, this species can be readily distinguished from the two species mentioned above by having more extensive microtomentose coverage on the ocellar tubercle and katapisternum, by the shape of the surstylus (digitiform with apex not swollen), and by the weakly differentiated posterior process of the male gonopod.

## *Aulacigaster korneyevi*, new species

FIGURES 1, 9–15, MAP 2

**DIAGNOSIS.** This species is distinguished from congeners by the following combination of characters: Medial portion of frons broadly depressed, concave; vertex mostly polished.

**DESCRIPTION.** Coloration and vestiture: Vertex mostly polished; ocellar tubercle mostly polished; fronto-orbital plate and mesofrons completely brown to dark brown, depressed portion of frons appearing velvety; mesofrons with a pair of silver microtomentose marks; antenna pale yellow to yellowish, not infusate dorsally or infusate on dorsal half; palpus brownish. Scutellum dull microtomentose; postpronotum concolorous with mesonotum, mostly polished; katapisternum mostly polished; halter mostly white. Wing hyaline or bearing a central, brownish faint mark (more pronounced in female specimens). Fore coxa yellow, fore femur yellowish, fore tibia brown, fore tarsus completely brown to dark brown; mid coxa brown to black, mid femur brown, mid tibia yellowish, mid tarsus mostly or entirely yellowish, apical and subapical tarsomere brownish to dark brown; hind coxa yellow, hind femur brown, hind tibia brown to dark brown, hind tarsus mostly or entirely yellowish, apical tarsomere brown to black. Male abdomen subshiny to dull. Female abdomen with dense microtomentum over tergites 1–4/5, remaining tergites mostly polished.

**Morphology:**

**Head:** Figures 11–12, 14. Medial portion of frons depressed, deep; ocellar seta hair-like, minute; medial vertical seta absent.

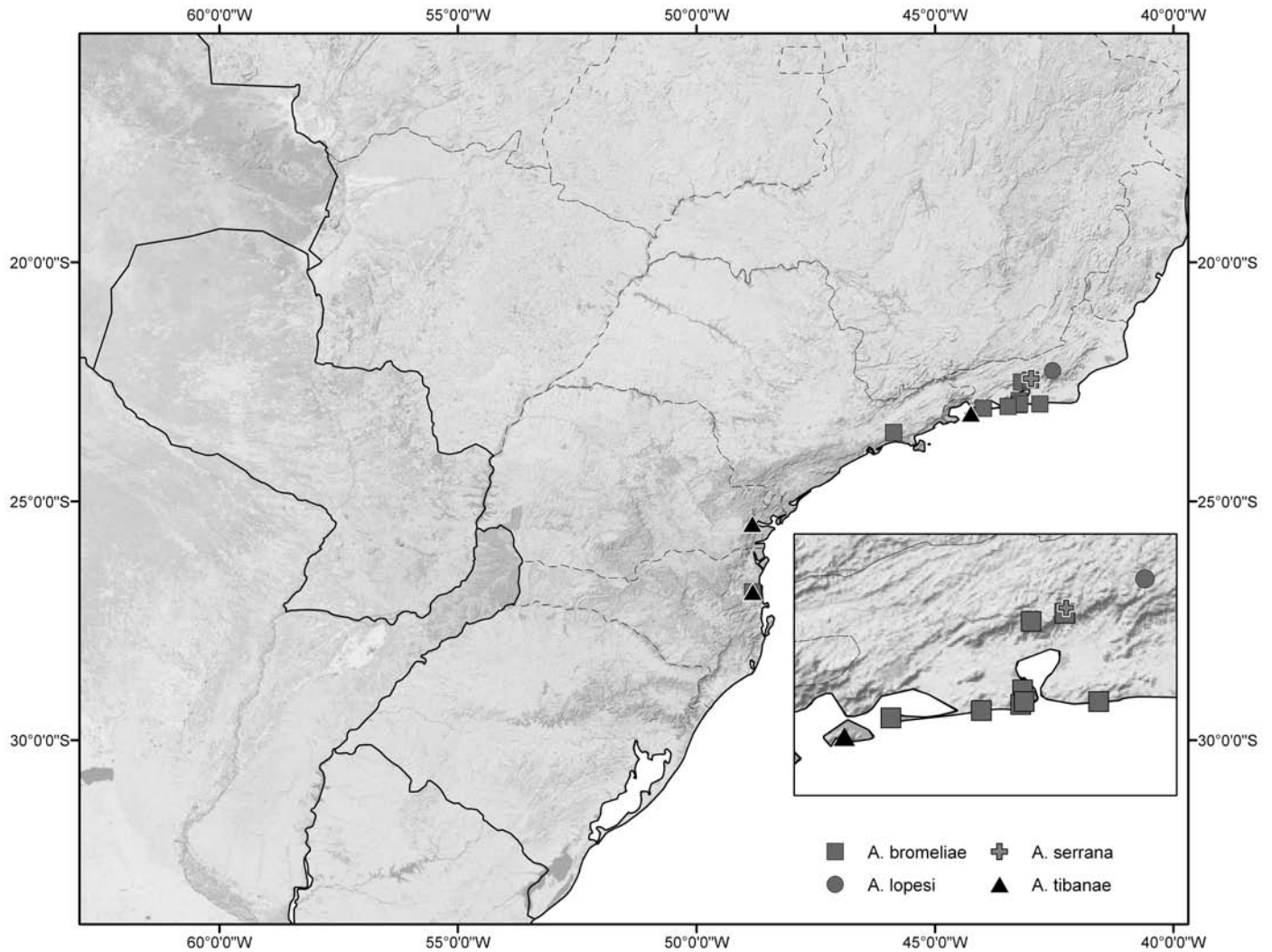
**Thorax:** Figures 9–10, 12–13. Acrostichal setae in 1 row; scutellum strongly angled dorsally (angle with scutum less than 135°), triangular, apex strongly pointed. Costa of male not bearing relatively strong, conspicuous spines.

**Male abdomen and terminalia:** Figure 15. Surstylar length subequal to the length of basal margin of epandrium; surstylus posteroventral to posterior, slender, with apex swollen, and apical dorsal triangular projection; anterior process of gonopod about same length of basal margin of epandrium, well developed; posterior process of gonopod well differentiated, about as long as surstylus; cercus narrow, digitiform, bearing long and well developed setae.

**Measurements:** Body length 2.9–3.3 mm. Wing length 2.9–3.0 mm, wing width 0.8–1.1 mm.

**TYPE MATERIAL.** The holotype male is labeled "COSTA RICA. Heredia: S[an]t[o].Domingo[,] INBIO, 9°58.4'N, 85°5.6'W, 21 February 2003, W. N. Mathis/USNM ENT 00197130 [plastic bar code label]/HOLOTYPE





MAP 1. Distribution of *Aulacigaster bromeliae*, *A. lopesi*, *A. serrana*, and *A. tibanae* (the *bromeliae* group, Neotropical Region).

♂ *Aulacigaster korneyevi* Rung & Mathis INBio [red].” The holotype is double mounted (minuten in a block of plastic), is in excellent condition and is deposited in INBio. Paratypes are as follows: Same label data as the holotype (9♂, 4♀; INBio, USNM). Same locality as the holotype but collected on 14 Jun 2003, D. and W. N. Mathis (5♂, 4♀; INBio, USNM); 29–31 Jul 2001, V. Korneyev (6♂, 6♀; INBio, USNM); 3 Oct 1999, M. Buck, S. Marshall (12♂, 5♀; UGE).

**OTHER SPECIMENS EXAMINED.** COSTA RICA. Heredia: Chilamate, 18–23 Aug 1988, W. J. Hanson (1♀, USU); Santo Domingo, Inbio Park (9°58.4'S, 84°05.5'W; on bromeliad leaves), 19–20 Aug 2001, M. Buck (10♂, 10♀; UGE); Santo Domingo, Inbio Park (9°58.4'S, 84°5.6'W; on bromeliad leaves), 10 Jun–18 Jul 2000, 2001, K. N. Barber, E. Fisher, (19♂; CSCA, UGE).

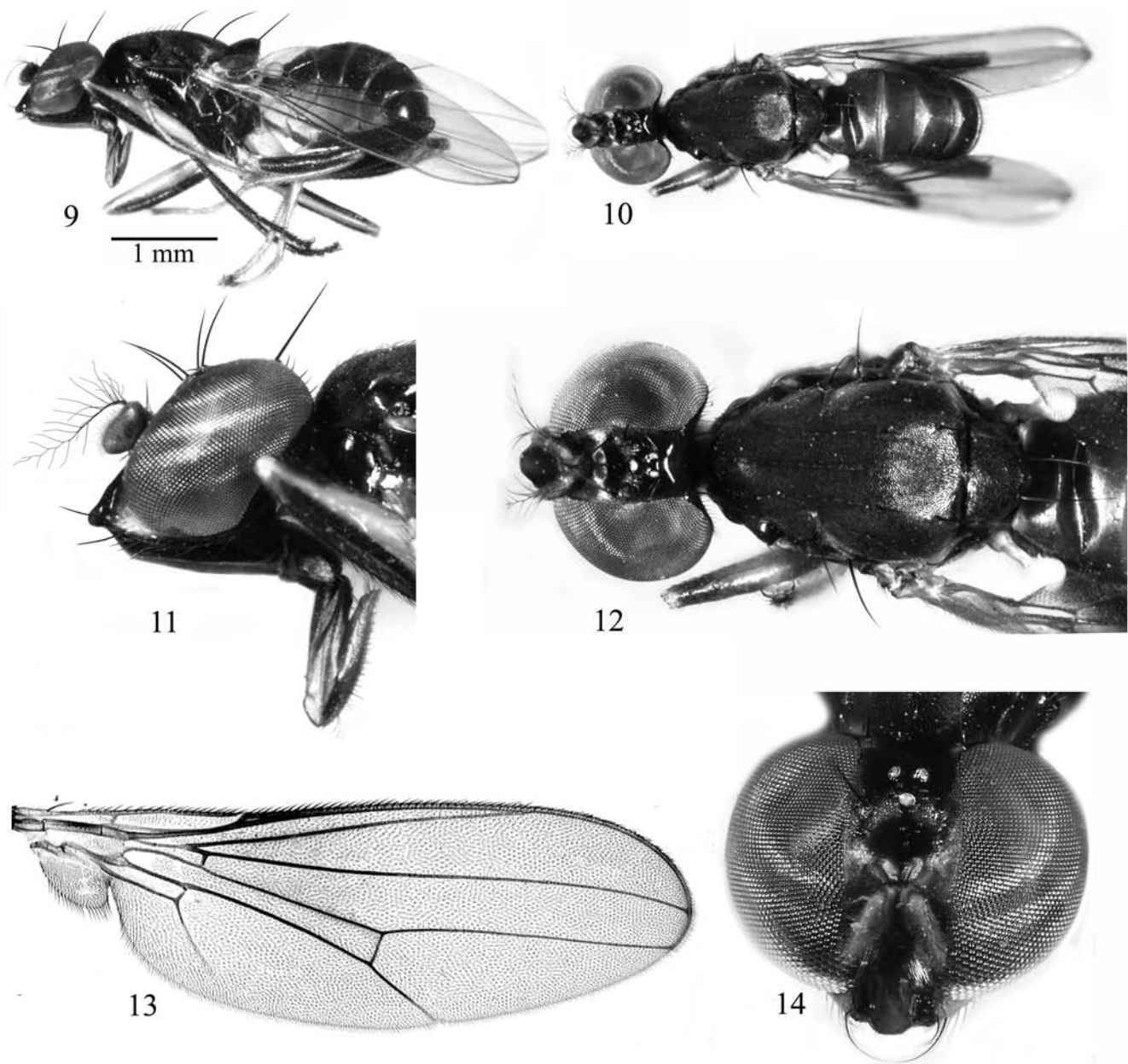
**TYPE LOCALITY.** Costa Rica. Heredia: Santo Domingo (INBio Parque; 09°58.4'N, 85°05.6'W).

**DISTRIBUTION.** (Map 2) Neotropical: Costa Rica (Heredia).

**ETYMOLOGY.** The specific epithet, *korneyevi*, is a genitive patronym to honor and recognize the contributions of Dr. Valery A. Korneyev to dipterology. Valery also collected many of the paratypes.

**REMARKS.** The central mark of the wing, though faint, is more conspicuous in female specimens than in the male specimens.

This species is similar to *A. bromeliae* and *A. vespertina* in the shape of the mesofrons, which is deeply depressed and has a pair of silver microtomentose marks. It can be easily distinguished from the first species by the characters



FIGURES 9–14. Digital photographs of *Aulacigaster korneyevi*, new species (male) (the *bromeliae* group, Neotropical Region): (9) body, lateral aspect; (10) body, dorsal aspect; (11) head, lateral aspect; (12) head and thorax, dorsal aspect; (13) right wing, dorsal aspect; (14) head, frontal aspect. Not all to the same scale.

given in the key and diagnosis. Like *A. vespertina*, *A. korneyevi* has a dark fronto-orbital plate region, lacks the medial vertical seta, and has a well-developed posterior gonopodal process and similar arrangement of the gonopodal setae. Besides the characters given in the key and diagnosis, *A. korneyevi* differs from *A. vespertina* in the shape of the swollen apex of the surstylus, which is triangular in the first species and approximately round in the second.

### *Aulacigaster lopesi*, new species

FIGURE 16, MAP 1

**DIAGNOSIS.** This species is distinguished from congeners by the following combination of characters: Fronto-orbital plate yellowish in ground color; medial portion of frons slightly depressed over a transverse, triangular

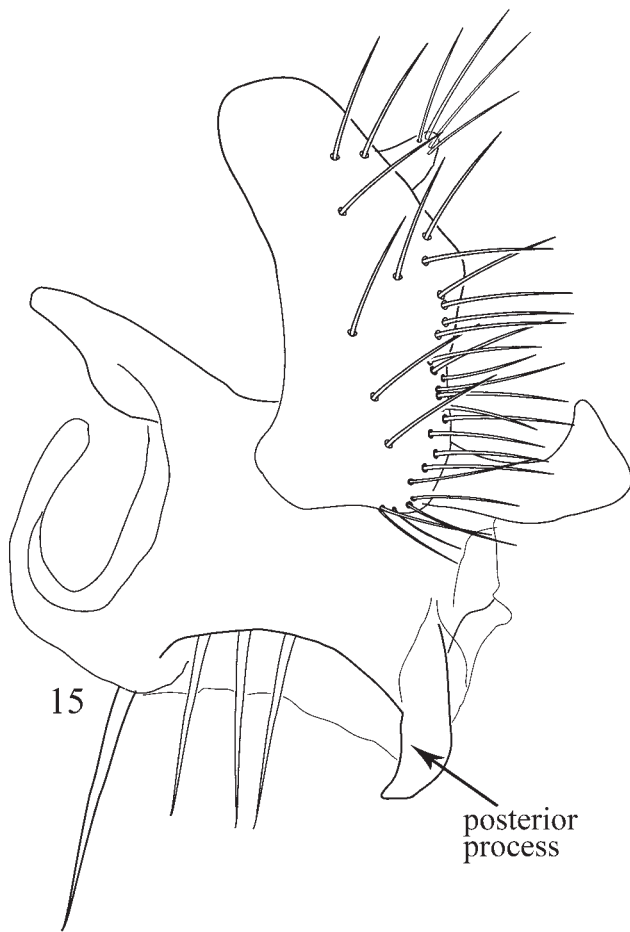


FIGURE 15. Illustration of *Aulacigaster korneyevi*, new species (male) (the *bromeliae* group, Neotropical Region): epandrium and internal genitalic structures, lateral aspect.

area from ptilinal suture to base of ocellus; medial vertical seta absent.

**DESCRIPTION.** Coloration and vestiture: Vertex mostly polished; fronto-orbital plate yellowish in ground color; ocellar tubercle mostly polished; mesofrons microtomentose; antenna pale yellow to yellowish, infuscate on dorsal half; palpus brownish. Scutellum dull microtomentose; postpronotum concolorous with mesonotum, scarcely microtomentose, subshiny; katepisternum mostly polished. Wing with a central, brown mark. Fore coxa yellow, fore femur yellowish, fore tibia brown, fore tarsus completely brown to dark brown; mid coxa brown to black, mid femur yellowish, mid tibia yellowish, mid tarsus yellowish, apical and subapical tarsomere brownish to dark brown; hind coxa yellow, hind femur yellow, hind tibia dark basally, yellow apically, hind tarsus yellowish, apical tarsomere brown

to black. Male abdomen subshiny to dull; female abdomen subshiny, or with dense microtomentum medially, lateral margins of tergites nearly polished.

**Morphology:**

**Head:** Medial portion of frons slightly depressed over a transverse, triangular area from ptilinal suture to base of ocellus; ocellar seta hair-like, minute; medial vertical seta absent.

**Thorax:** Acrostichal setae in 1 row; scutellum slightly raised (angle with scutum approximately  $135^\circ$ ), approximately triangular, apex relatively pointed. Costa of male bearing relatively strong, conspicuous spines.

**Male abdomen and terminalia:** Figure 16. Surstyler length about  $1/2$  length of basal margin of epandrium, posteroventral, digitiform; anterior process of gonopod about  $1/3$ – $1/2$  length of basal margin of epandrium, weak; posterior process of gonopod weakly differentiated; cercus narrow, digitiform, bearing several long and well-developed setae.

**Female abdomen and terminalia:** Spermathecae with ventral, digitiform projections.

**Measurements:** Body length 3.3–3.5 mm. Wing length 3.1–3.3 mm, wing width 1.0–1.3 mm.

**TYPE MATERIAL.** The holotype male is labeled “Salinas (Três Picos), Nova Friburgo[,] R[jio de]J[aneiro]-BRASIL/♂ [handwritten, pencil]/XI 1991 A. BAPTISTA R. BAPTISTA em bromelia [date and habitat handwritten]/HOLOTYPE ♂ *Aulacigaster lopesi* Rung & Mathis MNRJ [red].” The holotype is double mounted (glued on left side to a small triangle), is in moderately good condition (head setae damaged, left lateral vertical seta missing, right antenna broken, scutellar setae damaged and right wing missing) and is deposited in the MNRJ. Paratypes are as follows: Same label data as the holotype (4♂, 5♀; MNRJ, USNM).

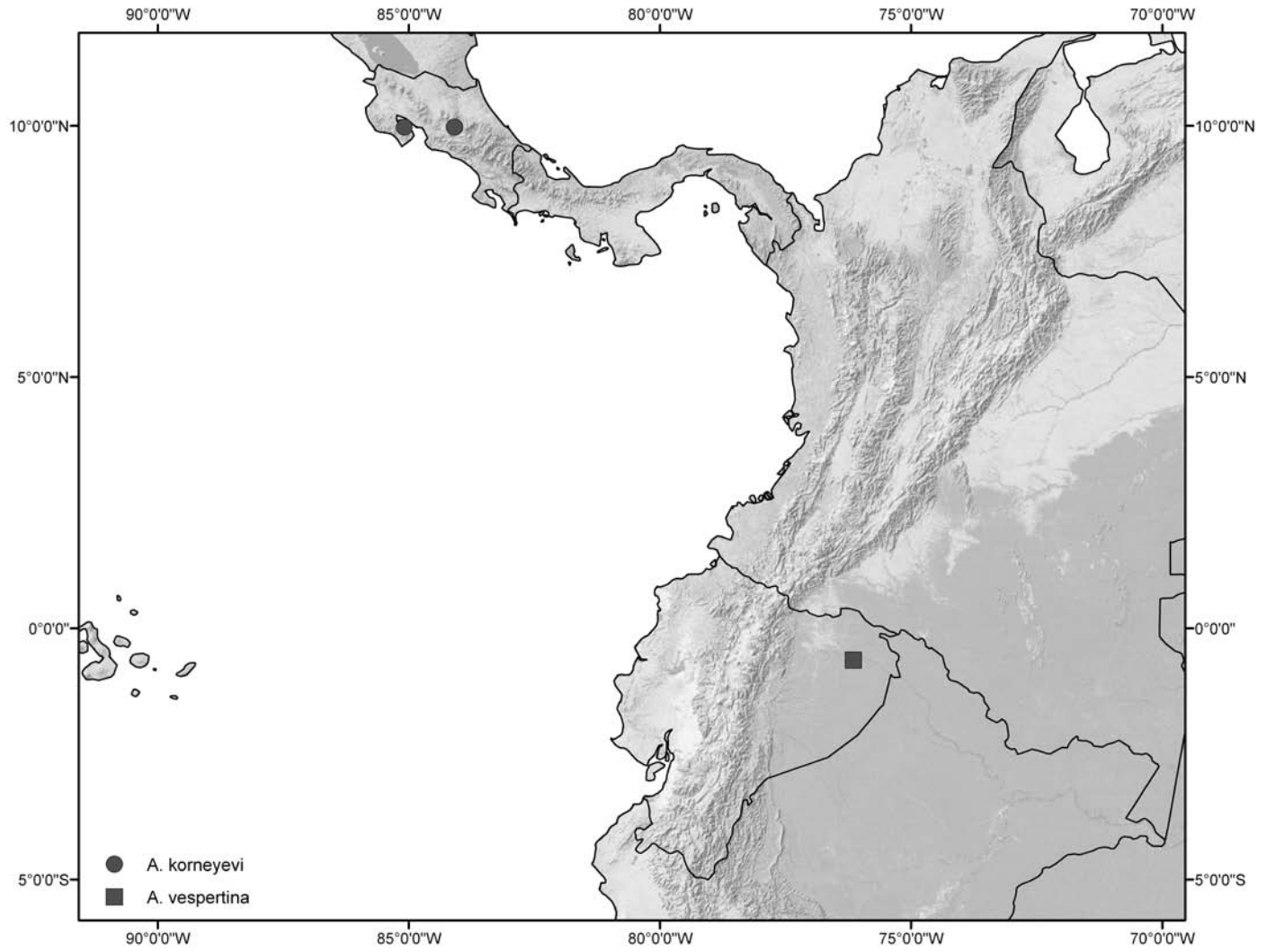
**TYPE LOCALITY.** Brazil. Rio de Janeiro: Nova Friburgo, Três Picos (Salinas;  $22^\circ 16'S$ ,  $42^\circ 32'W$ ).

**DISTRIBUTION.** (Map 1) Neotropical: Brazil (Rio de Janeiro).

**BIOLOGY.** This species was collected from bromeliads in the Atlantic forest.

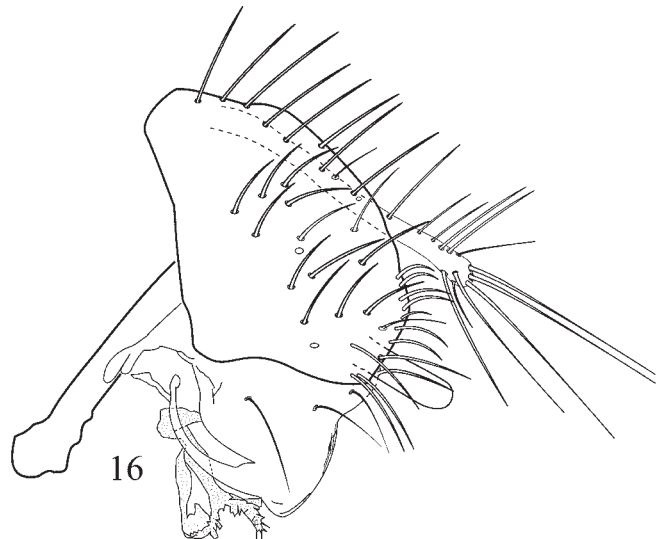
**ETYMOLOGY.** The specific epithet, *lopesi*, is a genitive patronym to honor and recognize the numerous contributions of Dr. Hugo de Souza Lopes to entomology in Brazil and specifically to the systematics of the family Sarcophagidae.

**REMARKS.** This species is similar to *A. serrana* and *A. tibanae* in the shape of the mesofrons, which has a small, triangular depression, and the male gonopod with anterior process weakly differentiated. Besides the characters given in the key and diagnosis, *A. lopesi* can be easily distinguished from these two species by the position of the



MAP 2. Distribution of *Aulacigaster korneyevi* and *A. vespertina* (the *bromeliae* group, Neotropical Region).

FIGURE 16. Illustration of *Aulacigaster lopesi*, new species (male) (the *bromeliae* group, Neotropical Region): epandrium and internal genitalic structures, lateral aspect.



surstylus, which arises from the posteroventral margin of the epandrium.

### *Aulacigaster serrana*, new species

FIGURE 17, MAP 1

**DIAGNOSIS.** This species is distinguished from congeners by the following combination of characters: Medial portion of frons slightly depressed over a transverse, triangular area from ptilinal suture to base of ocellus; ocellar seta absent.

**DESCRIPTION.** Coloration and vestiture: Vertex mostly polished; ocellar tubercle mostly polished; mesofrons completely brown to dark brown or with fronto-orbital plate yellowish in ground color and a pair of silver microtomentose marks; antenna pale yellow to yellowish, infusate along dorsal margin; palpus brownish. Scutellum dull microtomentose; postpronotum concolorous with mesonotum, mostly polished; katepisternum mostly polished; halter mostly white (infusate basally). Wing with a central, brown mark. Fore coxa brown to black, fore femur brown, fore tibia brown, fore tarsus completely brown to dark brown; mid coxa brown to black; mid femur brown; mid tibia with basal portion brown to dark brown, apical portion yellowish; mid tarsus yellowish, apical and subapical tarsomeres brownish to dark brown; hind coxa yellow; hind femur brown; hind tibia brown to dark brown; hind tarsus yellowish; apical tarsomere brown to black. Male abdomen bright shiny; female abdomen with dense microtomentum medially, lateral margins of tergites nearly polished.

#### Morphology:

**Head:** Medial portion of frons slightly depressed over a transverse, triangular area from ptilinal suture to base of ocellus; ocellar seta absent; medial vertical seta absent.

**Thorax:** Acrostichal setae in 1 row; scutellum strongly raised (angle with scutum less than 135°), triangular, apex strongly pointed. Costa of male bearing relatively strong, conspicuous spines.

**Male abdomen and terminalia:** Figure 17. Surstylus about 1/2 length of basal margin of epandrium, posterior, digitiform; anterior process of gonopod about 1/3–1/2 length of basal margin of epandrium, weak; posterior process of gonopod weakly differentiated; cercus narrow, digitiform.

**Measurements:** Body length 3.7–3.9 mm. Wing length 3.8–4.0 mm, wing width 2.8–3.0 mm.

**TYPE MATERIAL.** The holotype male is labeled “Brazil. R[io][aneiro,] Teresópolis/A. & R. Baptista[,] Jul

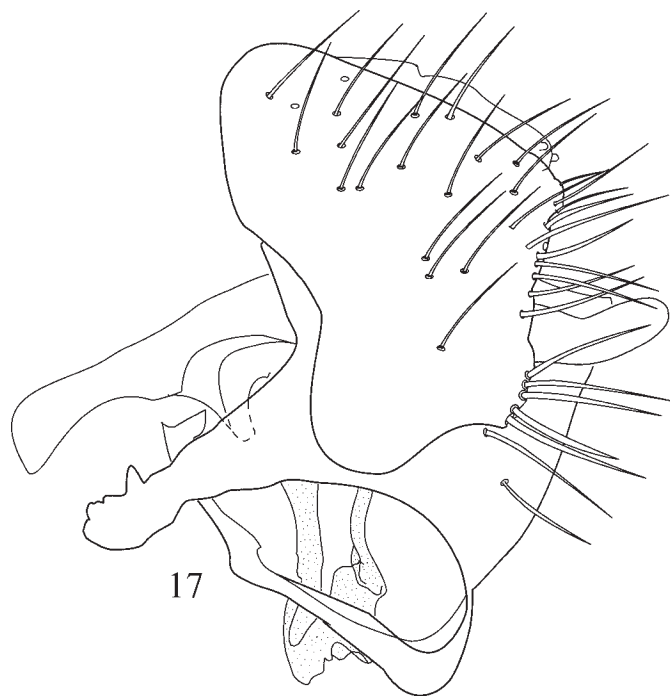


FIGURE 17. Illustration of *Aulacigaster serrana*, new species (male) (the *bromeliae* group, Neotropical Region): epandrium and internal genitalic structures, lateral aspect.

1996, Bromeliads/HOLOTYPE ♂ *Aulacigaster serrana* Rung & Mathis MNRJ [red].” The holotype is double mounted (glued to a point on left side), is in fair condition (eyes collapsed, left lateral vertical, dorsal fronto-orbital and right scutellar setae missing), and is deposited in the MNRJ. A paratype is as follows: Same label data as the holotype (1♂; MNRJ; abdomen removed and preserved in a vial attached to the specimen).

**TYPE LOCALITY.** Brazil. Rio de Janeiro: Teresópolis (22°26'S, 42°59'W).

**DISTRIBUTION.** (Map 1) Neotropical: Brazil (Rio de Janeiro).

**BIOLOGY.** This species was collected from bromeliads in the Atlantic forest.

**ETYMOLOGY.** The specific epithet, *serrana*, is taken from the type locality, Parque Nacional da Serra dos Orgãos.

**REMARKS.** This species is similar to *A. tibanae* and *A. lopesi* in the shape of the mesofrons, which has a small, triangular depression, and in the male gonopod, which has a weakly differentiated posterior process. *Aulacigaster lopesi* can be easily distinguished from both of these two species by the position of the surstylus, which arises

from the posteroventral margin of the epandrium. *Aulacigaster serrana* shares, with *A. tibanae* the posterior position of the surstylus, but both species are distinguished by the characters given in the key and diagnosis.

### *Aulacigaster tibanae*, new species

FIGURES 18–20, MAP 1

**DIAGNOSIS.** This species is distinguished from congeners by the following combination of characters: Medial portion of frons slightly depressed over a transverse, triangular area from ptilinal suture to base of ocellus; medial vertical seta present.

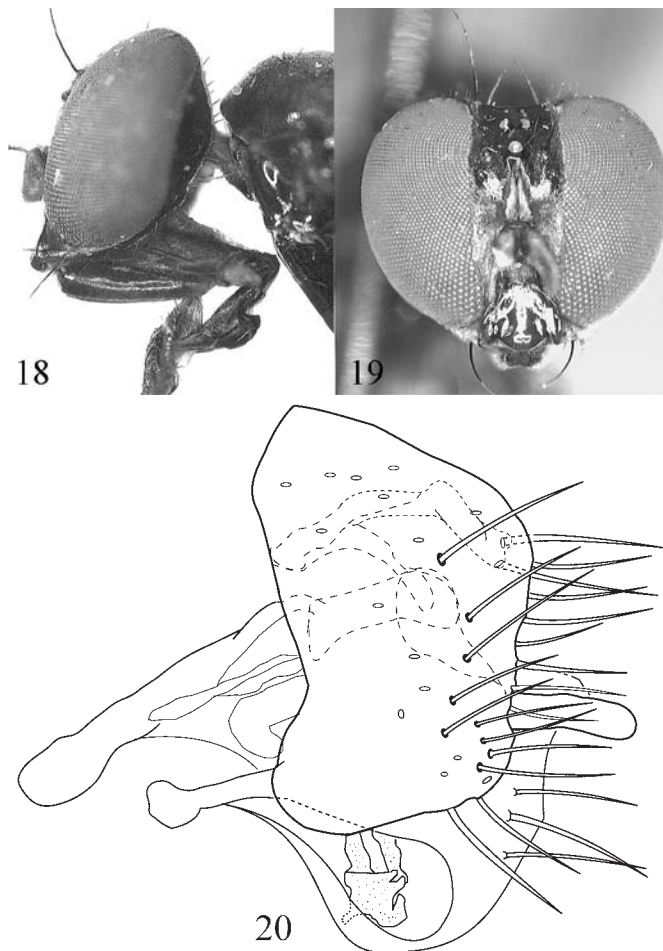
**DESCRIPTION.** Coloration and vestiture: Vertex mostly polished; ocellar tubercle mostly polished; frons with mesofrons completely brown to dark brown or with anterior portion of fronto-orbital plate yellowish in ground color; mesofrons microtomentose, or with a pair of silver microtomentose marks; antenna pale yellow to yellowish, infusate along dorsal margin; palpus brownish (invested with silver microtomentose hairs). Scutellum dull microtomentose; postpronotum concolorous with mesonotum (yellowish anteriorly), mostly polished; kat-episternum mostly polished. Wing with a central, brown mark. Fore coxa brown to black; fore femur brown; fore tibia brown; fore tarsus completely brown to dark brown; mid coxa brown to black; mid femur brown; mid tibia with basal portion brown to dark brown, apical portion yellowish; mid tarsus yellowish; apical and subapical tarsomere brownish to dark brown; hind coxa yellow; hind femur brown; hind tibia brown to dark brown; hind tarsus yellowish; apical tarsomere brown to black. Male abdomen subshiny to dull; female abdomen bright shiny, or with dense microtomentum medially, lateral margins of tergites nearly polished.

#### Morphology:

**Head:** Figures 18–19. Medial portion of frons slightly depressed over a transverse, triangular area from ptilinal suture to base of ocellus; ocellar seta minute; medial vertical seta weak, less than a 1/2 of lateral vertical seta.

**Thorax:** Acrostichal setae in 1 row; scutellum strongly raised (angle with scutum less than 135°), triangular, apex strongly pointed. Costa of male bearing relatively strong, conspicuous spines.

**Male abdomen and terminalia:** Figure 20. Surstylus about 1/2 length of basal margin of epandrium, posterior, slightly sickle-shaped; anterior process of gonopod about as long as basal margin of epandrium, well



FIGURES 18–20. Digital photographs (not to same scale) and an illustration of *Aulacigaster tibanae*, new species (male) (the *bromeliae* group, Neotropical Region): (18) head, lateral aspect; (19) head, frontal aspect; (20) epandrium and internal genitalic structures, lateral aspect.

developed; posterior process of gonopod weakly differentiated; cercus narrow, digitiform, bearing several long and well-developed setae.

**Female abdomen and terminalia:** Spermathecae with ventral, digitiform projections.

**Measurements:** Body length 3.7–4.0 mm. Wing length 3.7–3.9, wing width 1.0–1.3 mm.

**TYPE MATERIAL.** The holotype male is labeled “BRASIL: PR [Paraná][,] Curitiba[,] Morretes/A.R.P. Chaves[,] R.L.C. Baptista[,] 28–31 I 990 [28–31 Jan 1990] Em Bromelia [handwritten]/HOLOTYPE ♂ *Aulacigaster tibanae* Rung & Mathis MNRJ [red].” The

holotype is double mounted (glued to point of a small triangle), is in a fair condition (setae of head, scutellar setae, middles and right wing missing) and is deposited in the MNRJ. Paratypes are as follows: Same label data as the holotype (3♀; MNRJ, USNM). BRAZIL. Paraná: Morretes (25°28.6'S, 48°50.1'W; near ant column), 9 Nov 1990, S. A. Marshall (1♀; UGE); Rio Mae Catira, Serra do Mar (25°21.8'S, 48°52.6'W), 29 Aug 2000, D. and W. N. Mathis (1♀; USMN). Santa Catarina: Ilhota, Morro do Baú (26°54'S, 48°49.6'W; em bromélia), 26–27 Jan 1990, A. Chaves, R. Baptista (2♂, 1♀; MNRJ, USNM).

**TYPE LOCALITY.** Brazil. Paraná: Morretes (25°28.6'S, 48°50.1'W).

**OTHER SPECIMENS EXAMINED.** BRAZIL. Paraná: Curitiba, Morretes (25°28.6'S, 48°50.1'W; em bromélia), 28–31 Jan 1990, A. R. P. Chaves, R. L. C. Baptista (2♂; MNRJ). Rio de Janeiro: Angra dos Reis (23°10'S, 44°15'W), 8 Sep 1931, L. T. (1♂; MNRJ). Santa Catarina: Ilhota, Morro do Baú (26°54'S, 48°49.6'W; em bromélia), 26–27 Jan 1990, A. R. P. Chaves, R. L. C. Baptista (2♀; MNRJ).

**DISTRIBUTION.** (Map 1) Neotropical: Brazil (Rio de Janeiro, Paraná, Santa Catarina).

**BIOLOGY.** This species was collected on bromeliads in the Atlantic forests of Brazil.

**ETYMOLOGY.** The specific epithet, *tibanae*, is a genitive patronym to honor and recognize Dr. Rita Tibana, who collected many specimens of *Aulacigaster* that occur in bromeliads in coastal regions of the State of Rio de Janeiro (Brazil).

**REMARKS.** This species is similar to *A. serrana* and *A. lopesi* in the shape of the mesofrons, which has a small, triangular depression, and in the male gonopod, with weakly differentiated posterior process. *Aulacigaster lopesi* can be easily distinguished from these two species by having the surstylus arising from the posterior ventral margin of the epandrium. *Aulacigaster tibanae* shares, with *A. serrana*, the posterior position of the surstylus, but both species are distinguished from each other by the characters given in the key and diagnosis.

### ***Aulacigaster vespertina*, new species**

FIGURES 21–25, MAP 2

**DIAGNOSIS.** This species is distinguished from congeners by the following combination of characters: Medial portion of frons depressed, concave; frons with mesofrons completely brown to dark brown; vertex with small

polished spot extended from ocellus to at most 1/3 distance to eye margin.

**DESCRIPTION.** Coloration and vestiture: Vertex with small polished spot extended from ocellus to at most 1/3 distance to eye margin; ocellar tubercle mostly polished; frons with mesofrons completely brown to dark brown, depressed portion of frons appearing velvety; mesofrons with a pair of silver microtomentose marks; antenna pale yellow to yellowish, not infuscate dorsally to infuscate on dorsal half; palpus brownish (covered by silver microtomentum). Scutellum dull microtomentose; postpronotum concolorous with mesonotum, mostly polished; katepisternum mostly polished; halter mostly white. Wing with a central, brown mark. Fore coxa yellow, fore femur yellowish (tip brown), fore tibia brown, fore tarsus completely brown to dark brown; mid coxa brown to black, mid femur brown, mid tibia yellowish, mid tarsus yellowish, apical and subapical tarsomere brownish to dark brown; hind coxa yellow, hind femur brown, hind tibia brown to dark brown, hind tarsus yellowish, apical tarsomere brown to black. Male abdomen subshiny to dull; female abdomen with dense microtomentum over tergites 1–4/5, remaining tergites mostly polished.

**Morphology:**

**Head:** Figures 21–22. Medial portion of frons depressed, deep; ocellar seta hair-like; medial vertical seta absent.

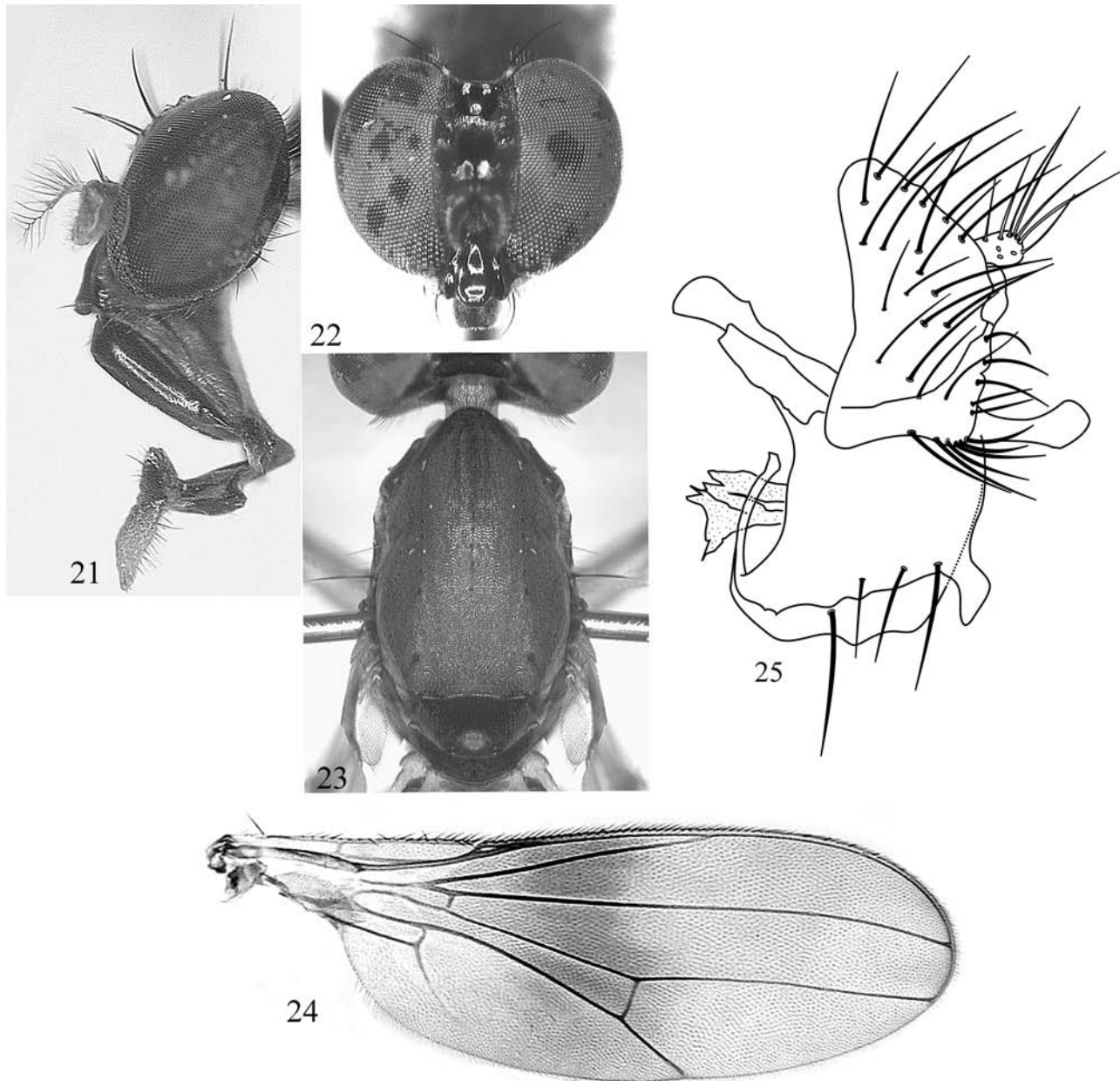
**Thorax:** Figures 23–24. Acrostichal setae in 1 row; scutellum strongly raised (angle with scutum less than 135°), approximately triangular, apex relatively pointed. Costa of male bearing relatively strong, conspicuous spines.

**Male abdomen and terminalia:** Figure 25. Surstylar length subequal to the length of basal margin of epandrium; surstylus posterior, slender, with apex swollen, blunt; anterior process of gonopod about the same length of basal margin of epandrium, well developed; posterior process of gonopod half the length of surstylus; cercus narrow, digitiform, bearing several long and well-developed setae.

**Measurements:** Body length 2.8–3.3 mm. Wing length 2.7–2.9, wing width 0.9–1.1 mm.

**TYPE MATERIAL.** The holotype male is labeled “ECUADOR. P[ue]rt[o] Orellana: Rio Tiputini (0°38.2'S, 76°8.9'W)[,] 12–26 Aug 1999, W. N. Mathis, A. Baptista, M. Kotrba/HOLOTYPE ♂ *Aulacigaster vespertina* Rung & Mathis USNM [red].” The holotype is double mounted (minuten in a block of plastic), is in excellent condition, and is deposited in the USNM. Paratypes are as follows: Same label data as the holotype (1♂, 6♀; EPNE, USNM).

**TYPE LOCALITY.** Ecuador. Orellana: Rio Tiputini (00°38.2'S, 76°08.9'W).



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FIGURES 21–25. Digital photographs (not to same scale) and an illustration of *Aulacigaster vespertina*, new species (male) (the *bromeliae* group, Neotropical Region): (21) head, lateral aspect; (22) head, frontal aspect; (23) thorax, dorsal aspect; (24) right wing, dorsal aspect; (25) epandrium and internal genitalic structures, lateral aspect.

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**DISTRIBUTION.** (Map 2) Neotropical: Ecuador (Orellana).

**ETYMOLOGY.** The specific epithet, *vespertina*, is of Latin derivation and means “of the evening.” This species was collected in late afternoons and early evenings in the rain forest of Ecuadorian Amazon.

**REMARKS.** This species is similar to *A. bromeliae* and *A. korneyevi* in the shape of the mesofrons, which is deeply depressed and has a pair of silver microtomentose marks. It can be easily distinguished from the *A. bromeliae* by the characters given in the key and diagnosis. Like *A. korneyevi*, *A. vespertina* has a dark fronto-orbital plate, lacks a medial vertical seta, and has a well-developed posterior gonopodal process, including a similar arrangement of the gonopodal setae. The surstylus of *A. vespertina* differs from that of *A. korneyevi* in the shape of the swollen apex, being somewhat rounded in *A. vespertina* but strongly triangular in *A. korneyevi*.

#### THE ECUADORIENSIS GROUP

FIGURES 26–61, 205–206, MAP 3

**DIAGNOSIS.** The *ecuadoriensis* group is distinguished from other species groups by the following combination of characters: Relatively large, dorsoventrally flattened flies with elongate body, body length 3.0–5.2 mm. Coloration and vestiture: Vertex mostly polished; ocellar tubercle mostly polished; frons mostly brown, anterior margin pale, yellowish. Scutum mostly devoid of microtomentum (rarely microtomentose on posterior margin, between dorsocentral setae); pleura and legs white to yellowish on ventral half. Wing often partly infusate.

**Morphology:** Body elongate, scutal ratio 1.5–1.75.

**Head:** Typically longer than high (head ratio higher than 1.1); 1st flagellomere triangular or round; face at level of pseudovibrissal seta narrower than width of 1st<sup>st</sup> flagellomere; face typically with dorsal 2/3 flat, ventral portion projected, bulbous, easily visible in lateral view; ocellar seta absent; medial vertical seta about 3/4 length of lateral vertical seta, sometimes slightly proclinate.

**Thorax:** Costal vein of the male with or without differentiated spines. Subcosta partially fused with vein R<sub>1</sub> apically but terminating on costal vein. Hind femur of male and female modified, with 2 ventral rows of spines, each spine bearing an apical seta; hind femur of male with or without a sub-basal lobe.

**Male abdomen and terminalia:** Surstylus in lateral view a wide, posterior ventral extension of epandrium or a short, posteroventral lobe; cerci partially fused; subepandrial

sclerite forming a single, plate-like structure; gonopods short, wide, with a few central setulae and 2 posterior processes (one process weakly developed in *A. stenoptera*), one of them with 4–7 strong, stout setae.

**DISTRIBUTION.** Neotropical: Brazil, Costa Rica, Ecuador, Panama, Peru.

**BIOLOGY.** The biology of this species group is mostly unknown. *Aulacigaster ecuadoriensis* has been collected on leaves of Heliconiaceae.

**DISCUSSION.** Species of the *ecuadoriensis* group can be best identified by the shape of the 1st flagellomere, the coloration of the wings, the presence/absence of a lobe on the hind femur of the male, the coloration of the face, and the shape of the surstylus.

The *ecuadoriensis* group includes five species of which two were described previously. The group is exclusively Neotropical.

#### *Aulacigaster aenigma*, new species

FIGURES 26–31, MAP 3

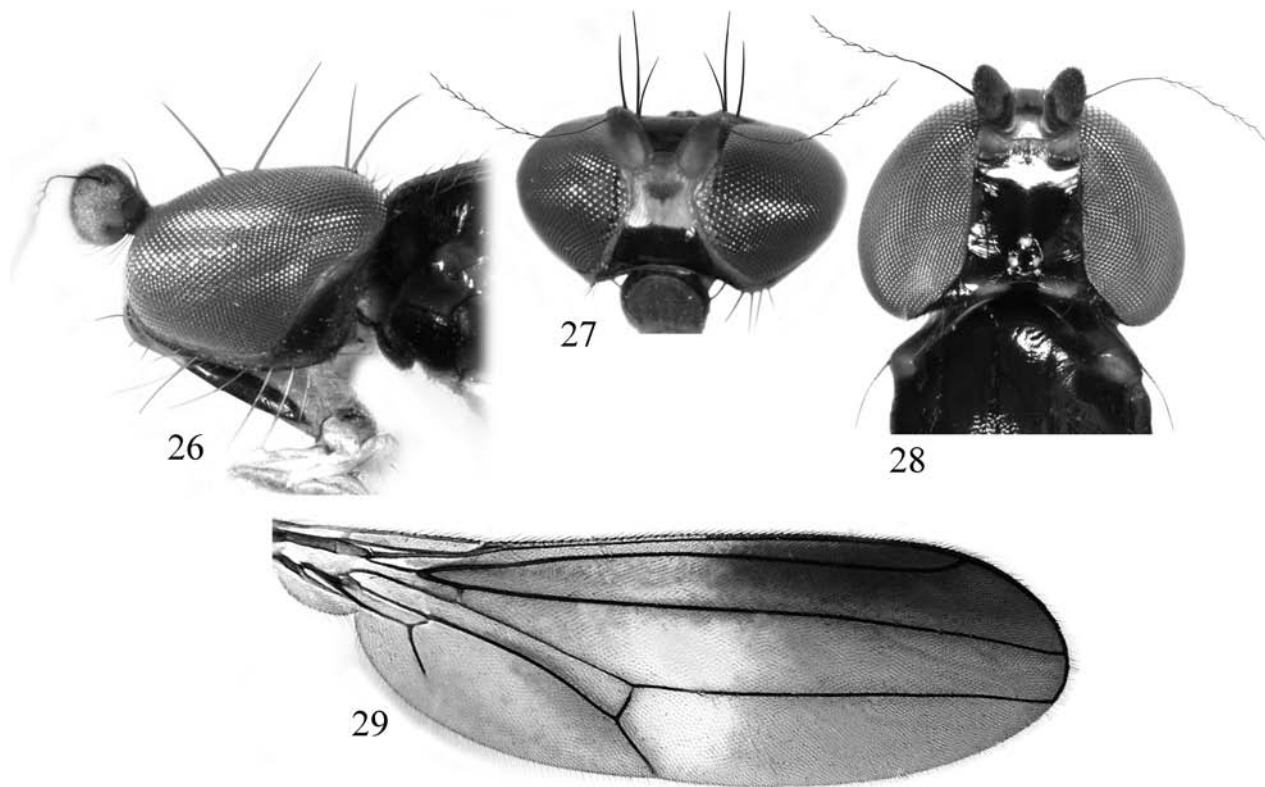
**DIAGNOSIS.** This species is distinguished from congeners by the following combination of characters: Vertex, between medial vertical setae, with a yellow mark interrupted behind ocellar tubercle.

**DESCRIPTION.** Coloration and vestiture: Vertex, between medial vertical setae, with a yellow mark interrupted behind ocellar tubercle; mesofrons mostly polished; antenna pale yellow to yellowish, infusate along dorsal margin; face dark brown on ventral 1/3–1/2 (some teneral specimens with a dark brown facial band, ventral portion of face yellow to light brown); palpus white. Scutum microtomentose near posterior margin, between dorsocentral setae; scutellum dull microtomentose; postpronotum yellowish or light brown; anepisternum subshiny; katepisternum subshiny to dull; halter mostly tan. Wing mostly brown infusate, with a posterior transverse hyaline mark not reaching cell r<sub>2+3</sub>. Abdomen with anterior margin white; male abdomen subshiny to dull; epandrium yellow on anteroventral portion; female abdomen with scarce microtomentum and membranous region between tergites and sternites pale.

**Morphology:**

**Head:** Figures 26–28. First flagellomere round; peristomal area with about 5–7 pale setae following pseudovibrissal seta.

**Thorax:** Figure 29. Acrostichal setae in 1 row; scutellum very weakly raised (making almost no angle with scutum), trapezoidal, apex nearly straight, disk of scutellum



FIGURES 26–29. Digital photographs of *Aulacigaster aenigma*, new species (male) (the *ecuadoriensis* group, Neotropical Region): (26) head, lateral aspect; (27) head, ventral–frontal aspect; (28) head and anterior portion of thorax, dorsal aspect; (29) right wing, dorsal aspect. Not all to the same scale.

slightly convex; basal scutellar seta less than 1/2 length of posterior seta. Costa of male not bearing relatively strong, conspicuous spines. Hind femur of male without a conspicuous lobe.

**Male abdomen and terminalia:** Figures 30–31. Surstylus a short, posteroventral lobe in lateral view, lobe approximately finger-like, tapering apically; cercus bearing 2 well-differentiated setae, the shorter seta less than 1/2 the length of the longer seta; gonopods with 2 subequal posterior processes, one bearing 5–6 strong, stout, setae.

**Female abdomen:** Sternite one reduced to a pair of lateral sclerotized plates; sclerotization on sternites 2–8 obviously weaker than on respective tergites, particularly on medial portion.

**Measurements:** Body length 4.0–4.5 mm. Wing length 4.0–4.5 mm, wing width 0.95–1.0 mm.

**TYPE MATERIAL.** The holotype male is labeled “ECU[ADOR]: Napo, El Chaco, 4.8 km W, 1750 m, 7 Nov 1999, S. A. Marshall, debu00108197/Holotype ♂ *Aulacigaster aenigma* Rung & Mathis UGE [red].” The holotype is double mounted (glued to a point), is in excellent

condition (wing tips slightly folded), and is deposited in the UGE. Paratypes are as follows: Same label data as the holotype (4♂, 4♀; UGE, USNM).

**TYPE LOCALITY.** Ecuador. Napo: El Chaco (4.8 km W; 00°20’S, 77°49’W).

**DISTRIBUTION.** (Map 3) Neotropical: Ecuador (Napo).

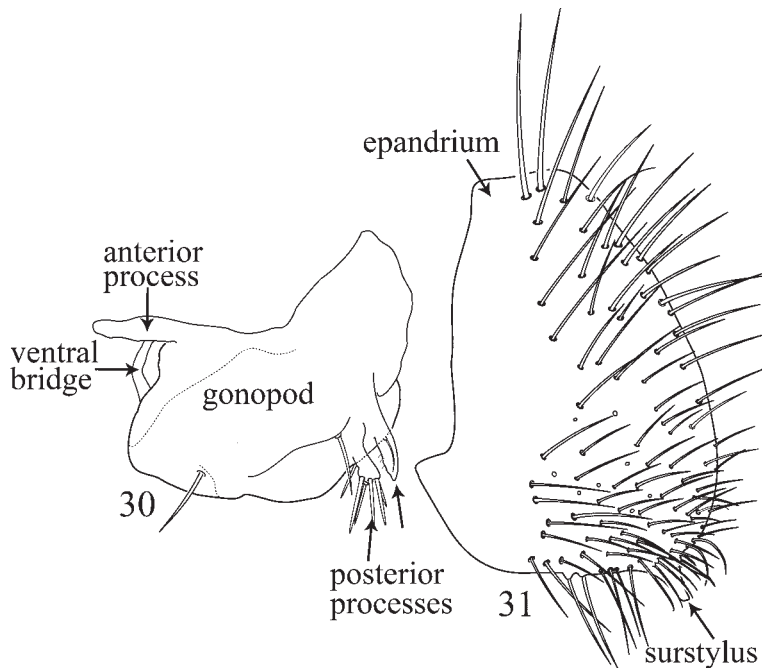
**ETYMOLOGY.** The specific epithet, *aenigma*, is of Greek derivation and means “obscure, or a mystery,” in reference to the unusual features displayed by this species.

**REMARKS.** This species is most similar to *A. fastidiosa*, but can be easily distinguished from it and from other congeners by the characters given in the key and diagnosis.

### ***Aulacigaster ecuadoriensis* (Hennig)**

FIGURES 32–38, 205–206, MAP 3

*Schizochroa ecuadoriensis* Hennig, 1969: 610, 605 [figure of head and wing].—Papavero, 1967: 91 [Neotropical catalog].



FIGURES 30–31. Illustrations of *Aulacigaster aenigma*, new species (male) (the *ecuadoriensis* group, Neotropical Region): (30) gonopod, lateral aspect; (31) epandrium, lateral aspect.

*Aulacigaster ecuadoriensis*.—D. K. McAlpine, 1983: 58 [generic combination].

**DIAGNOSIS.** This species is distinguished from congeners by the following combination of characters: First flagellomere triangular; lobe on hind femur of male present.

**DESCRIPTION.** Coloration and vestiture: Mesofrons mostly polished; antenna pale yellow to yellowish, infuscate along dorsal margin or infuscate on dorsal half; face white to yellowish (infuscate with brown below insertion of pseudovibrissa in some specimens); palpus white or yellowish. Scutellum dull, microtomentose on lateral margins and apex, medial portion of scutellum bright shiny; postpronotum light brown or concolorous with mesonotum; anepisternum subshiny; katepisternum subshiny to dull; halter mostly white, or mostly brown to dark brown. Wing with apical half mostly brown. Abdomen with anterior margin white; male abdomen subshiny to dull; epandrium whitish to pale yellow on anteroventral portion; female abdomen with dense microtomentum medially; lateral margins of tergites nearly polished; membranous region between tergites and sternites pale.

**Morphology:**

**Head:** Figures 32–33, 205–206. First flagellomere triangular; peristomal area with about 4 setae following pseudovibrissal seta.

**Thorax:** Figures 34, 36. Acrostichal setae in 1 row; scutellum slightly raised (angle with scutum approximately 135°), trapezoidal, apex nearly straight, disk of scutellum

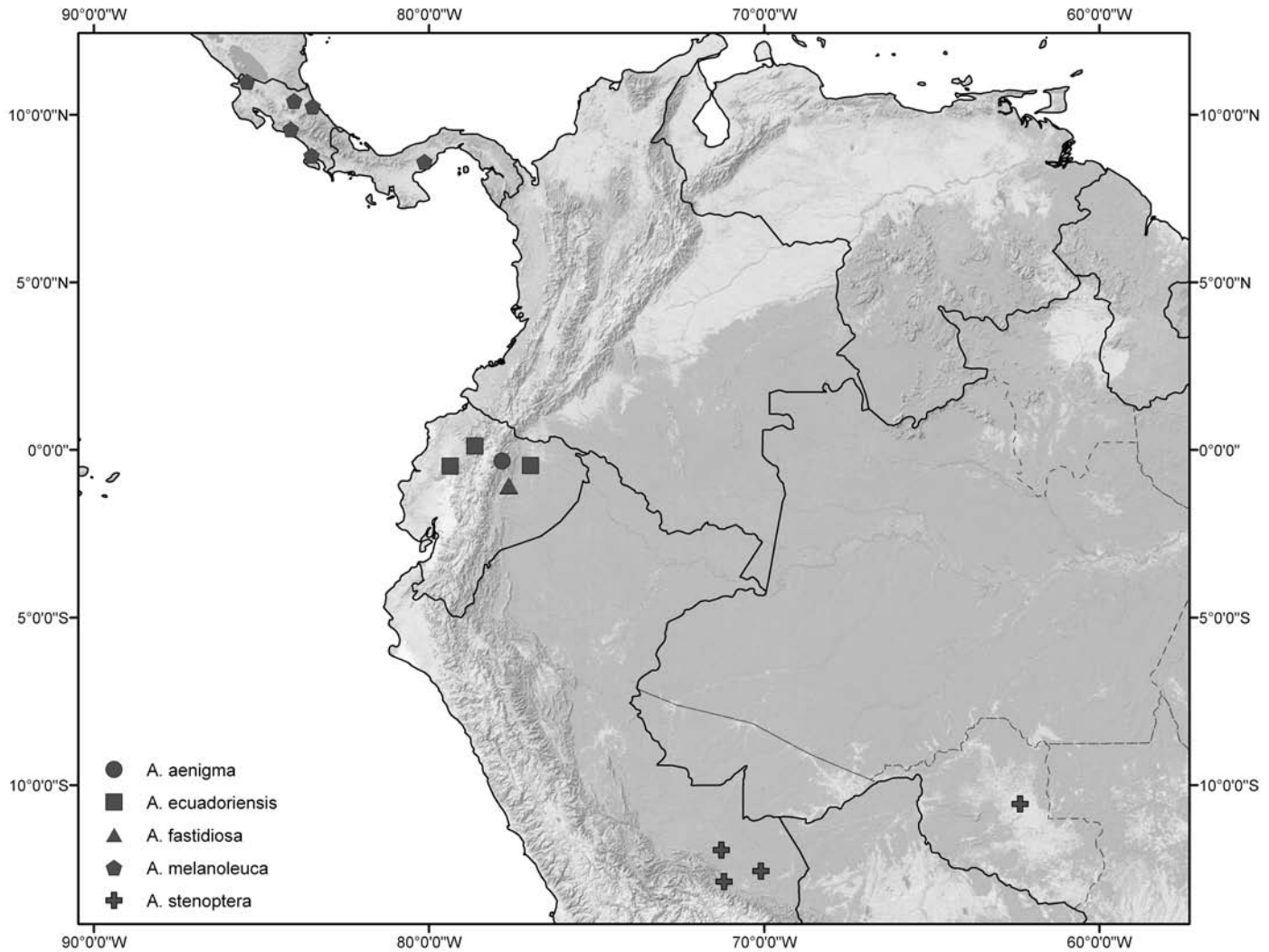
slightly convex; basal scutellar seta less than 1/2 length of posterior seta. Costa of male bearing relatively strong, conspicuous spines. Hind femur of male with a basal lobe not followed by a posterior concavity, lobe approximately triangular, setae on lobe yellow, 10–12, none especially elongate or strong.

**Male abdomen and terminalia:** Figures 37–38. Surstylus a short, posteroventral lobe in lateral view, approximately trapezoidal in shape, with posterior lateral margin slightly longer than anterior margin; cercus bearing 2 well-differentiated setae, the shorter seta less than 1/2 the length of the longer seta; gonopods with 2 posterior processes, one bearing 4–5 strong, stout, setae; anterior, setae-bearing process slightly shorter than posterior, naked process.

**Female abdomen:** Figure 35. Sternite 1 reduced to a pair of lateral round, small plates; sclerotization on sternites 2–8 obviously weaker medially.

**Measurements:** Body length 4.5–4.8 mm. Wing length 4.1–4.3 mm, wing width 0.9–1.1 mm.

**TYPE MATERIAL.** The holotype male is labeled “Coca, Napo R[iver]., Napo, ECUADOR[,] .V.1965 [May 1965] 250m., L. Pena/HOLOTYPUS *Schizochroa ecuadoriensis* Hg. [red][on reverse side “wing on slide”]/Holotype *Schizochroa ecuadoriensis* Hennig CNC No. 9931.” The holotype is glued directly to a pin, lacks a right wing, but otherwise is in good condition, and is deposited in the CNC (9931). Paratypes are as follows: Same label data as the holotype (1♂, 1♀; CNC (9931)).



MAP 3. Distribution of the *ecuadoriensis* species group of *Aulacigaster* (Neotropical Region).

**TYPE LOCALITY.** Ecuador. Orellana: Napo River, Puerto Francisco de Orellana (Coca; 00°28'S, 76°58'W).

**OTHER SPECIMENS EXAMINED.** ECUADOR. Los Ríos: Rio Palenque (00°29'S, 79°22'W), 22–26 Feb 1976, G. and M. Wood (1♂, teneral; CNC). Pichincha: Maquipucuna Biological Research Station (00°07'N, 78°38'W; river trail; *Heliconia* leaves; 1200 m), 26 Apr–29 Oct 1999, 2002, M Buck, S. A. Marshall (13♂, 6♀; UGE).

**DISTRIBUTION.** (Map 3) Neotropical: Ecuador (Los Ríos, Orellana, Pichincha).

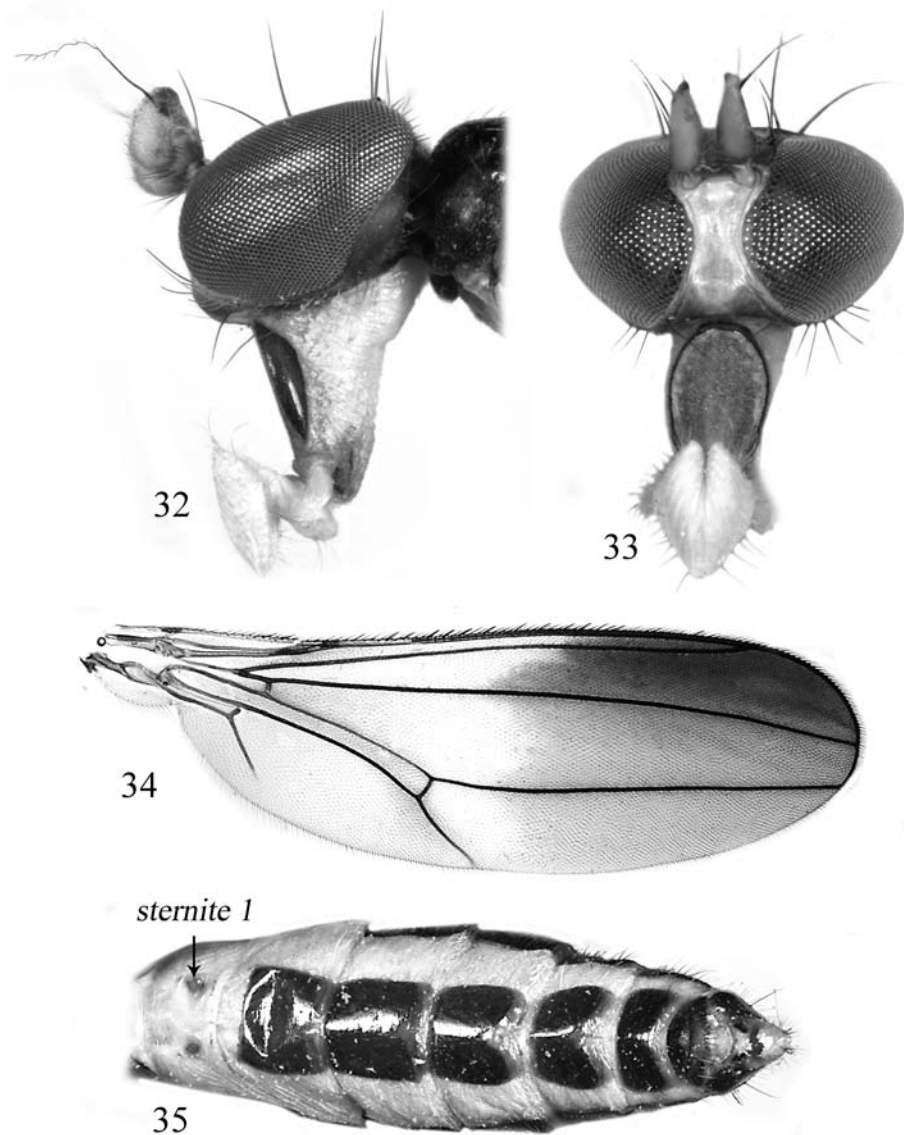
**REMARKS.** This species is similar to *A. melano-leuca* in having the 1st flagellomere triangular and the face mostly yellow. Both species can be easily distinguished with the characters given in the key and diagnosis.

### *Aulacigaster fastidiosa*, new species

FIGURES 39–47, MAP 3

**DIAGNOSIS.** This species is distinguished from congeners by the following combination of characters: 1st flagellomere triangular; costa of male not bearing relatively strong, conspicuous spines.

**DESCRIPTION.** Coloration and vestiture: Mesofrons mostly polished; antenna pale yellow to yellowish, infuscate along dorsal margin; face dark brown on ventral 1/4 to ventral 1/3 (some teneral specimens with a dark brown facial band, ventral portion of face yellow to light brown); palpus white. Scutum and scutellum mostly devoid



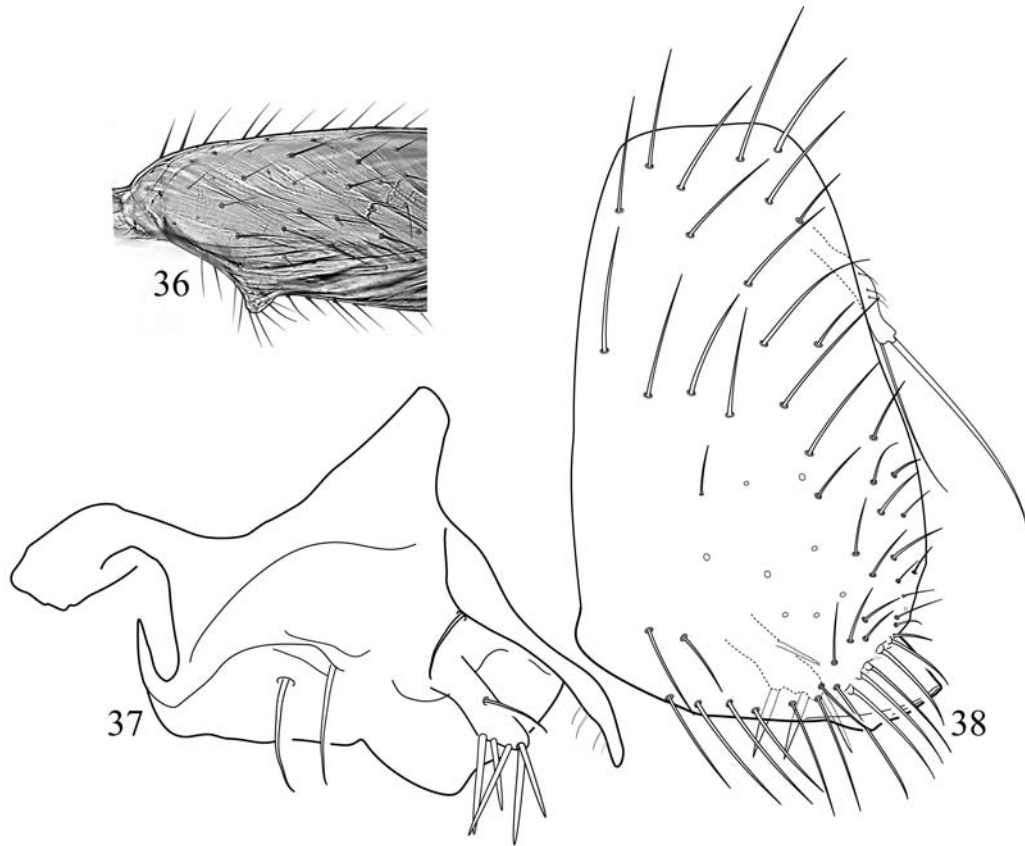
FIGURES 32–35. Digital photographs of *Aulacigaster ecuadoriensis* (Hennig) (the *ecuadoriensis* group, Neotropical Region): (32) head of male, lateral aspect; (33) head, frontal–ventral aspect; (34) left wing of male, dorsal aspect; (35) female abdomen, ventral aspect. Not all to the same scale.

of microtomentum; postpronotum dark brown or concolorous with mesonotum; anepisternum subshiny; katepisternum subshiny to dull; halter white to tan. Wing mostly brown infusate on apical half. Abdomen with anterior margin white; male abdomen subshiny to dull; epandrium yellow on anteroventral portion; female abdomen with scarce microtomentum and membranous region between tergites and sternites pale.

#### Morphology:

*Head:* Figures 42, 44. First flagellomere triangular; peristomal area with about 5–7 setae following pseudovibrissal seta.

