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Revision of the species of *Jaliscoa* Bouček within a review of the identity, relationships and membership of *Jaliscoa*, *Catolaccus* Thomson, *Eurydinoteloides* Girault, *Lyracus* Walker and *Trimeromicrus* Gahan (Hymenoptera: Pteromalidae)

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Abstract

The limits of *Lycrus* Walker (1842), *Catolaccus* Thomson (1878), *Eurydinoteloides* Girault (1913a), *Trimeromicrus* Gahan (1914), and *Jaliscoa* Bouček (1993) are re-evaluated and redefined to better reflect observed distribution of morphological features. Nine of 13 New World species of *Catolaccus* are transferred to other genera and photographs of the primary type specimens are given to assist future recognition. New features are provided to assist identification of the remaining four Nearctic species of *Catolaccus* and these are compared to European species, with the observation that *C. kansensis* (Girault 1917c) could be a junior synonym of *C. crassiceps* (Masi 1911). *Trimeromicrus* is removed from synonymy under *Lycrus* for the single species *T. maculatus* Gahan (1914) **rev. comb.** Newly synonymized under *Lycrus* is the Australasian genus *Neocylus* Bouček (1988) **n. syn.** Ten species are newly transferred to *Lycrus*—*L. nigraeneus* (Girault 1915) **n. comb.** (from *Neocylus*), *L. helice* (Walker 1843) **n. comb.** and *L. cyaneus* (Girault 1911) **n. comb.** (from *Catolaccus*), and *L. albiclavus* (Girault 1917c) **n. comb.**, *L. capitatus* (Burks 1955) **n. comb.**, *L. chalcis* (Burks 1955) **n. comb.**, *L. coeliodis* (Ashmead 1896) **n. comb.**, *L. deuterus* (Crawford 1911) **n. comb.**, *L. nigroaeneus* (Ashmead 1894a) **n. comb.** and *L. rosaecolis* (Burks 1955) **n. comb.** (from *Zatropis* Crawford 1908). *Catolaccus pallipes* Ashmead (1894b) is newly transferred to *Pteromalus* Swederus (1795) as *Pteromalus pallipes* (Ashmead) **n. comb.** and *Catolaccus fragariae* Rohwer (1934) to *Lariophagus* Crawford (1909) as *Lariophagus fragariae* (Rohwer) **n. comb.** Nine species are newly transferred to *Eurydinoteloides*—*E. tepicensis* (Ashmead 1895) **n. comb.** (from *Catolaccus*), *E. dymnus* (Walker 1847) **n. comb.**, *E. hermeas* (Walker 1847) **n. comb.**, *E. incerta* (Ashmead 1893) **n. comb.**, *E. orontas* (Walker 1847) **n. comb.**, *E. perdubia* (Girault 1916) **n. comb.**, *E. platensis* (De Santis in De Santis *et al.* 1979) **n. comb.** and *E. timaea* (Walker 1847) **n. comb.** (from *Lycrus*), and *E. eudubia* (Özdikmen 2011) **n. comb.** (from *Spintherus* Thomson 1878). Four species are newly transferred to *Jaliscoa*—*J. grandis* (Burks 1954) **n. comb.** and *J. hunteri* (Crawford 1908) **n. comb.** (from *Catolaccus*), and *J. townsendi* (Crawford 1912) **n. comb.** and *J. vulgaris* (Ashmead 1894b) **n. comb.** (from *Pteromalus*). The species of *Jaliscoa* are revised to include *J. nudipennis* Bouček 1993, *J. bouceki* **n. sp.**, *J. hunteri* and *J. vulgaris*. Re-established in synonymy under *J. hunteri* is *J. townsendi* **n. comb.** One new species of *Pteromalus*, *P. grisselli* **n. sp.**, is described as an egg predator in the egg sacs of *Dictyna coloradensis* Chamberlin (Araneae: Dictynidae) and compared to

Catolaccus species and other pteromalids that are predators of spider eggs. Lectotypes are designated for *Pteromalus helice* Walker (1843), *Catolaccus pallipes* Ashmead (1894b) and *Catolaccus vulgaris* Ashmead (1894b). Diagnoses are given to differentiate *Catolaccus*, *Eurydinoteloides*, *Jaliscoa*, *Lyracus* and *Trimeromicrus* from each other, and more extensive descriptions given to help differentiate these genera from other Pteromalinae. Morphological features are illustrated through macrophotography and scanning electron photomicrography.

Key words: Chalcidoidea, morphology, hosts, distribution

Introduction

Walker (1842) established *Lyracus* (Hymenoptera: Chalcidoidea: Pteromalidae: Pteromalinae) for a species discovered by Charles Darwin near Valparaiso, Chile, during the second voyage of the Beagle, likely sometime between 24 July and 13 August 1834 (Darwin 1839). Since then, 16 species from the Nearctic region and 5 species from the Neotropical region have been assigned to *Lyracus* (Noyes 2012). Several of these species were described originally in three other genera, *Zatropis* Crawford (1908), *Oluspa* Cameron (1913), and *Trimeromicrus* Gahan (1914). *Zatropis* was partly characterized by the body having “scattered, appressed, scale-like white hairs” (Crawford 1908: 159), whereas *Oluspa* was partly characterized by being “sparsely covered with distinct thickish white hairs” (Cameron 1913: 129), and *Trimeromicrus* was partly characterized by a unique mesonotal colour pattern but with unmodified setae similar to *Lyracus*. *Lyracus* was subsequently considered the senior synonym of *Trimeromicrus* by Heydon and Bouček (1992) and of *Oluspa* and *Zatropis* by Bouček (1993). Under this concept, *Lyracus* has been considered to be restricted to the New World (Noyes 2012).

Prior to the synonymy of *Zatropis* under *Lyracus*, Heydon and Bouček (1992: 480) stated that *Zatropis* “is one of the most species-rich genera of Nearctic Pteromalidae” but “despite its species sharing a similar gestalt, there are few autapomorphic characters defining *Zatropis* as a whole”. They listed the three most distinctive characteristics of *Zatropis* as 1) a distinct ventral row of admarginal setae on the fore wing, 2) often distinct flattened white setae on the head and mesosoma, and 3) a relatively short propodeum with a usually well-developed median carina and convex but dorsoposteriorly flattened nucha. However, they also noted that *Callitula* Spinola (1811), *Systasis* Walker (1834) and *Eurydinoteloides* Girault (1913a) all have similar admarginal setae, and that a few other pteromaline genera such as *Acaenacis* Girault (1917a) have flattened white setae on the body. They concluded that “more study is needed on the relationship between *Zatropis* and other similar pteromaline genera such as *Mesopolobus* and *Eurydinoteloides* and many similar forms found in the Neotropics”. In discussing their key to the Nearctic genera of Chalcidoidea, Bouček and Heydon (1997: 545) later repeated that in “some cases, genera, such as *Lyracus* or *Chlorocyclus* have a certain gestalt that, once learned, enables their ready recognition, but the variation among species is such that a single suite of characters is insufficient for generic classification of all the species”. Because of this, they keyed *Lyracus* three times (couplets 263, 287, 303) in order to differentiate species with two or three anelli, with or without a distinct malar depression, and with or without a distinct costula.

Eurydinoteloides was described by Girault (1913a) for a species from Paraguay that, similar to *Zatropis*, was characterized in part by the flagellum having three anelli and “short white hairs which are scattered and reclining” on the body, plus mandibles with four teeth and the median carina of the propodeum being “crossed at proximal third by a cross-carina joining the lateral ones” (Girault 1913a: 55). Bouček and Heydon (1997) included *Eurydinoteloides* in their key to Nearctic genera within a group of genera delineated in part by three anelli and a distinct costula, and distinguished it from *Lyracus* primarily by the presence of a distinct malar depression (couplet 286). Bouček (1988) had previously synonymized *Aeronea* Cameron (1913) and *Protolaccus* Burks (1954) under *Eurydinoteloides*. Burks (1954) described *Protolaccus* within a revision of five genera that he included in the *Catolaccus* group of genera, all of which were characterized in part by a malar depression. This group also included *Heterolaccus* Masi sensu Burks (1954) for five New World species. Masi (1937) established *Heterolaccus* for a species from Mauritania with two anelli and Bouček (1961) subsequently transferred its type species to *Pteromalus* Swederus (1795), treating *Heterolaccus* as a subgenus of *Pteromalus*. As a result of the actions of Bouček (1961), De Santis (1979) and Burks (1979), Noyes (2012) included two of the five species that Burks (1954) classified in *Heterolaccus* in *Catolaccus* Thompson (1878), whereas the other three species, which had originally been described in *Catolaccus*, he included in *Pteromalus*. Burks (1954) provided a history of *Catolaccus* and recognized four species from North America north of Mexico. Noyes (2012) listed another five species from

the Palaearctic region and, excluding those species that Burks (1954) included in *Heterolaccus*, an additional four species from the Neotropical region. Finally, in preparation for publishing Bouček and Heydon (1997), Bouček (1993) described the genus *Jaliscoa* based on a single female from Mexico. *Jaliscoa* was distinguished in part by a malar depression and two anelli like *Heterolaccus* sensu Burks (1954), but also by a transverse carina ventrally between the pro- and mesocoxae differentiating a mesosternal shelf, and by the metapleuron having a “sharp and raised anterior edge” (Bouček 1993: 1281). Crawford (1921) first used the feature of the anterior edge of metapleuron being recurved and projecting above the level of the mesopleuron to differentiate his new species *Zatropis tortricidis* from three other species then classified in *Zatropis*. Gibson *et al.* (2006) also used this feature to distinguish two of three species then classified in *Lycrus* that are associated with *Ceutorhynchus obstrictus* (Marshall) (Coleoptera: Curculionidae).

In an attempt to resolve the generic limits of *Lycrus* and the seemingly incongruent combinations of features shared with other genera, I initiated a review of species assigned to it and morphologically similar genera. This paper presents the results. Although *Pteromalus* is not treated in this work, one new species is described as part of the analysis of the relationships and generic limits of *Catolaccus*. Among the genera treated, only the species of *Jaliscoa* are revised, though a revision of *Eurydinoteloidea* from North America north of Mexico is in progress and a similar revision of *Lycrus* is planned.

Material

The acronyms listed below represent collections from which specimens were examined for this study or that contain unexamined type material (indicated by an asterisk). The names of individuals who assisted in loans of material are given in parenthesis.

AEI	American Entomological Institute, Gainesville, FL, USA (D. Wahl).
BMNH	The Natural History Museum, Department of Entomology, London, England (N. Dale-Skey).
CASC	California Academy of Sciences, Department of Entomology, San Francisco, CA, USA (R. Zuparko and B. Fisher).
CMNH	Cleveland Museum of Natural History, Cleveland, OH, USA (J. Keiper).
CNC	Canadian National Collection of Insects, Agriculture and Agri-Food Canada, Ottawa, ON, Canada.
CSCA	California State Collection of Arthropods, California Department of Food and Agriculture, Sacramento, CA, USA (J. Kishmirian).
DENH	Department of Zoology, University of New Hampshire, Durham, NH, USA (D. Chandler).
EMEC	Essig Museum of Entomology, University of California, Berkeley, CA, USA (R. Zuparko).
FSCA	Florida State Collection of Arthropods, Division of Plant Industry, FL, Gainesville, USA (J. Wiley).
HNHM*	Hungarian Natural History Museum, Zoological Department, Budapest, Hungary.
INHS	Illinois Natural History Survey, Insect Collection, Champaign, IL, USA (D. Dmitriev).
LACM	Los Angeles County Museum of Natural History, Insect Collection, Los Angeles, CA, USA (W. Xie).
LUZN*	Zoological Museum, Lund University, Lund, Sweden.
MEM	Mississippi Entomological Museum, Mississippi State, MI, USA (T. Schiefer).
MCSN*	Museo Civico di Storia Naturale “Giacomo Doria”, Genoa, Italy.
QMBA	Queensland Museum, Brisbane, Queensland, Australia (K. Koch, C. Burwell).
TAMU	Texas A&M University, Department of Entomology, College Station, TX, USA (E. Riley and J. Woolley).
UCDC	The Bohart Museum of Entomology, University of California, Davis, CA, USA (S. Heydon).
UCFO	University of Central Florida Collection of Arthropods, Department of Biology, Orlando, FL, USA (S. Fullerton).
UCRC	UCR Entomological Teaching and Research Collection, University of California, Riverside, CA, USA (S. Triapitzin).
USNM	United States National Entomological Collection, U.S. National Museum of Natural History, Washington, DC, USA (M. Gates).
WFBM	W.F. Barr Entomological Collection, University of Idaho, Moscow, ID, USA (F. Merickel).
ZMHB	Museum für naturkunde, Humboldt-Universität, Berlin, Germany (F. Koch, V. Richter).

Methods

Descriptions of structure were made using a Nikon SMZ-U microscope fitted with a 10 mm ocular grid having 100 divisions. A Leitz 50-watt tungsten halogen light source was used to illuminate specimens and a piece of translucent Mylar tracing acetate was taped to the objective between the light source and specimen to reduce glare. Specimens newly used for photography, except for primary type specimens or for scanning electron microphotography, were given a “CNC Photo 2011-x” specimen number label. These numbers are cited in the figure captions and in the lists of material examined for treated species so that figures can be matched with specimens in the future. Images without a cited CNC Photo number are SEM microphotographs taken previously for Gibson *et al.* (2006). Specimens were photographed with a Leica DFC 425C, 5 megapixel digital camera attached to a Leica Z16 APO macroscope and illuminated with two Leica KL2500 LCD fibre optic light sources fitted with 250-watt cold light reflector lamps. The serial images obtained were combined with Combine ZP or AutoMontage. Examination of specimens using the two different lights demonstrated that different light sources can significantly affect the perception and intensity of metallic lustre observed. This should be remembered by users when they use their own microscopes and light sources to compare specimens with the descriptions. Most scanning electron microphotographs were of uncoated specimens using a Philips XL30 environmental SEM. All the images were digitally retouched using Adobe Photoshop to enhance clarity, including, as necessary, horizontal flipping images so that body parts face in the same direction for ease of comparison.

Morphological terms follow Gibson (1997) with the following additions and clarification. The region of the propodeum lateral to the paraspiracular furrow (Figs 11, 190: psf) (= spiracular sulcus sensu Graham 1969) is the callus (Figs 11, 191: cal), whereas the region between the two paraspiracular furrows is the median region of the propodeum sensu Graham (1969). However, if plicae (= longitudinal folds or carinae, Figs 11, 158, 162: plc) are present on the median region then a plical region (Fig. 11: plr) (= panels of the median region sensu Graham 1969) is delimited between the plicae, and a paraspiracular region (Fig. 11: psr) is delimited between each plica and paraspiracular furrow. Even if plicae are not evident as carinae or folds along the length of the propodeum they are often indicated basally by the outer margins of the anterolateral plical depressions (Fig. 11: apd). The paraspiracular region sometimes has a transverse paraspiracular carina (Figs 158, 160, 190–194, 196: psc), which may (Figs 158, 160, 190–192) or may not (Figs 193, 194, 196) extend to the plica. The plical region can also have a transverse ridge or carina (= costula, Figs 158, 190–192: cos) that divides it into anterior and posterior panels (Fig. 190: ap, pp). Posterior to the plical region is a differentiated posteromedian region above the propodeal foramen anterior to the petiole. This region is called a nucha (Figs 11, 158, 192, 194: nuc) if it is convex, meshlike-coriaceous to reticulate, and not differentiated anteriorly by a distinct carina. It is called an adpetiolar strip (Figs 160, 196: aps) if it is more of a transverse-triangular or arcuate region that is differentiated anteriorly by a variably distinct carina and is comparatively smooth and shiny. However, the two extremes of structure intergrade so that designation of a nucha or adpetiolar strip is somewhat arbitrary in some taxa.

The number of anelli and funicular articles comprising the flagellum is also an important differential feature within Pteromalidae. In prior literature, an anellus has sometimes been interpreted simply as one or more ringlike or “anneliform” flagellomeres following the pedicel, and sometimes as one or more basal flagellomeres that lack multiporous plate sensilla (mps) regardless of their length (e.g. Bouček and Heydon 1997, couplet 236). The flagellum of the taxa treated herein is composed of eight flagellomeres, of which at least the basal two are ringlike and lack mps. However, the third flagellomere and rarely the fourth flagellomere can also lack mps and more closely resemble either the basal two anelliform flagellomeres or the subsequent flagellomeres depending on their length, setation, and sometimes colour. Because of the variation in structure, there is no objective method of defining an anellus other than the absence of mps. In this work, an anellus is considered as any basal flagellomere that lacks mps regardless of its appearance and, because of its variability, the exact structure of the third flagellomere is described. Presence or absence of mps from a flagellomere is correlated partly with length of the flagellomere. Species with small-bodied individuals, particularly *Lyracus* and males of *Eurydinotelooides*, can have up to four variably transverse flagellomeres that lack mps (Fig. 165). Further, when reduced, the third (Fig. 24) or fourth (Fig. 129) flagellomere may have just a single mps on one side and therefore apparent presence or absence differ depending on side of the flagellum viewed. Also, because the basal anellus is sometimes so reduced as to not be readily visible (e.g. Figs 129, 130), the number of anelli is best determined by counting the number of flagellomeres preceding the clava that have mps (= funiculars) rather than counting the number of visible ringlike flagellomeres.

For the fore wing, length of the submarginal vein (smv) is measured between the notch that delimits the base of the costal cell and the more or less abrupt angulation that delimits the base of the marginal vein (mv). Length of the marginal vein is measured between this angulation and the angle formed between the stigmal (stv) and postmarginal veins (pmv), length of the stigmal vein between this angle and the apex of the vein, and length of the postmarginal vein between the angle to the apex of the vein. The exact apex of the postmarginal vein can be difficult to determine because the vein usually gradually fades distally. Further, the basal point of the marginal vein is sometimes also difficult to determine precisely because it typically curves smoothly into the submarginal vein and the membrane of the costal cell extends at least slightly anterior to the base of the marginal vein. The admarginal area of the fore wing is a longitudinal region behind the length of the marginal vein, which typically has one or more rows of admarginal setae (Fig. 146: ams) on the ventral surface that point posteriorly in a different direction than the dorsal discal setae. The admarginal setae are sometimes obviously longer than the dorsal setae (e.g. Figs 18, 146) and/or conspicuous because the speculum (= bare region beyond the basal fold; Fig. 148: spc) extends partly (e.g. Figs 149, 150) or completely (e.g. Figs 143–146) to the stigmal vein.

Abbreviations used in the text, plates or figure captions are as follows: **ams** = admarginal setae, **ap** = anterior panel of propodeum, **apd** = anterolateral plical depression, **aps** = adpetiolar strip, **cal** = callus, **cos** = costula, **fl** = flagellomere, **Gt** = gastral tergum, **mpc** = mesopectal carina, **mps** = multiporous plate sensilla, **mv** = marginal vein, **nuc** = nucha, **oc** = occipital carina, **plc** = plical carina, **plr** = plical region, **pmv** = postmarginal vein, **pp** = posterior panel of propodeum, **psc** = paraspiracular carina, **psf** = paraspiracular furrow, **psr** = paraspiracular region, **PT** = paratype, **smv** = submarginal vein, **spc** = speculum, **stv** = stigmal vein.

Within lists of material examined, all records from Mexico are treated as Neotropical and those of *Jaliscoa hunteri* (Crawford) from Hawaii are listed under USA in the Nearctic region. The number of females and males examined is given for all species treated except for two very common species, *J. hunteri* and *Trimeromicrus maculatus* Gahan. Collection data are standardized and condensed following the format of Gibson (2011). New plant associates are listed in “Biology” only if the label stated the parasitoid was bred from the plant, not plants the parasitoid was simply collected from or “on”. A question mark after a new arthropod host record indicates the host identification is questionable based on the label data.

Results

Catolaccus Thomson

Pteromalus (*Catolaccus*) Thomson, 1878: 152. Type species: *Pteromalus cavigena* Thomson, by monotypy (♀ lectotype, LUZN, not examined). Gender: masculine.

Catolaccus Thomson; Ashmead, 1904: 320, 322.

Merisoides Masi, 1911: 141. Type species: *Merisoides crassiceps* Masi, by monotypy (♀ holotype, MCSN, not examined).
Synonymy by Delucchi (1956: 230).

Hortobagya Szélnyi, 1981: 403–404. Type species: *Hortobagya crassiceps* Szélnyi, by original designation and monotypy (♀ holotype, HNHM, not examined). Synonymy by Szélnyi (1982: 385).

Included regional species. *Catolaccus aeneoviridis* (Girault 1911), *C. cyanoideus* Burks (1954), *C. kansensis* (Girault 1917c), *C. victoria* Burks (1954).

Diagnosis. Metapleuron entirely sculptured and with anterior margin abutting posterior margin of mesopleuron on same level (Figs 11, 12). Flagellum of both sexes with 2 basal ringlike articles lacking mps and 6 funicular articles with mps (Figs 1, 2, 4). Fore wing ventrally with 3 or more rows of admarginal setae not longer than dorsal discal setae and with speculum often extending only to base of marginal vein (Fig. 10), though sometimes to base of stigmal vein. Head with arch-like malar depression extending about one-third to one-half distance to lower orbit (Figs 4, 7). Head and mesosoma sometimes with metallic blue or dark green lustre (Figs 3–6), but setae hairlike and not contrasting conspicuously with cuticle (Figs 3–9). Propodeum with variably developed plicae extending posteriorly to nucha, but without costula or transverse carina within paraspiracular region (Figs 11, 12). Mandibular dentition variable, but at least left mandible often tridentate (Fig. 6) or middle tooth with additional shorter, ventral, subapical tooth (Fig. 6: right mandible).

Description. Head and mesosoma black or with bluish to dark green lustre, with setae sometimes white but not contrasting conspicuously with cuticle and not suberect and bristlelike if dark (Figs 3–9). Eye bare or at least superficially bare with at most exceedingly short, sparse, inconspicuous setae (Figs 4–7). Mandibles with 3 or 4 teeth, the left mandible more commonly tridentate (Fig. 6), but both mandibles sometimes with shorter, subapical, ventral dent on middle tooth representing fourth tooth (Fig. 7). Head in frontal view (Fig. 6) subcircular; antenna inserted at or slightly above lower margin of eyes below middle, but at least within about ventral third of face; tentorial pits not evident; clypeus often appearing somewhat protuberant or at least distinctly differentiated from lower face by deep lateral angulation, and partly smooth to coriaceous or vertically alutaceous to somewhat reticulate-striate; lower face sometimes with more distinct, radiating striae lateral to clypeus, but usually meshlike coriaceous to reticulate, and upper face more distinctly though often finely meshlike reticulate, without tiny bump or smoother and shinier spot at ocular margin at midheight of eye (Figs 6, 7). Head in dorsal view (Fig. 5) variably distinctly transverse, but vertex broadly rounded (Fig. 4) and with (Fig. 8) or without dorsally margined occiput. Head in lateral view with arch-like malar depression extending about one-third to one-half distance to lower orbit (Fig. 7); malar space at least 0.5× length of comparatively small eye. Antenna with scape not quite extending to anterior ocellus, at least in female (Fig. 6); flagellum with 2 anelli and 6 funiculars in both sexes (Figs 1, 2, 4), the second anellus, at least in female, noticeably longer than first anellus (Fig. 2: insert) and sometimes obviously longer than wide; clava tapered to apex with small, ventroapical, encircled, oval micropilose sensory region; flagellum of male (Figs 1, 2) with funiculars closely abutting.

Pronotum with collar smoothly rounded into or abruptly angled relative to steeply angled collum (Figs 3, 5), but not separated from collum by smooth and shiny carina. Mesonotum (Fig. 8) meshlike reticulate; mesoscutum with incomplete notauli; scutellum widely truncate anteriorly, the axillae separated by distance similar to width of axilla, comparatively low convex and broad, without frenal line dorsally, and usually with abruptly reflexed marginal rim (Fig. 9: arrow); mesopectus without mesosternal shelf; upper mesepimeron extensively smooth and shiny. Fore wing (Figs 3, 10) hyaline or rarely variably distinctly infumate behind marginal and stigmal veins; marginal vein not thickened and at most about 1.3× as long as stv and 1.25× as long as pmv (Fig. 3); stigma not distinctly capitate; costal cell comparatively wide, with (Fig. 10) or without setae dorsoapically but with setae extending length of cell ventrally; basal cell and basal and mediocubital folds bare or variably extensively setose (Fig. 10), but at least vannal area and small region on disc adjacent to parastigma bare; disc ventrally with at least 3 rows of admarginal setae of similar length as dorsal setae and variably exposed depending on extent of speculum; disc dorsally variably densely setose beyond speculum and marginal fringe rarely absent if discal setae comparatively sparse; speculum often extending only to base of marginal vein (Fig. 10), but sometimes partly or completely to base of stigmal vein. Metapleuron completely sculptured and with anterior margin on same level as and abutting posterior margin of mesopleuron (Figs 11, 12). Metacoxa bare dorsobasally; metatibia with single tibial spur. Propodeum (Figs 11, 12) in dorsal view rounded posterolaterally, without distinct angulation or denticle projecting laterally; with transverse-rectangular or more globose, sculptured nucha and with variably developed plicae extending from anterior margin to anterolateral margins of nucha; plical region meshlike reticulate (Fig. 11) to transversely aciculate-coriaceous (Fig. 12) and with or without median carina, but without costula; paraspiracular region without transverse carina.

Gaster of female (Fig. 3) ovate to distinctly elongate-lanceolate with hypopygium extending at most about two-thirds length of gaster; gaster of male uniformly dark, without pale region basally; petiole very short, transverse, smooth and shiny, and not braced ventrally by extension of first gastral sternite; cercal setae all of similar length.

Generic limits. Burks (1954) provided a history of the interpretation of *Catolaccus* when he included it as one of five genera treated as the “*Catolaccus* group in the Americas”. He also included *Heterolaccus* Masi (1937) in the group, but unfortunately misinterpreted this name. Bouček (1961) synonymized *Heterolaccus* as a subgenus of *Pteromalus* and because of this De Santis (1979) transferred to *Pteromalus* four of the five species that Burks (1954) included in *Heterolaccus*. However, in the same year Burks (1979) transferred three of the species that occur in North America north of Mexico to *Catolaccus*. Consequently, Noyes (2012) included two of the names (*townsendi* and *vulgaris*) in *Pteromalus* and three of the names (*fragariae*, *grandis* and *hunteri*) in *Catolaccus*.

Burks (1954: 3) originally defined the *Catolaccus*-group using several features that are diagnostic of many genera, but primarily by the genae being “deeply excavated at the bases of the mandibles”. *Heterolaccus* sensu Burks and *Catolaccus* were differentiated from the other three *Catolaccus*-group genera by the presence of only

two anelli in both sexes, and *Heterolaccus* sensu Burks was differentiated from *Catolaccus* by a “relatively narrow and asetose or nearly so” costal cell, and antennae inserted considerably above the ventral margin of the eyes (cf. Figs 6, 67). Bouček (1993: 1282) described the costal cell of *J. nudipennis* as being “very broad”, though bare (Fig. 104) as for some *Heterolaccus* sensu Burks. Although none of the taxa included in *Heterolaccus* by Burks (1954) has a mesosternal shelf, four of the five (*grandis*, *hunteri*, *townsendi* and *vulgaris*) have a modified metapleuron similar to *J. nudipennis*. The metapleuron is partly smooth and shiny and its anterior margin is uniformly curved, convex, unsculptured and separated from the posterior margin of the mesopleuron (Figs 92, 102). Further, one species of *Heterolaccus* sensu Burks (1954) (*grandis*) was characterized by a strong pronotal carina that is distinctly emarginate sublaterally (Fig. 81: arrow), which is similar to the “laterally indented” structure described for *J. nudipennis* (Fig. 100). Another species (*hunteri*) was partly characterized by reduced fore wing pilosity (Fig. 94), and all the species have one or two rows of clearly exposed admarginal setae. I interpret the mesosternal shelf (Fig. 101) and comparatively wide costal cell (Fig. 104) of *J. nudipennis* as specific rather than generic features, and conclude that the four species with a modified metapleuron and two anelli in both sexes that Burks (1954) erroneously included in *Heterolaccus* are congeneric with *J. nudipennis*.

In addition to having a plesiomorphic metapleural structure (Figs 11, 12), *Catolaccus* is differentiated from *Jaliscoa* by the presence of three or more rows of admarginal setae that in most species are extensively overlain by the dorsal discal setae (Fig. 10). Species also have inconspicuous hairlike setae on the head and mesonotum (Figs 3–9) even if the setae are sometimes whitish. Another feature of most *Catolaccus*, although not distinctive for all species, is that the apical margin of the scutellum is reflexed into quite an evident marginal rim that in lateral view projects posteromedially as a short denticle or lip (Fig. 9: arrow) rather than being curved down in a single plane as is typical of *Jaliscoa* (Figs 82, 106.). Individuals of *Catolaccus* also have the costal cell setose along its entire length ventrally (Fig. 10), a shorter marginal vein (Fig. 10; Dzhanokmen 1980, figs 7, 10), typically have a more broadly rounded vertex (Figs 4, 5), and usually at least the left mandible is tridentate (Fig. 6) or the middle tooth of one or both mandibles has an additional, though smaller, preapical tooth (Figs 6, 7; Dzhanokmen 1980, figs 1, 5).