*Thorax:* Figures 39–41, 43. Acrostichal setae in 1 row; scutellum not raised (angle with scutum approximately  $0^\circ$ ), trapezoidal, apex nearly straight, disk of scutellum slightly convex; basal scutellar seta less than  $1/2$



FIGURES 36–38. Illustrations of *Aulacigaster ecuadoriensis* (Hennig) (male) (the *ecuadoriensis* group, Neotropical Region): (36) basal portion of the left hind femur, internal aspect; (37) gonopod, lateral aspect; (38) epandrium, lateral aspect. Not all to the same scale.

length of posterior seta. Costa of male not bearing relatively strong, conspicuous spines. Hind femur of male without a conspicuous lobe.

*Male abdomen and terminalia:* Figures 46–47. Surstylus a short, posteroventral lobe in lateral view, approximately triangular in shape; cercus bearing 2 well-differentiated setae, the shorter seta less than 1/2 the length of the longer seta; gonopods with 2 posterior processes, one bearing 5–6 strong, stout, setae; anterior, setae-bearing process shorter than posterior, naked process.

*Female abdomen:* Figure 45. Sternite one reduced to a pair of lateral sclerotized plates; sclerotization on sternites 2–8 obviously weaker than on respective tergites, particularly on medial portion.

*Measurements:* Body length 4.0–4.7 mm. Wing length 3.7–4.0 mm, wing width 1.9–2.0 mm.

**TYPE MATERIAL.** The holotype male is labeled “ECU[ADOR]:Napo, Jatun Sacha Res., 6 km E Misahuallí, 450 m, 1°4’S, 77°37’W, on foliage, 30 Apr–8 May 2002,

M. Buck, debu00186240/Holotype ♂ *Aulacigaster fastidiosa* Rung & Mathis UGE [red].” The holotype is double mounted (glued to a point), is in excellent condition, and is deposited in the UGE. Paratypes are as follows: Same label data as the holotype (15♂, 6♀; UGE, USNM); same locality and collector as the holotype, but date of 4–7 May 2002 (1♂, 4♀; UGE).

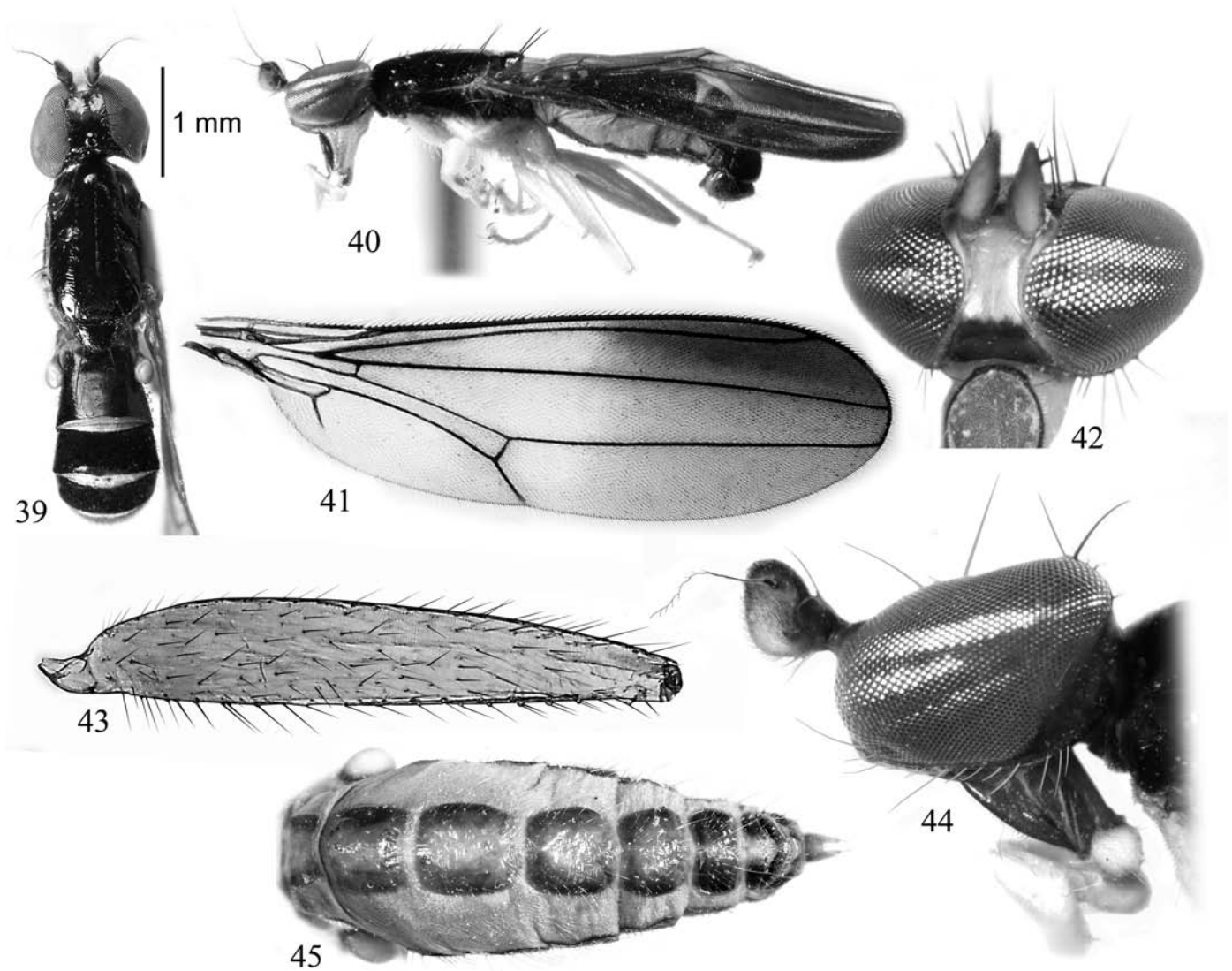
**TYPE LOCALITY.** Ecuador. Napo: Masahuallí (6 km E; 01°04’S, 77°37’W; 450 m).

**DISTRIBUTION.** (Map 3) Neotropical: Ecuador (Napo).

**BIOLOGY.** The type series was collected “on foliage.”

**ETYMOLOGY.** The specific epithet, *fastidiosa*, is of Latin derivation and has reference to the delicate appearance of this species.

**REMARKS.** This species is most similar to *A. aenigma* but can be easily distinguished from it and from other congeners by the characters given in the key and diagnosis.



FIGURES 39–45. Digital photographs of *Aulacigaster fastidiosa*, new species (the *ecuadoriensis* group, Neotropical Region). (39) body of male, dorsal aspect; (40) body of male, lateral aspect; (41) right wing of male, dorsal aspect; (42) head of male, frontal–ventral aspect; (43) hind femur of male, dorsal aspect; (44) head of male, lateral aspect; (45) female abdomen, ventral aspect. Not all to the same scale.

### *Aulacigaster melanoleuca* (Hennig)

FIGURES 48–58, MAP 3

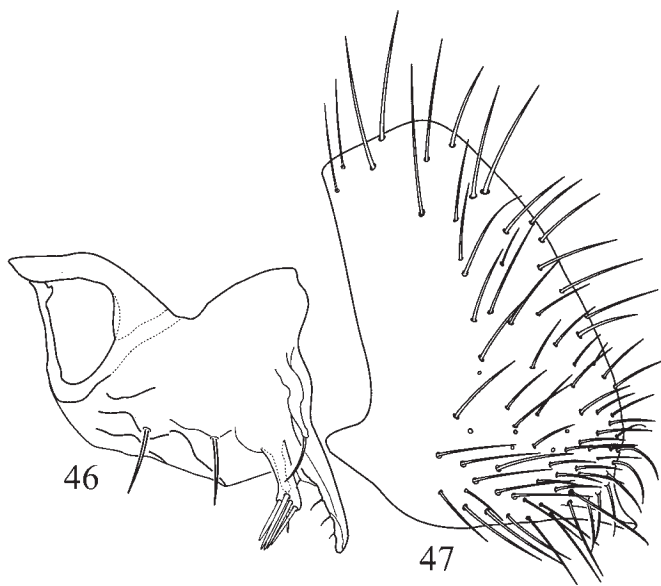
*Schizochroa melanoleuca* Hennig, 1956:152–154 [figure of head, wing and male postabdomen].—Papavero, 1967:91 [Neotropical catalog].

*Aulacigaster melanoleuca*.—D. K. McAlpine, 1983:58 [generic combination].

**DIAGNOSIS.** This species is distinguished from congeners by the following combination of characters: First

flagellomere triangular; wing with apical 2/3 of cells  $r_1$  and  $r_{2+3}$  dark brown, remaining wing light brown; female abdomen with membranous region between tergites and sternites brown to dark brown.

**DESCRIPTION.** Coloration and vestiture: Mesofrons mostly polished; antenna pale yellow to yellowish, infusate along dorsal margin or infusate on dorsal half; face white to yellowish (infusate with brown below insertion of pseudovibrissa in some specimens); palpus white, or yellowish. Scutellum commonly dull microtomentose on lateral margins and apex, medial portion of scutellum



FIGURES 46–47. Illustrations of *Aulacigaster fastidiosa*, new species (male) (the *ecuadoriensis* group, Neotropical Region). (46) gonopod, lateral aspect; (47) epandrium, lateral aspect.

bright shiny; postpronotum concolorous with mesonotum; anepisternum subshiny; katepisternum subshiny to dull; halter mostly brown to dark brown (base whitish). Wing with apical 2/3 of cells  $r_1$  and  $r_{2+3}$  dark brown, remaining wing light brown. Abdomen with anterior margin white; male abdomen subshiny to dull; epandrium whitish to pale yellow on anteroventral portion; female abdomen with dense microtomentum medially, lateral margins of tergites nearly polished; female abdomen with membranous region between tergites and sternites brown to dark brown.

**Morphology:**

**Head:** Figures 50–51. First flagellomere triangular; peristomal area with about 4 setae following pseudovibrissal seta.

**Thorax:** Figures 48–49, 52–53. Acrostichal setae in 1 row; scutellum slightly raised (angle with scutum approximately  $135^\circ$ ), trapezoidal, apex nearly straight, disk of scutellum flat or slightly convex; basal scutellar seta less than 1/2 length of posterior seta. Costa of male bearing relatively strong, conspicuous spines. Hind femur of male without a conspicuous lobe.

**Male abdomen and terminalia:** Figures 56–58. Surstylus a short, posteroventral lobe in lateral view, lobe with sub-basal constriction, round at apex, posterior-ventral margin slightly folded dorsally; cercus bearing 2 well-differentiated setae, the shorter seta less than 1/2 the length of the longer seta; gonopods with 2 subequal posterior processes, one bearing 4–5 strong, stout setae.

**Female abdomen:** Figures 54–55. Sternite 1 reduced to a pair of round lateral sclerotized plates and an anterior, thin stripe; sclerotization on sternites 2–8 not obviously weaker than on respective tergites.

**Measurements:** Body length 4.7–5.2 mm. Wing length 4.2–4.3 mm, wing width 2.2–2.5 mm.

**TYPE MATERIAL.** The holotype male is labeled “Costa Rica[,] Farm Hamburg am Reventazon[,] 8.3.28. [8 Mar 1928][green]/Eing. 1928 No 54 [handwritten on underside of green label]/Holotypus [red] 1972 [handwritten on underside of “Holotypus” label]/Holotypus [black submargin on red label]/Coll. DEI Eberswalde. The holotype is double mounted, is in fair condition (the proboscis, left antenna, right wing, and abdomen beyond the first tergite are missing), and is deposited in DEI. Paratypes are as follows: Same label data as the holotype (4♂, 3♀, 2 ex. (abdomens missing); DEI).

**TYPE LOCALITY.** Costa Rica. Limón: Hamburg Farm on the Río Reventazón ( $10^\circ 15'N$ ,  $83^\circ 28'W$ ).

**OTHER SPECIMENS EXAMINED.** COSTA RICA. Heredia: La Selva Biological Station, Puerto Viejo (3 km S;  $10^\circ 25'N$ ,  $84^\circ 01'W$ ), 26 Mar–8 Aug, 1980, 1982, 1984, 1986, 1987, 1992, H. A. Hespeneheide (3♂, UCLA; 2♂, 2♀; USNM; 1♂, 5♀; CSCA); La Selva Biological Station, Puerto Viejo (3 km S;  $10^\circ 25'N$ ,  $81^\circ 01'W$ ; under palm leaf), 17 Feb 2003, S. D. Gaimari (1♀; CSCA). Guanacaste: Estación Pitilla, Santa Cecilia (9 km S;  $10^\circ 59.5'N$ ,  $85^\circ 25.8'W$ ), C. Moranga, Jul 1991 (3♂, 1♀; INBio). Puntarenas: Piedras Blancas (24 km W;  $08^\circ 47'N$ ,  $83^\circ 30'W$ ; Malaise trap), Oct 1990, P. Hanson (2♀; USNM). San José: RioParaiso ( $09^\circ 33.8'N$ ,  $84^\circ 07.4'W$ ; 350–400 m), 15–17 Feb 2003, W. N. Mathis (1♂; USNM).

PANAMA. Coclé: El Valle ( $08^\circ 36'N$ ,  $80^\circ 08'W$ ), Jan 1947, N. L. H. Krauss (1♂; USNM).

**DISTRIBUTION.** (Map 3) Neotropical: Costa Rica (Guanacaste, Heredia, Limón, Puntarenas, San José), Panama (Coclé).

**REMARKS.** See “Remarks” under *A. ecuadoriensis*.

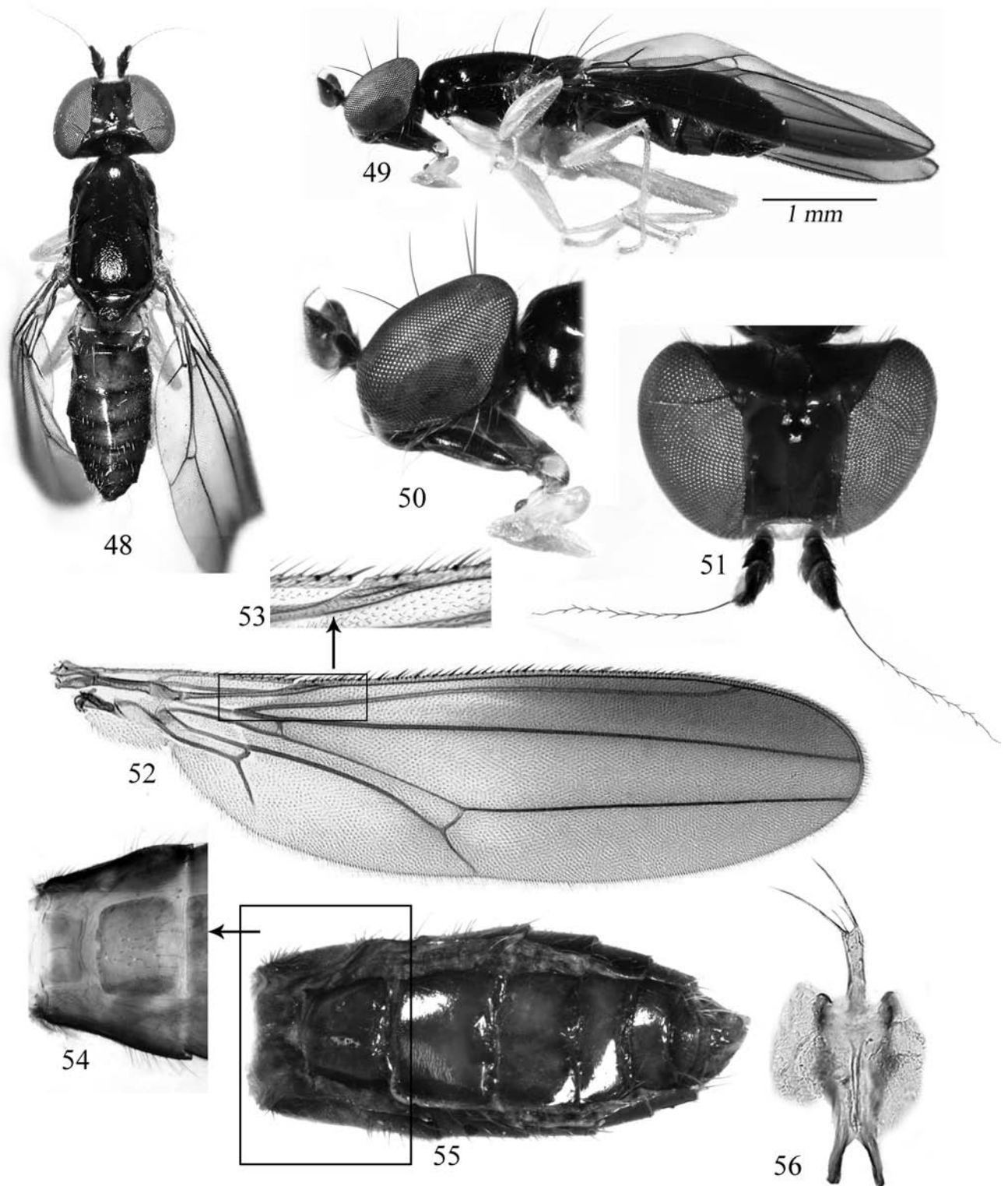
***Aulacigaster stenoptera*, new species**

FIGURES 59–61, MAP 3

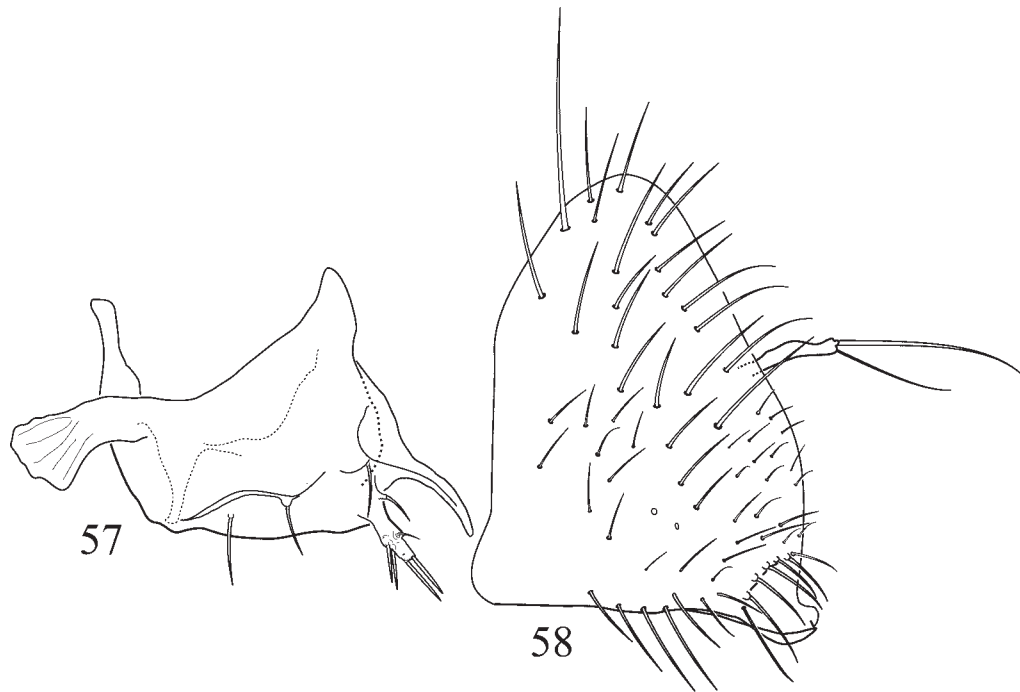
**DIAGNOSIS.** This species is distinguished from congeners by the following combination of characters: Thoracic pleura white to pale yellow on ventral half; 1st flagellomere round; wing mostly brown, infuscate (cells  $r_{2+3}$  and anterior half of wing more heavily infuscate).

**DESCRIPTION.** Coloration and vestiture: Mesofrons mostly polished; antenna pale yellow to yellowish,





FIGURES 48–56. Digital photographs of *Aulacigaster melanoleuca* (Hennig) (the *ecuadoriensis* group, Neotropical Region). (48) body of male, dorsal aspect; (49) body, lateral aspect; (50) head of male, lateral aspect; (51) head of male, dorsal aspect; (52) right wing of male, dorsal aspect; (53) enlargement of costal section, dorsal aspect; (54) sternites 1 and 2 of female abdomen (after KOH cleaning), ventral aspect; (55) female abdomen, ventral aspect; (56) subepandrial sclerite of male, ventral aspect. Not all to the same scale.



FIGURES 57–58. Illustrations of *Aulacigaster melanoleuca* (Hennig) (male) (the *ecuadoriensis* group, Neotropical Region). (57) gonopod, lateral aspect; (58) epandrium, lateral aspect.

not infusate dorsally or infusate along dorsal margin; face white to yellowish; palpus white. Scutellum dull microtomentose; postpronotum concolorous with mesonotum, mostly polished; anepisternum polished; katapisternum subshiny to dull; halter mostly brown to dark brown. Wing mostly brown, infusate (cells  $r_{2+3}$  and anterior half of wing more heavily infusate). Male abdomen subshiny to dull; female abdomen subshiny.

**Morphology:**

**Head:** Figure 59. First flagellomere round; 2–4 peristomal setae following pseudovibrissal setae present.

**Thorax:** Acrostichal setae in 1 row; scutellum slightly raised (angle with scutum approximately  $135^\circ$ ), approximately triangular, apex relatively pointed, disk of scutellum slightly convex; basal scutellar seta less than  $1/2$  length of posterior seta. Costal vein of the male without differentiated spines. Hind femur of male with a basal lobe not followed by a posterior concavity, lobe small, approximately triangular, setae on lobe 2–3; hind tibia with a row of tiny ventral spines.

**Male abdomen and terminalia:** Figures 60–61. Surstylus in lateral view a wide, ventral extension of the epandrium; cercus bearing 2 well-differentiated setae, the shorter seta less than  $1/2$  the length of the longer seta; gonopods

short, wide, with a few central setulae and two posterior processes, none bearing strong seate, posterior process only weakly developed.

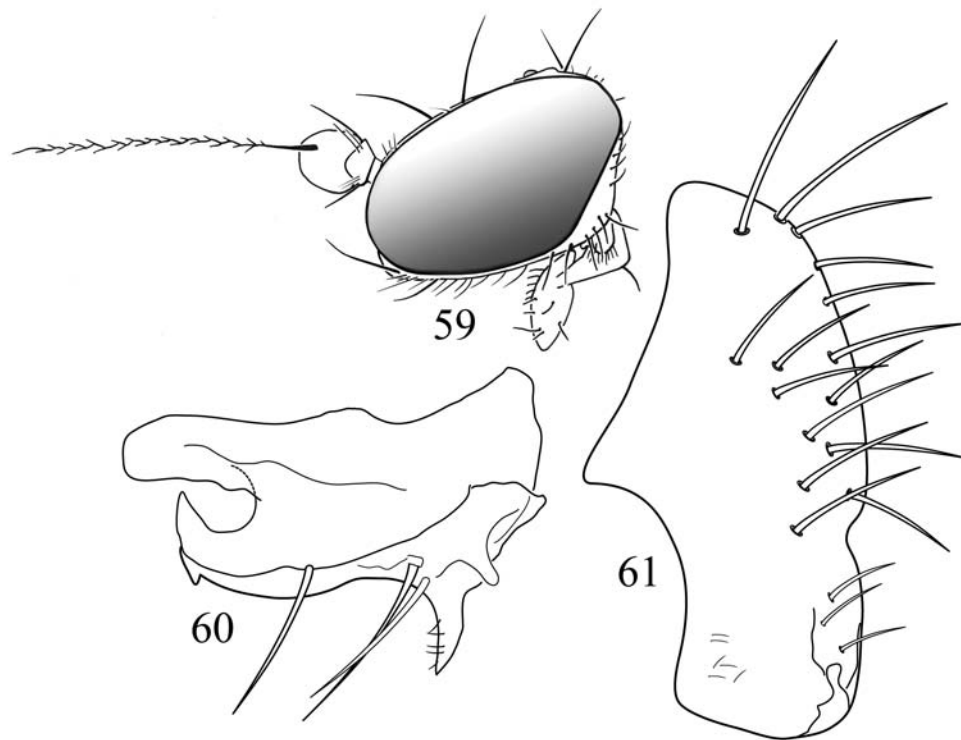
**Measurements:** Body length 3.0–3.3 mm. Wing length 3.0–3.1 mm, wing width 0.7–0.8 mm.

**TYPE MATERIAL.** The holotype male is labeled “PERU. Madre de Dios: Manu, Rio Manu, 250 m[,] Pakitza,  $12^\circ 7' S$ ,  $70^\circ 58' W$ , 9–23 Sep 1988[,] Amnon Freidberg/HOLOTYPE ♂ *Aulacigaster stenoptera* Rung & Mathis USNM [red].” The holotype is double mounted (minuten in a block of plastic), is in excellent condition, and is deposited in the USNM. Paratypes are as follows: Same label data as the holotype (1♂; USNM). PERU. Madre de Dios: Cocha Salvador ( $11^\circ 57' S$ ,  $72^\circ 07' W$ ; 240 m), 14 Sep 1988, A. Freidberg, W. N. Mathis (11♂, 12♀; MHNJP, USNM); Pakitza, Aguajal ( $11^\circ 58.2' S$ ,  $71^\circ 17' W$ ), 19 Sep 1988, A. Freidberg (8♂, 4♀; USNM).

**TYPE LOCALITY.** Peru. Madre de Dios: Manu, Rio Manu, Pakitza ( $11^\circ 56.6' S$ ,  $71^\circ 16.9' W$ ; 250 m).

**OTHER SPECIMENS EXAMINED.** BRAZIL. Rondônia: Ariquemes (62 Km SE;  $10^\circ 34' S$ ,  $62^\circ 22' W$ ), 15–22 Mar 1991, W. J. Hanson, G. Bohart (1♀, USU).

PERU. Madre de Dios: Los Amigos Biological Station ( $12^\circ 34' S$ ,  $70^\circ 06.1' W$ ), 2–4 Jun 2006, S. Paiero, J. Klymko



FIGURES 59–61. Illustrations of *Aulacigaster stenoptera*, new species (male) (the *ecuadoriensis* group, Neotropical Region). (59) head, lateral aspect; (60) gonopod, lateral aspect; (61) epandrium, lateral aspect. Not all to the same scale.

(1♂, 2♀; UGE); Rio Manu, Erika (near Salvación; 12°53'S, 71°12'W; 550 m), 5–6 Sep 1988, A. Freidberg (1♀; USNM).

**DISTRIBUTION.** (Map 3) Neotropical: Brazil (Rondônia), Peru (Madre de Dios).

**ETYMOLOGY.** The specific epithet, *stenoptera*, is of Greek derivation and is a combination of the Greek words for narrow (*steno*) and wing (*ptera*).

**REMARKS.** This species is peculiar to the *A. ecuadoriensis* group and is distinguished by the rounded 1st flagellomere and the gonopods that lack a posterior process that bears setae. The shape of the surstylus is also unique for this species.

#### THE FEMORATA GROUP

FIGURES 62–98, 207–208, MAPS 4–6

**DIAGNOSIS.** The *femorata* group is distinguished from other species groups by the following

combination of characters: Relatively small, delicate-looking flies, body length 2.0–3.5 mm. Coloration and vestiture: Frons mostly brown, anterior margin pale, yellowish; anterior portion of frons sometimes densely microtomentose on anterior 1/6, silver from certain angles. Scutum typically mostly devoid of microtomentum; anepisternum polished; katepisternum mostly polished. Wing often with apex slightly infuscate. Abdomen with a yellowish region on syntergite 1+2.

#### Morphology:

**Head:** Head higher than long (head ratio less than 0.9), or longer than high (head ratio higher than 1.1); margins of the eye nearly parallel; face slightly convex, barely visible in lateral view; ocellar seta typically hair-like; medial vertical setae often convergent and slightly proclinate.

**Thorax:** Subcosta incomplete, fused with vein  $R_1$  apically. Hind femur of male and female modified with 2 ventral rows of spines, each spine bearing an apical seta; hind tibia with a row of tiny ventral spines; hind femur of male often bearing a sub-basal lobe.

*Male abdomen and terminalia:* Surstylus in lateral view a wide, ventroposterior extension of epandrium, cerci often partially fused; subepandrial sclerite often forming a single, T-shaped structure; gonopods approximately rectangular, with a long, posterior, digitiform process. Cercus bearing 1 long, apical seta.

**DISTRIBUTION.** Neotropical: Brazil, Bolivia, Costa Rica, Ecuador, Guyana, Paraguay, Peru, Trinidad and Tobago. (Even though Brazil and the island of Trinidad and Tobago are not listed as localities for any of the species described below, we have studied two females from Brazil (Rondônia: 62 Km SE of Ariquemes, 13–25 Apr 1992 and 7–18 Nov 1995, W. J. Hanson) and one from Trinidad and Tobago (Simla Research Station, 2–15 Jun 1981, W. J. Hanson and Clemons) that belong in the *femorata* group, near *A. femorata* new species).

**DISCUSSION.** Species of the *femorata* group are distinguished best by the shape of the basal lobe on the male hind femur and the coloration of the legs. For the most part, females can only be identified with certainty when males are present in the sample.

The *femorata* group includes seven species of which six are newly described here. The group is exclusively Neotropical.

### ***Aulacigaster bella*, new species**

FIGURES 62–68, MAP 4

**DIAGNOSIS.** This species is distinguished from congeners by the following combination of characters: Abdomen with a yellowish region starting on syntergite 1+2, reaching tergite 4; fore tarsus mostly brown, basitarsomere yellow.

**DESCRIPTION.** Coloration and vestiture: Vertex mostly polished; ocellar tubercle mostly polished; mesofrons with a medial microtomentose stripe from base of antenna to level of anterior fronto-orbital seta; antenna pale yellow to yellowish, infuscate along dorsal margin; face pale yellow; palpus white. Scutum dull microtomentose on anteriormost portion (anterior 1/5), microtomentum faded on midline of scutum, between dorsocentral setae rows; scutellum mostly dull microtomentose; postpronotum concolorous with mesonotum, mostly polished; halter mostly white. Fore coxa yellow, fore femur yellowish, fore tibia yellowish, fore tarsus brown to dark brown, basal tarsomere yellow; mid coxa yellow, mid femur yellowish (tip slightly darkened in some specimens), mid tibia yellowish, mid tarsus mostly or entirely yellowish, apical and subapical tarsomere brownish to dark brown; hind coxa yellow, hind femur yellow on basal portion, apical portion dark (apical 1/3–1/2), hind tibia brown to black on central portion, base and apex

yellowish, hind tarsus yellowish. Male abdomen subshiny to dull, pregenital segment polished anteriorly, dull posteriorly.

**Morphology:**

*Head:* Figure 63. Face at level of pseudovibrissal seta narrower than width of 1st flagellomere; medial vertical seta 1/2 length of lateral vertical seta.

*Thorax:* Figures 62, 64, 66. Acrostichal setae in 2 rows; scutellum very weakly raised (making almost no angle with scutum), approximately cylindrical, apex relatively pointed. Hind femur of male with a basoventral lobe followed by a slight concavity, lobe approximately cylindrical, bearing 1 apical and 2 subapical setae; lobe preceded by a few yellow setae.

*Male abdomen and terminalia:* Figures 65, 67–68. Surstylus about as wide as posterior process of gonopod; lateral margins of surstylar projection approximately parallel, slightly convergent toward apex; surstylus with subapical posterior projection, forming a roughly triangular apex; gonopod as in Figure 67.

*Measurements:* Body length 2.5–3.0 mm. Wing length 2.3–2.4, wing width 1.7–1.8 mm.

**TYPE MATERIAL.** The holotype male is labeled “C[osta]R[ica], Prov. Limón, Bribri, 4 km NE, 50 m, Dec 1989–Mar 1990, P.Hanson, debu00100753/HOLOTYPE ♂ *Aulacigaster bella* Rung & Mathis UGE [red].” The holotype is double mounted (glued to a point), is in good condition (wings slightly folded, some head setae missing or disoriented), and is deposited in the UGE. Paratypes are as follows: same locality, date and collector as the holotype (3♂, 1♀; UGE, USNM).

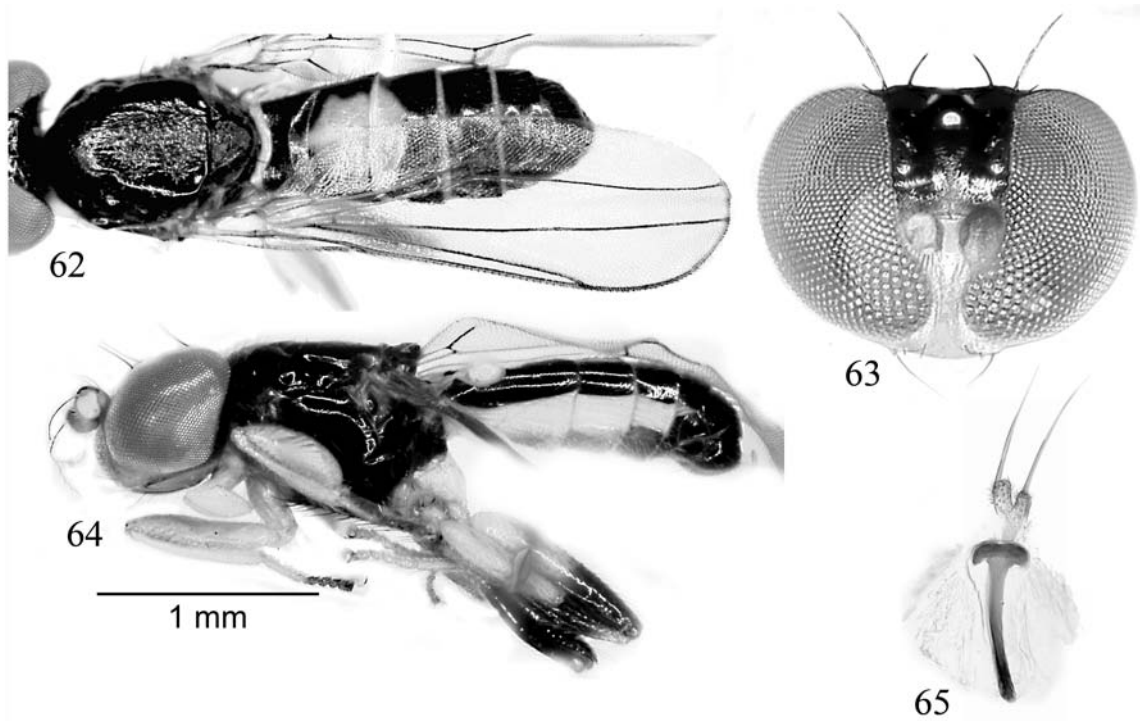
**TYPE LOCALITY.** Costa Rica. Limón: Bribri (4 km NE; 09°39'N, 82°49'W).

**OTHER SPECIMENS EXAMINED.** BOLIVIA. La Paz: Mapiri (5 km W Mapiri; 15°17.8'S, 68°15.6'W; 750 m), 16 Mar 2001, W. N. Mathis (2♂, 2♀; USNM).

COSTA RICA. Alajuela: Higuato, San Mateo (09°57'N, 84°33'W), Pablo Schild (2♂; USNM). Limón: Bribri (09°38'N, 82°50'W; Malaise trap), Jul–Sep 1990, P. Hanson (1♂, 1♀; USNM); Dec 1989–Mar 1990, P. Hanson (1♂; USNM).

ECUADOR. Orellana: Reserva Etnica Waorani, Onkonegare Camp (1 km S; 0°39.4'S, 76°27.2'W; 216 m; lot #1549), 21 Jun 1996, T. L. Erwin (1♀; USNM). Pichincha: Santo Domingo de los Colorados (1.6 km W; 0°15'S, 79°09'W), E. S. Ross, E. I. Schlinger, 23 Feb 1955 (1♂; CAS). Zamora-Chinchipec: Cumbaratza (3°59.4'S, 71°51.8'W; 700 m), 31 Mar 1965, L. E. Peña (1♂; CNC).

PARAGUAY. Cazaapá, San Rafael, Hermosa, Lopez Family Residence (26°19.3'S, 55°44.9'W; 90 m), 3–6 Dec 2000, Z. H. Falin (1♀; UGE).



FIGURES 62–65. Digital photographs of *Aulacigaster bella*, new species (male) (the *femorata* group, Neotropical Region). (62) thorax and abdomen, dorsal aspect; (63) head, frontal aspect; (64) body, lateral aspect; (65) subepandrial sclerite, ventral aspect. Not all to the same scale.

**DISTRIBUTION.** (Map 4) Neotropical: Bolivia (La Paz), Costa Rica (Alajuela, Limón), Ecuador (Orellana, Pichincha, Zamora-Chinchi), Paraguay.

**ETYMOLOGY.** The specific epithet, *bella*, is of Latin derivation and means “beautiful.”

**REMARKS.** The specimens listed under “Other Specimens Examined” have the scutellum more strongly raised than the type series. *Aulacigaster bella* can be easily distinguished from congeners by the characters given in the key and diagnosis. The approximately cylindrical lobe followed by a concavity and the shape of the surstylus are also characteristic of this species.

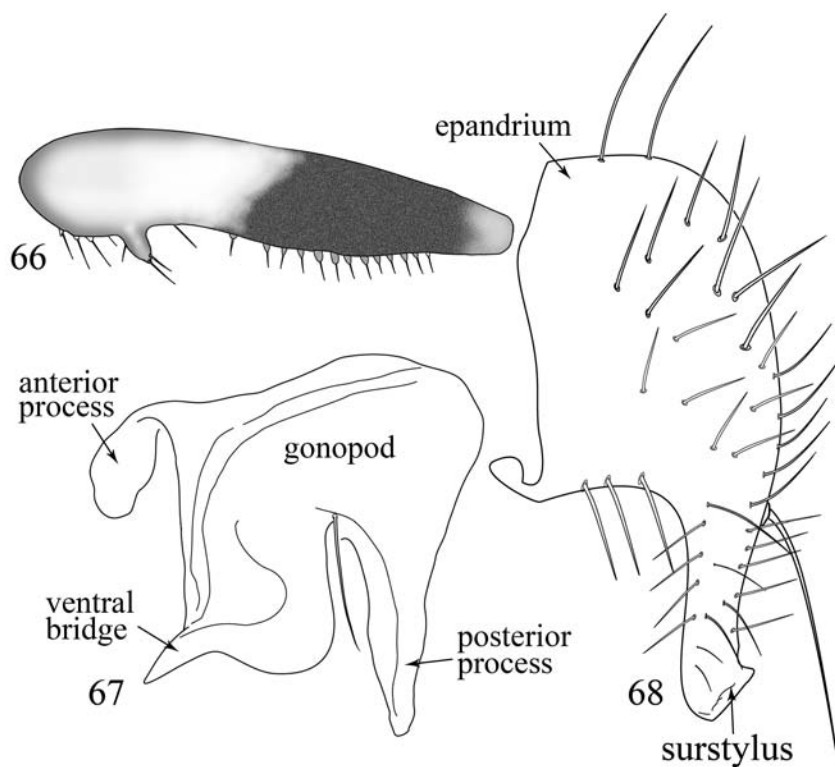
### ***Aulacigaster erwini*, new species**

FIGURES 69, MAP 4

**DIAGNOSIS.** This species is distinguished from congeners by the following combination of characters: Postpronotum yellow to yellowish-brownish; hind femur completely yellow, with a basoventral lobe followed by a

distinct concavity, lobe approximately rectangular; hind tibia yellow with a narrow brown mark on apical 2/3.

**DESCRIPTION.** Coloration: Vertex mostly polished; ocellar tubercle mostly polished; mesofrons with a faint medial microtomentose stripe from base of antenna to level of ocellar tubercle; antenna pale yellow to yellowish, infuscate along dorsal margin; face yellow (pale); palpus yellowish. Scutum dull microtomentose on anteriormost portion; scutellum dull posteriorly, anterior portion shiny; postpronotum yellow to yellowish-brownish, microtomentose over ventral and posterior margins, otherwise polished; halter mostly white (base infuscate). Male abdomen subshiny to dull, pregenital segment polished posteriorly, dull anteriorly (slightly so). Fore coxa yellow, fore femur yellowish, fore tarsus mostly or entirely yellowish, apical and sometimes subapical tarsomeres brownish; mid coxa yellow, mid femur yellowish, mid tibia yellowish, mid tarsus mostly yellowish; hind coxa yellow, hind femur yellow, hind tibia yellowish, with a small brown mark near apical 2/3, hind tarsus yellowish.



FIGURES 66–68. Illustrations of *Aulacigaster bella*, new species (male) (the *femorata* group, Neotropical Region). (66) left hind femur, medial aspect; (67) gonopod, lateral aspect; (68) epandrium, lateral aspect. Not all to the same scale.

#### Morphology:

**Head:** Face at level of pseudovibrissal seta narrower than width of 1st flagellomere; medial vertical seta 1/2 length of lateral vertical seta.

**Thorax:** Acrostichal setae in 1 row; scutellum slightly raised (angle with scutum approximately 135°), approximately triangular, apex relatively pointed. Hind femur of male with a basoventral lobe followed by a distinct concavity, lobe approximately rectangular; setae on lobe pale yellow, 4–6, lobe preceded by a few yellow setae.

**Male abdomen and terminalia:** Figure 69. Surstylus apically approximately 2 times the width of posterior process of gonopod, surstyler projection constricted subbasally, apex of surstylus approximately round to foot-shaped; gonopod as in Figure 69.

**Measurements:** Body length 3.1 mm, wing length 2.6 mm, wing width 0.6 mm.

**TYPE MATERIAL.** The holotype male is labeled “ECUADOR. Orellana: Res. Etnica Waorani (0°39.4’S, 76°27.2’W; 216 m; lot #1089)[,] 2 Jul 1995, T. L. Erwin/ HOLOTYPE ♂ *Aulacigaster erwini* Rung & Mathis USNM [red].” The holotype is double mounted (glued to a point), is in good condition (apical segments of abdomen removed, dissected, and stored in an attached microvial), and is held in trust at the USNM for eventual deposit in

Ecuador. Paratype is as follows: same locality and collector as the holotype, but date of 2 Oct 1996 and lot number 1720 (1♀; USNM).

**TYPE LOCALITY.** Ecuador. Orellana: Reserva Etnica Waorani, Onkonegare Camp (1 km S; 0°39.4’S, 76°27.2’W; 216 m).

**DISTRIBUTION.** (Map 4) Neotropical: Ecuador (Orellana).

**ETYMOLOGY.** The specific epithet, *erwini*, is a genitive patronym to honor and recognize Dr. Terry L. Erwin for his numerous contributions to entomology. He also was the collector of the type series.

**REMARKS.** This species is similar to *A. femorata* but can be easily distinguished from that species by the characters given in the key and diagnosis. *Aulacigaster lobata* is also very similar to and difficult to tell apart from *A. erwini*. Both species share a yellow hind femur with a rectangular lobe followed by a distinct concavity. The concavity on the hind femur of *A. erwini*, however, is less pronounced than in *A. lobata*. The face of *A. erwini* is pale yellow, and the postpronotum is paler in color compared to the rest of the mesonotum. In *A. lobata*, the face is yellowish-brownish and the postpronotum is concolorous with the mesonotum. Both species also differ in the coloration of the hind tibia, which is mostly yellow in *A. erwini* (at most with a small



MAP 4. Distribution of *Aulacigaster bella*, *A. erwini*, *A. femorata*, and *A. guyana* (the *femorata* group, Neotropical Region).

brown mark near apical 2/3) and brown on the central portion in *A. lobata*.

### ***Aulacigaster femorata*, new species**

FIGURES 70–73, 207–208, MAP 4

**DIAGNOSIS.** This species is distinguished from congeners by the following combination of characters: Abdomen with a yellowish region on sytergite 1+2; hind femur of male with a basoventral lobe followed by a pronounced concavity; hind femur yellow on basal portion, apical portion dark.

**DESCRIPTION.** Coloration and vestiture: Vertex mostly polished; ocellar tubercle mostly polished;

mesofrons mostly polished, or with a faint medial microtomentose stripe from base of antenna to level of anterior fronto-orbital seta; antenna pale yellow to yellowish, infusate along dorsal margin; face yellow; palpus white, or yellowish. Scutum dull microtomentose on anteriormost portion (anterior half); scutellum dull microtomentose on lateral margins and apex, medial portion of scutellum bright shiny; postpronotum concolorous with mesonotum, mostly polished (anteriormost portion and ventral margin microtomentose); halter mostly white (base infusate). Fore coxa yellow, fore femur yellowish, fore tibia yellowish, fore tarsus yellowish, apical and sometimes subapical tarsomeres brown to black; mid coxa yellow, mid femur yellowish or dark brown to black apically, yellowish basally, mid tibia yellowish, mid tarsus mostly yellowish;

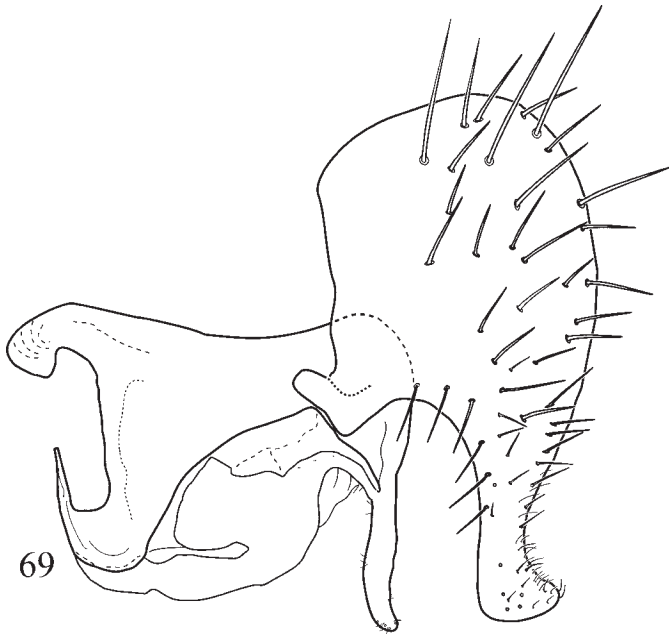


FIGURE 69. Illustrations of *Aulacigaster erwini*, new species (male) (the *femorata* group, Neotropical Region): gonopod and epandrium, lateral aspect.

hind coxa yellow, hind femur yellow on basal portion, apical portion dark (apical 1/2 blackish), hind tibia brown to black on central portion, base and apex yellowish, hind tarsus yellowish. Pregenital segment mostly subshiny; female abdomen subshiny (some microtomentum on lateral margin of tergites).

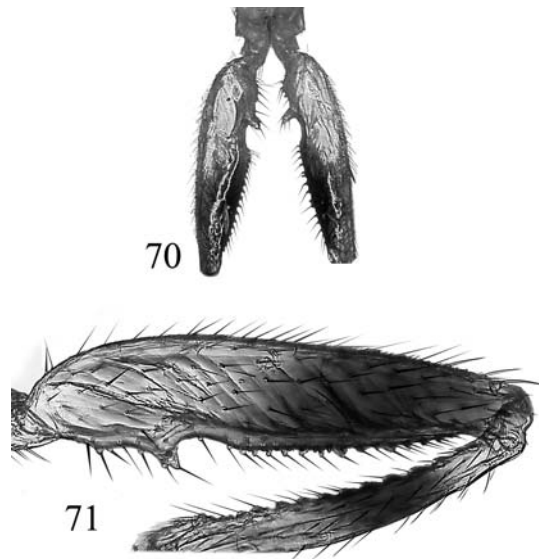
**Morphology:**

**Head:** Figures 72, 207–208. Face at level of pseudovibrissal seta narrower than width of 1st flagellomere; medial vertical seta 1/2 length of lateral vertical seta.

**Thorax:** Figures 70–71. Acrostichal setae in 1–2 rows, bifurcating posteriorly if 2; scutellum slightly raised (angle with scutum approximately 135°), trapezoidal, apex nearly straight or approximately triangular, apex relatively pointed. Hind femur of male with a basoventral lobe followed by a distinct concavity, lobe approximately rectangular; setae on lobe pale yellow, 4–6, lobe preceded by a few yellow setae.

**Male abdomen and terminalia:** Figure 73. Surstylus apically almost 2 times the width of posterior process of gonopod, surstyler projection with a sub-basal constriction, apex with round corners; gonopod as in Figure 73.

**Measurements:** Body length 3.0–3.5 mm. Wing length 2.0–2.5 mm, wing width 0.8–1.0 mm.



FIGURES 70–71. Digital photographs of *Aulacigaster femorata*, new species (male) (the *femorata* group, Neotropical Region). (70) hindlegs, posterior aspect; (71) left hind femur, medial aspect. Not all to the same scale.

**TYPE MATERIAL.** The holotype male is labeled “PERU. Madre de Dios: Manu, Rio Manu, 250 m[,] Pakitza, 12°7’S, 70°58’W, 9–23 Sep 1988[,] Amnon Freidberg/HOLOTYPE ♂ *Aulacigaster femorata* Rung & Mathis USNM [red].” The holotype is double mounted (minuten in a block of plastic), is in excellent condition, and is deposited in the USNM. Paratypes are as follows: Same label data as the holotype (24♂, 10♀; MHNJP, USNM); same locality and data, collected by W. N. Mathis (11♂, 3♀; USNM).

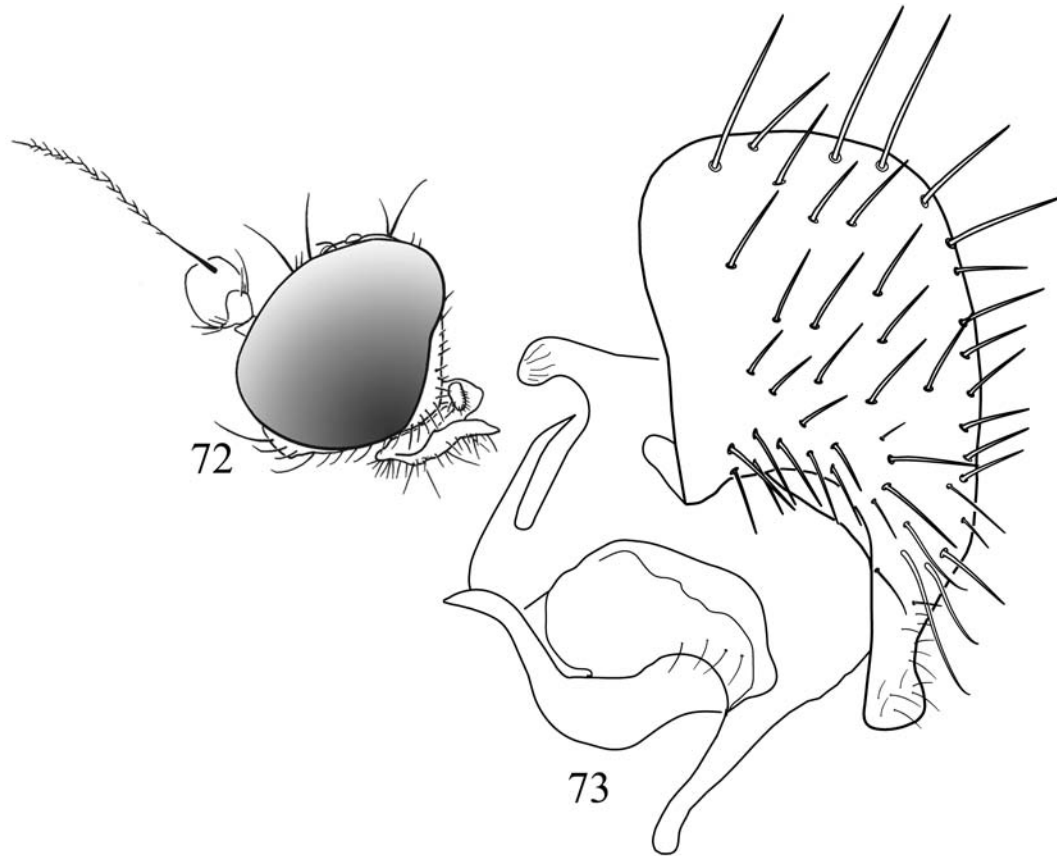
**TYPE LOCALITY.** Peru. Madre de Dios: Rio Manu, Pakitza (11°56.6’S, 71°16.9’W).

**DISTRIBUTION.** (Map 4) Neotropical: Peru (Madre de Dios).

**ETYMOLOGY.** The specific epithet, *femorata*, is of Latin derivation and refers to the enlarged hindfemora of this species.

**REMARKS.** *Aulacigaster femorata* keys out next to *A. guyana* but it can be easily separated from this species by the characters given in the key. Two other species, *A. lobata* and *A. erwini*, can also be confounded with *A. femorata*. The coloration of the hind femur, brown on apical 2/3 in *A. femorata*, will readily separate this species from the other two (hind femur completely yellow in *A. lobata* and *A. erwini*).





FIGURES 72–73. Illustrations of *Aulacigaster femorata*, new species (male) (the *femorata* group, Neotropical Region). (72) head, lateral aspect; (73) epandrium and gonopod, lateral aspect.

### ***Aulacigaster formosa*, new species**

FIGURES 74–76, MAP 5

**DIAGNOSIS.** This species is distinguished from congeners by the following combination of characters: Abdomen with a yellowish region on syntergite 1+2; hind femur of male yellow, with a basal lobe not followed by a posterior concavity, lobe approximately triangular.

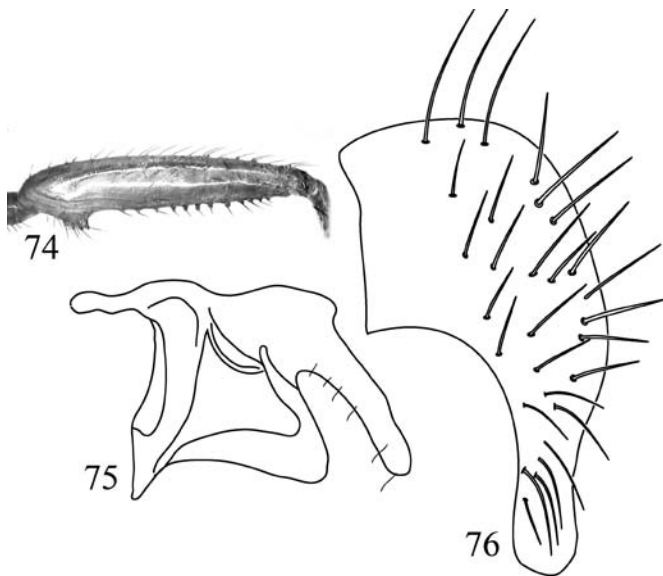
**DESCRIPTION.** Coloration and vestiture: Vertex mostly polished; ocellar tubercle mostly polished; mesofrons with a medial microtomentose stripe from base of antenna to level of anterior fronto-orbital seta; antenna pale yellow to yellowish, not infuscate dorsally or infuscate along dorsal, apical and ventral margins (antenna infuscate in females only); face white; palpus white. Scutum dull microtomentose on anteriormost portion (anterior 1/5–2/3); scutellum dull posteriorly, anterior portion shiny; postpronotum

concolorous with mesonotum, mostly polished; halter mostly white. Fore coxa yellow, fore femur yellowish, fore tibia yellowish, fore tarsus mostly yellowish; mid coxa yellow, mid femur yellowish, mid tibia yellowish, mid tarsus mostly yellowish; hind coxa yellow, hind femur yellow (females with basal 1/3 infuscate with brown), hind tibia yellowish, hind tarsus yellowish. Male abdomen subshiny to dull, pregenital segment polished posteriorly, dull anteriorly.

**Morphology:**

**Head:** Face at level of pseudovibrissal seta narrower than width of 1st flagellomere; medial vertical seta 1/2 length of lateral vertical seta.

**Thorax:** Figure 74. Acrostichal setae in 2 rows; scutellum slightly raised (angle with scutum approximately 135°), approximately triangular, apex relatively pointed. Hind femur of male with a basal lobe not followed by a posterior concavity, lobe approximately triangular; setae on lobe pale yellow, 4–6, preceded by a few yellow setae.



FIGURES 74–76. Illustrations of *Aulacigaster formosa*, new species (male) (the *femorata* group, Neotropical Region). (74) left hind femur, medial aspect; (75) gonopod, lateral aspect; (76) epandrium, lateral aspect. Not all to the same scale.

**Male abdomen and terminalia:** Figures 75–76. Surstylus apically approximately twice the width of anterior process of gonopod, surstylus constricted sub-basally, apex approximately round with a slight beak posteroventrally; gonopod as in Figure 75.

**Measurements:** Body length 2.5–2.7 mm. Wing length 0.8–0.9 mm.

**TYPE MATERIAL.** The holotype male is labeled “ECUADOR. Prt.[Puerto] Orll[ana]: RioTiputini (0°38.2’S, 76°08.9’W)[,] 12–26 Aug 1999, W. N. Mathis, A. Baptista, M. Kotrba/ USNM ENT 00090416 [plastic bar code label]/ HOLOTYPE ♂ *Aulacigaster formosa* Rung & Mathis USNM [red].” The holotype is double mounted (minuten in a block of plastic), is in excellent condition, and is deposited in the USNM. Paratypes are as follows: Same label data as the holotype (5♂, 2♀; EPNE, USNM).

**TYPE LOCALITY.** Ecuador. Orellana: Rio Tiputini (00°38.2’S, 76°08.9’W).

**DISTRIBUTION.** (Map 5) Neotropical: Ecuador (Orellana).

**ETYMOLOGY.** The specific epithet, *formosa*, is of Latin derivation and means “graceful, beautiful.”

**REMARKS.** *Aulacigaster formosa* is most similar to *A. irwini* and also to *A. unifasciata*. Besides the characters given in the key and diagnosis, *A. formosa* can be readily distinguished from *A. irwini* by the shape of the lobe on the

hind femur, triangular (approximately cylindrical in *A. irwini*). *Aulacigaster formosa* can be readily distinguished from *A. unifasciata* by the coloration of the mostly yellow hind tibia (with a medial to sub-apical brown mark in *A. unifasciata*) and also by characters of the male terminalia.

### *Aulacigaster guyana*, new species

FIGURES 77–79, MAP 4

**DIAGNOSIS.** This species is distinguished from congeners by the following combination of characters: Abdomen with a yellowish region on syntergite 1+2; postpronotum microtomentose on dorsal and anterior margins, otherwise polished; hind femur yellow on basal portion, apical portion dark.

**DESCRIPTION.** Coloration: Vertex mostly polished; ocellar tubercle mostly polished; mesofrons with a medial microtomentose stripe from base of antenna to level of anterior fronto-orbital seta; antenna pale yellow to yellowish, infuscate along dorsal margin; face yellow (pale); palpus whitish. Scutum dull microtomentose on anterior-most portion; scutellum dull posteriorly, anterior portion shiny; postpronotum concolorous with mesonotum, mostly polished, microtomentum, when present, over anterior and ventral margins; halter mostly white (base infuscate). Fore coxa yellow, fore femur yellowish, fore tarsus mostly yellowish; mid coxa yellow, mid femur yellowish, mid tarsus mostly yellowish; hind coxa yellow; hind femur yellow basally, apical 1/2 brown (Figure 77), hind tibia yellowish, hind tarsus yellowish. Male abdomen subshiny to dull, pregenital segment polished posteriorly, dull anteriorly (slightly so).

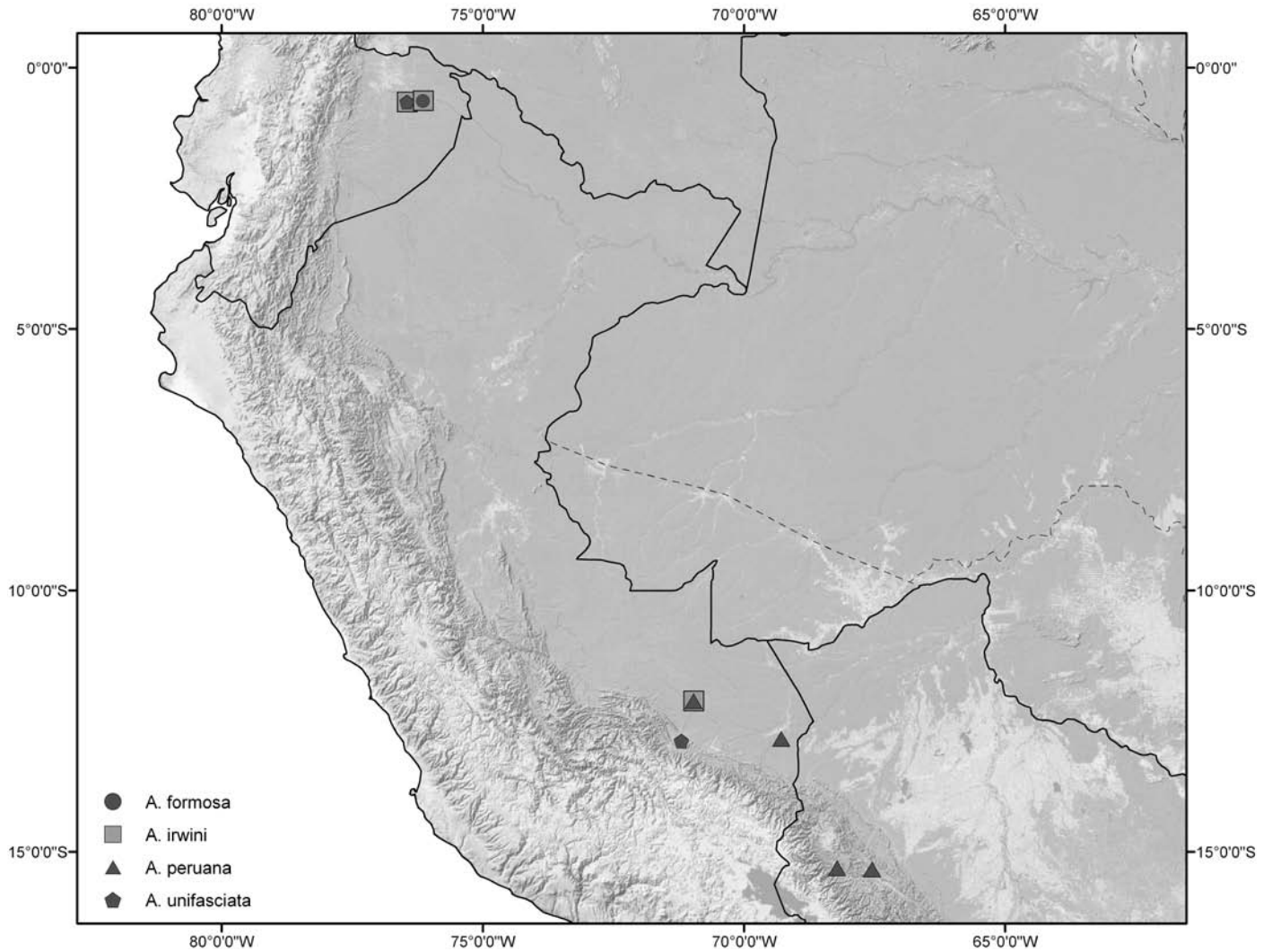
**Morphology:**

**Head:** Face at level of pseudovibrissal seta narrower than width of 1st flagellomere; medial vertical seta 1/2 length of lateral vertical seta.

**Thorax:** Figure 77. Acrostichal setae in 2 rows; scutellum slightly raised (angle with scutum approximately 135°), approximately triangular, apex relatively pointed. Hind femur of male with a basoventral lobe followed by a shallow concavity, lobe approximately rectangular; setae on lobe pale yellow, 4–6; lobe preceded by a few yellow setae.

**Male abdomen and terminalia:** Figures 78–79. Surstylus broad, surstylar projection apically more than 2 times the width of anterior process of gonopod, with a sub-basal constriction, apex with corners approximately round; gonopod as in Figure 78.

**Measurements:** Body length 2.0–2.3 mm. Wing length 2.0–2.3, wing width 0.6–0.7 mm.



MAP 5. Distribution of *Aulacigaster formosa*, *A. irwini*, *A. peruana*, and *A. unifasciata* (the *femorata* group, Neotropical Region).

**TYPE MATERIAL.** The holotype male is labeled “GUYANA. Moco-Moco[,] Lethem(30 km east)[,] 3°18.2'N, 59°39.0'W[,] 3–6 April 1994[,] Wayne N. Mathis/HOLOTYPE ♂ *Aulacigaster guyana* Rung & Mathis USNM [red].” The holotype is double mounted (minuten in a block of plastic), is in excellent condition, and is deposited in the USNM. Paratypes are as follows: Same label data as the holotype (4♂; USNM).

**TYPE LOCALITY.** Guyana. Moco-Moco (30 km E Lethem (3°18.2'N, 59°39.0'W)).

**DISTRIBUTION.** (Map 4) Neotropical: Guyana.

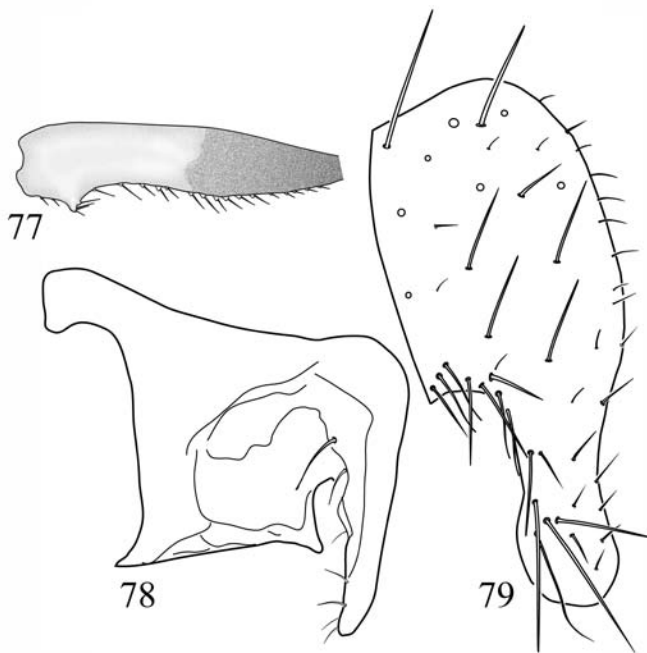
**ETYMOLOGY.** The specific epithet, *guyana*, is a noun in apposition and recognizes the country where this species was collected.

**REMARKS.** The shape of the hindfemoral lobe of *A. guyana* is characteristic for this species and, in conjunction with the coloration of the hind femur and shape of the surstylus (broader than in the other species of the *femorata* group), make this species easy to identify.

### ***Aulacigaster irwini*, new species**

FIGURES 80–83, MAP 5

**DIAGNOSIS.** This species is distinguished from congeners by the following combination of characters: Abdomen with a yellowish region on syntergite 1+2; postpronotum yellow to yellowish-brownish; hind femur yellow;



FIGURES 77–79. Illustrations of *Aulacigaster guyana*, new species (male) (the *femorata* group, Neotropical Region). (77) left hind femur, medial aspect; (78) gonopod, lateral aspect; (79) epandrium, lateral aspect. Not all to the same scale.

lobe on hind femur approximately cylindrical, not followed by a concavity.

**DESCRIPTION.** Coloration and vestiture: Vertex mostly polished; ocellar tubercle mostly polished; mesofrons mostly polished, or with a faint medial microtomentose stripe from base of antenna to level of anterior fronto-orbital seta; antenna pale yellow to yellowish, infuscate along dorsal margin; face white to pale yellow; palpus white. Scutum mostly polished, dull microtomentose on anteriormost portion (anterior 1/5); scutellum dull posteriorly, anterior portion shiny, or dull microtomentose on lateral margins and apex, medial portion of scutellum bright shiny; postpronotum yellow to yellowish-brownish, mostly polished; halter mostly white. Fore coxa yellow, fore femur yellowish or yellow basally, apex darkened, fore tibia yellowish, fore tarsus mostly yellowish; mid coxa yellow, mid femur yellowish, mid tibia yellowish, mid tarsus mostly yellowish; hind coxa yellow, hind femur yellow, hind tibia yellowish (infuscate with brown at base in some specimens), hind tarsus yellowish. Male abdomen subshiny to dull; epandrium polished anteriorly, dull posteriorly; female abdomen subshiny.

**Morphology:**

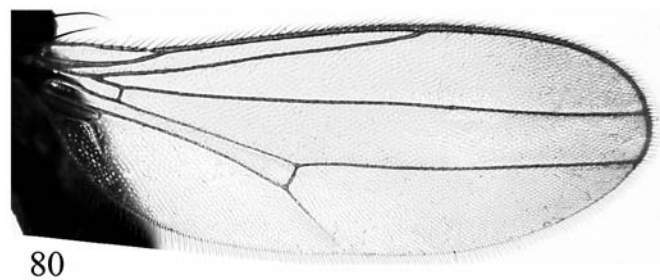
**Head:** Face at level of pseudovibrissal seta narrower than width of 1st flagellomere; medial vertical seta 1/2 length of lateral vertical seta.

**Thorax:** Figures 80–82. Acrostichal setae in 1 row, or 2 rows on anteriormost portion, merging into 1 row posteriorly; scutellum slightly raised (angle with scutum approximately 135°), trapezoidal, apex nearly straight. Hind femur of male with a basal lobe not followed by a posterior concavity, lobe approximately cylindrical, bearing 1 apical and 1 or 2 subapical setae; lobe preceded by a few yellow setae.

**Male abdomen and terminalia:** Figure 83. Surstylus 2–3 times the width of posterior process of gonopod; lateral margins of surstyler projection approximately parallel; apex of surstylus slightly expanded and approximately round to approximately quadrate; gonopod as in Figure 83.

**Measurements:** Body length 2.4–3.0 mm. Wing length 2.3–2.9 mm, wing width 0.6–0.8 mm.

**TYPE MATERIAL.** The holotype male is labeled “PERU: Madre de Dios: Manu, Rio Manu, 250 m[,] Pakitza, 12°7’S, 70°58’W, 9–23 Sep 1988, Amnon Freidberg/HOLOTYPE ♂ *Aulacigaster irwini* Rung & Mathis USNM [red].” The holotype is double mounted (minuten in a block of plastic), is in excellent condition, and is deposited

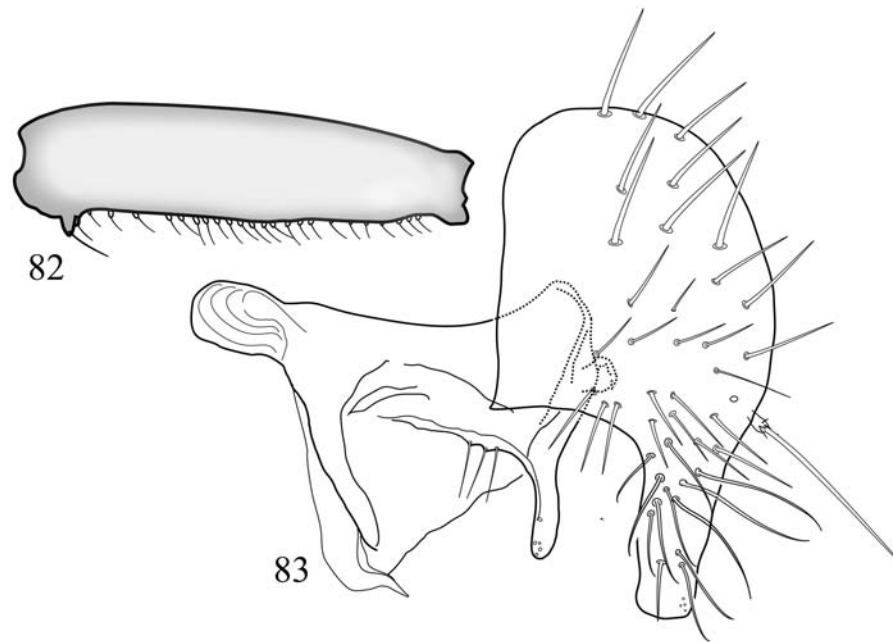


80



81

FIGURES 80–81. Digital photographs of *Aulacigaster irwini*, new species (male) (the *femorata* group, Neotropical Region). (80) right wing, dorsal aspect; (81) hindlegs, posterior aspect. Not all to the same scale.



FIGURES 82–83. Illustrations of *Aulacigaster irwini*, new species (male) (the *femorata* group, Neotropical Region). (82) left hind femur, medial aspect; (83) epandrium and gonopod, lateral aspect. Not all to the same scale.

in the USNM. Paratypes are as follows: Same label data as the holotype (2♂, 1♀; USNM).

**TYPE LOCALITY.** Peru. Madre de Dios: Rio Manu, Pakitza (11°56.6'S, 71°16.9'W).

**OTHER SPECIMENS EXAMINED.** ECUADOR. Orellana: Reserva Etnica Waorani, Onkonegare Camp (1 km S; 0°39.4'S, 76°27.2'W; 216 m; lot #998, 1457, 1717), 7 Feb–2 Oct 1995, 1996, T. L. Erwin (2♂, 1♀; EPNE, USNM); Tiputini Biodiversity Station (0°37.9'S, 76°08.6'W; 220–250 m; lot #2085), 8 Feb 1999, T. L. Erwin (1♂; USNM).

**DISTRIBUTION.** (Map 5) Neotropical: Ecuador (Orellana), Peru (Madre de Dios).

**ETYMOLOGY.** The specific epithet, *irwini*, is a genitive patronym to honor and recognize Dr. Michael E. Irwin for his numerous contributions to dipterology and his support and friendship.

**REMARKS.** The specimens from Ecuador have a less shiny frons and thorax than specimens from Peru. *Aulacigaster irwini* is most similar to *A. formosa* and also to *A. unifasciata*. Besides the characters given in the key and diagnosis, *A. irwini* can be readily distinguished from *A. formosa* by the shape of the lobe on the hind femur,

approximately cylindrical (triangular in *A. formosa*). *Aulacigaster irwini* differs from *A. unifasciata* in having the hind tibia mostly yellow (with a medial to sub-apical brown mark in *A. unifasciata*), and the surstylus approximately rectangular (surstylus with triangular apex in *A. unifasciata*).

### ***Aulacigaster lobata*, new species**

FIGURES 84–87, MAP 6

**DIAGNOSIS.** This species is distinguished from congeners by the following combination of characters: Postpronotum concolorous with mesonotum; hind femur completely yellow, with a basoventral lobe followed by a distinct concavity, lobe approximately rectangular.

**DESCRIPTION.** Coloration: Vertex mostly polished; ocellar tubercle mostly polished; mesofrons with a faint medial microtomentose stripe from base of antenna to level of anterior fronto-orbital seta; antenna pale yellow to yellowish, infuscate along dorsal margin; face yellowish brown; palpus yellowish. Scutum dull microtomentose on anteriormost portion; scutellum dull posteriorly, anterior portion shiny; postpronotum concolorous with mesonotum,

microtomentose over ventral and posterior margins, otherwise polished; halter mostly white (base infuscate). Male abdomen subshiny to dull, pregenital segment polished posteriorly, dull anteriorly (slightly so). Fore coxa pale yellow, fore femur yellowish, fore tibia yellowish; fore tarsus mostly or entirely yellowish, apical and sometimes subapical tarsomeres brown to black; mid coxa pale yellow, mid femur yellowish, mid tibia yellowish, mid tarsus mostly yellowish, apical and sometimes subapical tarsomeres brown to black; hind coxa pale yellow, hind femur yellow (rarely with apex brown infuscate), hind tibia brown to black on central portion, base and apex yellowish, hind tarsus yellowish.

**Morphology:**

**Head:** Face at level of pseudovibrissal seta narrower than width of 1st flagellomere; medial vertical seta 1/2 length of lateral vertical seta.

**Thorax:** Figures 84–86. Acrostichal setae in 1 row; scutellum slightly raised (angle with scutum approximately 135°), approximately triangular, apex relatively pointed. Hind femur of male with a basoventral lobe followed by a distinct concavity, lobe approximately rectangular; setae on lobe pale yellow, 4–6, lobe preceded by a few yellow setae.

**Male abdomen and terminalia:** Figure 87. Surstylus apically approximately 2 times the width of posterior process of gonopod, surstyler projection constricted subbasally, apex of surstylus approximately round to foot-shaped; gonopod as in Figure 87.

**Measurements:** Body length 3.1–3.5 mm. Wing length 2.7–2.9 mm, wing width 0.8–1.0 mm.

**TYPE MATERIAL.** The holotype male is labeled “PERU. Madre de Dios: Manu, Rio Manu, 250 m[,]

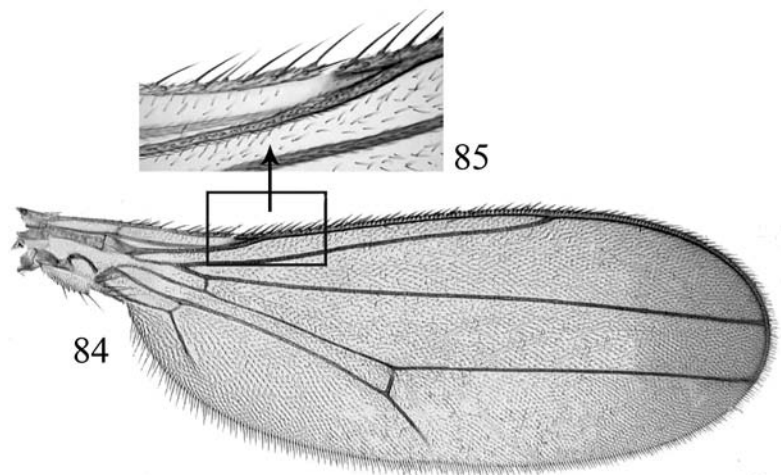
Pakitza, 12°7'S, 70°58'W, 9–23 Sep 1988[,] Wayne N. Mathis/HOLOTYPE ♂ *Aulacigaster lobata* Rung & Mathis USNM [red].” The holotype is double mounted (minuten in a block of plastic), is in excellent condition, and is deposited in the USNM. Paratypes are as follows: Same label data as the holotype (2♂; USNM); same locality data but collected by A. Freidberg (7♂; USNM). PERU. Madre de Dios: Manu, Rio Manu, Pakitza, Aguajal (11°58.2'S, 71°17'W), 19 Sep 1988, A. Freidberg, (1♂; USNM).

**TYPE LOCALITY.** Peru. Madre de Dios: Rio Manu, Pakitza (11°56.6'S, 71°16.9'W).

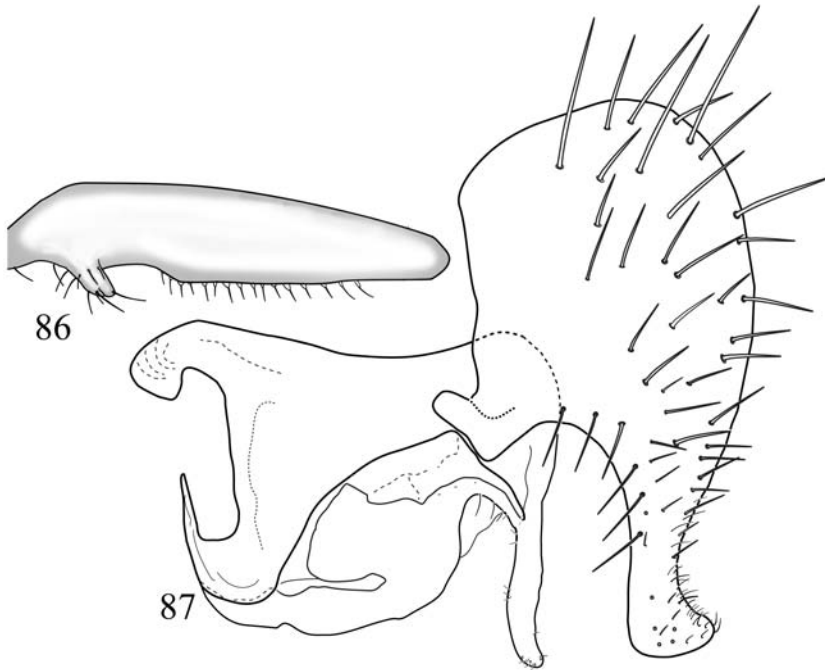
**DISTRIBUTION.** (Map 6) Neotropical: Peru (Madre de Dios).

**ETYMOLOGY.** The specific epithet, *lobata*, is of Greek derivation and means rounded projection or protuberance with reference to the shape of the lobe on the hind femur.

**REMARKS.** This species is similar to *A. erwini* and *A. femorata*. *Aulacigaster femorata* can be readily distinguished by the coloration of the hind femur which is brown on apical 2/3. Separation from *A. lobata* is trickier. Both species share a completely yellow hind femur with a rectangular lobe followed by a distinct concavity. The concavity in the hind femur of *A. erwini*, however, is less pronounced than in *A. lobata*. The face of *A. erwini* is pale yellow and the postpronotum is paler in color as compared with the rest of the mesonotum. In *A. lobata*, the face is yellowish-brownish and the postpronotum is concolorous with the mesonotum. Both species differ also in the coloration of the hind tibia, which is mostly yellowish in *A. erwini* (at most with a small brown mark near apical 2/3) and brown on central portion in *A. lobata*.



FIGURES 84–85. Digital photographs of *Aulacigaster lobata*, new species (the *femorata* group, Neotropical Region). (84) right wing, dorsal aspect; (85) enlargement of costal section, dorsal aspect.



FIGURES 86–87. Illustrations of *Aulacigaster lobata*, new species (male) (the *femorata* group, Neotropical Region). (86) left hind femur, medial aspect; (87) gonopod and epandrium, lateral aspect. Not all to the same scale.

### *Aulacigaster nigritibia*, new species

FIGURES 88–91, MAP 6

**DIAGNOSIS.** This species is distinguished from congeners by the following combination of characters: Abdomen with a yellowish region on syntergite 1+2; hind femur mostly dark brown, yellowish at basal 1/5–1/4.

**DESCRIPTION.** Coloration and vestiture: Vertex mostly polished; ocellar tubercle mostly polished; mesofrons with a medial microtomentose stripe from base of antenna to level of anterior fronto-orbital seta (stripe shaped as an inverted triangle); antenna pale yellow to yellowish, infusate along dorsal margin; face white to yellow; palpus white. Scutum dull microtomentose on anteriormost portion; scutellum dull posteriorly, anterior portion shiny; postpronotum concolorous with mesonotum, scarcely microtomentose, subshiny; halter mostly white (infusate at base). Fore coxa yellow, fore femur yellow basally, apex darkened, fore tibia yellowish, fore tarsus mostly or entirely yellowish, apical and sometimes subapical tarsomeres brown to black; mid coxa yellow, mid femur yellowish or dark brown to black apically, yellowish basally, mid tibia mostly or entirely yellowish on central portion, apex and basis brown, mid tarsus mostly yellowish; hind coxa yellow, hind femur mostly dark brown, yellowish at basal 1/5–1/4, hind tibia brown to dark brown, or brown to black on central portion, base and apex yellowish, hind tarsus yellowish.

Male abdomen bright shiny (tergite 5 more uniformly microtomentose), pregenital segment polished posteriorly, dull anteriorly; female abdomen with dense microtomentum medially, lateral margins of tergites nearly polished.

#### Morphology:

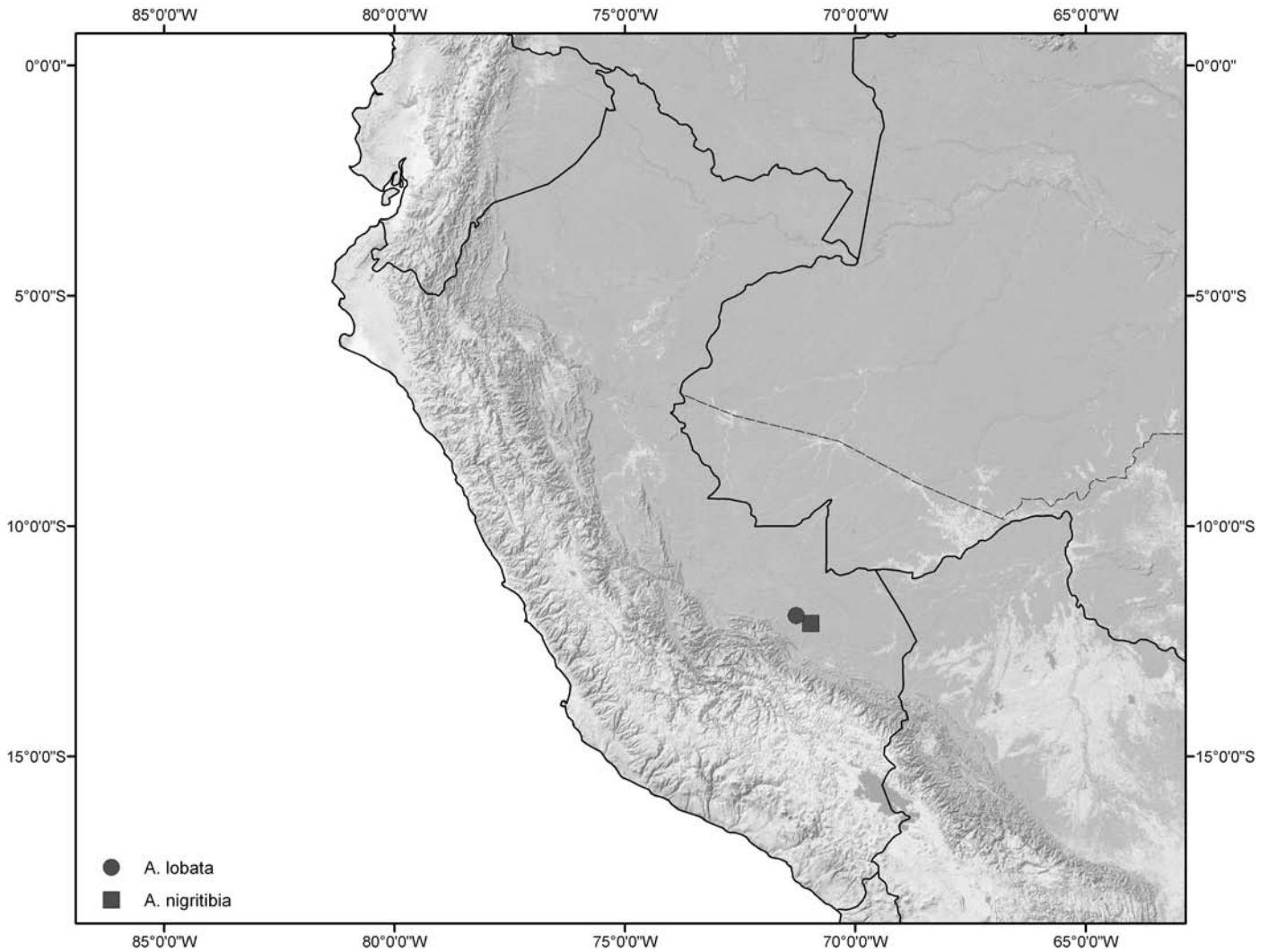
**Head:** Figure 88. Face at level of pseudovibrissal seta narrower than width of 1st flagellomere; medial vertical seta 1/2 length of lateral vertical seta.

**Thorax:** Figure 91. Acrostichal setae in 1 row, or 2 rows on anteriormost portion, merging into 1 row posteriorly; scutellum slightly raised (angle with scutum approximately 135°), approximately triangular, apex relatively pointed. Hind femur of male with a basoventral lobe followed by a slight to deep concavity, lobe approximately cylindrical; setae on lobe pale yellow, 2; lobe preceded by 2–3 yellow setae.

**Male abdomen and terminalia:** Figures 89–90. Surstylus 1.3 times the width of posterior process of gonopod; lateral margins of surstylar projection sinuous, convergent towards apex; gonopod as in Figure 89.

**Measurements:** Body length 2.2 mm. Wing length 2.1 mm, wing width 0.7 mm.

**TYPE MATERIAL.** The holotype male is labeled “PERU. Madre de Dios: Manu, Rio Manu, 250 m[.] Pakitza, 12°7'S, 70°58'W, 9–23 Sep 1988[.] Wayne N. Mathis/HOLOTYPE ♂ *Aulacigaster nigritibia* Rung & Mathis USNM [red].” The holotype is double mounted (minuten in a block of plastic), is in excellent condition, and is deposited



MAP 6. Distribution of *Aulacigaster lobata* and *A. nigritiba* (the *femorata* group, Neotropical Region).

in the USNM. The holotype is double mounted (minuten in a block of plastic), is in good condition (abdomen removed and dissected, anterior left and posterior right fronto-orbital setae as well as vertical setae broke), and is deposited in the USNM.

**TYPE LOCALITY.** Peru. Madre de Dios: Manu, Rio Manu, Pakitza (12°7'S, 70°58'W; 250 m).

**DISTRIBUTION.** (Map 6) Neotropical: Peru (Madre de Dios).

**ETYMOLOGY.** The species epithet, *nigritiba*, is of Greek derivation and refers to the mostly darkened hind tibia.

**REMARKS.** Besides the characters given in the key and diagnosis, this species is easy to separate from congeners based on the shape of the surstylus (as in Figure 90)

and the cylindrical lobe on the hind femur, which is followed by a slight to deep concavity.

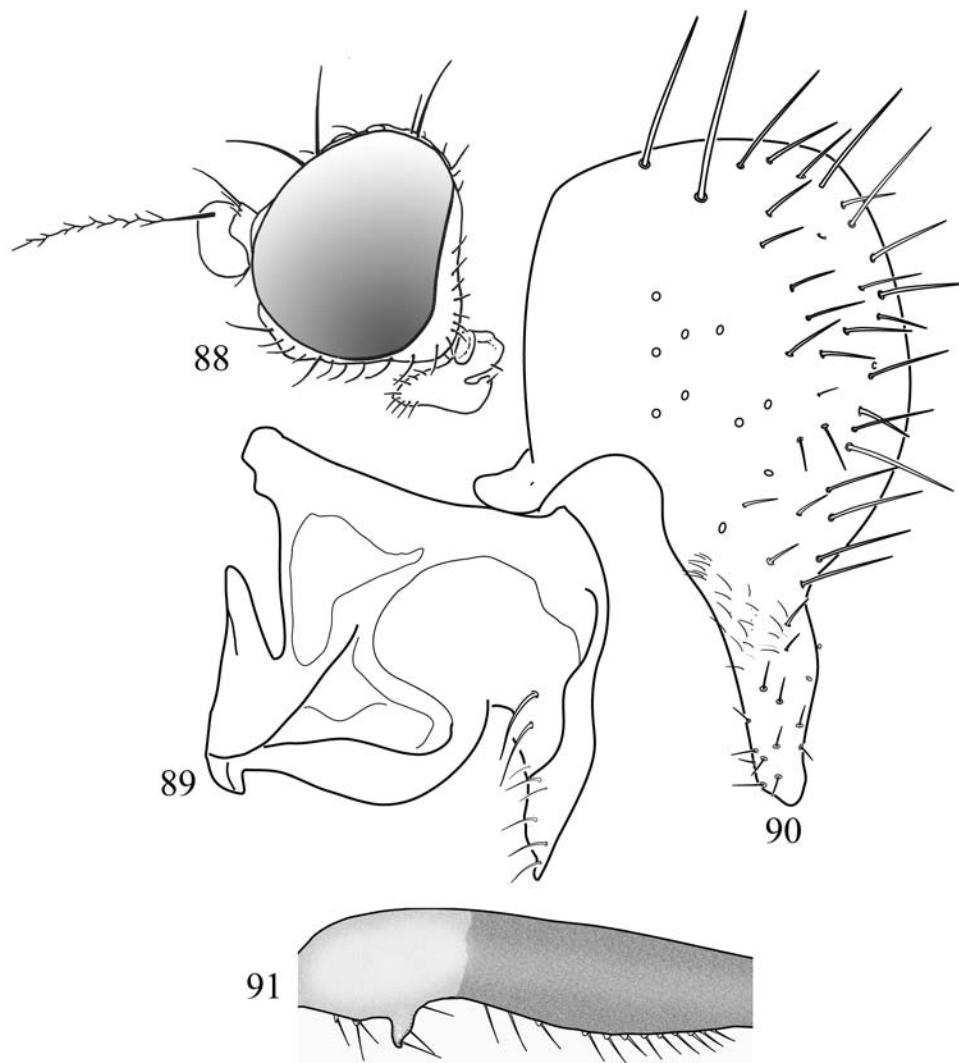
### ***Aulacigaster peruana*, new species**

FIGURES 92–95, MAP 5

**DIAGNOSIS.** This species is distinguished from congeners by the following combination of characters: Abdomen with a yellowish region on syntergite 1+2; frons mostly brown with anterior margin pale, yellowish; hind femur of male without a conspicuous lobe.

**DESCRIPTION.** Coloration and vestiture: Vertex mostly polished; ocellar tubercle mostly polished; mesofrons mostly polished, or with a faint medial microtomentose





FIGURES 88–91. Illustrations of *Aulacigaster nigritibia*, new species (male) (the *femorata* group, Neotropical Region). (88) head, lateral aspect; (89) gonopod, lateral aspect; (90) epandrium, lateral aspect; (91) left hind femur, medial aspect. Not all to the same scale.

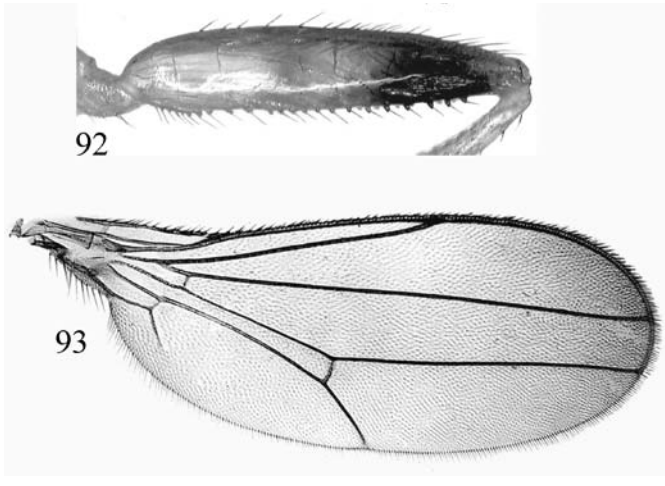
stripe from base of antenna to level of anterior fronto-orbital seta; antenna pale yellow to yellowish, infuscate along dorsal margin; face white to yellow; palpus white. Scutum dull microtomentose on anteriormost portion (anterior  $1/6$ – $1/2$ ); scutellum dull posteriorly, anterior portion shiny (completely microtomentose in some specimens); postpronotum concolorous with mesonotum, scarcely microtomentose, subshiny; halter mostly white (base infuscate). Fore coxa yellow, fore femur yellowish, fore tibia yellowish, fore tarsus mostly yellowish; mid coxa yellow, mid femur yellowish, mid tibia yellowish or mostly yellowish, apex brown infuscate (very faint in male), mid tarsus mostly yellowish; hind coxa yellow, hind femur yellow on basal

portion, apical portion dark (apical  $1/3$ – $1/2$ ), hind tibia yellowish, hind tarsus yellowish. Male abdomen subshiny to dull, pregenital segment polished posteriorly, dull anteriorly; female abdomen with dense microtomentum over anterior margin of tergites, posterior margin of tergites bright shiny (tergites 1–3 of in some specimens also with lateral microtomentum).

**Morphology:**

**Head:** Face at level of pseudovibrissal seta narrower than width of 1st flagellomere; medial vertical seta  $1/2$  length of lateral vertical seta.

**Thorax:** Figures 92–93. Acrostichal setae in 2 rows; scutellum slightly raised (angle with scutum approximately

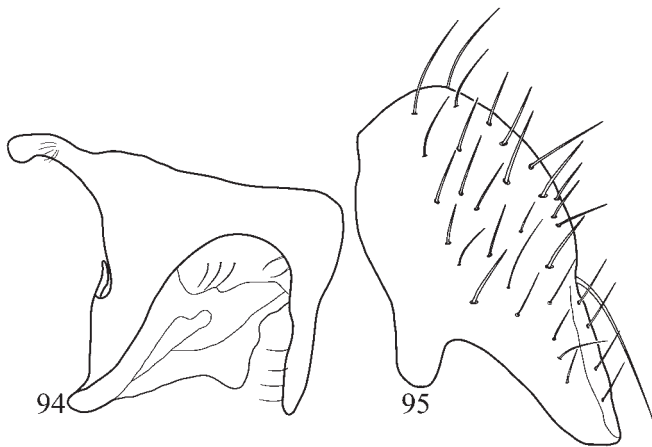


FIGURES 92–93. Digital photographs of *Aulacigaster peruana*, new species (male) (the *femorata* group, Neotropical Region). (92) left hind femur, medial aspect; (93) right wing, dorsal aspect. Not to the same scale.

135°), approximately triangular, apex relatively pointed (to triangular). Hind femur of male without a sub-basal lobe.

**Male abdomen and terminalia:** Figures 94–95. Surstylus slightly angled posteriorly, surstylar projection narrowing apically, apex approximately 3 times the width of anterior process of gonopod; gonopod as in Figure 94.

**Measurements:** Body length 2.5–3.3 mm. Wing length 2.6–2.9 mm, wing width 0.7–0.9 mm.



FIGURES 94–95. Illustrations of *Aulacigaster peruana*, new species (male) (the *femorata* group, Neotropical Region). (94) gonopod, lateral aspect; (95) epandrium, lateral aspect.

**TYPE MATERIAL.** The holotype male is labeled “PERU. Madre de Dios: Manu, Rio Manu, 250 m[,] Pakitza, 12°7’S, 70°58’W, 9–23 Sep 1988[,] Wayne N. Mathis/HOLOTYPE ♂ *Aulacigaster peruana* Rung & Mathis USNM [red].” The holotype is double mounted (minuten in a block of plastic), is in excellent condition, and is deposited in the USNM. Paratypes are as follows: Same label data as the holotype (48♂, 7♀; USNM). Same locality and data, collected by A. Freidberg (22♂, 6♀; MHNJP, USNM).

**TYPE LOCALITY.** Peru. Madre de Dios: Rio Manu, Pakitza (11°56.6’S, 71°16.9’W).

**OTHER SPECIMENS EXAMINED.** BOLIVIA. La Paz: S. Inicua, Rio Alto Beni (1100 m; 15°20’W, 67°33’W), 15–18 Jan 1976, L. E. Peña (1♂; CNC); Mapiri (15°18.6’S, 68°13’W; 720 m), 16 Mar 2001, A. Freidberg (2♂, 1♀; USNM).

PERU. Madre de Dios: Rio Tambopata Reserve (30 km SW Puerto Maldorado; 12°50.4’S, 69°17.4’W), 19 Sep–10 Oct 1984, D. A. Grimaldi (7♂, 2♀; AMNH).

**DISTRIBUTION.** (Map 5) Neotropical: Bolivia (La Paz), Peru (Madre de Dios).

**ETYMOLOGY.** The species epithet, *peruana*, recognizes the country, Peru, where the type series was collected.

**REMARKS.** This species is peculiar amongst congeners in the *femorata* group by lacking a lobe on the hind femur of the male. The wide surstylus, which is angled posteriorly, is also characteristic for *A. peruana*.

### *Aulacigaster unifasciata*, new species

FIGURES 96–98, MAP 5

**DIAGNOSIS.** This species is distinguished from congeners by the following combination of characters: Abdomen with a yellowish region on syntergite 1+2; up to apical half of wing brown infuscate; hind femur yellow on basal 1/2–2/3, apical portion dark.

**DESCRIPTION.** Coloration and vestiture: Vertex mostly polished; ocellar tubercle mostly polished; mesofrons mostly polished, or with a pair of silver microtomentose marks; antenna pale yellow to yellowish, infuscate along dorsal margin; face yellow; palpus white. Scutum dull microtomentose on anteriormost portion; scutellum dull microtomentose on lateral margins and apex, medial portion of scutellum bright shiny; postpronotum concolorous with mesonotum, mostly polished; halter mostly white. Wing with up to apical 1/2 brown infuscate, remaining wing light brown. Fore coxa yellow, fore femur yellowish,

fore tibia yellowish, fore tarsus mostly yellowish; mid coxa yellow, mid femur yellowish (slightly infuscate on apical 1/3 in female specimens), mid tibia yellowish, mid tarsus mostly yellowish; hind coxa yellow, hind femur yellow on basal 1/2 to basal 2/3, apical portion dark, hind tibia brown to black on central portion, base and apex yellowish, hind tarsus yellowish. Male abdomen subshiny to dull; female abdomen subshiny.

**Morphology:**

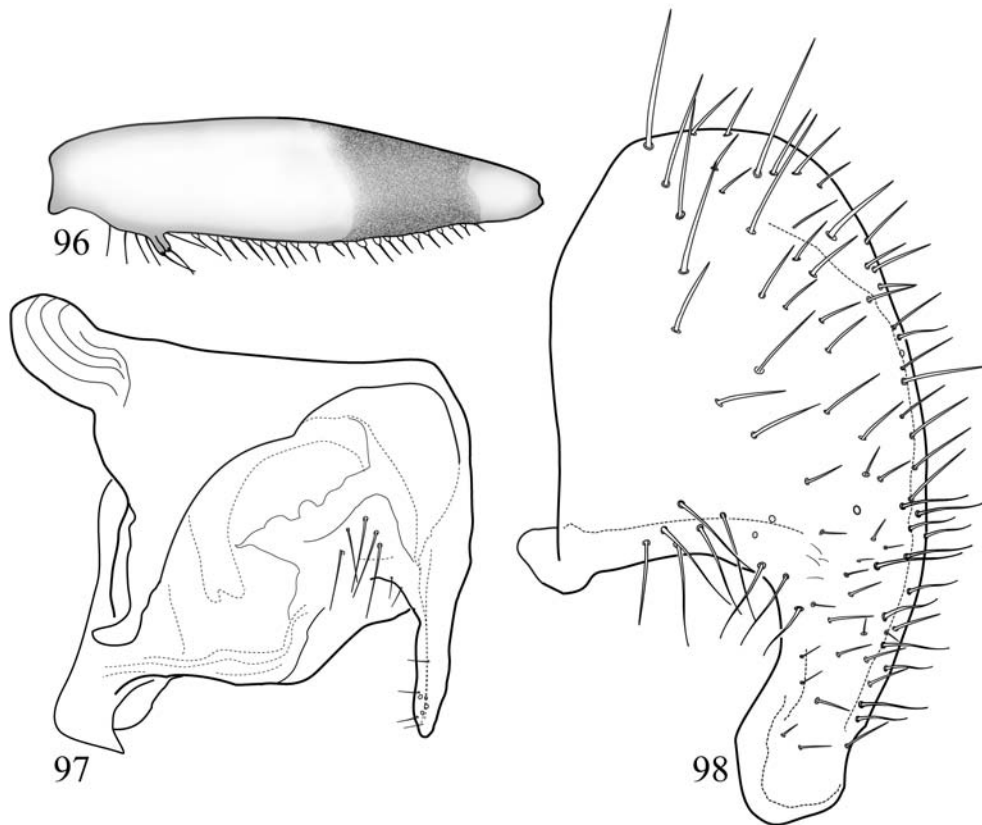
**Head:** Face at level of pseudovibrissal seta narrower than width of 1st flagellomere; inner vertical seta 1/2 length of outer vertical seta.

**Thorax:** Figure 96. Acrostichal setae 2 rows on anteriormost portion, merging into 1 row posteriorly; scutellum slightly raised (angle with scutum approximately 135°), trapezoidal, apex nearly straight. Hind femur of male with a basal lobe not followed by a posterior concavity, lobe approximately cylindrical, bearing two apical setae and one subapical seta; lobe preceded by a few small setae.

**Male abdomen and terminalia:** Figures 97–98. Surstylus more than twice the width of posterior process of gonopod; lateral margins of surstyler projection approximately parallel; apex of surstylus approximately triangular; gonopod as in Figure 97.

**Measurements:** Body length 2.9–3.3 mm. Wing length 2.5–3.1 mm, wing width 0.8–1.0 mm.

**TYPE MATERIAL.** The holotype male is labeled “ECUADOR. Orellana, Res. Etnica Waorani (0°39.4' S, 76°27.2' W, 216m; lot # 1581, 26 Jun 1998, T.L.Erwin/HOLOTYPE ♂ *Aulacigaster unifasciata* Rung & Mathis [red].” The holotype is double mounted (glued to a point), is in excellent condition (apical segments of abdomen removed, dissected, and stored in an attached microvial), and is held in trust at the USNM for eventual deposit in Ecuador. Paratypes are as follows: same locality and collector as the holotype, but with dates of 15 Jan–1 Oct 1994, 1995, 1996 and lot numbers 577, 700, 1160, 1430, 1690 (1♂, 4♀; EPNE, USNM).



FIGURES 96–98. Illustrations of *Aulacigaster unifasciata*, new species (male) (the *femorata* group, Neotropical Region). (96) right hind femur, medial aspect; (97) gonopod, lateral aspect; (98) epandrium, lateral aspect.

**TYPE LOCALITY.** Ecuador. Orellana: Reserva Etnica Waorani, Onkonegare Camp (1 km S; 0°39.4'S, 76°27.2'W; 216 m).

**OTHER SPECIMENS EXAMINED.** PERU. Madre de Dios: Rio Manu, Erika (near Salvación; 12°53'S, 71°12'W; 550 m), 5–6 Sep 1988, A. Freidberg (1♂, 1♀; USNM).

**DISTRIBUTION.** (Map 5) Neotropical: Ecuador (Orellana), Peru (Madre de Dios).

**REMARKS.** This species is similar to *A. irwini*. In addition to characters given in the key and diagnosis, *A. unifasciata* can be readily distinguished from this species by the coloration of the hind tibia (with a more conspicuous central brown to black mark), and the shape of the surstylus.

#### THE GRIMALDII GROUP

FIGURES 99–106, 209–210, MAP 7

**DIAGNOSIS.** The *grimaldii* group is distinguished from other species groups by the following combination of characters: Small flies, body length 1.88–2.80 mm. Coloration and vestiture: Frons mostly brown, anterior margin pale, yellowish; anterior portion of frons with a veil of microtomentum anterior to lower fronto-orbital setae, but not silver. Anepisternum polished. Abdomen with syntergite 1+2 whitish.

#### Morphology:

**Head:** Round, about as high as long (head ratio 0.9–1.1); face at level of pseudovibrissal seta narrower than width of 1st flagellomere, in lateral view projected from base of antenna to level of pseudovibrissal seta, thereafter receded to buccal opening (males) or strongly convex on ventral 2/3, easily visible in lateral view (females), bulbous; ocellar seta typically minute; fronto-orbital setae typically with posterior seta only slightly internal to anterior seta.

**Thorax:** Subcosta partially fused with vein  $R_1$  apically but terminating in costa.

**Male abdomen and terminalia:** Surstylus often arising from posteroventral margin of epandrium; subepandrial sclerite Y-shaped. Gonopods short, wide, with a few central setulae and a posterior process. Cerci partially fused, each cercus bearing 1 very long, posteriorly porrect seta.

**DISTRIBUTION.** Neotropical: Bolivia, Colombia, Costa Rica, Dominican Republic, Dominica, Ecuador, Guyana, Panama, Peru, Venezuela.

**DISCUSSION.** Species of the *grimaldii* group can be best identified by the coloration of the face and legs, and

the shape of the surstylus and other structures of the male internal terminalia.

The *grimaldii* group includes two species, none described previously.

### *Aulacigaster angusta*, new species

FIGURE 99, MAP 7

**DIAGNOSIS.** This species is distinguished from congeners by the following combination of characters: Abdomen with syntergite 1+2 white. Frons mostly brown, with anterior margin pale yellowish; face brown.

**DESCRIPTION.** Coloration and vestiture: Vertex mostly polished; ocellar tubercle mostly microtomentose; antenna pale yellow to yellowish, infusate along dorsal margin; face brown; palpus white. Scutum strongly microtomentose medially, polished between pleural region and dorsocentral row of setae, posterior of postpronotum; scutellum dull microtomentose; postpronotum pale brown, or concolorous with mesonotum, scarcely microtomentose, subshiny; katepisternum mostly polished; halter mostly white. Fore coxa mostly yellow, brown basally; fore femur mostly brown, fore tibia mostly brown, fore tarsus mostly brown, with apical and subapical tarsomere infusate with brown; mid coxa yellow, mid femur mostly brown (tip and base yellowish), mid tibia yellowish, mid tarsus yellowish, apical and subapical tarsomere brownish to dark brown; hind coxa yellow, hind femur mostly brown (tip and base yellowish), hind tibia brown basally, yellowish apically, hind tarsus yellowish, apical tarsomere brown to black. Male abdomen bright shiny.

#### Morphology:

**Head:** Head round, about as high as long (head ratio 1.1); medial vertical seta 1/2 length of lateral vertical seta; fronto-orbital setae with posterior seta slightly internal to and almost transversely aligned with anterior seta; peristomal vestiture consisting mostly of weak setae following pseudovibrissal seta (unusually thin); 1 strong peristomal seta present, following pseudovibrissal seta.

**Thorax:** Acrostichal setae in 2 rows; scutellum slightly raised (angle with scutum approximately 135°), approximately triangular, apex relatively pointed, disk of scutellum slightly convex; basal scutellar seta 1/2 length of apical seta.

**Male abdomen and terminalia:** Figure 99. Surstylus short (shorter than in *A. grimaldii*), with lateral margins subparallel, apex approximately round. Anterior process of gonopod making a right angle with posterior process.

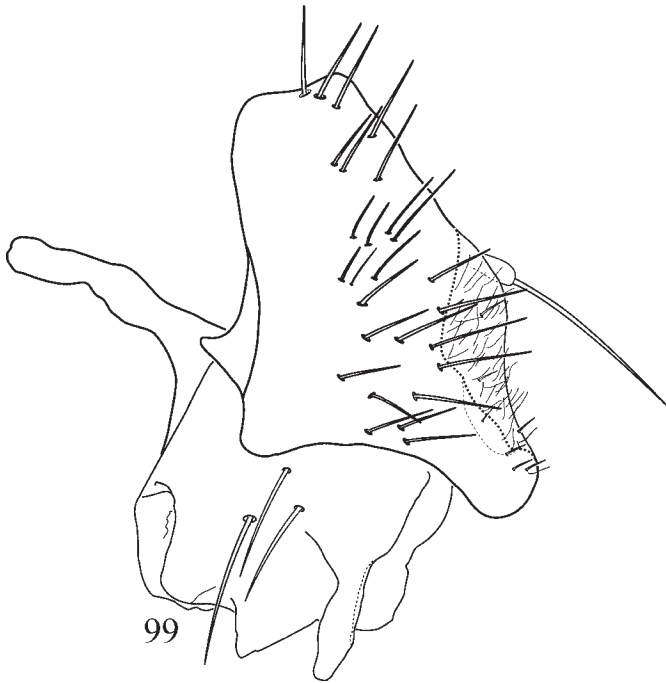


FIGURE 99. Illustrations of *Aulacigaster angusta*, new species (male) (the *grimaldii* group, Neotropical Region): epandrium and gonopod, lateral aspect.

**Measurements:** Body length 2.5–2.8 mm. Wing length 2.3 mm, wing width 0.9 mm.

**TYPE MATERIAL.** The holotype male is labeled “COSTA RICA: Puntarenas, Las Alturas, 20 km NE San Vito de Hava, 1500 m. [,] 20/III/91 [20 Mar 1991], Grimaldi&Stark [,] sweeping tree trunks./HOLOTYPE ♂ *Aulacigaster angusta* Rung & Mathis AMNH[red].” The holotype is double mounted (glued to a point), is in excellent condition, and is deposited in the AMNH.

**TYPE LOCALITY.** Costa Rica. Puntarenas: Las Alturas (20 km NE San Vito de Hava; 08°56.4'S, 82°50.1'W).

**DISTRIBUTION.** (Map 7) Neotropical: Costa Rica (Puntarenas).

**ETYMOLOGY.** The species epithet, *angusta*, is of Latin derivation and means narrow in reference to the narrow face of males.

**REMARKS.** This species can be easily identified from the only other species in this group, *A. grimaldii*, by the characters given in the key. *Aulacigaster angusta* also differs from that species by having the ocellar tubercle mostly microtomentose.

## *Aulacigaster grimaldii*, new species

FIGURES 100–106, 209–210, MAP 7

**DIAGNOSIS.** This species is distinguished from congeners by the following combination of characters: Abdomen with syntergite 1+2 white. Frons mostly brown, with anterior margin pale yellowish; face yellowish.

**DESCRIPTION.** Coloration and vestiture: Vertex mostly polished; ocellar tubercle mostly polished; antenna pale yellow to yellowish, infuscate along dorsal margin; face yellow; palpus white. Scutum strongly microtomentose medially, polished between pleural region and dorsocentral row of setae, posterior of postpronotum; scutellum dull microtomentose; postpronotum pale brown, or concolorous with mesonotum, scarcely microtomentose, subshiny; kat-episternum mostly polished; halter mostly white. Fore coxa yellow, fore femur yellowish, with apex brown infuscate in some specimens; fore tibia mostly brown (base yellowish), fore tarsus with basal tarsomere yellowish, remainder tarsomeres infuscate with brown, or brown to black (apical and subapical); mid coxa yellow, mid femur yellowish (tip darkened), mid tibia yellowish, mid tarsus yellowish, apical and subapical tarsomere brownish to dark brown; hind coxa yellow, hind femur yellow on basal portion, apical portion dark (1/2), hind tibia yellowish, hind tarsus yellowish, apical tarsomere brown to black. Male abdomen bright shiny; female abdomen subshiny.

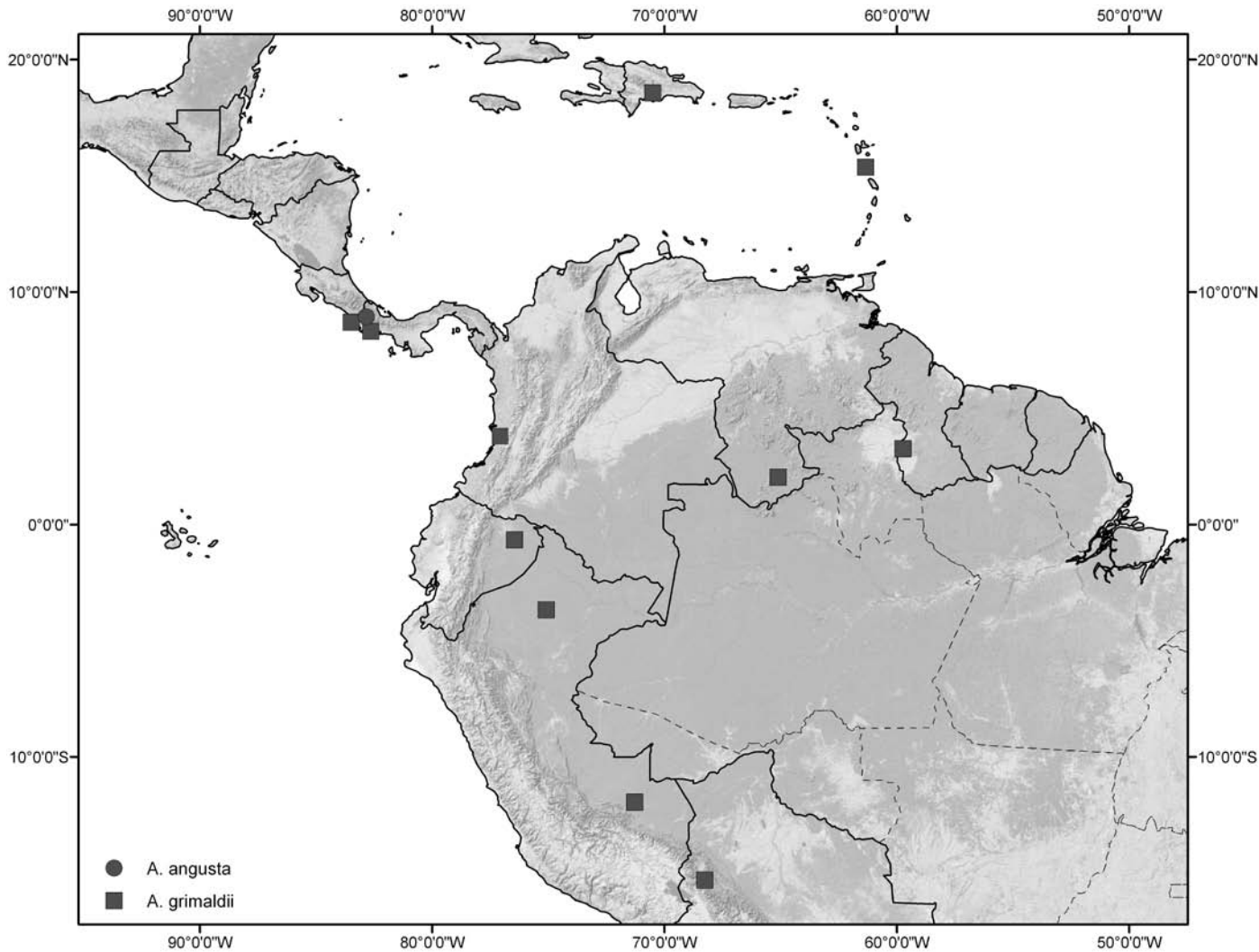
### Morphology:

**Head:** Figures 103–104, 209–210. Head round, about as high as long (head ratio 0.9–1.1); medial vertical seta 1/2 length of lateral vertical seta; fronto-orbital setae with posterior seta slightly internal to and almost transversely aligned with anterior seta; peristomal vestiture consisting mostly of weak setae following pseudovibrissal setal seta (unusually thin); 1 strong peristomal seta present, following pseudovibrissal seta.

**Thorax:** Figures 100–102. Acrostichal setae in 2 rows; scutellum slightly raised (angle with scutum approximately 135°), approximately triangular, apex relatively pointed, disk of scutellum slightly convex; basal scutellar seta 1/2 length of apical seta.

**Male abdomen and terminalia:** Figures 105–106. Surstylus longer than in *A. angusta*, with margins slightly converging toward round apex. Anterior process of gonopod making a wide angle with posterior gonopodal process.

**Female abdomen:** Sternites 1–5 appearing divided, often weakly sclerotized.



MAP 7. Distribution of the *grimaldii* species group of *Aulacigaster* (Neotropical Region).

**Measurements:** Body length 1.8–2.2 mm. Wing length 1.8–2.2 mm. Wing width 0.6–0.7 mm.

**TYPE MATERIAL.** The holotype male is labeled “VENEZUELA: Amazonas[,] Rio Mavaca Camp 65°06’W–2°2’N[,] 150 m, 16-27/III/89 [16–27 Mar 1989]/ Phipps-FUDCI Expedition by Amer. Mus. Nat. Hist. D. A. Grimaldi, coll./HOLOTYPE ♂ *Aulacigaster grimaldi* Rung & Mathis AMNH[red].” The holotype is double mounted (glued to a point), is in excellent condition, and is deposited in the AMNH. Paratypes are as follows: same label data as the holotype (1♂, 2♀; AMNH, USNM). VENEZUELA. Maracay: Rancho Grande Biological Station (Portochuelo Pass; 10°02.8’N, 67°33’W; 1400 m), 27 Feb 1995, S. A. Marshall (1♀; UGE).

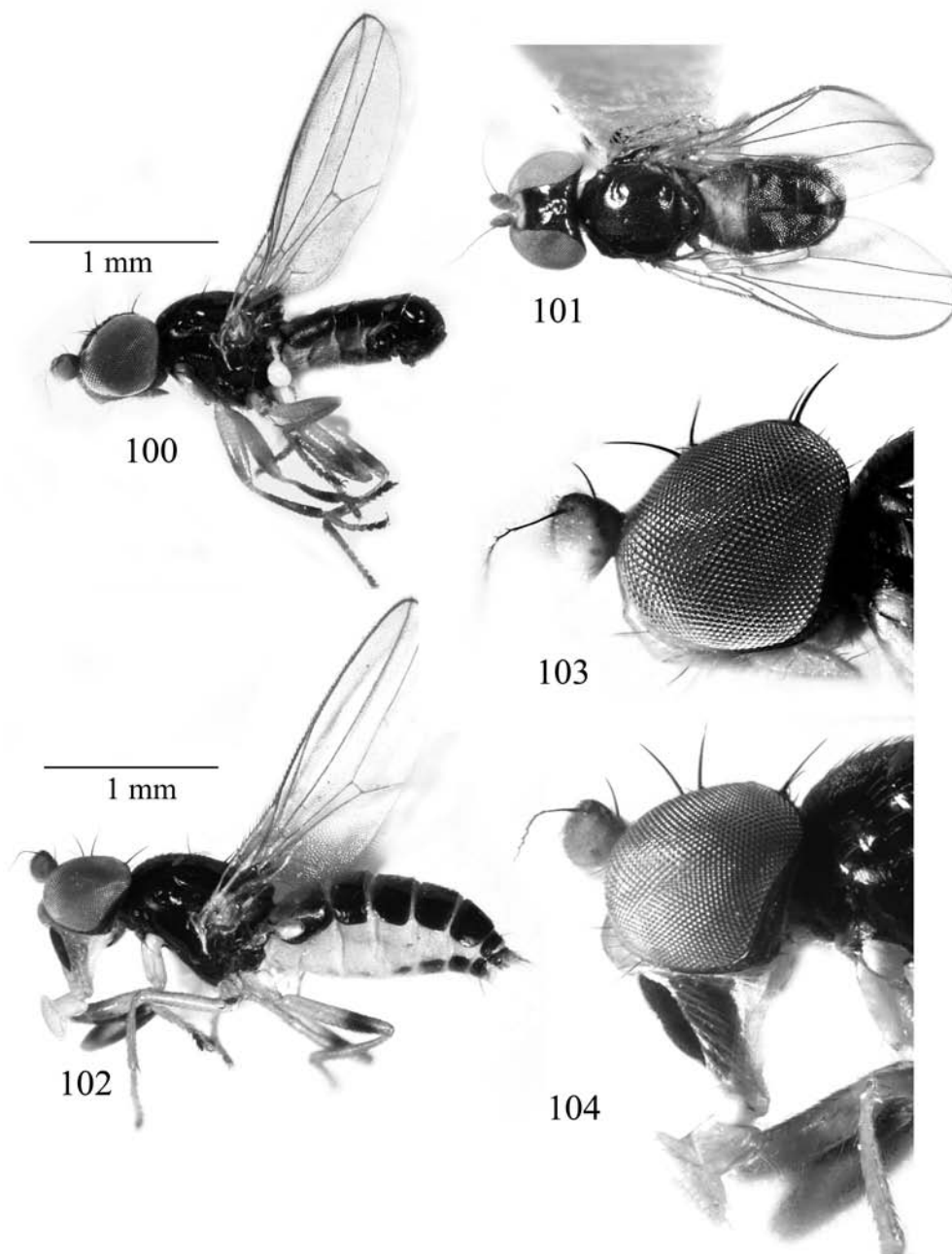
**TYPE LOCALITY.** Venezuela. Amazonas: Rio Mavaca Camp (02°02’N, 65°06’W).

**OTHER SPECIMENS EXAMINED.** BOLIVIA. La Paz: Arroyo Tuhiri (5 Km W Mapiri; 15°17.8’S, 68°15.6’W; 750 m), 19 Mar 2001, S. D. Gaimari (1♂; USNM).

COLOMBIA. Valle: Río Raposo (03°40’S, 75°05’W; light trap), Aug–Oct 1964, V. H. Lee (2♀; USNM).

COSTA RICA. Puntarenas: Peninsula de Osa, Rincón (08°42’N, 83°29’W; sea level; sweeping in palm-mangrove forest), 24 Mar 1991, D. A. Grimaldi, J. Stark (2♂; USNM); Peninsula de Osa, Rincón (08°42’N, 83°29’W; Malaise trap), Oct–Dec 1990, P. Hanson (2♀; USNM).

DOMINICA. Pont Cassé (15°22.8’N, 61°20.8’W, 12–14 Oct 1964, P. J. Spangler (1♂; USNM).



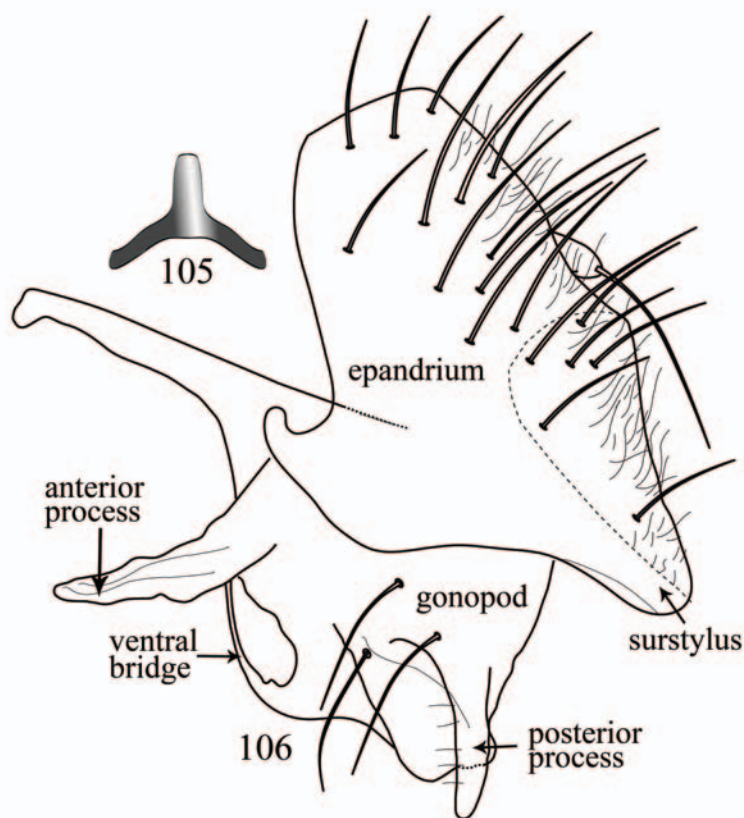
FIGURES 100–104. Digital photographs of *Aulacigaster grimaldii*, new species (the *grimaldii* group, Neotropical Region). (100) body of male, lateral aspect; (101) body of male, dorsal aspect; (102) body of female, lateral aspect; (103) head of male, lateral aspect; (104) head of female, lateral aspect. Not all to the same scale.

DOMINICAN REPUBLIC. Peravia: San José de Ocoa (30.6 km N; 18°33.8'N, 70°30'W; 915 m; near stream), 30 Jul 1991, D. A. Grimaldi, J. Stark (1♂; AMNH).

ECUADOR. Orellana: Reserva Etnica Waorani, Onkonegare Camp (1 km S; 0°39.4'S, 76°27.2'W; 216 m;

lots 1407, 1578, 1733, 2071), 4 Feb–3 Oct 1996, 1999, T. L. Erwin (3♂, 1♀; EPNE, USNM).

GUYANA. Kumo River (25 km SE Lethem in Kanuku Mountains; 03°15.9'N, 59°43.6'W), 3–6 Apr 1994, W. N. Mathis (1♂; USNM).



FIGURES 105–106. Illustrations of *Aulacigaster grimaldii*, new species (male) (the *grimaldii* group, Neotropical Region). (105) subepandrial sclerite, ventral aspect; (106) epandrium and internal genitalic structures (male), lateral aspect. Not all to the same scale.

PANAMA. Canal Zone: Barro Colorado Island (08°19'N, 82°38'W; on fresh-cut log), 15–30 Jun 1986, D. A. Grimaldi (1♂; AMNH).

PERU. Madre de Dios: Rio Manu, Pakitza (11°56.6'S, 71°16.9'W; 250 m), 9–23 Sep 1988, A. Freidberg (1♂; USNM); Rio Tambopata Reserve (30 km SW Puerto Maldonado; 12°50.4'S, 69°17.4'W; tropical moist forest) 19 Sep–10 Oct 1984, D. A. Grimaldi (1♀; AMNH).

VENEZUELA. Táchira: Pregonero, Presa Las Cuevas (8°01.5'N, 71°45.8'W; 650 m; rain forest; Malaise trap), 9–31 Jul 1989, S. and J. Peck (1♀; UGE).

**DISTRIBUTION.** (Map 7) Neotropical: Bolivia (La Paz), Colombia, Costa Rica (Puntarenas), Dominica, Dominican Republic (Peravia), Ecuador (Orellana), Guyana, Panama (Canal Zone), Peru (Madre de Dios), Venezuela (Amazonas, Táchira).

**ETYMOLOGY.** The specific epithet, *grimaldii*, is a genitive patronym to honor and recognize Dr. David A. Grimaldi for his numerous contributions to dipterology and his friendship.

**REMARKS.** This species can be easily identified from the only other species in this group, *A. angusta*, by

the characters given in the key and also by having a mostly polished ocellar tubercle.

#### THE MINUTA GROUP

FIGURES 107–131, 211–212, MAP 8

**DIAGNOSIS.** The *minuta* group is distinguished from other species groups by the following combination of characters: Relatively small, slender, delicate looking, dorsoventrally flattened flies with elongate body, body length 2.3–3.6 mm. Coloration and vestiture: Vertex mostly polished; ocellar tubercle mostly polished; frons typically mostly brown, anterior margin pale, yellowish, sometimes invested with dense microtomentum. Scutum mostly devoid of microtomentum; anepisternum polished; katepisternum mostly polished. Wing generally hyaline, infuscate with brown in some species.

**Morphology:** Body elongate, scutal ratio scutal ratio 1.5–1.75.

**Head:** Head typically longer than high (head ratio higher than 1.1); face slightly convex, barely visible in



lateral view; face at level of pseudovibrissal seta slightly narrower than width of 1st flagellomere; ocellar seta absent; medial vertical setae typically convergent and slightly proclinate.

*Thorax:* Subcosta incomplete, fused with vein  $R_1$  apically. Hind femur of male and female modified, with 2 ventral rows of spines, each spine bearing an apical seta; hind tibia with a row of tiny ventral spines. Hind femur of male often with a lobe.

*Male abdomen and terminalia:* Sternites 3–5 generally unmodified. Surstylus in lateral view a wide, ventroposterior extension of epandrium; cerci separate or partially fused; subepandrial sclerite forming a single, T-shaped structure; gonopods approximately rectangular, with a posterior, digitiform process and ventral, wide sclerotized plates; cercus bearing 1 very long, ventral seta and 1–3 longer setulae.

**DISTRIBUTION.** Neotropical: Bolivia, Costa Rica, Ecuador, Panama, Peru.

**BIOLOGY.** The biology of species belonging to this group is mostly unknown. One male of *A. appendiculata* was collected on cacao foliar nectaries. Specimens of *A. gaimarii* and *A. minuta* were collected on leaves of Heliconiaceae.

**DISCUSSION.** Species of the *minuta* group can be best identified by the shape of the basal lobe on the male hind femur and coloration of the legs: as with the *femorata* group, the shape of the surstylus and internal male terminalia do not provide many characters that are useful in species identification.

The *minuta* group includes four species of which one, *A. minuta* (Hennig), was previously described. The group is exclusively Neotropical.

### ***Aulacigaster appendiculata*, new species**

FIGURES 107–111, MAP 8

**DIAGNOSIS.** This species is distinguished from congeners by the following combination of characters: Body elongate, scutal ratio 1.5–1.75; thoracic pleura uniformly black; wing hyaline (at most with tip infuscate with brown); hind femur of male with a distinct basoventral lobe followed by a distinct concavity.

**DESCRIPTION.** Coloration and vestiture: Mesofrons mostly polished, or with a faint medial microtomentose stripe from base of antenna to level of anterior fronto-orbital seta; antenna pale yellow to yellowish, infuscate along dorsal margin; face brownish; antenna pale yellow to yellowish, infuscate along dorsal margin; palpus

white. Scutum mostly devoid of microtomentum; scutellum dull posteriorly, anterior portion shiny; postpronotum concolorous with mesonotum, mostly polished; halter mostly yellowish. Fore coxa yellow, fore femur yellowish, fore tibia yellowish, fore tarsus mostly yellowish; mid coxa yellow, mid femur yellowish, mid tibia yellowish, mid tarsus mostly yellowish; hind coxa yellow, hind femur mostly yellowish, apex brown infuscate, hind tibia brown to black on central portion, base and apex yellowish, hind tarsus yellowish, apical and sometimes subapical tarsomeres brown to black. Male abdomen subshiny to dull; female abdomen with dense microtomentum over syntergite 1+2, and anterior margin of remaining segments.

**Morphology:**

*Head:* Figures 109–110. Medial vertical seta 1/2 length of lateral vertical seta; peristomal area with about 3–5 setae following pseudovibrissal seta.

*Thorax:* Figures 107–108. Acrostichal setae in 1 row; scutellum slightly raised (angle with scutum approximately 135°), approximately triangular, apex relatively pointed, disk of scutellum flat; basal scutellar seta less than 1/2 length of posterior seta. Hind femur of male with a basoventral lobe followed by a distinct concavity, lobe approximately rectangular, long (about 1/3 the length of basal tarsomere), bearing a few apical and subapical setae and preceded by a few weak setae

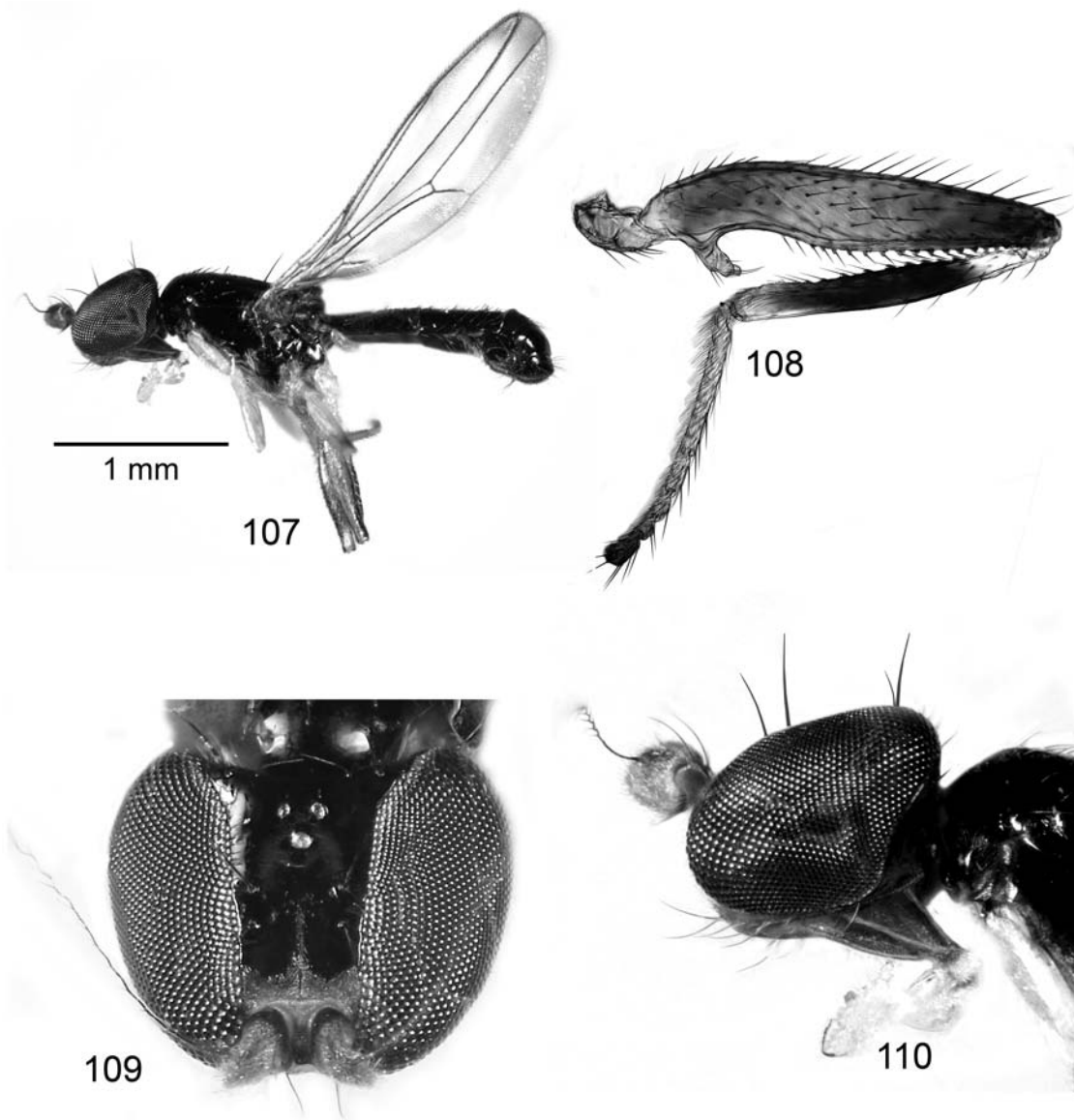
*Male abdomen and terminalia:* Figure 111. Surstylus at most 3 times the width of posterior process of gonopod; lateral margins of surstylar projection slightly convergent toward apex, with a subapical constriction; apex of surstylus roughly round; gonopod as in Figure 111.

*Measurements:* Body length 2.5–2.8 mm. Wing length 2.2–2.4 mm, wing width 0.6 mm.

**TYPE MATERIAL.** The holotype male is labeled “COSTA RICA: Heredia Pr.: La Selva Biol.[ogical] Sta. [tion] 3 Km S P[uer]to. Viejo 10°26'N 84°01'W/18 vi 1991 [18 Jun 1991] H. A. Hespeneide/HOLOTYP ♂ *Aulacigaster appendiculata* Rung & Mathis USNM [red].” The holotype is double mounted (glued to a paper point), is in excellent condition, and is deposited in USNM. Paratypes are as follows: Same label data as the holotype but with dates as follows: 2 May 1990, (1♂; UCLA); 8 Jul 1987 (at foliar nectaries of *Byttenaria aculeata* Jacq., plant # ?, cacao), H. A. Hespeneide (1♂; CAS).

**TYPE LOCALITY.** Costa Rica. Heredia: La Selva Biological Station (3 km S Puerto Viejo; 10°26'N, 84°01'W).

**OTHER SPECIMENS EXAMINED.** COSTA RICA. Heredia: La Selva Biological Station (3 km S Puerto Viejo; 10°26'N, 84°01'W; at foliar nectaries of *Byttenaria*



FIGURES 107–110. Digital photographs of *Aulacigaster appendiculata*, new species (male) (the *minuta* group, Neotropical Region). (107) body, lateral aspect; (108) left hind femur, medial aspect; (109) head, frontal aspect; (110) head, lateral aspect. Not all to the same scale.

*aculeata* Jacq., plant # ?, cacao), 8–26 Jul 1982, H. A. Hespenheide (5♂, 14♀; CSCA).

**DISTRIBUTION.** (Map 8) Neotropical: Costa Rica (Heredia).

**ETYMOLOGY.** The specific epithet, *appendiculata*, is of Latin derivation and means “little appendage” with reference to the lobe on the hind femur.

**REMARKS.** This species is closest to and shares a similar geographical distribution with *A. costaricana*. Males of both species can be readily distinguished by the characters

given in the key and diagnosis. Females of *A. appendiculata* and *A. costaricana* cannot be distinguished with certainty when males from the same series are not available.

### ***Aulacigaster condylura*, new species**

FIGURES 112–115, MAP 8

**DIAGNOSIS.** This species is distinguished from congeners by the following combination of characters: Body

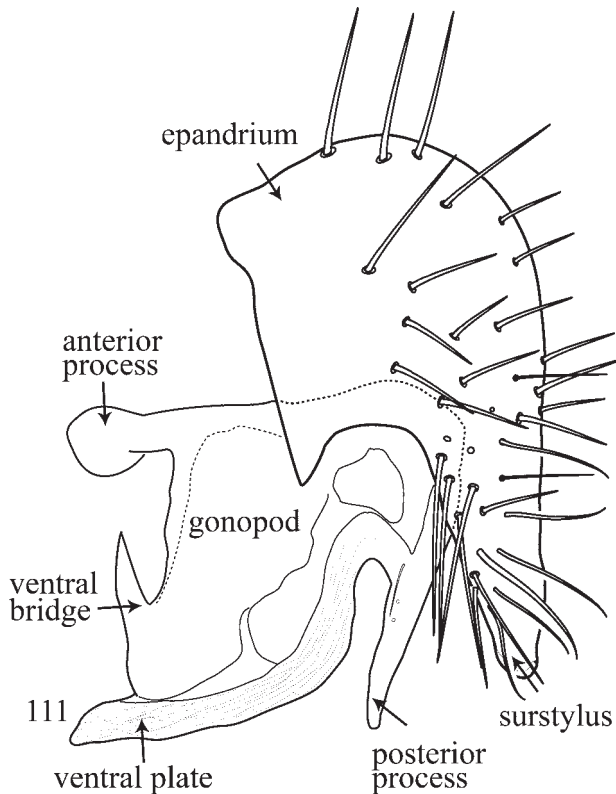


FIGURE 111. Illustrations of *Aulacigaster appendiculata*, new species (male) (the *minuta* group, Neotropical Region): epandrium and gonopod, lateral aspect.

elongate, scutal ratio 1.5–1.75; pleura uniformly black; scutellum dull microtomentose on lateral margins and apex, medial portion of scutellum bright shiny.

**DESCRIPTION.** Coloration and vestiture: Mesofrons mostly polished; antenna pale yellow to yellowish, infusate along dorsal margin in some specimens; face whitish or yellowish; palpus white. Scutum mostly devoid of microtomentum; scutellum dull microtomentose on lateral margins and apex, medial portion shiny; postpronotum concolorous with mesonotum, mostly polished; halter mostly white. Wing mostly brown, infusate. Fore coxa yellow, fore femur yellowish, fore tibia yellowish, fore tarsus mostly yellowish; mid coxa yellow, mid femur yellowish or dark brown to black apically, yellowish basally, mid tibia yellowish, mid tarsus mostly yellowish; hind coxa yellow, hind femur mostly brown, yellow on basal 1/3 to basal 1/2, hind tibia brown to black on central portion, base and apex yellowish, hind tarsus yellowish. Male abdomen subshiny to dull, pregenital segment polished posteriorly, dull anteriorly;

female abdomen with dense microtomentum over syntergite 1+2, and anterior margin of remaining segments.

**Morphology:**

**Head:** Medial vertical seta 1/2 length of lateral vertical seta; 1–2 peristomal setae present, following pseudo-vibrissal seta.

**Thorax:** Figures 112–114. Acrostichal setae in 1 row; scutellum very weakly raised (making almost no angle with scutum), approximately triangular, apex relatively pointed, disk of scutellum flat or slightly convex; basal scutellar seta less than 1/2 length of posterior seta. Hind femur of male with a basoventral lobe followed by a shallow concavity, lobe roughly ovoid, bearing about 6 apical marginal setae and preceded by a few yellow setae.