My examination of type material determined that nine of 13 New World species classified in *Catolaccus* or originally described in *Catolaccus* and erroneously transferred to *Pteromalus* are incorrectly assigned (see below). The generic description given above is based primarily on New World species. Additional study of the five Palearctic species included by Noyes (2012) in *Catolaccus* is required to verify the morphological limits and membership of the genus on a world level. Further study is also required to better establish phylogenetic relationships of *Catolaccus* to other genera, particularly *Pteromalus*. The USNM and CNC have specimens from the USA and Canada that E.E. Grissell (USNM, retired) identified as “*Catolaccus* prob. n. sp.” in Wheeler and McCaffrey (1989: 371). Most of the specimens were reared from the egg sacs of *Dictyna coloradensis* Chamberlin (Araneae: Dictynidae). Although I do not treat *Pteromalus* in this work, I describe the new species below within *Pteromalus* based on current, though admittedly inadequate, generic concepts so that it is formally characterized and illustrated for comparison of *Catolaccus* with *Pteromalus* and other pteromalid species that are spider egg parasitoids.

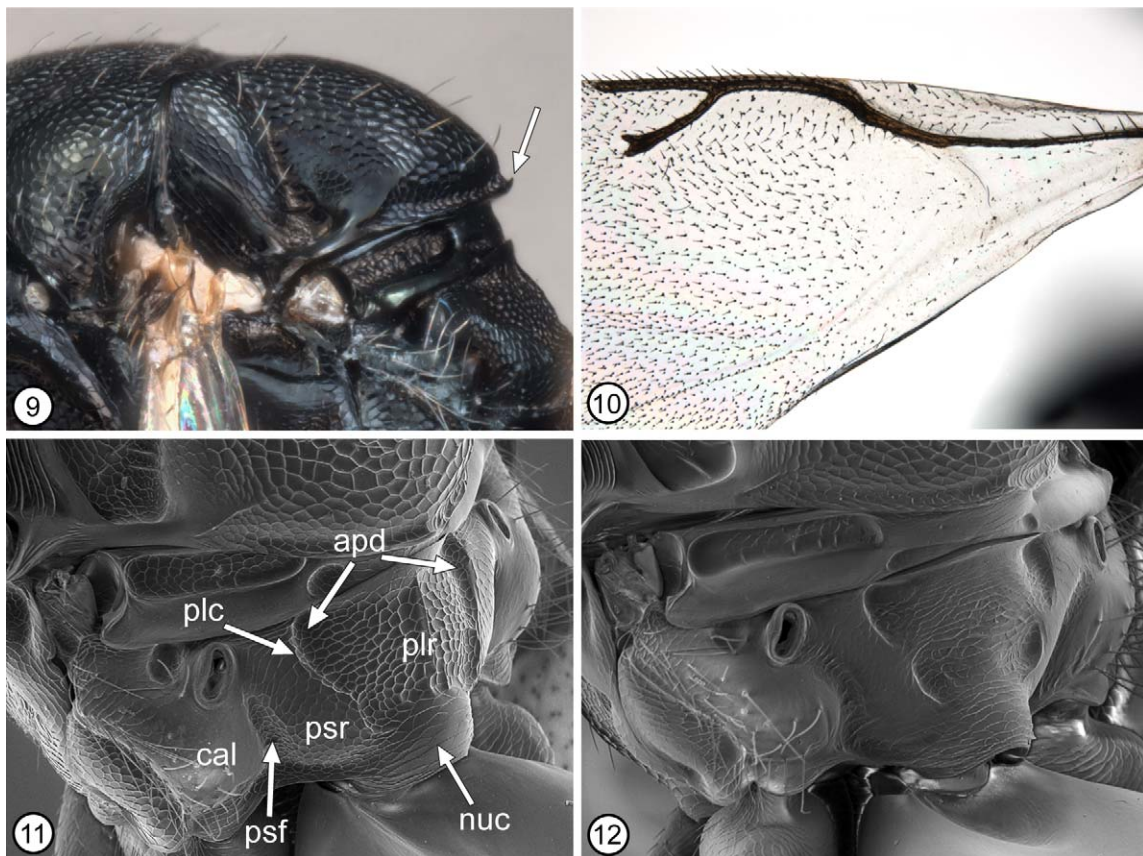
Species differentiation. Specimens of *Catolaccus* were not borrowed comprehensively from museums in order to revise the genus further to Burks (1954), but based on available material the following was noted. The first couplet of the key to Nearctic species of *Catolaccus* by Burks (1954) uses the presence of an occipital carina (Fig. 8: oc) to differentiate *C. aeneoviridis* and *C. victoria* from *C. cyanoideus* and *C. kansensis*. However, presence or absence of an occipital carina may not be visible if the posterior of the head is appressed to the pronotum. Fore wing setal pattern is usually a more readily visible feature to differentiate the two species pairs. Both *C. cyanoideus* (Figs 3, 10) and *C. kansensis* have setae dorsoapically within the costal cell and variably extensively on the basal and mediocubital folds (often also within the basal cell). *Catolaccus aeneoviridis* and *C. victoria* lack setae from the costal cell dorsally and from the basal cell, including the basal and mediocubital folds (also correlated with a more extensive speculum). Further, both *C. aeneoviridis* and *C. victoria* have a small, subapical, ventral dent on the middle tooth of both mandibles so that the mandibles appear more or less quadridentate (Fig. 7), whereas *C. cyanoideus* and *C. kansensis* have the left mandible tridentate (Fig. 6). Males of at least *C. aeneoviridis* also differ in antennal structure from those of *C. cyanoideus* and *C. kansensis*, having elongate funiculars and, at least in larger individuals, each funicular having multiple rows of closely aligned mps (Fig. 1) compared to males of the latter two species (Fig. 2). Correlated with the longer flagellum of *C. aeneoviridis* is a longer scape that, unlike males or females of other regional species, extends to the anterior ocellus. Additional study is required to better evaluate the species status of *C. aeneoviridis* relative to *C. victoria*, which Burks (1954) differentiated primarily on relative development of the median and plical carinae.



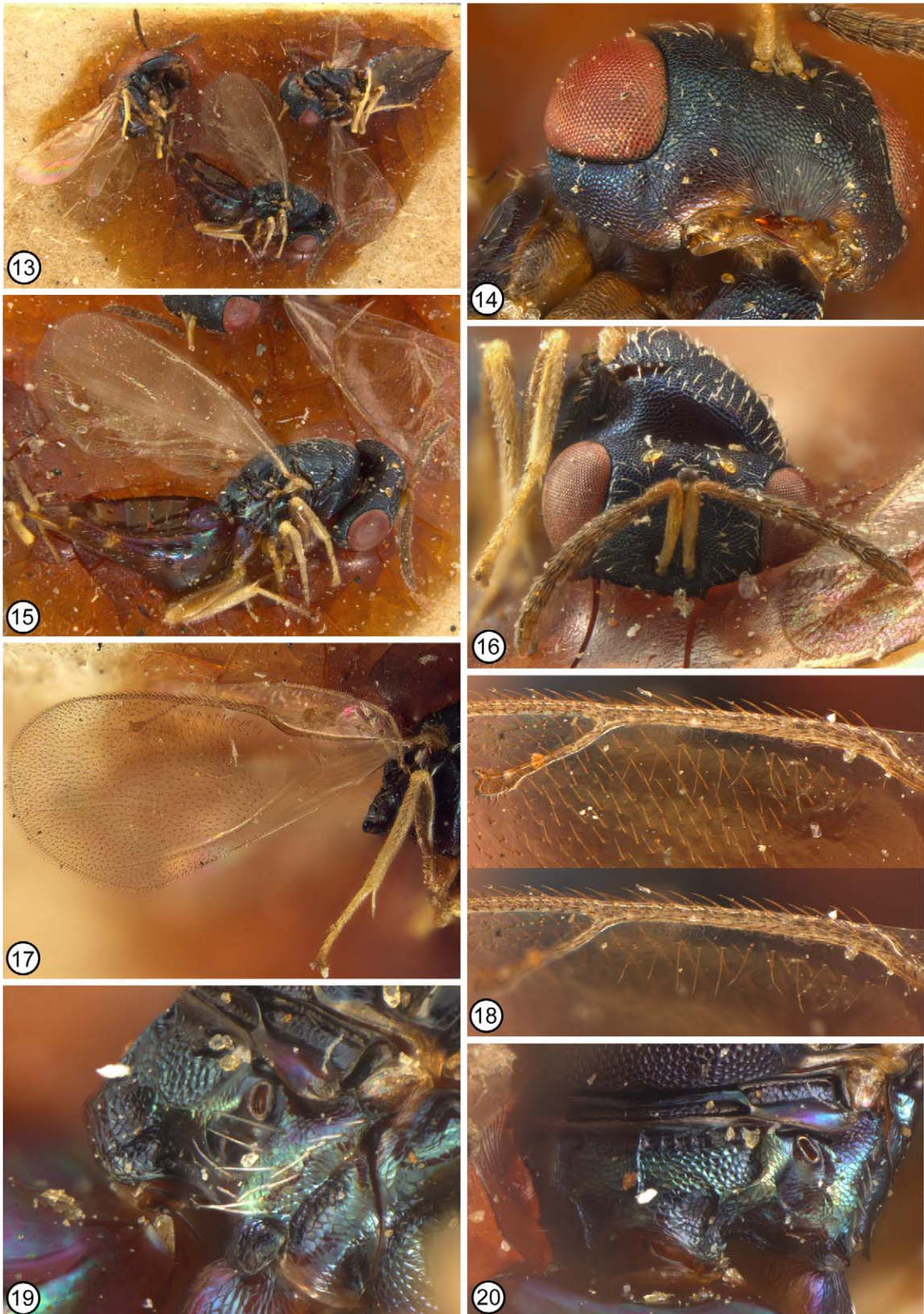
FIGURES 1–8. *Catolaccus* spp. **1**, *C. aeneoviridis*, ♂ antenna (132). **2–6**, *C. cyanoideus*: **2**, ♂ antenna (188) [insert: pedicel–fl33]; **3**, ♀ habitus, lateral (21); **4**, ♀ head and antenna, lateral (21); **5**, ♀ head and pronotum, dorsal (21); **6**, ♀ head, frontal (20). **7 and 8**, *C. aeneoviridis* ♀: **7**, head, frontolateral (34); **8**, head and mesosoma, dorsal (131). No. in parenthesis = CNC 2011 photo no.

Catolaccus kansensis is differentiated from *C. cyanoideus* and the other two Nearctic species by a unique propodeal sculpture pattern. The propodeum completely lacks a median carina and is transversely aciculate-coriaceous (Fig. 12) rather than being meshlike reticulate as for the other three described Nearctic species (Fig. 11). However, I examined Old World specimens [Austria, France (CNC); Hungary (INHS); Bulgaria, India, Israel, Italy (UCRC); Turkey (CNC, UCRC)] that I identify as *C. crassiceps* (Masi 1911) based on differentiation of *C. crassiceps* from *C. ater* (Ratzeburg) by Bouček (1970). The specimens are very similar to *C. kansensis* in colour pattern, propodeal sculpture pattern, mandibular dentition (Dzhanokmen 1980, fig. 8) and fore wing setal pattern (Bouček 1970, fig. 6; Dzhanokmen 1980, fig. 10). The CNC also has a female from Lethbridge, Alberta, Canada, identified as *C. crassiceps* by Bouček in 1989, which is *C. kansensis* sensu Burks (1954). It is therefore quite possible that *C. kansensis* is a junior synonym of *C. crassiceps*. I do not formally propose the synonymy because I have not examined the fragmentary type remains of *C. crassiceps* (see Graham 1969 and Bouček 1970 for type details and comments on accuracy of the original description). Further, molecular analyses should be conducted prior to such synonymy to determine if a single species or a sibling species-complex occurs throughout the Nearctic, Palaearctic and Oriental regions.

Catolaccus ater (Ratzeburg 1852) differs from *C. crassiceps* in having a more distinctly reticulate propodeum, more extensively and densely setose fore wings, and apparently a similar mandibular structure as *C. cyanoideus* (Dzhanokmen 1980, fig. 5). It is definitely a different species than *C. cyanoideus* because it has completely bare eyes, is dark non-metallic, and has even more extensively setose fore wings. Only the vannal area and a very slender inconspicuous band on the disc (adjacent to the parastigma and sometimes basally on the mediocubital fold basally) are bare (Dzhanokmen 1980, fig.7).



FIGURES 9–12. *Catolaccus* spp. **9**, *C. aeneoviridis* ♀, mesoscutum–propodeum, lateral (33) [arrow points to reflexed marginal rim of scutellum]. **10**, *C. cyanoideus* ♀, fore wing (19). **11 and 12**, ♀ propodeum, posterolateral (SEM): **11**, *C. aeneoviridis* (115); **12**, *C. kansensis* (96). No. in parenthesis = CNC 2011 photo no.



FIGURES 13–20. *Lyrcus cyaneus*, ♀ syntypes (INHS). **13**, syntypic series on card; **14**, head, frontolateral; **15**, habitus, lateral; **16**, head and antennae, frontal; **17**, fore wing; **18**, fore wing admarginal area (upper surface/lower surface); **19**, propodeum and metapleuron, lateral; **20**, propodeum, posterior.

Species excluded from *Catolaccus*

1. *Lyracus cyaneus* (Girault) n. comb.

Figs 13–20

Catolaccus cyaneus Girault, 1911: 400–402. Type data (♀ syntypes, INHS and ZMHB): described from eight females mounted on two cards labelled “Asuncion, Paraguay, 10/10. 1905, No. 55, J.D. Anisits” and “*Systasys* sp.”.

Neocatolaccus (*Catolaccus*) *cyaneus*; Girault, 1913: 56.

Discussion. Of the syntypes, I examined three mounted on a single card (Fig. 13) in INHS. An attached “paratype” label states “4 ♀ ♀”, suggesting that one female was lost from the card. The label data matches the published data though the collection date is written as “10.X.05”. The species is one of the comparatively rare species of *Lyracus* with distinct, white, parallel-sided lanceolate setae (Figs 14–16). Further, although the fore wing (Fig. 17) has a single row of conspicuously long admarginal setae (Fig. 18: lower frame), these are entirely overlain by dorsal discal setae (Fig. 18: upper frame). *Lyracus cyaneus* is typical for *Lyracus* in other respects, including a plesiomorphic metapleural structure (Fig. 19), three anelli (Fig. 16), and absence of a malar depression (Fig. 14). The propodeum (Fig. 20) has a complete median carina, plical carinae that extend from the anterolateral plical depressions posteriorly through the nuchal furrow, and a transverse paraspiracular carina that does not extend mesally to the plical carina. It also lacks a costula and has a transverse band of short crenulae along the anterior margin (Fig. 20). No lectotype is designated at this time because the fate and condition of the syntypes in ZMHB is unknown.

2. *Lariophagus fragariae* (Rohwer) n. comb.

Figs 21, 23, 25, 28, 29, 30, 32

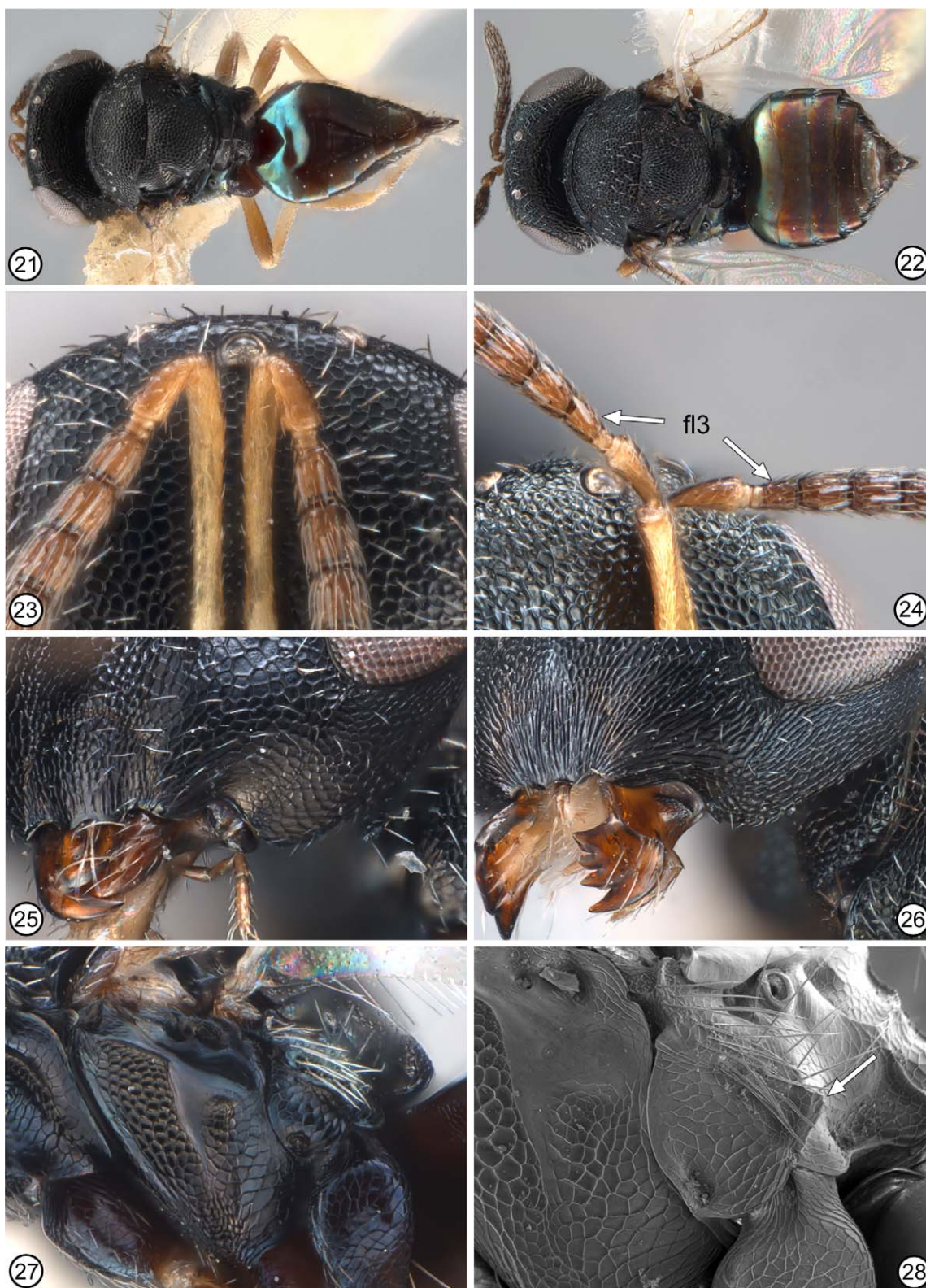
Catolaccus fragariae Rohwer, 1934: 44–45. Type data (♀ holotype, USNM, examined): described from 5 females and 3 males from Knoxville, Tennessee, reared from *Anthonomus signatus* by S. Marcovitch.

Heterolaccus fragariae; Burks, 1954: 10.

Catolaccus fragariae; Burks, 1979: 806.

Discussion. This is one of the five species that Burks (1954) included in *Heterolaccus* (see discussion under *Jaliscoa*). It was differentiated from most of the other species included in that genus by the thoracic notum having “mixed silvery and golden flattened hairs” and “gaster as broad at base as propodeum” (Burks 1954: 9). It is also the only one Burks included in *Heterolaccus* that has a plesiomorphic structure of the metapleuron (Figs 27, 28). Although the anterior margin is curved and very narrowly smooth and shiny, or almost so, it abuts the posterior of the mesopleuron on the same level. Furthermore, the posterolateral corner of the propodeum projects laterally into an acutely angled though small denticle (Figs 28–30: arrow), and two setae of each gastral cercus are much longer than the others, extending beyond the apex of the gaster in females (Fig. 32). Both of these features were used by Bouček and Heydon (1997) to differentiate *Lariophagus* Crawford (1909). It is because of these features that I transfer *C. fragariae* to *Lariophagus* as *L. fragariae* (Rohwer) n. comb. However, *Oaxa* Bouček is characterized by one long cercal seta (Bouček 1993, fig. 65) and I have seen females of an undescribed species of *Lyracus* from Florida (CNC) whose propodeum in dorsal view has a short, laterally projecting tooth (Fig. 197: arrow) similar to *Lariophagus* species.

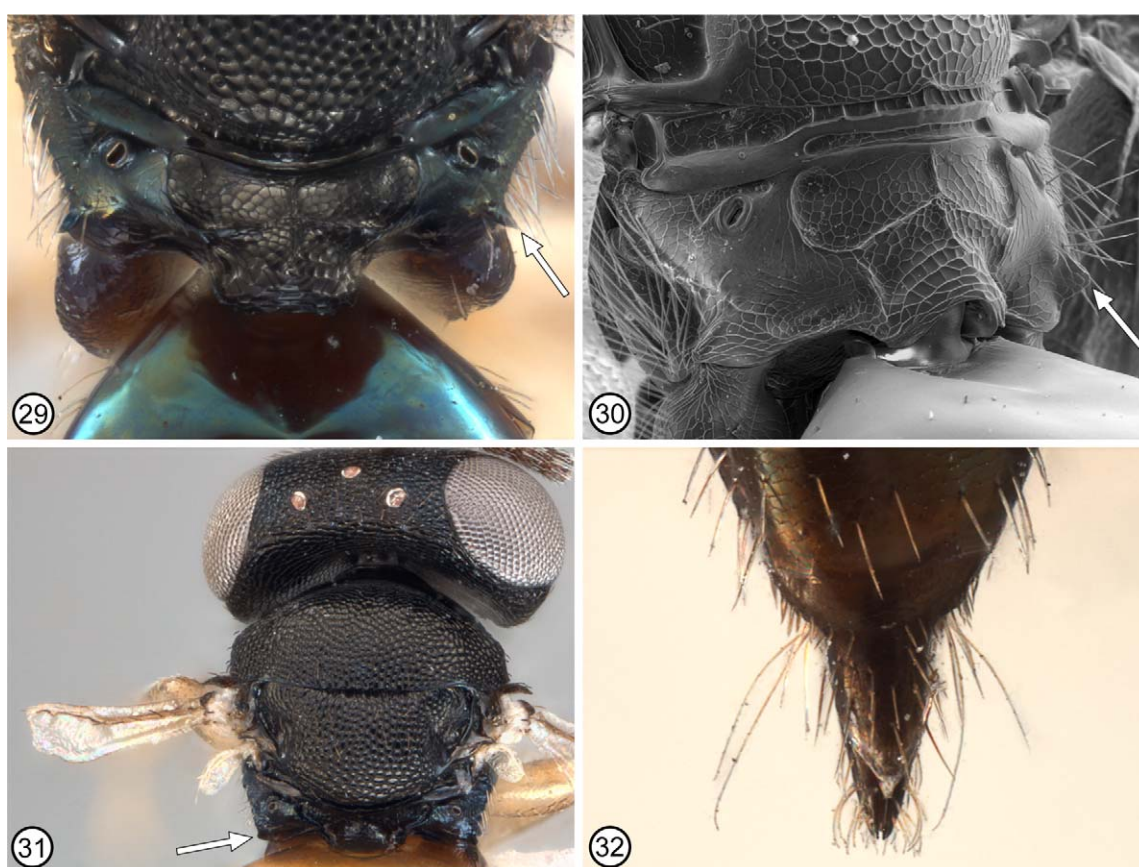
Burks (1954) included *L. fragariae* in the *Catolaccus*-group because it has a distinct malar depression (Fig. 25), and differentiated it from the other species he included in *Heterolaccus* partly by the presence of a mixture of white and brownish setae on the mesonotum (cf. Fig. 22). However, character-state distributions suggest both of these features are prone to homoplasy and represent specific features within some genera (see generic treatments below). I saw females of what apparently is an undescribed species of *Lariophagus* from Arizona and California (CNC) that are similar to *L. fragariae* in the features discussed above (cf. Figs 21, 22) except that they lack a malar depression (Fig. 26), sometimes (smallest females only about 1 mm in length) have only a very tiny and inconspicuous propodeal denticle, and sometimes have at least a slight brownish region on the fore wing adjacent to the parastigma (cf. Fig. 179). Most other New World species that appear to be *Lariophagus* based on length of the cercal setae and propodeal structure also lack a malar depression. The metapleuron can be shiny and virtually



FIGURES 21–28. *Lariophagus* spp. **21 and 22**, ♀ habitus, dorsal: **21**, *L. fragariae* (PT) (20); **22**, *Lariophagus* sp. (15). **23 and 24**, ♀ scape–fl5: **23**, *L. fragariae* (PT) (20); **24**, *Lariophagus* sp. (14). **25 and 26**, ♀ lower face and mandibles, frontolateral: **25**, *L. fragariae* (17); **26**, *Lariophagus* sp. (14). **27**, *Lariophagus* sp., ♀ meso- and metapleuron (13). **28**, *L. fragariae*, ♀ metapleuron and propodeal denticle [arrow] (160). No. in parenthesis = CNC 2011 photo no.

smooth, though the anterior margin is not separated from the mesopleuron. Different species also have entirely dark or, more rarely, entirely white notal setae. I therefore conclude that presence or absence of a malar depression, metapleural sculpture, mesonotal setal colour, and hyaline or partly infusate fore wings are specific rather than

generic features in *Lariophagus*. However, the generic limits of *Lariophagus* require further study, both within the New World and in other regions. Noyes (2012) listed nine world species, including *L. dryorhizoxeni* (Ashmead 1886), *L. texanus* Crawford (1909) and *L. distinguendus* (Förster 1841) in the New World, and seven species in the Palearctic region. Unlike New World species, some Old World species assigned to *Lariophagus* are described as having two distinct metatibial spurs (Graham 1969, Hedqvist 1978, Kamijo 1981). Further, the cosmopolitan species *L. distinguendus* is not only sculpturally different from other New World *Lariophagus* but also has quite a small and inconspicuous propodeal denticle, as do brachypterous females (Fig. 31: arrow) (males unknown) of the undescribed species of *Lariophagus* referred to in couplet 310 of Bouček and Heydon (1997). Females of this latter species also differ from other *Lariophagus* in having three rather than two anelli, though females of the undescribed macropterous species discussed above have only a single mps on either side of the third flagellomere (Fig. 24). Because of this, an mps may appear to be lacking from the third flagellomere depending on the surface viewed, and complete absence is apparently possible for the smallest females. Some females also have the third flagellomere noticeably shorter than the subsequent flagellomeres and therefore variably distinctly anelliform. Consequently, there appears to be considerable structural variation in *Lariophagus*, though all included species have one or, more commonly, two cercal setae that are conspicuously longer the others (Fig. 32).



FIGURES 29–32. *Lariophagus* spp. **29** and **30**, *L. fragariae*, ♀ propodeum (PT): **29**, posterior (20); **30**, posterolateral (161: SEM). **31**, *Lariophagus* sp., ♀ head and mesosoma, dorsal (40). **32**, *L. fragariae*, ♀ cercal setae, dorsal (PT) (16). No. in parenthesis = CNC 2011 photo no. [Arrow in Figs 29 and 31 points to propodeal denticle.]

3. *Catolaccus grandis* Burks (see *Jaliscoa*).

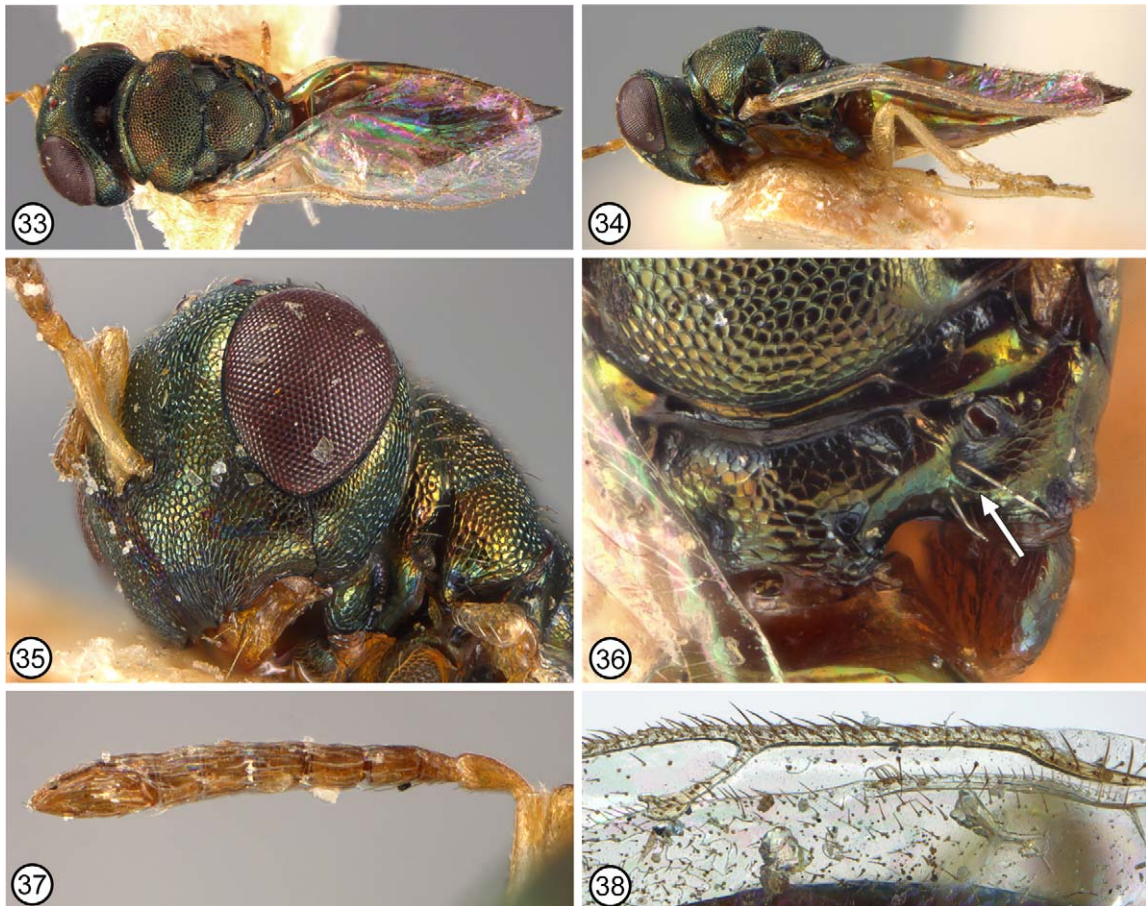
4. *Lycus helice* (Walker) n. comb.