**Male abdomen and terminalia:** Figure 115. Sternite 3 with posterior margin and medial portion only weakly sclerotized, posterior margin with a strong concavity, sternite appearing medially divided; sternite 4 modified, posterior margin with a strong concavity with a medial weakly sclerotized area; sternite 5 with a central, more membranous area, posterior margin with a strong concavity. Surstylus at most 3 times the width of posterior process of gonopod; lateral margins of surstylar projection approximately parallel, slightly convergent toward apex, with a subapical constriction; apex of surstylus roughly round; gonopod as in Figure 115.

**Measurements:** Body length 2.3–2.6 mm. Wing length 2.3–2.6 mm, wing width 3.5–4.0 mm.

**TYPE MATERIAL.** The holotype male is labeled “ECU[ADOR]:Napo, Jatun Sacha Res., 6 km E Misahuallí, 450 m, 1°4’S, 77°37’W, on foliage, 30 Apr–8 May 2002, M. Buck, debu00186183/Holotype ♂ *Aulacigaster condylura* Rung & Mathis UGE [red].” The holotype is double mounted (glued to a point), is in excellent condition, and is deposited in the UGE. Paratypes are as follows: Same label data as the holotype (31♂, 12♀; UGE); same locality and collector as the holotype, but date of 4–7 May 2002 (22♂, 28♀; UGE).

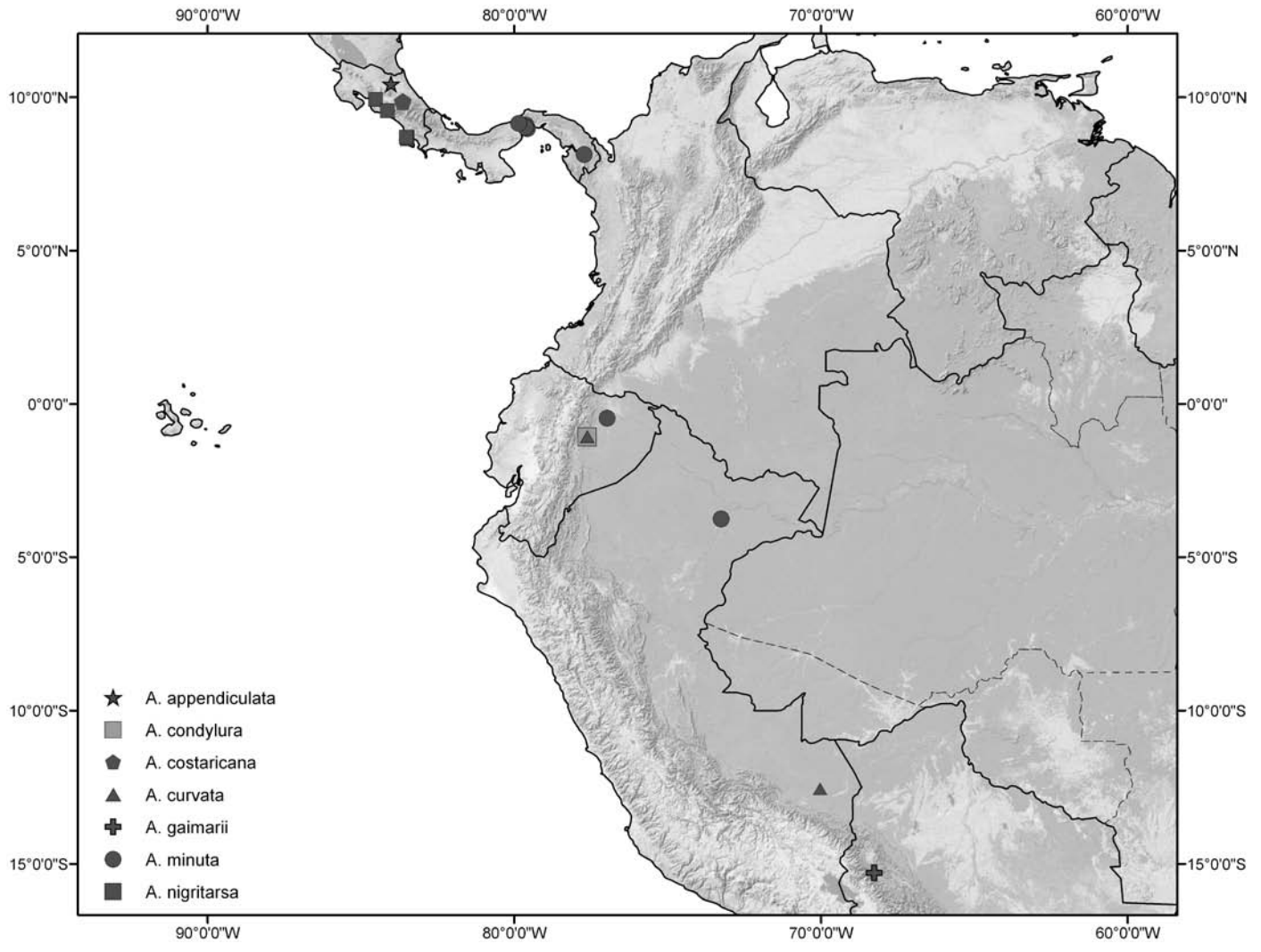
**TYPE LOCALITY.** Ecuador. Napo: Masahuallí (6 km E; 01°04’S, 77°37’W; 450 m).

**DISTRIBUTION.** (Map 8) Neotropical. Ecuador (Napo).

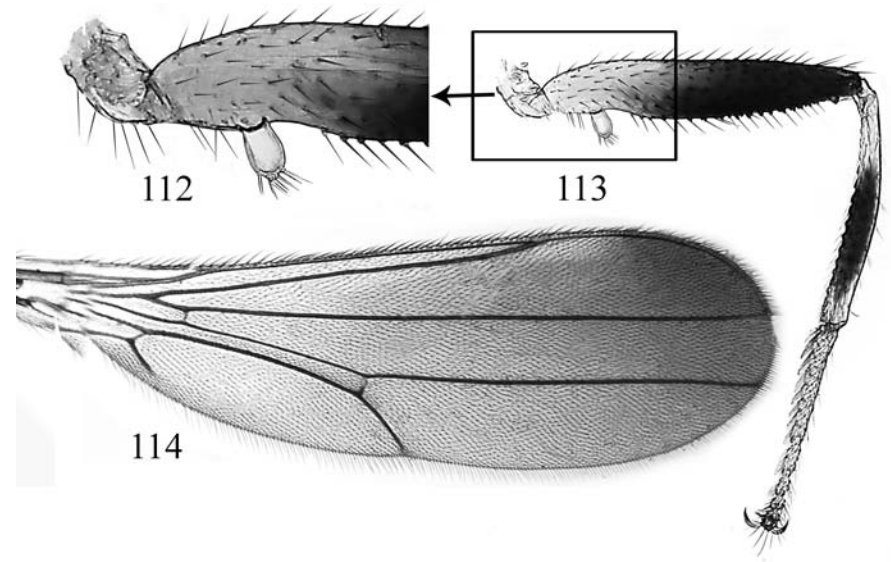
**BIOLOGY.** The type series was collected “on foliage.”

**ETYMOLOGY.** The specific epithet, *condylura*, is of Latin derivation and means “knob, prominence or enlarged end”, in reference to the lobe on the hind femur of the male.

**REMARKS.** *Aulacigaster condylura* is very similar to *A. curvata* and *A. gaimarii*. Even though males of



MAP 8. Distribution of the *minuta* species group of *Aulacigaster* (Neotropical Region).



FIGURES 112–114. Digital photographs of *Aulacigaster condylura*, new species (male) (the *minuta* group, Neotropical Region). (112) enlargement of anterior portion of hind femur, ventral aspect; (113) hind femur, ventral aspect; (114) right wing, dorsal aspect. Not all to the same scale.

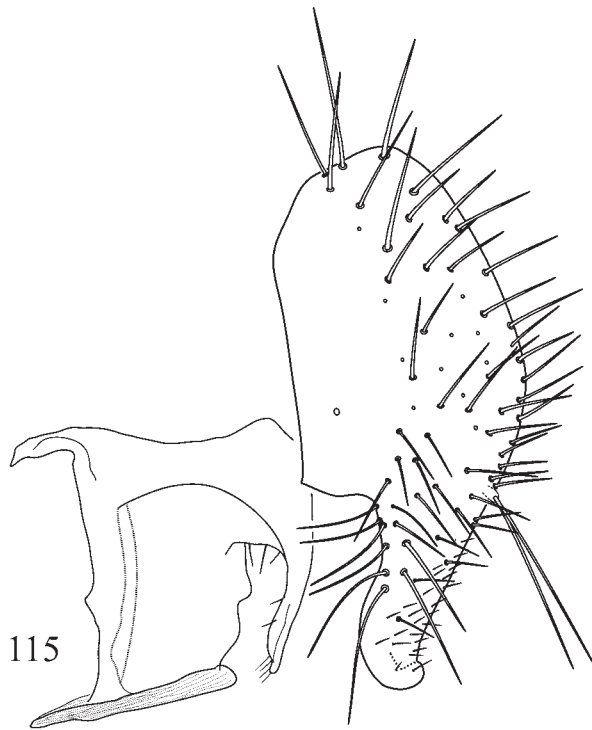


FIGURE 115. Illustrations of *Aulacigaster condylura*, new species (male) (the *minuta* group, Neotropical Region): epandrium and gonopod, lateral aspect.

these three species can be easily separated from each other with the characters given in the key and diagnosis, female identification is more difficult. Females of *A. condylura* can be for most part separated from females of the other two species by the less extensive dark coloration of the hind femur, and the flat scutellum. If the known distribution of these three species reflects their real distribution, they can also be separated based on country of origin.

### ***Aulacigaster costaricana*, new species**

FIGURES 116–120, MAP 8

**DIAGNOSIS.** This species is distinguished from congeners by the following combination of characters: Body elongate, scutal ratio 1.5–1.75; thoracic pleura uniformly black; hind femur of male with a small, inconspicuous, approximately cylindrical lobe.

**DESCRIPTION.** Coloration and vestiture: Mesofrons mostly polished, or with a faint medial microtomentose stripe from base of antenna to level of anterior fronto-orbital seta; antenna pale yellow to yellowish,

infusate along dorsal margin; face brownish; palpus white, or yellowish. Scutum mostly devoid of microtomentum; scutellum dull posteriorly, anterior portion shiny; postpronotum concolorous with mesonotum, mostly polished; halter mostly yellowish. Fore coxa yellow, fore femur yellowish, fore tibia yellowish, fore tarsus mostly yellowish; mid coxa yellow, mid femur yellowish, mid tibia yellowish (mid femur and mid tibia infusate apically in some specimens), mid tarsus mostly yellowish; hind coxa yellow, hind femur mostly yellowish, apex brown infusate, hind tibia brown to dark brown, yellowish at basal fifth or brown to black on central portion, base and apex yellowish, hind tarsus yellowish. Male abdomen subshiny to dull; female abdomen with dense microtomentum over syntergite 1+2, and anterior margin of remaining segments.

#### **Morphology:**

**Head:** Medial vertical seta  $1/2$  the length of lateral vertical seta; peristomal area with about 3–5 setae following pseudovibrissal seta.

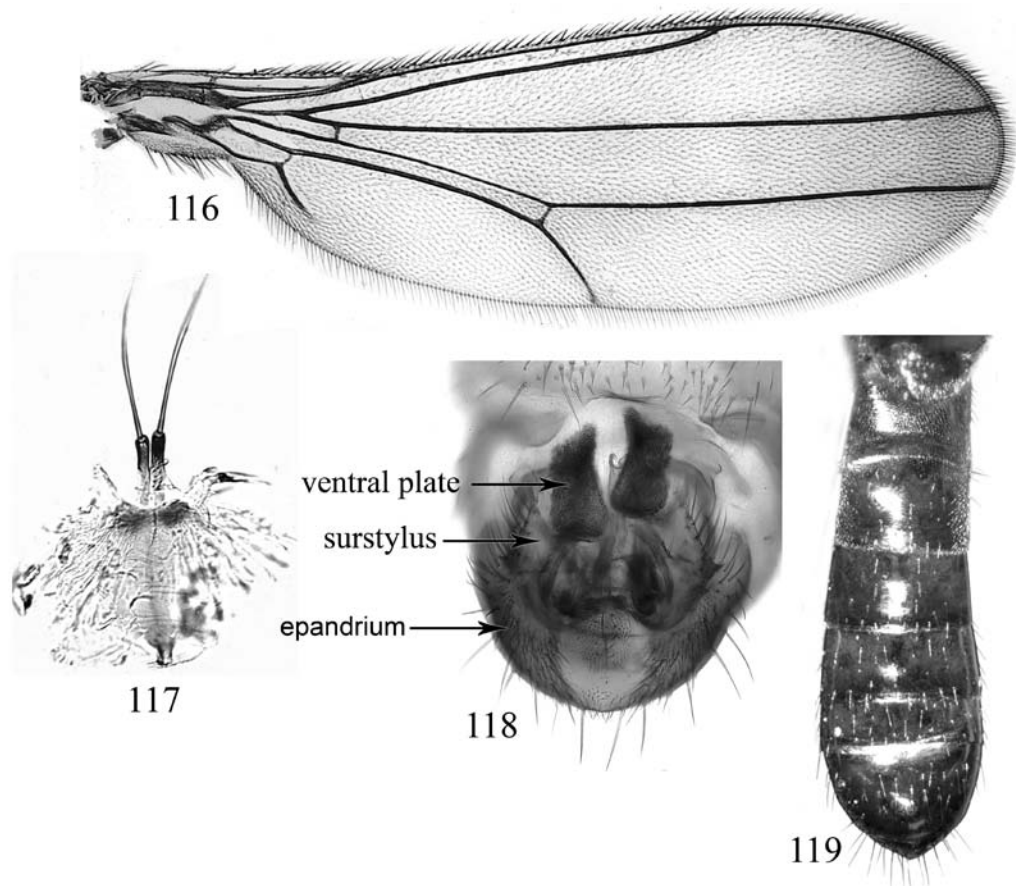
**Thorax:** Figure 116. Acrostichal setae in 1 row; scutellum slightly raised (angle with scutum approximately  $135^\circ$ ), approximately triangular, apex relatively pointed, disk of scutellum flat; basal scutellar seta less than  $1/2$  length of posterior seta. Hind femur of male with a small, inconspicuous, approximately cylindrical lobe; hind tibia with a row of tiny ventral spines.

**Male abdomen and terminalia:** Figures 117–120. Sternite 4 modified, posterior margin with a medial weakly sclerotized area; sternite 5 with a central, more membranous area, posterior margin appearing receded. Surstylus at most 3 times the width of posterior process of gonopod; lateral margins of surstyler projection convergent toward apex, with a subapical constriction; apex of surstylus roughly round; gonopod as in Figure 120.

**Measurements:** Body length 3.1–3.5 mm. Wing length 2.4–2.9 mm, wing width 0.6–0.9 mm.

**TYPE MATERIAL.** The holotype male is labeled “COSTA RICA: Heredia[,] Pr.: La Selva Biol.[ogical] Sta. [tion] 3 Km S Pto. Viejo  $10^\circ 26'N$   $84^\circ 01'W/18$ . vi 1991 [18 Jun 1991] H. A. Hespeneide/HOLOTYPE ♂ *Aulacigaster costaricana* Rung & Mathis USNM [red].” The holotype is double mounted (minuten in a block of plastic), is in excellent condition, and is deposited in USNM. Paratypes are as follows: Same label data as the holotype (2♂; UCLA, USNM); same locality data but different collector (P. Hanson) and date (Jan 1993) (1♂; USNM). COSTA RICA. Cartago: La Suiza ( $09^\circ 51.5'N$ ,  $83^\circ 37.5'W$ ), P. Schild (A. L. Melander Collection) (3♂; USNM).

**TYPE LOCALITY.** Costa Rica. Heredia: La Selva Biological Station (3 km S Puerto Viejo;  $10^\circ 26'N$ ,  $84^\circ 01'W$ ).



FIGURES 116–119. Digital photographs of *Aulacigaster costaricana*, new species (male) (the *minuta* group, Neotropical Region). (116) right wing, dorsal aspect; (117) subepandrial sclerite, ventral aspect; (118) epandrium and gonopod, ventral aspect; (119) abdomen, dorsal aspect. Not all to the same scale.

**OTHER SPECIMENS EXAMINED.** COSTA RICA. Limón: Amubri (09°31'N, 82°58'W), Talamanca, 26 Jul 1975, W. J. Hanson (1♂, 1♀; USU).

**DISTRIBUTION.** (Map 8) Neotropical. Costa Rica (Cartago, Heredia, Limón).

**ETYMOLOGY.** The specific epithet, *costaricana*, refers to the country, Costa Rica, where the type series was collected.

**REMARKS.** See "Remarks" under *A. appendiculata*.

### ***Aulacigaster curvata*, new species**

FIGURES 121–123, MAP 8

**DIAGNOSIS.** This species is distinguished from congeners by the following combination of characters: Body elongate, scutal ratio 1.5–1.75; pleura uniformly

black; wing infusate with brown; lobe on hind femur of male followed by a deep concavity.

**DESCRIPTION.** Coloration and vestiture: Mesofrons mostly polished, antenna pale yellow to yellowish, infusate along dorsal margin in some specimens; face whitish; palpus white. Scutum mostly devoid of microtomentum; scutellum mostly dull, or dull posteriorly, anterior portion shiny; postpronotum concolorous with mesonotum, mostly polished; halter mostly white. Wing mostly brown, infusate. Fore coxa yellow, fore femur yellowish, infusate with brown apically in some females, fore tibia yellowish, fore tarsus mostly yellowish; mid coxa yellow, mid femur yellowish or dark brown to black dorsally on apical 2/3, yellowish basally, mid tibia yellowish (partly to completely infusate with brown in some male specimens), mid tarsus mostly yellowish; hind coxa yellow, hind femur completely brown, or mostly brown, yellow on basal 1/5 to basal 1/4,

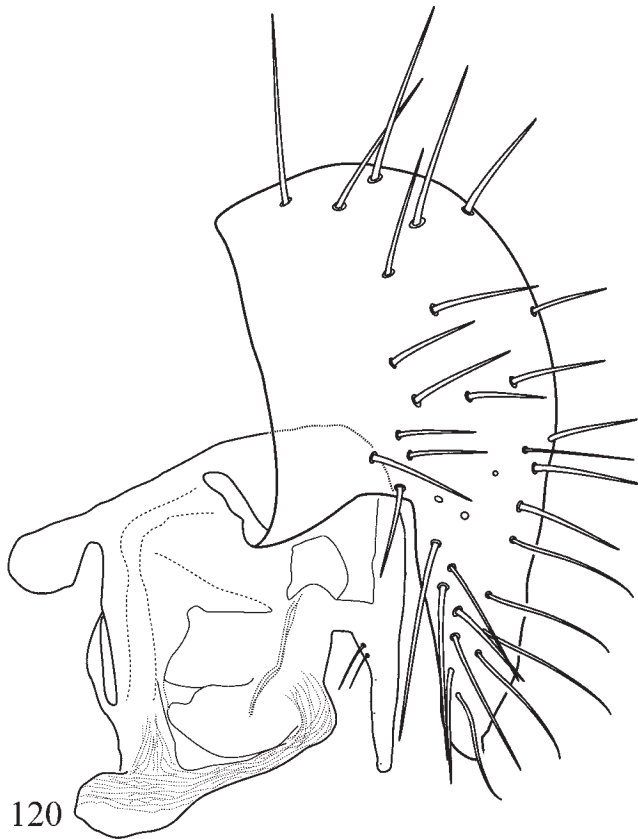


FIGURE 120. Illustrations of *Aulacigaster costaricana*, new species (male) (the *minuta* group, Neotropical Region): epandrium and gonopod, lateral aspect.

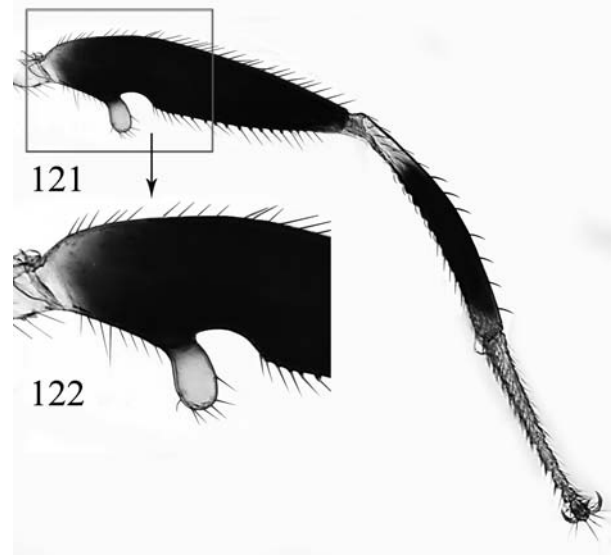
hind tibia brown to black on central portion, base and apex yellowish, hind tarsus yellowish. Male abdomen subshiny to dull, pregenital segment polished posteriorly, dull anteriorly; female abdomen with dense microtomentum over syntergite 1+2, and anterior margin of remaining segments.

**Morphology:**

**Head:** Medial vertical seta 1/2 length of lateral vertical seta; 1–2 peristomal seta present, following pseudovibrissal seta.

**Thorax:** Figures 121–122. Acrostichal setae in 1 row; scutellum slightly raised (angle with scutum approximately 135°), approximately triangular, apex relatively pointed, disk of scutellum flat or slightly convex; basal scutellar seta less than 1/2 length of posterior seta. Hind femur of male with a basoventral lobe followed by a strong concavity, lobe roughly ovoid, bearing about 6 apical marginal setae and preceded by a few yellow setae.

**Male abdomen and terminalia:** Figure 123. Sternite 3 with posterior margin and medial portion only weakly



FIGURES 121–122. Digital photographs of *Aulacigaster curvata*, new species (male) (the *minuta* group, Neotropical Region). (121) hind femur, ventral aspect; (122) enlargement of anterior portion of hind femur, ventral aspect. Not to the same scale.

sclerotized, posterior margin with a strong concavity, sternite appearing medially divided; sternite 4 modified, posterior margin with a strong concavity; sternite 5 with a central, more membranous area, posterior margin with a strong concavity. Surstylus at least 3 times the width of posterior process of gonopod; lateral margins of surstyler projection convergent toward apex, with a subapical constriction; apex of surstylus roughly round; gonopod as in Figure 123.

**Measurements:** Body length 3–3.4 mm. Wing length 2–2.4 mm, wing width 3.5–3.9 mm.

**TYPE MATERIAL.** The holotype male is labeled “ECU[ADOR]:Napo, Jatun Sacha Res., 6 km E Misahuallí, 450 m, 1°4’S, 77°37’W, on foliage, 30 Apr–8 May 2002, M. Buck, debu00186306/Holotype ♂ *Aulacigaster curvata* Rung & Mathis UGE [red].” The holotype is double mounted (glued to a point), is in excellent condition, and is deposited in the UGE. Paratypes are as follows: Same label data as the holotype (9♂, 20♀; UGE, USNM); same locality and collector as the holotype, but date of 4–7 May 2002 (13♂, 14♀; UGE, USNM); same locality but collected by O. Lonsdale, 2–7 May 2002 (1♂, 2♀; UGE); same locality, 350 m, Feb 1983, M.J. Sharkey (1♂; UGE).

**TYPE LOCALITY.** Ecuador. Napo: Masahuallí (6 km E; 01°04’S, 77°37’W; 450 m).

**OTHER SPECIMENS EXAMINED.** ECUADOR. Pichincha: Maquipucuna Biological Research Station

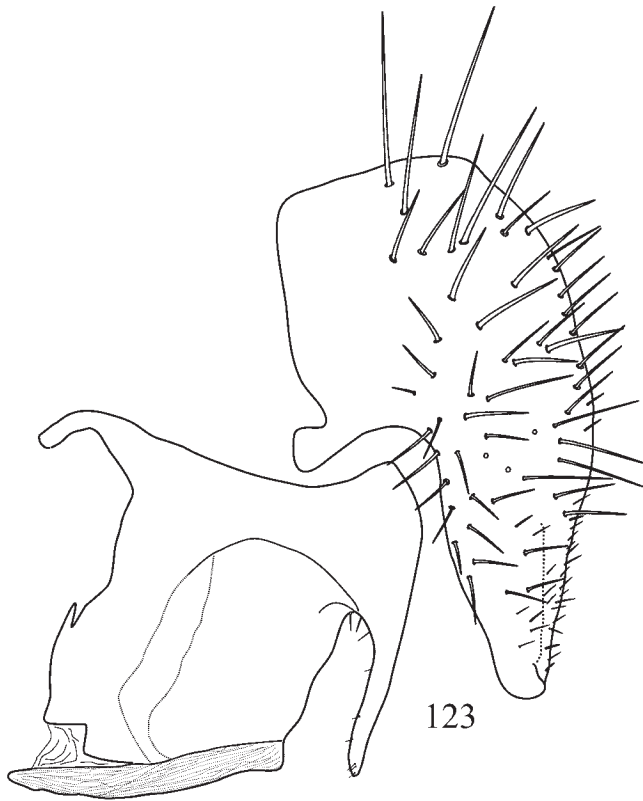


FIGURE 123. Illustrations of *Aulacigaster curvata*, new species (male) (the *minuta* group, Neotropical Region): epandrium and gonopod, lateral aspect.

(00°07'N, 78°38'W; river trail; *Heliconia* leaves; 1200 m), 26 Apr–29 Oct 1999, 2002, M Buck, S. A. Marshall (3♀; UGE).

PERU. Madre de Dios: Los Amigos Biological Station (12°34'S, 70°06.1'W), 2–14 Jun 2006, S. Paiero, J. Klymko (3♂, 1♀; UGE).

**DISTRIBUTION.** (Map 8) Neotropical: Ecuador (Napo, Pichincha), Peru (Madre de Dios).

**BIOLOGY.** The type series was collected “on foliage.”

**ETYMOLOGY.** The specific epithet, *curvata*, is of Latin derivation and means “curved, bent,” in reference to the strong curvature on the male hind femur following the lobe.

**REMARKS.** See above under *A. condylura*.

### ***Aulacigaster gaimarii*, new species**

FIGURES 124–127, MAP 8

**DIAGNOSIS.** This species is distinguished from congeners by the following combination of characters:

Body elongate, scutal ratio 1.5–1.75; thoracic pleura uniformly black; lobe on hind femur of male approximately foot-shaped, with apical and posterior marginal setae, not followed by a concavity.

**DESCRIPTION.** Coloration and vestiture: Mesofrons mostly polished; antenna pale yellow to yellowish, infuscate along dorsal margin in some specimens; face pale yellow, often with a brownish area posteriorly; palpus white. Scutum mostly devoid of microtomentum; scutellum dull posteriorly, anterior portion shiny; postpronotum concolorous with mesonotum, mostly polished; halter mostly white. Wing mostly brown, infuscate. Fore coxa yellow, fore femur yellowish, fore tibia yellowish, fore tarsus mostly yellowish; mid coxa yellow, mid femur yellowish or dark brown to black apically, yellowish basally, mid tibia yellowish (partly to completely infuscate with brown in some female specimens), mid tarsus mostly yellowish; hind coxa yellow, hind femur completely to mostly brown, yellow on basal 1/4, hind tibia brown to black on central portion, base and apex yellowish, hind tarsus yellowish. Male abdomen subshiny to dull, pregenital segment polished posteriorly, dull anteriorly; female abdomen with dense microtomentum over syntergite 1+2, and anterior margin of remaining segments.

#### **Morphology:**

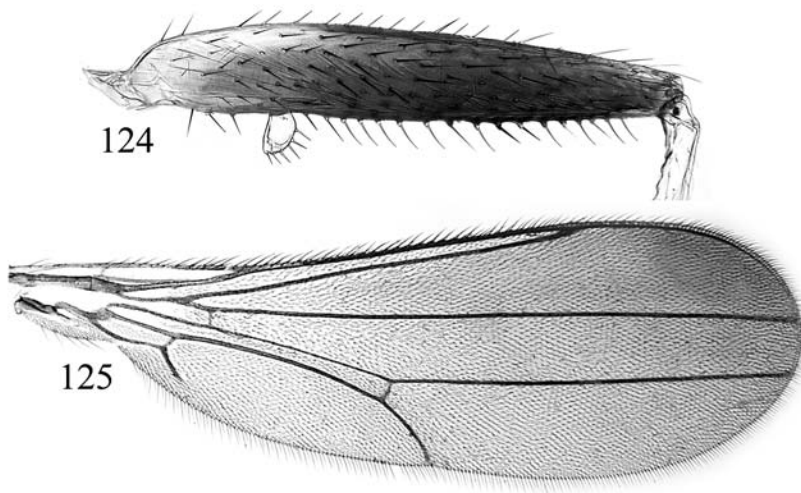
**Head:** medial vertical seta 1/2 length of lateral vertical seta; 1 peristomal seta present, following pseudovibrissal seta.

**Thorax:** Figures 124–125. Acrostichal setae in 1 row; scutellum slightly raised (angle with scutum approximately 135°), approximately triangular, apex relatively pointed, disk of scutellum flat or slightly convex; basal scutellar seta less than 1/2 length of posterior seta. Hind femur of male with a basoventral lobe not followed by a distinct concavity, lobe roughly foot-shaped, bearing apical and posterior marginal setae and preceded by a few yellow setae.

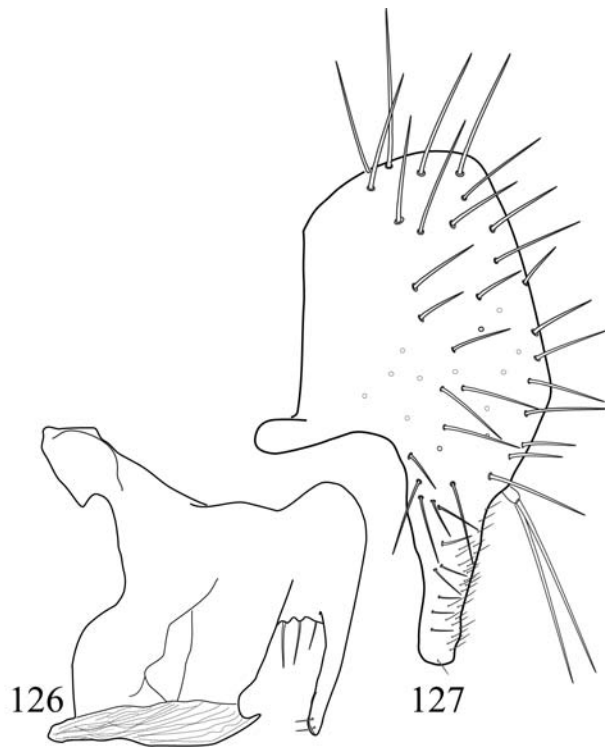
**Male abdomen and terminalia:** Figures 126–127. Sternite 3 with posterior margin and medial portion only weakly sclerotized, posterior margin receded, sternite appearing medially divided; sternite 4 modified, posterior margin with a medial weakly sclerotized area; sternite 5 with a central, more membranous area, posterior margin appearing receded. Surstylus at most 2 times the width of posterior process of gonopod; lateral margins of surstylar projection convergent toward apex, with a subapical constriction; apex of surstylus roughly round; gonopod as in Figure 126.

**Measurements:** Body length 2.7–3.1 mm. Wing length 2.4–2.7 mm, wing width 0.6–0.7 mm.





FIGURES 124–125. Digital photographs of *Aulacigaster gaimarii*, new species (the *minuta* group, Neotropical Region). (124) right hind femur of male, medial aspect; (125) right wing, dorsal aspect. Not to the same scale.



FIGURES 126–127. Illustrations of *Aulacigaster gaimarii*, new species (male) (the *minuta* group, Neotropical Region). (126) gonopod, lateral aspect; (127) epandrium, lateral aspect.

**TYPE MATERIAL.** The holotype male is labeled “BOLIVIA: Depto. La Paz[,] 5 km W Mapiri, Arroyo Tuhiri[,] 750 m, 15°17.8’S 68°15.6’W[,] 19-iii-2001 [19 Mar 2001], S. D. Gaimari/HOLOTYPE ♂ *Aulacigaster gaimarii* Rung & Mathis USNM [red].” The holotype is

double mounted (minuten in a block of plastic), is in excellent condition, and is deposited in the USNM. Paratypes are as follows: Same label data as the holotype (5♂, USNM); same locality and collector data as the holotype but with dates of 17 Mar 2001 (1♀; USNM), 18 Mar 2001 (6♂, 8♀; USNM); same locality, 16 Mar 2001, A. Freidberg (15♂, 7♀; USNM).

**TYPE LOCALITY.** Bolivia. La Paz: Mapiri (5 km W; Arroyo Tuhiri; 15°17.8’S 68°15.6’W).

**OTHER SPECIMENS EXAMINED.** BOLIVIA. La Paz: Arroyo Tuhiri, W. Mapiri (15°17.5’S 68°15.5’W), 10 Apr 2001, S. A. Marshall (5♂, 3♀; UGE).

**DISTRIBUTION.** (Map 8) Neotropical. Bolivia (La Paz).

**BIOLOGY.** The type series was collected on leaves of plants belonging to the family Heliconiaceae (S. D. Gaimari, personal communication).

**ETYMOLOGY.** The specific epithet, *gaimarii*, is a genitive patronym to honor and recognize Dr. Stephen D. Gaimari, who collected this species and many other interesting Acalyptrate Diptera in Bolivia.

**REMARKS.** See above under *A. condylura*.

### ***Aulacigaster minuta* (Hennig)**

FIGURES 128–129, MAP 8

*Schizochroa minuta* Hennig, 1969: 609, 605 [figure of wing].—Papavero, 1967:91 [Neotropical catalog].

*Aulacigaster minuta*.—D. K. McAlpine, 1983:58 [generic combination].

**DIAGNOSIS.** This species is distinguished from congeners by the following combination of characters:

Body elongate, scutal ratio 1.50–1.75; hind femur mostly dark brown, yellowish at basal 1/5–1/4; lobe on hind femur shaped as an inverted “M.”

**DESCRIPTION.** Coloration and vestiture: Mesofrons mostly polished, or with a faint medial microtomentose stripe from base of antenna to level of anterior fronto-orbital seta (females without stripe); antenna pale yellow to yellowish, in some specimens infusate along dorsal margin; face yellowish to light brown; palpus white. Scutum mostly devoid of microtomentum; scutellum dull posteriorly, anterior portion shiny (dull along apical margin); postpronotum concolorous with mesonotum, mostly polished; halter mostly white, or mostly brown to dark brown. Fore coxa yellow, fore femur yellowish, fore tibia yellowish, fore tarsus mostly yellowish; mid coxa yellow, mid femur yellowish or dark brown to black apically, yellowish basally, mid tibia yellowish or brownish, mid tarsus mostly yellowish; hind coxa yellow, hind femur mostly dark brown, yellowish at basal 1/5–1/4, hind tibia yellow basally, dark apically or brown to black on central portion, base and apex yellowish, hind tarsus yellowish. Male abdomen subshiny to dull (mostly on lateral margin of tergites); female abdomen with dense microtomentum over lateral margins of syntergite 1+2, remaining segments shiny.

**Morphology:**

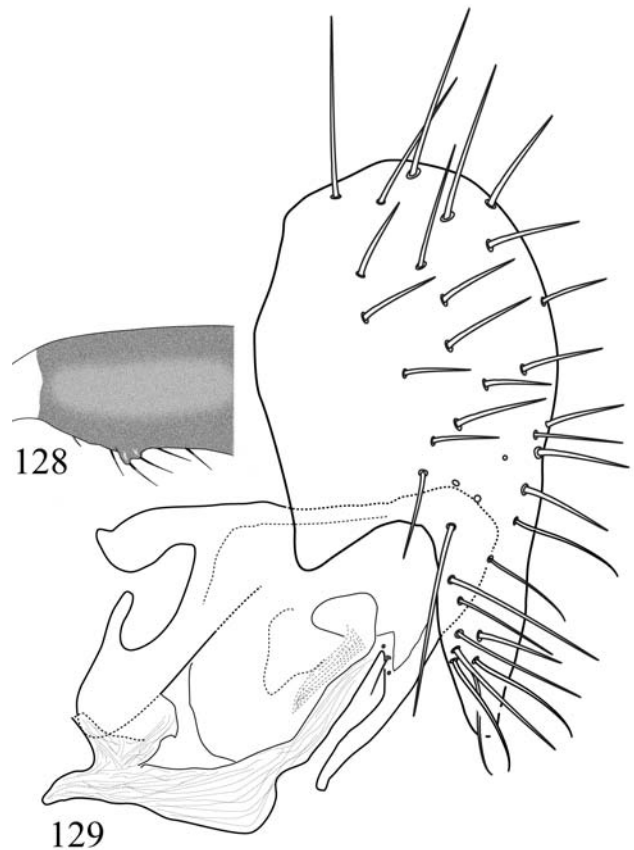
**Head:** Medial vertical seta 1/2 length of lateral vertical seta; peristomal area with 2–4 setae following pseudo-vibrissal seta.

**Thorax:** Figure 128. Acrostichal setae in 1 row; scutellum slightly raised (angle with scutum approximately 135°), approximately triangular, apex relatively pointed, disk of scutellum flat; basal scutellar seta less than 1/2 length of posterior seta. Hind femur modified, with 2 ventral rows of spines, each spine bearing an apical seta; hind femur of male with a basal lobe not followed by a posterior concavity, lobe approximately shaped as an inverted “M”, with one seta on each pointed projection; setae on lobe yellowish to brown, lobe preceded by a 2–3 weak setae.

**Male abdomen and terminalia:** Figure 129. Surstylus at most 3 times the width of posterior process of gonopod; lateral margins of surstyler projection convergent toward apex, with a subapical constriction; apex of surstylus roughly round; gonopod as in Figure 129.

**Measurements:** Body length 2.7–3 mm. Wing length 2.2–2.3 mm. Wing width 0.5–0.6 mm.

**TYPE MATERIAL.** The holotype female is labeled “Coca, Napo R[iver]., Napo, ECUADOR, 25.30.IV.65, 250 m., L. Peña/Schizochroa minuta Hg. HOLOTYPE wing on slide [red]/HOLOTYPE Schizochroa minuta Hennig CNC No. 9930 [red].” The holotype is glued directly



FIGURES 128–129. Illustrations of *Aulacigaster minuta* (Hennig) (male) (the *minuta* group, Neotropical Region). (128) basal portion of the left hind femur, medial aspect; (129) epandrium and gonopod, lateral aspect. Not to the same scale.

to the pin, is in good condition (left wing is missing), and is deposited in the CNC (9930).

**TYPE LOCALITY.** Ecuador. Orellana: Napo River, Puerto Francisco de Orellana (Coca; 00°28'S, 76°58'W).

**OTHER SPECIMENS EXAMINED.** PANAMA. Canal Zone: Corozal (08°59'N, 79°34'W), 19 Jan 1929, C. H. Curran (1♂; AMNH); Erwin Island, 17 Jul 1923, R. C. Shannon (1♂; USNM); Madden Forest (09°06'N, 79°37'W), 7–16 Mar 1961, S. B. Pipkin (3♂, 5♀; USNM); Paraíso (09°01.5'N, 79°37.5'W), 28 Jan–11 Feb 1911, A. Busck (2♂, 1♀; USNM); Piña Area (09°15.4'N, 79°57.9'W), 17 May 1960, W. J. Hanson (1♂; USU); Pipeline road (09°08.6'N, 79°43.6'W), 22 Mar 1982, W. J. Hanson (1♀; USU); Barro Colorado Island (09°09.3'N, 79°50.8'W), 18 Jul 1924, N. Banks (2♂, 3♀; AMNH). Darien: El Real (08°08'N, 77°43'W; ex. *Heliconia curhispatha*), 28 Nov 1963, S. B. Pipkin (1♂; USNM).

PERU. Loreto: Iquitos (03°44.9'S, 73°14.8'W), Mar-Apr 1931, R. C. Shannon (4♀; USNM).

**DISTRIBUTION.** (Map 8) Neotropical. Ecuador (Orellana), Panama (Canal Zone, Darien), Peru (Loreto).

**REMARKS.** This species is similar to *A. nigratarsa* but is distinguished from that species by its completely yellow antenna, the coloration of the hind femur (yellow on basal 1/5) and hind tarsus (completely yellow), and by the shape of the lobe on the hind femur of the male (shaped as an inverted "M", and bearing apical setae).

### *Aulacigaster nigratarsa*, new species

FIGURES 130–131, MAP 8

**DIAGNOSIS.** This species is distinguished from congeners by the following combination of characters: Body elongate, scutal ratio 1.50–1.75; hind tibia entirely brown to dark brown.

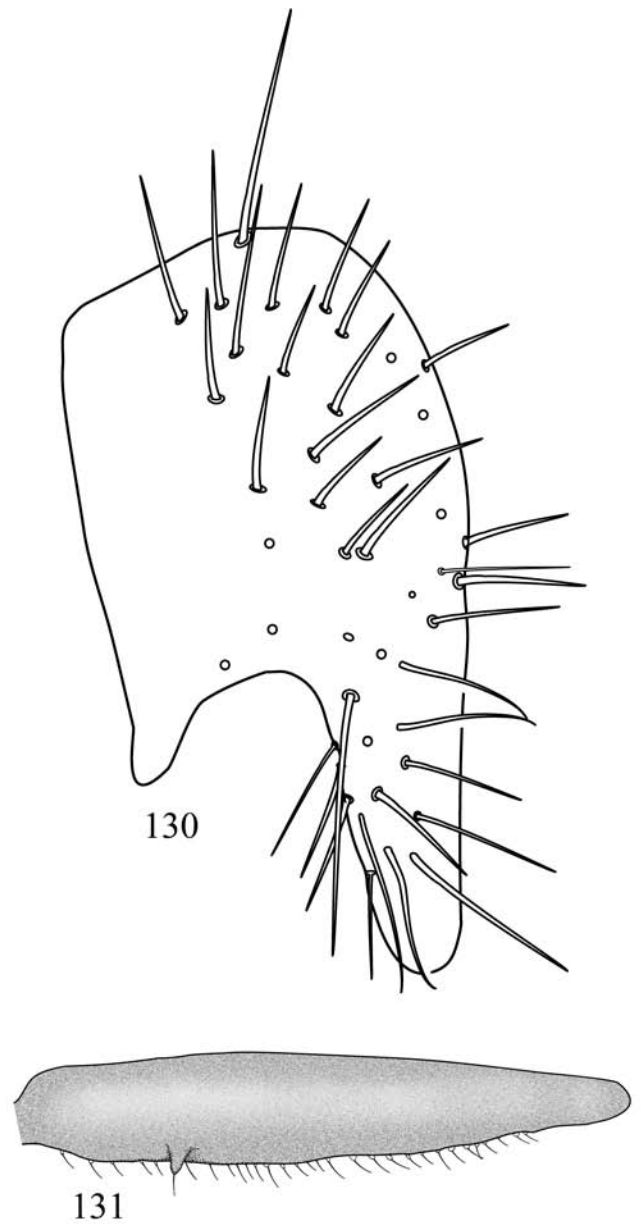
**DESCRIPTION.** Coloration and vestiture: Mesofrons with a faint medial microtomentose stripe from base of antenna to level of anterior fronto-orbital seta; antenna pale yellow to yellowish, not infusate dorsally; face brownish; palpus white. Scutum mostly devoid of microtomentum; scutellum dull microtomentose, or dull posteriorly, anterior portion shiny; postpronotum concolorous with mesonotum, mostly polished; halter mostly yellowish. Fore coxa yellow, fore femur yellowish, fore tibia yellowish, fore tarsus mostly yellowish; mid coxa yellow, mid femur yellowish, mid tibia brownish or with basal portion brown to dark brown, apical portion yellowish, mid tarsus mostly yellowish; hind coxa yellow, hind femur brown, hind tibia brown to dark brown, hind tarsus with basal tarsomere brown, apical tarsomere yellowish. Male abdomen subshiny to dull, pregenital segment mostly subshiny.

#### Morphology:

**Head:** Medial vertical seta thin, about 1/2 of lateral vertical seta; peristomal area with about 2 setae following pseudovibrissal seta.

**Thorax:** Figure 131. Acrostichal setae in 1 row; scutellum slightly raised (angle with scutum approximately 135°), approximately triangular, apex relatively pointed, disk of scutellum flat; basal scutellar seta less than 1/2 length of posterior seta. Hind femur modified, with 2 ventral rows of spines, each spine bearing an apical seta; hind femur of male with a basal lobe not followed by a posterior concavity, lobe approximately cylindrical approximately triangular, bearing an apical seta; lobe preceded by 5–6 weak setae

**Male abdomen and terminalia:** Figure 130. Sternite 5 with a central, more membranous area, posterior margin



FIGURES 130–131. Illustrations of *Aulacigaster nigratarsa*, new species (male) (the *minuta* group, Neotropical Region). (130) epanandrium, lateral aspect; (131) left hind femur, medial aspect. Not to the same scale.

appearing receded surstylus at most 3 times the width of posterior process of gonopod; lateral margins of surstylar projection convergent toward apex, without a conspicuous subapical constriction; apex of surstylus roughly round.

**Measurements:** Body length 3.2–3.6 mm. Wing length 2.4–2.6 mm, wing width 1.6–1.7 mm.

**TYPE MATERIAL.** The holotype male is labeled “Higuito[,] San Mateo[,]C[osta]R[ica]/PabloSchild Coll/HOLOTYPE ♂ *Aulacigaster nigratarsa* Rung & Mathis USNM [red].” The holotype is double mounted (minuten in a narrow, rectangular block of pith), is in fair condition (setae of head and mesonotum broken, right wing slightly folded, right midleg is missing), and is deposited in the USNM. Paratypes are as follows: Same label data as the holotype (4♂, 4♀; USNM).

**TYPE LOCALITY.** Costa Rica. Alajuela: Higuito, San Mateo (09°56'N, 84°31'W).

**OTHER SPECIMENS EXAMINED.** COSTA RICA. Puntarenas: Cerro de Oro (08°39'N, 83°29'W; 200 m), B. Gamboa, 5–9 May 1995 (1♀; USNM); Peninsula de Osa, Rincón (08°42'N, 83°29'W; Malaise trap), Oct–Dec 1990, P. Hanson (1♀; USNM); Peninsula de Osa, Rincón (08°42.2'N, 83°30.8'W; pan traps, grasses under canopy), 10–11 Aug 2001, K. N. Barger (1♀; UGE). San José: San Carlos, Riosparaíso Reserve, Pecarí Station (16 km NE Quepos; 09°33'53"N, 84°7'32"W; 400m), 15 Feb 2003, S. A. Marshall (1♀; UGE).

**DISTRIBUTION.** (Map 8) Neotropical: Costa Rica (Alajuela, Puntarenas).

**ETYMOLOGY.** The specific epithet, *nigratarsa*, is of Latin derivation and refers to the black coloration of the tarsus.

**REMARKS.** See “Remarks” under *A. minuta*.

#### THE PLESIOMORPHICA GROUP

FIGURES 132–160, 213–214, MAPS 9–13

**DIAGNOSIS.** The *pleiomorphica* group is distinguished from other species groups by the following combination of characters: Stout, medium-sized flies, body length 2.4–3.5 mm. Coloration and vestiture: Frons with anterior 1/3–1/2 yellowish in ground color; anterior portion of frons densely microtomentose, microtomentum forming a with a wide, lunate, silvery microtomentose stripe; facial band often present. Anepisternum mostly dull microtomentose. Abdomen in a few cases with a large, white to yellowish region on syntergite 1+2.

**Morphology:**

**Head:** Head higher than long (head ratio less than 0.9); face strongly convex on ventral 2/3, easily visible in lateral view; ocellar seta minute; fronto-orbital setae with posterior seta slightly internal to and almost transversely aligned with anterior seta.

**Thorax:** Subcosta partially fused with vein  $R_1$  apically but terminating on costa.

**Male abdomen and terminalia:** Surstylus a short, posteroventral lobe in lateral view; cerci often partially fused; subepandrial sclerite typically forming a single, plate-like structure; gonopods often with 2 posterior processes; one bearing 4–5 strong, stout setae.

**DISTRIBUTION.** Neotropical: Belize, Brazil, Costa Rica, Ecuador, Guyana, Panama, Peru, Venezuela.

**BIOLOGY.** There is sparse biological information on species of this group. Exemplars collected by us in the rainforest were collected on tree trunks and aerial portions of large *Ceiba* trees with no visible, wound-exuding sap fluxes.

**DISCUSSION.** Species of the *pleiomorphica* group are distinguished by the presence/absence of a facial band, the shape of the face, and coloration of the legs. In some cases, species can only be identified with certainty by the shape of the surstylus and other structural characters of the male, such as the shape of sternite 5, presence/absence of setae on the hind trochanter and hind tibia.

The *pleiomorphica* group includes nine species, and of these only one was previously described. The group is exclusively Neotropical.

#### *Aulacigaster albifacies*, new species

FIGURES 132–133, MAP 9

**DIAGNOSIS.** This species is distinguished from congeners by the following combination of characters: Body robust, scutal ratio 1.1–1.35; katepisternum subshiny to dull, microtomentose; face, in lateral view, barely visible, not appearing bulbous; scutellum triangular, apex strongly pointed.

**DESCRIPTION.** Coloration and vestiture: Vertex mostly polished, with a densely microtomentose stripe posterior to ocellar tubercle, with a shiny spot extended from ocellus to 2/3 distance to eye margin; ocellar tubercle dull microtomentose; frontal white-microtomentose stripe bordered posteriorly by a conspicuous velvety-black stripe; antenna pale yellow to yellowish, infusate along dorsal margin; face white to yellow; facial band present, distinct, gray or golden microtomentose over brown mark, on dorsal portion of face; palpus white. Scutum mostly completely microtomentose (specimens from Venezuela) or polished on anteriormost portion, opposite to postcranium (specimens from Guyana and Peru); scutellum dull microtomentose; postpronotum concolorous with mesonotum, scarcely microtomentose, subshiny; anepisternum mostly dull (dorsoposterior portion more shiny in some specimens); katepisternum subshiny to dull;

halter mostly white. Fore coxa brown to black, fore femur brown, fore tibia yellowish or brown, fore tarsus yellowish, apical and sometimes subapical tarsomeres brown to black; mid coxa brown to black, mid femur brown or brown to black, apex yellowish, mid tibia yellowish or brownish, mid tarsus mostly or entirely yellowish, apical and subapical tarsomere brownish to dark brown; hind coxa brown, hind femur brown or brown to black, apex yellowish, hind tibia yellowish-brownish or brown to dark brown, hind tarsus yellowish, apical tarsomere brown to black. Abdomen completely dark brown to black or with a large, white to yellowish region on syntergite 1+2, male abdomen bright shiny, pregenital segment mostly subshiny; female abdomen with dense microtomentum medially, lateral margins of tergites nearly polished.

**Morphology:**

**Head:** Head higher than long (head ratio less than 0.9); face at level of pseudovibrissal seta approximately the same width as the 1st flagellomere, not appearing bulbous; medial vertical seta 1/2–3/4 length of lateral vertical seta; 1 strong peristomal seta present, following pseudovibrissal seta.

**Thorax:** Acrostichal setae in 2 rows; scutellum strongly raised (angle with scutum less than 135°), triangular, apex strongly pointed, disk of scutellum flat; basal scutellar seta 1/2 length of posterior seta.

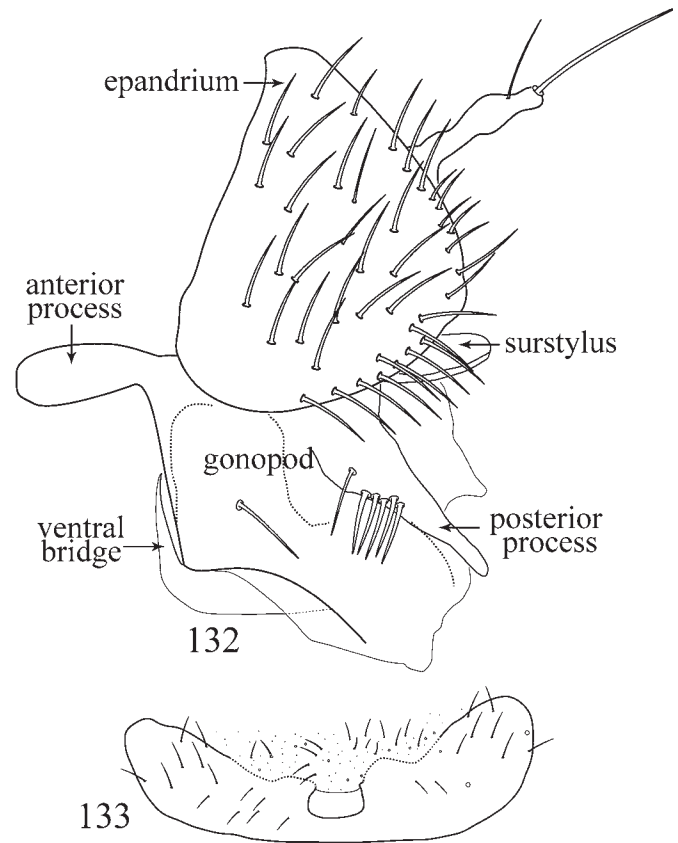
**Male abdomen and terminalia:** Figures 132–133. Sternite 5 with a central, more membranous area, posterior margin appearing receded, and bearing a tongue-like medial projection. Surstylus approximately rectangular, from lateral view “boat-shaped” and bearing one apical and one subapical setae; anterior process of the gonopod almost as long and as large as the surstylus; gonopod as in Figure 132; cerci partially fused, each cercus bearing 1 very long, ventral seta and 1–3 longer setulae.

**Measurements:** Body length 2.7–3.0 mm. Wing length 2.7–2.9 mm, wing width 0.8–0.9 mm.

**TYPE MATERIAL.** The holotype male is labeled “ECUADOR. Prt.[Puerto]. Orellana: Rio Tiputini (0°38.2'S, 76°8.9'W)[,] 12–26 Aug 1999, W. N. Mathis, A. Baptista, M. Kotrba/USNM ENT 00090363 [plastic bar code label]/HOLOTYPE ♂ *Aulacigaster albifacies* Rung & Mathis USNM [red].” The holotype is double mounted (minuten in a block of plastic), is in excellent condition, and is deposited in the USNM. Paratypes are as follows: Same label data as the holotype (7♂; EPNE, USNM).

**TYPE LOCALITY.** Ecuador. Orellana: Rio Tiputini (00°38.2'S, 76°08.9'W).

**OTHER SPECIMENS EXAMINED.** GUYANA. Moco Moco River (30 km E Lethem in Kanuku Mountains;



**FIGURES 132–133.** Illustrations of *Aulacigaster albifacies*, new species (male) (the *pleiomorphica* group, Neotropical Region). (132) epandrium and gonopod, lateral aspect; (133) sternite 5, ventral aspect. Not all to the same scale.

03°18.2'N, 59°39.0'W), 3–29 Apr 1994, 1995, W. N. Mathis (5♂, 1♀; USNM).

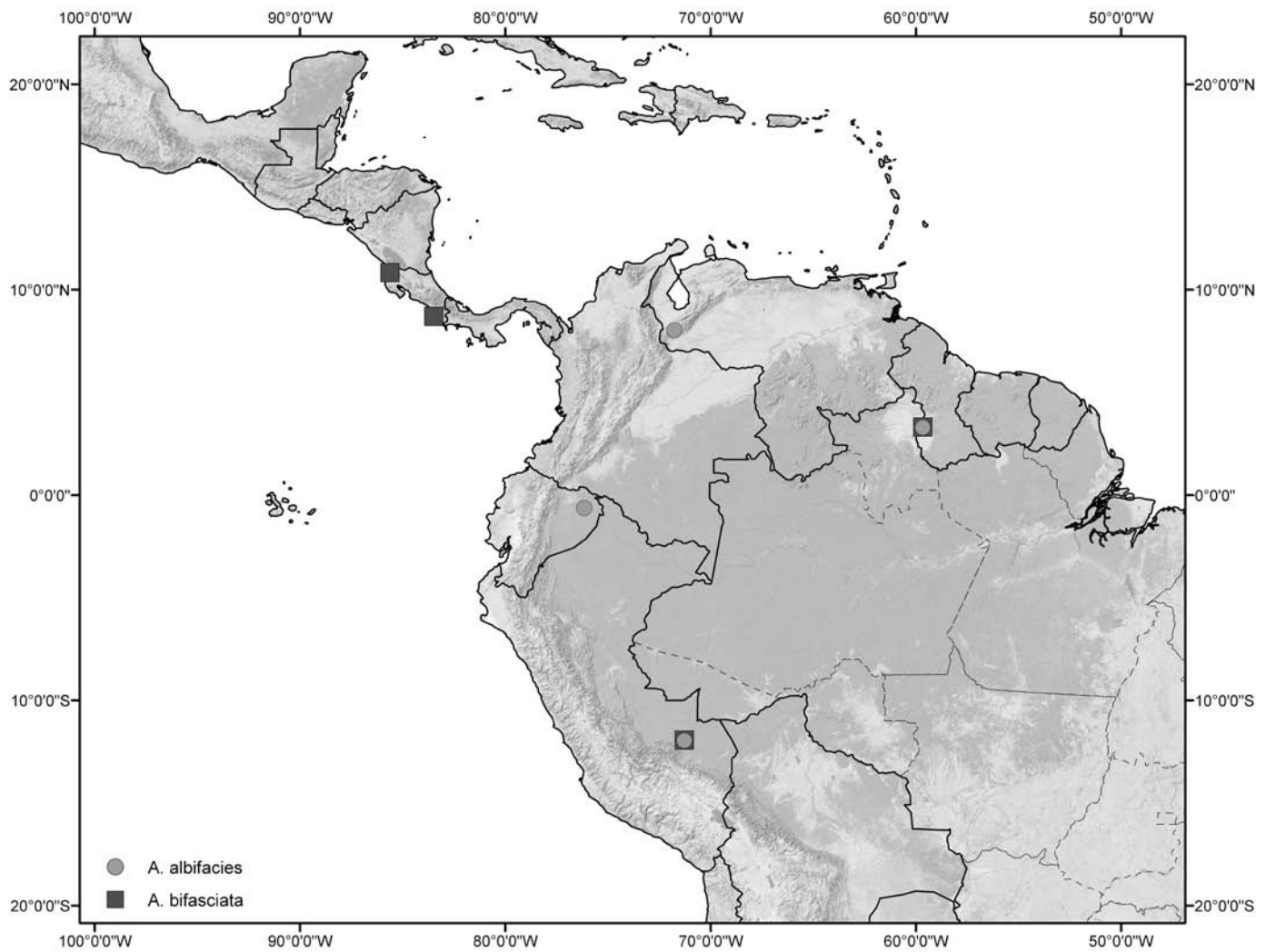
PERU. Madre de Dios: Manu, Rio Manu, Pakitza, Aguajal (11°58.2'S, 71°17'W), 19 Sep 1988, A. Freidberg, (2♂, 1♀; USNM).

VENEZUELA. Táchira: Pregonero, Presa Las Cuevas (8°01.5'N, 71°45.8'W; 650 m; rain forest; Malaise trap), 9–31 Jul 1989, S. and J. Peck (1♂, 1♀; UGE).

**DISTRIBUTION.** (Map 9) Neotropical: Ecuador (Orellana), Guyana, Peru (Madre de Dios), Venezuela (Táchira).

**BIOLOGY.** This species was collected while sweeping trunks of Ceiba trees (Bombacaceae: *Ceiba* sp.) in the rainforest of Ecuador. The tree trunk had no visible wound exuding sap flux.

**ETYMOLOGY.** The specific epithet, *albifacies*, is of Latin derivation and refers to the white coloration of the facial band.



MAP 9. Distribution of *Aulacigaster albifacies* and *A. bifasciata* (the *plesiomorphica* group, Neotropical Region).

**REMARKS.** Specimens collected in Venezuela have the scutum mostly completely microtomentose, whereas specimens collected in Guyana and Peru have a polished region on the anteriormost portion of scutum, opposite to postcranium. We did not observe any other difference that would justify description of another species. This species shares with *A. trifasciata* the presence of a tongue-like medial projection on the posterior margin of the male fifth sternite and a predominantly polished vertex. The surstylus is also very similar in both species. Specimens of *A. albifacies* are stouter and darker than those of *A. trifasciata*, have the femora and tibiae mostly black, and a microtomentose ocellar tubercle. Specimens of *A. trifasciata* are smaller, have the femora and tibiae mostly yellow, and have a polished ocellar tubercle.

### *Aulacigaster atriseta*, new species

FIGURE 134–136, MAP 10

**DIAGNOSIS.** This species is distinguished from congeners by the following combination of characters: Frons with anterior 1/3–1/2 yellowish in ground color; hind tibia with strong, dark, apicodorsal setae; hind trochanter of male without a ventral tuft of setae.

**DESCRIPTION.** Coloration and vestiture: Vertex mostly densely microtomentose, with a shiny spot extended from ocellus to 2/3 distance to eye margin to with a shiny spot extended from ocellus at most 1/2 way to eye margin; ocellar tubercle dull microtomentose; frontal white-microtomentose stripe bordered posteriorly by a

conspicuous velvety-black stripe; antenna pale yellow to yellowish, infuscate along dorsal margin; face yellow anteriorly, brown to black on posterior portion; facial band present (region of facial band “wrinkled and matt), delimited as a transversely wrinkled band on dorsal portion of face, mostly lacking microtomentum; palpus white. Scutellum dull microtomentose; postpronotum concolorous with mesonotum, dull microtomentose; anepisternum mostly dull; katepisternum subshiny to dull; halter mostly white. Fore coxa brown to black, fore femur brown to black, apex yellowish, fore tibia yellowish (brown infuscate basally), fore tarsus mostly yellowish to yellowish, apical and sometimes subapical tarsomeres brown to black; mid coxa brown to black, mid femur brown to black, apex yellowish, mid tibia yellowish, mid tarsus mostly yellowish; hind coxa brown, hind femur brown to black, apex yellowish, hind tibia yellowish or dark basally, yellow apically, hind tarsus yellowish. Male abdomen bright shiny, pregenital segment polished posteriorly, dull anteriorly; female abdomen with dense microtomentum medially, lateral margins of tergites nearly polished.

**Morphology:**

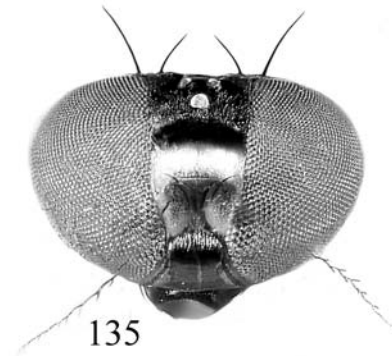
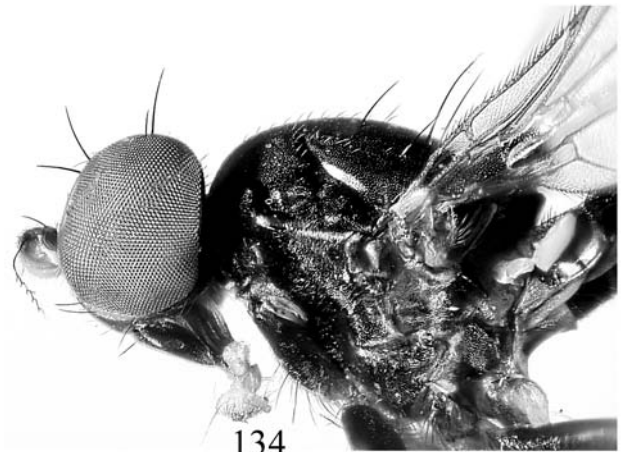
**Head:** Figures 134–135. Head round, about as high as long (head ratio 0.9–1.1), or higher than long (head ratio less than 0.9); face at level of pseudovibrissal seta approximately the same width as the 1st flagellomere, not appearing “bulbous”; medial vertical seta  $1/2$ – $3/4$  length of lateral vertical seta; 1 strong peristomal seta present, following pseudovibrissal seta.

**Thorax:** Figure 134. Acrostichal setae in 1 row; scutellum strongly raised (angle with scutum less than  $135^\circ$ ), approximately triangular, apex relatively pointed, disk of scutellum slightly convex; basal scutellar seta  $1/2$  length of posterior seta. Hind tibia with strong, dark, apicodorsal setae.

**Male abdomen and terminalia:** Figure 136. Surstylus not well differentiated from folded portion of epanthrium, difficult to discern in lateral view; gonopod as in Figure 136; cerci bearing 1 very long, ventral seta and 1–3 longer setulae.

**Measurements:** Body length 2.9 mm, wing length 2.9 mm, wing width 0.9 mm.

**TYPE MATERIAL.** The holotype male is labeled “PERU. Madre de Dios: [Rio] Manu, Erika (near Salvacion), 550 m, 5–6 Sept 1988, W. N. Mathis/HOLOTYPE ♂ *Aulacigaster atriseta* Rung & Mathis USNM [red].” The holotype is double mounted (minuten in a block of plastic), is in good condition (ventral right fronto-orbital seta broken), and is deposited in the USNM. A paratype is as follows: PERU. Madre de Dios: Manu, Rio Manu, Pakitza



**FIGURES 134–135.** Digital photographs of *Aulacigaster atriseta*, new species (male) (the *pleiomorphica* group, Neotropical Region). (134) head and mesonotum of male, lateral aspect; (135) head, frontal aspect. Not all to the same scale.

( $11^\circ 56.6'S$ ,  $71^\circ 16.9'W$ ; 250 m), 9–23 Sep 1988, W. N. Mathis (1♂; USNM).

**TYPE LOCALITY.** Peru. Madre de Dios: Rio Manu, Erika (near Salvación;  $12^\circ 53'S$ ,  $71^\circ 12'W$ ).

**DISTRIBUTION.** (Map 10) Neotropical: Peru (Madre de Dios).

**ETYMOLOGY.** The specific epithet, *atriseta*, is of Latin derivation and is a combination of *atra*, meaning black, and *seta* and refers to the black, dorsoapical setae on the hindfemora.

**REMARKS.** This species shares with *A. proxima* and *A. pleiomorphica* the presence of black, dorsoapical setae on the hind femur, but it can be easily distinguished from these two species by the absence of well-developed setae on the hind trochanter of the male and by the absence of a conspicuous surstylus.

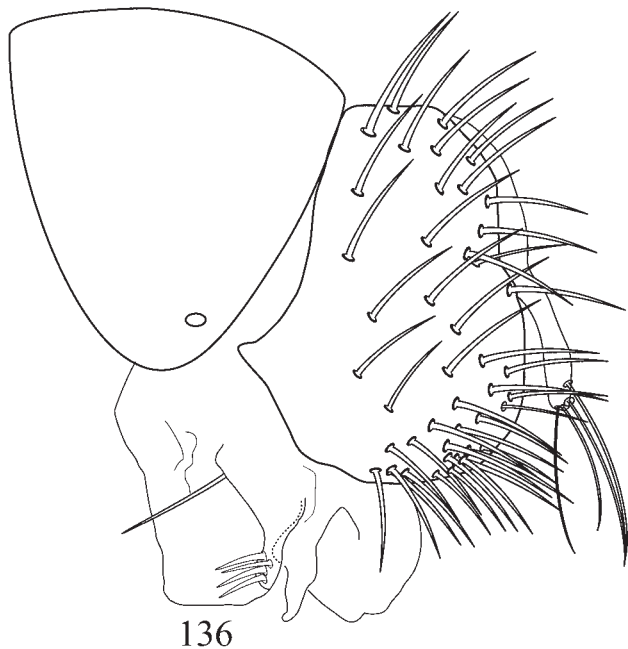


FIGURE 136. Illustrations of *Aulacigaster atriseta*, new species (male) (the *pleiomorphica* group, Neotropical Region): pregenital segment, epandrium and gonopod, lateral aspect.

### *Aulacigaster belize*, new species

FIGURES 137–138, MAP 10

**DIAGNOSIS.** This species is distinguished from congeners by the following combination of characters: Frons with anterior 1/3–1/2 yellowish in ground color; face not appearing bulbous; hind tibia without apicodorsal setae; surstylus more or less folded below the epandrium, difficult to see in lateral view.

**DESCRIPTION.** Coloration and vestiture: Vertex mostly densely microtomentose, with a shiny spot extended from ocellus at most 1/2 way to eye margin or with a shiny spot extended from ocellus to 2/3 distance to eye margin; ocellar tubercle dull microtomentose; frontal white-microtomentose stripe bordered posteriorly by a conspicuous velvety-black stripe; antenna pale yellow to yellowish, infuscate along dorsal margin; face yellow anteriorly, brown to black on posterior portion; facial band present, delimited as a transversely wrinkled band on dorsal portion of face, mostly lacking microtomentum; palpus white. Scutellum dull microtomentose; postpronotum concolorous with mesonotum, dull microtomentose; anepisternum mostly dull;

katepisternum subshiny to dull; halter mostly white. Fore coxa brown to black, fore femur brown to black, apex yellowish, fore tibia yellowish (brown infuscate basally), fore tarsus yellowish, apical and sometimes subapical tarsomeres brown to black; mid coxa brown to black, mid femur brown to black, apex yellowish, mid tibia yellowish (brown infuscate on basal portion), mid tarsus mostly yellowish; hind coxa brown, femur brown to black, apex yellowish, hind tibia yellowish or dark basally, yellow apically, hind tarsus yellowish. Male abdomen bright shiny, pregenital segment polished posteriorly, dull anteriorly; female abdomen with dense microtomentum medially, lateral margins of tergites nearly polished.

#### Morphology:

**Head:** Head round, about as high as long (head ratio 0.9 to 1.1) to higher than long (head ratio less than 0.9); face at level of pseudovibrissal seta wider than width of 1st flagellomere or approximately the same width as the 1st flagellomere, not appearing bulbous; medial vertical seta 1/2–3/4 length of lateral vertical seta; 1 strong peristomal seta present, following pseudovibrissal seta.

**Thorax:** Acrostichal setae in 1 row; scutellum slightly raised (angle with scutum approximately 135°), semicircular, disk of scutellum slightly convex; basal scutellar seta 1/2 length of posterior seta.

**Male abdomen and terminalia:** Figures 137–138. Sternite 5 with a central, more membranous area, posterior margin appearing receded. Surstylus more or less folded below the epandrium, difficult to see in lateral view, approximately triangular, with apex pointing dorsally towards cerci, bearing one medial and one strong apical setae; gonopod as in Figure 137; cerci separate, narrow, digitiform, each cercus bearing 1 very long, ventral seta and 1–3 longer setulae.