Figs 33–38

Pteromalus Helice Walker, 1843: 46–47. Lectotype (♀, BMNH, here designated). Lectotype labels: “LECTOTYPE” / “St. Vincent” / “*Lamprotatus Helice* Walker (and on reverse) “Stood under this name in old B. M. Coll. C. Waterhouse” /

“B.M. TYPE HYM 5.3948” / “LECTOTYPE, *Pteromalus helice* Walker 1843, S.L. Heydon 2000” / “LECTOTYPE, *Pteromalus Helice* Walker 1843 (Gibson, 2012)”.
? *Catolaccus helice*; Ashmead, 1894b: 163.

Discussion. Although Walker (1843) did not state the number of females upon which he based his species, ranges given for two length measurements and citation of a “*Var. B*” demonstrate there were more than one. The BMNH has nine conspecific females labelled “*Lamprotatus Helice* Walker”, of which one bears a “S.L. Heydon 2000” lectotype label and the others BMNH paralectotype labels. However, the lectotype designation apparently was never published. The female with the Heydon lectotype label, illustrated by figures 33–38, is the most complete specimen and I hereby designate it as lectotype of *P. helice*. It is typical for *Lyracus* in all respects, including having dark hairlike setae that do not contrast conspicuously with the cuticle (Figs 33, 34), three anelli (Fig. 37), no malar depression (Fig. 35), and a propodeum with plical carinae posteriorly within the nuchal furrow, a transverse paraspiracular carina behind the spiracle that does not extend mesally to the plica (Fig. 36: arrow), and a very short median carina basally within a slightly concave, strongly transverse region extending between each anterolateral plical depression. Only the left pair of wings remain and the two are appressed together over the gaster (Fig. 33) so as to obscure the setal pattern. However, there apparently were seven (four remaining) comparatively long admarginal setae in a single row, which are completely exposed because the speculum extends to about the middle of the stigmal vein (some setae of hind wing visible basally within speculum in Fig. 38). It also has the tegula (Fig. 35) and all legs beyond the coxae (Fig. 34) yellow.



FIGURES 33–38. *Lyracus helice*, ♀ lectotype. 33, habitus, dorsal; 34, habitus, lateral; 35, head, frontolateral; 36, propodeum, posterior [arrow points to paraspiracular carina]; 37, left antenna; 38, admarginal area of left fore wing and hind wing below.

5. *Catolaccus hunteri* Crawford (see *Jaliscoa*).

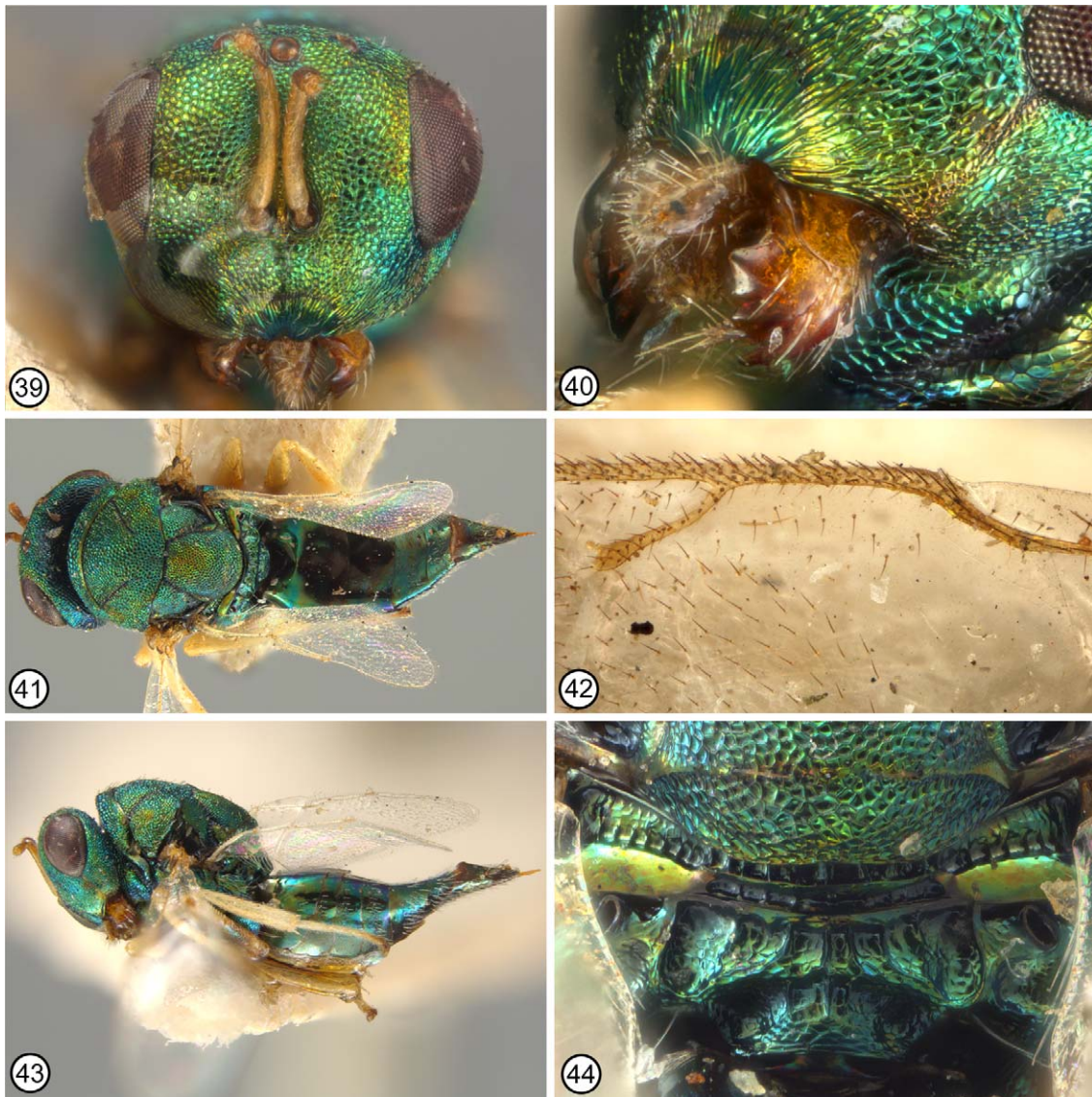
6. *Pteromalus pallipes* (Ashmead) n. comb.

Figs 39–44

Catolaccus pallipes Ashmead, 1894b: 163–164. Lectotype (♀, BMNH, here designated). Lectotype labels: “TYPE” / “St. Vincent W.I., H.H. Smith, 210” / “W. Indies 99-331” / “Type *Catolaccus pallipes* Ashm. ♀” / “B.M. TYPE HYM 5.690 3948” / “LECTOTYPE, *Catolaccus pallipes* Ashmead 1894 (Gibson, 2012)”.

Catolaccus pallidipes Dalla Torre, 1898: 108. Unjustified emendation.

Discussion. This species was described from one male and one female from St Vincent, collected by Herbert H. Smith. I examined the remaining female syntype (Figs 39–44), which I hereby designate as lectotype of *P. pallipes*. Although both antennae are now missing beyond the basal anellus (Fig. 39), the original description stated that the funicle was 6-segmented. The left mandible has two teeth and a dorsal truncation, whereas the right mandible has four similar teeth (Fig. 40). The costal cell is setose ventrally over only about its apical half, the basal cell and basal fold are bare, the marginal vein is only about 1.5× as long as the stigmal vein, and the speculum extends to a level about equal with the middle of the stigmal vein so that eight or nine (depending on wing) admarginal setae are clearly visible, which are of similar length to the dorsal discal setae (Fig. 42). Propodeal structure resembles that of *P. elevatus* (Walker 1834) somewhat because there is a transverse, arcuate ridge at about mid-length, but the anterior and posterior panels are additionally divided by longitudinal carinae (Fig. 44). As noted by Ashmead, the body is bright green (Figs 41, 43) and the scape and legs are yellow except for the femora basally (Fig. 43).



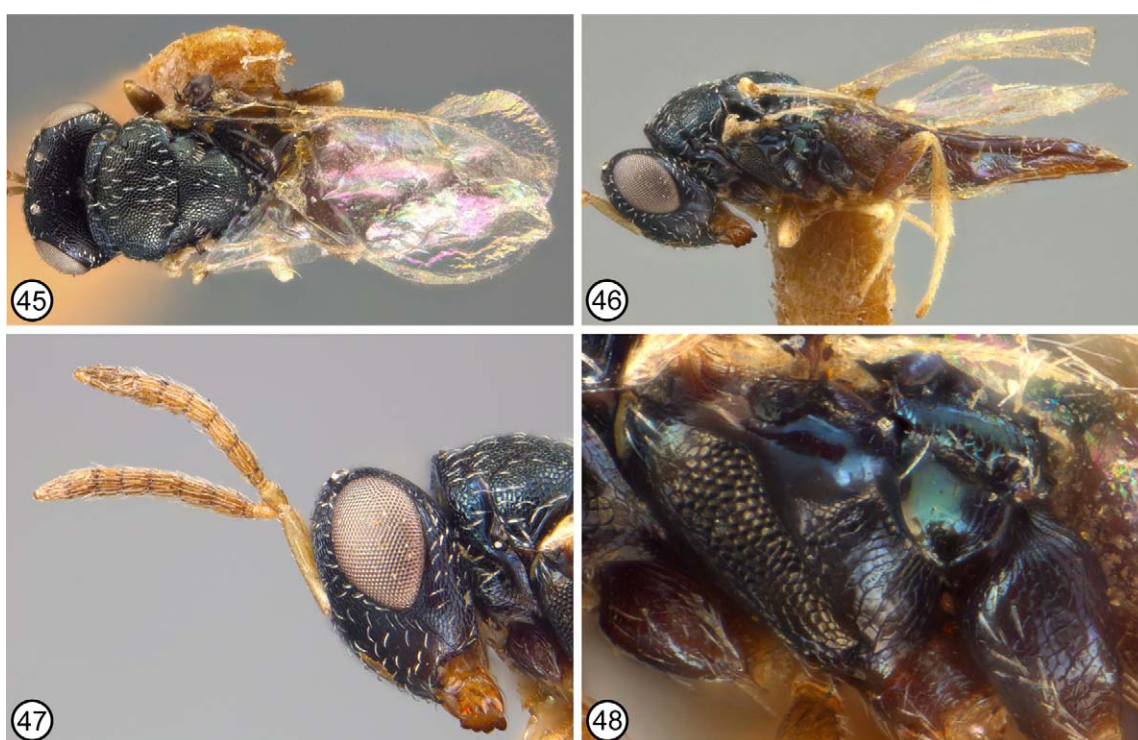
FIGURES 39–44. *Pteromalus pallipes*, ♀ lectotype. **39**, head, frontal; **40**, malar space and mandibles, frontolateral; **41**, habitus, dorsal; **42**, fore wing; **43**, habitus, lateral; **44**, propodeum, posterior.

7. *Eurydinoteloides tepicensis* (Ashmead) n. comb.

Figs 45–48

Catolaccus tepicensis Ashmead, 1895: 554. Type data (♀ holotype, CASC, examined): described from one female from Tepic [Mexico], collected by Messrs. Eisen and Vaslit.

Discussion. The holotype (Figs 45–48) is entire and typical for *Eurydinoteloides* in all aspects. It is one of the species that has a malar sulcus but lacks an evident malar depression (Fig. 47), has a yellow scape (Fig. 47) and tegula (Fig. 45), and a largely smooth and shiny metapleuron with its anterior margin uniformly curved, convex, and raised slightly above and over the posterior margin of the mesopleuron (Fig. 48) rather than recurved outward at an abrupt angle to the mesopleuron. The tibiae are also mostly yellow, though the metatibia (Fig. 48) has a slight brownish tint mesally, the knee and apex more broadly being yellow. The left fore wing appears to have nine completely exposed and comparatively long admarginal setae in a single row. The wings and glue mostly conceal the propodeum (Fig. 45) so that presence or absence of plical carinae posteriorly within the nuchal furrow is not visible, but there is a fine median carina. The clypeus is comparatively broadly and shallowly incurved.



FIGURES 45–48. *Eurydinoteloides tepicensis*, ♀ holotype. 45, habitus, dorsal; 46, habitus, lateral; 47, head and antennae, lateral; 48, meso- and metapleuron.

8. *Catolaccus townsendi* Crawford (see *Jaliscoa*).

9. *Catolaccus vulgaris* Ashmead (see *Jaliscoa*).

Pteromalus Swederus

Pteromalus Swederus, 1795: 201. Type species: *Ichneumon puparum* L. (1758), designated by Westwood (1839: 71).

Discussion. Noyes (2012) should be consulted for full generic synonymy of *Pteromalus*. Dzhankmen (1998) provided a short description of the genus, but *Pteromalus* is not characterized by any distinctive features much less any putative apomorphies. As noted by Dzhankmen (1998: 706), it is “apparently the largest and most

taxonomically difficult pteromalid genus". Essentially, *Pteromalus* is what remains after other, sometimes monotypic, genera are differentiated based on one or more features.

Noyes (2012) listed 486 available species names for world *Pteromalus* and 47 species from the Nearctic region. The genus has remained unrevised in the Nearctic region since Girault (1911) provided a key to 11 species under the name *Habrocytus* Thomson (1878), now sometimes treated as a subgenus of *Pteromalus* (see Graham 1969). Consequently, isolated species descriptions of new Nearctic species of *Pteromalus* should not be encouraged. However, I describe and differentiate the species below so that the description and figures can be used for analysis of the limits and relationships of *Pteromalus* relative to *Catolaccus*.

***Pteromalus grisselli* n. sp.**

Figs 49–53, 55–60

Material examined. *Holotype* ♀ (USNM): 5 mi. W. Clarkston, Asotin Co., WASH., VI-3-82 / G.S. Wheeler Collector / Reared from *Dictyna* egg sac, #13 / *Catolaccus* n. sp., det. E. Grissell, 1983, ID 82-7513 / *Holotype Pteromalus grisselli* Gibson.

Paratypes (29♀, 14♂). **CANADA. Ontario:** Ottawa, 2.VI.40, O. Peck (1♀ CNC). **Yukon Territory:** Klo-Kut, Old Crow area between Porcupine R. & Small lake, edge of open area, 3-VII.75, REM, 7-7-75-1 (1♀ CNC, Photo 2011-97). **USA. Idaho: Boise Co.,** Garden Valley, 11 mi. E, 5.VIII.82, reared from *Dictyna* egg sacs (1♂ WFBM). **Kootenai Co.,** Atol, 5 mi. E, 10.VI.82, G.S. Wheeler, web sacs of *Dictyna* sp. (1♀ USNM). Reared from egg sacs of *Dictyna* sp., *Centaurea maculosa*, G.S. Wheeler—Athol, 1 mi. E, 25.VI.82, 6, 11, 13, 29.VII.82 (3♀, 2♂ CNC; 1♀ USNM; 9♀, 3♂ WFBM (CNC Photo number 2011-117, 161, 163)); Farragut St. Pk., 25.VI.82 (2♀, 1♂ WFBM); Rathdrum, 3 mi. S, 25.VI.82 (1♀ USNM; 1♂ WFBM); Salmon, 8.6 mi. S, 24.VII.82 (1♀ WFBM). **Montana: Wheatland Co.,** Deadman's Basin St. Rec. Area, 3600', 5.VI.82, G. Gibson (2♀ CNC). **Washington: Asotin Co.,** same data as holotype except some reared 3, 30.V, 6, 9, 15.VI and some labelled *Sisymbrium altissimum* (6♀, 4♂, USNM; 1♀, 2♂ WFBM (CNC Photo 2011-135, 136, 162)).

Etymology. Named after Dr. Eric Grissell, who first realized the similarity between this species and those of *Catolaccus*.

Description. FEMALE (habitus: Figs 55, 57). Length = 1.9–3.1mm. Head dark metallic green to bluish-green or bluish-purple (Figs 49, 50) and often with diffuse coppery lustre under some angles of light; setae mostly brownish on vertex, but more white on face and genae (Figs 49, 50); mandible yellow except for reddish-brown teeth; palpi yellowish-brown. Antenna with scape and ventral surface of pedicel yellow, but remainder of pedicel and flagellum dark brown (Fig. 53). Mesosoma (Figs 55, 57) similar in colour to head except tegula yellow to yellowish-brown; setae mostly brownish similar to vertex, but propodeal callus sometimes with more whitish setae. Legs (Fig. 57) with coxae similar in colour to mesosoma or dark brown with variably distinct metallic lustre; femora extensively dark brown, sometimes with slight metallic lustre, but lighter yellowish apically; tibiae or at least protibia sometimes yellowish similar to femora apically, but meso- and metatibiae usually variably distinctly brown medially except narrowly basally and somewhat more broadly yellowish apically; tarsi yellow except apical one or two tarsomeres brown. Gaster dark brown except usually for metallic green lustre basally and laterally under some angles of light (Fig. 57). Fore wing hyaline with venation yellow.

Head in dorsal view transverse-rectangular, about 2× as wide as long; occiput not margined; OOL: POL: LOL: MPOD about 3.0: 3.4: 1.6: 1.0. Head in frontal view (Fig. 49) about 1.2× as wide as high; distance between eyes about 1.7× height of eye; face meshlike reticulate, including immediately ventral of toruli, but clypeus vertically striate and striae extending at least half distance to toruli dorsomesally and obliquely toward lower orbit somewhat more extensively lateral of toruli (Figs 49, 51); clypeus with lateral margin indicated by incision about as deep as emargination of anterior margin, hence more or less bilobed, but not protuberant, the clypeal lobes at same level as mouth laterally (Figs 49, 51). Head in lateral view (Fig. 57) with malar space about 0.7× height of eye, abruptly incurved along oral margin only along narrow band above base of mandible anterior to obscure malar sulcus (Fig. 51). Eye (Fig. 57) about 1.6× as high as wide, with very short and sparse, inconspicuous setae (best seen from strongly oblique view). Antenna (Fig. 53) with length of pedicel + flagellum about 0.75× width of head; scape about 0.9× height of eye with apex separated from ventral margin of anterior ocellus by about one ocellar diameter if appressed to head (Fig. 49); pedicel about 2× as long as apical width and almost as long as combined length of

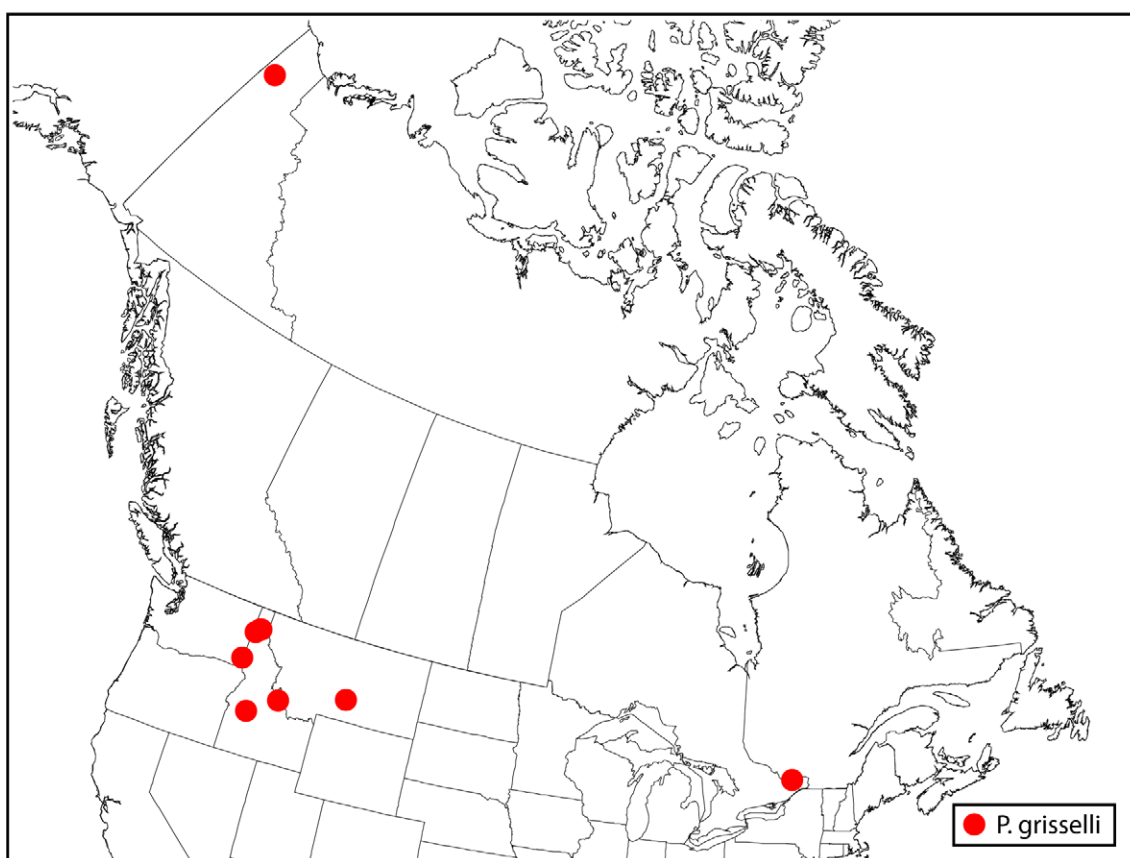
f11–f13; f11 strongly transverse, ringlike; f12 transverse and about 1.5× as long as f11; f13 and f14 slightly longer than wide, f15 quadrate or f15–f18 slightly wider than long, and clava about 2× as long as wide.

Mesosoma dorsally as in Fig. 55, and laterally as in Fig. 57. Fore wing with discal setae not reduced beyond speculum and with marginal fringe; costal cell dorsally with line of setae along anterior margin over about apical half and ventrally with 2 lines of setae along anterior margin over at least basal half, the setae becoming more numerous apically such that about apical third of cell completely setose (Fig. 59); basal fold with line of 2–10 setae, but at most with 1 seta apically within basal cell; mediocubital fold bare basal and distal to basal fold; disc with 1–9 setae on ventral surface adjacent to basal fold; smv: mv: stv: pmv about 3.0: 1.3: 1.0: 1.5; disc ventrally with about 5 or 6 rows of admarginal setae; speculum extending only slightly beyond base of marginal vein so as to mostly cover admarginal setae (Fig. 59). Propodeum (Fig. 60) with sinuate, carinate plica extending posteriorly to nucha, sometimes continuous through nuchal furrow but usually variably distinctly interrupted as separate carina within nuchal furrow; plical region and nucha similarly meshlike reticulate, the plical region with short longitudinal carinae along anterior margin and with variably developed, only sometimes complete median carina; paraspiracular area sparsely setose posteriorly (not visible in Fig. 60).

Gaster ovate (Fig. 55) to subcircular, but pointed apically, about 1.2–1.4× as long as wide and only about 0.8–0.85× length of mesosoma (air-dried specimens, excluding ovipositor sheaths).

MALE (habitus: Figs 56, 58). Length = 1.5–3.0 mm. Similar to female except as follows. Head and mesosoma often brighter green (Figs 50, 52, 58); pedicel sometimes and anelli usually yellowish, and funiculars often with at least extreme apices indistinctly yellowish (in smaller males) to distinctly bicolored, brown basally and yellow apically (Figs 51, 58); legs of smaller males somewhat lighter in colour though similar to female (Figs 56, 58), but entirely yellow beyond coxa in larger males except metafemur dark with metallic lustre; gaster with subbasal, transverse dorsal band and often larger yellowish-orange region ventrally. Sculpture similar to female except striae sometimes distinct only on clypeus. Structure similar to female except scape extending fully to ventral margin of anterior ocellus (Fig. 50); oral margin flat lateral to clypeus, and rounded into gena on same level (Fig. 52).

Distribution. Map 1.



MAP 1. Distribution of *Pteromalus grisselli* Gibson.



FIGURES 49–54. *Pteromalus* spp. **49–53**, *Pteromalus grisselli*: **49**, ♀ head, frontal (136); **50**, ♂ head and antenna, frontal (162); **51**, ♀ lower face and mandibles, frontolateral (136); **52**, ♂ lower face and mandibles, frontal (162); **53**, ♀ antenna (holotype) [insert: pedicel–fl3]. **54**, *Pteromalus* ? *platyphilus*, ♂ lower face and mandibles (175). No. in parenthesis = CNC 2011 photo no.

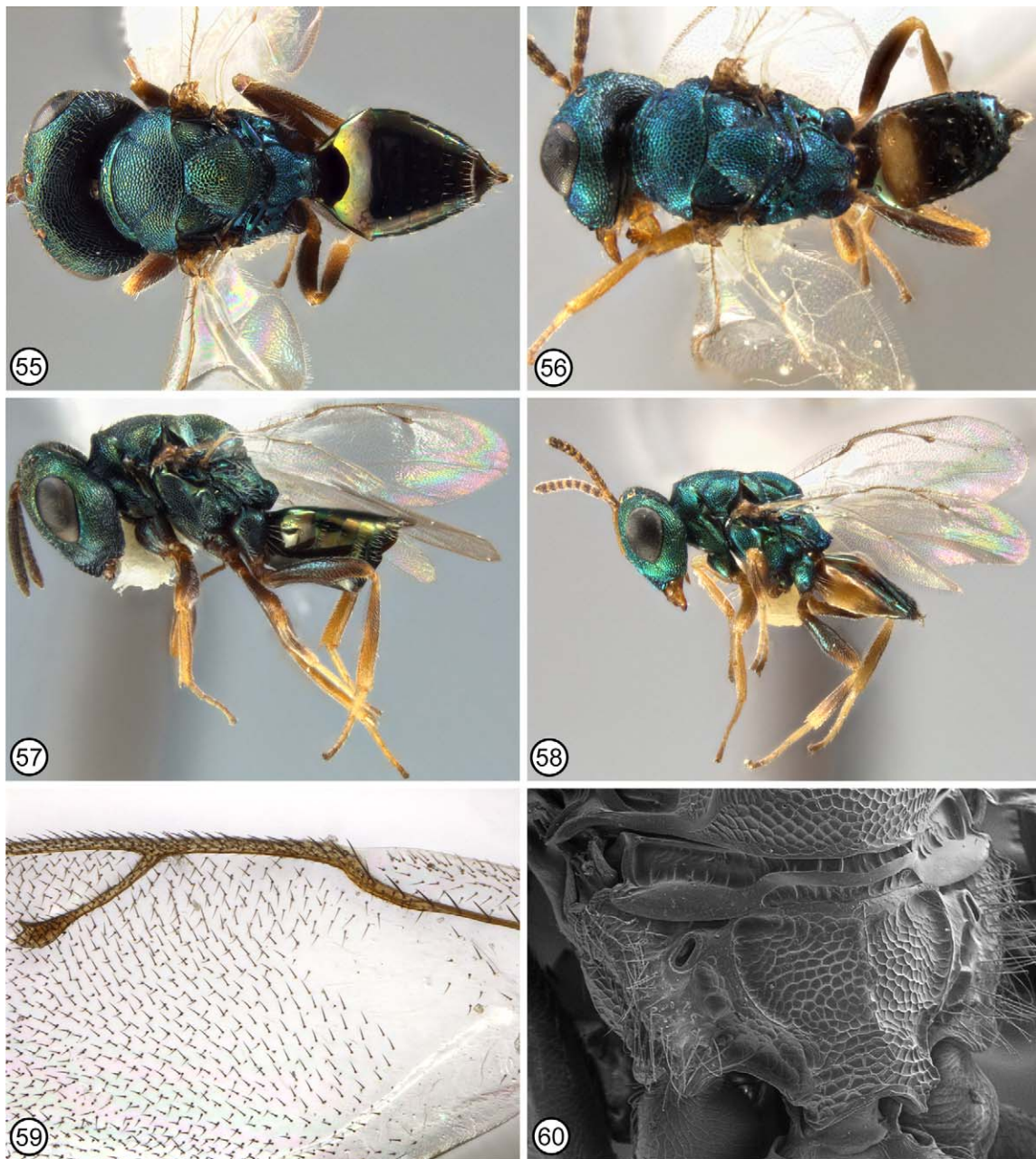
Biology. The biology of this species was studied by Wheeler and McCaffrey (1989) who reared most of the specimens included in the type series as egg predators from the egg sacs of *Dictyna coloradensis* Chamberlin (Araneae: Dictynidae).