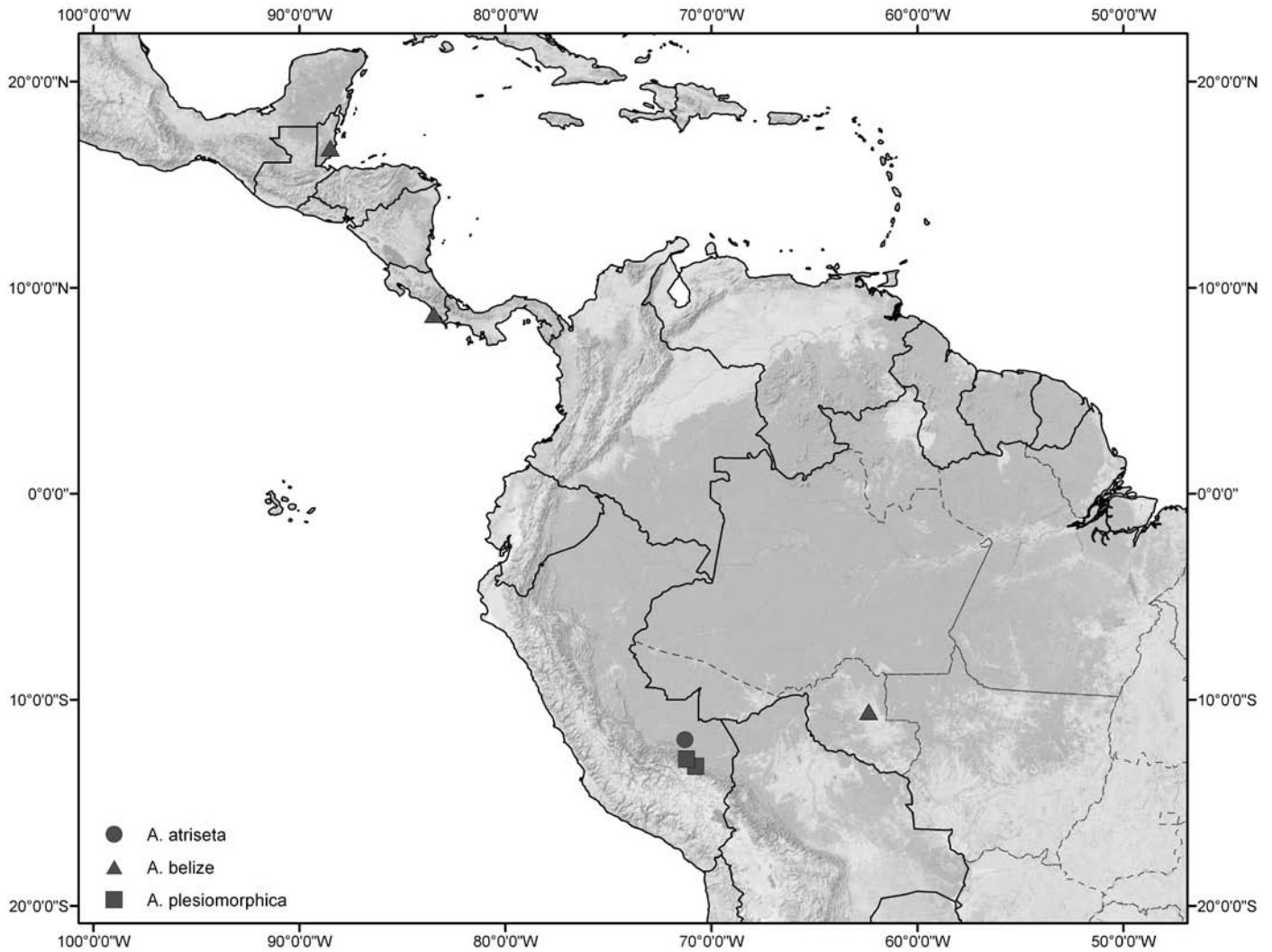
**Measurements:** Body length 2.8–3.0 mm. Wing length 2.5–2.7 mm, wing width 0.7–0.9 mm.

**TYPE MATERIAL.** The holotype male is labeled “BELIZE. Stann Creek District: Cockscomb Basin Wldlfe. Sanct. (16°47'N, 88°30'W)[,] 5–6 Apr 1993, W. Mathis/HOLOTYPE ♂ *Aulacigaster belize* Rung & Mathis USNM [red].” The holotype is double mounted (minuten in a block of plastic), is in excellent condition, and is deposited in the USNM. Paratypes are as follows: Same label data as the holotype (10♂, 6♀; USNM).

**TYPE LOCALITY.** Belize. Stann Creek District: Cockscomb Basin Wildlife Sanctuary (16°47'N, 88°30'W).

**OTHER SPECIMENS EXAMINED.** BRAZIL. Rondônia: Ariquemes (62 Km SE; 10°34'S, 62°22'W), 7–20 Nov 1994, 1995, W. J. Hanson (1♂, 1♀; USU).





MAP 10. Distribution of *Aulacigaster atriseta*, *A. belize*, and *A. plesiomorphica* (the *plesiomorphica* group, Neotropical Region).

COSTA RICA. Puntarenas: Península de Osa, Rincón (08°42'N, 83°29'W; sea level; sweeping in palm-mangrove forest), 24 Mar 1991, D. A. Grimaldi, J. Stark (3♂; AMNH).

**DISTRIBUTION.** (Map 10) Neotropical: Brazil (Rondônia), Belize, Costa Rica (Puntarenas).

**ETYMOLOGY.** The specific epithet, *belize*, refers to the country of Belize, where the type locality is located and is a noun in apposition.

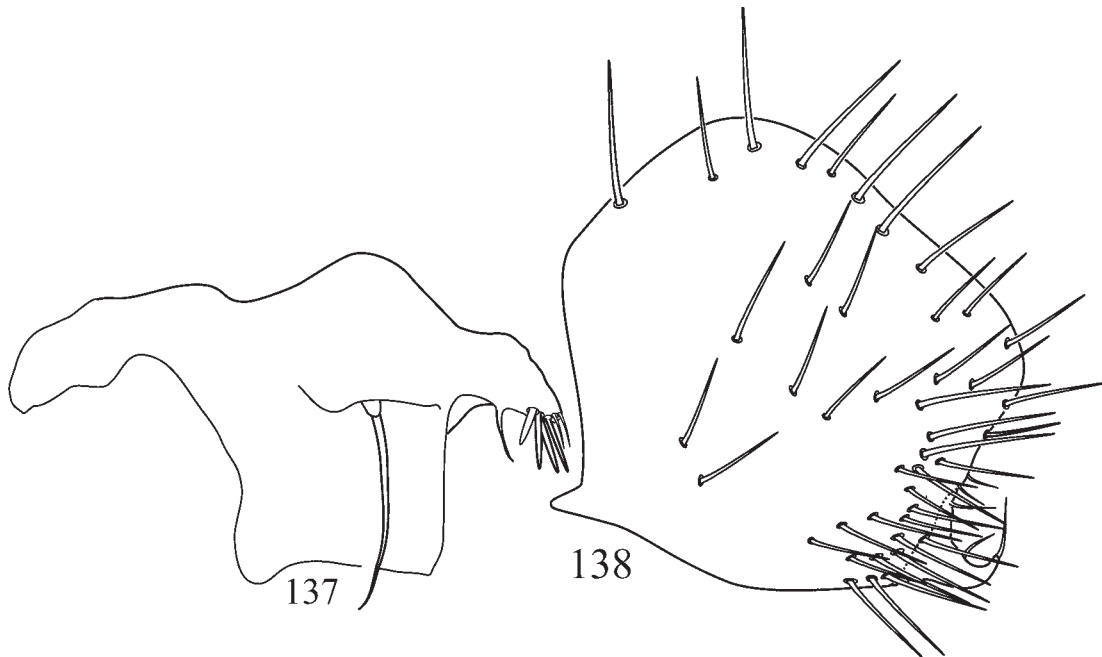
**REMARKS.** This species is not easily confounded with congeners and can be reliably separated from them with the characters given in the key and diagnosis. It is also the only species of the genus known from Belize.

### *Aulacigaster bifasciata*, new species

FIGURES 139–140, MAP 9

**DIAGNOSIS.** This species is distinguished from congeners by the following combination of characters: Frons with anterior 1/3–1/2 yellowish in ground color; face bulbous; facial band absent; frons white-microtomentose stripe bordered posteriorly by a conspicuous velvety-black stripe.

**DESCRIPTION.** Coloration and vestiture: Vertex mostly densely microtomentose, with a shiny spot extended from ocellus at most 1/2 way to eye margin; ocellar tubercle



FIGURES 137–138. Illustrations of *Aulacigaster belize*, new species (male) (the *pleiomorphica* group, Neotropical Region). (137) gonopod, lateral aspect; (138) epandrium, lateral aspect.

dull microtomentose; frontal white-microtomentose stripe bordered posteriorly by a conspicuous velvety-black stripe; antenna pale yellow to yellowish, infuscate along dorsal margin or infuscate on dorsal half; face brownish; palpus white, or yellowish. Scutellum dull microtomentose; postpronotum concolorous with mesonotum, mostly polished; anepisternum mostly dull; katapisternum subshiny to dull; halter mostly white. Fore coxa brown to black, fore femur brown, fore tibia mostly or entirely yellowish-brownish, fore tarsus mostly yellowish; mid coxa brown to black, mid femur brown; mid tibia yellowish to brownish, mid tarsus mostly yellowish; hind coxa brown, hind femur brown, hind tibia yellowish-brownish or brown to black on central portion, base and apex yellowish, hind tarsus yellowish. Male abdomen bright shiny, pregenital segment polished posteriorly, dull anteriorly; female abdomen with dense microtomentum medially, lateral margins of tergites nearly polished.

**Morphology:**

**Head:** Head higher than long (head ratio less than 0.9); face at level of pseudovibrissal seta wider than width of 1st flagellomere, bulbous; medial vertical seta 1/2–3/4 length of lateral vertical seta; 1 strong peristomal seta present, following pseudovibrissal seta.

**Thorax:** Acrostichal setae 2 rows on anteriormost portion, merging into 1 row posteriorly; scutellum slightly raised (angle with scutum approximately 135°), semicircular, disk of scutellum strongly convex; basal scutellar seta 3/4 length of posterior seta.

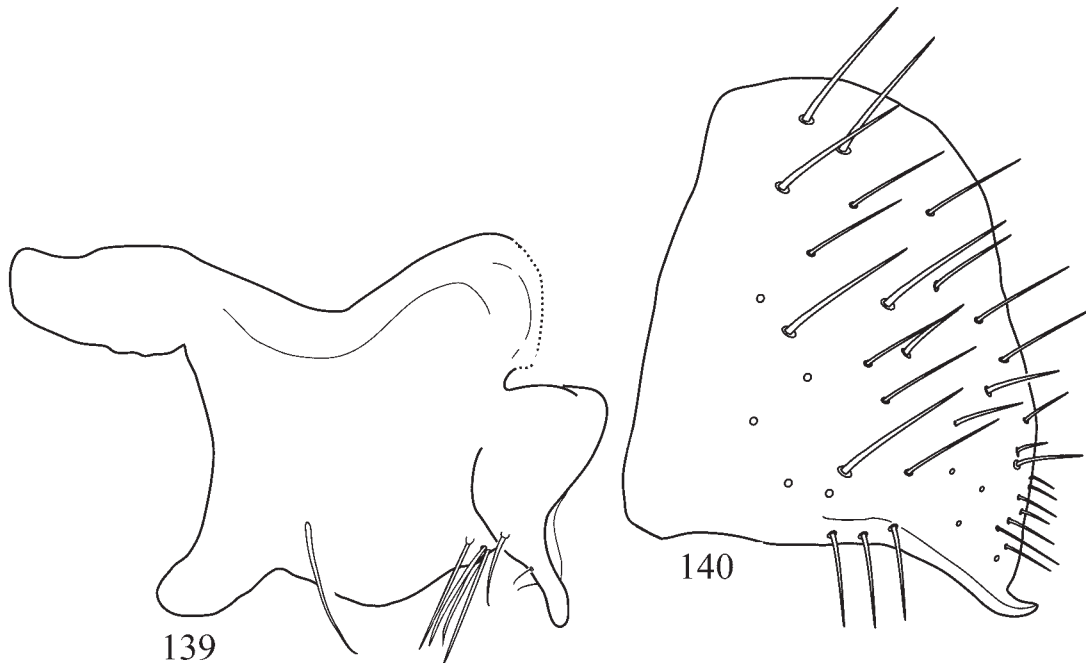
**Male abdomen and terminalia:** Figures 139–140. Surstylus a short, posteroventral lobe, in lateral view somewhat inconspicuous, approximately beak-shaped; cercus bearing 1 very long, posteriorly porrect setulae; gonopod as in Figure 139.

**Measurements:** Body length 2.9–3.1 mm. Wing length 2.5–2.7 mm, wing width 0.8–1.0 mm.

**TYPE MATERIAL.** The holotype male is labeled “PERU: Madre de Dios: Manu, Rio Manu, 250 m[,] Pakitza, 12°7’S, 70°58’W, 9–23 Sep 1988, Wayne N. Mathis/HOLOTYPE ♂ *Aulacigaster bifaciata* Rung & Mathis USNM [red].” The holotype is double mounted (minuten in a block of plastic), is in excellent condition, and is deposited in the USNM. Paratypes are as follows: Same label data as the holotype (4♂, 5♀; USNM).

**TYPE LOCALITY.** Peru. Madre de Dios: Rio Manu, Pakitza (11°56.6’S, 71°16.9’W).

**OTHER SPECIMENS EXAMINED.** COSTA RICA. Guanacaste: Estación Santa Rosa (10°50.1’N,



FIGURES 139–140. Illustrations of *Aulacigaster bifasciata*, new species (male) (the *plesiomorphica* group, Neotropical Region). (139) gonopod, lateral aspect; (140) epandrium, lateral aspect.

85°36.8'W; 300 m), 11 Feb 1996, S. A. Marshall (1♀; UGE). Puntarenas: Peninsula de Osa, Rincón (08°42'N, 83°29'W; sea level, sweeping in palm-mangrove forest), 24 Mar 1991, D. A. Grimaldi, J. Stark (1♂; AMNH).

GUYANA. Moco Moco (30 km E Lethem in Kanuku Mountains; 03°18.2'N, 59°39.0'W), 3–6 Apr 1994, W. N. Mathis (1♀; USNM).

**DISTRIBUTION.** (Map 9) Neotropical: Costa Rica (Guanacaste, Puntarenas), Guyana, Peru (Madre de Dios).

**ETYMOLOGY.** The specific epithet, *bifasciata*, is of Latin derivation and is a combination of the prefix “bi-”, meaning two, and the Latin word for band (*fascia*) with reference to the black and silvery stripes toward the anterior margin of the frons.

**REMARKS.** This species is not easily confounded with congeners and can be reliably separated from them with the characters given in the key and diagnosis.

### ***Aulacigaster conspicua*, new species**

FIGURES 141–146, MAP 11

**DIAGNOSIS.** This species is distinguished from congeners by the following combination of characters:

Frons with anterior 1/3–1/2 yellowish in ground color; face bulbous; facial band present; hind femur brown to black on central portion, apex and base yellowish.

**DESCRIPTION.** Coloration and vestiture: Vertex mostly densely microtomentose, without a shiny spot or with a shiny spot extended from ocellus at most 1/2 way to eye margin; ocellar tubercle dull microtomentose; frontal white-microtomentose stripe not bordered posteriorly by a conspicuous velvety-black stripe; antenna pale yellow to yellowish, infuscate along dorsal margin; face yellow anteriorly, brown to black on posterior portion; facial band present, distinct, gray or golden microtomentose over brown mark, on dorsal portion of face; palpus white. Scutellum dull microtomentose; postpronotum yellow to yellowish-brownish or concolorous with mesonotum, scarcely microtomentose, subshiny; katepisternum subshiny to dull; halter mostly white. Fore coxa brown to black, fore femur brown to black, apex yellowish, fore tibia yellowish, fore tarsus mostly or entirely yellowish, apical and sometimes subapical tarsomeres brown to black; mid coxa brown to black, mid femur brown to black, apex yellowish, mid tibia yellowish, mid tarsus mostly or entirely yellowish, apical and subapical tarsomere brownish to dark brown; hind coxa brown, hind femur brown to black on central portion, apex and base

yellowish, hind tibia yellowish or brown to black on central portion, base and apex yellowish, hind tarsus mostly or entirely yellowish, apical tarsomere brown to black. Male abdomen bright shiny, pregenital segment polished posteriorly, dull anteriorly; female abdomen with dense microtomentum medially, lateral margins of tergites nearly polished.

**Morphology:**

**Head:** Figures 141–142. Head higher than long (head ratio less than 0.9); face at level of pseudovibrissal seta wider than width of 1st flagellomere, bulbous; medial vertical seta 1/2–3/4 length of lateral vertical seta; 1 strong peristomal seta present, following pseudovibrissal seta.

**Thorax:** Acrostichal setae in 1 row; scutellum slightly raised (angle with scutum approximately 135°), semicircular, disk of scutellum slightly convex; basal scutellar seta 1/2 length of posterior seta.

**Male abdomen and terminalia:** Figures 143–144. Sternite 5 with a central, more membranous area, posterior margin appearing receded. Surstylus keel-shaped, with an apical and 1–2 basal marginal, strong setae; gonopod as in Figure 145; cerci partially fused, each cercus bearing 1 very long, posteriorly porrect setula.

**Measurements:** Body length 3.1–3.2 mm. Wing length 2.5–2.7 mm, wing width 0.8–0.9 mm.

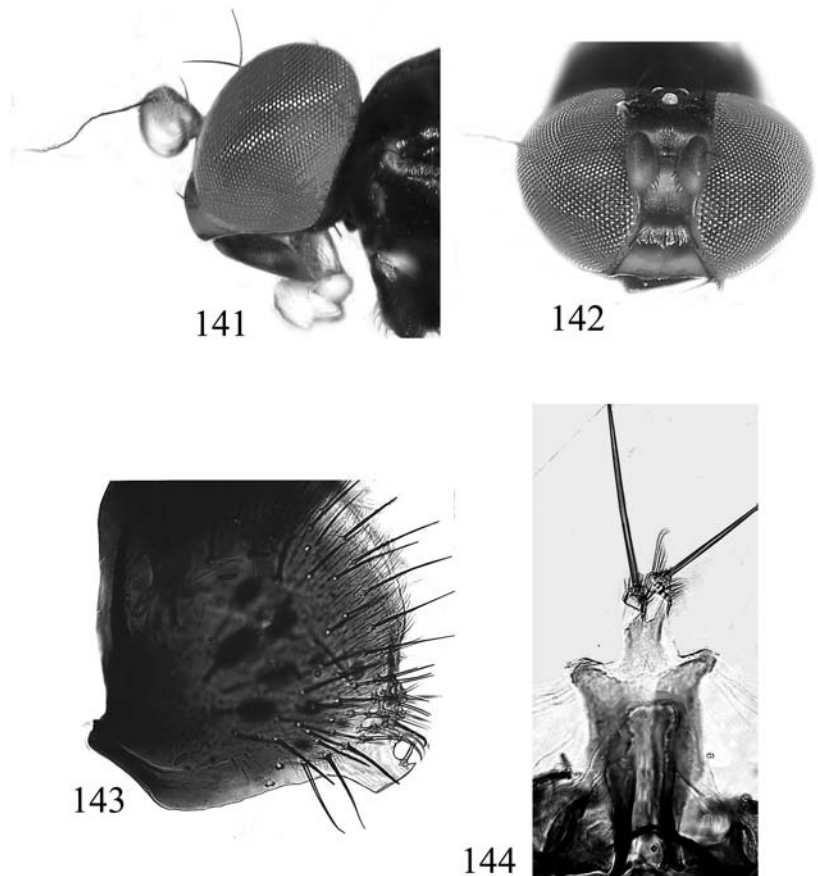
**TYPE MATERIAL.** The holotype male is labeled “COSTA RICA: Puntarenas, Peninsula de Osa, Rincon[,] 24 March 1991, sea level[,] Grimaldi & Stark, sweeping in palm-mangrove forest/HOLOTYPE ♂ *Aulacigaster conspicua* Rung & Mathis AMNH [red].” The holotype is double mounted (minuten in a block of plastic), is in good condition (vertical, left fronto-orbital, scutal and scutellar setae partially broken), and is deposited in the AMNH. Paratypes are as follows: Same label data as the holotype (1♂, 2♀; AMNH, USNM).

**TYPE LOCALITY.** Costa Rica. Puntarenas: Peninsula de Osa, Rincón (08°42'N, 83°29'W).

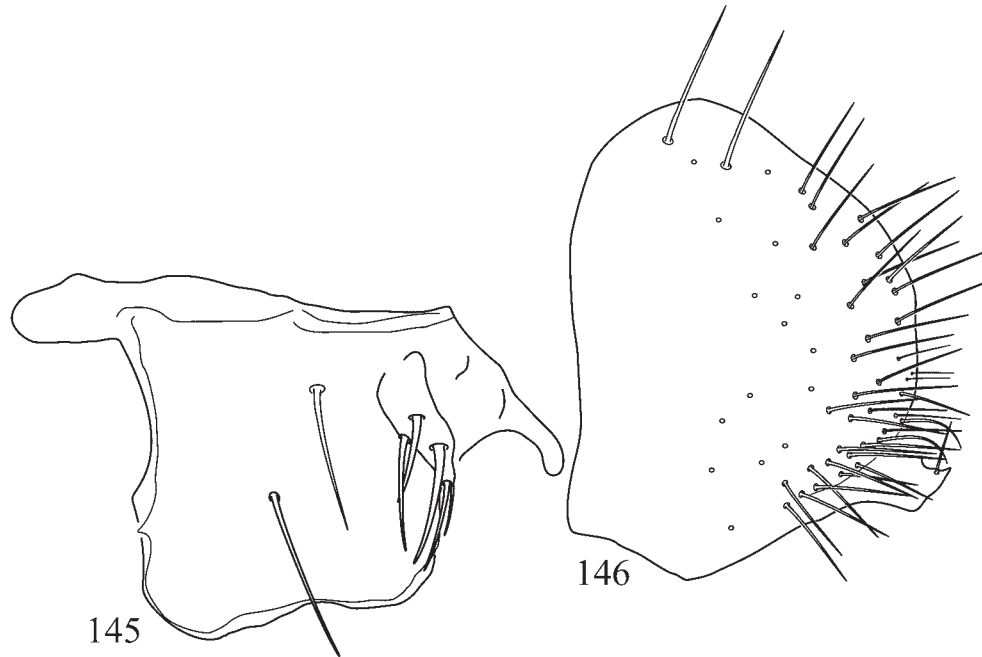
**OTHER SPECIMENS EXAMINED.** COSTA RICA. Puntarenas: Rincón (08°42'N, 83°29'W; Malaise trap), Oct–Dec 1990, P. Hanson (5♀; USNM).

PANAMA. Canal Zone: Barro Colorado Island (09°09.3'N, 79°50.8'W), 10 Jan 1929, C. H. Curran (1♂, 1♀; AMNH).

**DISTRIBUTION.** (Map 11) Neotropical: Costa Rica (Puntarenas), Panama (Canal Zone).



FIGURES 141–144. Digital photographs of *Aulacigaster conspicua*, new species (male) (the *pleiomorphica* group, Neotropical Region). (141) head, lateral aspect; (142) head, frontal aspect; (143) epandrium, lateral aspect; (144) subepandrial sclerite, ventral aspect. Not all to the same scale.



FIGURES 145–146. Illustrations of *Aulacigaster conspicua*, new species (male) (the *pleiomorphica* group, Neotropical Region). (145) gonopod, lateral aspect; (146) epandrium, lateral aspect.

**ETYMOLOGY.** The specific epithet, *conspicua*, is of Latin derivation and means “prominent” with reference to the conspicuous habitus, allowing for easy identification of this species.

**REMARKS.** The four females from Puntarenas (Costa Rica), which were caught in a Malaise trap, are apparently this species but the legs and face are much lighter in the coloration. *Aulacigaster conspicua* is not easily confounded with congeners and can be reliably separated from them with the characters given in the key and diagnosis.

### ***Aulacigaster erika*, new species**

FIGURES 147, MAP 11

**DIAGNOSIS.** This species is distinguished from congeners by the following combination of characters: Frons with anterior 1/3–1/2 yellowish in ground color; frons white-microtomentose stripe bordered posteriorly by a posterior, velvety-black stripe; facial band absent.

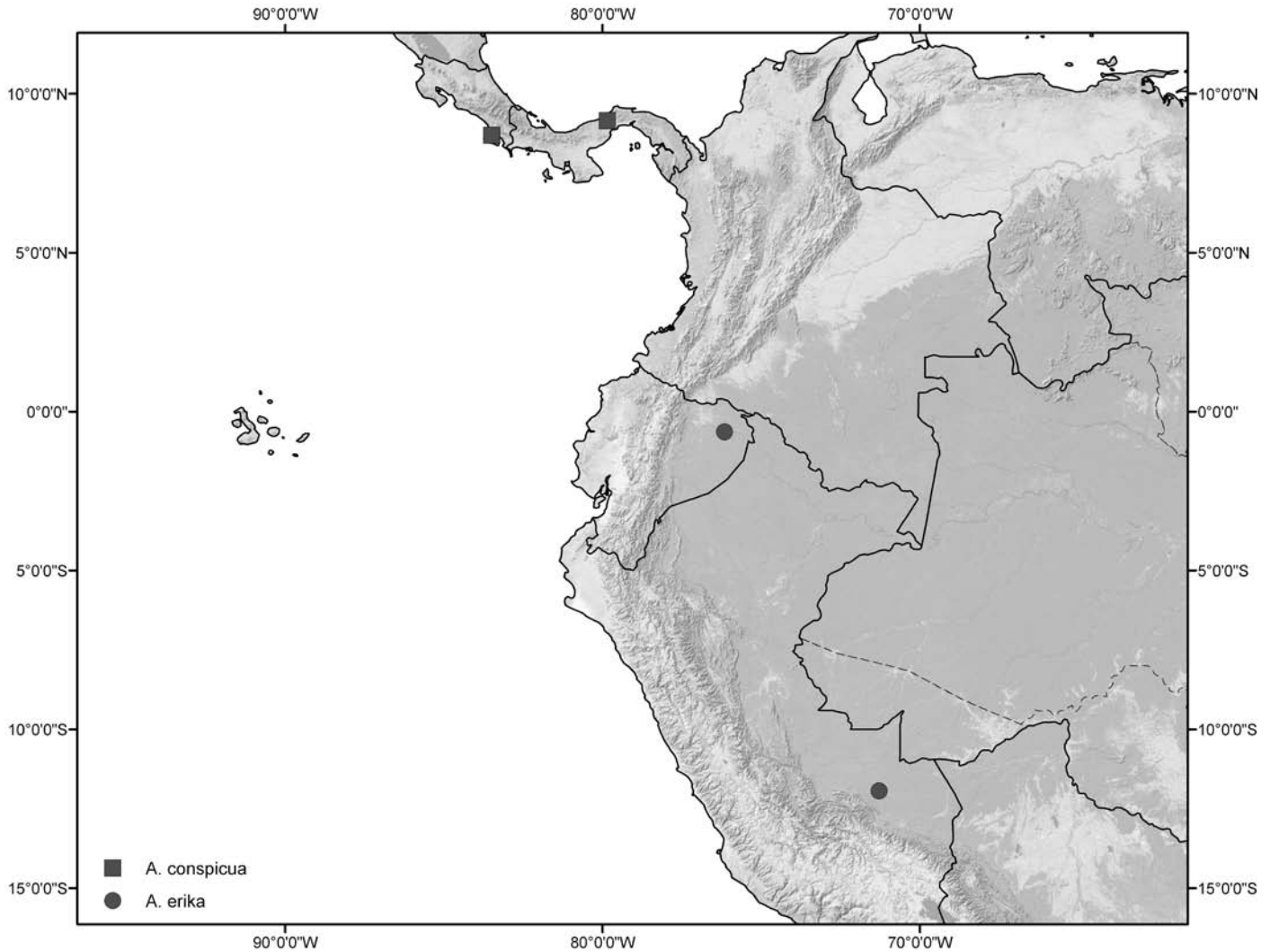
**DESCRIPTION.** Coloration: Vertex mostly densely microtomentose, with a shiny spot extended from ocellus to 2/3 distance to eye margin; ocellar tubercle dull microtomentose; frontal white-microtomentose stripe not

bordered posteriorly by a posterior, velvet black stripe; antenna pale yellow to yellowish, infuscate along dorsal margin; face brownish; palpus white, or yellowish. Scutellum dull microtomentose; postpronotum concolorous with mesonotum; katapisternum subshiny to dull; halter mostly white (base dark). Fore coxa brown to black, fore femur brown to black, apex yellowish; fore tibia yellowish, fore tarsus mostly yellowish; mid coxa brown to black, mid femur brown to black, tip yellowish; mid tibia yellowish to brownish; mid tarsus mostly yellowish; hind coxa brown to black, hind femur brown to black, tip yellowish; hind tibia yellowish-brownish or brown to black on central portion, base and apex yellowish, hind tarsus yellowish. Male abdomen bright shiny, pregenital segment polished posteriorly, dull anteriorly; female abdomen with dense microtomentum medially, lateral margins of tergites nearly polished.

#### **Morphology:**

**Head:** Head higher than long (head ratio less than 0.9); face at level of pseudovibrissal seta wider than width of 1st flagellomere, not appearing bulbous; medial vertical seta 1/2–3/4 length of lateral vertical seta; 1 strong peristomal seta present, following pseudovibrissal seta.

**Thorax:** Acrostichal setae in 1 row; scutellum slightly raised (angle with scutum approximately 135°), approximately triangular, apex relatively pointed, disk of



MAP 11. Distribution of *Aulacigaster conspicua* and *A. erika* (the *pleiomorphica* group, Neotropical Region).

scutellum slightly convex; basal scutellar seta 1/2 length of posterior seta.

**Male abdomen and terminalia:** Figure 147. Sternite 5 with a central, more membranous area, posterior margin appearing receded. Surstylus approximately nose-shaped, apex slightly pointed; gonopod as in Figure 147; cerci partially fused, each cercus bearing 1 very long, posteriorly correct setulae.

**Measurements:** Body length 2.4–2.5 mm. Wing length 2.3–2.4 mm, wing width 0.8–0.9 mm.

**TYPE MATERIAL.** The holotype male is labeled “PERU. Madre de Dios: Manu, Erika (near Salvacion), 550 m, 5–6 Sept 1988, W.N. Mathis/HOLOTYPE ♂ *Aulacigaster erika* Rung & Mathis USNM [red].” The holotype

is double mounted (minuten in a block of plastic), is in excellent condition, and is deposited in the USNM. Paratypes are as follows: Same label data as the holotype (3♂, 7♀; USNM); same locality data but with A. Freidberg (9♂, 1♀; USNM). PERU. Madre de Dios: Pakitza (11°56.6'S, 71°16.9'W; 250 m), 9–23 Sep 1988, A. Freidberg, W. N. Mathis (12♂, 7♀; USNM).

**TYPE LOCALITY.** Peru. Madre de Dios: Rio Manu, Rio Manu, Erika (near Salvación; 12°53'S, 71°12'W; 550 m).

**OTHER SPECIMENS EXAMINED.** ECUADOR. Orellana: Rio Tiputini (00°38.2'S, 76°08.9'W), 12–26 Aug 1999, W. N. Mathis, A. Baptista, M. Kotrba (5♂, 2♀; EPNE, USNM).

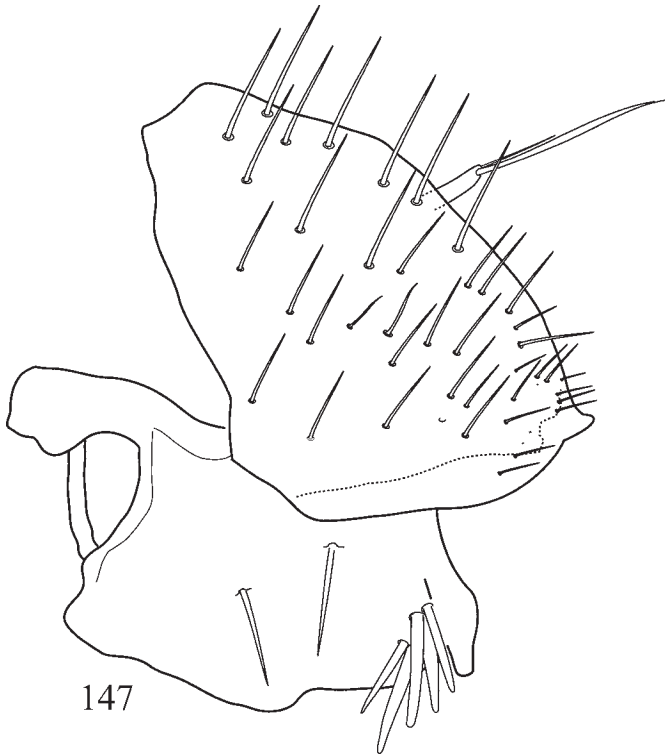


FIGURE 147. Illustrations of *Aulacigaster erika*, new species (male) (the *plesiomorphica* group, Neotropical Region): epandrium and gonopod, lateral aspect.

**DISTRIBUTION.** (Map 11) Neotropical: Ecuador (Orellana), Peru (Madre de Dios).

**BIOLOGY.** This species was collected while sweeping the aerial portion of prop roots of a large *Ceiba* tree.

**ETYMOLOGY.** The specific epithet, *erika*, refers to the type locality, Erika, and is a noun in apposition.

**REMARKS.** This species is not easily confounded with congeners and can be reliably separated from them with the characters given in the key and diagnosis.

### ***Aulacigaster plesiomorphica* (Hennig)**

FIGURES 148, 152–154, MAP 10

*Schizochroa plesiomorphica* Hennig 1969: 608, 605 [figure of head and wing].—Papavero 1967:91 [Neotropical catalog].

*Aulacigaster plesiomorphica*.—D. K. McAlpine 1983:58 [generic combination].

**DIAGNOSIS.** This species is distinguished from congeners by the following combination of characters:

Hind trochanter of male with a ventral, black tuff of setae born on a projection.

**DESCRIPTION.** Coloration and vestiture: Vertex mostly densely microtomentose, with a shiny spot extended from ocellus at most 1/2 way to eye margin; ocellar tubercle dull microtomentose; frontal white-microtomentose stripe bordered posteriorly by a conspicuous velvety-black stripe; antenna pale yellow to yellowish, infusate on dorsal half; face brown to black; facial band present, delimited as a transversely wrinkled band on dorsal portion of face, mostly lacking microtomentum; palpus white. Scutellum dull microtomentose; postpronotum concolorous with mesonotum; anepisternum mostly dull; katepisternum subshiny to dull; halter mostly white. Fore coxa brown to black, fore femur brown or brown to black, apex yellowish, fore tibia yellowish, fore tarsus mostly yellowish; mid coxa brown to black, mid femur brown or brown to black, apex yellowish, mid tibia yellowish, mid tarsus mostly yellowish; hind coxa brown to black, hind femur brown or brown to black, apex yellowish, hind tibia yellowish or dark basally, yellow apically, hind tarsus yellowish. Male abdomen bright shiny, pregenital segment mostly subshiny; female abdomen with dense microtomentum medially, lateral margins of tergites nearly polished.

#### **Morphology:**

**Head:** Head higher than long (head ratio less than 0.9); face not appearing “bulbous”; medial vertical seta 1/2–3/4 length of lateral vertical seta; 1 strong peristomal seta present, following pseudovibrissal seta.

**Thorax:** Figures 148, 152. Acrostichal setae in 1 row; scutellum strongly raised (angle with scutum more than 135°), approximately triangular, apex relatively pointed, disk of scutellum strongly convex; basal scutellar seta 1/2 length of posterior seta. Hind trochanter of male with a ventral, black tuff of setae born on a projection; hind tibia with strong, dark, apicodorsal setae.

**Male abdomen and terminalia:** Figures 153–154. Surstylus more or less folded below the epandrium, difficult to see in lateral view, approximately triangular, with 1 apical and 2 basal, marginal, strong setae; gonopod as in Figure 153; cerci separate.

**Measurements:** Body length 2.7–3.2 mm. Wing length 2.6–2.7 mm, wing width 1.0 mm.

**TYPE MATERIAL.** The holotype is labeled “Quincemil [.] Cuzco, PERU[.], 13–31.VIII.'62 [.] L. Pena. 780 m./Schizochroa plesiomorphica Hg. [handwritten] HOLOTYPE [RED]/HOLOTYPE *Schizochroa plesiomorphica* Hennig CNC No. 9929 [red]/CNC [handwritten].” The holotype is glued directly to the pin, is in

good condition (teneral, slightly dirty), and is deposited in the CNC (9929). Paratypes are as follows: same locality and collector as the holotype, 15–30 Dec 1962 (1♂, CNC); 1–15 Nov 1962 (1♀, CNC).

**TYPE LOCALITY.** Peru. Cuzco: Quincemil (13°13.7'S, 70°45.6'W).

**OTHER SPECIMENS EXAMINED.** PERU. Madre de Dios: Rio Manu, Erika (near Salvación; 12°53'S, 71°12'W; 550 m), 5–6 Sep 1988, A. Freidberg (1♂; USNM).

**DISTRIBUTION.** (Map 10) Neotropical: Peru (Cuzco, Madre de Dios).

**REMARKS.** The holotype is teneral, and description of coloration is based on the two conspecific paratypes. Two specimens in the paratype series (1♂, 1♀; CNC) represent another species (*A. ruffifemur*, see below). *Aulacigaster plesiomorphica* share with males of *A. ariseta* and *A. proxima* the presence of black, dorsoapical setae on the hind femur. *Aulacigaster atriseta* can be easily distinguished from the

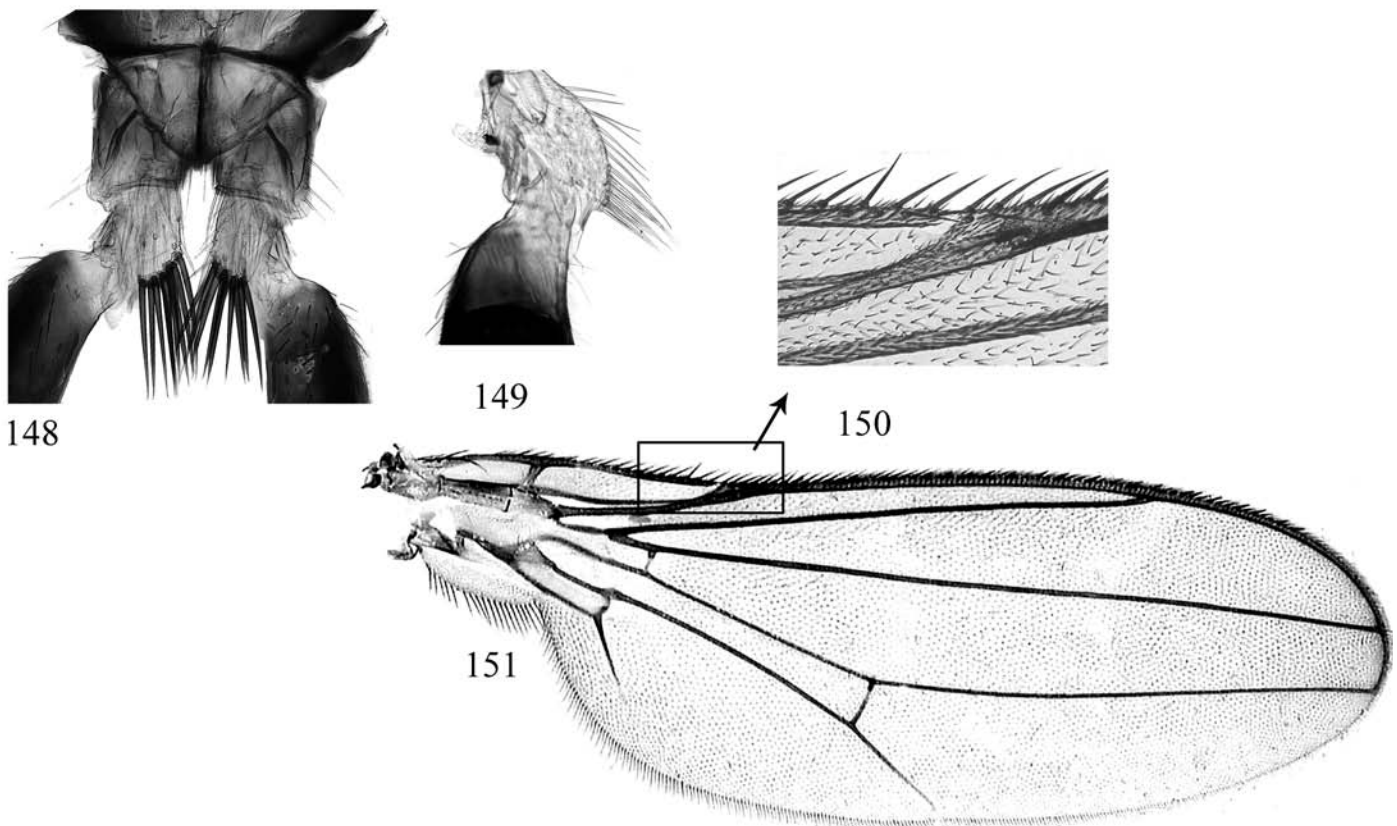
other two species by the absence of well-developed setae on the hind trochanter of the male and by the absence of a conspicuous surstylus. Males of *A. plesiomorphica* have a black tuft of thick setae on the hind trochanter, whereas males of *A. proxima* have a yellowish tuft of thinner setae. Females of these two species cannot be reliably separated.

### *Aulacigaster proxima*, new species

FIGURES 149–151, 155, 213–214, MAP 12

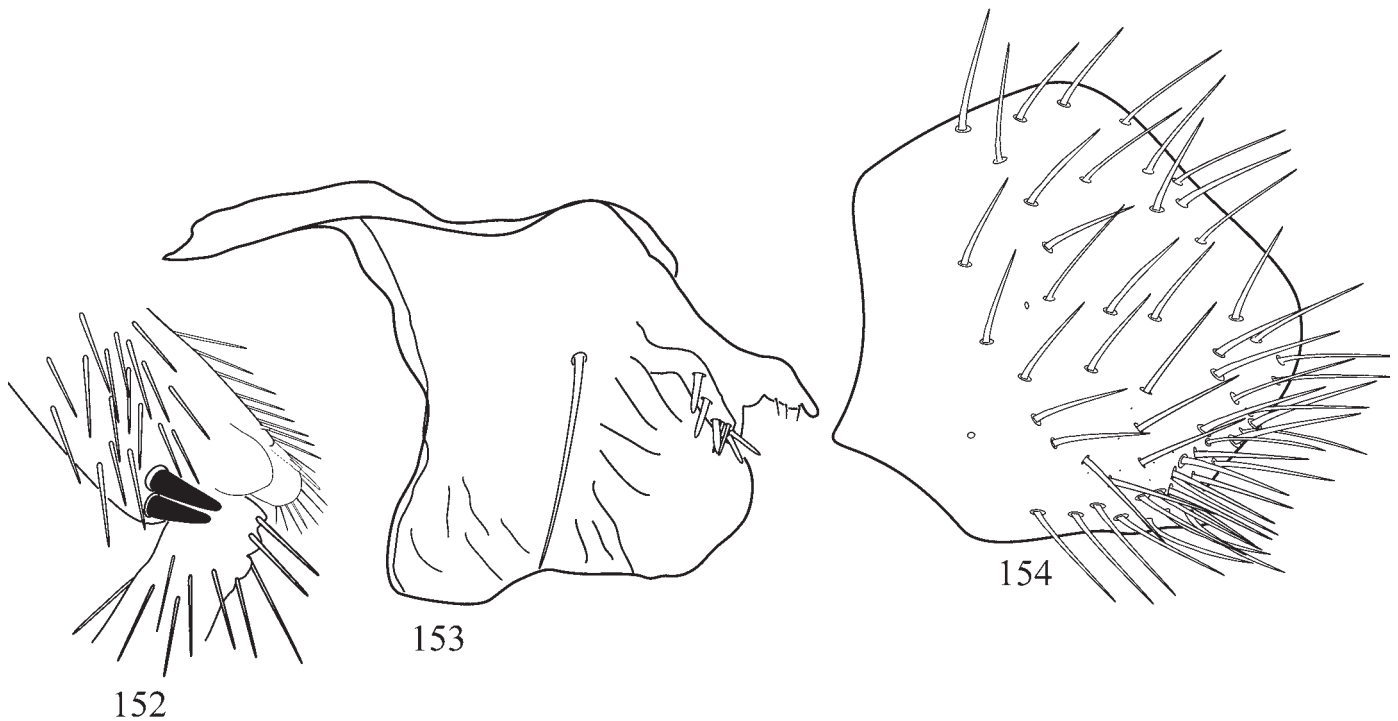
**DIAGNOSIS.** This species is distinguished from congeners by the following combination of characters: Hind trochanter of male with a ventral, yellowish tuft of setae not born on a projection.

**DESCRIPTION.** Coloration: Vertex mostly densely microtomentose, with a shiny spot extended from ocellus to at most 1/2 way to eye margin, with a shiny spot



FIGURES 148–151. Digital photographs of aulacigastrids (the *plesiomorphica* group, Neotropical Region). (148) *Aulacigaster plesiomorphica* (Hennig), hind trochanter of male, posterior aspect; (149) *Aulacigaster proxima*, hind trochanter of male, posterior aspect; (150) enlargement of costal section, dorsal aspect; (151) right wing, dorsal aspect. Not all to the same scale.





FIGURES 152–154. Illustrations of *Aulacigaster plesiomorphica* (Hennig) (male) (the *plesiomorphica* group, Neotropical Region). (152) apex of hind tibia, anterodorsal aspect; (153) gonopod, lateral aspect; (154) epandrium, lateral aspect. Not all to the same scale.

extended from ocellus to  $2/3$  distance to eye margin; ocellar tubercle dull microtomentose; frontal white-microtomentose stripe bordered posteriorly by a conspicuous velvety-black stripe; antenna pale yellow to yellowish, infusate along dorsal margin or infusate on dorsal half; face yellow anteriorly, brown to black on posterior portion (from level of pseudovibrissa to base of antenna); facial band present, delimited as a transversely wrinkled band on dorsal portion of face, mostly lacking microtomentum; palpus white. Scutellum dull microtomentose; postpronotum concolorous with mesonotum, scarcely microtomentose, subshiny to dull microtomentose; anepisternum mostly dull; katapisternum subshiny to dull; halter mostly white. Fore coxa brown to black, fore femur brown to black, apex yellowish, fore tibia yellowish, fore tarsus mostly yellowish; mid coxa brown to black, mid femur brown to black, apex yellowish, mid tibia yellowish, mid tarsus mostly yellowish; hind coxa brown, hind femur brown to black, apex yellowish, hind tibia yellowish or dark basally, yellow apically, hind tarsus yellowish. Male abdomen bright shiny, pregenital segment polished posteriorly, dull anteriorly; female abdomen with dense microtomentum medially, lateral margins of tergites nearly polished.

#### Morphology:

**Head:** Figures 213–214. Head round, about as high as long (head ratio 0.9–1.1) to higher than long (head ratio less than 0.9); face at level of pseudovibrissal seta narrower than width of 1st flagellomere, not appearing bulbous; medial vertical seta  $1/2$  length of lateral vertical seta; 1 strong peristomal seta present, following pseudovibrissal seta.

**Thorax:** Figures 149–151. Acrostichal setae in 1 row; scutellum strongly raised (angle with scutum more than  $135^\circ$ ), approximately triangular, apex relatively pointed, disk of scutellum flat; basal scutellar seta  $1/2$  length of posterior seta (but thinner). Hind trochanter of male with a ventral, yellowish tuff of setae not borne on a projection; hind tibia with strong, dark, apicodorsal setae.

**Male abdomen and terminalia:** Figure 155. Sternite 4 with posterior margin and medial portion only weakly sclerotized, posterior margin receded; sternite 5 with a central, more membranous area, posterior margin appearing receded. Surstylus more or less folded below the epandrium, difficult to see in lateral view, approximately foot-shaped, with 2 subapical and 2 basal, marginal, strong setae; gonopod as in Figure 155; cerci separate,

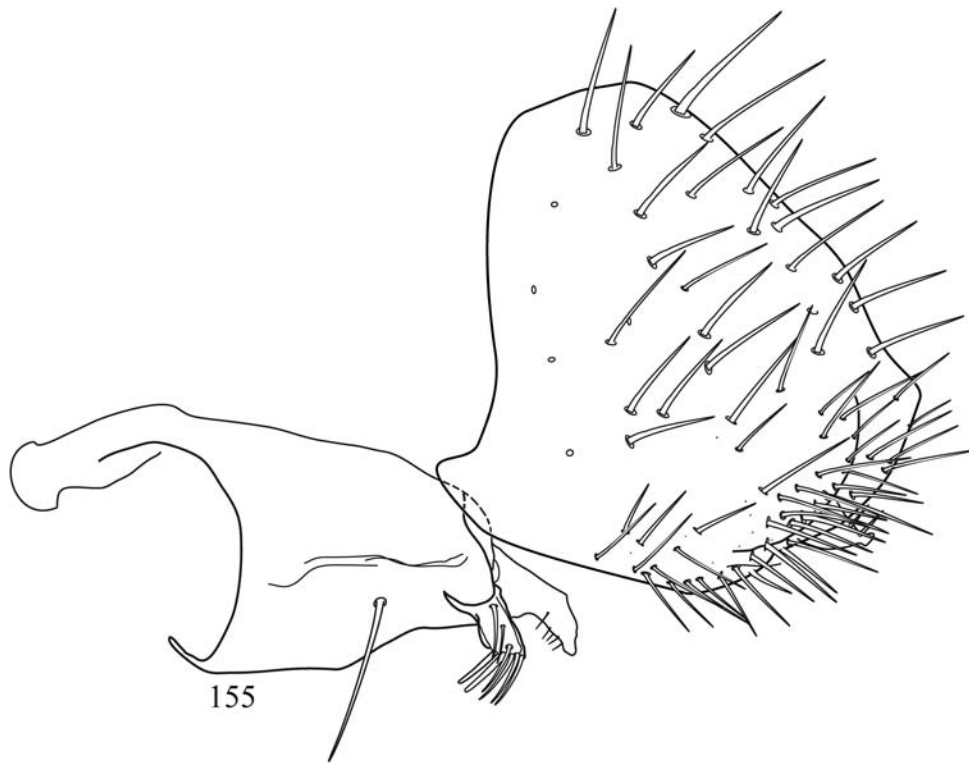


FIGURE 155. Illustrations of *Aulacigaster proxima*, new species (the *plesiomorphica* group, Neotropical Region): epandrium and internal genitalic structures (male), lateral aspect.

narrow, digitiform, each cercus bearing 1 very long, ventral seta and 1–3 longer setulae.

**Measurements:** Body length 3.10–3.53 mm. Wing length 2.7–3.2 mm, wing width 0.9–1.0 mm.

**TYPE MATERIAL.** The holotype male is labeled “PERU. Madre de Dios: Manu, Rio Manu, 250 m[,] Pakitza, 12°7’S, 70°58’W, 9–23 Sep 1988[,] Amnon Freidberg/HOLOTYPE ♂ *Aulacigaster proxima* Rung & Mathis USNM [red].” The holotype is double mounted (minuten in a block of plastic), is in good condition (left posterior dorsocentral seta missing), and is deposited in the USNM. Paratypes are as follows: Same label data as the holotype (2♂; USNM); same label as the holotype but collected by W. N. Mathis (11♂; USNM).

**TYPE LOCALITY.** Peru. Madre de Dios: Rio Manu, Pakitza (11°56.6’S, 71°16.9’W).

**OTHER SPECIMENS EXAMINED.** ECUADOR. Orellana: Rio Tiputini (00°38.2’S, 76°08.9’W), 12–26 Aug 1999, W. N. Mathis, A. Baptista, M. Kotrba (3♂; EPNE, USNM).

**DISTRIBUTION.** (Map 12) Neotropical: Ecuador (Orellana), Peru (Madre de Dios).

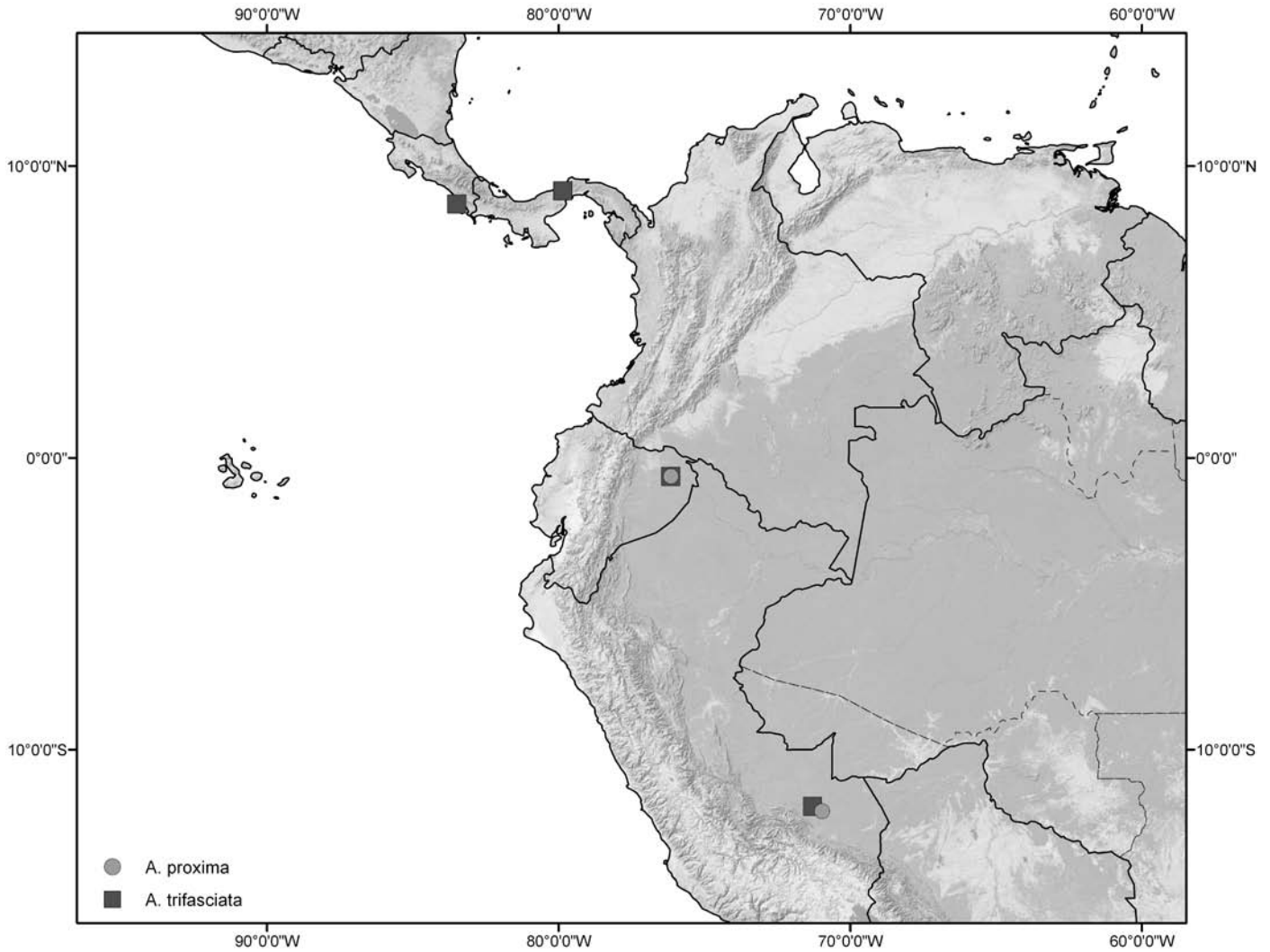
**ETYMOLOGY.** The specific epithet, *proxima*, is of Latin derivation and means near, referring to the fact that it is very similar to *A. plesiomorphica*. See “Remarks” under *A. plesiomorphica* for separating between these two species.

### ***Aulacigaster rufifemur*, new species**

FIGURES 156–159, MAP 13

**DIAGNOSIS.** This species is distinguished from congeners by the following combination of characters: Frons with anterior 1/3–1/2 yellowish in ground color; vertex with a shiny spot extended from ocellus 1/2 way to eye margin; hind femur yellow.

**DESCRIPTION.** Coloration: Vertex mostly densely microtomentose, with a shiny spot extended from ocellus at most 1/2 way to eye margin; ocellar tubercle dull microtomentose; frontal white-microtomentose stripe bordered posteriorly by a conspicuous velvety-black stripe; antenna pale yellow to yellowish, infusate along dorsal margin or infusate on dorsal half; face yellow anteriorly,



MAP 12. Distribution of *Aulacigaster proxima* and *A. trifasciata* (the *pleiomorphica* group, Neotropical Region).

brown to black on posterior portion; facial band present, distinct, gray or golden microtomentose over brown mark, on dorsal portion of face; palpus white. Scutellum dull microtomentose; postpronotum concolorous with mesonotum; anepisternum mostly dull; katepisternum subshiny to dull; halter mostly white. Fore coxa brown to black, fore femur brown to black, up to apical third yellowish, fore tibia yellowish, fore tarsus yellowish, apical and sometimes subapical tarsomeres brown to black; mid coxa brown to black, mid femur brown, with apex yellowish, mid tibia yellowish, mid tarsus yellowish, apical and subapical tarsomere brownish to dark brown; hind coxa yellowish to brownish, hind femur yellow, hind tibia yellowish, hind tarsus yellowish, apical tarsomere brown to black. Male abdomen bright shiny, pregenital segment polished posteriorly,

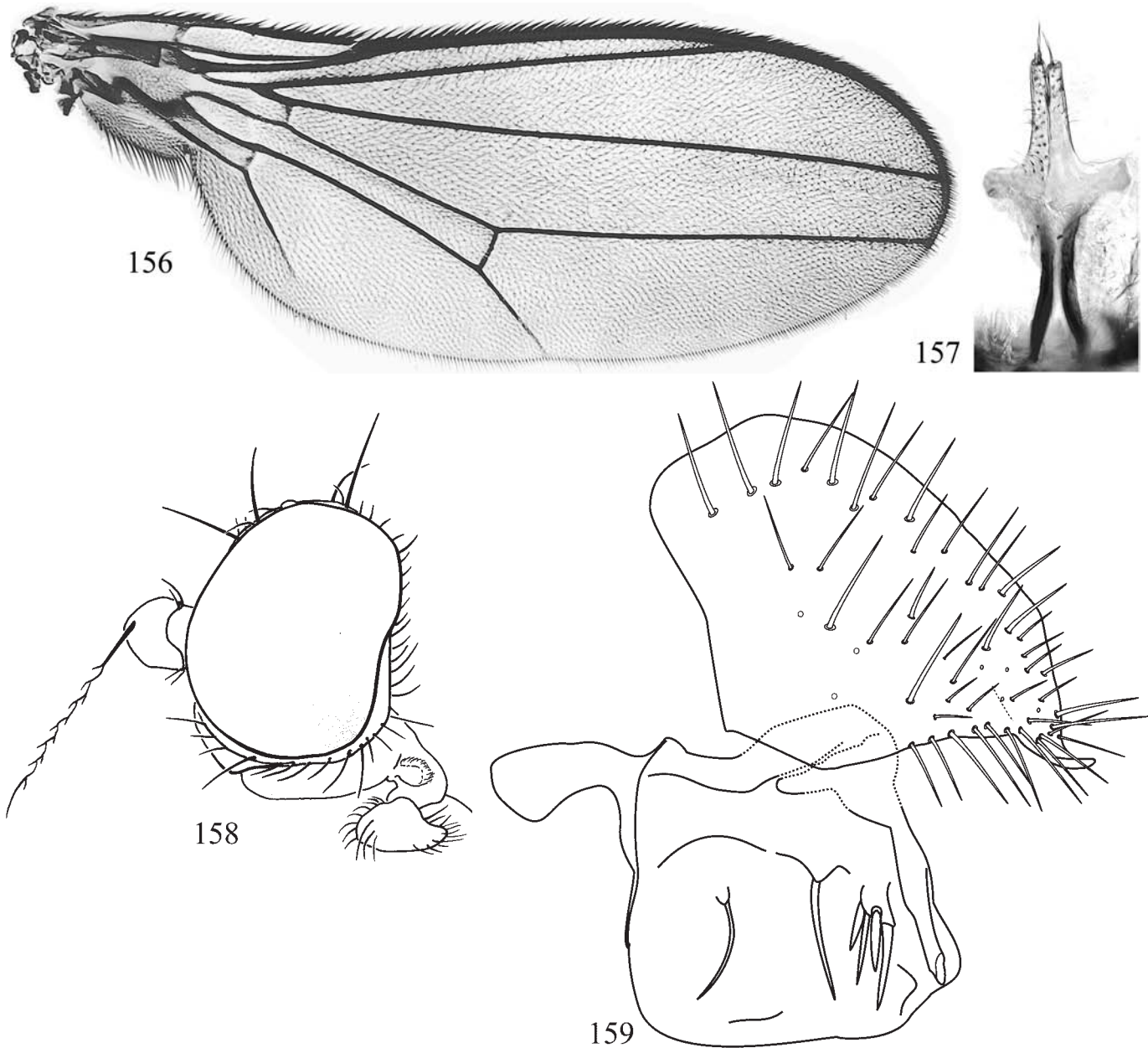
dull anteriorly; female abdomen with dense microtomentum medially, lateral margins of tergites nearly polished.

#### Morphology:

**Head:** Figure 158, Head higher than long (head ratio less than 0.9); face at level of pseudovibrissal seta wider than width of 1st flagellomere, not appearing bulbous; medial vertical seta  $1/2$ – $3/4$  length of lateral vertical seta; 3–4 peristomal seta present, following pseudovibrissal seta.

**Thorax:** Figure 156. Acrostichal setae in 1 row, or two rows anteriorly, convergent into one row posteriorly; scutellum slightly raised (angle with scutum approximately  $135^\circ$ ), semicircular, disk of scutellum strongly convex; basal scutellar seta  $1/2$  length of posterior seta (at most).

**Male abdomen and terminalia:** Figures 157, 159. Sternite 5 with a central, more membranous area,



FIGURES 156–159. Digital photographs and illustrations of *Aulacigaster rufifemur*, new species (male) (the *pleiomorphica* group, Neotropical Region). (156) right wing, dorsal aspect; (157) subepandrial sclerite, ventral aspect; (158) head, lateral aspect; (159) epandrium and gonopod, lateral aspect. Not all to the same scale.

posterior margin appearing receded. Surstylus approximately triangular in lateral view, apex strongly pointed, surface concave; gonopod as in Figure 159; cerci partially fused, each cercus bearing 1 very long, posteriorly porrect setulae.

*Measurements:* Body length 2.9–3.0 mm. Wing length 2.7–3.2 mm, wing length 2.2–2.6, wing width 0.9–1.0 mm.

*TYPE MATERIAL.* The holotype male is labeled “PERU. Madre de Dios: Manu, Rio Manu, 250 m[,] Pakitza,

12°7'S, 70°58'W, 9–23 Sep 1988[,] Amnon Freidberg/HO-  
 LOTYPE ♂ *Aulacigaster rufifemur* Rung & Mathis USNM  
 [red].” The holotype is double mounted (minuten in a block  
 of plastic), is in excellent condition, and is deposited in the  
 USNM. Paratypes are as follows: Same label data as the  
 holotype (29♂, 16♀; USNM); same locality data as the ho-  
 lotype but collected by W. N. Mathis (9♂, 4♀; USNM).

**TYPE LOCALITY.** Peru. Madre de Dios: Rio  
 Manu, Pakitza (11°56.6'S, 71°16.9'W).

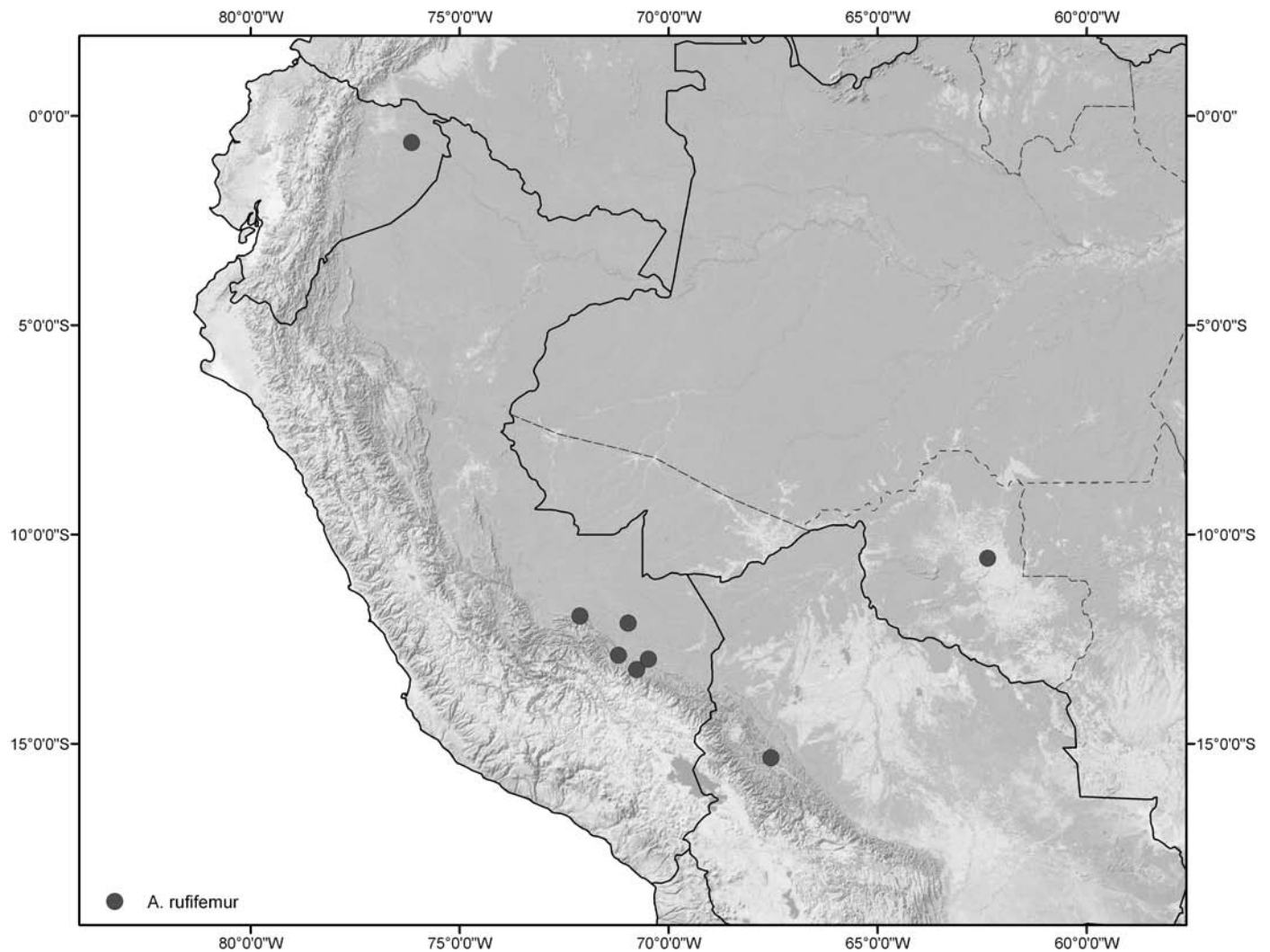
**OTHER SPECIMENS EXAMINED.** BOLIVIA.  
 La Paz: S Inicua River (15°20'S, 67°33'W; 1100 m), Alto  
 Beni, 15–18 Jan 1976, L. E. Peña (1♀; CNC).

BRAZIL. Rondônia: Ariquemes (62 Km SE; 10°34'S,  
 62°22'W), 22 Oct–16 Nov 1996, 1997, W. J. Hanson  
 (2♀, USU).

ECUADOR. Orellana: Rio Tiputini (00°38.2'S,  
 76°08.9'W), 12–26 Aug 1999, W. N. Mathis, A. Baptista,  
 M. Kotrba. (11♂, 3♀; EPNE, USNM).

PERU. Cuzco: Quincemil (13°13.7'S, 70°45.6'W; 780  
 m), 13–31 Aug 1962, L. Peña (1♀; labeled as a “paratype”  
 of *A. plesiomorphica* CNC). Madre de Dios: Avispas  
 (12°58.7'S, 70°20.8'W; 400 m), 20–30 Sep 1962, L. Peña  
 (1♂; labeled as a “paratype” of *A. plesiomorphica* CNC);  
 Rio Manu, Erika (near Salvación; 12°53'S, 71°12'W; 550  
 m), 5–6 Sep 1988, A. Freidberg (1♀; USNM); Rio Manu,  
 Cocha Salvador (11°57'S, 72°07'W; 240 m), 14 Sep 1988,  
 W. N. Mathis (1♀; USNM).

**DISTRIBUTION.** (Map 13) Neotropical: Brazil  
 (Rondônia), Bolivia (La Paz), Ecuador (Orellana), Peru  
 (Madre de Dios).



MAP 13. Distribution of *Aulacigaster rufifemur* (the *plesiomorphica* group, Neotropical Region).

**ETYMOLOGY.** The specific epithet, *rufifemur*, is of Latin derivation and is a combination of the Latin words for red (*rufus*) and thigh (*femur*). This character makes this species unique and very easy to separate from congeners in the *pleiomorphica* group.

### ***Aulacigaster trifasciata*, new species**

FIGURE 160, MAP 12

**DIAGNOSIS.** This species is distinguished from congeners by the following combination of characters: Ocellar tubercle mostly polished; abdomen with a large, white to yellowish region on syntergite 1+2.

**DESCRIPTION.** Coloration: Vertex mostly densely microtomentose, with a shiny spot extended from ocellus to 2/3 distance to eye margin; ocellar tubercle mostly polished; frontal white-microtomentose stripe not bordered posteriorly by a velvety-black stripe; antenna pale yellow to yellowish, infuscate along dorsal margin; face white; facial band present, distinct, gray or golden microtomentose over brown mark, on dorsal portion of face; palpus white. Scutellum dull microtomentose; postpronotum concolorous with mesonotum, dull microtomentose; anepisternum mostly dull; katapisternum subshiny to dull; halter mostly white. Fore coxa yellow, fore femur yellowish, fore tibia yellowish, fore tarsus yellowish, apical and sometimes subapical tarsomeres brown to black; mid coxa yellow, mid femur yellowish (tip infuscate in some specimens), mid tibia yellowish, mid tarsus yellowish, apical and subapical tarsomere brownish to dark brown; hind coxa yellow, hind femur yellow on basal portion, apical portion dark (apical 1/3 infuscate to black), hind tibia yellowish, hind tarsus yellowish, apical tarsomere brown to black. Abdomen with a large, white to yellowish region on syntergite 1+2, male abdomen bright shiny; female abdomen with dense microtomentum medially, lateral margins of tergites nearly polished.

#### Morphology:

**Head:** Head higher than long (head ratio less than 0.9); face not appearing bulbous; medial vertical seta 1/2–3/4 length of lateral vertical seta; 1 strong peristomal seta present, following pseudovibrissal seta.

**Thorax:** Acrostichal setae in 1 row; scutellum slightly raised (angle with scutum approximately 135°), approximately triangular, apex relatively pointed, disk of scutellum slightly convex; basal scutellar seta 1/2 length of posterior seta. Hind femur modified, with 2 ventral rows of spines, each spine bearing an apical seta; hind tibia with a row of tiny ventral spines; hind tibia without ventroapical projections.