Discussion. Evidence is lacking for the monophyly of *Pteromalus*, and *P. grisselli* and similar European species such as *P. platyphilus* Walker (1874) and *P. crassicornis* (Zetterstedt 1838) may eventually be shown to be more closely related to species of *Catolaccus* than to most other species currently classified in *Pteromalus*. However, I am describing it in *Pteromalus* based on current generic concepts. *Pteromalus grisselli* is similar to species classified in *Catolaccus* in several respects, including overall habitus (*cf.* Figs 3, 57). The head is comparatively thick with similar relative dimensions as for *Catolaccus*, the antenna is similar, including the scape not extending to the anterior ocellus in females (*cf.* Figs 6, 49), the right mandible is quadridentate and the left

mandible tridentate (*cf.* Figs 6, 52) (though not all *Catolaccus* have this mandibular structure), the propodeum has a similar structure and sculpture pattern as for most *Catolaccus* (*cf.* Figs 11, 60), and the fore wings have a similarly broad costal cell, the same relative ratios of the veins, and a setal pattern typical of various *Catolaccus* (*cf.* Figs 10, 59). Individuals, particularly males of *P. grisselli*, are more distinctly metallic than typical *Catolaccus*, but individuals of *C. cyanoideus* are at least obscurely dark metallic blue (Figs 3–6) and some specimens have quite a distinct green lustre under some angles of light. Under current concepts, *P. grisselli* is differentiated from *Catolaccus* primarily by the absence of a broad, arch-like malar depression (*cf.* Figs 7, 51), though there is a very slender incurved region along the oral margin above the base of the mandible (*cf.* Fig. 135) (see further below). Different species I classify in *Eurydinoteloides* lack a malar depression entirely (Fig. 136) or have a variably slender (Fig. 135) to broad, arch-like depression (Figs 133, 134), and species I include in *Lariophagus* usually lack (Fig. 26) though sometimes have (Fig. 25) an arch-like malar depression. Hence, character-state distribution suggests that presence or absence and size of a malar depression can be a species rather than a generic feature. *Pteromalus grisselli* also differs from *Catolaccus* species in having the clypeus strongly striate and, even though distinctly bidentate (Figs 49–52), it is less distinctly protuberant than for *Catolaccus* species (*cf.* Figs 6, 49). Further, unlike *Catolaccus*, males of *P. grisselli* have a large subbasal yellowish region on the gaster (Figs 56, 58) like some, though not all, species classified in *Pteromalus*.

The specimen of *P. grisselli* from Yukon (Map 1) might indicate a Holarctic species and I describe *P. grisselli* as a new species with some hesitation because at least females appear to be very similar to *P. platyphilus*. This latter species is widely distributed throughout the Palaearctic region (Noyes 2012) and is also a predator in spider egg sacs, including those of *Dictyna* species (see Noyes 2012 for references). Graham (1969) included *P. platyphilus* along with *P. crassicornis* in his *platyphilus* species-group of *Pteromalus* (see Graham 1969, couplet 49 for differential features of group). I have not seen any specimen identified as *P. crassicornis*, but the CNC has a single female from Turkey that is identified as *P. platyphilus* (by Z. Bouček, 1989) and a female from Spain identified as *Pteromalus cf. platyphilus* (by Z. Bouček, 1993). Graham (1969: 508) stated that the “striations of the clypeus extend well up the genae, nearly to the lower corners of the eyes”, in both *P. platyphilus* and *P. crassicornis*. This is similar to the facial sculpture of *P. grisselli* (Figs 49–52), though Dzhankmen (2001) described the clypeus of *P. platyphilus* as finely rugose. Neither female identified by Bouček has the lower face as strongly striate as for females of *P. grisselli* or described for the *platyphilus* species-group by Graham (1969), though the lower face lateral to the clypeus is obliquely reticulate-striate partly toward the lower orbit. Similar to *P. grisselli*, both females have a slender malar depression along the oral margin above the base of the mandible. Graham (1969: 514) differentiated *P. crassicornis* from *P. platyphilus* in part by the gena having “a narrow hollow above the base of mandible”, though the original description of *Catolaccus pappi* Szelenyi (1982: 386), which was synonymized under *P. platyphilus* by Bouček and Rasplus (1991), stated the head “near mandible bases on both sides with a deep hole”. The female from Turkey has its broad costal cell bare dorsally but setae on the mediocubital fold proximal to the basal fold, unlike *P. grisselli* and the female from Spain, though the latter, like *P. grisselli*, has two rows of setae along the ventral surface of the costal cell, unlike the single row described for *P. platyphilus* by Dzhankmen (2001). Further, Szelenyi (1982) described the speculum in *C. pappi* as being closed below, unlike *P. grisselli* or the female from Spain or Turkey. Both of the latter females are dark, similar to the description of *P. platyphilus* by Dzhankmen (2001), though the female from Spain has a slight green lustre under some angles of light. The female from Turkey certainly represents a different species from *P. grisselli*, but observed differences between the female from Spain and those from North America might represent nothing more than infraspecific variation. My decision to describe *P. grisselli* as a new species is based primarily on males. The CNC has five males from Oman identified as *P. platyphilus* by Z. Bouček in 1991. These have bicolored funiculars (apices narrowly white) and a large subbasal white region on the gaster similar to males of *P. grisselli*. However, all the Oman males have a distinctive head structure and sculpture. The oral margin is broadly transverse with the region lateral to the clypeus being slightly produced and reflexed relative to the clypeus, and the clypeus and face meshlike reticulate rather than striate as for males of *P. grisselli* (*cf.* Figs 52, 54). Graham (1969) noted that males of *P. platyphilus* were unknown at that time, but tentatively keyed them based on specimens identified as such by Bouček. Graham (1969) did not mention facial sculpture, but the first differential feature used was “edge of oral fossa, on either side of the clypeus, with a projecting flange rather like that of *Rohatina inermis*” (Graham 1969: 514; fig. 572). Consequently, males of *P. grisselli* are different from those identified as *P. platyphilus* by Bouček. Given the wide distribution known for *P. platyphilus* and some apparent discrepancies between the observations of

Bouček and the descriptions of Graham (1969), Szelényi (1982) and Dzhankmen (2001), future revision of the *platyphilus* species-group is required to more confidently assess species limits and sex associations. Further studies that including molecular techniques are also required to assess whether *platyphilus*-group species might be more closely related to species classified in *Catolaccus* than to others classified in *Pteromalus*.



FIGURES 55–60. *Pteromalus grisselli*. **55**, ♀ habitus, dorsal (161); **56**, ♂ habitus, dorsal (163); **57**, ♀ habitus, lateral (holotype); **58**, ♂ habitus, lateral (162); **59**, ♀ fore wing (117); **60**, propodeum, posterolateral (97: SEM). No. in parenthesis = CNC 2011 photo no.

Within North America, the only other pteromalids known to be predators in egg sacs of spiders are *Arachnopteromalus dasys* Gordh (1976) and *Epipteromalus algonquinensis* Ashmead (1904). *Arachnopteromalus* is monotypic, but Sureshan and Talukdar (2009) described a second species of *Epipteromalus*, *E. bengalensis* from spider egg sacs in India. *Epipteromalus algonquinensis* was differentiated in part by “strong striation radiating from mouth margin and extending above toruli” (Bouček and Heydon 1997: 597; fig. 446) similar to at least *P. grisselli*, whereas *E. bengalensis* was described as having the striae hardly reaching beyond the clypeal margins. Individuals of *E. algonquinensis* also have a very slender, incurved region above the base of the mandible and very sparse, short, and inconspicuous setae on the eyes similar to *P. grisselli*, and males have a subbasal yellow region on the

gaster. However, unlike *P. grisselli*, *platyphilus*-group species or *Catolaccus* species, both mandibles of *E. algonquinensis* have four similar teeth, the marginal vein is longer (1.5× length of stigmal vein), the propodeum has an anteriorly margined adpetiolar strip rather than a nucha, and the scutellum is strongly convex and anteriorly narrowed such that the axillae are separated by a distance equal to only about half the width of an axilla. *Arachnopteromalus dasys* is similar to *E. algonquinensis* and *P. grisselli* in having a slender incurved region along the oral margin above the base of the mandible, but is distinguished by being generally much more densely and conspicuously setose, including having the fore wings entirely setose, and having longer eyes such that the toruli are distinctly above the lower margins of the eyes and the malar space is comparatively short. It also has a reticulate nucha and complete, carinate plicae similar to *platyphilus*-group and *Catolaccus* species, but has quadridentate mandibles and a marginal vein that is almost 1.5× as long as the stigmal vein; the male has a uniformly dark metasoma.

***Jaliscoa* Bouček**

Jaliscoa Bouček, 1993: 1281–1282. Type species: *Jaliscoa nudipennis* Bouček, by original designation (USNM). Gender: feminine.
Heterolaccus; Burks, 1954 (in part).

Included species. *Jaliscoa grandis* (Burks 1954) **n. comb.**, *J. hunteri* (Crawford 1908) **n. comb.**, *J. nudipennis* Bouček (1993), *J. townsendi* (Crawford 1912) **n. comb.**, *J. vulgaris* (Ashmead 1894b) **n. comb.**

Diagnosis. Metapleuron extensively smooth and shiny with anterior margin evenly curved, unsculptured, and raised above and slightly over posterior margin of mesopleuron (Figs 66, 71, 84, 92, 96, 102, 103). Flagellum of both sexes with 2 basal ringlike articles lacking mps and 6 funicular articles with mps (Figs 68, 79, 85, 86). Fore wing ventrally usually with 1 or 2 rows of admarginal setae (sometimes up to 3 irregular rows distally) of similar length to discal setae when latter not reduced in density behind marginal vein, and with speculum extending behind marginal vein at least to near base of stigmal vein (Figs 72, 80, 93, 94, 104, 110). Head with bare, arch-like malar depression extending about half distance to lower orbit. Head and mesosoma black or at most with limited bluish lustre under some angles of light except propodeum sometimes more conspicuously blue to green, and with parallel-sided, white setae contrasting conspicuously with cuticle (e.g. Figs 77, 81, 85, 89). Propodeum with plical carina present (Figs 95, 96, 103, 109) or absent (Figs 71, 83, 84) posteriorly in nuchal furrow and without or with variably complete, carinate costula (Figs 71, 83, 84, 96, 103), but without transverse carina within paraspircular region. Both mandibles with four similar teeth (Figs 67, 68, 85–87, 98).

Description. Head and mesosoma black (Figs 81, 82, 90, 105, 106) or at most with limited bluish lustre (Figs 66, 102) except propodeum often more conspicuously green to bluish (Figs 83, 109), but with conspicuously contrasting, very slightly lanceolate (almost parallel-sided) white setae (e.g. Figs 77, 81, 85, 89). Eye bare or at least superficially bear with at most exceedingly short, sparse, inconspicuous setae. Mandibles quadridentate, with four similarly acute teeth (Figs 67, 68, 85–87, 98). Head in frontal view (Figs 67, 68, 77, 85, 86, 98) transverse-oval; antenna inserted obviously above lower margin of eyes near middle of face; tentorial pits not evident; clypeus incurved, vertically finely strigose (Fig. 87) to mostly coriaceous- or reticulate-striate; supraclypeal region, lower face toward inner orbit, and scrobal depression with isodiametric meshlike sculpture (Figs 88, 105), but parascrobal region above level of toruli with more vertically aligned and elongated sculpture, and without tiny bump or smoother and shinier spot at ocular margin at midheight of eye (Figs 67, 68, 77). Head in dorsal view abruptly declined immediately behind posterior ocelli (Figs 73, 75, 89, 99), hence strongly transverse with vaulted vertex, but occiput not margined. Head in lateral view with arch-like malar depression extending almost half distance to lower orbit (Figs 69, 78, 88, 105); malar space at most 0.5× height of eye and with (Fig. 69) or without (Fig. 88) malar sulcus. Antenna with scape extending about to level of ventral margin of anterior ocellus (Fig. 79); flagellum with 2 anelli and 6 funiculars with mps in both sexes (Figs 68, 79, 85, 86); clava with apical clavomere uniformly conical with tiny, terminal, encircled, micropilose sensory region; flagellum of male with funiculars closely abutting.

Pronotum with collar smoothly rounded or transversely ridged (Fig. 82: arrow) relative to steeply angled collum (Figs 66, 74, 76, 91, 97), but not separated from collum by smooth and shiny carina. Mesonotum meshlike-reticulate (Figs 81, 90, 100); mesoscutum with incomplete notauli; scutellum widely truncate

anteriorly, the axillae separated by distance about equal to width of axilla, moderately convex and broad, without frenal line, and with posterior margin vertical above metanotum, not reflexed into distinct marginal rim; mesopectus sometimes with anterior margin of femoral depression carinately margined and continuous ventrally as transverse carina anterior to mesocoxa (Figs 101, 102: mpc) differentiating mesosternal shelf; upper mesepimeron extensively smooth and shiny (Figs 82, 92, 101, 102). Fore wing (Figs 72, 80, 93, 94, 104, 110) hyaline; marginal vein not thickened and about 2–3× length of stigmal vein and about 1.3–1.8× length of postmarginal vein; stigma not distinctly capitate; costal cell variably wide, but dorsally bare and ventrally either bare or with variable number of setae over at most about apical third; basal cell including basal and mediocubital folds bare; disc ventrally usually with 1 or 2 rows of admarginal setae (sometimes up to 3 irregular rows distally) of similar length as dorsal setae when these not reduced; disc sometimes with setae variably reduced in density and length beyond speculum, at least behind stigmal and/or marginal veins (Figs 72, 94, 104), and then sometimes marginal fringe absent (Fig. 94); speculum extending behind marginal vein at least to level near base of stigmal vein such that admarginal setae fully exposed. Metapleuron extensively smooth and shiny with anterior margin uniformly curved, unsculptured, and raised slightly above and over posterior margin of mesopleuron (Figs 66, 71, 92, 96, 102, 103). Metacoxa bare dorsobasally; metatibia with single tibial spur. Propodeum (Figs 71, 83, 84, 95, 96, 103, 109) with vertical flange posterolaterally on callus (Fig. 103: arrow 1), but in dorsal view not developed as distinct, laterally projecting denticle; with Λ -shaped to transverse-rectangular, finely meshlike coriaceous-reticulate nucha, the furrow delineating nucha without longitudinal carinae except usually for posterior continuation of median carina and sometimes plical carinae; plica at least indicated by outer margin of basolateral depression (e.g. Figs 71, 83, 84) and sometimes with complete plical carina extending from depression to nucha (Figs 96, 103); plical region meshlike coriaceous-reticulate similar to nucha, with median carina and variably developed costula, sometimes as short, irregular, transverse carina crossing median carina at about midlength so as to appear more or less +-like (e.g. Fig. 71) or as variably conspicuous, convex angulation (e.g. Figs 83, 84) or as uniform carina recurved from plical carina and directed anteromesally to median carina to differentiate anterior and posterior, transverse panels (Fig. 103); paraspiracular region without transverse carina, though sometimes callus with carina extending posterolaterally from spiracle (Fig. 103: arrow 2).

Gaster of female lanceolate with hypopygium extending at most about two-thirds length of gaster (e.g. Figs 64, 65); gaster of male with pale region basally (e.g. Figs 70, 75); petiole very short, transverse, smooth and shiny, and not braced ventrally by extension of first gastral sternite; cercal setae all of similar length.

Distribution. New World.

Hosts. Parasitoids of Bruchinae (Coleoptera: Chrysomelidae) and Curculioninae (Coleoptera: Curculionidae).

Discussion. When Bouček (1993) established *Jaliscoa* he stated that the genus belonged to an otherwise numerous group of Pteromalinae characterized by a propodeum with a costula delimiting two depressed anterior areas (Fig. 103), but differed by having reduced fore wing pilosity (Fig. 104) and a transverse carina on the ventral part of the mesopleuron delimiting a mesosternal shelf (Figs 101, 102: mpc). He also noted the presence of only 2 anelli and a “hollowed” gena, and although not discussed further included in the description the statement that the metapleuron had a “sharp and raised anterior edge” (Bouček 1993: 1281). Because of the presence of a mesosternal shelf, Bouček and Heydon (1997) keyed *Jaliscoa* through couplet 151 along with *Perilampidea* Crawford (1913) and *Halticopteroides* Girault (1913a). *Perilampidea* and *Halticopteroides* both contain only two described species (Noyes 2012). In addition to the differential features given in Bouček and Heydon (1997), members of the latter two genera have a metapleuron that is completely sculptured and abutting the mesopleuron on the same level, three similar teeth or two teeth and a dorsal truncation on the left mandible, lack a malar depression, usually have two metatibial spurs, and the costal cell is often at least partly setose dorsally. Females of some species of *Halticopteroides* have three anelli. Relationships and limits of *Perilampidea* and *Halticopteroides* relative to each other require further study, as do their relationships to other genera such as *Neocatolaccus* Ashmead (1904) and *Heteroschema* Gahan (1919), which lack a mesosternal shelf, but typically have two metatibial spurs, similar propodeal structures, and three anelli in females but only two anelli in males.

For the reasons discussed under *Catolaccus*, I transfer to *Jaliscoa* the four species with a modified metapleuron that Burks (1954) included in *Heterolaccus*. The generic key of Bouček and Heydon (1997) is constructed primarily for females, but both sexes of those *Jaliscoa* species without a mesosternal shelf key to *Lyrcus* (couplet 263) because of the presence of a malar depression and a flagellum with two anelli and six

funiculars. Females of *Lyracus* as defined herein do not key to couplet 263 because they have at least three distinct anelli. Males of *Lyracus*, and particularly males of *Eurydinoteloides*, are variable in structure of the third flagellomere (see under respective genera). However, regardless of the number of anelli in either sex, an unmodified metapleuron (Figs 19, 174) differentiates *Lyracus* from *Jaliscoa*. All species of *Jaliscoa* have the metapleuron extensively smooth and shiny, convex anteriorly, and with the anterior margin evenly curved, unsculptured, and raised slightly above and over the posterior margin of the mesopleuron (Figs 66, 71, 84, 92, 96, 102, 103). This derived structure is also shared with some species of *Eurydinoteloides* (Figs 48, 139, 140). Other species of *Eurydinoteloides* have a similar structure except that the anterior margin is recurved outward at an abrupt angle relative to the mesopleuron (Figs 141, 142), whereas others have a less conspicuously modified metapleuron with only a comparatively small, smooth and shiny region anteromesally and with the anterior margin variably distinctly angulate with some fine sculpture, and sometimes only slightly separated from the mesopleuron (Figs 114–116, 118, 137, 138). This latter structure may well be the groundplan metapleural structure for *Eurydinoteloides* because it is more similar to the presumed plesiomorphic metapleural structure of *Lyracus* (Figs 19, 174) and most other pteromalids (Figs 27, 28, 212, 213). If so, the similar metapleural structures shared by *Jaliscoa* and some *Eurydinoteloides* must either have evolved convergently or the common structure indicates *Jaliscoa* renders *Eurydinoteloides* paraphyletic. Independent evolution might be supported by the number of anelli in females of the two genera (see below) and by a similar metapleural structure also being possessed by specimens (mostly in CNC) representing several undescribed Neotropical species of uncertain generic status. The species (e.g. Fig. 61) are morphologically similar to the only two species currently classified in *Toxeumelloides* Girault (1913a), but both described species of *Toxeumelloides* have a plesiomorphic metapleural structure as well as a flagellum with two anelli (Bouček 1993, fig. 80). The undescribed species have a derived metapleural structure (Fig. 62) very similar to that of *Jaliscoa* and some *Eurydinoteloides* species, as well as three anelli in both sexes (Fig. 61: insert). Mandibles are concealed in most available specimens, but it appears that at least the left mandible is tridentate in *Toxeumelloides* species, whereas the left mandible is quadridentate in the undescribed species similar to *Jaliscoa*. Otherwise, the undescribed species resemble described species of *Toxeumelloides*. The fore wing has one or more rows of admarginal setae that are covered by the discal setae behind at least the apical half of the marginal vein and that are not conspicuously longer than the discal setae (Bouček 1993, fig. 79), and the costal cell is setose along its length. However, the two most distinctive features that distinguish them from *Jaliscoa* and *Eurydinoteloides* is an elongate, smooth and shiny tubular petiole in both sexes (Figs 61, 63; Bouček 1993, figs 81, 82), and dark hairlike setae that do not contrast with the cuticle. The described species of *Toxeumelloides* and the undescribed Neotropical species also have a variably developed malar depression, either abruptly reflexed along the oral margin above the base of the mandible similar to *P. grisselli* and some *Eurydinoteloides* species (Fig. 135) or more arch-like, similar to *Jaliscoa* and some *Eurydinoteloides* (Figs 112, 113, 133) species. Based on similarities, it seems likely that the undescribed species are closely related to *Toxeumelloides*, but comprise a clade with a secondarily modified metapleuron and three anelli. Recognition of the undescribed species as a separate genus based on these two differences could render *Toxeumelloides* paraphyletic. However, if the difference in mandibular dentition noted above is shown to be accurate, then the presence of only three teeth on the left mandible might be evidence for a monophyletic *Toxeumelloides* that is the sister group of the undescribed group of species.

Although the shared metapleural structure of *Jaliscoa* and some *Eurydinoteloides* could be convergent, a close relationship between the two taxa is strongly suggested by some species sharing very similar morphologies, particularly those *Eurydinoteloides* with a similarly broad, arch-like malar depression. Some species of *Eurydinoteloides* from the Neotropical region with a broad malar depression are also completely black and therefore closely resemble *Jaliscoa* species, particularly *J. hunteri* or *J. bouceki* (cf. Figs 91, 121). However, in addition to having three anelli, such species have a metapleuron whose anterior margin is anteromesally angulate and partly sculptured (Figs 115, 116) rather than evenly curved and smooth (see further under *Eurydinoteloides*). Some other species of *Eurydinoteloides* not only have a broad malar depression (Fig. 133) but also have the anterior margin of the metapleuron evenly curved and smooth (Figs 139, 140) similar to *Jaliscoa*, but these are differentiated from *Jaliscoa* by the presence of three anelli and a more distinct metallic lustre (Figs 122, 133, 139). The latter colour feature is less reliable because, as noted in methods, different light sources affect the perception and intensity of observed metallic lustre. Males of an undescribed species of *Eurydinoteloides* from Florida are particularly similar to *Jaliscoa* males because they not only have an arch-like malar depression (Fig. 133), but also

a flagellum with two anelli and six similar funiculars encircled by mps (Fig. 132). However, like females, those *Eurydinoteloides* males with an arch-like malar depression also have quite an obvious metallic lustre on the head and mesosoma.

If *Jaliscoa* and *Eurydinoteloides* represent a monophyletic lineage, either as monophyletic sister taxa or with *Jaliscoa* rendering *Eurydinoteloides* paraphyletic, then a single genus might be recognized based on the metapleuron being partly shiny with the anterior margin at least slightly separated from the mesopleuron. Two subgenera within this genus might then be recognized based on females having either two or three anelli. Species with either two or three anelli in females are classified together in some other genera such as *Mesopolobus* Westwood (1833), *Psilocera* Walker (1833), and *Lariophagus*. However, intermediate structures between a large third flagellomere with mps and a smaller flagellomere without or with at least a reduced number of mps are evident in *Psilocera* and *Lariophagus*. Such intermediate structures are not evident for *Jaliscoa* or *Eurydinoteloides* in which females have, respectively, either two or three distinct anelli. Further, three compared to two anelli presumably represents a derived state within Pteromalinae. Consequently, this transformation series is opposite of the transformation series proposed above for the metapleuron in *Eurydinoteloides* and *Jaliscoa*. If these two genera do form a monophyletic group based on shared metapleural structure, then this suggests either that the three anelli shared by *Eurydinoteloides* and *Lyrceus* females is convergent or the two anelli of *Jaliscoa* females represents a secondary reversal. As noted above, some species of *Eurydinoteloides* are very similar to *Jaliscoa*. However, other species of *Eurydinoteloides* are very similar to *Lyrceus*, as discussed under this latter genus. I therefore prefer to retain *Jaliscoa* and *Eurydinoteloides* as separate genera until a rigorous phylogenetic analysis of Pteromalinae is conducted to better resolve generic relationships.

Key to species of *Jaliscoa*

- 1 Propodeal callus with oblique carina extending posterolaterally from spiracle (Fig. 103: arrow 2); anterior, carinate margin of femoral depression continuous ventrally as transverse carina anterior to mesocoxae (Figs 101, 102: mpc), hence setal line on anterior margin not extending to anterodorsal angle of mesocoxae (Fig. 102); antenna, legs, and usually gaster in part yellowish-orange (Figs 97, 99); propodeum with complete, sinuate plica extending to nucha, the sinuation forming variably developed but complete costula extending to median carina (Fig. 103); female with fore wing dorsally almost bare at least to apex of stigmal vein (Fig. 104) ***J. nudipennis* Bouček**
- Propodeal callus uniformly convex and sculptured adjacent to spiracle (Figs 71, 84, 96); anterior margin of femoral depression and setal line extending to anterodorsal angle of mesocoxae, without transverse carina delimiting ventral region anterior to mesocoxae (Figs 66, 82, 92); antenna with at least flagellum brown, and often legs in part and gaster of female often at least dorsally dark (Figs 65, 70, 91); propodeum with plica often distinct only anteriorly and/or with costula incomplete or developed as only angulate or rounded margin (Figs 71, 84, 96); female with fore wing dorsally sometimes extensively setose beyond speculum (Figs 80, 93, 110) 2
- 2(1) Pronotal collar with anterior margin sublaterally (anterior of notaulus) almost right-angled emarginate (Fig. 81: arrow) and variably distinctly reflexed above level of dorsal surface of collar as transverse, sculptured margin or ridge (Fig. 82: arrow); legs more or less light coloured beyond coxae, though femora usually variably darker orange compared to yellowish-white tibiae and tarsi (Figs 73–76); propodeum without plical carina (Figs 83, 84) ***J. grandis* (Burks)**
- Pronotal collar with anterior margin sublaterally more smoothly sinuate (Fig. 90) and usually without evident anterior margin; legs usually with at least femora extensively dark brown to almost black similar to mesosoma (Fig. 91), though sometimes similar to above; propodeum sometimes with plical carina, at least posteriorly within nuchal furrow (Figs 95, 96) 3
- 3(2) Propodeum without any indication of plical carina posterior of anterolateral plical depression, including absence from nuchal furrow (Fig. 71); tibiae yellowish-white to white (Figs 65, 70) and fore wing of female, excluding admarginal setae, essentially glabrous to level at least about equal with apex of stigmal vein (Fig. 72); malar space with at least fine, though sometimes obscure malar sulcus (Fig. 69: arrows), and comparatively short (Figs 67–69), in lateral view at most 0.6× width of eye ***J. bouceki* n. sp.**
- Propodeum usually with at least a short carina within nuchal furrow and sometimes with variably distinct plical carina extending posterior of anterolateral plical depression (Figs 95, 96, 109), but if not then one or more of above features different, usually with at least meso- and/or metatibia quite obviously bicolored (with darker orange to brown region subbasally to medially) (Fig. 91) and/or female with fore wing extensively setose behind marginal vein, posterobasally in oblique line toward medial fold from about middle of stigmal vein or marginal vein (Figs 93, 110), and malar space either without malar sulcus (Figs 88, 107) or greater than 0.6× width of eye (Figs 85, 86) 4 [*hunteri*-complex]
- 4(3) United States through Central America and South America; body length variable, but malar space greater than 0.6× width of eye ***J. hunteri* (Crawford)**
- Caribbean islands (St. Vincent and Grenada); body length only about 3.2 mm and malar space at most 0.6× width of eye. ***J. vulgaris* (Ashmead)**

***J. bouceki* n. sp.**

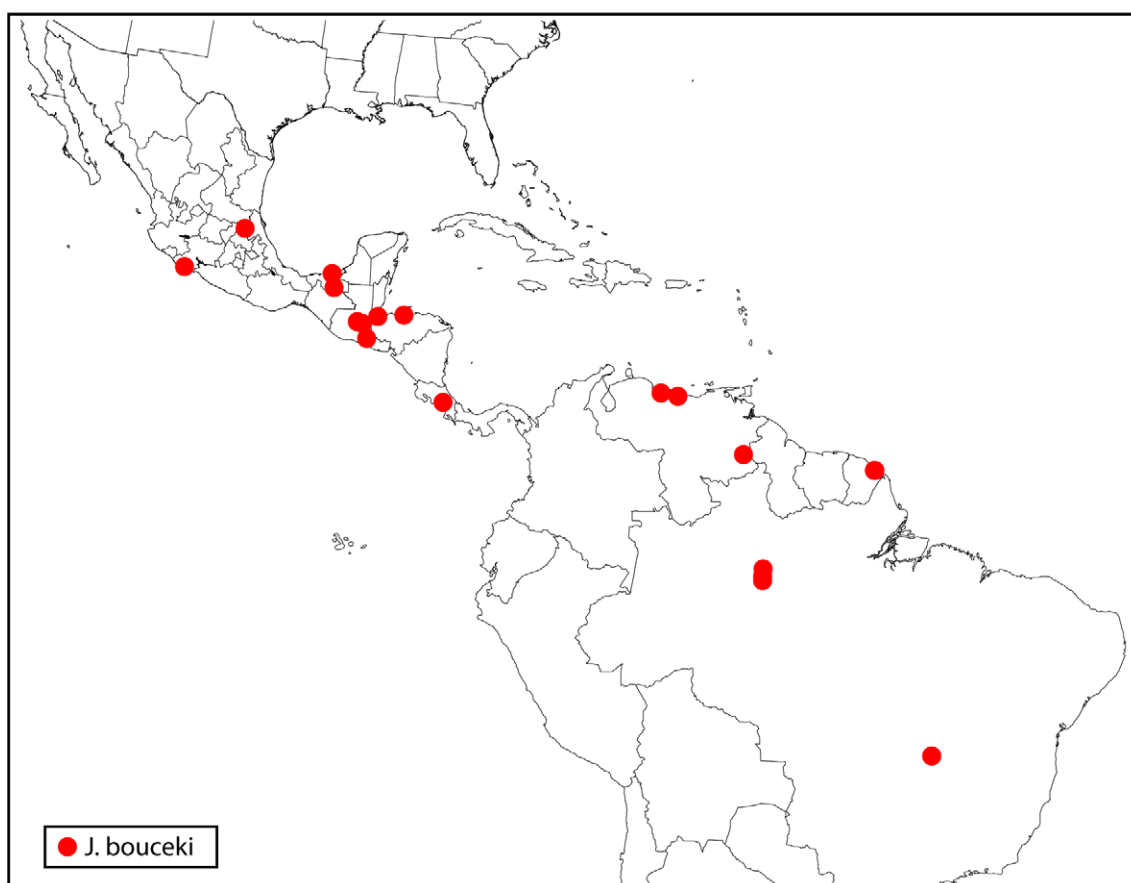
Figs 64–72

Material examined. *Holotype* ♀ (CNC): GUATEMALA: Izobal, Las Escobas, 200m, xi.86-x.87, M. Sharkey / *Holotype Jaliscoa bouceki* Gibson, CNC Type No 24061.