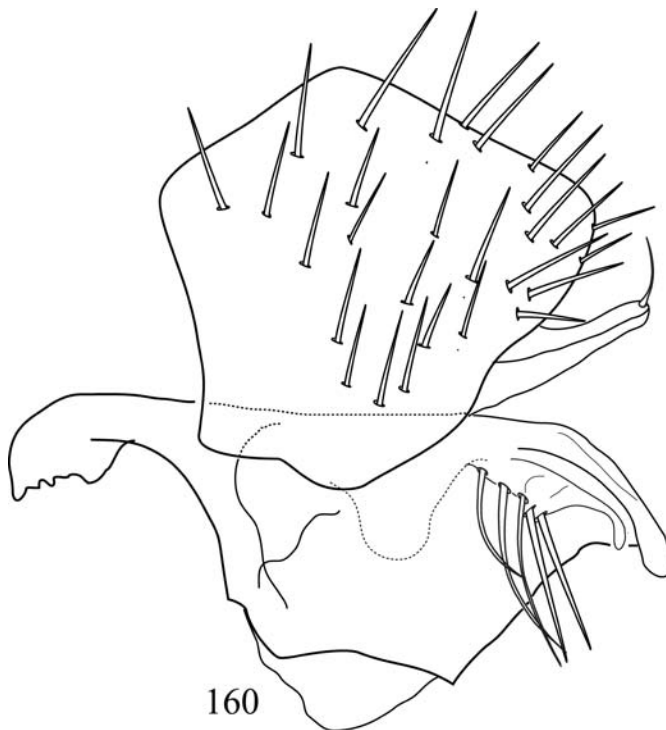


FIGURE 160. Illustrations of *Aulacigaster trifasciata*, new species (male) (the *pleiomorphica* group, Neotropical Region): epandrium and gonopod, lateral aspect. Not all to the same scale.

**Male abdomen and terminalia:** Figure 160. Sternite 5 with a central, more membranous area, posterior margin appearing receded, and bearing a tongue-like medial projection. Surstylus from lateral view “boat-shaped” and bearing one apical seta; gonopod as in Figure 160; cerci partially fused, each cercus bearing 1 very long, ventral seta and 1–3 longer setulae.

**Measurements:** Body length 2.5–2.7 mm, wing length 2.4–2.7 mm, wing width 0.8–0.9 mm.

**TYPE MATERIAL.** The holotype male is labeled “ECUADOR. P[ue]rt[o] Orellana: Rio Tiputini (0°38.2’S, 76°8.9’W)[,] 12–26 Aug 1999, W. N. Mathis, A. Baptista, M. Kotrba/HOLOTYPE ♂ *Aulacigaster trifasciata* Rung & Mathis USNM [red].” The holotype is double mounted (minuten in a block of plastic), is in excellent condition, and is deposited in the USNM. Paratypes are as follows: Same label data as the holotype (54♂, 19♀; EPNE, USNM).

**TYPE LOCALITY.** Ecuador. Orellana: Rio Tiputini (00°38.2’S, 76°08.9’W).

**OTHER SPECIMENS EXAMINED.** COSTA RICA. Puntarenas: Peninsula de Osa, Rincón (08°42’N, 83°29’W);

sea level; sweeping in palm-mangrove forest), 24 Mar 1991, D. A. Grimaldi, J. Stark (1♂; AMNH).

PANAMA. Canal Zone: Barro Colorado Island (09°09.3'N, 79°50.8'W), 10 Jan 1929, C. H. Curran (2♂; AMNH).

PERU. Madre de Dios: Manu, Rio Manu, Pakitza (11°56.6'S, 71°16.9'W); 250 m, 9–23 Sep 1988, A. Freidberg, W. N. Mathis (8♂, 4♀; USNM).

DISTRIBUTION. (Map 12) Neotropical: Costa Rica (Puntarenas), Ecuador (Orellana), Panama (Canal Zone), Peru (Madre de Dios).

ETYMOLOGY. The specific epithet, *trifasciata*, is of Latin derivation and is a combination of the prefix “tri-”, meaning three, and the Latin word for band (*fascia*) in reference to the three bands on eyes of live specimens.

REMARKS. See “Remarks” under *A. albifacies*.

THE LEUCOPEZA GROUP

FIGURES 161–201, 215–220, MAPS 14–18

DIAGNOSIS. The *leucopeza* group is distinguished from other species groups by the following combination of characters: Stout, small to medium-sized flies, body length 1.6–3.5 mm. Coloration and vestiture: Frons typically bearing a transverse, orange to orange-brown stripe, often followed by a brown stripe or shadow; anterior portion of frons densely microtomentose, with a narrow, anterior, silver stripe merging with brown ventrally; facial band often present. Wing infusate with brown in known Afrotropical species. Abdomen in a few species with a large, white to yellowish region on syntergite 1+2.

Morphology:

*Head:* Head typically higher than long (head ratio less than 0.9); arista short, with very inconspicuous, alternate hairs (arista appearing naked at low magnification) or short,

with tiny, dense, alternate hairs, arista appearing straight; face in lateral view with dorsal half concave, ventral portion bulbous; gena in most species in lateral view approximately 1/7–1/2 the width of 1st flagellomere; ocellar seta typically minute; fronto-orbital setae typically with posterior seta internal to and almost horizontally aligned with anterior seta.

*Thorax:* Subcosta partially fused with vein R<sub>1</sub> apically but terminating in costa.

*Male abdomen and terminalia:* Surstylus often arising from posteroventral margin of epandrium; cerci often broad, plate-like; subepandrial sclerite forming a single, plate-like structure. Gonopods short, wide, with a few central setae and a posterior lobe or process.

DISTRIBUTION. Worldwide, excluding the Australian and Oceanic Regions.

DISCUSSION. Species of the *leucopeza* group are best identified by the coloration and shape of the ventral portion of the frons, the presence and extent of microtomentum posterior to the fronto-orbital setae, the coloration of legs, and the shape of the surstylus and male internal terminalia.

The *leucopeza* group includes 15 species of which nine were described previously. Thus far, only species of the *leucopeza* group occur outside the Neotropical Region. Mathis and Freidberg (1994) revised the Nearctic *Aulacigaster*, and provided a key for the species known to occur in that region. Papp (1998a) published a key to the Palearctic species. Barraclough (1993) and Hilger and Kassebeer (2000) treated the Afrotropical species of the genus.

*Afrotropical Species*

DISCUSSION. The Afrotropical fauna of the *leucopeza* group presently comprises three described and three previously undescribed species, two of which are described here. One species, *Aulacigaster perata* Barraclough, is known only from a single female.

Key to the Afrotropical Species of *Aulacigaster*

1. Anterior dorsocentral seta lacking. Wing hyaline . . . . . *A. sp.*, undescribed species (Barraclough, 1993)  
 Anterior dorsocentral seta present. Wing faintly brown infusate . . . . . 2
2. Palpus short, length about half that of 1st flagellomere . . . . . 3  
 Palpus long, subequal to 1st flagellomere . . . . . *A. africana* Barraclough
3. Abdomen completely dark brown to black. Coxae yellowish to brownish . . . . . *A. perata* Barraclough  
 Abdomen with syntergite 1+2 pale. Coxae brown to dark brown . . . . . 4
4. Vertex with a shiny spot extended from ocellus at most 1/2 way to eye margin (fig. 1b; Hilger and Kassebeer, 2000:169).  
 Posterodorsal process of gonopod, in lateral view, shorter than surstylus, approximately triangular (fig. 2c; Hilger and Kassebeer, 2000:170) . . . . . *A. borbonica* Hilger and Kassebeer  
 Vertex with a shiny spot extended from ocellus to at least 2/3 of eye margin. Posterodorsal process of gonopod, in lateral view, almost as long as surstylus, variously shaped [Figures 166, 168] . . . . . 5

5. Surstylus shorter, about 0.2–0.3 times the length of ventral margin of epandrium [Figure 169]; posterior process of gonopod digitiform, at least 3 times wider than surstylus, bearing one central seta [Figure 168] . . . . . *A. malawana*, new species
- Surstylus longer, about 0.3–0.4 times the length of ventral margin of epandrium [Figure 167]; posterior process of gonopod with lateral margins convergent apically, pointed, at least 1/2 the width of surstylus on its narrowest point, devoid of setae [Figure 166] . . . . . *A. freidbergi*, new species

### *Aulacigaster africana* Barraclough

FIGURES 161–165, MAP 14

*Aulacigaster africana* Barraclough, 1993:34–38 [figures of head, wing and male terminalia].—Duxbury and Barraclough, 1994:35 [Figure 4].—Papp, 2008:227–232 [description, illustrations of female terminalia and immature stages].

**DIAGNOSIS.** This species is distinguished from congeners by the following character: Palpus long, subequal in length to third antennal segment.

**DESCRIPTION.** Coloration and vestiture: Vertex mostly densely microtomentose, with a shiny spot extended from ocellus at most 2/3–3/4 to eye margin; frons bearing a transverse, large, orange band, merging into dark brown ventrally; silver stripe on frons approximately straight; antenna yellow, infuscate with brown on dorsal 1/2; face yellow in ground color; facial band present, sharply defined, transverse, on protruding, ventral portion of face; palpus white. Scutum dull microtomentose anteriorly, devoid of microtomentum posterior of transverse suture; scutellum mostly devoid of microtomentum, bright shiny; postpronotum concolorous with mesonotum, microtomentose over ventral and posterior margins, otherwise polished; anepisternum mostly microtomentose, with a basal silver stripe extended posteriorly to anepimeron; katapisternum subshiny to dull; halter mostly white. Wing membrane very faintly infuscate, darker along costal margin and apex (not as pronounced as suggested in fig. 2; Barraclough, 1993:35). Fore coxa brown to black, fore femur brown, apex yellowish; fore tibia yellowish or brown, fore tarsus yellowish, apical and sometimes subapical tarsomeres brown to black; mid coxa brown to black, apex yellowish, mid femur brown to black, apex yellowish, mid tibia yellowish or brownish, mid tarsus yellowish, apical and subapical tarsomere brownish to dark brown; hind coxa brown, apex yellowish, hind femur brown to black, apex yellowish, hind tibia yellowish or brown to dark brown, hind tarsus yellowish, apical tarsomere brown to black. Male abdomen subshiny to dull.

**Morphology:**

**Head:** Figures 162–164. Head higher than long (head ratio less than 0.9); face in lateral view with dorsal

half concave, ventral portion bulbous; gena in lateral view 1/5–1/6 the width of 1st flagellomere; palpus long, subequal in length to 1st flagellomere; setae on head and mesonotum unusually long (posterior fronto-orbital seta longer than 1/2 length of eye in lateral view); medial vertical seta 3/4 length of lateral vertical seta; 1 well-developed peristomal seta and several setulae following pseudovibrissal setae present.

**Thorax:** Figure 161. Acrostichal setae in 2 rows.

**Male abdomen and terminalia:** Figure 165. Surstylus arising from ventral margin of epandrium, slender, slightly sickle-shaped, relatively long (approx. 1/2 length of ventral margin of epandrium); cerci broader at base, tapering toward round apex, with a few prominent apical setae; gonopod with 1 medial seta and several setae preceding posterior dorsal process, subrectangular in lateral view (approx. 0.7 times as high as long); posterior process of gonopod digitiform (slightly shorter than surstylus), not particularly wide (slightly wider than base of surstylus), bearing a few marginal ventral setae (figs. 3–4; Barraclough, 1993:35).

**Measurements:** (from one paratype male) Body length 2.8 mm. Wing length 3.0 mm, wing width 1.0 mm.

**TYPE MATERIAL.** The holotype male is labeled “S. AFRICA: Natal #41[,] Royal Natal Nat. Park[,] 28°43’S: 28°56’E[,] 1540 m[,] 2.ix.1992, Indig. Forest Near Tendele and Tugela[,] Rock ledge, Whittington/HOLOTYPE ♂ *Aulacigaster africana* BARRACLOUGH [red border].” The holotype is deposited in NMSA (597). Paratype as follows: same label as the holotype, but collected by D. A. Barraclough (1♂; NMSA).

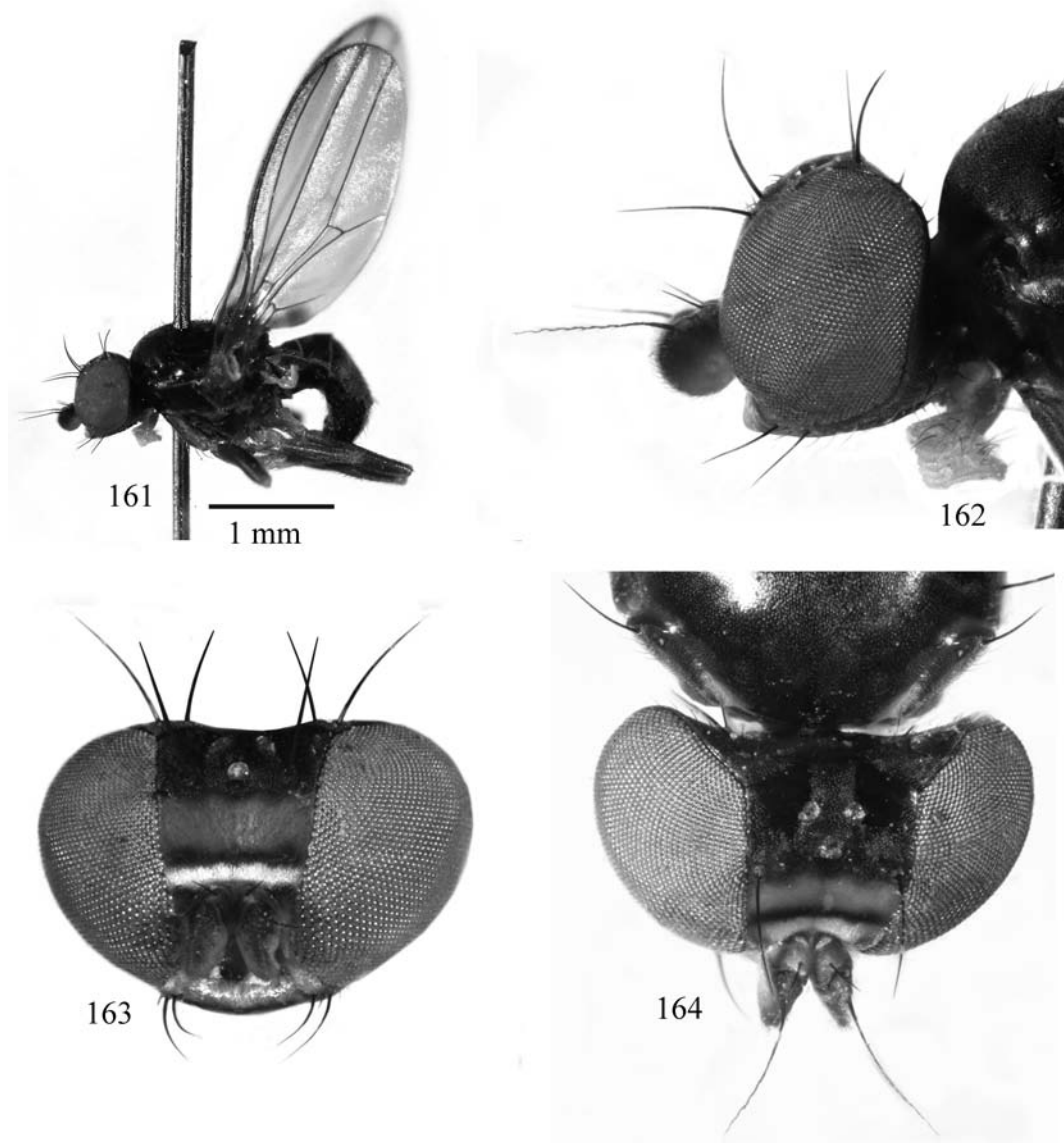
**TYPE LOCALITY.** South Africa. KwaZulu-Natal: Royal Natal National Park (28°43’S, 28°56’E).

**OTHER SPECIMENS EXAMINED.** SOUTH AFRICA. Natal: Royal Natal Nat. Park (28°43’S, 28°56’E; Indig Forest near Tendele and Tugela, Rock ledge; 1540 m), 2 Sep 1992, A. E. Whittington (1♂; NMSA).

**DISTRIBUTION.** (Map 14) Afrotropical: South Africa (Eastern Cape, KwaZulu-Natal).

**REMARKS.** The female is not known for this species. The description presented here is based on a male paratype and a conspecific male, both collected in the same locality as the holotype. According with Barraclough (1993), *A. africana* was collected from a shaded sandstone ledge.





FIGURES 161–164. Digital photographs of *Aulacigaster africana* Barraclough (male) (the *leucopeza* group, Afrotropical Region). (161) body, lateral aspect; (162) head, lateral aspect; (163) head, frontal aspect; (164) head, dorsal aspect. Not all to the same scale.

### ***Aulacigaster borbonica* Hilger and Kassebeer**

MAP 14

*Aulacigaster borbonica* Hilger and Kassebeer, 2000:167–172 [figures of male terminalia, head and thorax].

**DIAGNOSIS.** This species is distinguished from congeners by the following combination of characters: Abdomen with syntergite 1+2 whitish; mid tarsus brown, basal 3 tarsomeres yellow; thoracic pleural region with a

stripe of white microtomentum beginning on fore coxa and ending beneath halter.

**DESCRIPTION.** Coloration and vestiture: Vertex mostly densely microtomentose, with a shiny spot extended from ocellus at most 1/2 way to eye margin; frons bearing a transverse, large, orange band, frontal orange band merging into dark brown ventrally; silver stripe on frons approximately straight; antenna brownish; face brownish; facial band present, yellow (Hilger and Kassebeer 2000:168), sharply defined, transverse, on protruding, ventral portion of face; palpus white. Scutum uniformly microtomentose;

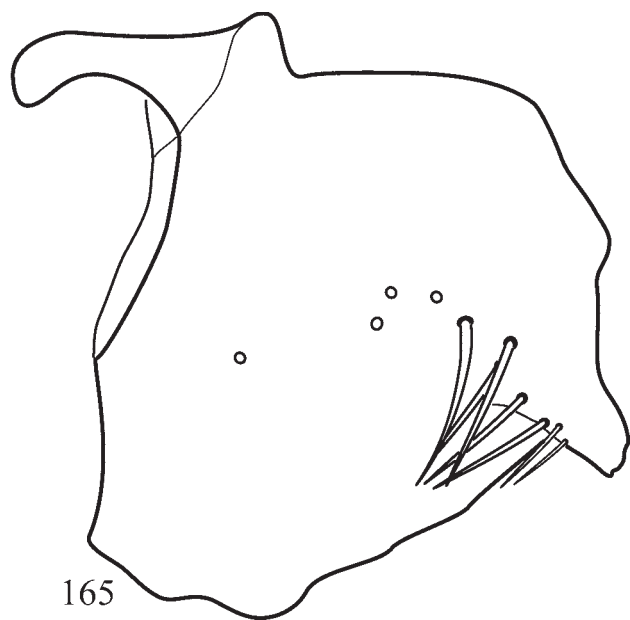


FIGURE 165. Illustration of *Aulacigaster africana* Barraclough (male) (the *leucopeza* group, Afrotropical Region): gonopod, lateral aspect.

postpronotum concolorous with mesonotum, more strongly microtomentose on lateral and posterior margins, subshiny; thoracic pleural region with a stripe of white microtomentum beginning on fore coxa and ending beneath the halter; halter mostly white. Wing mostly brown, infusate. Fore coxa brown to black, fore femur brown, fore tibia brown, fore tarsus brown to dark brown, basal 2 tarsomeres white to yellow; mid coxa brown to black, mid femur brown, mid tibia brownish, mid tarsus brown, basal 3 tarsomeres white to yellow; hind coxa brown, hind femur brown, hind tibia brown to dark brown, hind tarsus brown, basal 3 tarsomeres white to yellow. Abdomen with dorsal portion of tergite 1 white.

**Morphology:**

**Head:** Face in lateral view with dorsal half concave, ventral portion bulbous; gena in lateral view approximately 1/3–1/2 the width of 1st flagellomere; medial vertical seta 3/4 length of lateral vertical seta; peristomal area with about 1 strong and several weaker setae following pseudovibrissal seta (fig. 1a; Hilger and Kassebeer 2000).

**Thorax:** Acrostichal setae in 2 rows.

**Male abdomen and terminalia:** Surstylus arising from posteroventral margin of epandrium, slender, digitiform, relatively long (approx. 0.4 times the length of ventral margin of epandrium; Figure 2a; Hilger and Kassebeer,

2000:170) with round and slightly enlarged apex; subepandrial sclerite with lateral arms broad and curved posteriorly (fig. 2b; Hilger and Kassebeer, 2000:170); cerci fused on basal 1/2, broader at base, with almost parallel margins and with a few prominent apical setae; gonopod with one medial seta and three setae preceding posterior process, sub-rectangular in lateral view (approx. height twice length), with a short pointed process posterodorsally (less than 1/2 the length of surstylus; fig. 2c; Hilger and Kassebeer, 2000:170).

**Measurements:** Body length 2.0–2.8 mm. Wing length 2.0–2.3 mm, wing width not available in original description.

**TYPE MATERIAL.** The holotype male is labeled (quoted from Hilger and Kassebeer, 2000:168E) “La Reunión: Salazie, Mare à Poule d’Eau, 490 m, 21°03’7”S 55°31’29”E, on slime flux of *Casuarina cunninghamiana*, 2.3.1999, leg. C. F. Kassebeer (CFK) & S. Hilger, in Coll. CFK.”

**TYPE LOCALITY.** La Reunión. Salazie (21°03’S, 55°30.4’E).

**DISTRIBUTION.** (Map 14) Afrotropical: Reunión.

**BIOLOGY.** According to Hilger and Kassebeer (2000), *A. borbonica* was collected from a slime flux of the Horsetail Tree (*Casuarina cunninghamiana* Miq.), originally from Australia and introduced to Réunion.

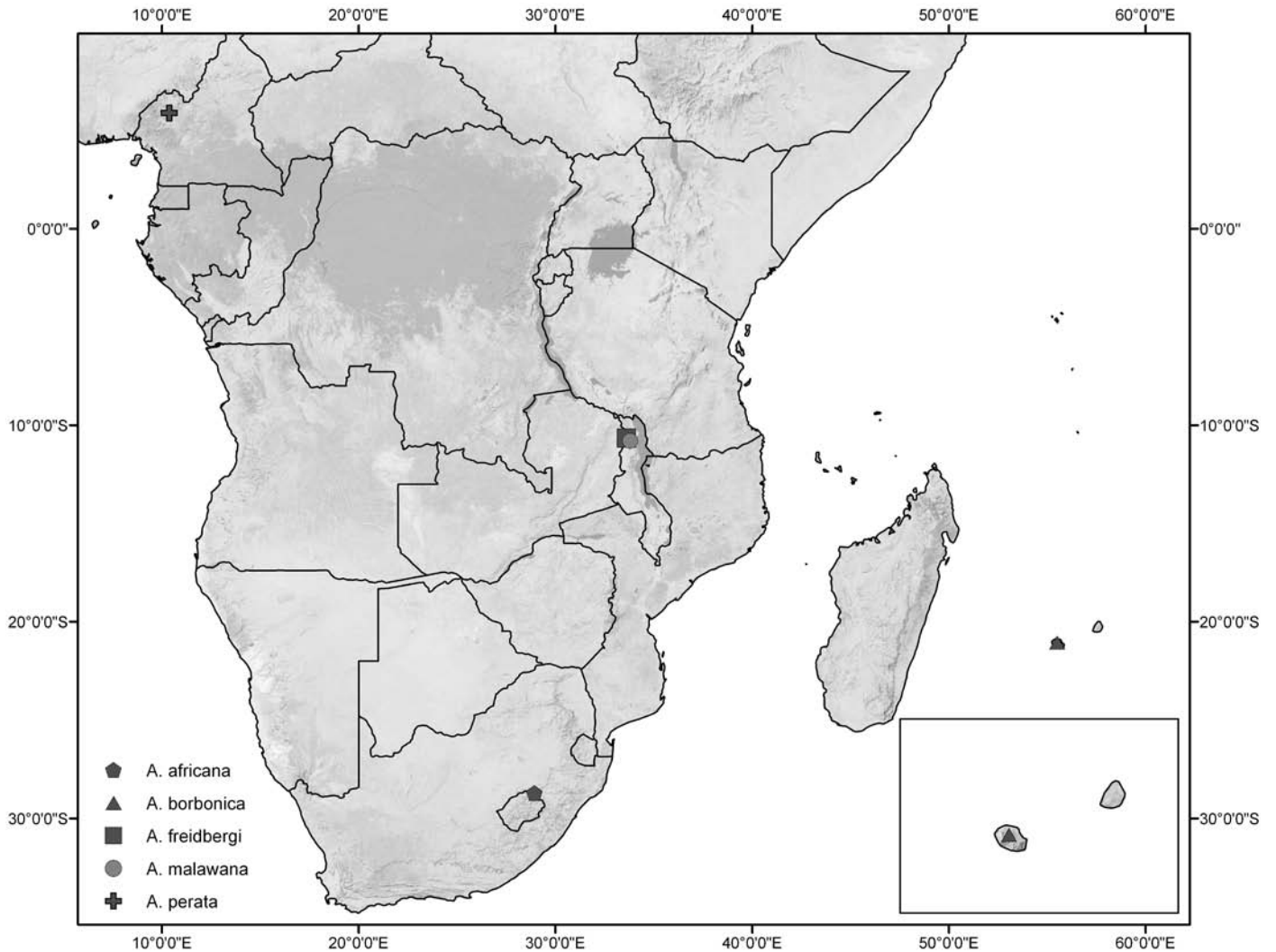
**REMARKS.** The description herein presented is based on Hilger and Kassebeer (2000). We were not able to analyze the type specimens because they are deposited in the Kassebeer’s personal collection and he has not responded to our requests to send the material.

### *Aulacigaster freidbergi*, new species

FIGURES 166–167, MAP 14

**DIAGNOSIS.** This species is distinguished from congeners by the following combination of characters: Abdomen with syntergite 1+2 whitish; gena in lateral view 1/7 width of 1st flagellomere; posterior process of gonopod with lateral margins convergent apically, pointed, at least 1/2 width of surstylus on its narrowest point, devoid of setae.

**DESCRIPTION.** Coloration and vestiture: Vertex mostly densely microtomentose, with a shiny spot extended from ocellus to near eye margin (2/3 or more to eye margin); frons bearing a transverse, large, orange band, merging into dark brown ventrally; silver stripe on frons approximately straight; antenna yellow, infusate with brown dorsally; face yellow in ground color; facial band present, sharply defined, transverse, over brown mark on protruding portion of face;



MAP 14. Distribution of the Afrotropical species of *Aulacigaster* (the *leucopeza* group).

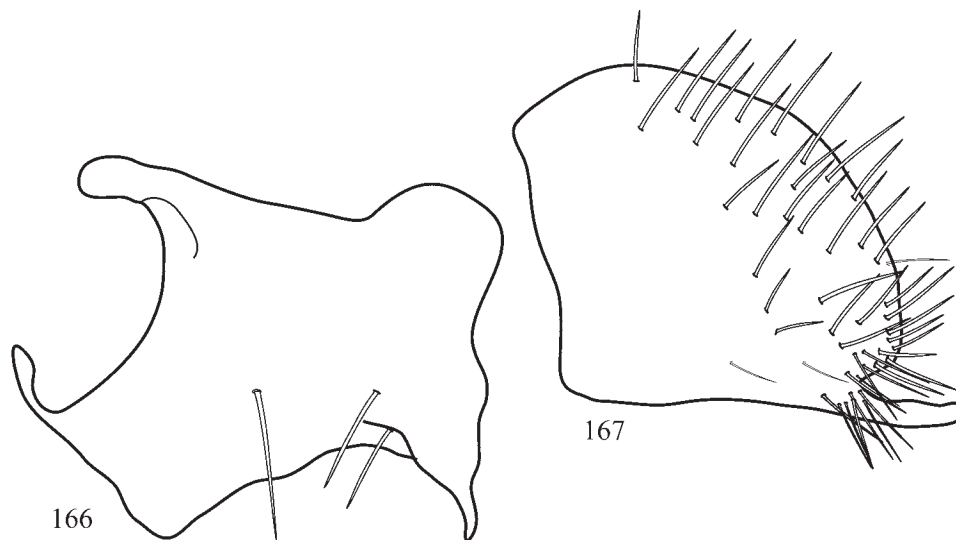
palpus white. Scutum with weakly defined microtomentose stripes; scutellum dull, microtomentose; postpronotum concolorous with mesonotum, scarcely microtomentose, subshiny; anepisternum mostly microtomentose with a semi-lunate, ventral polished area; katepisternum mostly polished; halter mostly white. Wing faintly brown infuscate in cells  $r_1$  and  $r_{2+3}$ . Fore coxa brown to black, fore femur brown, fore tibia brown, fore tarsus brown to dark brown, basal tarsomere yellow; mid coxa brown to black, mid femur brown, mid tibia brownish, mid tarsus yellowish, apical and subapical tarsomere brown; hind coxa brown, hind femur brown, hind tibia brown to dark brown, hind tarsus yellowish, apical and subapical tarsomere brown. Abdomen with syntergite 1+2 white.

#### Morphology:

**Head:** Head round (head ratio 1); face at level of pseudovibrissa wider than width of 1st flagellomere, in lateral view with dorsal half concave, ventral portion bulbous; gena in lateral view approximately 1/7 the width of 1st flagellomere; ocellar seta between 1/3–1/2 the length of medial vertical seta; medial vertical seta 3/4 length of lateral vertical seta; peristomal area with about 1 strong and 4 weaker setae following pseudovibrissal seta.

**Thorax:** Acrostichal setae in 2 rows.

**Male abdomen and terminalia:** Figures 166–167. Surstylus arising from posteroventral margin of epandrium, slender, digitiform, relatively long (approximately 0.3–0.4 times the length of ventral margin of epandrium), slightly



FIGURES 166–167. Illustrations of *Aulacigaster freidbergi*, new species (male) (the *leucopeza* group, Afrotropical Region). (166) gonopod, lateral aspect; (167) epandrium, lateral aspect.

bulged medially, apex round; subepandrial sclerite with cerci fused on basal 1/2, lateral arms curved posteriorly and blunt apically; gonopod sub-rectangular in lateral view (approx. two times higher than long), with a pronounced dorsal “hunch” and with 1 medial seta and 3 setae preceding posterior process; posterior dorsal process of gonopod long (subequal in length to surstylus), with dorsal and ventral margins convergent to pointed apex.

**Measurements:** Body length 2.50–2.75 mm. Wing length 2.5–2.9 mm, wing width 0.9–1.1 mm.

**TYPE MATERIAL.** The holotype male is labeled “ZAMBIA: Nyika National Park[,], Chowo Forest[,], 28.ix.1998[,], F. KAPLAN & A. FREIDBERG/HOLOTYPE ♂ *Aulacigaster freidbergi* Rung & Mathis TAU [red].” The holotype is double mounted (minuten in a block of plastic), is in good condition (vertical, scutellar and mesonotal setae broken, wings slightly folded), and is deposited in the TAU.” Paratypes are as follows: same label data as the holotype (2♀; TAU, USNM).

**TYPE LOCALITY.** Zambia. Nyika National Park (10°40’S, 33°38’E).

**DISTRIBUTION.** (Map 14) Afrotropical: Zambia.

**ETYMOLOGY.** The specific epithet, *freidbergi*, is a genitive patronym to honor and recognize the contributions of Dr. Amnon Freidberg to dipterology and in particular to this project. Amnon not only collected the type series of this species but numerous other specimens that gave genesis to this study.

### *Aulacigaster malawana*, new species

FIGURES 168–169, MAP 14

**DIAGNOSIS.** This species is distinguished from congeners by the following combination of characters: Abdomen with sytergite 1+2 whitish; gonopod subrectangular, with one medial seta and three setae preceding posterior process; posterior process of gonopod digitiform, at least 3 times wider than surstylus, bearing one central seta.

**DESCRIPTION.** Coloration and vestiture: Vertex mostly densely microtomentose, with a shiny spot extended from ocellus to near eye margin (2/3 or more to eye margin); frons bearing a transverse, large, orange band, merging into dark brown ventrally; silver stripe on frons approximately straight; antenna yellow, infusate with brown dorsally; face yellow in ground color; facial band present, sharply defined, transverse, over brown mark on protruding portion of face; palpus white. Scutum with weakly defined microtomentose stripes; postpronotum concolorous with mesonotum, scarcely microtomentose, subshiny; anepisternum mostly microtomentose; katepisternum mostly polished; halter mostly white. Wing faintly brown infusate in cells  $r_1$  and  $r_{2+3}$ . Fore coxa brown to black, fore femur brown, fore tibia brown, fore tarsus brown to dark brown, basal tarsomere yellow; mid coxa brown to black, mid femur brown, mid tibia brownish, mid tarsus yellowish, apical and subapical tarsomere brown; hind coxa brown, hind femur

brown, hind tibia brown to dark brown, hind tarsus yellowish, apical and subapical tarsomere brown. Abdomen with syntergite 1+2 white.

**Morphology:**

**Head:** Head round (head ratio 1); face at level of pseudovibrissa wider than width of 1st flagellomere, in lateral view with dorsal half concave, ventral portion bulbous; gena in lateral view approximately 1/7 the width of 1st flagellomere; ocellar seta between 1/3–1/2 the length of medial vertical seta medial vertical seta 3/4 length of lateral vertical seta; peristomal area with about 1 strong and 4 weaker setae following pseudovibrissal seta.

**Thorax:** Acrostichal setae in 2 rows.

**Male abdomen and terminalia:** Figures 168–169. Surstylus arising from posteroventral margin of epandrium, slender, digitiform, relatively long (approximately 0.2–0.3 times the length of ventral margin of epandrium), apex round; subepandrial sclerite with lateral arms curved posteriorly and blunt apically; cerci fused on basal 1/2; gonopod with 1 medial seta and 3 setae preceding posterior process, sub-rectangular in lateral view (approx. 2 times higher than long); posterior process of gonopod digitiform, long (slightly longer than surstylus) and wide (at least 3 times wider than surstylus), bearing one central seta.

**Measurements:** Body length 2.2–2.5 mm. Wing length 2.5–2.7 mm, wing width 0.9–1.1 mm.

**TYPE MATERIAL.** The holotype male is labeled “MALAWI: North Nyika National Park[,] Zovo-Chipolo Forest[,] 25-16.ix.1998, F. KAPLAN & A. FREIDBERG/ HOLOTYPE ♂ *Aulacigaster malawana* Rung & Mathis TAU [red].” The holotype is double mounted (minuten in a block of plastic), is in good condition (vertical, scutellar

and mesonotal setae broken, wings slightly folded), and is deposited in the TAU.” Paratypes are as follows: same label data as the holotype (5♂, 4♀; TAU, USNM).

**TYPE LOCALITY.** Malawi. North Malawi, Nyika National Park, Zovo-Chipolo Forest (10°48’S, 33°48’E).

**DISTRIBUTION.** (Map 14) Afrotropical: Malawi.

**ETYMOLOGY.** The specific epithet, *malawana*, refers to the country where the type series was collected.

### ***Aulacigaster perata* Barraclough**

MAP 14

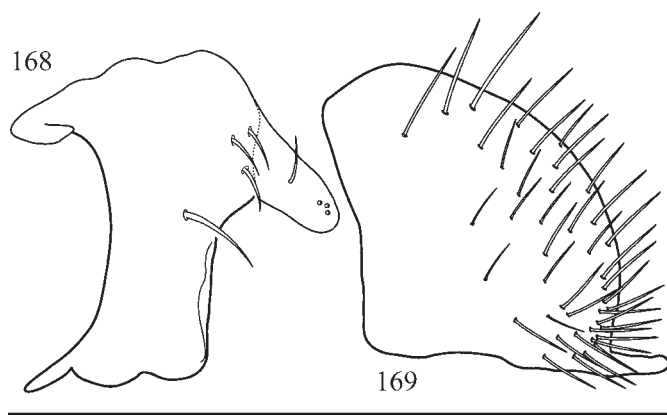
*Aulacigaster perata* Barraclough 1993:39–40.

**DIAGNOSIS.** This species is distinguished from congeners by the following combination of characters: Abdomen completely brown; gena in lateral view, immediately below ventral margin of eye, approximately 1/5 width of 1st flagellomere.

**DESCRIPTION.** Coloration and vestiture: Vertex mostly densely microtomentose, with a shiny spot extended from ocellus at most 1/2–2/3 to eye margin; frons bearing a transverse, large, orange band, frontal orange band merging into dark brown ventrally; silver stripe on frons; antenna pale yellow to brownish; face yellow in ground color; facial band present, sharply defined, over brown mark on protruding portion of face; palpus white. Scutum dull microtomentose, devoid of microtomentum on anteriormost portion; scutellum mostly microtomentose; postpronotum concolorous with mesonotum, uniformly microtomentose anepisternum mostly dull; katepisternum mostly polished; halter mostly yellowish, or mostly brown to dark brown (knob darker). Wing mostly brown, infuscate, not noticeably darker along costal margin and apex. Fore coxa brownish (“yellow-brown to medium brown”: Barraclough, 1993:39), fore femur brown, fore tibia brown, fore tarsus yellowish, apical and sometimes subapical tarsomeres brown to black; mid coxa yellowish to brownish (“paler, entirely yellow-brown: Barraclough, 1993:39); mid femur brown, mid tibia brownish, mid tarsus yellowish, apical and subapical tarsomere brownish to dark brown; hind coxa brownish (“paler, entirely yellow-brown: Barraclough, 1993:39), hind femur brown, hind tibia brown to dark brown, hind tarsus yellowish apical and subapical tarsomere brownish to dark brown.

**Morphology:**

**Head:** Head higher than long (head ratio less than 0.9); face in lateral view with dorsal half concave, ventral portion bulbous; gena in lateral view approximately 1/4–1/5 the width of 1st flagellomere; medial vertical seta 3/4



FIGURES 168–169. Illustrations of *Aulacigaster malawana*, new species (male) (the *leucopeza* group, Afrotropical Region). (168) gonopod, lateral aspect; (169) epandrium, lateral aspect.

length of lateral vertical seta; peristomal area with about 1 strong and 4 weaker setae following pseudovibrissal seta.

**TYPE MATERIAL.** The holotype female is labeled "CAMEROON[,] 50Km E. Bamenda[,] off Rt.N11 Bamballang Area[,] 21.XI.1987[,] FINI KAPLAN/HOLOTYPE ♀ *Aulacigaster perata* BARRACLOUGH." The holotype is deposited in TAU.

**TYPE LOCALITY.** Cameroon. Nord-Ouest: Bamenda (50 km E), Bamballang Area (off Rt. N11; 05°53'N, 10°23'E).

**DISTRIBUTION.** (Map 14) Afrotropical: Cameroon.

**REMARKS.** The description herein presented is based on Barraclough (1993). The male is not known for

this species. According with Barraclough (1993), *A. perata* was collected at approximately 1500 m altitude.

#### Nearctic Species

**DISCUSSION.** The Nearctic fauna includes three described species. One species, *A. neoleucopeza* Mathis and Freidberg, was also reported from the Palearctic Region (see below) by Papp (1998a), but this record was contested by Kassebeer (2001) (see Palearctic Species). Mathis and Freidberg (1994) provided a key to the Nearctic species, which is repeated below with minor modifications, plus distributional data, descriptions, and illustrations.

#### Key to the Nearctic Species of *Aulacigaster*

- Species larger (wing length averaging 2.6 mm), darker, and shinier; shiny spot on vertex small, at most extended from ocellus 1/2 way to eye margin, sometimes indistinct (fig.17; Mathis and Freidberg, 1994:594); anepisternum with ventral 1/3 shiny, bare of microtomentum, bordered dorsally by dense gray microtomentum; katepisternum, coxae, femora, and abdomen strongly shiny, lacking microtomentum, although fore femur sparsely microtomentose anteriorly; acrostichal setulae in 2 rows along entire length (fig. 18; Mathis and Freidberg, 1994:594); 1st flagellomere usually blackened on dorsal 2/3. . . . . *A. mcalpinei* Mathis and Freidberg  
Smaller and duller species (wing length averaging 2.35 mm); shiny spot on vertex larger and distinct, typically extended from ocellus more than 1/2 way distance to eye margin (fig. 3; Mathis and Freidberg, 1994:587); anepisternum usually entirely microtomentose, rarely with a bare, shiny stripe ventrally; katepisternum, coxae, femora, and abdomen not strongly shiny, at least partially covered with microtomentum; acrostichal setulae in a single medial row anteriorly, row bifurcate at posterior 1/2–2/5 (fig.15; Mathis and Freidberg, 1994:587); 1st flagellomere with only dorsal 1/4 darkened . . . . . 2
- Surstylus moderately long (0.3–0.5 times the length of basal margin of epandrium) [Figures 173, 175, 177, 179, 182]; gonopod in lateral view with a lobe-like posterodorsal process [Figures 172, 174, 176, 178] . . . . . *A. neoleucopeza* Mathis and Freidberg  
Surstylus short (less than 0.2 times the length of basal margin of epandrium; Figure 184); gonopod in lateral view with a distinctly pointed process posterodorsally [Figure 183] . . . . . *A. sabroskyi* Mathis and Freidberg

### *Aulacigaster mcalpinei* Mathis and Freidberg

FIGURES 170–171, MAP 15

*Aulacigaster mcalpinei* Mathis and Freidberg, 1994:593–597 [illustration of head, thorax, male terminalia and spermatheca].

**DIAGNOSIS.** This species is distinguished from congeners by the following combination of characters: Vertex with a shiny spot extended from ocellus at most 1/2 way to eye margin; surstylus broad, beak-like, wider than width of apical portion of phallapodeme.

**DESCRIPTION.** Coloration and vestiture: Vertex mostly densely microtomentose, with a shiny spot

extended from ocellus at most 1/2 way to eye margin; ocellar tubercle dull microtomentose; frons bearing a transverse, large, orange band, frontal orange band merging into dark brown ventrally; silver stripe on frons approximately straight; antenna pale yellow to yellowish, infusate along dorsal margin (to dorsal 2/3); face yellow, with a transverse brown mark on dorsal portion; facial band present, sharply defined, transverse, on protruding, ventral portion of face; palpus white. Scutum with weakly defined microtomentose stripes; scutellum dull microtomentose; postpronotum concolorous with mesonotum; anepisternum with ventral 1/3 shiny, bare of microtomentum, bordered dorsally by dense gray microtomentum; katepisternum mostly polished; halter mostly white (knob mostly dark brown

anteriorly). Fore coxa brown to black, fore femur brown to black, fore tibia yellowish, fore tarsus yellowish, apical and sometimes subapical tarsomeres brown to black; mid coxa brown to black, mid femur brown to black, mid tibia brown to black, mid tarsus yellowish, apical and subapical tarsomere brownish to dark brown; hind coxa brown to black, hind femur brown to black, hind tibia brown to black, hind tarsus yellowish, apical tarsomere brown to black. Male abdomen subshiny to dull; female abdomen with dense microtomentum medially, lateral margins of tergites nearly polished.

**Morphology:**

**Head:** Head higher than long (head ratio less than 0.9); face at level of pseudovibrissa wider than width of 1st flagellomere, in lateral view with dorsal half concave, ventral portion bulbous; gena in lateral view approximately 1/3–1/2 the width of 1st flagellomere; medial vertical seta 3/4 length of lateral vertical seta; 1 long and 3–4 shorter peristomal setae following pseudovibrissal setae present.

**Thorax:** Acrostichal setae in 2 rows; scutellum slightly raised (angle with scutum approximately 135°), trapezoidal, apex nearly straight, disk of scutellum slightly convex; basal scutellar seta 1/2 length of posterior seta.

**Male abdomen and terminalia:** Figures 170–171. Surstylus arising from posteroventral margin of epandrium, broad basally, shaped as a beak, relatively long; subepandrial sclerite with cerci mostly fused, lateral arms curved posteriorly and pointed apically (fig. 22; Mathis and Freidberg, 1994:595); gonopod (fig. 21; Mathis and Freidberg,

1994:595) in lateral view with pointed process preceded by a few small setae, shallow ventrally (about as long as high), approximately rectangular in lateral view.

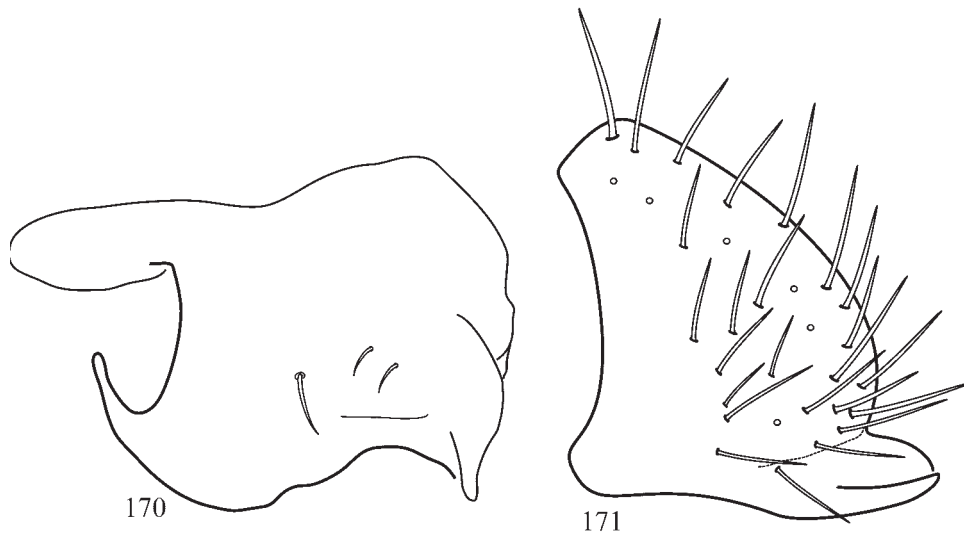
**Female abdomen and terminalia:** Spermathecae with ventral digitiform projections.

**Measurements:** Body length 2.5–2.6 mm. Wing length 2.5–2.6 mm, wing width 0.9 mm.

**TYPE MATERIAL.** The holotype male is labeled “USA. M[arylan]D: Montgomery Co., Potomac[,] 23 Jul–23 Aug 1989[,] Amnon Freidberg[,] slime flux on oak/HOLOTYPE ♂ *Aulacigaster mcalpinei* W. N. Mathis & Freidberg USNM [red; “♂ *Aulacigaster mcalpinei*” and “Freidberg” handwritten].” Paratypes: Same locality data as the holotype (17♂, 15♀; TAU, USNM). Connecticut. Fairfield: Redding, 31 Mar 1929, A. L. Melander (4♂, 4♀; USNM). New Hampshire. Hillsborough: Hollis (Beaver Brook Association), 20 Apr 1980, N. E. Woodley (14♂, 8♀; NEW, USNM). Virginia. Fairfax: Dead Run (38°58'N, 77°10.3'W; at sap tree, at sap sugar maple), 8 Mar–28 Jul 1914, 1915, 1916, 1925, R. C. and E. M. Shannon (17♂, 21♀; USNM).

**TYPE LOCALITY.** United States. Maryland. Montgomery: Potomac (39°01.1'N, 77°12.5'W).

**OTHER SPECIMENS EXAMINED.** CANADA. Ontario: Ottawa (45°25'N, 75°45'W), 27 Apr–1 May 1955, 1983, D. G. F. Cobb, J. R. Vockeroth (3♂, 2♀; CNC; Ottawa, Rockcliffe, McKay Lake (45°27.1'N, 75°40.3'W), 27–28 Apr 1955, 1983, D. G. F. Cobb, J. F. McAlpine (2♂, 5♀; CNC).



**FIGURES 170–171.** Illustrations of *Aulacigaster mcalpinei* Mathis and Freidberg (male) (the *leucopexa* group, Nearctic Region). (170) gonopod, lateral aspect; (171) epandrium, lateral aspect.

UNITED STATES. Arkansas. Garland: Hot Springs National Park (34°31'N, 93°03.2'W), 29 Aug–13 Sep 1943, B. C. Marshall (2♀; USNM). Logan: Magazine Mountain (35°10'N, 93°38.7'W; oak sap flux), 6 Jul 1992, D. A. Grimaldi (10♂, 6♀; AMNH, USNM).

District of Columbia. Washington (38°49.8'N, 77°00.6'W), 3 Mar–4 Aug 1927, H. S. Barber (1♂, 1♀; USNM).

Florida. Alachua: Gainesville (29°39.1'N, 82°19.5'W), 22 May 1957, H. V. Weems (3♂; USNM). Highlands: Archbold Biological Station (27°11.3'N, 81°20.3'W; at sap flow from ambrosia beetle hole on dying *Quercus laurifolia*), 27 May 2002, M. Deyrup (6♂; ABSF).

Illinois. Cook: Chicago (41°47.4'N, 87°36'W) (1♀; USNM). Macoupin: Carlinville (39°16.8'N, 89°52.9'W), Robertson (1♂; USNM).

Indiana. Dubois: Ireland (38°24.9'N, 86°60'W; in trap), 17 Jul 1965, O. Mund (1♂; USNM).

Maryland. Montgomery: Colesville (39°04.8'N, 77°00.1'W; Malaise trap), 26 Jun 1977, W. W. Wirth (1♀; USNM); Glen Echo (38°58.1'N, 77°08.4'W), 23 Jul–6 Aug 1922, J. R. Malloch (1♂, 2♀; USNM); Plummers Island (38°58.2'N, 77°10.6'W), 25 Mar–18 Aug 1912, 1914, 1916, W. L. McAtee, R. C. Shannon (5♂, 3♀; USNM). Prince Georges: College Park (38°58.8'N, 76°56.2'W), 29 Jun 1933, C. T. Greene (1♂; USNM).

Massachusetts. Middlesex: Cambridge (42°22.5'N, 71°06.3'W), 7–16 Jul 1981, N. E. Woodley (3♀; USNM). Norfolk: Boston (42°21.5'N, 71°03.6'W; Arnold Arboretum), 18 Apr 1980, N. E. Woodley (3♂, 1♀; USNM).

Michigan. Livingston: Edwin S. George Reserve (42°27'N, 83°01'W), 16 Apr 1950, K. Bohnsack (1♀; USNM). Washtenaw: Ann Arbor (42°16.3'N, 83°43.6'W), 30 Apr 1936, G. C. Steyskal (1♀; USNM). Wayne: Detroit (42°19.9'N, 83°02.8'W), 29 Aug 1943, G. C. Steyskal (1♀; USNM); Grosse Isle (42°07.7'N, 83°08.7'W), 2 Apr 1957, G. C. Steyskal (1♀; USNM).

Minnesota. Olmstead (43°53.6'N, 92°10.2'W): C. Ainslio (1♀; CNC).

New Jersey. Bergen: Ridgewood (40°58.8'N, 74°07'W), Apr 1987, A. Soll (2♀; AMNH). Mercer: Princeton (40°20.9'N, 74°39.6'W), 14 Apr 1916 (1♀; USNM).

New York. Broome: Chenango Valley State Park (42°12.8'N, 75°50.5'W), 15 Apr–16 May 1982, D. A. Grimaldi (1♂; AMNH). Tomkins: Ithaca (42°26.4'N, 76°29.8'W), 15 Apr 1913, H. Morrison (2♀; USNM).

North Carolina. Mecklenburg: Highway 51 (1.6 km W of Rt. 16, near Matthews; 35°07'N, 80°43.4'W; Magnolia cone and flower of *Magnolia grandiflora*), 12–23 May 1979, 1981, A. G. Wheeler, Jr. (1♂; PDA).

Pennsylvania. Dauphin: Harrisburg (40°16.4'N, 76°53.1'W; sap flux on *Ulmus*), 15 Apr–19 Jul 1982, 1985, K. R. Valley (2♂, 1♀; PDA). Schuylkill: Interstate 81 (4.2 km S at exit 31, Rt. 433; 40°32.1'N, 76°25.7'W; sap flux on *Betula*), 29 Apr 1986, K. R. Valley (1♂; PDA).

Virginia. Fairfax: Mt. Vernon (38°42.5'N, 77°05.2'W), 8 Jul–22 Aug 1956, 1976, P. H. Arnaud, Jr. (2♂; CAS, USNM). Alexandria, Maywood (38°53.8'N, 77°06.3'W; McAtee's residence; at oak sap), 4 May 1916, W. L. McAtee (1♂; USNM). Falls Church, Holmes Run (38°50.9'N, 77°10.4'W; at light), 14 Jun–23 Aug 1961, W. W. Wirth (1♂, 1♀; USNM). Scott Run, Stubblefield Falls (38°58.1'N, 77°12.2'W; on *Pinus virginiana*), J. R. Malloch (1♂, 1♀; USNM). Page: Big Meadows (38°31'N, 78°26.4'W), 15 Jun 1941, A. L. Melander (1♀; USNM).

**DISTRIBUTION.** (Map 15) Eastern North America: Canada (Ontario), United States (Arkansas, Connecticut, District of Columbia, Florida, Illinois, Indiana, Massachusetts, Maryland, Michigan, Minnesota, New Hampshire, New York, New Jersey, North Carolina, Pennsylvania, Virginia).

**BIOLOGY.** This species has been collected on tree wounds and fluxes of the following genera of deciduous trees: *Acer*, *Pinus*, and *Quercus*.

### *Aulacigaster neoleucopeza* Mathis and Freidberg

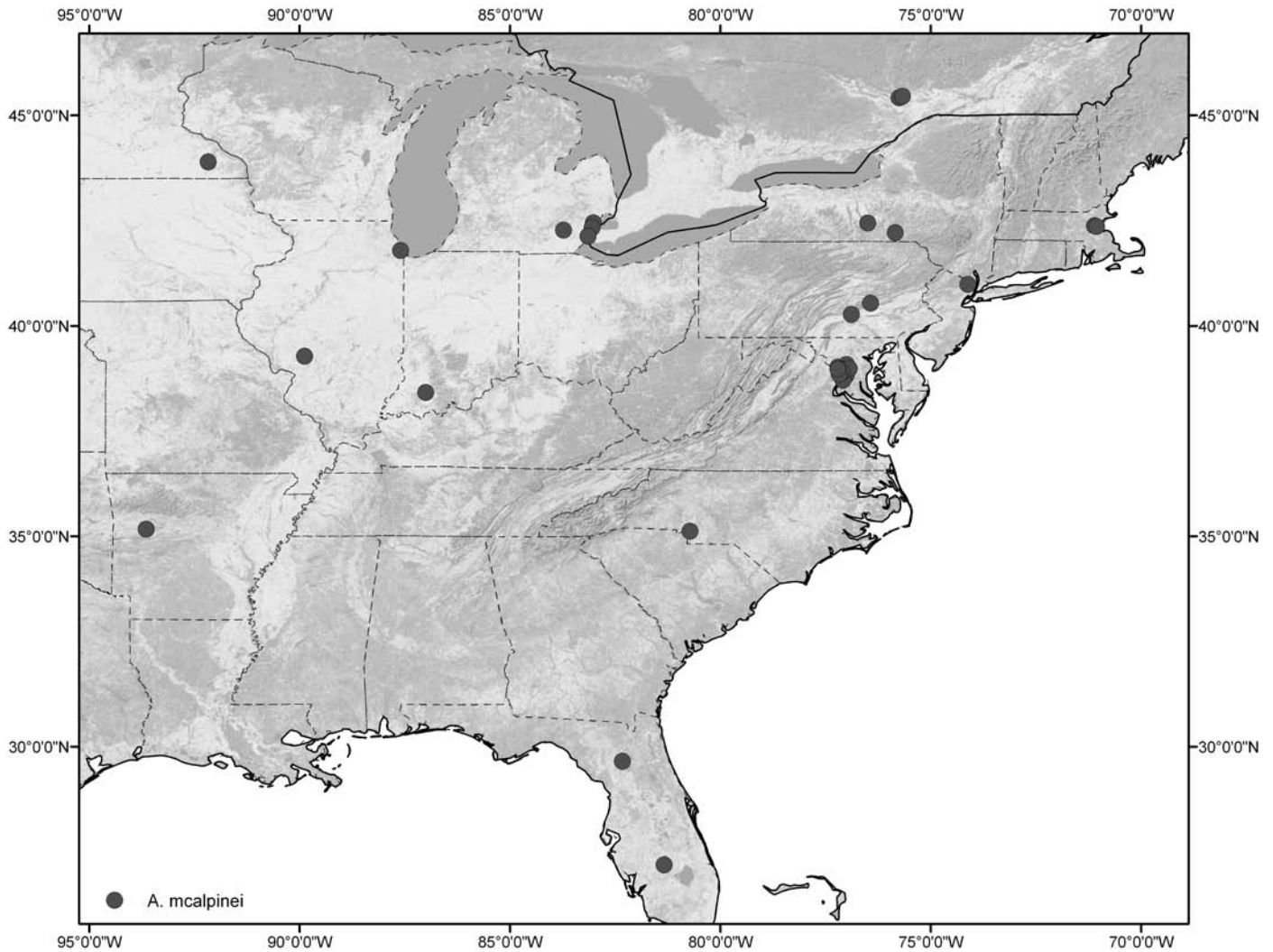
FIGURES 172–182, MAP 16

*Aulacigaster neoleucopeza* Mathis and Freidberg, 1994:586–591 [illustration of head, thorax, and male terminalia].—Papp, 1998a:229, 230–232 [comparison with *A. leucopeza*, illustrations of head and male terminalia], 233 [key to Palearctic species of *Aulacigaster*]; 1998b:280–284 [Manual of Palearctic Diptera].—Bächli et al., 1999:121 [checklist, Switzerland].

**DIAGNOSIS.** This species is distinguished from congeners by the following combination of characters: Posterior fronto-orbital seta slightly internal to and almost horizontally aligned with anterior seta; scutum with weakly defined microtomentose stripes; surstylus moderately long, about 1/3 length of basal margin of epandrium in lateral view.

**DESCRIPTION.** Coloration and vestiture: Vertex mostly densely microtomentose, with a shiny spot extended from ocellus to 1/2–3/4 distance to eye margin; ocellar tubercle dull microtomentose; frons bearing a transverse, large, orange band merging into dark brown ventrally; silver stripe on frons approximately straight; antenna pale





MAP 15. Distribution of *Aulacigaster mcalpinei* (the *leucopeza* group, Nearctic Region).

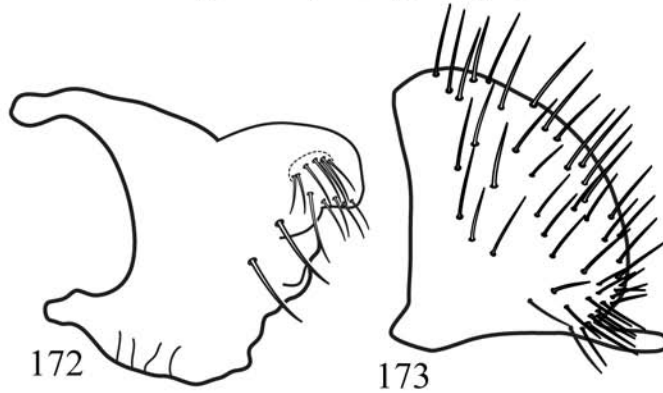
yellow to yellowish, infusate along dorsal margin; face yellow, with a transverse brown mark on dorsal portion; facial band present, sharply defined, transverse, on protruding, ventral portion of face; palpus white. Scutum with weakly defined microtomentose stripes; scutellum dull microtomentose; postpronotum usually concolorous with mesonotum (lighter than mesonotum in more teneral specimens), dull microtomentose; anepisternum mostly dull, often with a semi-lunate, ventral, strongly microtomentose stripe; katepisternum typically with anterior portion dull microtomentose, and posterior portion mostly polished (katepisternum mostly covered with microtomentum in some specimens); halter mostly white (knob and base with brownish marks). Fore coxa brown to black, fore femur brown to black, apex often yellowish; fore tibia brown to

black; fore tarsus yellowish, apical and sometimes subapical tarsomeres brown to black; mid coxa brown to black, mid femur brown to black, apex often yellowish; mid tarsus yellowish, apical and subapical tarsomere brownish to dark brown; hind coxa brown to black, hind femur brown to black, apex often yellowish; hind tarsus yellowish, apical tarsomere brown to black (legs dark yellow to pale brown in more teneral specimens). Male abdomen subshiny to dull; female abdomen with dense microtomentum medially, lateral margins of tergites nearly polished.

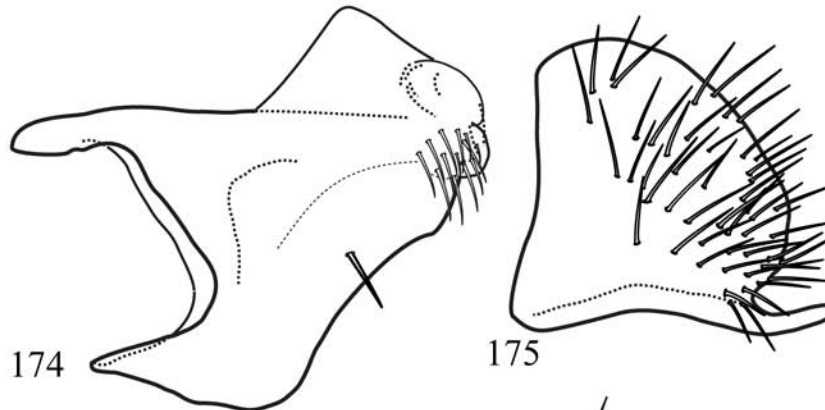
**Morphology:**

**Head:** Head higher than long (head ratio less than 0.9); face at level of pseudovibrissa wider than width of 1st flagellomere, in lateral view with dorsal half concave, ventral portion bulbous; gena in lateral view approximately

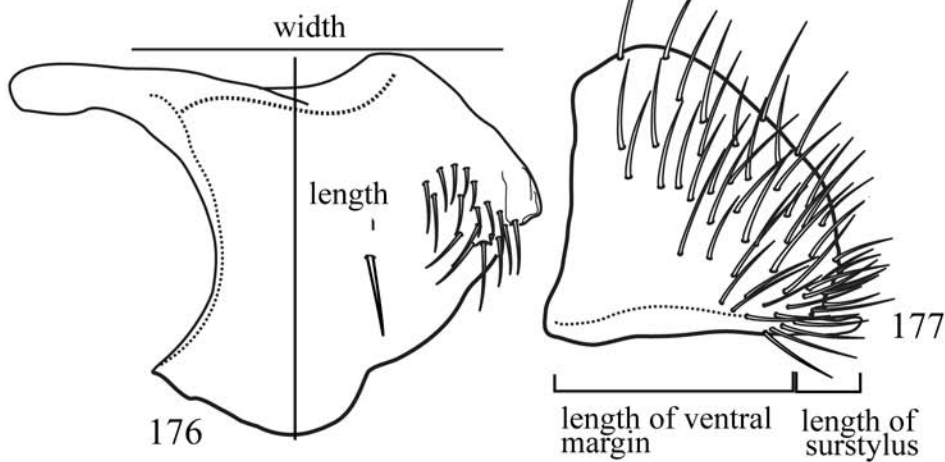
Paratype: MD, Montgomery Co.



CA: El Dorado Co.



CA: Sacramento Co.



FIGURES 172–177. Illustrations of the lateral aspect of the gonopod (left hand side) and epandrium (right hand side) of males of *Aulacigaster neoleucopeza* Mathis and Freidberg (the *leucopeza* group, Nearctic Region) from various localities. (172) paratype, gonopod, lateral aspect (Montgomery County, Maryland); (173) paratype, epandrium, lateral aspect (Montgomery County, Maryland); (174) gonopod, lateral aspect (El Dorado County, California); (175) epandrium, lateral aspect (El Dorado County, California); (176) gonopod, lateral aspect (Sacramento County, California); (177) epandrium, lateral aspect (Sacramento County, California). Not all to the same scale.

1/3–1/2 the width of 1st flagellomere; medial vertical seta 3/4 length of lateral vertical seta; 1 long and 3–4 shorter peristomal setae following pseudovibrissal setae present.

*Thorax:* Acrostichal setae in 1 row, bifurcating posteriorly; scutellum slightly raised (angle with scutum approximately 135°), trapezoidal, apex nearly straight, disk of scutellum slightly convex; basal scutellar seta less than 1/2 length of posterior seta or 1/2 length of posterior seta.

*Male abdomen and terminalia:* Figures 172–182. Surstylus arising from posteroventral margin of epandrium, slender, digitiform, relatively long (0.3–0.5 times length of basal margin of epandrium), tapered toward a round to slightly blunt apex; surstylus in lateral view with or without apex slightly elevated in relation to the basal margin of epandrium; subepandrial sclerite with lateral arms well sclerotized, curved posterolaterally, with slight recurved apices; cerci generally with deep, narrow cleft, fused only on basal 1/4 (fig. 9, Mathis and Freidberg, 1994: 588); gonopod with posterodorsal lobe bearing basal elongate setae, shallow ventrally (about 0.8–0.9 times as long as high), approximately rectangular to tongue-shaped in lateral view.

*Female abdomen and terminalia:* Spermathecae with ventral digitiform projections.

*Measurements:* Body length 1.63–3.0 mm. Wing length 2.0–3.1 mm, wing width 0.8–1.0 mm.

**TYPE MATERIAL.** The holotype male is labeled “USA. M[arylan]D: Montgomery Co., Potomac[,] 23 Jul–23 Aug 1989[,] Amnon Freidberg[,] slime flux on oak/HOLOTYPE ♂ *Aulacigaster neoleucopeza* W. N. Mathis & Freidberg USNM [red; “♂ *Aulacigaster neoleucopeza*” and “Freidberg” handwritten].” Paratypes: Same locality data as the holotype (22♂, 9♀; TAU, USNM). UNITED STATES. Maryland. Prince Georges: Camp Springs (38°48.2'N, 76°54.4'W), 1 Apr 1979, G. F. Hevel (16♂, 7♀; USNM). Virginia. Stafford: Stafford (6.4 km N; 38°32.8'N, 77°24.5'W), 14 Aug 1990, W. N. Mathis (3♂; USNM).

**TYPE LOCALITY.** United States. Maryland. Montgomery: Potomac (39°01.1'N, 77°12.5'W).

**OTHER SPECIMENS EXAMINED.** CANADA. Alberta. Edmonton (53°33'N, 113°30'W), 29 Apr 1924, O. Bryant (6♂, 4♀; CAS, USNM); Elkwater (49°42'N, 110°16'W), 29 May 1955, J. R. Vockeroth (1♀; CNC).

British Columbia. Remo (11.3 km SW Terrace; 54°29.4'N, 128°43.7'W; flowers of *Heracleum*), 6–13 Jun 1960, J. G. Chillcott (1♂, 1♀; CNC).

Manitoba. Ninette (49°25.1.1'N, 99°38'W; flood plain community; bleeding stumps of *Acer negundo*), 5 May 1958, J. F. McAlpine (2♂, 2♀; CNC).

New Brunswick. Kouchibouguac National Park (46°51'N, 64°58'W), 17 May 1977, B. Copper (1♀; CNC).

Ontario. Carp (45°21.8'N, 76°02'W; bleeding maple stump), 22 Apr 1954, J. F. McAlpine (2♂; CNC); Maynooth (45°12.8'N, 77°57'W), 22 Jun 1953, J. F. McAlpine (1♂, 1♀; CNC); Midland (44°45'N, 79°53.4'W), 20 Aug 1955, J. G. Chillcott (1♀; CNC); Ottawa (45°25'N, 75°42'W), 18 Apr–18 Jun 1951, 1983, D. G. F. Cobb, J. F. McAlpine, J. R. Vockeroth (4♂, 4♀; CNC).

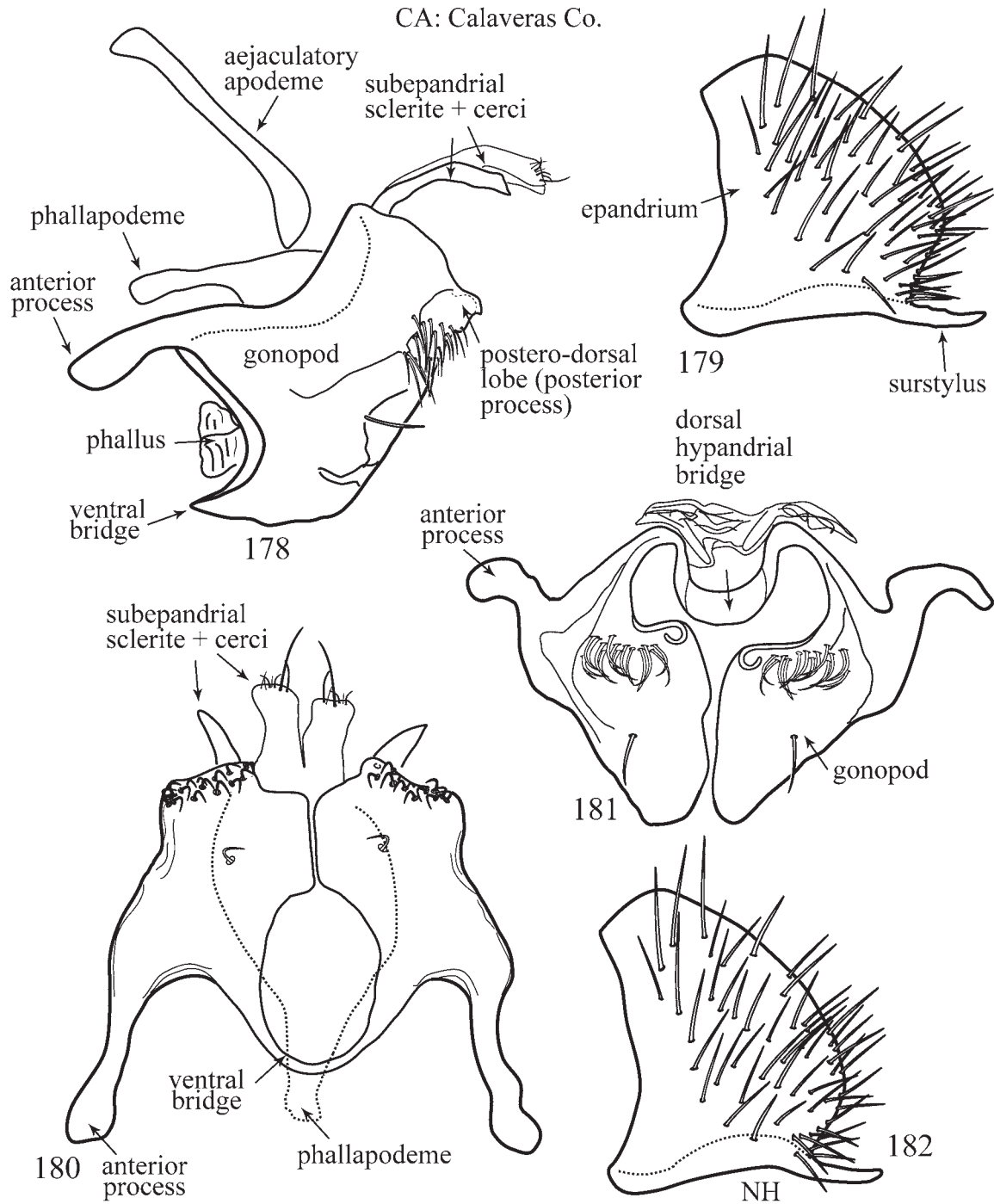
Quebec. Duncan Lake near Rupert (75°46'N, 47°34'W), 31 Jul 1971, J. F. McAlpine (1♀; CNC); La Ferme (46°6.8'N, 76°03'W), 11 Jul 1913, A. Robert (1♀; CNC); Old Chelsea (45°30'N, 75°49'W), 16 Apr–3 May 1939, 1958, G. S. Walley, G. E. Shewell, J. R. Vockeroth (1♂, 2♀; CNC).