Paratypes (57♀, 18♂). **BRAZIL. Amazonas:** Manaus—ca. 60 km N, Hwy ZF 2, km 19.5, 02°30'S 60°15'W, 18.VIII.79, terra firme, canopy fogging, Adis, Erwin & Montgomery (2♀, 1♂ USNM); 40 km SW, Rio Janauaca, 10.III.79, 03°20'S 60°17'W, canopy fogging, Montgomery, Erwin, Sucharov, Schimmel, Krischik, Date & Bacon (3♀ USNM). Rio Tatumã Mirím, 2 km from Rio Negro, 03°02'S 60°17'W, 27.VII.79, Igapo canopy fogging, Adis, Erwin & Montgomery (1♀ USNM). **COSTA RICA.** San José, Cerro d. l. Muerte, 3400m, 30.VIII.86, elfin, L. Masner (1♀ CNC). **EL SALVADOR.** Santa Anna, X.59, N.L.H. Krauss (1♀ USNM). **FRENCH GUIANA.** Patawa Kaw Mountains, 04°33.562'N 52°12.425'W, IX.2007, J. Cerda (3♀ CNC, Photo 2011-10, 11). PK35, 230m, rainforest, 04°32.663'N 52°09.371'W, x.2007, J. Cerda (1♀ CNC). **GUATEMALA.** Baja Verapaz, 6 km S Purulha, 2-10.IX.87, M. Sharkey (1♀ CNC). Izobal, Las Escobas, 200m, VI.87 (6♀ CNC, Photo 2011-154), XI.86-X.87 (20♀, 15♂ CNC, Photo 2011-116, 155, 156), M. Sharkey; V.87, L. Masner (8♀ CNC, Photo 2011-88). Quiché, 4 km W of Rio Blanco, 2.IX.87, 4000', M. Sharkey (1♀ CNC). **HONDURAS.** La Celba, 10.VI.49, E. Becker (1♀, 1♂ CNC). **MEXICO. Chiapas:** Palenque Ruins, 4 mi. SW, 30.VII.83, R. Anderson (1♀ CNC). **Michoacan:** Aquila, 49 mi. SE, 13.VII.84, J.B. Woolley (2♀ TAMU). **Pueblo:** Xicotepcede, Juarez, 17.VI.83, R. Anderson (1♀ CNC, Photo 2011-28). **Veracruz:** Tlanchinol, 20 km NE, 13.VI.83, M. Kaulbars (1♂ CNC). **VENEZUELA.** Aqua Blanca, Miranda Guatopo Nat. Pk, 35 km N Altagracia, 400m, 3-10.VI.87, S&J Peck (1♀ CNC). Aragua, H. Pittier Nat. Park, Portachuelo Pass, 1100m, 10°21'N 67°41'W, 14.V.98, J. Ashe, R. Brooks & R. Hanley (1♀ CNC). Bolivar, 12.5 km S El Dorado, 1100m, 18.VII-7.VIII.86, B. Gill (1♀ CNC).

Distribution. Map 2.

Etymology. Named in honour of the late Dr. Zdenek Bouček, the originator of *Jaliscoa*.



MAP 2. Distribution of *Jaliscoa bouceki* Gibson.

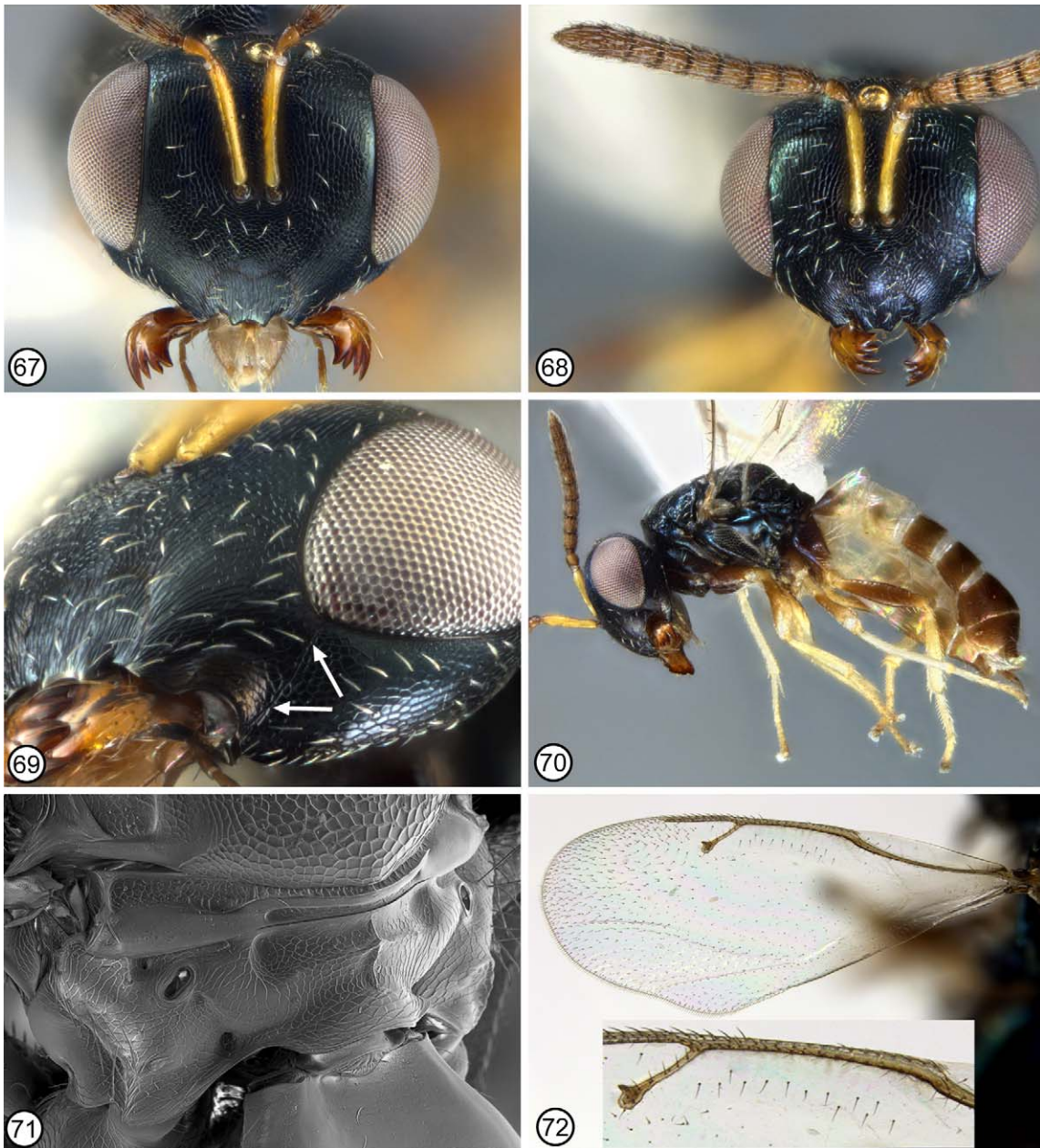


FIGURES 61–66. 61–63, undetermined species near *Toxumelloides*: 61, ♂ habitus, lateral (73) [insert: pedicel–fl4]; 62, ♂ meso- and metapleuron (73); 63, ♀ propodeum and petiole, dorsal (170). 64–66, *Jaliscoa bouceki* ♀: 64, ♀ habitus, dorsal (10); 65, ♀ habitus, lateral (11); 66, ♀ mesosoma, lateral (11). No. in parenthesis = CNC 2011 photo no.

Description. FEMALE (habitus: Figs 64, 65). Length = 1.7–3.2 mm. *Head.* Face (Fig. 67) with clypeus more or less uniformly, longitudinally, finely striate to strigose, and finely, obliquely, coriaceous-alutaceous for at least half distance to eye and then meshlike coriaceous or only very shallowly coriaceous-reticulate adjacent to eye, but with parascrobal region vertically striate-alutaceous, scrobal depression meshlike reticulate, and supraclypeal region meshlike reticulate to partly coriaceous (Fig. 69); malar space with fine, though sometimes obscure malar sulcus extending between lower orbit and oral margin at posterior limit of malar depression (Fig. 69: arrows), and 0.32–0.40× eye height (Fig. 67) and 0.44–0.59× eye width. Antenna more or less uniformly yellowish or pedicel and/or flagellum yellowish-brown to light brown (Fig. 64).

Mesosoma. Tegula yellow. Pronotal collar abruptly angled relative to collum (Fig. 66), but not raised or carinate anteriorly, and laterally shallowly sinuate (*cf.* Fig. 90). Mesopectus (Fig. 66) with short, horizontal ridge or at least abrupt angulation at level of base of mesocoxa, but carinate anterior margin of femoral depression not continuous ventrally anterior to mesocoxa and setal line extending ventrally close to anterior angle of mesocoxa. Fore wing (Fig. 72) with 0–3 setae in costal cell ventroapically; disc (excluding admarginal setae) essentially

glabrous to about apex of stigmal vein (membrane behind marginal vein usually with variably distinct spots representing remains of setal pores), though dorsally sometimes with a couple of setae proximal to stigmal vein and variably extensively and distinctly setose beyond level of stigmal vein, and ventrally with distinct setae beyond level of stigmal vein posteriorly to medial fold, the medial fold with a line of distinct setae extending further basally; admarginal area with 7–14 setae usually arranged in 1 or 2 irregular rows; marginal fringe usually complete (rare absence in museum specimens likely result of abrasion); smv: mv: pmv: stv about 3.5–4.1: 2.2–2.7: 1.7–2.0: 1.0. Legs (Fig. 65) sometimes with one or more femora quite distinctly brown except basally and apically, more often with femora yellowish-orange to orange, but at least tibiae and tarsi more yellowish-white to white. Propodeum (Fig. 71) with callus uniformly convex, without oblique carina lateral of spiracle; without plical carina, even posteriorly within nuchal furrow; plical region usually with distinct, transverse angulation evenly recurved anteromesally from basal plical depression so as to delineate strongly transverse, depressed anterior panel, the median region intersected by median carina that extends to nucha, and medially with anterior panel at most as long as posterior panel and at least slightly shorter than nucha.



FIGURES 67–72. *Jaliscoa bouceki*. **67**, ♀ head, frontal (154); **68**, ♂ head and antenna, frontal (156); **69**, ♀ head, frontolateral (88) [arrows point to malar sulcus]; **70**, ♂ habitus, lateral (155); **71**, ♀ propodeum, posterolateral (10: SEM); **72**, ♀ fore wing (116) [insert: admarginal setae]. No. in parenthesis = CNC 2011 photo no.

Metasoma. Gaster (Figs 64, 65) often not contrasting conspicuously in color with mesosoma, variably dark brown to almost black with metallic lustres dorsobasally on Gt1 and basolaterally on other terga, but sometimes orangey-brown to light brown with limited metallic lustre laterally; lanceolate, length about 1.9–3.4× as long as wide (typically more elongate-slender in air-dried specimens with collapsed gaster); Gt2–Gt4 with posterior margins variably distinctly emarginate, but at most Gt2 and Gt3 with very short, white, mediolongitudinal line posteriorly; syntergum at least about as long as wide and with about apical half setose; cercus conical but short, not distinctly digitiform.

MALE (habitus: Fig. 70). Similar to female except as follows: gaster with large, subbasal, yellowish region (Fig. 70); fore wing with up to 6 setae ventroapically in costal cell, disc always extensively setose except for oblique speculum extending to base of stigmal vein, and with up to 21 admarginal setae in 1–3 rows.

Biology. Hosts and plant associates unknown, but undoubtedly a parasitoid of Curculionidae (Coleoptera) based on known host associations of other *Jaliscoa* species.

Discussion. Individuals of *J. bouceki* are very similar to those differentiated below as the *hunteri*-complex (*J. hunteri* and *J. vulgaris*) except for the features given in the key. Complete absence of any indication of a plical carina (Fig. 71) differentiates *J. bouceki* from most *hunteri*-complex individuals (Figs 95, 96). However, some *J. hunteri* lack a plical carina or have this developed only very slightly such that it can be easily overlooked (Fig. 109) without proper illumination and magnification. In such instances a combination of three features—tibial colour, fore wing setal pattern, and malar space structure distinguish individuals. Females of *J. bouceki* always have the fore wings essentially glabrous behind the marginal vein (Fig. 72) and both sexes have the tibiae yellowish-white to white (Figs 65, 70). Females recognized here as *J. vulgaris* have yellowish-white tibiae similar to *J. bouceki* as well as a relatively short malar space, but lack a malar sulcus (Figs 105, 107) and have the fore wings extensively setose behind the marginal vein (Fig. 110). Individuals of *J. hunteri* are more variable, but typically at least the meso- and/or metatibiae are banded with an obviously darker orange to brown band subbasally to mesally (Fig. 91) and/or the fore wings are extensively setose behind the marginal vein (Fig. 93), but if not then the malar space not only lacks a malar sulcus but is at least 0.6× as long as the width of an eye (Fig. 88). Males of *J. bouceki* and those of the *hunteri*-complex have similarly, extensively setose fore wings and thus can be more difficult to differentiate. Based on the above features, I include in the type series one male from Tlanchinol, Mexico that was collected the same time and place as one female and one male I identify as *J. hunteri*.

***Jaliscoa grandis* (Burks) n. comb.**

Figs 73–84

Heterolaccus grandis Burks, 1954: 9. Holotype (♀, USNM, examined). Type data: Nicaragua, Managua, 2 May, 1944, A. Hurtado, ex *Anthonomus grandis* Boh.

Pteromalus grandis; De Santis, 1979: 148.

Catolaccus grandis; Burks, 1979: 806.

Description. FEMALE (habitus: Figs 73, 74). Length = 2.8–6 mm. *Head.* Face (Fig. 77) with clypeus more or less uniformly, longitudinally, finely striate, the striae or at least fine, oblique, coriaceous-alutaceous sculpture extending at least half distance to eye and then meshlike coriaceous or only very shallowly coriaceous-reticulate adjacent to eye and parascrobal region vertically striate-alutaceous, though scrobal depression meshlike reticulate and supraclypeal region meshlike reticulate to partly coriaceous (Fig. 78); malar space with (Fig. 78) or without a malar sulcus, but 0.35–0.44× eye height (Fig. 77) and 0.53–0.65× eye width. Antenna (Figs 74, 79) with scape, pedicel and sometimes anelli yellow to yellowish-orange, but flagellum usually dark brown or rarely orangey-yellow.

Mesosoma. Tegula yellow. Pronotum usually with quite distinct carina or raised ridge differentiating collar from neck (Fig. 82: arrow), and margin abruptly incised laterally so as to be almost right-angled emarginate (Fig. 81: arrow). Mesopectus (Fig. 82) with short, horizontal ridge or at least abrupt angulation at level of base of mesocoxa, but carinate anterior margin of femoral depression not continuous ventrally anterior to mesocoxa and setal line extending close to anterior angle of mesocoxa. Fore wing (Fig. 80) with 0–5 setae within costal cell ventroapically; disc at least with elongate band of setae proximal to stigma and usually more distinctly and extensively setose except for broad speculum extending to base of stigmal vein; admarginal area with 12–26 setae

arranged in 1 or usually 2 rows; marginal fringe usually complete, though often with very short or sometimes absent setae apically; smv: mv: pmv: stv about 4.0–5.3: 2.7–3.8: 2.0–2.4: 1.0. Legs (Fig. 74) beyond coxae light coloured, the femora yellowish-orange to orange and tibiae and tarsi more yellowish-white to white. Propodeum (Figs 83, 84) with callus uniformly convex, without oblique carina lateral of spiracle; without plical carina, even posteriorly within nuchal furrow; plical region usually with distinct, transverse angulation evenly recurved anteromesally from basal plical depression so as to delineate strongly transverse, depressed anterior panel, the median region intersected by median carina that extends to nucha, and medially at most as long as posterior panel and at least slightly shorter than nucha.

Metasoma. Gaster (Figs 73, 74) typically not contrasting conspicuously in color with mesosoma, variably dark brown to almost black with metallic lustres dorsobasally on Gt1 and basolaterally on other terga, though extremely rarely mostly orangey-brown with limited metallic lustre laterally; lanceolate, length about 2.5–3.8× as long as wide and at most Gt2 and Gt3 with posterior margins distinctly emarginate and sulcate over at most apical half; syntergum at least as long as wide, usually conspicuously longer, at least apical half setose; cercus conical but short, not distinctly digitiform.

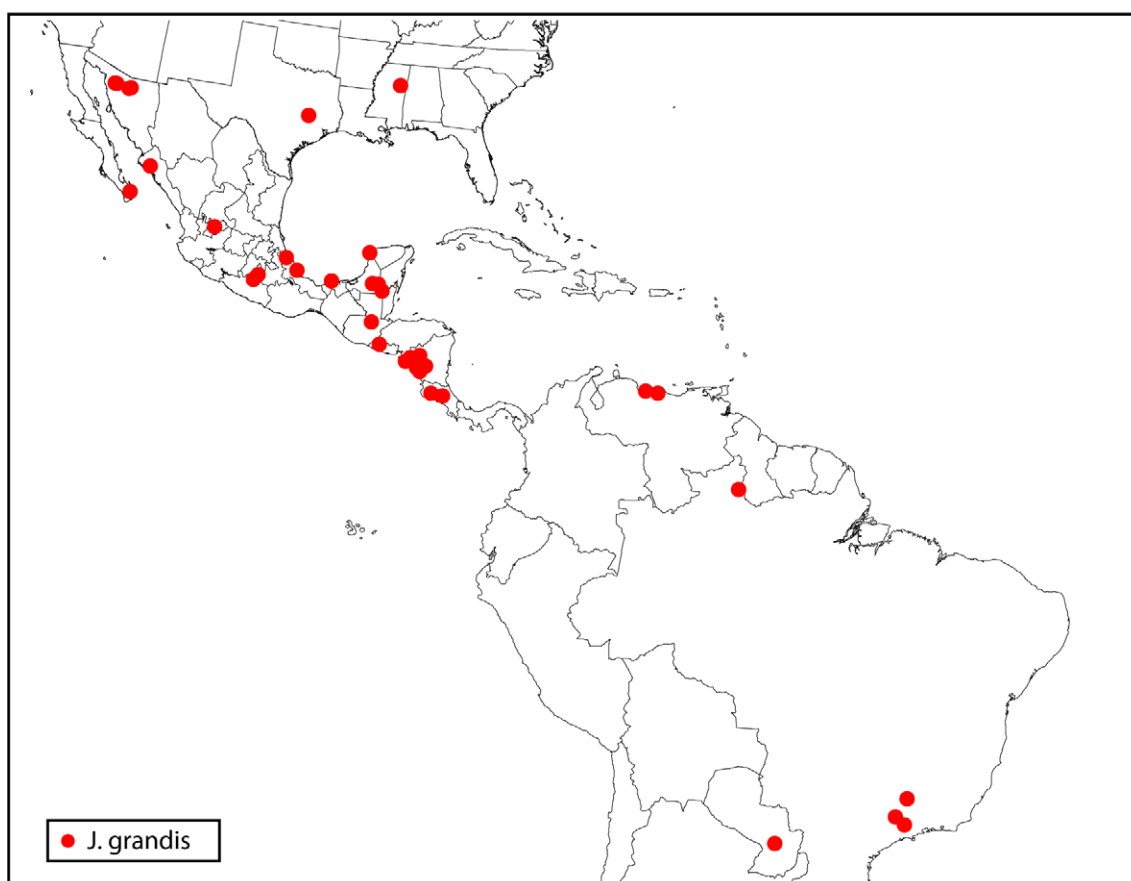
MALE (habitus: Figs 75, 76). Similar to female except legs usually more uniformly yellowish-white beyond coxae (Fig. 76), gaster with large, subbasal, yellowish region (Fig. 75), and fore wing always extensively setose except for oblique speculum extending to base of stigmal vein.

Material examined. *NEARCTIC. USA. Mississippi: Oktibbeha Co.*, Starkville, 1.5 mi. SW, 9.VIII.67, 20.VIII.67, W.H.C. & W.L. McGovern, em. infested cotton squares (3♀ MEMS). *Texas: Brazos Co.*, TAMU lab. cult., 5.VIII.77, J.R. Cate (40♀, 51♂ TAMU). College Station—XII.82, in culture, J.R. Cate (5♀, 2♂ TAMU); TAMU Biol. Cont., IX.88, ex *Anthonomus grandis* in lab culture (25♀, 19♂ TAMU, CNC Photo 2011–105, 152).

NEOTROPICAL. BRAZIL. Amazonas: Manaus, ca. 60 km N, Hwy ZF 2, km 19.5, 02°30'S 60°15'W, 18.VIII.79, Adis, Erwin & Montgomery, terra firme, canopy fogging (1♀ USNM). *Minas Gerais:* Carmo do Rio Claro Janerio, 78, Carvalho & Schaffner (1♀ TAMU). *São Paulo:* Campinas—16.V.38, H.F.G. Sauer, par. curculionid (2♀ USNM); Faz., Mogi Guacu, 1–8.I.70, JM & BA Campbell (1♀ CNC, Photo 2011–153). *COSTA RICA.* Guanacaste, nr Abangares, 9.I.64, W.H.C., em. pupa found in boll weevil cell in cultivated cotton (1♂ MEMS). San José, 30.I.64, A. Matarrita, ex *A. grandis* (2♀ CSCA, 2♀ USNM). *EL SALVADOR.* Quezaltepeque—500m, 19.VI.63, D.Q. Cavagnaro & M.E. Irwin (1♂ CASC); 23.VIII.76, Jose R. Quezada, ex *A. grandis* (2♂ MEMS). *GUATEMALA.* Alta Verapaz, Lanquin, 22.II.65, W.H. Cross, em. 12.III.65 from *Gossypium barbadense* (1♂ MEMS). *MEXICO. Baja California Sur:* Punta Pescadero, 14.8 mi. S, W.H. Cross, 4.XI.65, em. 22.XI.65 ex *Gossypium davidsoni* (10♀, 3♂ MEMS). *Campeche:* Escarcega-Xpujil, 11–15.XI.90, J.R. Cate & R. Jones, ex *Hampea trilobata* (3♀ TAMU). Xpujil, 10 km W, Chincanna, 12–14.VII.83, M. Kaulbars (2♀ CNC). *Chiapas:* Municipio Cintalapa, 5 mi. N Nuevo Tenochilan, 29.IV.90, R.W. Jones, D. Baro (1♀ TAMU). *Guerrero:* S. Zacacoyuca, km 179 on Hwy 95, 18.I.67, W.H. Cross, em. from boll weevil infested cultivated cotton (20♀, 21♂ MEMS; 1♀, 1♂ USNM). *Morelos:* Zacatapec, INIA Station, 17.XII.71, Jesus Cabral M., cultivated cotton (2♂ MEMS; 1♀ USNM). *Nayarit:* San Blas, 24–26.IV.61, Howden & Martin (1♀ CNC). *Quinta Roo:* Chetumal, 68 km SW, Kuhunlich, 160m, 14–17.VII.83, M. Kaulbars (1♀ CNC). *Sinaloa:* Guasave, 1.VIII.96 (5♀, 5♂ USNM), 20.V.96 (4♀, 8♂ USNM), 7.VIII.96 (4♀, 4♂ USNM, CNC Photo 2011–169), T. Chavez-Chavez. *Sonora:* Caborca, W.H. Cross—2 mi. E, 20.I.63, dead in boll weevil cell in cotton boll (2♀ MEMS); 4.5 mi. W, 20.I.63, pupa from boll weevil cell in cotton boll, em. 30.I.63 (2♀, 2♂ MEMS). Los Chirriones, 18.XI.69, 10.XII.69, W.H. Cross, ex cultivated cotton (16♀, 12♂ MEMS). Magdalena, W.H. Cross, cultivated cotton—km 2299 on Hwy, 31.10.65 (17♀, 2♂ MEMS; 2♀, 1♂ USNM), km 2296.7 on Hwy 15, 17.XI.69 (33♀, 28♂ MEMS). Rockefeller Res. Center, 20.IV.59, ex *Anthonomus* (1♀ USNM). Santa Ana, 31.X.65, W.H. Cross, ex cotton with weevils (2♀, 1♂ MEMS). *Veracruz:* W.H. Cross—VII.79, ex *A. grandis* (3♀, 2♂ USNM, CNC Photo 2011–12, 68. 151); 3.5 mi. SE Martinez de la Torre on Misantla Road, 27.X.67, ex boll weevil infested buds of *Hampea* sp. (11♀, 7♂ MEMS; 1♀, 1♂ USNM). Jct Hwy 127&105, 13.VI.83, M. Kaulbars (1♀ CNC). *Yucatan:* Celestun—24.IV.84 (2♀ TAMU), 12.12.83 (2♀ TAMU), R.W. Fisher, on *Gossypium hir.*; 19.XII.81, D.W. Williams, cotton square (2♀ TAMU). Yucatan, lab-reared, III.84, R. Fisher, ex *Anthonomus* spp. on *Hampea* spp. (3♀, 3♂ USNM). *Zacatecas:* Tabasco, IX, X.81, P. Stanley, ex *Anth. grandis* (18♀, 20♂ BMNH). *NICARAGUA.* Chinandega, 16.I.53, Horvilleur, ex *A. grandis* (1♂ paratype USNM). Comalapa, 1.XII.76, W.H. Cross, ex *Gossypium hirsutum* (3♂ MEMS). Jinotega, VII.89, T. Reinboldt (1♀ CNC, Photo 2011–150). La Calera, 13.V.65,

25.V.65, R. Bodan, larva enpacha de algodón, adulto (1♀ USNM). Managua, 24.III.52 (1♀ paratype USNM, CNC Photo 2011-6; 1♂ allotype USNM), I.44 (1♀ USNM), 2.V.44, A. Hurtado, ex *A. grandis* Boh. (holotype, 6♀ paratypes and 2♀ USNM). V. [Volcan] Mombacho, VIII.89, F. Reinboldt, ex cotton boll weevil (1♀ CNC, Photo 2011-27). **PARAGUAY.** Molinascue, X.39, F. Schade (1♀ USNM). **VENEZUELA.** Aragua—Parque Nac. H. Pittier, La Trilla, 200m, 11-14.IV.94, L. Masner (1♀ CNC); Rancho Grande, 12.V.1979, G. Gordh (2♀ UCRC).