Saskatchewan. Maple Creek (49°55'N, 109°29'W), 28 May 1955, J. R. Vockeroth (1♂; CNC).

MEXICO. Baja California: Tecate (32°34'N, 116°38'W; ex *Populus* ooze), 16 Jun 1964, R. Duke (1♂, 1♀; USNM).

Baja California Sur: San José del Cabo (23°09'N, 109°42'W; reared from cottonwood ooze), 6 Nov 1953, R. E. Ryckman, C. C. Lindt (4♂, 1♀; USNM).

UNITED STATES. California. Calaveras: Calaveras Big Trees State Parks (38°15'N, 120°15'W; 4219 feet; banana trap), 8–15 Jul 2005, A. R. Cline (6♂, 9♀; CAS). El Dorado: Blodgett Forest (38°53.2'N, 120°38.9'W; banana bait), 30 Apr 1981, H. Spleth (2♂; CAD). Kern: Kern Canyon (35°27.6'N, 118°46.7'W), Apr 1934, A. H. Sturtevant (1♂, 2♀; USNM); Rosamond (34°51.9'N, 118°09.8'W), 17 Oct 1956, A. H. Sturtevant (2♀; USNM); Tupman (6.4 km E; 35°17.9'N, 119°21'W; Kern River; *Populus* slime flux), 1 Jul 1984, E. M. Fisher (1♂, 1♀; CAS). Los Angeles: Glendora (34°08.2'N, 117°51.9'W), 15 Mar 1929, A. H. Sturtevant (1♀; USNM); Mount Wilson, San Gabriel Mountains (34°17.3'N, 117°38.8'W; 1675 m), 1 Oct 1980, E. Fisher (1♀; CSA). Napa: Moskowite Corner (5.5 km NW; 38°27.5'N, 122°12.3'W; 200 m), Capell Creek (38°45.9'N, 122°12.6'W), 4 Sep 1977, P. H. Arnaud, Jr. (1♂, 1♀; CAS). Orange: San Juan Canyon (33°33.3'N, 117°33.1'W), 22 Jul 1953, A. H. Sturtevant (2♀; USNM). Riverside: Mecca, Cottonwood Spring (33°34.3'N, 116°04.6'W), May 1939, A. H. Sturtevant (2♀; USNM). Sacramento: Sacramento River (pocket area; 38°18.6'N, 121°39.2'W; ex. *Populus*), 20 Jun 2008, A. Rung, M. Hauser (9♂, 3♀; CAS). San Bernardino: Redlands (35°03.3'N, 117°10.9'W), 27 May 1923, F. R. Cole (1♂, 1♀; USNM); South Fork Santa Ana River (34°10.3'N, 116°49.8'W), 2 Jul 1968, P. H. Arnaud, Jr. (1♀; CAS); 29 Palms (34°08.1'N, 116°03.3'W; Oasis Nature Area), 13 Jan 1953, P. H. Arnaud, Jr. (1♂; USNM). San Diego: Alpine (32°50.1'N, 116°46'W; ex.



FIGURES 178–182. Illustrations of *Aulacigaster neoleucopeza* Mathis and Freidberg (male) (the *leucopeza* group, Nearctic Region) from two localities. Figures 178–181 (Calaveras County, California): (178) internal male genitalia, lateral aspect; (179) epandrium, lateral aspect; (180) internal male genitalia, ventral aspect; (181) internal male genitalia, posterior aspect. Figure 182 (Grafton County, New Hampshire): epandrium, lateral aspect. Not all to the same scale.

*Rhus ovata*, 12 May 1959, Moffet (1♀; USNM); Palomar Mountain (33°19.4'N, 116°52.7'W; 1615 m), 23 Jul 1953, A. H. Sturtevant (3♂, 1♀; USNM). Santa Clara: Palo Alto (37°26.7'N, 122°09.6'W), 14 Jun–17 Jul 1921, A. H. Sturtevant (4♂; USNM); Stanford University (37°25.6'N, 122°10.2'W), 7 May 1961, P. H. Arnaud, Jr. (1♀; CAS).

Connecticut. Fairfield: Redding (41°18.1'N, 73°23'W), 31 Mar 1929, A. L. Melander (1♀; USNM).

District of Columbia. Washington (38°49.8'N, 77°00.6'W). 19 Jun–17 Aug, 1913, 1944 (2♂, 1♀; USNM).

Idaho. Bear Lake: Montpelier (3.2 km E; 42°19.3'N, 111°17.9'W), 15 Aug 1981, P. H. Arnaud, Jr. (1♂; CAS).

Illinois. Champaign: Champaign (40°07'N, 88°14.6'W; bleeding elm), 14 Oct 1956, J. F. McAlpine (2♂; CNC); Urbana (40°06.6'N, 88°12.4'W; at light), 20 Apr 1957, J. F. McAlpine (1♂; CNC). Crawford: Flat Rock (38°54.1'N, 87°40.3'W), 1915 (1♂, 3♀; USNM).

Indiana. Tippecanoe: Lafayette (40°25'N, 86°52.5'W), 26 Jul 1916, J. M. Aldrich (1♀; USNM).

Iowa. Story: Ames (42°02.1'N, 93°37.2'W), 1 Apr 1918 (1♀; USNM). Webster: Lehigh (42°21.6'N, 94°03.1'W), 15 Apr 1955, D. M. Norris (1♀; USNM).

Kansas. Douglas: Lawrence (38°58.3'N, 95°14.1'W), 22 Jun 1922, C. H. Curran (1♂, 2♀; CNC).

Maryland. Montgomery: Bethesda (38°58.8'N, 77°06'W), 27 Jul 1965, G. C. Steyskal (4♂, 3♀; USNM); Colesville (39°04.8'N, 77°00.1'W), 14 Jun 1977, W. W. Wirth (1♀; USNM); Glen Echo (38°58.1'N, 77°08.4'W), 6 Aug 1922, J. R. Malloch (1♂; USNM); Plummers Island (38°58.2'N, 77°10.6'W), 3 Aug 1912 (8♂, 5♀; USNM). Prince Georges: Marlboro, May 1913, H. S. Barber (1♀; USNM).

Massachusetts. Barnstable: Woods Hole (41°31.5'N, 70°40.3'W), Jul–20 Sep 1922, A. H. Sturtevant (7♂, 8♀; USNM). Dukes: Naushon Island (41°29'N, 70°45.5'W), 30 Jul 1922, A. H. Sturtevant (1♀; USNM). Middlesex: Cambridge (42°22.5'N, 71°06.3'W), 15 Jul 1981, N. E. Woodley (1♀; USNM).

Michigan. Wayne: Detroit (42°19.9'N, 83°02.8'W), 13 Apr–18 Jul 1938, 1942, 1943, G. C. Steyskal (4♂, 2♀; USNM); Grosse Isle (42°07.7'N, 83°08.7'W), 11 Jul 1948, G. C. Steyskal (1♀; USNM).

Minnesota. Clearwater: Itasca State Park (47°11.9'N, 95°12.1'W), 15 Jul 1952 (1♂, 1♀; AMNH).

Nevada. Washoe: Verdi, Crystal Peak Park (39°30.9'N, 119°59.7'W; 1480 m), 28 Jul 1973, P. H. Arnaud, Jr. (1♂; CAS).

New Hampshire. Grafton: Hanover (43°42.1'N, 72°17.4'W), 31 Aug 1916, A. H. Sturtevant (1♂; USNM). Hillsborough: Nashua, Long Hill (42°43'N; 71°27.1'W; 20 m; Malaise trap), 27 Jun 2004, S. D. and A. V. Gaimari (1♀; CAS).

New Jersey. Morris: Morristown (40°47.8'N, 74°28.9'W), 9 Apr 1922, A. H. Sturtevant (2♀; USNM).

New Mexico. Otero: Cloudcroft (32°57.4'N, 104°44.5'W; *Pinus ponderosa*), E. J. Hay (1♂; USNM); Lincoln National Forest, Sacramento Mountains (32°50'N, 105°48'W; 1795 m; Malaise trap), 13–15 Jun 2007, S. D. Gaimari (1♂; CAS).

New York. Broome: Chenango Valley State Park (42°12.8'N, 75°50.5'W), 15 Apr–6 May 1982, D. A. Grimaldi (1♂, 2♀; AMNH). Tompkins: Brown Farm, Caroline Center (1 km S; maple sap flux), 19 Apr 1986 (1♀; AMNH); Ithaca (42°26.6'N, 76°30.2'W), 15 Apr 1913, H. Morrison (2♀; USNM); Trumansburg (42°32.5'N, 76°40'W; maple sap flux), 16–22 Jun 1983, D. A. Grimaldi (1♂; AMNH).

Oregon. Jackson: Trail (42°38.9'N, 122°48.6'W), 20 Aug 1951, A. H. Sturtevant (2♂; USNM). Union: Lick Creek (45°07.8'N, 117°37.8'W; 45 km SE Union; 1305 m; sap flow), 23 Apr 1977, R. S. Zack (1♂; USNM). Wallowa: Elgin (45°35'N, 117°55'W; 35.4 km N; *Alnus* seep), 20 May 1977, E. S. Davis (1♀; USNM).

Pennsylvania. Dauphin: Harrisburg (40°16.4'N, 76°53.1'W; sap flux on *Ulmus*), 15 Apr–19 Jul, K. R. Valley (3♂; PDA). Philadelphia: Roxborough (40°02.6'N, 75°13.3'W), 30 Apr 1910 (2♂; USNM).

South Dakota. Brule: Chamberlain (43°48.6'N, 99°19.8'W), 25 Jun 1948, A. H. Sturtevant (1♂, 3♀; USNM).

Utah. Cache: Logan Canyon, Bunchgrass Creek (41°53.5'N, 111°33.9'W), 8–19 Aug 1986, W. J. Hanson, G. Knowlton (1♀; USU); Turner Campground (41°53.1'N, 111°34.4'W), 10–20 Jun 1985, W. J. Hanson (3♂, 4♀; USU), Mendon Cold Spring (41°42.6'N, 111°58.7'W), Jun–Jul 1977, W. J. Hanson, G. Knowlton (2♂, 9♀; USU); West Hodges Canyon (41°55'N, 111°25'W; Malaise trap), 6–13 Jun 1980, Jul 1978 (1♂, 3♀; USU). Garfield: Capitol Reef National Park, Sulphur Creek (38°17.5'N, 111°15'W; Malaise trap), 28 Jul 1978, Lindhal (2♀; USU). Juab: Mountain Nebo, Red Creek (39°45.7'N, 111°42.7'W; Malaise trap), 4–19 Aug 1977 (1♂, 1♀; USU). Kane: Chamb Ranch (37°22.7'N, 112°51.3'W), 24 Jul 1981, C. R. Nelson (1♀; USU). Utah: Provo (40°14.7'N, 111°38.7'W; Malaise trap), Jun–Jul 1985 (2♀; USU). Uintah: Bonanza (SW; 40°01.3'N,

109°10.6'W; 1525–1710 m; TIOS R24E), 15 May 1981 (1♀; USU). Washington: Beaver Dam Wash, Lytle Ranch Pres. (38°53.7'N, 113°55.3'W), 6–19 Aug 1987, W. J. Hanson (2♀; USU); Leeds Canyon (37°13'N, 113°24'W), 13–16 Sep 1984, W. J. Hanson, Joussef (1♂; USU); Zion National Park (37°18'N, 113°03'W), 7 Jun 1934, A. H. Sturtevant (3♂, 1♀, 1ex; USNM).

Vermont. Orange: Fairlee (43°54.5'N, 72°08.6'W), 5 Aug 1956, A. H. Sturtevant (1♂; USNM). Windsor: Mad Brook Farm, E Charleston (44°50.6'N, 71°59.4'W), 15–25 Jul 1982, D. A. Grimaldi (2♂; AMNH).

Virginia. Fairfax: Dead Run (38°58'N, 77°10.3'W), R. C. Shannon (8♂, 9♀; USNM); Mt. Vernon (38°42.5'N, 77°05.2'W; on tree trunk), 22 Aug 1976, P. H. Arnaud, Jr. (1♀; CAS); Turkey Run (mouth; 38°57.9'N, 77°09.4'W), 4 May 2006, D. and W. N. Mathis (2♂; GWMP, USNM).

Washington. Walla Walla: Walla Walla, Mill Creek (46°02.3'N, 118°28.7'W), 2–6 Jul 1922, V. N. Argo, A. L. Melander (16♂, 8♀; USNM).

Wisconsin. Dane (43°04.8'N, 89°23.2'W): 29 Apr 1951, R. H. Jones (1♂; USNM).

**DISTRIBUTION.** (Map 16) Nearctic: Canada (Alberta, British Columbia, Manitoba, New Brunswick, Ontario, Quebec, Saskatchewan), Mexico (Baja California, Baja California Sur), United States (California, Connecticut, District of Columbia, Idaho, Illinois, Indiana, Iowa, Kansas, Massachusetts, Maryland, Michigan, Minnesota, Nevada, New Hampshire, New Jersey, New Mexico, New York, Oregon, Pennsylvania, South Dakota, Utah, Vermont, Virginia, Washington, Wisconsin).

**BIOLOGY.** This species has been collected on wounds and fluxes from the following genera of deciduous trees: *Acer*, *Alnus*, *Pinus*, *Platanus*, *Populus*, *Quercus*, and *Salix*. Davis and Zack (1978) reared adults from larvae that were in seeps of a wounded Douglas fir (*Pseudotsuga menziesii* (Mirbel) Franco). Bächli et al. (1999) collected this species in Europe using beer/wine traps.

**REMARKS.** Mathis and Freidberg's illustration of the internal male terminalia of this species (1994:588, fig. 8) does not show a "ventral gonial bridge," which the authors correctly recognized as being present and described as "straight or slightly indented posteriorly." The "ventral gonial bridge" is an anteroventral connection between the 2 halves of the hypandrium + gonopod and is present in all aulacigastrids. Slight changes in the position of the internal male structures, however, may conceal this character. Moreover, the "ventral gonial bridge" may look slightly different, depending on the condition of the preparation of the male terminalia. For this reason, we have not chosen to describe this feature here, as did Mathis and Freidberg (1994), but

we do provide illustrations of the gonopod from a position that shows the gonopodal bridge (Figures 172, 174, 176).

This widely occurring species has the widest range of variation among congeners, and it is possible that this species represents a species complex. Even though we have found some variation in the size and shape of the shiny spot adjacent to the ocellar tubercle, extent of microtomentum over the katepisternum, darkness of the legs and postpronotum, slight variations in the size and shape of the surstylus, shape of the gonopod and posterodorsal gonopodal lobe, and the length of the cleft between the cerci, we have chosen a conservative approach and have not recognized additional species. The observed variation does not show any consistency that would allow for clear separation between forms. Perhaps with use of molecular evidence or information from behavior, immature stages or the female internal genital tract, additional species will be recognized.

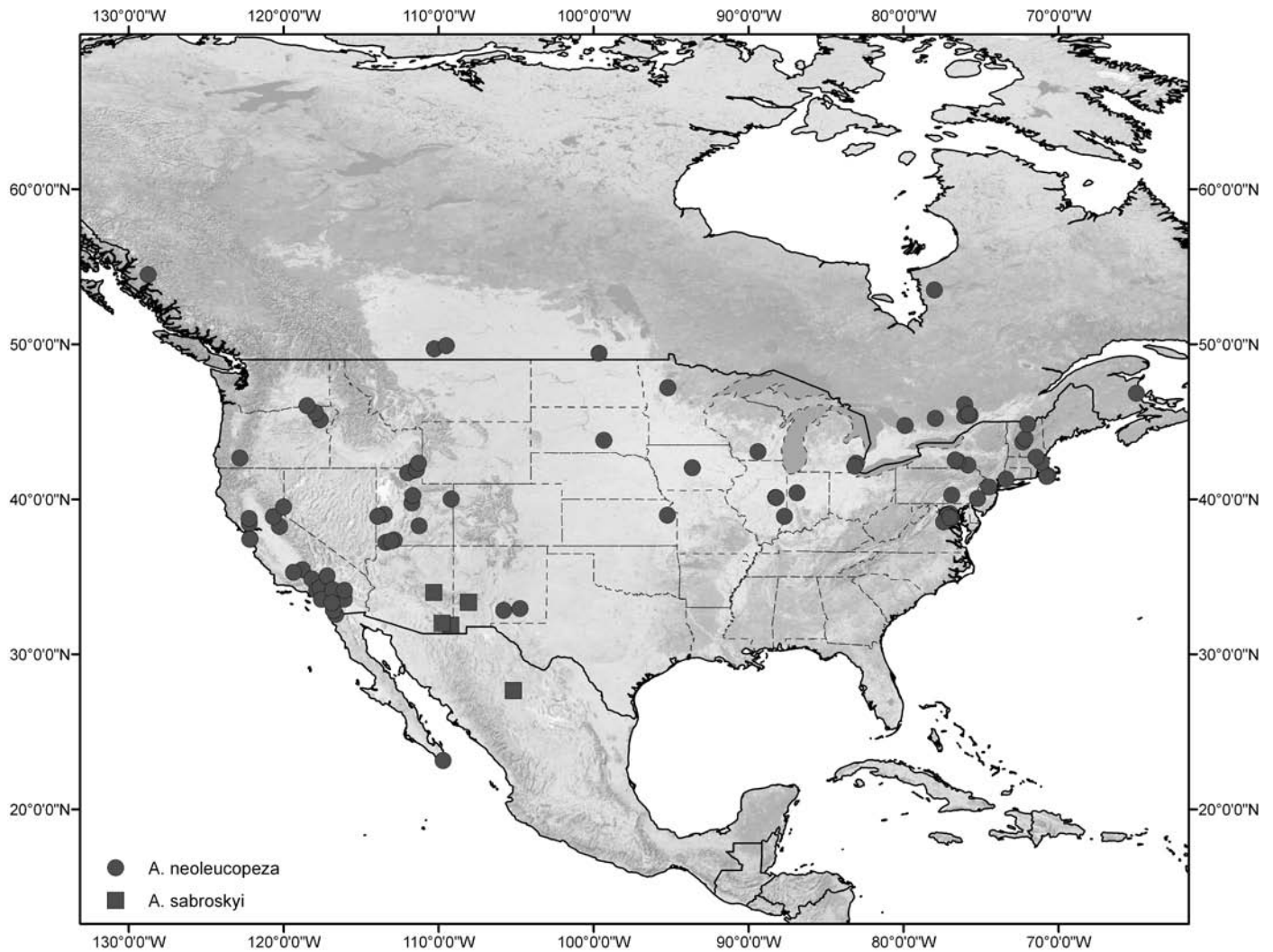
### *Aulacigaster sabroskyi* Mathis and Freidberg

FIGURES 183–184, MAP 16

*Aulacigaster sabroskyi* Mathis and Freidberg, 1994:591–593 [illustration of male terminalia and spermathecae].

**DIAGNOSIS.** This species is distinguished from congeners by the following combination of characters: Posterior fronto-orbital seta slightly internal to and almost horizontally aligned with anterior seta; katepisternum mostly microtomentose, with a shiny area posteriorly, below the posterior katepisternal seta; surstylus short, less than 0.2 times length of basal portion of epandrium in lateral view.

**DESCRIPTION.** Coloration and vestiture: Vertex mostly densely microtomentose, with a shiny spot extended from ocellus to 2/3 distance to eye margin; ocellar tubercle dull microtomentose; frons bearing a transverse, large, orange band, frontal orange band merging into dark brown ventrally; silver stripe on frons approximately straight; antenna pale yellow to yellowish, infuscate along dorsal margin; face yellow, with a transverse brown mark on dorsal portion; facial band present, sharply defined, transverse, on protruding, ventral portion of face; palpus white. Scutum with weakly defined microtomentose stripes; scutellum dull microtomentose; postpronotum concolorous with mesonotum, dull microtomentose; anepisternum mostly dull; katepisternum mostly microtomentose, with a shiny area posteriorly, below the posterior katepisternal seta; halter mostly white. Fore coxa brown to black, fore femur brown to black, fore tibia brown to black; fore tarsus yellowish,



MAP 16. Distribution of *Aulacigaster neoleucepeza* and *A. sabroskyi* (the *leucepeza* group, Nearctic Region).

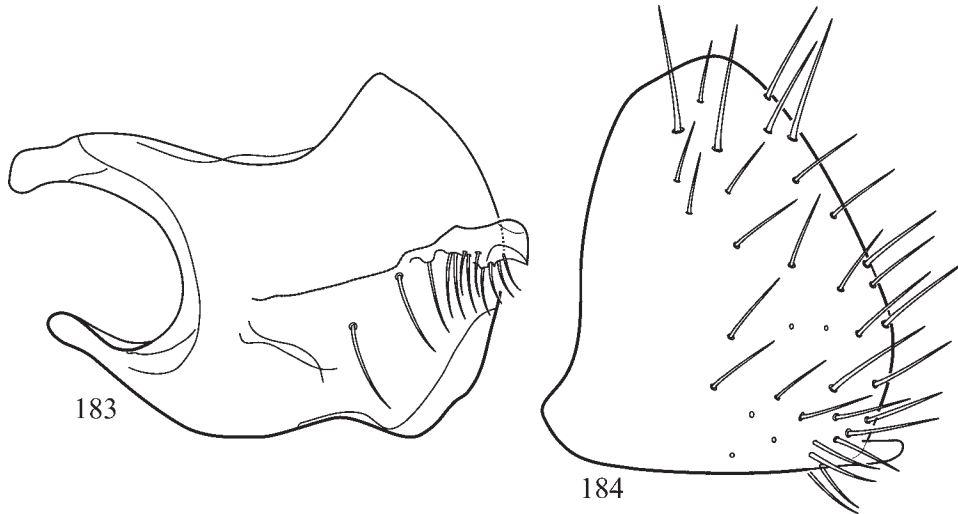
apical and sometimes subapical tarsomeres brown to black; mid coxa brown to black, mid femur brown to black, mid tibia brown to black, mid tarsus yellowish, apical and subapical tarsomere brownish to dark brown; hind coxa brown to black, hind femur brown to black, hind tibia brown to black, hind tarsus yellowish, apical tarsomere brown to black. Male abdomen subshiny to dull, pregenital segment polished posteriorly, dull anteriorly; female abdomen with dense microtomentum medially, lateral margins of tergites nearly polished.

**Head:** Head higher than long (head ratio less than 0.9); face at level of pseudovibrissa wider than width of 1st flagellomere, in lateral view with dorsal half concave, ventral portion bulbous; gena in lateral view approximately

1/3–1/2 the width of 1st flagellomere; medial vertical seta 3/4 length of lateral vertical seta; 1 long and 3–4 shorter peristomal setae following pseudovibrissal setae present.

**Thorax:** Acrostichal setae in 1 row, bifurcating posteriorly; scutellum slightly raised (angle with scutum approximately 135°), trapezoidal, apex nearly straight, disk of scutellum slightly convex; basal scutellar seta 1/2 length of posterior seta.

**Male abdomen and terminalia:** Figures 183–184. Surstylus arising from posteroventral margin of epandrium, slender, digitiform, relatively short; subepandrial sclerite (fig. 13; Mathis and Freidberg, 1994:591) with lateral arms narrow, well sclerotized, more or less parallel sided, curved evenly posteriorly; cerci fused on basal 1/2; gonopod (fig.



FIGURES 183–184. Illustrations of *Aulacigaster sabroskyi* Mathis and Freidberg (male) (the *leucopeza* group, Nearctic Region). (183) gonopod, lateral aspect; (184) epandrium, lateral aspect.

12; Mathis and Freidberg, 1994: 591) with a small pointed process posterodorsally, approximately rectangular in lateral view.

**Measurements:** Body length 2.0–2.4 mm. Wing length 2.0–2.4 mm, wing width 0.7 mm.

**TYPE MATERIAL.** The holotype male is labeled “ARIZ.: Portal 4800 ft. vi-5–13 Sept.[crossed out] 1967 [“vi-5-” and “7” of 1967 handwritten]/CWSabrosky collector/At bleeding sap, cottonwood/HOLOTYPE ♂ *Aulacigaster sabroskyi* W.N.Mathis&Freidberg USNM [red; “♂ *Aulacigaster sabroskyi*” and “Freidberg” handwritten].” Paratypes: MEXICO. Chihuahua: Camargo (27°40’N, 105°10’W; wound in poplar tree), 30 May 1964, J. F. McAlpine (1♀; CNC). UNITED STATES. Arizona. Cochise: Portal (31°53’N, 109°12.2’W; at bleeding sap, cottonwood; 1463 m), 5 Jun 1967, C. W. Sabrosky (8♂, 2♀; USNM, TAU); Portal (31°53’N, 109°12.2’W; slime flux on tree), 17

May 1973, C. W. Sabrosky (5♂, 2♀; USNM); Portal, Turkey Creek (31°59.9’N, 109°45.1’W; 1950 m), 18 May 1973, C. W. Sabrosky (1♂; USNM). Gila: Carrizo (33°59.6’N, 110°17.3’W), 26 Sep 1954, A. H. Sturtevant (1♂; USNM).

New Mexico. Catron: Whitewater Canyon (33°21.6’N, 108°03.9’W; ulcer on Sycamore tree), 1 Jun 1972, W. W. Wirth (3♂, 3♀; USNM).

**TYPE LOCALITY.** United States. Arizona. Cochise: Portal (31°54.5’N, 109°08.8’W).

**DISTRIBUTION.** (Map 16) Nearctic: Mexico (Chihuahua), United States (Arizona, New Mexico).

*Neotropical Species*

**DISCUSSION.** The Neotropical fauna of the *leucopeza* group comprises three species of which all are described here.

**Key to the Neotropical Species of the *leucopeza* Group of *Aulacigaster***

1. Frons bearing a horizontal, unusually large, orange band extended beyond base of anterior ocellus medially [Figure 185]; face in lateral view dorsoventrally projected, ventral portion of face not retracted; facial band unusually wide, ~1/3 length of 1st flagellomere [Figure 186] ..... *A. L2*, undescribed species  
 Frons at most with a narrower, orange-brown transverse band [as in Figure 217]; ventral portion of face retracted [Figure 216] ..... 2
2. Frons yellowish-orange on central portion, merging with black along lateral margins; facial band absent [Figures 215–216]; cephalic and thoracic setae not unusually long ..... *A. spangleri*, new species  
 Frons with a transverse, narrow, orange-brown band; facial band present; cephalic and thoracic setae relatively long ..... *A. L1*, undescribed species



***Aulacigaster spangleri*, new species**

FIGURES 215–216, MAP 17

**DIAGNOSIS.** This species is distinguished from congeners by the following combination of characters: Frons yellowish-orange on central portion, merging with black along lateral margins; arista with inconspicuous, alternate hairs, appearing naked.

**DESCRIPTION.** Coloration and vestiture: Vertex mostly polished, with a densely microtomentose stripe posterior to ocellar tubercle; ocellar tubercle dull microtomentose; frons yellowish-orange centrally, merging with black along lateral margins; silver stripe on frons approximately semi-lunate; antenna pale yellow to yellowish, not infuscate dorsally; face brownish; facial band absent; palpus white. Scutellum dull microtomentose; postpronotum concolorous with mesonotum, scarcely microtomentose, subshiny; anepisternum polished; katepisternum mostly polished; halter mostly white. Fore coxa brown to black, fore femur brown, fore tibia brown, fore tarsus yellowish, apical and sometimes subapical tarsomeres brown to black; mid coxa brown to black, mid femur brown (base and apex yellowish), mid tibia yellowish, mid tarsus mostly yellowish; hind coxa yellow, hind femur brown to black on central portion, apex and base yellowish (base yellowish), hind tibia brown to dark brown, hind tarsus yellowish, apical tarsomere brown to black. Abdomen with a large, white to yellowish region on syntergite 1+2, male abdomen subshiny to dull; female abdomen with dense microtomentum over anterior margin of tergites, posterior margin of tergites bright shiny.

**Morphology:**

**Head:** Figures 215–216. Head higher than long (head ratio less than 0.9); face at level of pseudovibrissal seta wider than width of 1st flagellomere, in lateral view with dorsal half concave, ventral portion bulbous; gena in lateral view approximately 1/3–1/2 the width of 1st flagellomere; peristomal area with 1 long and about 4 shorter setae following pseudovibrissal seta.

**Thorax:** Acrostichal setae in 2 rows; scutellum slightly raised (angle with scutum approximately 135°), trapezoidal, apex nearly straight, disk of scutellum slightly convex; basal scutellar seta 1/2 length of posterior seta. Costal vein of male bearing a few tiny, but conspicuous spines.

**Male abdomen and terminalia:** Surstylus arising from posteroventral margin of epandrium, slender, approximately triangular, bearing setae (with a long terminal seta), relatively long; cerci broad, plate-like, bearing short setae, none especially elongate (observations made without dissecting abdomen).

**Measurements:** Body length 2.2 mm. Wing length 2.3 mm, wing width 0.8 mm.

**TYPE MATERIAL.** The holotype male is labeled “COSTA RICA[,] Turrialba[,] VII-15-19-65 [15–19 Jul 1965] P. J. Spangler/HOLOTYPE ♂ *Aulacigaster spangleri* Rung & Mathis USNM [red].” The holotype is double mounted (minuten in a block of polyporus), is in good condition (vertical, scutellar and mesonotal setae broken, wings slightly folded), and is deposited in the USNM. A paratype is as follows: Same label data as the holotype (1♀, USNM).

**TYPE LOCALITY.** Costa Rica. Cartago: Turrialba (09°54'N, 83°41'W).

**DISTRIBUTION.** (Map 17) Costa Rica (Cartago).

**ETYMOLOGY.** The specific epithet, *spangleri*, is a genitive patronym to honor and recognize the friendship and numerous contributions of Dr. Paul J. Spangler to entomology.

**REMARKS.** The holotype is precariously pinned, and removal of the abdomen would probably break what remains of this fragile specimen. Thus, we have opted not to dissect this specimen.

***Aulacigaster* L1, undescribed species**

MAP 17

**DIAGNOSIS.** This species is distinguished from congeners by the following combination of characters: Frons with a dark, orange, narrow stripe infuscated with brown; cephalic and thoracic setae relatively long.

**DESCRIPTION.** Coloration: Vertex mostly polished (microtomentose around vertical setae); ocellar tubercle dull microtomentose; frons with a transverse, narrow, orange-brownish stripe; silver stripe on frons approximately straight, bright shiny; antenna pale yellow to yellowish, not infuscate dorsally; face yellow, with a transverse brown mark on dorsal portion; facial band present, sharply defined, transverse, on protruding, ventral portion of face; palpus white. Scutellum dull microtomentose; postpronotum concolorous with mesonotum, dull microtomentose; anepisternum polished; katepisternum mostly polished; halter mostly white. Fore coxa brown to black, fore femur brown, fore tibia brown, fore tarsus yellowish, apical and sometimes subapical tarsomeres brown to black; mid coxa brown to black, mid femur brown on central portion, apex and base yellowish, mid tibia yellowish-brownish, mid tarsus yellowish, apical and subapical tarsomere brownish to dark brown; hind coxa brown, hind femur brown to black on central portion, apex and base yellowish, hind tibia

yellowish, hind tarsus yellowish, apical tarsomere brown to black. Male abdomen subshiny to dull.

**Morphology:**

**Head:** Head higher than long (head ratio less than 0.9); face at level of pseudovibrissal seta wider than width of 1st flagellomere, in lateral view with dorsal half concave, ventral portion bulbous; gena in lateral view approximately 1/3–1/2 the width of 1st flagellomere; cephalic and thoracic setae relatively long; ocellar seta very thin, but long, 1/3 length of fronto-orbital setae; medial vertical seta 3/4 length of lateral vertical seta; peristomal area with about 3 setae following pseudovibrissal seta.

**Thorax:** Acrostichal setae in 2 rows; scutellum slightly raised (angle with scutum approximately 135°),

approximately triangular, apex relatively pointed, disk of scutellum slightly convex; basal scutellar seta 3/4 length of posterior seta.

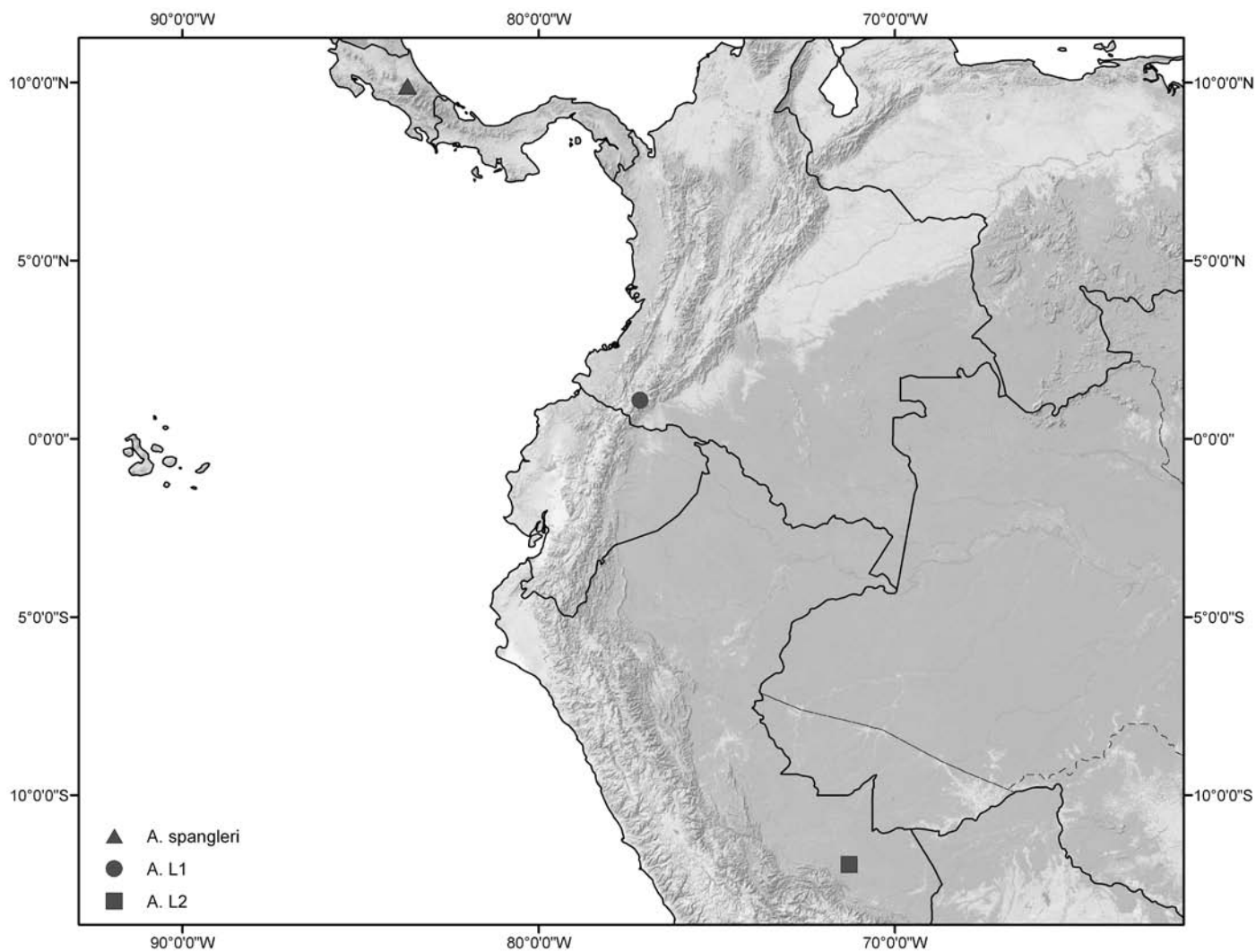
**Male abdomen and terminalia:** Cerci bearing short setae, none especially elongate.

**Measurements:** Body length 3.5 mm. Wing length 3.1 mm, wing width 1.3 mm.

**MATERIAL EXAMINED.** COLOMBIA. Nariño, Laguna, La Cocha (01°05'N, 77°09'W), 26 Sep 1971, Gebohart (1♂; USNM).

**DISTRIBUTION** (Map 17) Neotropical: Colombia (Nariño).

**REMARKS.** We have decided not to name this species because there is only one specimen available and the



MAP 17. Distribution of the Neotropical species of the *leucopeza* group of *Aulacigaster* (Nearctic Region).

surstylus was damaged during dissection of the epandrium. Therefore, this important structure cannot be described.

### ***Aulacigaster* L2, undescribed species**

FIGURES 185–186, MAP 17

**DIAGNOSIS.** This species is distinguished from congeners by the following combination of characters: Arista short, with very inconspicuous, alternate hairs (arista appearing naked at low magnification); face in lateral view dorsoventrally projected, ventral portion of face not receded.

**DESCRIPTION.** Coloration and vestiture: Vertex mostly polished, with a densely microtomentose spot posterior to ocellar tubercle; ocellar tubercle dull microtomentose; frons bearing a transverse, unusually large, orange band extended beyond anterior ocellus medially, frontal orange band merging into dark brown ventrally; silver stripe on frons approximately straight, bright shiny; antenna pale yellow to yellowish, infuscate along dorsal margin; face yellow dorsally, brown ventrally; facial band present, unusually broad (about 1/3 length of 1st flagellomere), sharply defined, transverse, on protruding, ventral portion of face; palpus white. Scutum strongly microtomentose medially, polished between pleural region and dorsocentral row of setae, posterior of postpronotum; scutellum dull microtomentose; postpronotum concolorous with mesonotum, dull microtomentose; anepisternum mostly dull; katepisternum with anterior portion dull microtomentose, and posterior portion mostly polished; halter mostly white (knob with dark mark). Fore coxa brown to black, fore femur brown, fore tibia yellowish-brownish,

fore tarsus yellowish, apical and sometimes subapical tarsomeres brown to black; mid coxa brown to black, mid femur brown to black, apex yellowish, mid tibia yellowish-brownish, mid tarsus yellowish, apical and subapical tarsomere brownish to dark brown; hind coxa brown, hind femur brown to black, apex yellowish, hind tibia brown to dark brown (tip yellowish), hind tarsus yellowish, apical tarsomere brown to black. Female abdomen with dense microtomentum medially, lateral margins of tergites nearly polished (tergite 6 mostly polished).

#### **Morphology:**

**Head:** Figures 185–186. Head round, about as high as long (head ratio 0.9–1.1); face at level of pseudovibrissal seta wider than width of 1st flagellomere, in lateral view projected dorsoventrally, ventral portion of face not receded; ocellar seta very thin, but 2/3 of fronto-orbital setae; medial vertical seta 3/4 length of lateral vertical seta.

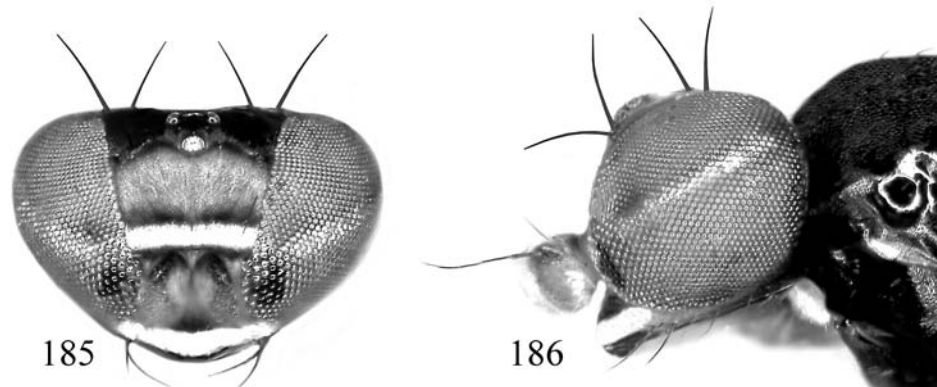
**Thorax:** Acrostichal setae in 2 rows; scutellum strongly raised (angle with scutum less than 135°), triangular, apex strongly pointed; basal scutellar seta 1/2 length of posterior seta.

**SPECIMENS EXAMINED.** PERU. Madre de Dios: Rio Manu, Pakitza (11°56.6'S, 71°16.9'W; 250 m), 9–23 Sep 1988, A. Freidberg (1♀; USNM).

**Measurements:** Body length 2.2 mm. Wing length 2.0 mm, wing width 0.7 mm.

**DISTRIBUTION.** (Map 17) Neotropical: Peru (Madre de Dios).

**REMARKS.** In addition to the characters cited in the diagnosis, this species is peculiar among the Neotropical species of the *leucopeza* group in having a wide, orange band on the anterior portion of frons. This species was not named because it is represented by a single female.



FIGURES 185–186. Photographs of *Aulacigaster* L2, undescribed species (female) (the *leucopeza* group, Neotropical Region). (185) head, frontal aspect; (186) head, lateral aspect.

*Palaearctic Species*

**DISCUSSION.** The Palaearctic fauna includes four named species, all in the *leucopeza* group. Papp (1998a:233) provided a key to the Palaearctic species of *Aulacigaster* that

included four species, one of which, *A. neoleucopeza* Mathis and Papp, was later recognized by Kassebeer (2001) as a distinct species, *A. pappi*. Kassebeer (2001:30) provided a key to the species from Germany.

**Key to the Palaearctic Species of *Aulacigaster***

1. Frontal orange band higher than 1/2 distance of lunule to anterior ocellus. Postpronotum yellow to pale brown, lighter in color than rest of mesonotum. Epanthrium densely setose . . . . . 2  
Frontal orange band shorter than 1/2 distance of lunule to anterior ocellus. Postpronotum concolorous with mesonotum. Epanthrium not densely setose . . . . . 3
2. Frons posterior of fronto-orbital setae completely shiny. Surstylus digitiform (fig.1; Papp, 1998a: 227) . . . . . *A. afghanorum* Papp  
Frons posterior of fronto-orbital setae at least partly microtomentose, with a shiny spot extended from ocellus to near eye margin (shiny spot separated from eye margin by a distance less than the width of one ocellus). Surstylus sickle-shaped . . . . . *A. falcata* Papp
3. Shiny spot on vertex extended from ocellar tubercle to near eye margin (shiny spot separated from eye margin by a distance that is approximately equal to the width of one ocellus). Surstylus shorter, ~0.2 times the length of ventral margin of epanthrium, tapered to a blunt apex (fig. 2d; Kassebeer, 2001:31) . . . . . *A. pappi* Kassebeer  
Shiny spot on vertex smaller, extended from ocellus to 1/2 distance to eye margin. Surstylus longer, nearly 0.3–0.4 times the length of ventral margin of epanthrium, slightly tapered to a rounded apex . . . . . *A. leucopeza* Meigen

***Aulacigaster afghanorum* Papp**

*Aulacigaster afghanorum* Papp, 1998a:226, 227–229 [figures of male terminalia]; 1998b:279–284 [Manual of Palaearctic Diptera].

**DIAGNOSIS.** This species is distinguished from congeners by the following combination of characters: Frons shiny, microtomentum absent posterior of fronto-orbital setae; abdomen completely dark brown to black; posterior fronto-orbital seta slightly medial to and almost horizontally aligned with anterior seta; surstylus slender, approximately digitiform, making a wide angle with anterior margin of epanthrium.

**DESCRIPTION.** Coloration and vestiture: Vertex sparsely microtomentose, frons posterior of fronto-orbital setae completely shiny; ocellar tubercle dull microtomentose; frons bearing a transverse, large, orange band, frontal orange band higher than 1/2 distance of lunule to anterior ocellus, merging into dark brown ventrally; silver stripe on frons approximately straight; antenna pale yellow to yellowish, not infuscate dorsally; face yellow, with a transverse brown mark on dorsal portion; facial band present, sharply defined, transverse, on protruding, ventral portion of face; palpus yellowish. Scutellum dull microtomentose; postpronotum yellow to yellowish-brownish, dull microtomentose; anepisternum mostly dull; katepisternum subshiny to dull; halter mostly yellowish. Fore coxa brown to black, fore

femur brown or brown to black, apex yellowish, fore tibia brown, fore tarsus brown to dark brown, basal tarsomere yellow; mid coxa brown to black, mid femur brown, mid tibia brownish, mid tarsus yellowish, apical and subapical tarsomere brownish to dark brown; hind coxa brown, hind femur brown, hind tibia brown to dark brown, hind tarsus yellowish, apical tarsomere brown to black. Male abdomen subshiny to dull, pregenital segment mostly polished. Epanthrium mostly dark brown to black.

**Morphology:**

**Head:** Higher than long (head ratio less than 0.9); face at level of pseudovibrissa wider than width of 1st flagellomere, in lateral view with dorsal half concave, ventral portion bulbous; gena in lateral view approximately 1/3–1/2 the width of 1st flagellomere; ocellar seta minute; medial vertical seta 3/4 the length of lateral vertical seta; fronto-orbital setae with posterior seta internal to and almost horizontally aligned with anterior seta; peristomal vestiture consisting of relatively well-developed setae; peristomal area with about 3–4 setae following pseudovibrissal seta.

**Thorax:** Acrostichal setae in 2 rows; scutellum slightly raised (angle with scutum approximately 135°), trapezoidal, apex nearly straight, disk of scutellum slightly convex; basal scutellar seta 1/2 the length of posterior seta.

**Male abdomen and terminalia:** Epanthrium densely setose. Surstylus arising from posteroventral margin of

epandrium, slender, digitiform, relatively long (approx. 0.4 times the length of ventral margin of epandrium) (fig. 1; Papp, 1998a:227); subepandrial sclerite (fig. 9; Papp 1998a:229) with lateral arms spread sideways, with a beak-shaped apex; cerci broad, parallel-sided, with apex setose and lacking well-differentiated setae; gonopod (fig. 3; Papp, 1998a:227) with a small pointed process posterodorsally, preceded by several elongate setae, shallow ventrally (about 0.7 times as long as high), approximately rectangular to trapezoid in lateral view.

**Measurements:** Body length 1.63–2.65 mm. Wing length 1.95–2.75 mm, wing width 0.78–1.10 mm.

**TYPE MATERIAL.** The holotype male is labeled “Afganistan[,] Kabul, Aliabad/ University Park, 1800 m[,] 21.4.1974/No. 49[,] L. Papp/*Aulacigaster leucopeza* Meig. [handwritten] det. L. Papp 1986/Partypus *Aulacigaster afghanorum* L. Papp [white label with red borders, species name handwritten].” The specimen is double mounted (minuten in cardboard), is in excellent condition, and is deposited in HNHM.

**TYPE LOCALITY.** Afghanistan. Kabul: Aliabad, University Park (34°31'N, 69°08'E).

**DISTRIBUTION.** Palearctic: Afghanistan (Kabul).

**BIOLOGY.** This species was collected from oozing sap of *Populus alba* L. and *Morus alba* L. (Papp, 1998a).

### ***Aulacigaster falcata* Papp**

FIGURE 187

*Aulacigaster falcata* Papp, 1998a:226–229 [figures of male terminalia]; 1998b:279–284 [Manual of Palearctic Diptera].—Bächli et al., 1999:120 [checklist, Greece, Italy, Switzerland].—Kassebeer, 2001: 24–25 [biology, locality data from Germany].

**DIAGNOSIS.** This species is distinguished from congeners by the following combination of characters: Posterior fronto-orbital seta slightly internal to and almost horizontally aligned with anterior seta; surstylus slender, approximately sickle-shaped.

**DESCRIPTION.** Coloration and vestiture: Vertex mostly densely microtomentose, with a shiny spot extended from ocellus to near eye margin, leaving only a narrow microtomentose stripe parallel to eye margin; ocellar tubercle dull microtomentose; frons bearing a transverse, large, orange band, frontal orange band higher than 1/2 distance of lunule to anterior ocellus, merging into dark brown ventrally; silver stripe on frons approximately straight; antenna pale yellow to yellowish, infusate along dorsal margin; face yellow, with a transverse brown mark on dorsal

portion; facial band present, sharply defined, transverse, on protruding, ventral portion of face; palpus white. Scutellum dull microtomentose; postpronotum yellow to yellowish-brownish, dull microtomentose; anepisternum mostly dull; katepisternum with anterior portion dull microtomentose, and posterior portion mostly polished; halter mostly white, or mostly yellowish. Fore coxa brown to black, fore femur brown, fore tibia brown, fore tarsus brown to dark brown, basal tarsomere yellow (1–3); mid coxa brown to black, mid femur brown, mid tibia brownish, mid tarsus yellowish, apical and subapical tarsomere brownish to dark brown; hind coxa brown, hind femur brown, hind tibia brown to dark brown, hind tarsus yellowish, apical tarsomere brown to black. Male abdomen subshiny to dull, pregenital segment mostly subshiny; female abdomen with dense microtomentum medially, lateral margins of tergites nearly polished.

**Morphology:**

**Head:** Head higher than long (head ratio less than 0.9); face at level of pseudovibrissa wider than width of 1st flagellomere, in lateral view with dorsal half concave, ventral portion bulbous; gena in lateral view approximately 1/3–1/2 the width of 1st flagellomere; ocellar seta minute; medial vertical seta 3/4 the length of lateral vertical seta; fronto-orbital setae with posterior seta internal to and almost horizontally aligned with anterior seta; setulae between fronto-orbital setae 1, proclinate; peristomal vestiture consisting of relatively well-developed setae; peristomal area with about 4 setae following pseudovibrissal seta.

**Thorax:** Acrostichal setae in 2 rows; scutellum slightly raised (angle with scutum approximately 135°), trapezoidal, apex nearly straight, disk of scutellum slightly convex; basal scutellar seta 1/2 the length of posterior seta.

**Male abdomen and terminalia:** Figure 187. Epandrium densely setose. Surstylus arising from posteroventral margin of epandrium, slender, digitiform, relatively long (approx. 0.6 times the length of ventral margin of epandrium) (fig. 2; Papp 1998a:227); subepandrial sclerite (fig. 10; Papp 1998a:229) with lateral arms spread sideways, tapering toward pointed apex; cerci broad, parallel-sided to slightly divergent from each other, with apex setose and lacking well-differentiated setae; gonopod (fig. 4; Papp 1998a:227) with a small pointed process posterodorsally, preceded by several elongate setae, shallow ventrally (about 0.7 times as long as high), approximately trapezoid in lateral view.

**BIOLOGY.** Adults of this species have been recorded from hornbeam (*Carpinus* sp), oak trees (*Quercus* sp) (1998a), and *Morus* sp (1998a). It has also been collected in beer/wine traps (Kassebeer, 2001).

**Measurements:** Body length 1.92–2.5 mm. Wing length 2.17–2.88 mm, wing width 0.80–1.07 mm.

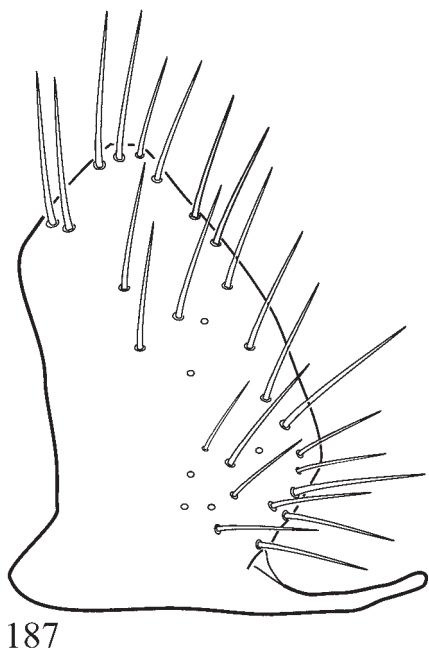


FIGURE 187. Illustrations of *Aulacigaster falcata* Papp (male) (the *leucopeza* group, Palearctic Region): epandrium, lateral aspect.

**TYPE MATERIAL** Although we did not examine the holotype of this species, we did examine a topotypical male paratype that is reported to have the same label data as the holotype. This male paratype is labeled “KUP. Kunfehértó 1988. VII. 15. [handwritten]/leg.Papp L./Paratypus ♂ *Aulacigaster falcata* L. Papp [all except “Paratypus” handwritten; red border].” The paratype, and presumably the holotype, is double mounted (minuten in a flat rectangular card) and is deposited in HNHM.

**TYPE LOCALITY.** Hungary. Bács-Kiskun: Kiskunsági National Park, Kunfehértó (47°02'N, 18°58'E).

**OTHER SPECIMENS EXAMINED.** HUNGARY. Bács-Kiskun: Kiskunsági National Park, Kunfehértó (47°02'N, 18°58'E), 15 Jul 1982, L. Papp (1♂; paratype; USNM). Budapest. Pestszeöntlorinc, Halmi-erdő, 11 Jul 1998, L. Papp, “tölgifák sebeiről” (1♂, 1♀; USNM).

**DISTRIBUTION.** Palearctic: Germany, Greece, Hungary, Italy, Switzerland.

### *Aulacigaster leucopeza* (Meigen)

FIGURES 188–193, 217–218

*Diastata leucopeza* Meigen, 1830:100.

*Aulacigaster leucopeza*.—Oldenberg, 1914:30 [generic combination, as “*Aulacogaster*” = unjustified emendation].—Duda, 1924:176 [discussion];

1934:3–4 [revision].—Robinson, 1953:77–83 [description of biology and immature stages].—Chandler, 1987:40 [interpretation and usage as a synonym of *A. rufitarsis* Macquart].—Ferrari, 1987:79–81, 581 [biology, breeding habits and immature stages].—Teskey, 1987:891, 894 [illustrations, manual Nearctic Diptera].—Mathis and Freidberg, 1994:583 [locality data].—Bächli, 1997:33 [faunistic and host record].—Papp, 1998a:228, 231–233 [illustrations and key to Palearctic species]; 1998b:279–284 [Manual of Palearctic Diptera].—Bächli et al., 1999:120–121 [checklist, Switzerland].—Kassebeer, 2001:25–26 [biology, locality data from Germany].—Papp, 2008:229–232 [comparison of female terminalia and immature stages with *A. africana*].

*Aulacigaster rufitarsis* Macquart, 1835:580. Type locality: Liège (Belgium).—Schiner, 1863:270 [review, synonymy]; 1864:56 [list of Palearctic species].—Becker, 1905:216 [Palearctic catalog].

*Diastata diadema* Meigen, 1838:379. Type locality: Lütticher Gegend [near Liège] (Belgium).

*Apotomella impressifrons* Dufour, 1846:460. Type locality: France.—Schiner, 1863:270 [synonymy with *A. rufitarsis*].

*Ampycophora tarsata* Wahlberg, 1847:261. Type locality: Sweden.—Schiner, 1863:270 [synonymy with *A. rufitarsis*].

*Sephanilla sertulata* Rondani, 1874:268.—Mathis and Freidberg, 1994:585 [synonymy with *D. leucopeza* Meigen].

**DIAGNOSIS.** This species is distinguished from congeners by the following combination of characters: Posterior fronto-orbital seta slightly medial to and almost horizontally aligned with anterior seta; vertex mostly densely microtomentose, with a shiny spot extended from ocellus at most 1/2 way to eye margin; surstylus digitiform, relatively long (nearly 0.3 times length of ventral margin of epandrium).

**DESCRIPTION.** Coloration and vestiture: Vertex mostly densely microtomentose, with a shiny spot extended from ocellus at most 1/2 way to eye margin (usually not more than 1/3–1/2 way to eye margin); ocellar tubercle dull microtomentose; frons bearing a transverse, large, orange band, frontal orange band shorter than 1/2 distance of lunule to anterior ocellus, merging into dark brown ventrally; silver stripe on frons approximately straight; antenna pale yellow to yellowish, infusate along dorsal margin or infusate on dorsal half; face yellow, with a transverse brown mark on dorsal portion; facial band present, sharply defined, transverse, on protruding, ventral portion of face; palpus white. Scutum with faintly defined microtomentose stripes; scutellum dull microtomentose; postpronotum concolorous with mesonotum, dull microtomentose; anepisternum mostly dull; katepisternum mostly microtomentose on anterior half and on a narrow stripe over katepisternal setae, halter mostly white. Fore coxa brown to black, fore femur brown to black, apex yellowish, fore tibia brown, fore tarsus yellowish, apical and sometimes

subapical tarsomeres brown to black; mid coxa brown to black, mid femur brown to black, apex yellowish, mid tibia completely brown or yellowish on central portion, apex and basis brown, mid tarsus yellowish, apical and subapical tarsomere brownish to dark brown; hind coxa brown, hind femur brown to black, apex yellowish, hind tibia completely brown to dark brown, or with basal and central portion yellowish, hind tarsus yellowish, apical tarsomere brown to black. Male abdomen subshiny to dull; female abdomen with dense microtomentum medially, lateral margins of tergites nearly polished.

**Morphology:**

**Head:** Figures 189–191, 217–218. Head higher than long (head ratio less than 0.9); face at level of pseudovibrissa wider than width of 1st flagellomere, in lateral view with dorsal half concave, ventral portion bulbous; gena in lateral view approximately 1/3–1/2 the width of 1st flagellomere; medial vertical seta 3/4 length of lateral vertical seta; 3–4 peristomal setae following pseudovibrissal setae present.

**Thorax:** Figures 188–189. Acrostichal setae in 2 rows, these often convergent anteriorly; scutellum slightly raised (angle with scutum approximately 135°), trapezoidal, apex nearly straight, disk of scutellum slightly convex; basal scutellar seta 1/2 length of posterior seta.

**Male abdomen and terminalia:** Figures 192–193. Epandrium not densely setose. Surstylus arising from posteroventral margin of epandrium, slender, digitiform, relatively long (0.3–0.4 times length of ventral margin of epandrium), tapering toward a rounded apex; subepandrial sclerite (fig. 9; Papp 1998a:229) with lateral arms spread sideways, tapering toward pointed apex; cerci broad, bulging medially, with apex setose and lacking prominent setae; gonopod with a small pointed process posterodorsally, preceded by several elongate setae, shallow ventrally (about 0.9 times as long as high), approximately rectangular in lateral view.

**TYPE MATERIAL.** Meigen's description of *Dia-stata leucopeza* indicates a type series of a single specimen, gender unknown, that had a broken antenna and that is now presumably lost. Becker (1902) did not find the type, and our queries and searches did not result in its discovery (see remarks below).

**TYPE LOCALITY.** Unknown, presumably Germany (Baumhauer's collection).

**OTHER SPECIMENS EXAMINED.** AUSTRIA. J. Egger (in Loew's collection (labeled as "*Aulacigaster rufitarsis* Macquart") (1♀; ZMB).

DENMARK. Copenhagen: Dyrehaven (55°39.9'N, 12°32.6'E), 3 May–6 Jun 1917, 1918, W. Lundbeck (9♂, 3♀; UZMC).

GERMANY. Berlin: Dahlem (52°27'N, 13°17'E), 25 May 1959, Kirchberg (1♂, 1♀; ZMB); Zehlendorf (52°26'N, 13°16'E), 3 Jun 195?, Kirchberg (1♂, 1♀; ZMB). Brandenburg: Frankfurt. Oder (52°20.4'N, 14°31.8'E), M. P. Riedel (labeled as "*Aulacigaster leucopeza* Meigen". The female labeled as "*Aulacigaster (rufitarsis) leucopeza*", P. P. Riedel Det.) (4♂, 1♀; ZMB). Saxony-Anhalt: Dessau (51°49.8'N, 12°13.2'E), 8 Jul 1924, E. Heidenreich (labeled as "*Aulacigaster leucopeza* Meigen", M. P. Riedel 1924 Det.) (1♂; ZMB).

HUNGARY. Mátra Mountains (47°55.1'N, 19°53.7'E), 24 Aug 1996, A. Freidberg (1♀; USNM).

MONGOLIA. Khovd: Dund Tsenkher Gol (47°20.4'N, 91°51.8'E; 1745m), 17 July 2009, W.N. Mathis ((2♂, 1♀; USNM).

POLAND. Rauden OS (53°37'N, 19°05'E), 4–21 Jul 1932, L. Duda (6♂; ZMB). Wrocław (51°05'N, 17°00'E), 07 Apr 1982, T. Zatwarnicki (2♀; CAS). Wustung bei Habelschwerdt (50°17.9'N, 16°38.5'E), 16 May–25 Jun 1924, L. Duda (6♂; ZMB).

SWEDEN: Lund (55°42'N, 13°12'E), 29 Oct 1954, J. R. Vockeroth (1♀; CNC).

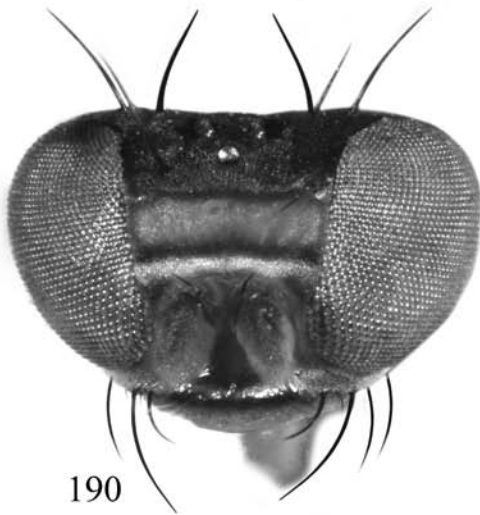
**DISTRIBUTION.** Palearctic: Austria, Denmark, France, Germany, Hungary, Israel, Italy, Mongolia, Poland, Spain, Sweden, Switzerland, United Kingdom.

**BIOLOGY.** This species has been recorded from the following hosts: *Aesculus* sp. (Kassebeer, 2001), *Betula* sp. (Kassebeer, 2001), *Populus* sp. (Kassebeer, 2001), *Quercus* sp. (Kassebeer, 2001) and *Ulmus* sp. (Kassebeer, 2001). It has also been collected by beer/wine traps (Bächli et al., 1999; Kassebeer, 2001).

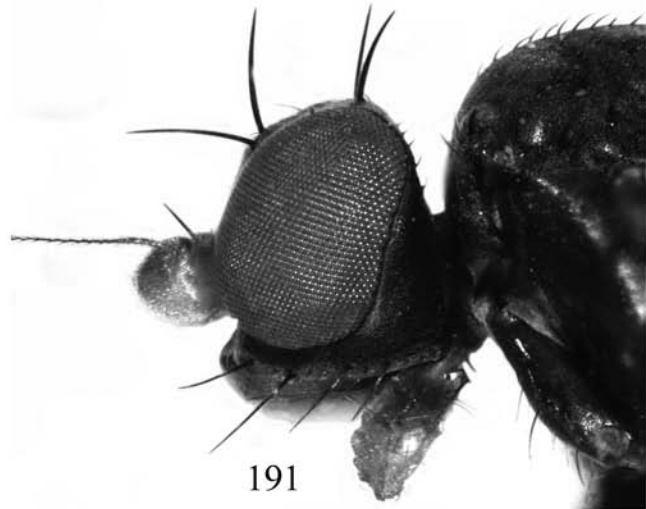
**REMARKS.** Until the mid-1990s, *A. leucopeza* was the only known species of *Aulacigaster* from the Palearctic Region. Papp 1998a then described *A. afghanorum* and *A. falcata* and reported the presence of *A. neoleucopeza* (later named *A. pappi* by Kassebeer (2001) from that region and noted that previous locality records of *A. leucopeza* needed verification (Papp, 1998a:230). A few years later, after collecting and studying museum specimens from Germany, Kassebeer (2001) reported the presence of *A. falcata* (previously known only from Croatia) and *A. pappi* from that country, in addition to *A. leucopeza*. In this study, we have only had access to a limited sample of the European fauna of Aulacigastridae. We agree with Papp (op. cit.) that a more extensive study of specimens from the Palearctic Region is necessary to clarify the distributional ranges of the various species concerned. Moreover, the identity of the European species, particularly *A. pappi* (see remarks under *A. pappi*), needs further investigation, including location and study of any extant primary types and possibly involving DNA sequence data. The junior synonyms previously



189



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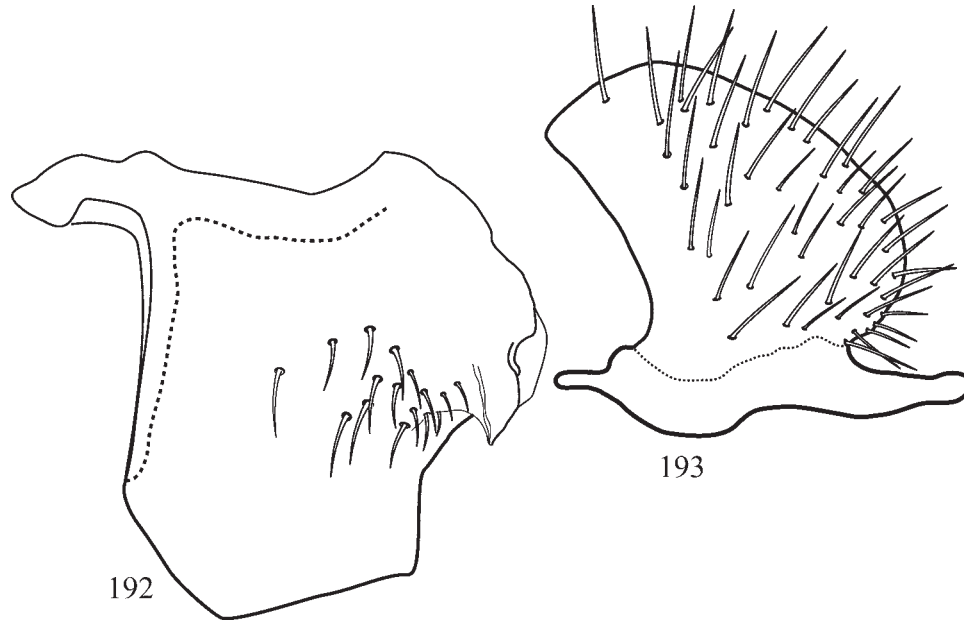
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FIGURES 188–191. Digital photographs of *Aulacigaster leucopeza* (Meigen) (male) (the *leucopeza* group, Palearctic Region). (188) body, lateral aspect; (189) head and mesonotum, dorsal aspect; (190) head, frontal aspect; (191) head, lateral aspect. Not all to the same scale.

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FIGURES 192–193. Illustrations of *Aulacigaster leucopeza* (Meigen) (male) (the *leucopeza* group, Palearctic Region). (192) gonopod, lateral aspect; (193) epandrium, lateral aspect.

noted, for example, may represent older names for species Papp described. For these reasons and not wanting to promulgate unverified and potentially false information, we have not produced distribution maps for species occurring in the Palearctic Region.

### ***Aulacigaster pappi* Kassebeer**

FIGURES 194–199

*Aulacigaster neoleucopeza* of authors, not Mathis and Freidberg [misidentification].—Papp, 1998a:230–232 [discussion, list, Hungary].—Bächli et al., 1999:121 [list, Switzerland].

*Aulacigaster pappi* Kassebeer, 2001:26 [description, list, France, Switzerland].

**DIAGNOSIS.** This species is distinguished from congeners by the following combination of characters: Posterior fronto-orbital seta slightly medial to and almost horizontally aligned with anterior seta; shiny spot adjacent to ocellar tubercle extended from ocellus beyond half-way to eye margin; surstylus digitiform, tapering towards blunt apex, relatively short (approx. 0.2 times the length of ventral margin of epandrium), in lateral view with apex slightly elevated in relation to the ventral margin of epandrium.

**DESCRIPTION.** Coloration and vestiture: Vertex mostly densely microtomentose, with a shiny spot extended from ocellus to near eye margin (shiny spot separated from eye margin by a distance approximately equal to width of one ocellus); ocellar tubercle dull microtomentose; frons bearing a transverse, large, orange band, frontal orange band shorter than 1/2 distance of lunule to anterior ocellus, merging into dark brown ventrally; silver stripe on frons approximately straight; antenna pale yellow to yellowish, infuscate along dorsal margin or infuscate on dorsal half; face yellow, with a transverse brown mark on dorsal portion; facial band present, sharply defined, transverse, on protruding, ventral portion of face; palpus white. Scutum with weakly defined microtomentose stripes; scutellum dull microtomentose; postpronotum concolorous with mesonotum, dull microtomentose; anepisternum mostly dull; katepisternum mostly microtomentose on anterior half and on a narrow stripe over katepisternal setae; halter mostly white. Fore coxa brown to black, fore femur brown to black, fore tibia brown, fore tarsus yellowish, apical and sometimes subapical tarsomeres brown to black; mid coxa brown to black, mid femur brown to black, mid tibia completely brown or yellowish on central portion, mid tarsus yellowish, apical and subapical tarsomere brownish to dark brown; hind coxa brown, hind femur brown to black, hind tibia completely brown to dark brown, or with basal and central portion yellowish, hind tarsus

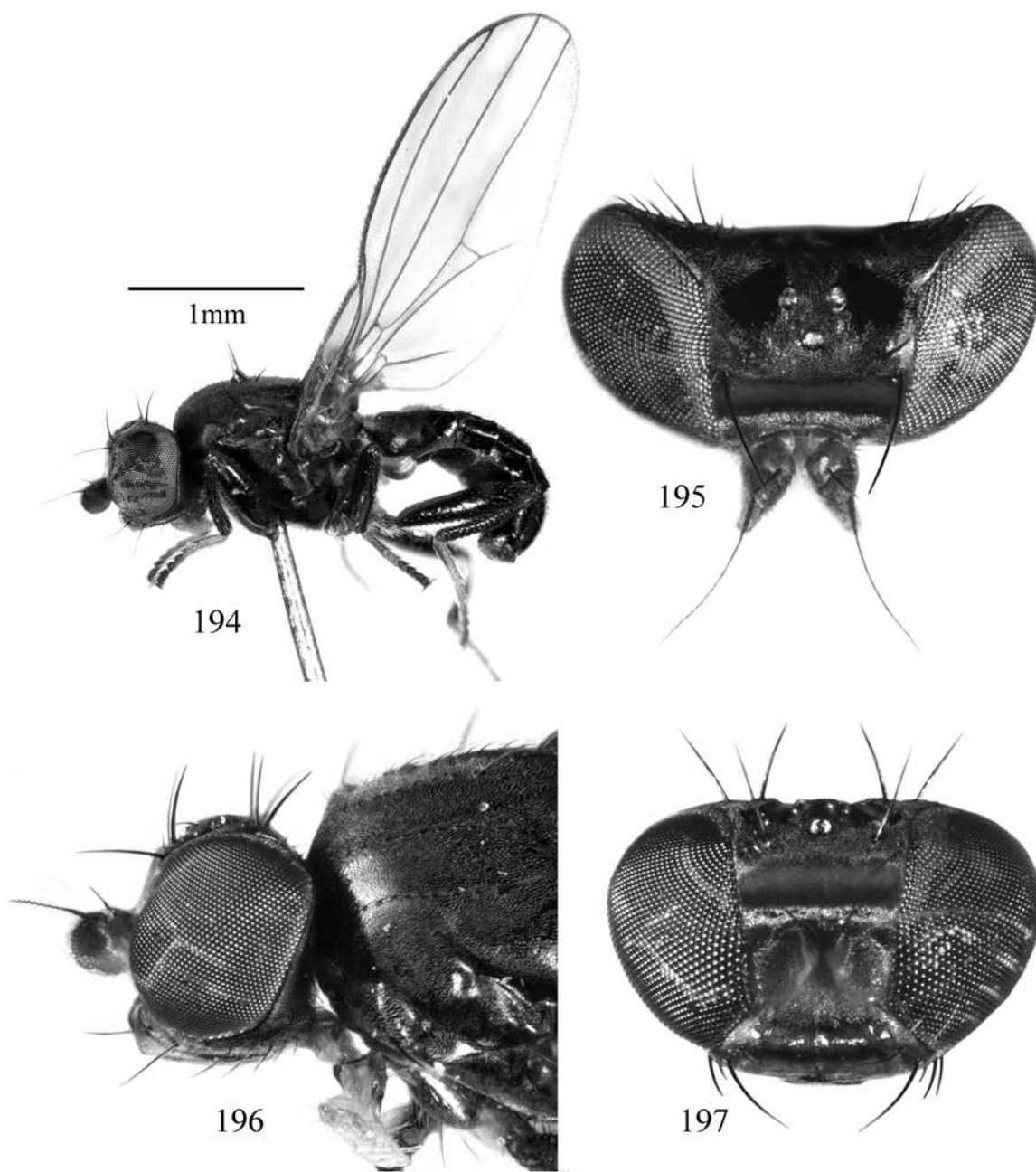
yellowish, apical tarsomere brown to black. Male abdomen subshiny to dull; female abdomen with dense microtomentum medially, lateral margins of tergites nearly polished.