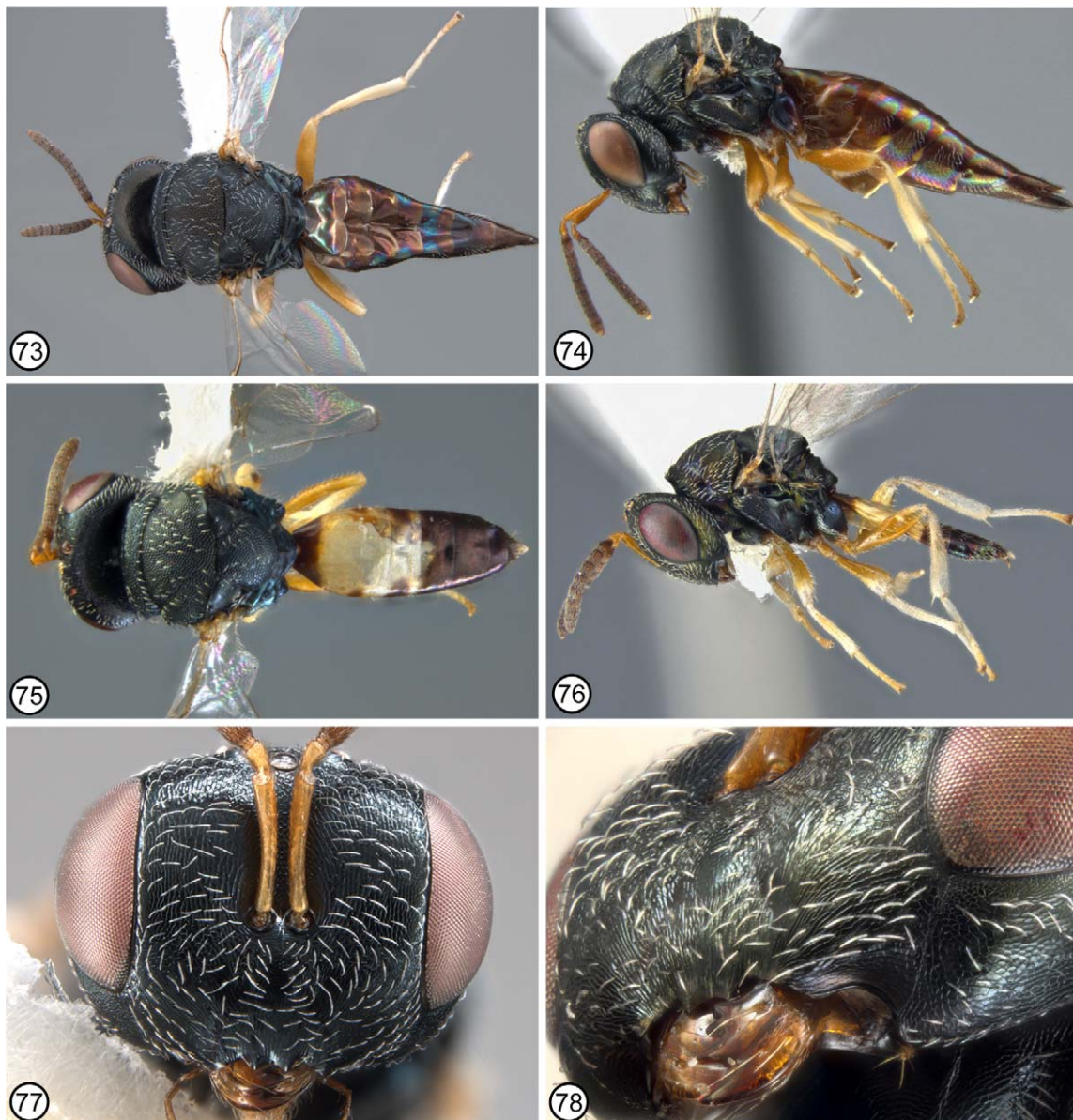
Distribution. Map 3. Noyes (2012) listed *J. grandis* from Arizona, Mississippi, New Mexico and Texas in USA, but presence of a sustaining population in North America north of Mexico is not proven. Burks (1979) stated that *J. grandis* was introduced into Arizona and Texas, but I was unable to find any original literature or specimens that support an Arizona release. It was introduced into Texas (Cate *et al.* 1990) as well as Mississippi (Johnson *et al.* 1973) and Alabama (Morales-Ramos *et al.* 1994) for biocontrol of the boll weevil, but apparently did not overwinter in these areas and has not been recovered subsequently (Morales-Ramos and Cate 1992). Finally, the record for New Mexico is based on a laboratory experiment testing the residual effects of pesticides (Pierce *et al.* 2002). The three specimens examined from Mississippi represent voucher specimens from the field trials of Johnson *et al.* (1973), whereas the specimens examined from Texas were laboratory cultured. The latter two sites are included in the distribution map because specimens were at least released. Cross and Mitchell (1969) previously compared the then known distributions of *J. grandis* and *J. hunteri*.



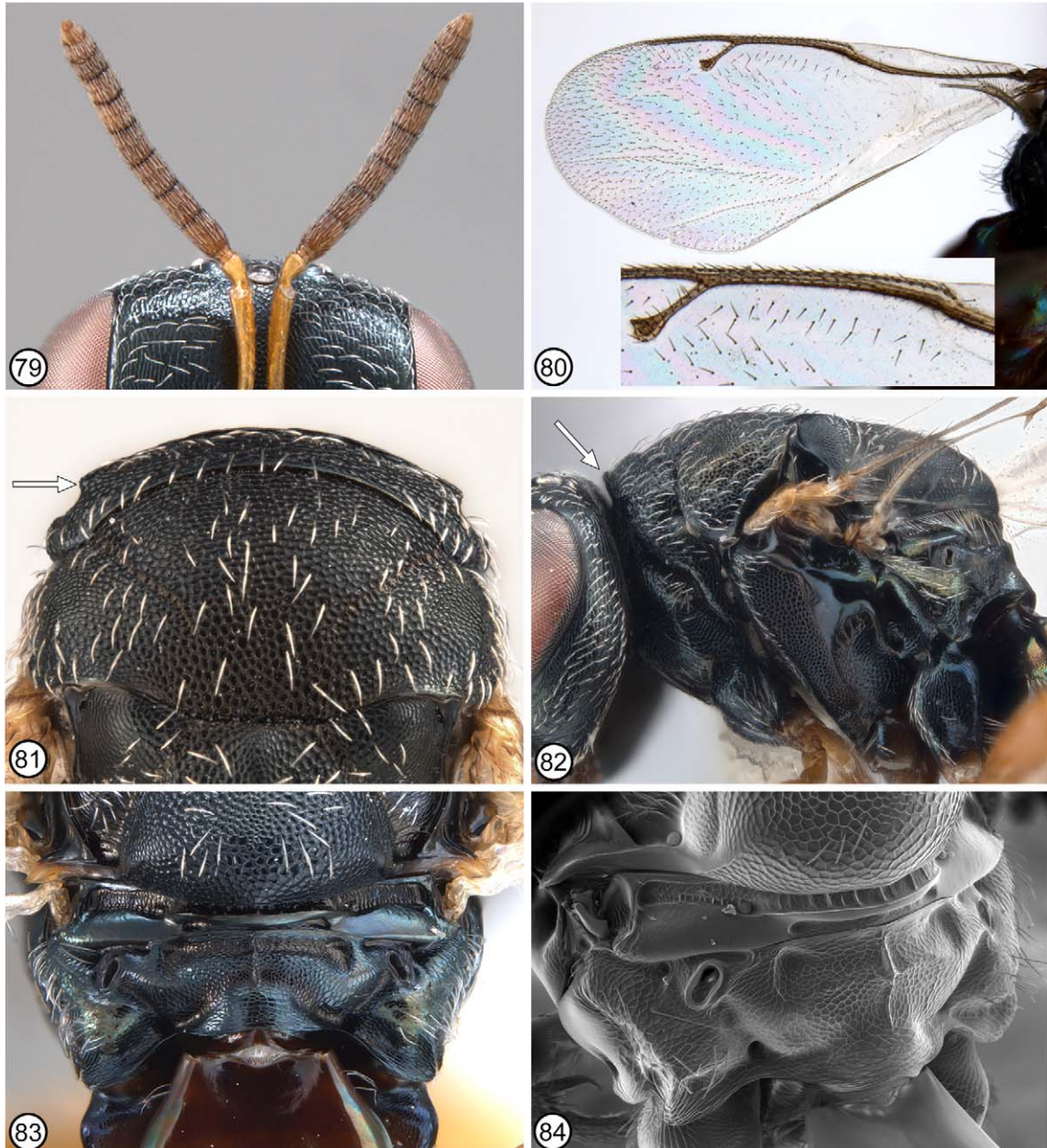
MAP 3. Distribution of *Jaliscoa grandis* (Burks).

Biology. *Jaliscoa grandis* is a primary parasitoid of the cotton boll weevil, *Anthonomus grandis* Boheman, and *A. hunteri* Burke & Cate (Cate *et al.* 1990, Morales-Ramos [no date]), and augmentative releases have successfully reduced boll weevil populations (see references in Morales-Ramos *et al.* 2000). It is also able to parasitize other curculionids and bruchids in the laboratory, including *Anthonomus eugenii* Cano (Rojas *et al.* 1998), *Chalcodermus aeneus* Boheman (Rojas *et al.* 1998), *Euscepes postfasciatus* (Fairmaire) (Ramalho & Dias 2003) and the bruchid *Callosobruchus maculatus* (Fabricius) (Ramalho & Dias 2003). Material examined resulted in no new host records, but three new plant associates—**Malvaceae:** *Gossypium barbadense* L., *Gossypium davidsoni* Kellogg, and *Hampea trilobata* Standley.

Discussion. Females of *J. grandis* are most similar to those of the *hunteri*-complex, but usually are readily differentiated by a combination of three features—pronotal collar usually quite obviously ridged anteriorly (Fig. 82: arrow) rather than rounded into collum anteriorly, but at least with an abrupt, almost right-angled indentation laterally (Fig. 81: arrow) rather than more smoothly, sinuately emarginate laterally (Fig. 90); legs comparatively light coloured with femora at most orange (Fig. 74) rather than femora and often tibiae partly brown (Fig. 91); and propodeum without any indication of plical carinae (Figs 83, 84) rather than usually with at least some indication of a plical carinae (Figs 95, 96, 109). Most females of *J. hunteri* from America north of Mexico have the fore wing extensively glabrous behind the marginal and stigmal veins (Fig. 94), whereas *J. grandis* females typically have more extensively setose fore wings (Fig. 80), though setal pattern is highly variable in females of both species. Males of both species always have extensively setose fore wings. *Jaliscoa grandis* is the only species that is variable in presence (Fig. 78) or absence of a malar sulcus. Other species lack a malar sulcus except for *J. bouceki*.



FIGURES 73–78. *Jaliscoa grandis*. 73, ♀ habitus, dorsal (6); 74, ♀ habitus, lateral (150); 75, ♂ habitus, dorsal (151); 76, ♂ habitus, lateral; 77, ♀ head, frontal (6); 78, ♀ lower face, frontolateral (169). No. in parenthesis = CNC 2011 photo no.



FIGURES 79–84. *Jaliscoa grandis* ♀. **79**, antennae (6); **80**, fore wing (27) [insert: admarginal setae]; **81**, pro- and mesonotum, dorsal (27) [arrow points to pronotal emargination]; **82**, mesosoma, lateral (12) [arrow points to pronotal ridge]; **83**, propodeum, posterior (6); **84**, propodeum, posterolateral (105: SEM). No. in parenthesis = CNC 2011 photo no.

***Jaliscoa hunteri* (Crawford) n. comb.**

Figs 85–96

Catolaccus hunteri Crawford, 1908: 160. Holotype (♀, USNM, examined). Type data: Texas, Mineola, bred from *Anthonomus grandis* Boh.

Catolaccus townsendi Crawford, 1912: 172–173. Holotype (♀, USNM, examined). Type data: Peru, Department of Piura, 795° 3e, C.H.T. Townsend, ex *Anthonomus vestitus*. Synonymy under *C. hunteri* by Gahan, 1951: 175. Reestablished as valid species by Burks, 1954: 11. **Re-established syn.**

Zatropis hunteri; Crawford, 1921: 171.

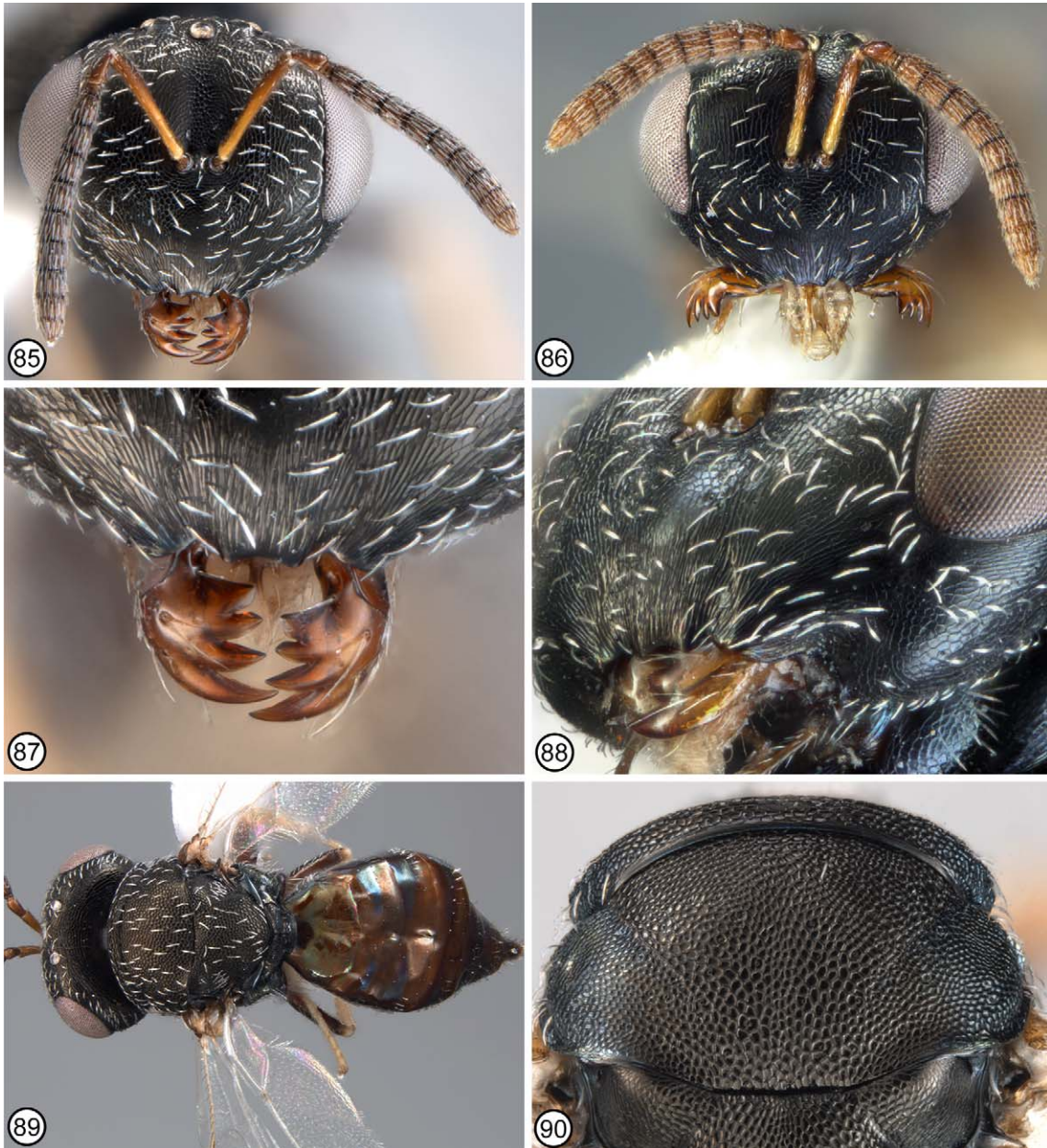
Heterolaccus hunteri; Burks, 1954: 9.

Heterolaccus townsendi; Burks, 1954: 11.

Pteromalus hunteri; De Santis, 1979: 148.

Pteromalus townsendi; De Santis, 1979: 151.
Catolaccus hunteri; Burks, 1979: 806.

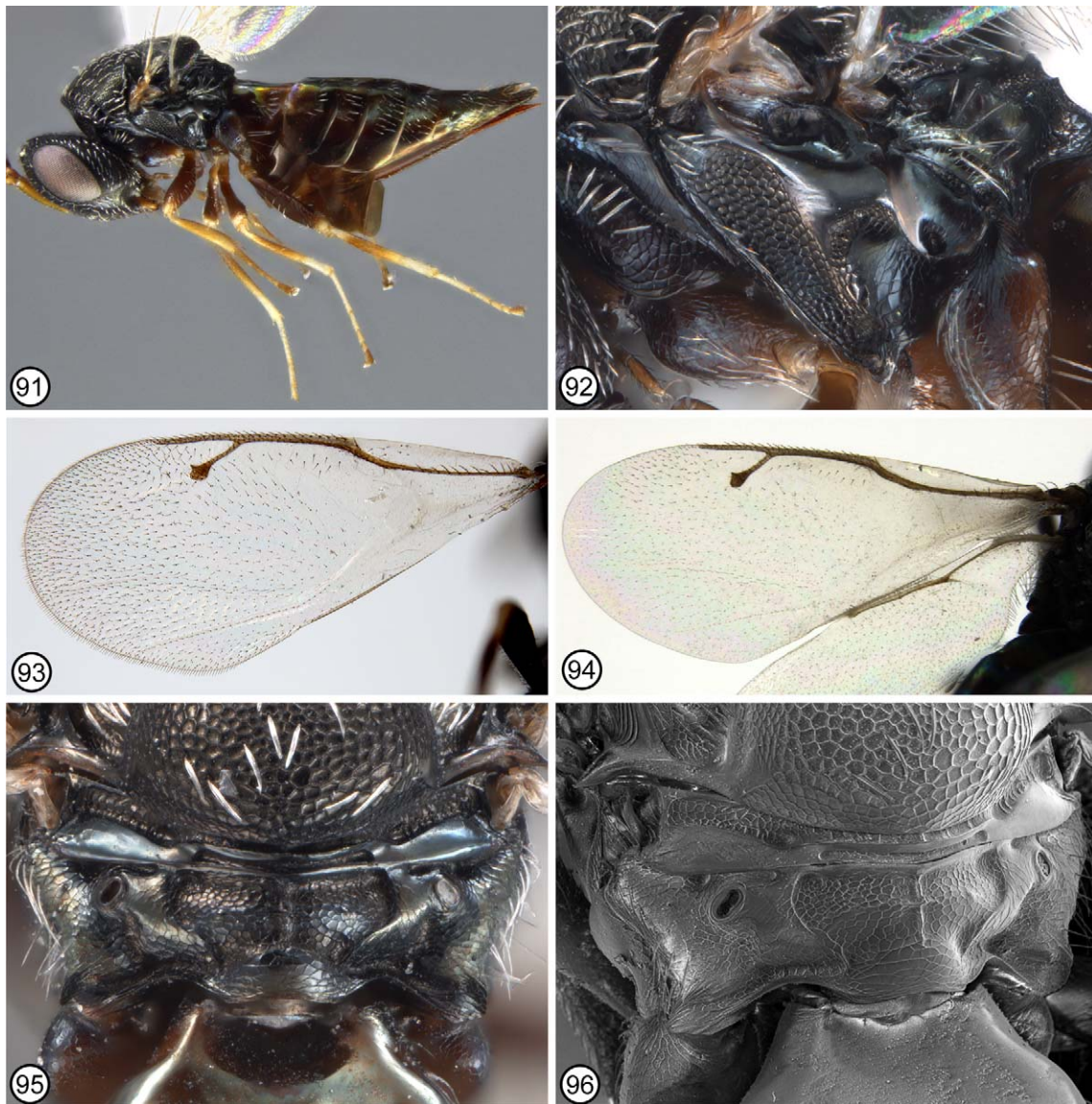
Description. FEMALE (habitus: Figs 89, 91). Length = 1.9–4.6 mm. *Head.* Face (Fig. 85) with clypeus more or less uniformly, longitudinally, finely striate to strigose, and finely, obliquely, coriaceous-alutaceous for at least half distance to eye and then meshlike coriaceous or only very shallowly coriaceous-reticulate adjacent to eye, but with parascrobal region vertically striate-alutaceous, scrobal depression meshlike reticulate, and supraclypeal region meshlike reticulate to partly coriaceous (Fig. 88); malar space without malar sulcus (Fig. 88), though sometimes with line of finer sculpture extending between lower orbit and oral margin at posterior limit of malar depression, and $0.37\text{--}0.57\times$ eye height (Fig. 85) and $0.61\text{--}0.97\times$ eye width. Antenna (Fig. 85) with scape yellowish or with up to about apical two-thirds brown, and pedicel and flagellum variably yellowish-brown to dark brown.



FIGURES 85–90. *Jaliscoa hunteri*. **85**, ♀ head and antenna, frontal (7); **86**, ♂ head and antennae, frontal (157); **87**, ♀ clypeus and mandibles, frontal (7); **88**, ♀ lower face, frontolateral (158); **89**, ♀ habitus, dorsal (9); **90**, ♀ pro- and mesonotum, dorsal (28). No. in parenthesis = CNC 2011 photo no.

Mesosoma. Tegula yellow to brown. Pronotum with collar abruptly angled relative to collum (Fig. 91), but not raised or carinate anteriorly, and laterally shallowly sinuate (Fig. 90). Mesopectus (Fig. 92) with short, horizontal

ridge or at least abrupt angulation at level of base of mesocoxa, but carinate anterior margin of femoral depression not continuous ventrally anterior to mesocoxa and setal line extending close to anterior angle of mesocoxa. Fore wing with 1–6 setae within costal cell ventroapically; disc varying from uniformly setose beyond broad, oblique speculum extending to about middle of marginal vein or middle of stigmal vein (Fig. 93), to essentially glabrous to or beyond level of stigmal vein (Fig. 94), though sometimes with variably large setal region that does not extend posteriorly to medial fold proximal to stigma or stigmal vein; admarginal area with 7–19 setae usually arranged in 1 or 2 irregular rows; marginal fringe usually complete though sometimes absent; smv: mv: pmv: stv about: 3.3–4.3: 2.1–3.1: 1.3–2.0: 1.0. Legs (Fig. 91) with femora brown and more northern specimens usually with noticeably darker, variably broad orange to dark brown band on at least meso- and/or metatibiae, though southern specimens usually with tibiae more uniformly yellowish-white to white. Propodeum (Figs 95, 96) with callus uniformly convex, without oblique carina lateral of spiracle; plical carina variable, sometimes with a complete, sinuate carina between basal plical depression and nucha (Fig. 96), but usually less evident as a fine, raised line partly between plical depression and nucha and/or only a short carina within nuchal furrow, and sometimes completely absent; plical region with median carina extending to nucha, but more or less uniformly convex or with variably developed transverse angulation or ridge recurved anteromesally from plical depression so as to delineate transverse, depressed anterior panel at most as long as posterior panel and at least slightly shorter than nucha.



FIGURES 91–96. *Jaliscoa hunteri* ♀. **91**, habitus, lateral (8); **92**, meso- and metapleuron (8); **93**, fore wing (38); **94**, fore wing (87); **95**, propodeum, posterior (9); **96**, propodeum, posterolateral (9) (SEM). No. in parenthesis = CNC 2011 photo no.

Metasoma. Gaster (Figs 89, 91) usually not contrasting conspicuously in color with mesosoma, variably dark brown to almost black with metallic lustres dorsobasally on Gt1 and basolaterally on other terga, though sometimes more reddish- or orangey-brown with limited metallic lustres; lanceolate, length about 2.2–2.9× as long as wide (typically more elongate-slender in air-dried specimens with collapsed gaster); Gt2 and Gt3 with posterior margins variably distinctly emarginate, but at most with very short, white, mediolongitudinal line posteriorly (though critical-point dried specimen with inflated gaster usually with one or more of Gt2–Gt4 impressed mediolongitudinally); syntergum at least about as long as wide and with about apical half setose; cercus conical but short, not distinctly digitiform.

MALE (Fig. 86). Similar to female except as follows: gaster with large, subbasal, yellowish region; fore wing with up to 9 setae ventroapically in costal cell, disc always extensively setose except for oblique speculum extending to base of stigmal vein, and marginal vein sometimes only about 2x as long as stigmal vein.

Type information. Crawford (1908) listed only Mineola (♀) and Waco (♂), Texas, as localities when he described *C. hunteri*, but specimens in the USNM from Palestine, Terrell and Waco, Texas, as well as Alexandria, Forbing and Marksville, Louisiana, are labelled as paratypes. Burks (1975) stated that the two female paralectotypes of *Eurydinoteloides orontas* (Walker 1847) were not conspecific with the lectotype. I examined all three type specimens and one that bears a Burks identification label with “*Catolaccus*” is a small *J. hunteri* female, which I labelled as such.

Material examined. NEARCTIC. USA. ARIZONA: *Cochise Co.*, Douglas—22.XI.58, J.A. Russell, on *Sphaeralcea* (1 USNM); 7 mi. NE, 27.VIII.79, C.W. Melton (1 UCRC). nr Tombstone, 22.VIII.93, M. Sharkey (2 CNC). *Maricopa Co.*, Theba, 10 mi. W, 12.V.53, *Asclepias subulata*, Schlinger & Bechtel (1 EMEC). *Navajo Co.*, Winslow, 23 mi. W, 3.VII.53, E.S. Ross (3 CASC). *Pima Co.*, Organ Pipe Cactus Nat'l Monument, Williams Spring, 15.II.70, P.H. Arnaud Jr. (1 CASC). Tucson, 14.I.32, T.P. Cassidy, ex *Anthonomus grandis thurberiae* larvae and pupae (1 USNM). *Pinal Co.*, Stanfield, 7.VIII.66, A. Stoner, on *Sphaeralcea* (1 USNM). *Santa Cruz Co.*, Patagonia—31°32.52'N 110°46.03'W, 13–20.VIII.95, B. Brown & E. Wilk (1 CNC); 4.5 mi. N, 12.VIII.83 (1 CNC). Sycamore Canyon—8, 18.V.83, R.S. Anderson (1 BMNH, 1 CNC); Peña Blanca, 9 mi. W, 12.VIII.83, R. Anderson (2 CNC). *Yavapai Co.*, Ash Fork, 17.VI, Barber & Schwarz (1 USNM). Campe Verde, 4.6 mi. N, 17.V.83, R.S. Anderson (1 CNC). ARKANSAS: *Clark Co.*, Arkadelphia, C.E. Hood, par. *A. grandis*—em. 16.VIII.09 (1 USNM); 10.VIII.09, em. 15.VIII.09 (1 USNM); 14.IX.08, em. 19.IX.08, em. 22.X.08 (2 USNM). Gurdon, 29.IX.10, bred on cotton square (3 USNM). *Hempstead Co.*, Hope, VII.58, J.H. Black, par. *A. grandis* (1 USNM). *Lee Co.*, Thomasville, 20.IV.10, W.D. Pierce (1 USNM). *Little River Co.*, Ashdown, 19.IX.08, em. 21.IX.08, par. *A. grandis*, C.E. Hood (1 USNM). *Miller Co.*, Fouke, 27.VII.08, em. 6.VIII.08, C.E. Hood, par. *A. grandis* (2 USNM). Texarkana—30.IX.10, bred on cotton square (1 USNM); 18.VIII.09, C.E. Hood, par. *A. grandis* (1 USNM). *Ouachita Co.*, Camden, 10.IX.08, em. 17.IX.08, par. *A. grandis*, C.E. Hood, par. *A. grandis* (4 USNM). *Sevier Co.*, DeQueen, 23.IX.08, C.E. Hood, par. *A. grandis* (1 USNM). CALIFORNIA: *Contra Costa Co.*, Martinez, IX.36, R.C. Dickson (1 UCRC). *Imperial Co.*, Glamis, 3.5 mi. NW, Algodones Dunes, 13.IV.68, R. Hobza, assoc. with *Sphaeracelia* (3 UCRC). Holtville, 12.XI.65—Pineda, *Sphaeracia* (1 USNM); 12.XI.65, ex *Sphaeralcea orcuttii*, Flock & Pineda (1 CSCA). *Inyo Co.*, Eureka Valley Dunes, 4.V.77, J.D. Pinto (1 UCRC). Mariposa Spring, 36°09'33"N 117°40'06"W, 1950m, 18.VII.99, M. Gates (1 UCRC). *Kern Co.*, nr Frazier Park, 8.VII.82, em. 19–23.VII.82, W.H. Cross, ex *Sphaeralcea* (11 MEMS). Red Rock Cyn., 4.VII.54, Chemsak, Linsley & Martins (1 EMEC). *Los Angeles Co.*, Claremont, Baker (1 USNM). Littlerock Recreation Area, 34°28.27'N 118°1.27'W, 1100m, 10.VI.98, J.M. Heraty (1 UCRC). *Orange Co.*, Garden Grove—VII.24, em. VIII.24, ex *Anthonomus eugenii* (2 USNM); VII.28 (2 UCRC); 8.VII.28, A.C. Davis, par. *A. eugenii*, ex buds containing larvae (2 USNM). Huntington Beach, 9.VI.85, H. Andersen (1 UCRC). *Riverside Co.*, Blythe—29.III.73, C. Goodpasture (1 USNM); 18 mi. W, 7.VI.65, J.T. Doyan (1 EMEC). Deep Canyon, 9.X.63, M.E. Irwin (1 UCRC). Desert Center, 5 mi. N, 28.V.55, C.D. MacNeil (1 EMEC). Lake Skinner—Shipley Reserve, 33°36'N 117°1'W, 469m, 15.VI.98, Redak Lab. (1 UCRC); NE end, 33°36'7"N 117°2'5"W, 7–21.V.96, J.D. Pinto (1 UCRC). Riverside—18.V.38, Timberlake, *Solanum douglasii* (1 UCRC); Box Springs Canyon, 375m, 15.I.96, M. Gates (1 UCRC). Temecula Canyon, Santa Margarita, 18.V.68 (1 UCRC). Wiley's Well Road at Hwy I-10, 8.X.2000, G.R. Ballmer, on *Sphaeralcea emoryi* (1 UCRC). *San Bernardino Co.*, 8.V.85, J.D. Pinto (3 CNC, Photo 2011–157). Apple Valley, 20.V.55, W.R.M. Mason (1 CNC). Bear Valley, 13.IV.79, J. LaSalle, on *Eriogonum fasciculatum* (1 UCRC). Granite Pass, 4000m, 27.IV.68, R. Hobza, on *Sphaeralcea* sp. (1 UCRC). Hodge, 1 mi. N, 13.VI.79, J. LaSalle (1 UCRC). Lucerne Valley, 16.5 mi. N, 2.V.85, J.D. Pinto (1 CNC). Oak Glen, 34°2'N 116°57'W, 1500m, 3–17.V.85 (2

CNC), 27.VI–5.VII.85 (1 UCRC), R.E. Wagner. Phelan, 6mi. E, Baldy Mesa, 22.V.81, M.E. Schauff, sweeping *Larrea divaricata* (2 USNM). NW Pioneertown, T1N R4E S12, 1280m, 3.V.94, M. Cooperband (1 UCRC). **Santa Barbara Co.**, Cuyama, 18 mi. WNW, CT11N 1228W, 1–7.III.88 W.E. Wahl (1 CNC). **San Diego Co.**, Bonsall, 1 mi. W, 8.VIII.79, G. Gordh (1 UCRC). **DELEWARE: Sussex Co.**, 27.VI.39, J.M. Amos, cut strawberry buds (1 USNM). **DISTRICT OF COLUMBIA:** Washington, par. *A. nigrinus*—3.VII.06, 14.VII.06 (1 USNM); 06.VII.06, em. 16.VII.06 (1 USNM); 24.VII.07, em. 2.VIII.07 (2 USNM). **FLORIDA: Alachua Co.**, Gainesville—28.VIII.76, Z. Boucek (1 BMNH); 22.III–2.IV.88, 30.IV–11.V.88, D. Wahl (2 CNC); IFAS, 16.IX.87, L. Masner (1 CNC, Photo 2011-9); Doyle Conner Bldg., 28.VII–1.VIII.75, 22–28.IX.75, E.E. Grissell (2 FSCA). University of Florida lab, IV.2003, J.M. Leavengood Jr. (29 FSCA). **Duval Co.**, Jacksonville—Ashmead (1 USNM); 11.X.05, C.R. Jones, on *Isopappus divaricatus* (1 USNM); 11.X.05, em. 16.X.05, W.D. Pierce, par. *Anthonomus disjunctus* (1 USNM); Florida: St. John's Bluff (paralectotype of *Pteromalus orontas* Walker, BMNH). **Leon Co.**, Tallahassee, 26.V.80, ex fruit *Prunus serotina*, G.B. Marshall (5 CASC). Tall Timbers Res. Sta., 3.VIII.71, D.L. Harris (1 FSCA). **Miami-Dade Co.**, Homestead, T.R.E.C., 13, 15–20.III.87, V. Gupta (2 CNC). **Monroe Co.**, Key West, 3.X.12, E.A. Schwarz, ex cecid gall on *Eugenia buxifolia* (1 USNM). **Seminole Co.**, Astor Farms, 2.5 mi. N, Bald Cypress Swamp, 27.IV.2000, S. Fullerton & T. Sims (1 UCFC). **GEORGIA: McIntosh Co.**, Sapelo Island, 9.V–26.VI.87, BRC Hym Team (1 CNC). **Spalding Co.**, 6.X.56, J.E. Roberts (1 USNM). **Tift Co.**, Tifton, 27.X.36, 3, 4.XI.36, P.A. Glick, collected on cotton (3 USNM). **HAWAII:** IV.35, parasite on pepper weevil (18, UCRC). **Hawaii Co.**, Kapulena, Hamakua District, 5.VII.89, H.E. Andersen (3 UCRC). **Honolulu Co.**, Honolulu, IV.35, Fullaway, ex pepper weevil (9 UCRC). Waipio, Oahu Peninsula, 4.V.66, J.W. Beardsley (1 UCRC). **ILLINOIS: Champaign Co.**, U. of Illinois, South Farms, 23, 28.VI.81 (2 BMNH), 23–24.VI.81, 2.VII.81 (6 INHS), 19.V.85, 16.VI.85 (8 INHS), 18.VI.87, (4 INHS), S. Heydon. **Effingham Co.**, Effingham, 3 mi. NW, 7.VII.80, S.L. Heydon (1 INHS). **Gallatin Co.**, Swaneetown, 2 mi. SSE, 4.VI.81, S.L. Heydon (1 INHS). **Mason Co.**, Sandridge State Forest (Park), 6.VII.80, S.L. Heydon (2 INHS). **McHenry Co.**, Algonquin, 26.V.1896 (1 USNM). **McLean Co.**, Le Roy, 5 mi. NNW, Morraine View St. Pk., 10.IX.83, S.L. Heydon (1 INHS). **Wabash Co.**, Maud, 2.5 mi. S, 4.VI.81, S.L. Heydon (1 INHS). **White Co.**, Emma, 3.VI.81, S.L. Heydon (1 INHS). **INDIANA: Henry Co.**, New Lisbon, 2 mi. S, 14.VII.81, S.L. Heydon (2 INHS). **KANSAS: Douglas Co.**, Breidenthal Reserve, 14.V.79, R.J. McGinley (1 USNM). Lawrence, 4.VIII.79, R.J. McGinley (1 USNM). **Lincoln Co.**, Crab Orchard, VI.60, Gibson, ex *Prionomerus calceatus* (1 USNM). **Shawnee Co.**, Topeka, IX.03, *Croton capitatus* (2 USNM). **LOUISIANA: Avoyelles Par.**, Mansura, C.E. Hood—10.XII.09, em. 13.XII.09, par. *A. grandis* (1 USNM); 13.XII.09, em. 14.XII.09, par. *A. grandis* (1 USNM); 21.XII.09, bred cotton boll (1 USNM); 9.I.10, 4.II.10, in spanish moss (4 USNM). Marksville, 10.VIII.07, par. *A. grandis*—em. 17.VIII.07 (1 USNM + 1 USNM *C. hunteri* paratype), em. 23.VIII.07 (1 USNM). **Caddo Par.**, Forbing, 07.VII.07, em. 10.VII.07, par. *A. grandis* (1 USNM *C. hunteri* paratype). Shreveport—1907 (1 MEMS); 2000' (on plane), 3.X.56, P.A. Glick (1 USNM). Shreveport, H.S. Smith, par. *A. grandis*—22, 30.VII.07, em. 6, 7, 19.VIII.07 (3 USNM); 5.VIII.08, em. 22.X.08 (1 USNM); 22.IX.08 (1 USNM); 5.X.08, em. 22, 23.X.08 (6 USNM); 29.X.08, em. 9.XI.08 (11 USNM), em. 13.XI.08 (3 USNM); 27, 29.X.08 (12 USNM). Shreveport, E.S. Tucker, par. *A. grandis*—9.VIII.08 (3 USNM); 8.IX.08, (1 USNM); 19.X.08, em. 14, 18, 19.XI.08 (7 USNM). **Calcasieu Par.**, Orange, 29.IX.06, em. 18.X.08, par. *A. grandis* (1 USNM). **Cameron Par.**, Johnsons Bayou, 6.IX.06, par. *A. albopilosus* (1 USNM). **Concordia Par.**, Shaw—25.VIII.10, G.D. Smith, par. *A. grandis* (1 USNM); 9.VIII.14 (1 MEMS). Vidalia, 15.IX.08, em. 21.IX.08, W.D. Pierce & H.S. Smith, par. *A. grandis* (1 USNM). **De Soto Par.**, Mansfield, 24.VIII.06, em. 27.VIII.06, par. *A. grandis* (1 USNM). **East Baton Rouge Par.**, Baton Rouge, 5.VI.50, C.E. Smith, ex leaf miner on *Magnolia* (3 USNM). **East Carroll Par.**, Lake Providence, 25.VIII.14 (1 MEMS). **Lafayette Par.**, Lafayette, 19.III.08, em. 4, 5, 6, 7, 8.IV.08, par. *A. nebulosus* (38 USNM). **Lincoln Par.**, Ruston—30.X.08, H.S. Smith, par. *A. grandis* (2 USNM), X.31, W.D. Pierce / W.A. Hooker, on *Heterotheca subaxillaris* (3 USNM). **Madison Par.**, Milliken's Bend, 27.VIII.14 (2 MEMS). Tallulah—(18 MEMS); 193 (13 USNM); 28.VIII.14 (1 MEMS); 3, 4, 21.VIII.32 (4 MEMS); 3.IX.09 (1 USNM); 9.V.57, P.A. Glick (1 USNM); [?], V.I. Safro (1 USNM). Tallulah, bred cotton square—7, 12, 13.VIII.09, em. 6.IX.09 (3 USNM); 11, 14, 15.IX.09, 8, 17, 20.XI.09 (12 USNM). Tallulah, par. *A. grandis*—17, 18.IX.13 (2 USNM); 31.VIII.10, em. 31.VIII.10 (1 USNM); 1.VII.10 (1 USNM), 7.VII.09, em. 14.VII.09, R.A. Cushman (1 USNM); 31.VII.11, 11, 17, 19, 21, 22, 23, 25, 27, 28, 29, 31.VIII.11, 5, 14.IX.11, H. Pinkus (32 USNM). **Ouachita Par.**, Monroe, par. *A. grandis*—24, 31.X.08, H.S. Smith (3 USNM); 21.I.09, R.A. Cushman (1 USNM). **Pointe Coupee Par.**, Livonia, 26.VII.10, G.D. Smith, par. *A. grandis* (1 USNM). **Rapides Par.**, Alexandria, 8.VIII.07, em. 16.VIII.07 (1 USNM *C. hunteri* paratype), 2.VIII.07, 24.VIII.07, 11.IX.07, em. 9.VIII.07, 12.VIII.07, 6.IX.07, 11.IX.07, par. *A. grandis* (7 USNM). Glenmora, 22, 23.VIII.07, em. 26, 27, 30,

31.VIII.07, par. *A. grandis* (6 USNM). **Red River Par.**, East Point, 7.X.07, em. 21, 22, 25.X.07, par. *A. grandis* (4 USNM). **Sabine Par.**, Many, 23.VIII.06, em. 4.IX.06, par. *A. grandis* (1 USNM). **St. Landry Par.**, Opelousas, G.R. Pilate (5 USNM). **Tensas Par.**, Newellton, 17.XI.09, bred cotton square (2 USNM). **Union Par.**, Monroe, bred cotton square—16.VIII.09, em. 19.VIII.09 (2 USNM); 12.VIII.08, 16.IX.09 (2 USNM). Monroe, par. *A. grandis*—11.X.08, em. 21.IX.08, W.D. Pierce (1 USNM); 24.V.08, 8, 9, 24, 31.X.08, H.S. Smith (32 USNM); 31.X.08, em. 10.XI.08, H.S. Smith (5 USNM). **Vernon Par.**, Leesville, 29.IX.06, par. *A. albopilosus* (6 USNM). **MARYLAND: Anne Arundel Co.**, Sherwood forest, 13.VI.71, W.H. Cross, swept from *Robinia pseudoacacia* (1 MEMS). South River, 12.IV.39, W.H. Anderson, ex seed capsule *Labelia* sp. infested with *Miarus hispidulus* (3 USNM). **Prince George's Co.**, Oxon Hill, 8.IX.71, G.F. Hevel (1 USNM). **MICHIGAN: Washtenaw Co.**, 30.VII.72, D.P. Cowan (1 EMEC). **MINNESOTA: Freeborn Co.**, Geneva, 25.VI.96, H.E. Andersen (1 UCRC). **MISSISSIPPI: Adams Co.**, Natchez, 15.VII.09, em. 23.VII.09, C.E. Hood, par. *A. grandis* (1 USNM). Natchez, H.S. Smith, par. *A. grandis*—16.IX.08, em. 18.IX.08 (1 USNM); 13.X.08, em. 9.XI.08 (1 USNM); 16.X.08, em. 8, 9.XI.08 (5 USNM); 21.X.08, em. 9, 10, 23.XI.08 (7 USNM); 11.XI.08, em. 23.XI.08 (7 USNM); 12, 18, 23.XI.08, bred cotton square (5 USNM); 16, 21, 23.X.08, 11, 12, 14, 17, 18, 24.XI.08, bred on cotton square (38 USNM). **Amite Co.**, Gloster, H.S. Smith—18.IX.08, bred *Croton* seed (2 USNM); 14.X.08, em. 21, 22.X.08, 2, 9.XI.08, par. *A. grandis* (6 USNM). **Bolivar Co.**, Boyle, 19 km W, Hwy 446, Dahomey Nat'l Wildlife Refuge, 9–25.V.98, N.M. Schiff (1 UCDC). Scott, 30.VI.16, em. 7–12.VII.16, T.C. Barber, par. *A. grandis* (2 MEMS). **Carroll Co.**, Slaton Field, 18.VII.66, W.H. Cross, cultivated cotton (2 MEMS). **Claiborne Co.**, Port Gibson—19.VIII.10, G.D. Smith, par. *A. grandis* (1 USNM); 27.VIII.14, 3.IX.14 (3 MEMS). **Coahoma Co.**, Boone, 27.VII.60 (1 USNM). **Jefferson Co.**, 25.VIII.70, W.L. McGovern (1 MEMS). Jones Co., Ellisville, 21.VIII.22, par. *A. grandis* (2 USNM). **Oktibbeha Co.**, 14.X.65, em. 25.X.65, T.L. Chestnut, em. from *Croton* (7 MEMS). Agr. Coll.—19.VI.14, R.N. Lobdell, bred cotton square (5 MEMS); 14.VI.17, W.D. Pierce (1 USNM); 2.VIII.65, em. 25.X.65, T.L. Chestnut, em. from bolls, many with boll weevil stages (2 MEMS). Lab. Colony, 15.X.65, T.L. Chestnut, reared from boll weevil in artificial diet (2 MEMS). Starkville—2.VIII.65, 26.VIII.65, T.L. Chestnut, em. from fallen cotton squares and bolls, many with boll weevil stages (2 MEMS); 1.5 mi. SW, 12.VII.67, em. 30.VII.67, W.L. McGovern, em. from boll weevil infested cotton squares (1 MEMS); 1 mi. W, 3.VIII.68, W.H. Cross, em. from boll weevil infested cotton squares (1 MEMS); 3 mi. W, 28.IX.67, W.H. Cross & W.L. McGovern, em. from *Croton lindheimeri* (5 MEMS); 7 mi. WSW, 5.VIII.71, W.H. Cross, swept from *Croton lindheimeri* (4 MEMS). Sturgis, 5 mi. NNE, IX.71, dead 21.VII.72, W.L. McGovern (17 MEMS). **Perry Co.**, Beaumont, 4.VIII.11, W.D. Pierce (1 USNM). **Sharkey Co.**, Rolling Fork, 21.VIII.14 (1 MEMS). **MISSOURI: New Madrid Co.**, Morehouse, 5 mi. E, 36°50'N 89°41'W, 17.IX.89, G.F. Hevel (1 USNM). **St. Clair Co.**, Taberville, ~3 mi. N, Taberville Prairie, 29.VI.99, M. Gates (2 UCRC). **Wayne Co.**, Williamsville, VI.87, J.T. Becker (1 CNC, Photo 2011-8). **NEW JERSEY: Atlantic Co.**, Egg Harbor, 3.VI, ex *Anthonomus signatus* (2 USNM). **Burlington Co.**, Whitesbog, 8.VII.36, L.J. Bottimer (1 USNM). **NEW MEXICO: Catron Co.**, Alma, 0.5 mi S, 3.VIII.29, V.E. Romney, *Salsola pestifer* (1 USNM). Omega, 18.VIII.51, E.L. Kessel (1 CASC). **Doña Ana Co.**, Mesilla, 27.VI.1895, Cockerell (1 USNM). Mesilla Park, C.N. Ainslie (1 USNM). **Hidalgo Co.**, Animas, 9.3 mi. W, 4400', 26-30.VII.82, G. Gibson (5 CNC, Photo 2011-158). Lordsburg, 15 mi. NE, 25.VIII.82, J. LaSalle (1 CNC). Road Forks, 16 mi. S, 28.VIII.79, J. LaSalle (2 UCRC). Peloncillo Mts, Post Office Cyn, 14.VIII.65, M.E. Irwin (1 UCRC). **Rio Arriba Co.**, Tres Piedras, 5.4 mi. N, Hwy 285, 8250', 18.VI.82, G. Gibson (1 CNC). **Torrance Co.**, Estancia, 12.VII.67, Burke, *Brachycerus ornatus* (1 USNM). **NEW YORK: Otsego Co.**, Oneonta, 1900', 18.VIII.35, H.K. Townes (1 AED). **NEVADA: Clark Co.**, Willow Creek campground, Charleston Mts., 1.VII.54, J.S. MacSwain (1 EMEC). **Nye Co.**, Mercury, BYU-AEC-NTS, 18.VI.65, 30.VII.62, 11, 23.VIII.65, 30.VIII.65 (7 USNM). Tonopah, 15 mi. W, 7.VII.80, JC&EM Hall (1 USNM). **NORTH CAROLINA: Columbus Co.**, Chadbourn, E.G. Smyth—21.V.10, bred from *A. signatus* (8 USNM); 4.IV, collected on blackberry (1 USNM). **Duplin Co.**, Tin City, 7.X.34, sweeping weeds (4 USNM). **OHIO: Delaware Co.**, Delaware, R.B. Neiswander, ex *Orchestes pallicornis*—1.VI.34, em. 10, 11.VI.34 (5 USNM); 28.V.34, em. 8, 9.VI.34 (4 USNM); 6.VI.34, em. 14.VI.34 (1 USNM). **Union Co.**, Milford Centre, 28, 29, 30.VI.29, 2, 4, 8.VII.29, H.F. Dietz, ex *O. pallicornis* Say (11 USNM). **OKLAHOMA: Garvin Co.**, Pauls Valley, VIII.21, bred cotton square (1 USNM). **SOUTH CAROLINA: Charleston Co.**, Sullivans Island, 20.IX.63, N.L.H. Krauss (1 USNM). **Florence Co.**, Florence—(4 MEMS); 10.VII.26, em. 26.VII.26 (2 MEMS); 15, 16.VII.26, em. 24.VII.26 (9 MEMS); 16–26.VII.26, em. 3.VIII.26 (4 MEMS); 22.VII.26, em. 1–7.VII.26 (3 MEMS); 22.VII.26, em. 1.VIII.26 (1 MEMS); 22–23.VII.26, em. 20–27.VII.26 (3 MEMS); 23.VII.26, em. 26–30.VII.26 (7 MEMS); 26.VII.26, em. 4–5.VIII.26 (8 MEMS); 28.VII.26, em. 11.VIII.26 (1 MEMS); 6.VIII.24, E.W. Dunham (9 MEMS). **Greenwood Co.**, Kirksey, 24.VI.57, W.R.M. Mason (1 CNC). **Williamsburg Co.**, Andrews, 19.V.62, R.D.

Eikenbary (1 USNM). **TENNESSEE: Knox Co.**, 9.VIII.82, *Liriomyza* sp. on cotton (1 USNM). Knoxville, Jct. I-40 & 11E, 24.VII.86, J.D. Pinto (1 CNC). **Sevier Co.**, Twin Creeks, 35°41.10'N 83°29.94'W, 23.V-5.VI.2001, Parker (1 CLEV). **TEXAS: Anderson Co.**, Palestine, 10.VIII.06, em. 14 VIII.08 (1 USNM + 1 USNM *C. hunteri* paratype), 20.VIII.08 (2 USNM), par. *A. grandis*. **Austin Co.**, Stephen F. Austin State Park, 21.II.65, J.C. Schaffner (1 TAMU). **Bee Co.**, Beeville—1.XI.1895, em. 19, 20, 23, 27.XII.1895 (7 USNM); 9.XI.1895, em. 23, 29.XI.1895 (2 USNM); em. 10.III.1896 (1 USNM). **Bexar Co.**, San Antonio, 18, 19.X.05, 17.XI.05, F.C. Pratt (3 USNM). **Brazos Co.**, Bryan, Hensel Park, 24.VI.86, J. Heraty (1 TAMU, 1 UCRC). College Station—IX, Banks (1 USNM); 16.V.07, em. 23.V.07, par. *Anthonomus* (1 USNM), 16.V.07, em. 26.V.07, par. *A. aeneolus* (2 USNM); 13.VII.70, D.B. Gates, par. *A. aeneolus* (1 USNM); 9.X.70, D.B. Gates, ex larvae *A. aeneolus* (1 TAMU); 23.IV.71, 11.V.71, D.B. Gates, ex larvae *A. convictus* (13 TAMU); VII.79, A.J. O'Neil, ex *A. grandis* (13 USNM); Lick Creek Park, 7-17.IV.1987, Hearty & Woolley (1 TAMU); 10 mi. W, 13.VII.70, D.B. Gates, ex larva *A. aeneolus* (6 TAMU). nr College Station, TAMU Range Sci. Area, 18.VI.78, S.J. Merritt, *Cassia* sp. (3 TAMU). Turk Ranch Rd., 0.9 mi. SE Jct. Duck Pond Rd., 18.IX.76, S.J. Merritt (3 TAMU). **Brewster Co.**, Big Bend Nat'l Park—Basin, 5-6000', 10.VIII.75, S. Peck (3 CNC); Cottonwood Campsite, 2300', 13-14.VII.82, G. Gibson (33 CNC, Photo 2011-87); Croton Spring, 29° 20'N 103° 20'W, 9.IX.1993, E.E. Grissell & R.F. Denno (1 USNM); Grapevine Hills Campground, 3300', 23-27.V.82, G. Gibson (1 CNC); Green Gulch, 5000', 2.V.59, W.R.M. Mason (1 CNC); Headquarters, 14.V.59, J.F. McAlpine (3 CNC); Lost Mine Trail, 5000'-6850', 15.VII.83, G. Gibson (1 CNC, Photo 2011-38); lowlands desert, 19, 21.VII.77, L. Masner (3 CNC); Oak Canyon Window Trail, 4.VII.86, J. Heraty (2 TAMU); St. Elena Canyon, 9.V.59, W.R.M. Mason (1 CNC). Big Bend Nat'l Park, Government Springs—3000', 3.VII.86, J. Heraty (2 TAMU, 3 UCRC); Grapevine Hills Rd., 1.IX.71, E.E. Grissell & R.F. Denno (1 USNM); 3 mi. W Panther Jct., 31.VIII.71, sweeping *Sphaeralcea angustifolia*, E.E. Grissell (35 FSCA). Big Bend Nat'l Park, Government Springs, Panther Jct.—5.3 mi. W, 10-14.VII.82, G. Gibson (1 CNC); 10.7 mi. W, 3650', 28.VI.82, G. Gibson (1 CNC); 12.5 mi. SE, 2500', 10-16.VII.82, G. Gibson (1 CNC). **Brown Co.**, Brownwood, 21.V.07, em. 3.VI.07 (1 USNM). **Caldwell Co.**, spring.83, C. Cole (1 TAMU). **Cameron Co.**, Brownsville—18.VI.1895, C.H.T. Townsend (3 USNM); 19.III.08, em. 5.IV.08, bred *Mimosa* head (1 USNM); 1, 2.III.09, McMillan & Marsh, par. *A. mexicanus* (2 USNM); 10.IV.09, C.E. Hood, bred *Solanum elegans* bud (1 USNM); 22.I.36, from cotton (1 USNM); 28.II.36, 4, 6.III.36, P.A. Glick (4 TAMU). Brownsville, par. *A. grandis*—em. 18.VII.1895 (1 USNM); 28.VII.06, em. 4, 6, 8.VIII.06 (3 USNM); 28.VIII.06, 29.IX.06, em. 15.X.06 (2 USNM); 5.IX.06, em. 12, 13, 17.X.06, C.R. Jones (4 USNM); 15.IX.06, em. 29.XI.06 (4 USNM), 29.IX.06, em. 15.X.06 (4 USNM). Olmito, XI.21, M.M. High, par. *A. eugenii* (2 USNM). Rancho Viejo/Olmito, 3-9.III.96, D.F. Gumz (1 CNC, Photo 2011-7). Southpoint Nursery, 1 mi. S. Southmost Ranch, 5-6.VII.82, G. Gibson (1 CNC). **Cherokee Co.**, Jacksonville, 11.X.05, em. 16.X.05, W.D. Pierce, par. *A. disjunctus* (1 USNM); 17.X.10, E.S. Tucker, par. *A. grandis* (1 USNM). **Childress Co.**, Childress, 29.VII.09, V.I. Safro, bred *Solanum elegans* bud (1 USNM). **Collin Co.**, Farmersville, 27.VII.82, D.A. Dean, ex cotton (1 TAMU). **Colorado Co.**, Eagle Lake—14.VIII.07, em. 22.VIII.07, par. *A. grandis* (1 USNM); 21.III.08, em. 31.III.08, par. *A. signatus* (1 USNM). **Culberson Co.**, Pine Sprgs., 3.6 mi. S, Old Guadalupe Pass, 5200', 20-22.VII.82, G. Gibson (4 CNC). **Dallas Co.**, Dallas—24.V.06 (2 USNM), em. 30.V.06, 1, 2.VI.06, par. *A. aeneolus* (3 USNM); 18.VI.06, bred *Solanum torreyi* bud (4 USNM); 1.V.09, 9.VIII.09, W.D. Pierce (2 USNM); 1.V.12, W.D. Pierce (1 USNM). Dallas, par. *A. grandis*—6.X.06 (1 USNM); 27.VII.07, em. 3.VIII.07 (1 USNM); 2.VIII.07, em. 9.VIII.07 (1 USNM); 2.VIII.07, R.A. Cushman (1 USNM); 8.VIII.07, em. 7.IX.07 (1 USNM); 22.VIII.07, em. 29.VIII.07 (1 USNM); 20.V.07, em. 4.VI.07 (1 USNM); 1, 4, 5, 6, 8.VIII.08, W.D. Pierce (8 USNM); 21.IX.08, F.C. Bishop (2 USNM); 12.X.08, em. 28.X.08 (1 USNM); 26.VII.09, em. 6.VIII.09, W.D. Pierce (1 USNM); 27.VII.09, W.D. Pierce (1 USNM); 27.VII.09, em. 30, 31.VII.09, em. 2.VIII.09, W.D. Pierce (5 USNM); 27.VII.09, em. 4.VIII.09, E.S. Tucker (1 USNM). Dallas, T.E. Holloway, bred *Solanum torreyi* bud—6.VII.09, em. 19.VII.09 (1 USNM); 16.VII.09 (1 USNM). **DeWitt Co.**, Cuero, par. *A. grandis*—3.V.06 (1 USNM); 12.VIII.07, em. 17, 18.VIII.07 (3 USNM); 31.VIII.06, em. 11.IX.06 (1 USNM). **Duval Co.**, San Diego, 6.XII.1894, par. of larva *A. grandis* (1 USNM). **Goliad Co.**, Fannin, 14.VIII.63, N.L.H. Krauss (1 USNM). Goliad—2. XI.1895, em. 17, 18, 21, 27.XII.1895 (7 USNM); 3.IX.06, em. 14.IX.06, par. *A. grandis* (2 USNM); 3.IX.06, em. 10, 19.IX.06, C.R. Jones, par. *A. grandis* (3 USNM). **Gonzales Co.**, Rancho, 7.XII.1895, Townsend, in fallen squares (1 USNM). **Grayson Co.**, Denison, 17.VIII.07, em. 3.IX.07, par. *A. grandis* (2 USNM). **Grimes Co.**, Navasota, 7.XI.59, W.R.M. Mason (2 CNC). **Hidalgo Co.**, Weslaco, IV.95, Greenberg, weevil parasite (2 TAMU). **Hockley Co.**, Anton, 2 mi. S, 9.IX.82, D.A. Dean, ex cotton (1 TAMU). **Jim Wells Co.**, Ben Bolt—16.VII.54, J.G. Chillcott (1 CNC); 8 mi. W, La Copita Research Station, 20.V.87, J.B. Woolley (1 TAMU). **Karnes Co.**, Kenedy—1.XI.1895, em. 21.XII.95 (1 USNM); 8.XI.1895, em. 26, 27,