**Morphology:**

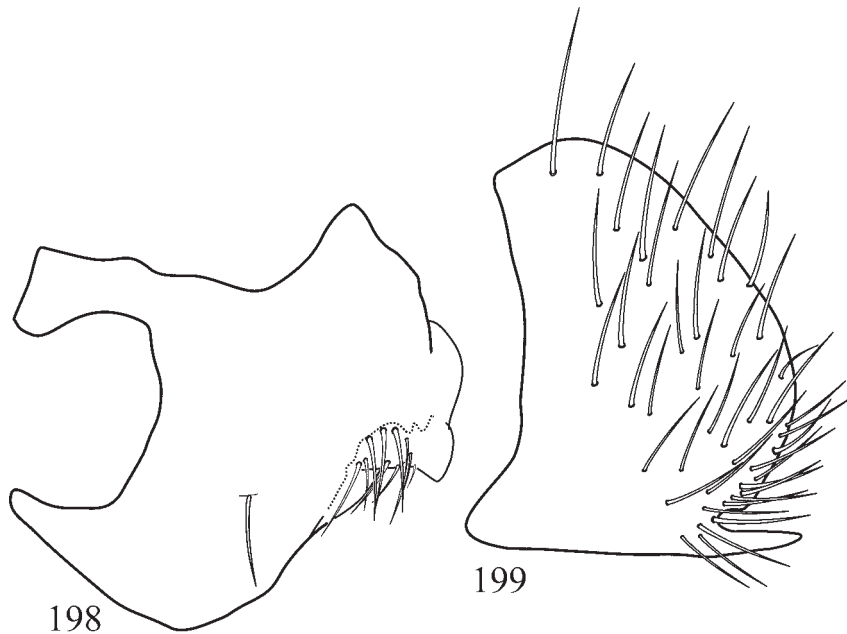
**Head:** Figures 195–197. Head higher than long (head ratio less than 0.9); face at level of pseudovibrissa wider than width of 1st flagellomere, in lateral view with

dorsal half concave, ventral portion bulbous; gena in lateral view approximately  $1/3$ – $1/2$  the width of 1st flagellomere; medial vertical seta  $3/4$  length of lateral vertical seta; peristomal area with one long and 3–4 shorter setae following pseudovibrissal setae.

**Thorax:** Figures 194, 196. Acrostichal setae in 2 rows, these convergent anteriorly at level of anterior



**FIGURES 194–197.** Digital photographs of *Aulacigaster pappi* Kassebeer (male) (the *leucopeza* group, Palearctic Region). (194) body of male, lateral aspect; (195) head, dorsal aspect; (196) head and anterior portion of mesonotum, lateral aspect; (197) head, frontal aspect. Not all to the same scale.



FIGURES 198–199. Illustrations of *Aulacigaster pappi* Kassebeer (male) (the *leucopeza* group, Palearctic Region). (198) gonopod, lateral aspect; (199) epandrium, lateral aspect.

dorsocentral seta; scutellum slightly raised (angle with scutum approximately  $135^\circ$ ), trapezoidal, apex nearly straight, disk of scutellum slightly convex; basal scutellar seta 1/2 length of posterior seta.

**Male abdomen and terminalia:** Figures 198–199. Epandrium not densely setose. Surstylus arising from ventral margin of epandrium, slender, digitiform, tapering towards blunt apex, relatively short (approx. 0.2 times the length of ventral margin of epandrium); surstylus in lateral view with apex slightly elevated in relation to the ventral margin of epandrium (fig. 2d; Kassebeer, 2001:31); gonopod with several strong setae that are as long as the surstylus; subepandrial sclerite with lateral arms narrow, well sclerotized, curved evenly posteriorly; cerci completely separated, more developed ventrally, approximately tongue-shaped in lateral view.

**TYPE MATERIAL.** The holotype male is labeled (quoted from Kassebeer's paper) "**Deutschland: Brandenburg:** [7.6]–5.7.2001, Brüsenwalde, BF, leg. G. Möller, Coll. C. F. Kassebeer."

**TYPE LOCALITY.** Germany: Brandenburg, Brüsenwalde ( $53^\circ13'N$ ,  $13^\circ28'E$ ).

**OTHER SPECIMENS EXAMINED.** HUNGARY. Nógrád: Szendehely, Keskeny-bükki p.v. tölgyerdők ( $47^\circ51.3'N$ ,  $19^\circ06.3'E$ ), Jun 1996, L. Papp (2♂; CSCA).

**DISTRIBUTION.** Palearctic. France, Germany, Hungary, Switzerland.

**BIOLOGY.** This species has been recorded from *Quercus* sp. (Kassebeer, 2001). It has also been collected by beer/wine traps (Kassebeer, 2001).

**REMARKS.** The description provided here is a combination of the diagnosis published by Kassebeer (2001) and study of two specimens from Hungary previously identified by L. Papp as *A. neoleucopeza*. Kassebeer (2001) concluded that reports of *A. neoleucopeza* occurring in Europe (Papp, 1998a) were based on misidentifications and proposed the name of *A. pappi* for these specimens. Kassebeer's discovery of specimens collected by Thalhammer over 100 years ago (DEI) also invalidates the idea of a recent introduction of *A. neoleucopeza* into the Palearctic Region. While we are accepting Kassebeer's proposals, being the most recent treatment of this species, we have not had access to the specimens that Kassebeer examined and cannot confirm his findings. With the exception of three females deposited in the Muséum d'histoire naturelle, Genève, and one male deposited in DEI, the material studied by Kassebeer is entirely held in two private collections: Kassebeer's and C. Bächli's. The only male available from institutional collections (DEI) was borrowed by Kassebeer some years ago and has not yet been returned.

The specimens we studied from Hungary are generally darker than specimens of *A. neoleucopeza* and *A. leucopeza*, two species with which *A. pappi* could be easily confused. In the latter species, the apices of the coxae are not pale brown to yellow as in the former two species. The orange band on the frons is slightly darker, and the microtomentose band on the lower frons sits on a brown mark that is wider than that present in Palearctic and Nearctic species. The facial band on the lower face of *A. pappi* is weakly microtomentose and tends to be more yellow than in other temperate species of the *leucopeza* group. *Aulacigaster pappi* is more easily confused with and may be conspecific with *A. neoleucopeza*. The shape of the gonopod and posterodorsal gonopodal process, including the

arrangement of the setae preceding the process, is within the range of variation found for *A. neoleucopeza*. Even though both species can be separated by the characters given herein, it is possible that analysis of additional material of *A. pappi* will reveal intermediate forms, making the possibility of this distinction tenuous.

#### Oriental Species

**DISCUSSION.** The presence of undescribed *Aulacigaster* in the Oriental Region was previously documented (Sabrosky, 1977). Two species are described herein, and one other is reported. All species are classified in the *leucopeza* group.

#### Key to the Oriental Species of *Aulacigaster*

1. Vertex mostly microtomentose; facial band absent; scutum with weakly defined microtomentose stripes (Nepal) . . . . . *A. L3*, undescribed species  
Vertex with a shiny area between posterior ocellus and margin of eye; facial band present [Figure 219]; scutum without obvious stripes . . . . . 2
2. Shiny spot of vertex small, extended from ocellus at most 1/2 way to eye margin; scutum uniformly microtomentose (Sri Lanka) . . . . . *A. srilanka*, new species  
Shiny spot of vertex large, extended from ocellus 2/3 to eye margin [Figure 219]; scutum mostly uniformly microtomentose, but polished opposite to postcranium (India) . . . . . *A. india*, new species

#### ***Aulacigaster india*, new species**

FIGURES 200, 219–220, MAP 18

**DIAGNOSIS.** This species is distinguished from congeners by the following combination of characters: Arista short, with tiny, dense, alternate hairs on apical 2/3, basal 1/3 of arista naked; scutum polished on anteriormost portion, opposite to postcranium.

**DESCRIPTION.** Coloration and vestiture: Vertex mostly densely microtomentose, with a shiny spot extended from ocellus to 2/3 distance to eye margin; ocellar tubercle dull microtomentose; frons bearing a transverse, large, orange band, frontal orange band merging into dark brown ventrally (dark brown region interrupted in some specimens); silver stripe on frons approximately straight, weak; antenna pale yellow to yellowish, infuscate along dorsal margin; face yellow, with a transverse brown mark on dorsal portion; facial band present, sharply defined, transverse, on protruding, ventral portion of face; palpus white. Scutum mostly uniformly microtomentose, polished on anteriormost portion, opposite postcranium; scutellum dull microtomentose; postpronotum concolorous with mesonotum, dull microtomentose; anepisternum mostly dull; katepisternum

with anterior portion dull microtomentose, and posterior portion mostly polished; halter mostly white, or mostly yellowish (knob with brown area). Fore coxa brown to black, fore femur brown (tip yellowish); fore tibia yellowish (tip and sometimes basis dark), fore tarsus yellowish, apical and sometimes subapical tarsomeres brown to black (apical and subapical); mid coxa brown to black, mid femur brown to black, apex yellowish, mid tibia yellowish on central portion, apex and basis brown (tip, and sometimes basis brown), mid tarsus yellowish-brownish; hind femur brown to black, apex yellowish, hind tibia mostly yellow, base and apex infuscate with brown, hind tarsus yellowish, apical tarsomere brown to black (apical and subapical).

**Morphology:**

**Head:** Figures 219–220. Head higher than long (head ratio less than 0.9); face at level of pseudovibrissa wider than width of 1st flagellomere, in lateral view with dorsal half concave, ventral portion bulbous; gena in lateral view approximately 1/3–1/2 the width of 1st flagellomere; medial vertical seta 3/4 length of lateral vertical seta; peristomal area with about 1 long and 3–4 smaller setae following pseudovibrissal seta.

**Thorax:** Acrostichal setae in 2 rows; scutellum slightly raised (angle with scutum approximately 135°),

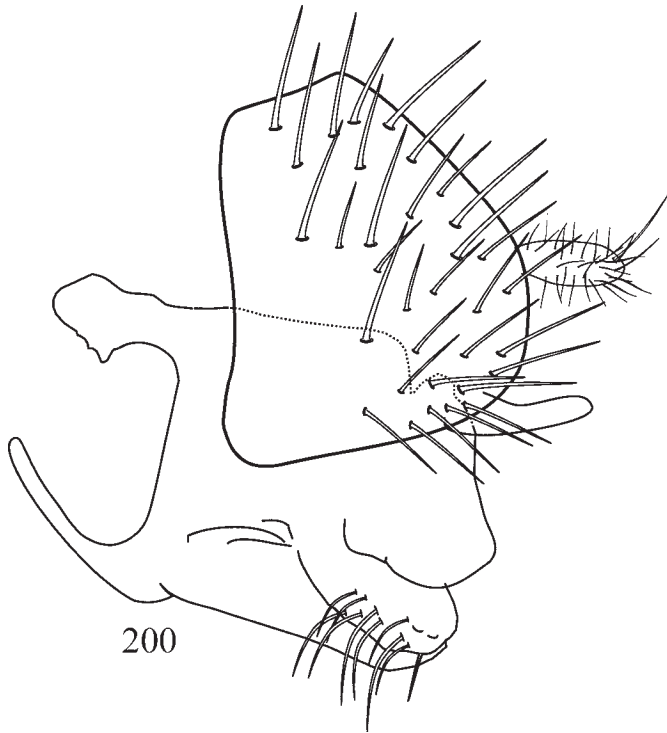


FIGURE 200. Illustrations of *Aulacigaster india*, new species (male) (the *leucopeza* group, Oriental Region): epandrium and gonopod, lateral aspect.

trapezoidal, apex nearly straight, disk of scutellum strongly convex; basal scutellar seta 1/2 length of posterior seta.

**Male abdomen and terminalia:** Figure 200. Surstylus arising from posteroventral to ventral margin of epandrium, slender, digitiform, relatively long (approx. 0.5 times the length of ventral margin of epandrium), margins almost parallel, apex round; cerci broad, with apex bearing a few preeminent setae; gonopod sub-quadrangle in lateral view (approximately as high as long); posterior medial process of gonopod approximately digitiform, wide (at least 3 times wider than surstylus) bearing ca 11 strong setae.

**Measurements:** Body length 2.4–2.7 mm. Wing length 2.4–2.7 mm, wing width 1.0 mm.

**TYPE MATERIAL.** The holotype male is labeled “INDIA: Meghalaya[,] Mawphlang (20 km W. Shillong)[,] 21Ap[ril] 1980[,] A[.]Freidberg/HOLOTYPE ♂ *Aulacigaster india* Rung & Mathis USNM [red].” The holotype is double mounted (minuten in a block of plastic), is in excellent condition (abdomen removed and dissected with structures in an attached microvial), and is deposited in the USNM. Paratypes are as follows: Same label data as the holotype (3♀; USNM).

**TYPE LOCALITY.** India. Meghalaya: Shillong (20 km W, road from Shillong to Mawphlang; 25°34'N, 91°45'E).

**DISTRIBUTION.** (Map 18) India (Meghalaya).

**ETYMOLOGY.** The specific epithet, *india*, refers to the country where the type series was collected. The name is a noun in apposition.

### ***Aulacigaster srilanka*, new species**

FIGURE 201, MAP 18

**DIAGNOSIS.** This species is distinguished from congeners by the following combination of characters: Gena very narrow, in lateral view approximately 1/5 the width of 1st flagellomere below ventral margin of eye; surstylus very reduced, inconspicuous.

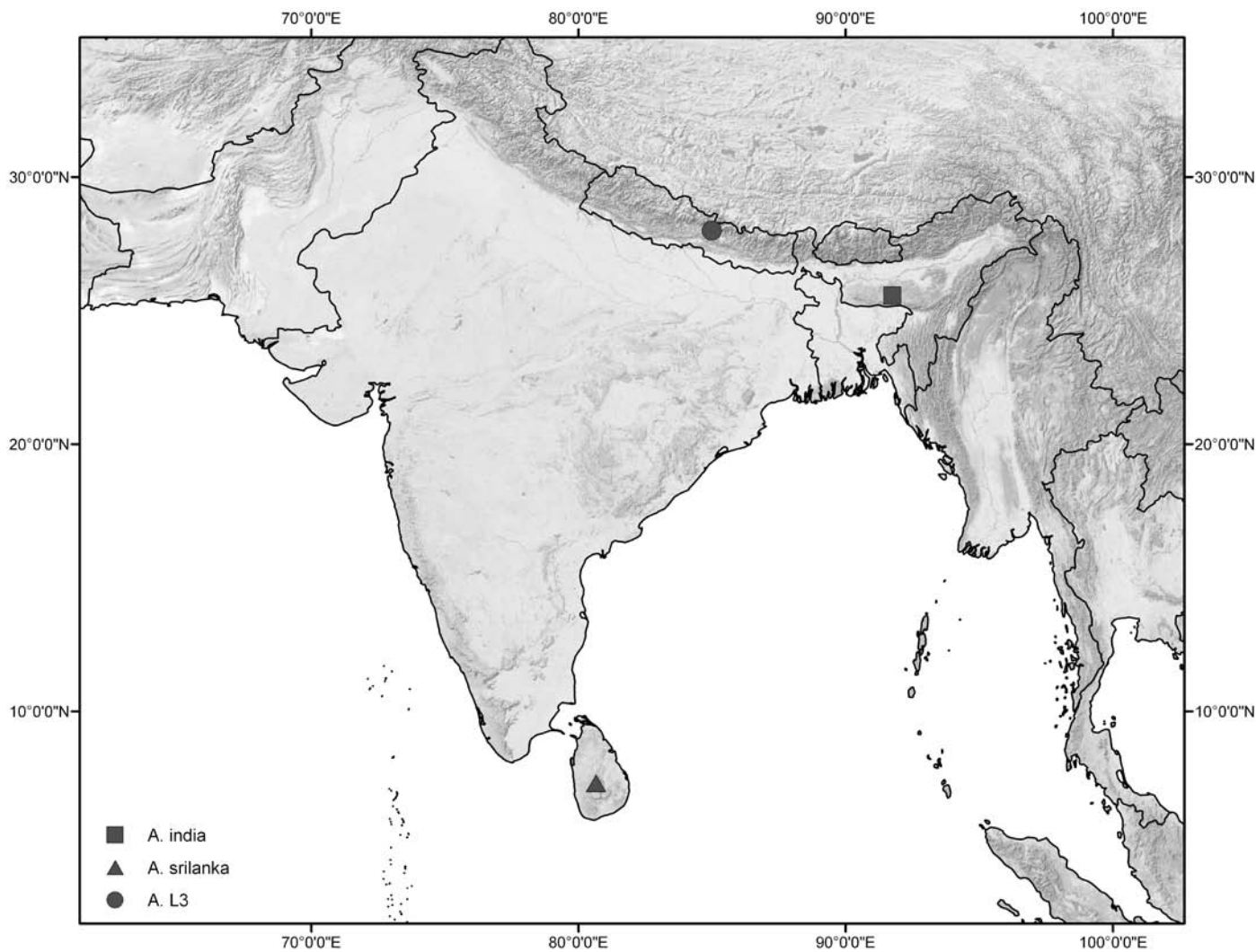
**DESCRIPTION.** Coloration: Vertex mostly densely microtomentose, with a shiny spot extended from ocellus at most 1/2 way to eye margin; ocellar tubercle dull microtomentose; frons bearing a transverse, large, orange band; silver stripe on frons approximately straight, bright shiny; antenna pale yellow to yellowish, infuscate along dorsal margin; face yellow, with a transverse brown mark on dorsal portion; facial band present, sharply defined, transverse, on protruding, ventral portion of face; palpus white. Scutellum dull microtomentose; postpronotum concolorous with mesonotum, dull microtomentose; anepisternum mostly dull; katepisternum mostly microtomentose, with a shiny area posteriorly, below the posterior katepisternal seta; halter mostly brown to dark brown. Fore coxa brown to black; mid coxa brown to black, mid femur brown, mid tarsus yellowish, apical and subapical tarsomere brownish to dark brown; mid coxa brown, mid femur brown, mid tarsus yellowish; hindlegs missing in the holotype. Male abdomen bright shiny.

**Thorax:** Acrostichal setae in 2 rows; scutellum slightly raised (angle with scutum approximately 135°), trapezoidal, apex nearly straight, disk of scutellum slightly convex; basal scutellar seta less than 1/2 length of posterior seta.

**Male abdomen and terminalia:** Figure 201. Posteroventral margin of epandrium bearing strong setae surstylus reduced, inconspicuous; posterodorsal process of gonopod wide, digitiform, bearing approximately 11 strong setae.

**Measurements:** Body length 2.7 mm. Wing length 2.4 mm, wing width 0.7 mm.

**TYPE MATERIAL.** The holotype male is labeled “SRI LANKA. Dist. Kandy[,] Udawattakele Sanct.[,]”



MAP 18. Distribution of the Oriental species of the *leucopeza* group of *Aulacigaster*.

22-III-1981 [22 Mar 1981]/K.V. Krombein[,], T. Wijesinhe[,]  
L. Weeratunge/HOLOTYPE ♂ *Aulacigaster srilanka* Rung  
& Mathis USNM [red].” The holotype is double mounted  
(minuten in a block of polyporus), is in good condition  
(abdomen removed and dissected with structures in an at-  
tached microvial), and is deposited in the USNM.

**TYPE LOCALITY.** Sri Lanka. Central: Kandy,  
Udawattakele Sanctuary (07°18'N, 80°39'E).

**DISTRIBUTION.** (Map 18) Oriental: Sri Lanka.

**ETYMOLOGY.** The specific epithet, *srilanka*, re-  
fers to the country where the type series was collected. The  
name is a noun in apposition.

### ***Aulacigaster* L3, undescribed species**

MAP 18

**DIAGNOSIS.** This species is distinguished from  
congeners by the following combination of characters:  
Arista short, with very inconspicuous, alternate hairs (arista  
appearing naked at low magnification); facial band absent;  
frons bearing a transverse, large, orange band.

**DESCRIPTION.** Coloration: Vertex mostly  
densely microtomentose, without a shiny spot (a small  
dot lateral to posterior ocellus is however present); ocellar

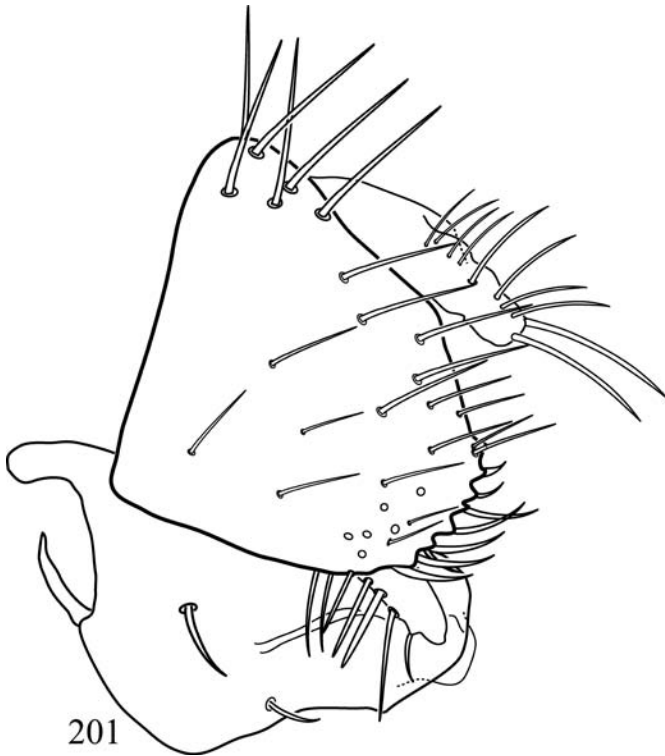


FIGURE 201. Illustrations of *Aulacigaster srilanka*, new species (male) (the *leucopeza* group, Oriental Region): epandrium and gonopod, lateral aspect.

tubercle dull microtomentose; frons bearing a transverse, large, orange band, frontal orange band with a blackish mark basal to ocellar tubercle, and a pair of blackish marks on ventrolateral corners, above ptilinal fissure; anterior portion of frons densely microtomentose, with a faint, narrow, anterior silvery stripe, not followed by a black stripe or shadow; antenna pale yellow to yellowish, infuscate on dorsal half or infuscate along dorsal margin; face yellow anteriorly, brown to black on posterior portion; palpus white. Scutum with weakly defined microtomentose stripes; scutellum dull microtomentose; postpronotum yellow to yellowish-brownish, dull microtomentose; anepisternum mostly dull (with a silver, transverse, ill-defined stripe); kat-episternum mostly polished, or with anterior portion dull microtomentose, and posterior portion mostly polished; halter mostly white (base slightly infuscate). Fore coxa brown to black, fore femur brown to black, apex yellowish, fore tarsus yellowish, apical and sometimes subapical tarsomeres brown to black; mid coxa brown to black, mid femur brown to black, apex yellowish, mid tarsus yellowish, apical and subapical tarsomere brownish to dark

brown; hind femur brown to black, apex yellowish, hind tarsus yellowish, apical tarsomere brown to black. Female abdomen subshiny.

**Morphology:**

**Head:** Head round, about as high as long (head ratio 0.9–1.1); face at level of pseudovibrissa wider than width of 1st flagellomere, in lateral view with dorsal half concave, ventral portion bulbous; gena in lateral view approximately 1/3–1/2 the width of 1st flagellomere; medial vertical seta 3/4 length of lateral vertical seta; peristomal area with about 4 setae following pseudovibrissal seta.

**Thorax:** Acrostichal setae in 1 row, bifurcating posteriorly; scutellum slightly raised (angle with scutum approximately 135°), trapezoidal, apex nearly straight, disk of scutellum slightly convex; basal scutellar seta 1/2 length of posterior seta.

**Measurements:** Body length 2.7–2.8 mm. Wing length 2.4–2.5 mm, wing width 0.9–1.0 mm.

**SPECIMENS EXAMINED.** NEPAL. Canadian Nepal Expedition (28°00'N, 85°00'E; Malaise trap), 26 May 1967 (2♀; CNC).

**DISTRIBUTION.** (Map 18) Oriental: Nepal.

**REMARKS.** This species is not described because it is represented by two females only.

## PHYLOGENETIC ANALYSIS AND DISCUSSION

### CHARACTERS USED IN THE CLADISTIC ANALYSIS

1. A transverse, sharp orange band on ventral frons: 1. absent; 2. present.
2. A transverse, silver microtomentose stripe on ventral frons: 1. absent; 2. present as a straight microtomentose stripe covering ventral 1/4; 3. present as a semi-lunate microtomentose band covering ventral 1/3–1/2.
3. Transverse, silver facial band on ventral portion of face, extended to gena: 1. absent; 2. present.
4. Microtomentum coverage of scutum: 1. uniformly covering most of scutum; 2. present only between dorsocentral rows of setae; 3. present only on anterior 1/3–1/2 of scutum; 4. nearly absent.
5. Coloration of thoracic pleural region: 1. uniformly black; 2. white to pale yellow on ventral half.
6. Coloration of abdominal tergites 1+2: 1. without a yellowish region dorsally; 2. with a yellowish

region dorsally that sometimes extends over tergite 3.

7. Shape of body: 1. robust, scutal ratio 1.1–1.35; 2. elongate, scutal ratio 1.5–1.75.
8. Shape of vertex, between compound eyes: 1. nearly straight; 2. excavated.
9. Margins of eye: 1. not encroaching on the posterior portion of the frons; 2. encroaching on the posterior portion of the frons.
10. Clypeus (proportions): 1. stout, 1.5 to 2.5 times longer than wide; 2. elongate, 3.5–5.5 times longer than wide.
11. First flagellomere (shape): 1. round; 2. oval, decumbent; 3. triangular.
12. Arista (shape): 1. naked; 2. with very inconspicuous, alternate hairs (arista appearing naked at low magnification); 3. distinctly zigzagged on apical 2/3 and bearing short hairs; 4. distinctly zigzagged on apical 2/3 and bearing long hairs.
13. Dimorphism in the shape of the face: 1. absent; 2. present.
14. Ocellar seta: 1. absent; 2. present.
15. Development of ocellar seta: 1. weak; 2. strong, seta-like.
16. Subcosta: 1. complete, fused with vein  $R_1$  apically, and reaching costal vein; 2. incomplete, fused with vein  $R_1$  apically, not reaching costal vein.
17. Length of vein  $R_{2+3}$ : 1. long, ending at or near tip of the wing; 2. short, ending on basal 2/3 of the wing.
18. Hind femur: 1. without a basal lobe; 2. with a ventral basal lobe.
19. Hind femur: 1. not modified, and without ventral protrusions bearing setae; 2. modified, with two ventral rows of protrusions, each protrusion bearing an apical seta.
20. Mesonotal setulae: 1. not organized in rows; 2. organized in rows.
21. Position of surstylus: 1. posterior to postero-ventral; 2. ventral.
22. Setae on gonopodal process: 1. absent or hair-like; 2. well developed, long; 3. strongly developed, long and thick.
23. Ventral portion of gonopod: 1. not modified; 2. distinguished from medial portion, forming a weakly sclerotized ventral plate; 3. forming a strongly sclerotized, black ventral plate.
24. Number of anterior gonopodal processes: 1. one; 2. two.

## DISCUSSION

The 17 optimal trees (Figure 202) resulting from an exhaustive search have 39 steps, a consistency-index of 0.82, and retention index of 0.93. Successive weighing did not change the number of optimal trees or their topologies. After the third iteration of character weighing, the resulting 17 trees had 30.60 steps, CI = 0.89, and RI = 0.95.

The main clades supported by this analysis are the following. First, the genus *Aulacigaster*, in our rooting, is monophyletic. Second, all of the species groups of *Aulacigaster* represented by more than one exemplar were recovered, indicating that the groups proposed in this revision are natural groups. The most striking differences in the topologies of the best trees obtained concern the relationships between the *plesiomorphica* and *bromeliae* groups and the remaining species groups of Neotropical *Aulacigaster*, which remain largely unresolved. The relationships between species of the widespread *leucopeza* group, which lie beyond the scope of this analysis (see “Methods and Materials”), also remain unresolved and account for most of the conflicting topologies. For discussions of phylogenetic distribution of character states below, refer to Figure 202, which corresponds to PAUP tree number 1. This tree was optimized using accelerated transformation (ACTRAN).

In this analysis, the genus *Aulacigaster* is supported by three unambiguous synapomorphies: arista distinctly zigzagged on apical 2/3 and bearing short hairs (character 12, state 3; Figures 51, 59); ocellar seta reduced, weak (character 15, state 1; Figure 11); and mesonotal setulae organized in rows (character 20, state 2; Figures 1, 12). In the sister-group *Curiosimusca* the arista is straight and naked, the ocellar seta is strongly developed, and the mesonotal setulae are randomly distributed rather than organized in rows. Apart from the zigzagged arista with short ray-like hairs, all characters supporting the monophyly of *Aulacigaster* in this analysis are found in presumably closely related families such as Periscelididae *sensu lato* (including *Stenomicro*, *Cyamops* and *Planinasus*) and Anthomyzidae. The monophyly of *Aulacigaster* and its sister-group relationship to *Curiosimusca* have been discussed elsewhere (Rung et al., 2005) and the reader should consult that contribution for additional synapomorphies and discussion about them.

The widely distributed *leucopeza* group is supported by two unambiguous synapomorphies: the presence of an orange band on ventral frons (character 1, state 2; Figure 217), a non-homoplasious synapomorphy; and the presence



of a silver microtomentose stripe on the ventral portion of the frons (character 2, state 2; Figure 217). Both characters are absent in *Curiosimusca* and closely related families. Species of the *grimaldii* group have a transverse microtomentose stripe on the lower frons that is similar to that found in the *leucopeza* group, a convergence according to this analysis (Figure 209). In species of the *plesiomorphica* group, a wide, semi-lunate band covering a larger portion of the lower (ventral) frons is present (Figure 213). Because we believe that this condition is distinct from that found in the *leucopeza* group, we have coded it as a separate state (state 3). Two species of the *leucopeza* group, both Neotropical in distribution (*A. L1*, undescribed species and *A. spangleri*), have the frontal orange band partially obliterated laterally by black infuscation (Figure 215), a putative synapomorphy for these two species (not coded). These two closely related species also share a nearly naked arista (character 12, state 2; Figure 216).

The exclusively Neotropical groups of *Aulacigaster* are united by two unambiguous synapomorphies: face without a sharp silver band on the ventral portion that extends to the gena (character 3, state 1; Figure 203); and vein  $R_{2+3}$  short, not reaching the tip of the wing (character 17, state 2; Figure 2). Species of both *Curiosimusca* and the *leucopeza* group of *Aulacigaster* have a sharp and distinctive facial band that extends posteriorly to the gena (Figure 219), and vein  $R_{2+3}$  reaching nearly to apex of the wing (Figure 188). Both synapomorphies correspond to widespread conditions in presumably closely related families, and the second synapomorphy is reversed within the *ecuadoriensis* group (see below), which has a long vein  $R_{2+3}$  also nearly reaching the wing apex (Figure 52). Several species of the *plesiomorphica* group have a short, sometimes inconspicuous facial band located between the pseudovibrissae (Figure 213) and differing in appearance and location from the facial band present in the *leucopeza* group and *Curiosimusca*.

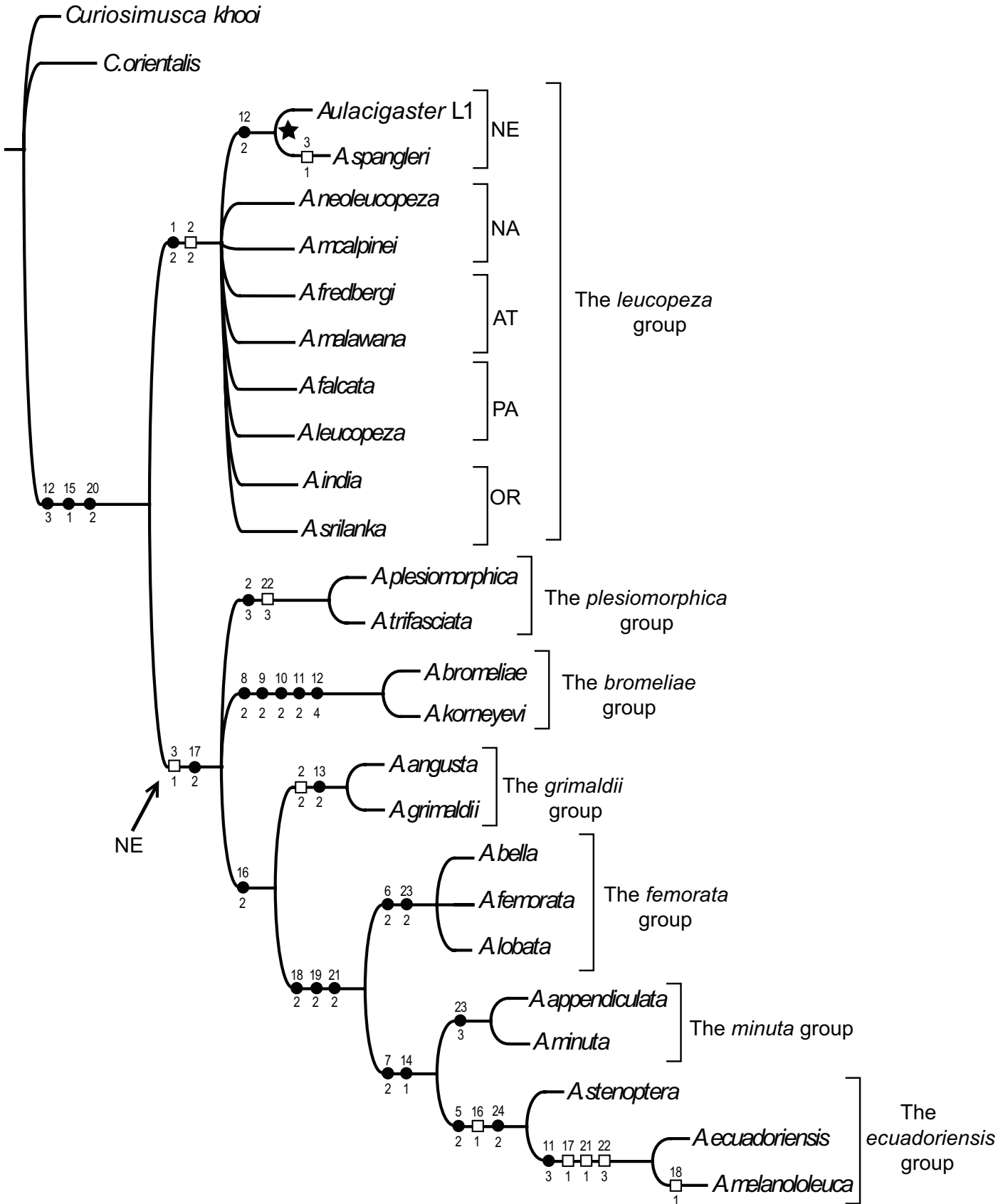
The *bromeliae* group of *Aulacigaster* is well characterized by five unambiguous synapomorphies. Besides their unique natural history traits (see in introduction and under “the bromeliae group” above), species of this group share the following synapomorphies: an excavated vertex (character 8, state 2; Figure 203); eyes encroaching on the dorsal portion of the frons (character 9, state 2; Figure 203); an elongated clypeus (character 10, state 2; Figure 21); an oval, decumbent 1st flagellomere (character 11, state 2; Figure 4); and an arista with long rays (character 12, state 4; Figure 4). The oval 1st flagellomere with an arista bearing long rays is a widespread condition in the

Perisclididae *sensu lato* and also occurs in the Anthomyzidae. The remaining characters are apparently unique to the *bromeliae* group.

The monophyly of the *plesiomorphica* group is supported by two synapomorphies: (1) a strong, sharp, semi-lunate microtomentose band on the ventral portion of the frons (character 2, state 3; Figure 213), unique to this group; (2) the presence of unusually strong setae on one posterior process of the gonopod (character 22, state 3; Figure 132). The last character is also present in species of the *ecuadoriensis* group but this is hypothesized in this analysis to be convergent. Characters 22 and 24 may be dependent (linked), because generally whenever two processes are present on the gonopod, at least one bears strong setae. There are a few exceptions to this rule, however. For example, *A. belize*, in the *plesiomorphica* group (Figure 137), has only one posterior gonopodal process, and it has strong setae; also, *A. india* (Figure 200), *A. srilanka* (Figure 201), and *A. L3* (not coded), species of the *leucopeza* group, have relatively well-developed, long setae on the only posterior process of their gonopod. Until there is evidence showing that characters 22 and 24 are linked, we have chosen to code them as separate characters.

The remaining groups of *Aulacigaster* (the *grimaldii*, *ecuadoriensis*, *femorata*, and *minuta* groups) together share one unambiguous (albeit homoplasious) synapomorphy, reduction in the subcosta (character 16, state 2; Figure 85). In *Curiosimusca*, as well as in species of the *leucopeza*, *bromeliae*, and *plesiomorphica* groups, the subcosta is partially fused with vein  $R_1$ , but still reaches the Costa (state 2; Figures 3, 150). Character state 1 (subcosta incomplete) is also present in the *ecuadoriensis* group, but as the result of reversal based on our analysis. A subcostal vein partially fused with vein  $R_1$  is present in presumably related families, such as the Anthomyzidae and Opomyzidae, but whether the Sc vein is complete or incomplete to the Costa in these families was not ascertained by us, and would not change our results. The groups *grimaldii*, *ecuadoriensis*, *femorata*, and *minuta* also share a reduction in the microtomentum coverage of the scutum (character 4, states 2–4), but the optimization of the corresponding states are ambiguous in our cladogram.

The two known species of the *grimaldii* group form a monophyletic group supported by two unambiguous synapomorphies: the presence of a microtomentose stripe on the lower frons (character 2, state 2; Figure 209), a condition similar to but not homologous with the condition found in the *leucopeza* group; and sexual dimorphism of



**FIGURE 202.** (*Facing page*) One of 17 trees obtained with branch-and-bound search, unordered characters, chosen to represent the phylogenetic relationships between species groups of *Aulacigaster* (39 steps, consistency index = 0.82 and retention index = 0.93). Only unambiguous synapomorphies are represented. Empty squares represent homoplasious synapomorphies; filled circles represent non-homoplasious synapomorphies. Branches that are not supported by any characters are shown as collapsed, and a filled star shows where branches collapse on the strict consensus cladogram.

the face (character 13, state 2; Figures 103–104). An additional synapomorphy for these two species that is present only under delayed transformation optimization (DELTRAN optimization) is the microtomentose coverage of the scutum, present only between the dorsocentral rows of setae (character 4, state 2).

Certain modifications of the hindlegs support the monophyly of a clade comprising the *ecuadoriensis*, *femorata*, and *minuta* groups. In species of this clade, the hind femur of males and females is enlarged and has two ventral rows of well-defined protrusions, each bearing an apical seta (character 19, state 2; Figure 66). The male hind femur also bears a basal lobe with setae (character 18, state 2) that in some species is preceded by a basal concavity (Figure 66). The lobe is reduced in some species, as in *A. melanoleuca* (Figure 43). Such unique modifications of the hind femur are not present in closely related groups outside Aulacigastridae. A third synapomorphy for this assembly is in the ventral position of the surstylus (character 21, state 2; Figure 68). In other groups of *Aulacigaster*, the surstylus is located posteroventrally. This synapomorphy is reversed in *A. ecuadoriensis* + *A. melanoleuca*, being also present in two species not represented in our analysis (*A. aenigma* and *A. fastidiosa*). The latter have a lobe-like, posteroventral surstylus (Figure 38), a condition similar to that found in the *pleiomorphica* group (Figure 143).

Species of the *femorata* group are united by two unambiguous synapomorphies: the presence of a white to yellowish region on tergites 1+2 that sometimes extends over tergite 3 (character 6, state 2; Figure 62); and the ventral portion of the gonopod partly separated from the medial portion, forming a weakly differentiated ventral plate (character 23, state 2; Figure 67). This last character state seems at least superficially to be homologous with that found in the *minuta* group (state 3; Figure 111), whose species have a strongly sclerotized ventral plate, but the results of our analysis suggest that these structures have developed independently. Coding character 23 as ordered to force one step between states 2 and 3 does not change the results of this analysis. An additional synapomorphy for the *femorata* group that is present under DELTRAN optimization only is the microtomentose coverage of the

scutum, present only on the anterior portion (character 4, state 3).

Species belonging in the *minuta* and the *ecuadoriensis* groups have an elongated body (character 7, state 2; Figures 40, 107) and show the loss of the ocellar seta (character 14, state 1). Under DELTRAN optimization, they share an additional synapomorphy, the almost complete lack of microtomentum on the scutum (character 4, state 4). Both groups have other similarities, apparently correlated with a compressed body: head longer than high, face not protrudent, wing unusually longer than wide, etc. To which extent a complete reduction in the ocellar setae and compression of the body are correlated in these two groups cannot be determined with certainty for the present. We know, however, that reduction of the ocellar seta is widespread in closely related groups that do not have a dorsoventrally compressed body, and dorsoventrally compressed species of Neurochatetidae have long ocellar setae. Therefore, we have decided to treat these two characters as independent in this analysis.

Species of the *ecuadoriensis* group are unique among *Aulacigaster* in the coloration of the thoracic pleural region, which is white on the ventral half (character 5, state 2; Figure 40). This state is absent in related families as well as in *Curiosimusca* and other species of *Aulacigaster*. Other synapomorphies for this group are the presence of two posterior processes on the gonopod (character 24, state 2; Figure 30), a convergence with the *pleiomorphica* group, and the subcostal vein reaching the costal margin (character 16, state 1; Figure 53), which is a reversal. Within the *ecuadoriensis* group, *A. ecuadoriensis* and *A. melanoleuca* are sister-groups. They share at least one non-homoplasious synapomorphy: a triangular 1st flagellomere (character 11, state 3; Figure 206). Other synapomorphies shared by these two species are reversals, as the long vein  $R_{2+3}$  (character 17, state 1; Figure 41), or convergences with character states found in the *pleiomorphica* group, such as the position of the surstylus (character 21, states 1) and the presence of strongly developed, long and thick setae on the posterior process of the gonopod (character 22, state 3; Figure 30).

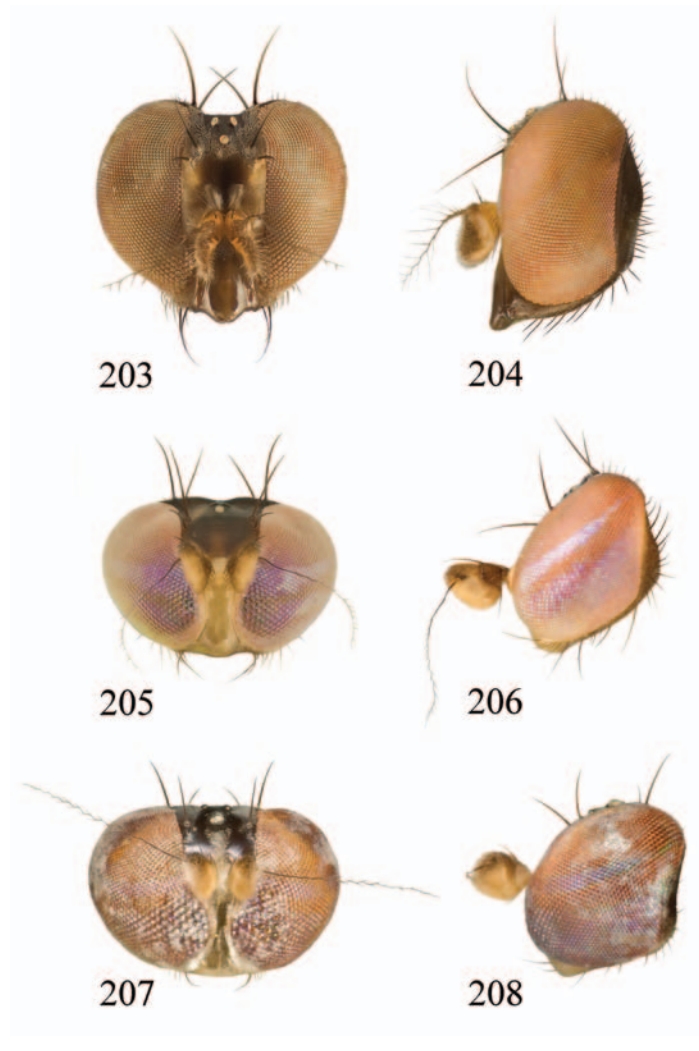
The *minuta* group is unique for having a dark brown structure on the ventral portion of the gonopods (character

23, state 3; Figure 111). Species of this group are also unusually small and delicate, a condition quite different from that found in the *ecuadoriensis* group.

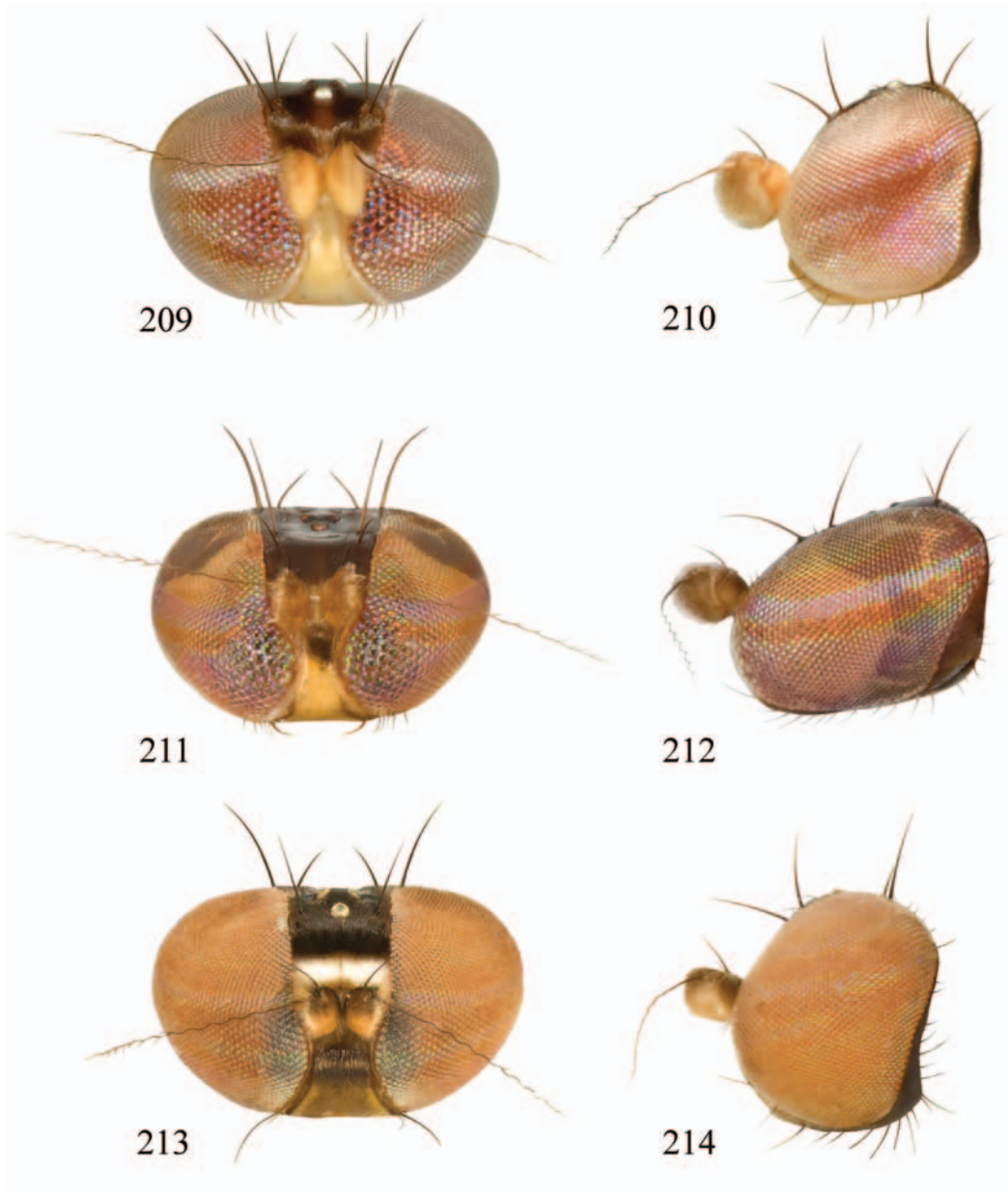
Even though this contribution has greatly increased the number of known species of *Aulacigaster* and expanded our knowledge about the distribution of the genus worldwide, we believe that much more collecting is needed to reveal the distribution patterns of the various species groups, particularly in the Neotropical Region. Most species reported in this contribution come from Central America and the northern portion of South America, giving the impression that the species groups to which they belong are primarily distributed in these regions. For example, species of the relatively rare *minuta* group are

only known from Central America and one South American country, Bolivia. Out of the seven Neotropical species groups recognized in this study, only one, the *bromeliae* group, is reported from the southern part of South America, and except for a few scattered specimens collected in Rondônia (in the frontier with Bolivia), the *ecuadoriensis*, the *femorata*, and the *plesiomorphica* groups are unknown from Brazil or from anywhere south of Bolivia. These distribution patterns, rather than reflecting true biogeographic history and ecological constraints, are probably a function of sampling error and collecting biases, the lack of good acalyptrate collections in museums of several countries in South America, and difficulties obtaining collecting and export permits from countries such as Brazil.

## FIGURES 203–220



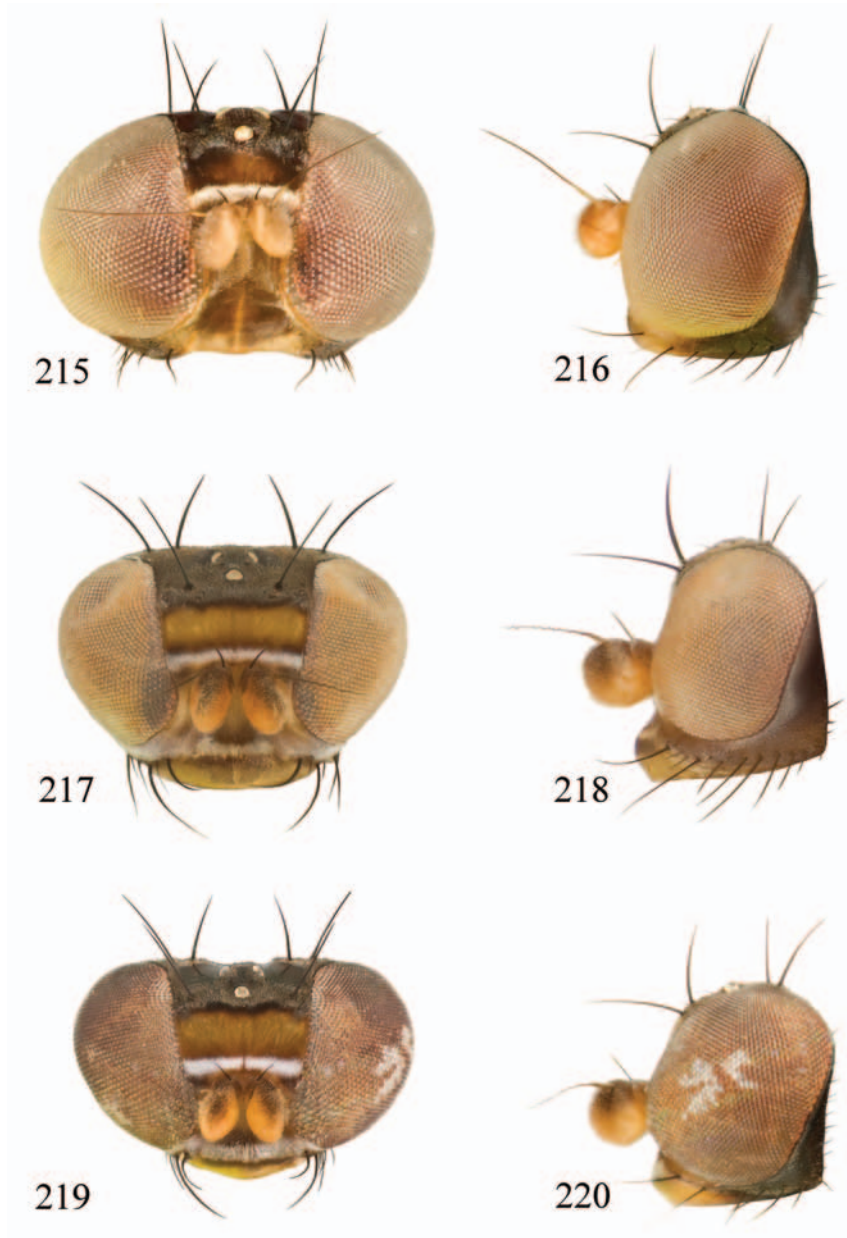
FIGURES 203–208. Digital photographs of heads of *Aulacigaster* species. (203) *A. bromeliae*, frontal aspect; (204) *A. bromeliae*, lateral aspect; (205) *A. ecuadoriensis*, frontal aspect; (206) *A. ecuadoriensis*, lateral aspect; (207) *A. femorata*, frontal aspect; (208) *A. femorata*, lateral aspect.



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FIGURES 209–214. Digital photographs of heads of *Aulacigaster* species. (209) *A. grimaldii*, frontal aspect of male; (210) *A. grimaldii*, lateral aspect; (211) *A. minuta*, frontal aspect; (212) *A. minuta*, lateral aspect; (213) *A. proxima*, frontal aspect; (214) *A. proxima*, lateral aspect.

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FIGURES 215–220. Digital photographs of heads of *Aulacigaster* species. (215) *A. spangleri*, frontal aspect; (216) *A. spangleri*, lateral aspect; (217) *A. leucopeza*, frontal aspect; (218) *A. leucopeza*, lateral aspect; (219) *A. india*, frontal aspect; (220) *A. india*, lateral aspect.





# Appendix: Character Matrix

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```
#NEXUS
BEGIN DATA;
  DIMENSIONS NTAX=26 NCHAR=24;
  FORMAT SYMBOLS= "0 1 2 3 4 5" MISSING=? GAP=- ;
  MATRIX

      123456789012345678901234
C.khooi      112111111111122111111111
C.orientalis 112111111111122111111111
A.angusta    1212111111113221221121111
A.grimaldi   1212111111113221221121111
A.bromeliae  111111122224121121121111
A.korneyevi  111111122224121121121111
A.plesiomorpha 131111111113121121121311
A.trifasciata 131111111113121121121311
A.ecuadoriensis 11142121113311-112221312
A.melanololeuca 11142121113311-111221312
A.stenoptera  11142121111311-122222112
A.bella       111312111113121222222121
A.femorata    111312111113121222222121
A.lobata      111312111113121222222121
A.appendiculata 11141121111311-222222131
A.minuta      11141121111311-222222131
A.L1          22211111111212111112??11
A.spangleri   22111111111212111112??11
A.india       222111111113121111121211
A.srilanka    22211111111?12111112-211
A.neoleucopeza 222111111113121111121-11
A.macalpinei  222111111113121111121111
A.fredbergii  222111111113121111121111
A.malawana    222111111113121111121111
A.falcata     222111111113121111121111
A.leucopeza   222111111113121111121111
;
END;
Set AUTOCLOSE;
LOG file = aulaciphylo.log;
bandb;
savetrees file=bandb.tre;
contree;
```

Displayed here is a Nexus file (including character matrix and PAUP commands) used to generate the phylogenetic analysis in PAUP.



# References

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- Bächli, G. 1997. Die Arten der Tanypezidae, Dryomyzidae, Periscelididae, Acartophthalmidae, Aulacigastridae and Stenomicridae in der Schweiz (Diptera). *Mitteilungen der Entomologischen Gesellschaft Basel*, 47(1):29–34.
- . 1998. “Aulacigaster.” In *Diptera–Checklist*, ed. B. Merz, G. Bächli, J.-P. Haenni, and Y. Gonseth, pp. 288, 369. Fauna Helvetica 1. Basel: Schweizerische Entomologische Gesellschaft, Société Entomologique Suisse.
- Bächli, G., L. Papp, and S. Vanin. 1999. New Records of Aulacigastridae and Drosophilidae (Diptera) from Switzerland, Italy and Greece. *Mitteilungen der Schweizerischen entomologischen Gesellschaft*, 72:119–122.
- Baptista, A. R. 1998a. “Systematics of the Family Aulacigastridae.” In *Fourth International Congress of Dipterology, Abstracts, 6–13 September 1998, Oxford, UK*, ed. J. W. Ismay.
- . 1998b. “Preliminary Cladistic Analysis of the Family Aulacigastridae *sensu lato* (Diptera, Cyclorrhapha).” In *17th Meeting of the Willi Hennig Society, Abstracts, São Paulo, Brazil, 21–25 September 1998*. São Paulo, Brazil: Universidade de São Paulo.
- Barraclough, D. A. 1993. The Afrotropical Species of *Aulacigaster* Macquart (Diptera: Aulacigastridae: Aulacigastrinae). *Annals of the Natal Museum*, 34(1):31–42.
- Becker, T. 1902. Die Meigen’schen Typen der sogen. Muscidae acalypterae (Muscaria holometopa) in Paris und Wien. *Zeitschrift für systematische Hymenopteroologie und Dipterologie* 2(5):209–256, 289–349.
- . 1905. “Aulacigaster.” In *Katalog der paläarktischen Dipteren*, ed. T. Becker, M. Bezzi, K. Kertész, and P. Stein, p. 216. Hódmezővásárhely, Budapest: G. Wesselényi.
- Chandler, P. J. 1987. The Families Diastatidae and Campichoetidae (Diptera, Drosophiloidea) with a Revision of Palaearctic and Nepalese Species of *Diastata* Meigen. *Entomologica Scandinavica*, 18(1):1–50.
- Christianson, C. P., and R. E. Ryckman. 1955. First Report of *Aulacigaster leucopeza* (Mg.) from Baja California, Mexico; California, New Mexico and Idaho. *Bulletin of the Brooklyn Entomological Society*, 50:17.
- Cole, E. J., and F. A. Streams. 1970. Insects Emerging from Brown Slime Fluxes in Southern New England. *The Canadian Entomologist*, 102:321–333.
- Courtney, G. W., B. J. Sinclair, and R. Meier. 2000. “Morphology and Terminology of Diptera Larvae.” In *Contributions to a Manual of Palaearctic Diptera*, ed. L. Papp and B. Darvas, pp. 85–161. Budapest: Science Herald.
- Cumming, J. M., B. J. Sinclair, and D. M. Wood. 1995. Homology and Phylogenetic Implications of Male Genitalia in Diptera—Eremoneura. *Entomologica Scandinavica*, 26(2):121–149.

- Dallwitz, M. J. 1980. A General System for Coding Taxonomic Descriptions. *Taxon*, 29:41–46.
- Dallwitz, M. J., T. A. Paine, and E. J. Zurcher. 1993. User's Guide to the DELTA System: A General System for Processing Taxonomic Descriptions, 4th ed. <http://biodiversity.uno.edu/delta/> (accessed 20 Jul 2000).
- Davis, E. J., and R. S. Zack. 1978. New Host Records and Notes on the Dipterous Family Aulacigastridae. *The Pan-Pacific Entomologist*, 54:129–130.
- Duda, O. 1924. Beitrag zur Systematik der Drosophiliden unter besonderer Berücksichtigung der paläarktischen u. orientalischen Arten (Dipteren). *Archiv für Naturgeschichte*, 90:172–234.
- . 1934. "Periseelidae, Astiidae, Aulacogastridae Curtonotidae." In *Die Fliegen der paläarktischen Region*, ed. E. Lindner, pp. 1–5. Stuttgart: Schweizerbart.
- Dufour, L. 1846. Histoire des métamorphoses de l'*Aulacigaster rufitarsis*, et critiques sur ce genre de Muscides Acalyptérées (1). *Annales Société de la Entomologique de France*, 4:455–463.
- Duxbury, K. J., and D. A. Barraclough. 1994. Rarely Encountered Diptera Families in Southern Africa: An Introductory Conservation Perspective. *Annals of the Natal Museum*, 35:25–43.
- Evenhuis, N. L. 1989. "Family Aulacigastridae." In *Catalog of the Diptera of the Australasian and Oceanian Regions*, ed. N. L. Evenhuis, p. 549. Honolulu and Leiden: B. P. Bishop Museum and E. J. Brill.
- . 1994a. *Catalogue of the Fossil Flies of the World (Insecta: Diptera)*. Leiden: Backhuys Publishers.
- . 1994b. *Catalogue of the Fossil Flies of the World (Insecta: Diptera)*. <http://hbs.bishopmuseum.org/fossilcat> (accessed 27 April 2009).
- Farris, J. S. 1969. A successive approximations approach to character weighting. *Systematic Zoology*, 18:374–385.
- . 1986. A Successive Approximations Approach to Character Weighting. *Systematic Zoology*, 26:269–276.
- . 1989. The Retention Index and the Rescaled Consistency Index. *Cladistics*, 5:417–419.
- Ferrari, P. 1987. A Guide to the Breeding Habits and Immature Stages of Diptera Cyclorrhapha. *Entomonograph*, 8(1):1–478; (2):479–907.
- Freidberg, A. 1994. A New Palearctic Species of *Xenasteia* Hardy (Diptera: Xenasteiidae). *Israel Journal of Entomology*, 28:133–137.
- Griffiths, G. C. D. 1972. *The Phylogenetic Classification of Diptera Cyclorrhapha with Special Reference to the Structure of the Male Postabdomen*. Series Entomologica, Vol. 8. The Hague: W. Junk.
- Hennig, W. 1956. Neue neotropische Acalyptrata aus dem Deutschen Entomologischen Institut (Diptera: Acalyptrata). *Beiträge zur Entomologie*, 6:146–154.
- . Die Familien der Diptera Schizophora und ihre phylogenetischen Verwandtschaftsbeziehungen. *Beiträge zur Entomologie*, 8:505–688.
- . 1965. Die Acalyptraten der Baltischer Bernsteins. *Stuttgarter Beiträge zur Naturkunde*, 145:1–215.
- . 1969. Neue Gattungen und Arten der Acalyptratae. *The Canadian Entomologist*, 101(6):589–633.
- . 1971. Neue Untersuchungen über die Familien der Diptera Schizophora (Diptera: Cyclorrhapha). *Stuttgarter Beiträge zur Naturkunde*, 226:1–76.
- Hilger, S., and C. F. Kassebeer. 2000. A New Species of *Aulacigaster* Macquart 1835 (Diptera, Aulacigastridae) from Réunion. *Dipteron*, 3(2):167–172.
- Kassebeer, C. 2001. The einheimischen Arten der Gattung *Aulacigaster* Macquart, 1835 (Diptera, Aulacigastridae). *Dipteron*, 4(1):23–32.
- Macquart, J. 1835. Histoire naturelle des insectes. Diptères. Tome deuxi-me. Ouvrage accompagn. de planches. Paris: Roret.
- Malloch, J. R., and W. L. McAtee. 1924. Flies of the Family Drosophilidae of the District of Columbia Region, with Keys to the Genera, and Other Notes, of Broader Application. *Proceedings of the Biological Society of Washington*, 37:25–42.
- Mathis, W. N., and A. Freidberg. 1994. A Review of North American *Aulacigaster* Macquart (Diptera: Aulacigastridae). *Proceedings of the Entomological Society of Washington*, 96(4):583–598.
- Mathis, W. N., and L. Papp. 1992. A New Genus of Periscelididae (Diptera) from the Neotropics. *Proceedings of the Biological Society of Washington*, 105(2):366–372.
- McAlpine, D. K. 1978. Description and Biology of a New Genus of Flies Related to *Anthoclusia* and Representing a New Family (Diptera, Schizophora, Neurochaetidae). *Annals of the Natal Museum*, 23(2):273–295.
- . 1983. A New Subfamily of Aulacigastridae (Diptera: Schizophora), with a Discussion of Aulacigastrid Classification. *Australian Journal of Zoology*, 31:55–78.
- McAlpine, J. F. 1981. "Morphology and Terminology—Adults." In *Manual of Nearctic Diptera*, ed. J. F. McAlpine, B. V. Peterson, G. E. Shewell, H. J. Teskey, J. R. Vockeroth, and D. M. Wood, pp. 9–63. Ottawa: Research Branch, Agriculture Canada.
- . 1989. "Phylogeny and Classification of the Muscomorpha." In *Manual of Nearctic Diptera*, ed. J. F. McAlpine, B. V. Peterson, G. E. Shewell, H. J. Teskey, J. R. Vockeroth, and D. M. Wood, pp. 1397–1518. Ottawa: Research Branch, Agriculture Canada.
- Meigen, J. W. 1830. *Systematische Beschreibung der bekannten europäischen zweiflügeligen Insekten*. Volume 6. Hamm: Schulz-Wundermann.
- . 1838. *Systematische Beschreibung der bekannten europäischen zweiflügeligen Insekten*. Vol. 7, oder Supplementband. Hamm: Schulz-Wundermann.
- Oldenberg, L. 1914. Beitrag zur Kenntnis der europäischen Drosophiliden (Dipt.). *Archiv für Naturgeschichte*, 80(2):1–42.
- Pankhurst, R. J. 1991. *Practical Taxonomic Computing*. Cambridge: Cambridge University Press.
- Papavero, N. 1967. "Family Aulacigastridae." In *A Catalogue of the Diptera of the Americas South of the United States*, ed. N. Papavero, pp. 1–2. São Paulo: Departamento de Zoologia, Secretaria de Agricultura.
- Papp, L. 1984. "Family Aulacigastridae." In *Catalogue of Palearctic Diptera*, ed. A. Soós and L. Papp, pp. 60–61. New York: Elsevier.
- . 1998a. The Palearctic Species of *Aulacigaster* Macquart (Diptera, Aulacigastridae). *Acta Zoologica Academiae Scientiarum Hungaricae*, 43(3):225–234.

- . 1998b. “Family Aulacigastridae.” In *Contributions to a Manual of Palaearctic Diptera (With Special Reference to Flies of Economic Importance)*, Higher Brachycera, ed. L. Papp and Bela Darvas, Vol. 3, pp. 279–284. Budapest: Science Herald.
- . 2008. Description of the Immature Stages and the Adult Female of *Aulacigaster africana*, the First Known for the Afrotropical Aulacigastridae (Diptera: Schizophora). *African Invertebrates*, 49(2):227–232.
- Robinson, I. 1953. The Postembryonic Stages in the Life Cycle of *Aulacigaster leucopeza* (Meigen) (Diptera, Cyclorrhapha: Aulacigasteridae). *Proceedings of the Royal Entomological Society of London (A)*, 28:77–84.
- Roháček, J. 1998. Taxonomic Limits, Phylogeny and Higher Classification of Anthomyzidae (Diptera), with Special Regard to Fossil Record. *European Journal of Entomology*, 95:141–177.
- Rondani, C. 1874. Species Italicae ordinis Dipteriorum (Muscaria Rndn.) collectae et observatae. Stirps XXII Loncheinae Rndn. *Bullettino della Società Entomologica Italiana*, 6:243–274.
- Rung, A., W. N. Mathis, and L. Papp. 2005. *Curiosimusca*, gen. nov., and Three New Species in the Family Aulacigastridae from the Oriental Region (Diptera: Opomyzoidea). *Zootaxa*, 1009:21–36.
- Sabrosky, C. W. 1977. “Family Aulacigastridae.” In *A Catalog of the Diptera of the Oriental Region. Suborder Cyclorrhapha (Excluding Division Aschiza)*, ed. M. D. Delfinado and D. E. Hardy, p. 230. Honolulu: University Press of Hawaii.
- . 1983. A Synopsis of the World Species of *Desmometopa* Loew (Diptera, Milichiidae). *Contributions of the American Entomological Institute*, 19(8):1–69.
- Schiner, I. R. 1863. “Die Fliegen (Diptera).” In *Fauna Austriaca*, Vol. 2, pp. 81–288. Vienna: Carl Gerold’s Sohn.
- . 1864. *Catalogus systematicus dipteriorum Europae*. Vindobonae [Vienna]: Societatis zoologico-botanicae.
- Swofford, D. L. 2002. *PAUP\*. Phylogenetic Analysis Using Parsimony (\*and Other Methods)*. Sinauer Associates, Sunderland, Massachusetts.
- Teskey, H. J. 1976. Diptera Larvae Associated with Trees in North America. *Memoirs of the Entomological Society of Canada*, 100:1–53.
- . 1987. “Family Aulacigastridae.” In *Manual of Nearctic Diptera*, ed. J. F. McAlpine, pp. 891–894. Ottawa: Research Branch, Agriculture Canada.
- Wahlberg, P. F. 1847. Tvänne nya dipter-genera af agromyzidernas familj. *Öfversigt af Kongl. Vetenskaps-Akademiens Förhandlingar*, 4:259–263.
- Winkler, I. S., A. Rung, and S. J. Scheffer. 2010. Hennig’s Orphans Revisited: Testing Morphological Hypotheses in the “Opomyzoidea.” *Molecular Phylogenetics and Evolution* 54:746–762.
- Wirth, W. W. 1965. “Aulacigastridae.” In *A Catalog of the Diptera North of Mexico*, ed. A. Stone, C. W. Sabrosky, W. W. Wirth, R. H. Foote, and J. R. Coulson, p. 823. Washington, D.C.: U.S. Department of Agriculture.
- Yeates, D. K. 1995. Groundplans and Exemplars: Paths to the Tree of Life. *Cladistics*, 11:343–57.



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