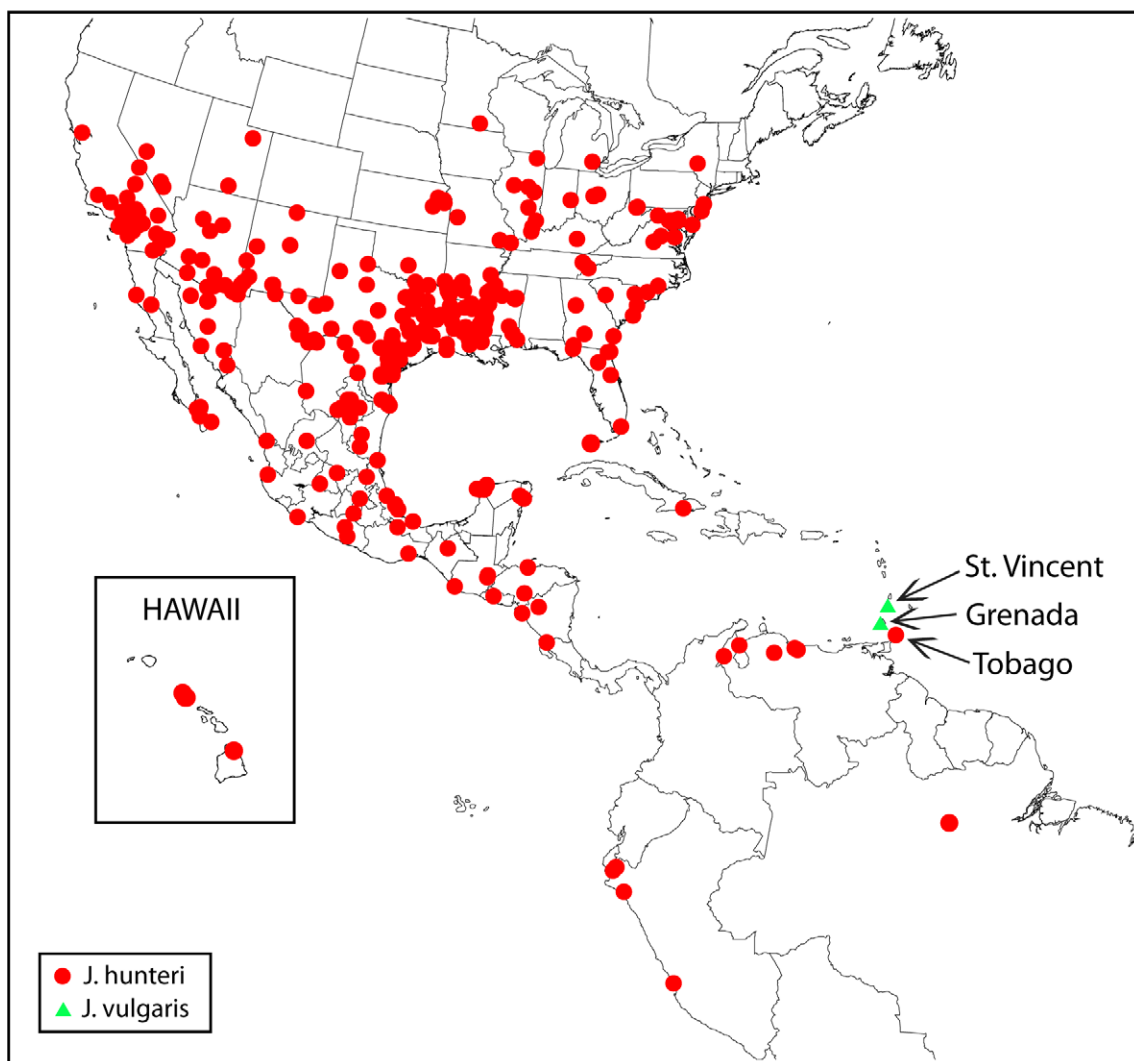
30.XI.1895, 9.XII.1895, 2.I.1896 (6 USNM); em. 11.XII.1895, par. *A. grandis* (1 USNM); em. 16.I.1896 (2 USNM); 19.VI.07, em. 26.VII.07, par. *A. grandis* (1 USNM). **Kaufman Co.**, Terrell, 12, 19.VIII.08, em. 21.VIII.08, par. *A. grandis* (2 USNM *C. hunteri* paratypes). **Kerr Co.**, Hunt, 5 mi. W, Stumberg's Patio Ranch, 2000', 1–2.VII.82, G. Gibson (1 CNC). **Kimble Co.**, Junction, 24.IX.06, em. 11.X.06, par. *A. grandis* (1 USNM). Roosevelt, 25.IX.06, em. 3.X.06, par. *A. grandis* (1 USNM). **Lamar Co.**, Paris—14.XI.07, em. 21.XI.07, F.C. Bishopp, par. *A. grandis* (2 USNM); 24.IX.10, bred on cotton square (3 USNM). TX, **Lavaca Co.**, Hallettaylor, 27.IV.07, em. 13.V.07, par. *A. aeneolus* (1 USNM). **Maverick Co.**, Eagle Pass, *A. aeneolus*—11.VII.1895, on *Solanum elaeagnifolium* (1 USNM); em. 6.VII.1897, on *Solanum* (5 USNM). **McLennan Co.**, Waco, 16.IX.65, em. 16.IX.65, T.L. Chestnut, em. from bolls, many with boll weevil stages (2 MEMS). Waco, par. *A. grandis*—29.VIII.06, 12.X.06 (10 USNM); 2.VIII.07, em. 5.VIII.07 (1 USNM partytype), em. 8, 12.VIII.07 (2 USNM). **Nacogdoches Co.**, Nacogdoches, 15.X.10, E.S. Tucker, par. *A. grandis* (1 USNM). **Navarro Co.**, 22.VI.07, em. 7.VII.07, par. *A. grandis* (1 USNM). **Nueces Co.**, Corpus Christi—10.VII.06, em. 14, 16, 19.VII.06, W.E. Hindst, par. *A. grandis* (6 USNM); 23.III.08, em. 18.IV.08, bred from *Opuntia engelmannii* joint (1 USNM). Nueces, 28.IV.1896, Marlatt (1 USNM). **Polk Co.**, Romayor, 4 mi. N, 22.V.84, J.B. Woolley (1 TAMU). **Presidio Co.**, Presidio—L.W. Noble, reared from *Sphaeralcea incana* (1 USNM); XI.54, J.H. Russell, on *Sphaeralcea* (3 USNM); 1.VIII.67, em. from buds and flowers of *Sphaeralcea angustifolia* (1 USNM); 35 mi. upriver, 14.VII.67, em. 25.VII–10.VIII.67, W.H. Cross, from *Sphaeralcea angustipennis* (1 MEMS); Slacks Brdg Farm, 3.XI.61, em. 5.XI.61, W.H. Cross, from fallen cotton squares (2 MEMS). Hot springs above Ruidosa, 1.VIII.79, W.H. Cross, em. from buds, flowers and capsules of *S. angustifolia* (26 MEMS). Shafter, Cibolo Creek, 6.IX.1984, T.O. Robbins, prob. ex *Epimechus canoides* on *Baccaris* sp. (2 USNM). **Robertson Co.**, Calvert—16.VIII.02, G.H. Harris, bred cotton square (1 USNM); 5.VII.07, em. 12.VII.07, par. *A. grandis* (1 USNM). 5.7 mi. N jct OSR & FM 1940, 26.VI.77, S.J. Merritt, *Cassia* sp. (2 TAMU). **San Jacinto Co.**, Coldspring, 5 km S, Double Lake Campground, 22–24.V.83, M. Kaulbars (2 CNC). **San Patricio Co.**, Sharpsburg, 5.X (1 USNM). Welder Wildlife Refuge—1.XI.88, J. Heraty (3 TAMU, 2 UCRC); 28°06.73'N 97°25.0'W, 20m, II.2004, S&J Peck (1 CNC). **Shelby Co.**, Timpson, 21.X.10, bred on cotton square (1 USNM). **Stonewall Co.**, Old Glory, 5 mi. N, 12.VI.69, D.S. Moody, leaf galls on *Solanum* (1 MEMS). **Tarrant Co.**, Arlington—18.VII.07, em. 25.VII.07 (1 USNM); 1.VII.08, em. 11.VII.08 (4 USNM); 29.VII.07, em. 2, 3, 4.VIII.07, par. *A. aeneolus* (6 USNM); 26.X.08, em. 12.XI.08, E.S. Tucker (2 USNM); bred on cotton square (1 USNM). Arlington, par. *A. grandis*—7.VII.07 (1 USNM); 18.VII.07, em. 1.VIII.07 (1 USNM); 6.VIII.07, em. 13.VIII.07 (1 USNM); 28.VIII.07, em. 6.IX.07 (2 USNM); 7.VII.08, em. 25.VII.08, C.E. Hood (3 USNM); 6.VIII.08, em. 14.VIII.08, F.C. Bishopp (2 USNM); 3.XI.08, em. 11.VII.08, C.E. Hood (1 USNM). **Terrell Co.**, Terrell, 26.VIII.07, em. 29, 31.VIII.07, 4, 7.IX.07, par. *A. grandis* (4 USNM). **Travis Co.**, Austin—20.IX.78, P.D. Hurd, *Gutierrezia glutinosa* (1 USNM); 11 mi. S, E.E. Grissell, taken on *Parthenium hysterophorus*—(2 FSCA); Heep Farm, 2.VIII.72 (1 TAMU). **Trinity Co.**, Trinity—30.VIII.06, 9.VIII.06, par. *A. grandis* (3 USNM); 7.VII.07, em. 11, 12, 15, 18.VII.07, par. *A. aeneolus* (22 USNM); 20.III.07, em. 30.III.07, par. *A. signatus* (2 USNM). **Val Verde Co.**, Devils River, 4.V.07, em. 22.V.07, par. *Anthonomus* (1 USNM). **Victoria Co.**, Victoria—22.III, E.A. Schwarz (1 USNM); 8.VII.07, *Acacia*, J.D. Mitchell (1 USNM); 21.VII.10, 30.IX.10, bred on cotton square (3 USNM). Victoria, par. *A. grandis*—9.VII.1893, W.E. Hindst (1 USNM); II.02, E.A. Schwarz (1 USNM); 13.03[?], W.E. Hinds (1 USNM); 15.XI.03, A.W. Morrill (5 USNM); 26.VI.06, em. 30.VI.06 (1 USNM); 1.X.06, em. 10.IX.06 (1 USNM); 10, 14.VI.07, 11, 19.VII.07 (5 USNM); 10.VIII.07, em. 17.VIII.07 (1 USNM); 19.V.08, em. 28.V.08, J.D. Mitchell (1 USNM); 19.VI.08, em. 23, 28.VI.08, E.S. Tucker (2 USNM); 25.VI.08, em. 29.VI.08 (2 USNM). **Walker Co.**, Ellis Prison Unit, 5.V.80, D.A. Dean (1 TAMU). **Ward Co.**, Barstow, 22.VII.84, GF&JF Hevel (1 USNM). Monahans, 6.0 mi. NE, Monahans St. Park, 3000', 21–22.VI.82, G. Gibson (1 CNC). **Wood Co.**, Mineola—X.02, F.C. Bishop, *Eupatorium serotinum* (1 USNM); 2.X.06, par. *A. grandis* (1 USNM). **UTAH: Barfield Co.**, Escalante, 30 mi. SE, Coyote Cyn., 26–29.V.85, M.C. Whitmore (1 EMEC). **Duchesne Co.**, Duchesne, 12 mi. N, 22.VII.34, Timberlake, *Malvastrum coccineum* (2 UCRC). **VIRGINIA: 11.IX.1880**, par. *A. grandis* (1 USNM). **Buckingham Co.**, Dillwyn, 27.VI.64, O. Peck (1 CNC). **Essex Co.**, Dunnsville, 1 mi. SE, 37°52'N 76°48'W, 12–21.VI.96, 3–16.VII.96, D.R. Smith (2 USNM). **Fairfax Co.**, New Alexandria, 15.XI.24, D.H. Blake, par. *A. disjunctus* (1 USNM). Vienna, 28.VIII.11, R.A. Cushman, par. *A. nigrinus* (2 USNM). **Louisa Co.**, Cuckoo, 4 mi. S, 3.VIII.85, J. Kloke & D.R. Smith (1 USNM). **Winchester Co.**, Winchester, 14, 17.VI.64, O. Peck (2 CNC). **WEST VIRGINIA: Monongalia Co.**, Coopers Rock State Forest, 22.VI.64, O. Peck (1 CNC). Morgantown, 17.VI.64, O. Peck (1 CNC).

NEOTROPICAL. COSTA RICA. Guanacaste, Canas, 24 km NW, Hacienda Comelco, Inter-Am Hwy, 50m, 4.II.72, E.R. Heithaus, on flowers of *Casearea sylvestris* (1 CASC). **CUBA.** Santiago, Jardin Botanico, 6.XII.95,

L. Masner (1 UCDC). **EL SALVADOR**. San Salvador, 4.V.58, O.L. Cartwright (1 USNM). **GUATEMALA**. XI.34, Bianki [?], ex *A. eugenii* (4 USNM). Champerico, Baker (1 USNM). Zacapa—Dpto. San Lorenzo, 12.VII.86, L. LeSage (4 CNC); nr Santa Cruz, XI.86, M. Sharkey (1 CNC). **HONDURAS**. La Ceiba, 13.VI.44, E.C. Becker (1 CNC). Zamorano, 19.X, W.P. Cockerell (1 USNM). **MEXICO**. **Baja California Norte**: El Rosario, 6 mi. NW nr. Consuelo, 18.IV.65, D.Q. Cavagnaro, C.E. & E.S. Ross, & V.L. Vesterby (1 CASC). Palm Oasis, N of Catavina, 24.VIII.94, S.L. Heydon, off *Baccharis* (1 UCDC). **Baja Calif. Sur**: La Paz—10 km N, 28.X.83, J.D. Pinto (1 UCRC); 13 mi. W, 11.XI.65, W. Ewart & R. Dickson, *Tecoma stans* (1 UCRC). Las Barracas, 15.IV.87, 11.V.85, P. DeBach (2 UCRC). San Pedro, 15 km S, 23.X.83, J.D. Pinto (1 UCRC). **Chiapas**: Municipio Tenejapa, below Paraje Yashanal, 3.VII.90, R.W. Jones & D. Bavo, ex *Hampea longipes* (ground buds) (1 TAMU). Revolution, 2 mi. SE, 23.III.53, R.C. Bechtel & E.I. Schlinger (1 EMEC). **Chihuahua**: Juarez, 29.VI.84, G. Gordh (1 UCRC). **Coahuila**: Los Lirios, 9 mi. W, 6000', 24.IX.76, J.A. Chemsak, J. Powell & A&M Michelbacher (2 EMEC). Saltillo, 15 mi. S, 8.VII.83, Kovarik, Harrison, & Schaffner (1 TAMU). **Durango**: Bermejillo, 25 mi. NE, 19.IV.61, Howden & Martin (3 CNC). **Guerrero**: La Laguna, 1 mi. NE, 17.VII.84, J.B. Wooley (1 TAMU). Tierra Colorada, 3 km N, 9.I.80, C.D. Johnson, reared seeds, *Heliocarpus palmeri* (1 TAMU). **Hidalgo**: Tlanchinol, 20 km NE, 13.VI.83, M. Kaulbars (2 CNC). **Jalisco**: Puerto Vallarta, sea level, 31.XII.70, P.H. & M. Arnaud (1 CASC). **Mexico**: Teotihuacan, Pyramid to the Sun, 27.XII.70, P.H. & M. Arnaud, at flowers *Cassia tomentosa* L. F. (2 CASC). **Michoacan**: Aquila, 49 mi. SE, 13.VII.84, J.B. Wooley (3 TAMU). Lazaro Cardenas, 100 km N, 7. VIII.84, G. Gordh (1 UCRC). **Morelos**: Zacatepec, INIA (INIFAP) station, Jesus Cabral M.—XII.71, emer. from boll weevil infested bolls, cult. cotton (2 MEMS); 17.XII.71, sweep sample in cult. cotton (1 MEMS). **Nuevo León**: Bustamante, Santo Thomas, 18.V.84, Gordh, Sierra & Rodriguez (2 UCRC). Galeana, Cerro Potosi, 2347m, 4.VI.83, M. Kaulbars (1 CNC). Municipio Cienega de Flores, Hacienda La Amistad, 10.VII.83, A. Gonzalez H. (1 UCRC). Municipio El Carmen, El Carmen—10.VII.83, A. Gonzalez H. (9 UCRC); 10.VII.83, G. Gordh (5 UCRC); Hacienda Bernabe Villarreal, 10.VII.83, A. Gonzalez H. (3 UCRC). Municipio Escobedo, Hacienda El Canada, 12.VII.83, G. Gordh (4 UCRC). Municipio Guadalupe, Rincón de la Sierra, 11.VII.83, A. Gonzalez H. (2 UCRC). Municipio Santiago, El Cercado, Hacienda Las 3 Blanquitas, 9.VII.83, A. Gonzalez H. (2 UCRC). San Juan, Río San Juan, 14.VII.83, A. Gonzalez H. (6 UCRC). **Oaxaca**: Tehuantepec, 4.IX.74, D.J. Calvert, *A. grandis* Boheman, on *Cienfuegosia rosei* (5 FSCA). Tuxtepec, 6 mi. S, 200', 26.VI.83, R. Anderson (2 CNC). **Querétaro**: Querétaro, 46 mi. N on Hwy 57, 12.X.67, em. by 3.XI.67, W.H. Cross, em. from *Sphaeralcea angustifolia* (1 MEMS). **Quintana Roo**: Akumal-Tulum, 18–20.IX.85, P. Krauter & D. Hutchinson, ex *Anthonomus hunteri* Burke & Cate, on *Hampea trilobata* (Standley), *Bracon* comp vouchers, lab reared (2 TAMU). **Quintana Roo + Yucatan**: S Tulum to N Coba (Q.R.) + Xalau & Yalcoba to Nueva X-can (Yucatan), 28.X–1.XI.86, P.C. Krauter & J.R.Cate, ex *Anthonomus hunteri*, on *Hampea trilobata* (2 TAMU). **Sinaloa**: La Concha, 11 mi. N, nr microondas sta. La Muralla 2, 25.X.82, J.T. Huber (1 UCRC). **Sonora**: Agua Prieta, 45 km E, 31°19'30N 109°05'30W, 7.IV.07, R.L. Minckley, ex *Sphaeralcea laxa* (1 UCRC). Alamos, 1 mi. W, 26.XII.76, em. by 3.I.77, C.D. Johnson, reared from seeds *Sida aggregata* (1 TAMU). Caborca, 4.5 mi. W, 20.I.63, em. 30.I.63, W.H. Cross, pupa from boll weevil cell in cotton boll (4 MEMS). Hwy 15, +/- 2296.7 km., 17.XI.69, W.H. Cross, from cultured cotton—2nd gen. (1 MEMS). Los Chirriones, 18.XI.69, W.H. Cross, em. from cultured cotton bolls—em. 21.XI.69 (2 MEMS); em. 20.XI–2.XII.69 (1 MEMS); em. 28.XII.69 (1 MEMS); em. 30.XII.69 (23 MEMS). Magdalena, Hwy +/- 2299 km S, 31.X.65, W.H. Cross, cultured cotton (10 MEMS, 2 USNM). S Santa Ana, 31.X.65, W.H. Cross, emerged from fallen cotton squares and bolls, many with boll weevil stages (1 MEMS). San Jose de Guaymas, 10.IV, L.O. Howard (1 USNM). **Tabasco, Yucatan, Quintana Roo**: XI.83, P. Stansly & R. Fisher, *Anthonomus* spp., on *Hampea* spp., *Catolaccus hunteri* vouchers, lab reared (6 USNM). **Tamaulipas**: Ciudad Victoria, 6 mi. N, 17.XI.48, E.S. Ross (1 CASC). Municipio Gomez Farias, 23°02'51N 99°09'20W, 14.II.2001, D. Yanega (1 UCRC). Tampico, 6.XII, F.C. Bishopp (1 USNM). **Veracruz**: Cardel—13.3 km, N, Hwy 180, 27.X.67, em. by 14.XI.67, W.H. Cross, em. from mallow (1 MEMS); 3 mi. N, by Rio Actopan, 31.X.82, J.T. Huber & A. Gonzalez (1 UCRC). Martinez de la Torre, 3.5 mi. SE on Misantla Rd, 27.X.67, W.H. Cross—em. from male *Hampea rovirosae* (4 MEMS); em. from boll weevil infested buds of male *Hampea* sp. (2 MEMS). Veracruz—1959, N.L. Krauss (3 USNM); 1.II.57, R. & K. Dreisbach (1 USNM); 19.II.68, O. Peck (1 CNC); III.61, N.L.H. Krauss (1 USNM); 4.VI.67, M.J. LuRefahr, *A. grandis*, *Hampea* buds (1 USNM). **Yucatan**: Celestún—24.IV.84, 29.XII.83, R.W. Fisher, on *Gossypium hir.* (2 TAMU); 15, 19.XII.81, D.W. Williams, ex wild cotton square (7 TAMU); 15 mi. E, 28.IX.81, 1, 15.X.81, 13.XII.81, D.W. Williams, on *Hampea trilobata*

(7 TAMU); 40 km E, 8.VIII.84, ex *Anthonomus* spp., on *Hampea* spp. (2 TAMU). Rancho, km 33, 1984, VIII.84, 1, 3, 5.X.84, R.W. Fisher, on *Hampea trilobata* (12 TAMU). Sisal, 5.I.84, R.W. Fisher, on *Gossypium hir.* (1 TAMU). **Zacatecas:** Fresnillo, 9 mi. S, 9.VII.54, E.G. Linsley, J.W. MacSwain & R.F. Smith, *Sphaeralcea augustifolia* (1 EMEC). **Veracruz:** Catemaco, 5 km NE, Lago de Catemaco, 29.II.80, C.D. Johnson, reared seeds, *Mimosa albida* (1 TAMU). **NICARAGUA.** Chinandega, Baker (1 USNM). Jinotega, VII.89, T. Reinboldt (1 CNC). **PANAMA.** Canal Zone, Corazal, 1.III.12, A. Busck (1 USNM). **PERU.** C.H.T. Townsend (6 USNM). Cañete, V–VI.41, P. Berry, from caged cotton buds (152 CNC, USNM). Dept. Piura, 795, C.H.T. Townsend—(1 USNM + 4 USNM *C. townsendi* paratypes); 795°3e, VII–II (Holotype and 4 USNM *C. townsendi* paratypes); from weevil squares (1 USNM). Lambayeque, 3.X.70, M. Torres (1 USNM). Piura, P. Berry—cotton balls (15); 2.VI.41, *A. vestitus* (40 USNM); 20.IX.41, cotton buds (28 CNC plus 2 capsules of unmounted specimens in USNM). Piura, 17.VII.40, E.J. Hambleton (2 USNM). **TOBAGO.** Goldsborough, 17–24.III.94, 17.II–26.V.94, M.J. Sommeijer, ex neglected citrus orchard bordering on primary forest (2 USNM). **URUGUAY.** Montevideo, Parasite Lab—24.VIII.42, *A. vestitus* (1 USNM); 25.VIII.45 (7 USNM); 30.VIII.44, P. Berry (3 USNM). **VENEZUELA** Aragua—Cumboto, ~90m, 12.I.96, M. Sharkey (2 CNC); Maracay, 26.XI.67, G.I. Stage (2 USNM). Lara, 1 km E Barquisimeto, 27.XII.85, P. Kovarik & R. Jones (1 TAMU). Zulia, Dtto. Maracaibo, Jardín Botánico, II.82—Eleodoro L. (2 USNM); Rubio & E. Inciarte (2 USNM). Zulia, Los Angeles del Tucuco, 15–16.IV.81, E.E. Grissell (2 USNM).

Distribution. Map 4. Specimens examined from Hawaii result from the intentional introduction of *J. hunteri* from Guatemala in 1934 and 1937 for biocontrol of the pepper weevil, *Anthonomus eugenii* Cano (Clausen 1978). Cross and Mitchell (1969) previously compared the then known distributions of *J. hunteri* and *J. grandis*.



MAP 4. Distribution of *Jaliscoa hunteri* (Crawford) and *Jaliscoa vulgaris* (Ashmead).

Biology. Noyes (2012) listed three species of Bruchidae, 20 species of Curculionidae (Coleoptera) and one species of Gelechiidae (Lepidoptera), *Pectinophora* (= *Platyedra*) *gossypiella* (Saunders), as hosts. The latter record is based on Rude (1937), who reared *J. hunteri* from cotton blooms and squares along with the boll weevil, *A. grandis*, and the pink bollworm, *P. gossypiella*. Based on numbers of each species reared he suggested that *J. hunteri* was probably a parasitoid of both cotton pests; however, there has never been a documented rearing of *J. hunteri* from *P. gossypiella*. There is an extensive literature of *J. hunteri* as a primary ectoparasitoid of the larvae of boll weevil and the pepper weevil, *A. eugenii* Cano, among other listed hosts (see references in Noyes (2012), including Rodríguez-Leyva *et al.* (2000)).

Based on material examined, anomalous rearing records include a Cecidomyiidae (Diptera) gall on *Eugenia buxifolia*, *Liriomyza* sp. (Diptera: Agromyzidae) on cotton, and a leafminer on *Magnolia*. New host records include—**Curculionidae:** *Anthonomus convictus* Gates, *A. hunteri* Burke & Cate, *A. mexicanus* Boheman; *Brachycerus ornatus* Westwood; *Epimechus canoides* Fall (?); *Miarus hispidus* Bovie (?).

New plant associates include—**Asteraceae:** *Baccharis* sp. **Cactaceae:** *Opuntia engelmannii* Salm-Dyck. **Campanulaceae:** *Labelia* sp. **Euphorbiaceae:** *Croton lindeimeri* (Engelman & Gray). **Fabaceae:** *Mimosa albida* Humbolt & Bonpland ex Willdenow. **Magnoliaceae:** *Magnolia* sp. **Malvaceae:** *Cienfuegosia rosei* Fryxell; *Hampea longipes* Miranda, *H. rovirosae* Standley, *H. trilobata* Standley; *Heliocarpus palmeri* S. Watson; *Sida aggregata* C. Presl; *Sphaeralcea angustifolia* (Cavanilles), *S. laxa* Wootton & Standley, *S. orcuttii* Rose. **Myrtaceae:** *Eugenia foetida* Persoon (= *E. buxifolia*). **Rosaceae:** *Fragaria* × *ananassa* Duchesne; *Prunus serotina* Ehrhart. **Solanaceae:** *Solanum elaeagnifolium* Cavanilles, *S. elegans* Dunal, *S. torreyi* A. Gray.

Discussion. Gahan (1951) originally synonymized *J. townsendi* under *J. hunteri*. Burks (1954: 11) resurrected the name because he considered that there “are small but consistent differences” between the two, although he also stated that it “may eventually be shown that the two are geographical subspecies, rather than species”. Burks (1954: 12) also recognized *J. vulgaris*, although stating “longer series of specimens might show that this is a subspecies of the *hunteri* complex”. He differentiated females of both *J. townsendi* and *J. vulgaris* from *J. hunteri* by the upper surface of the fore wing being setose around the apex of the stigmal vein compared to aetose, and the “lateral folds of the propodeum” (= plicae) being interrupted in the middle compared to complete in *J. hunteri*. For the sake of discussion, I designate specimens identified as *J. hunteri*, *J. townsendi* and *J. vulgaris* as the *hunteri*-complex. Most females of the *hunteri*-complex from the Neotropical region, or at least south of Mexico, have the fore wings comparatively extensively setose, including the type series of *J. townsendi* and *J. vulgaris* (Fig. 110). The fore wings have a marginal fringe and typically are setose beyond an oblique speculum that extends to about the middle of the marginal vein or even beyond to about the middle of the stigmal vein. Most females from north of Mexico have the fore wings essentially glabrous to or beyond the apex of the stigmal vein, including sometimes entirely lacking a marginal fringe (Fig. 94). However, there appears to be all intermediates between the two extremes and some females from north of Mexico have as extensively setose fore wings (Fig. 93) as typical southern females (Fig. 110). There is considerable variation as to the presence, extent, and colour of the setae basal to the stigmal vein and how far the setae extend posteriorly to the medial fold. Even the type series of *J. hunteri* has a few inconspicuous whitish setae extending in a band behind and basal to the stigma. A longitudinal geographical gradient is also apparent for leg color. Females of the *hunteri*-complex from more southern localities typically have all the tibiae yellowish-white to white, whereas females from more northern localities, including those with extensively setose wings, typically have at least the meso- and/or metatibiae banded by an obviously darker orange to brown region subbasally to mesally (Fig. 91). There is also considerable variation in development of plical carinae, though this does not appear to be along a geographical gradient. Most individuals of the *hunteri*-complex, including the type series of *J. hunteri*, *J. townsendi* and *J. vulgaris*, have plical carinae developed at least as short carinae within the nuchal furrow (Fig. 109: arrow) and sometimes as variably distinctly differentiated lines extending between the nucha and anterolateral plical depressions (Figs 95, 96). However, the different states of all three characters—fore wing setal pattern, tibial colour, and propodeal plical carinae are present in all combinations in females and thus do not appear to support presence of separate species. I presently interpret observed variation to reflect a single highly variable species that extends from the United States through Central and South America and the Caribbean. Molecular analyses could provide additional evidence, though genetic variation should also be expected over such a large geographical range. The very few individuals of *J. vulgaris* known from St. Vincent share an unusually short malar space (Figs 105–107) relative to most other *hunteri*-group individuals from continental America (Fig. 88). The malar space of females of the type series of *J. vulgaris* is 0.58–0.61× the width

of an eye. The malar space is usually obviously greater than $0.6\times$ the width of an eye for continental specimens of *J. hunteri*, though a female from Tobago (Map 4) I assign to *J. hunteri* has the malar space only about $0.66\times$ the width of the eye. Relative length of the malar space may well represent yet another variable, but continuous feature that is partly correlated with small body size or populational differences across its range. However, length of the malar space of the type series of *J. vulgaris* is somewhat anomalous relative to most continental specimens. Because of the implications synonymy of *J. hunteri* under *J. vulgaris* would have for the extensive biological literature of this economically important weevil parasitoid, I prefer to retain both names as valid until species status of the *hunteri*-complex can be examined further through molecular analyses.

***Jaliscoa nudipennis* Bouček**

Figs 97–104

Jaliscoa nudipennis Bouček, 1993: 1282. Holotype (♀, USNM, examined). Type data: Mexico, Jalisco, 6 km N of Autlan. Mine Road, 7 July 1984, J.B. Woolley.

Description. FEMALE (habitus: Figs 97, 99). Length = 1.9–3.0 mm. *Head.* Face (Fig. 98) with clypeus variably extensively meshlike coriaceous to coriaceous-reticulate at least dorsomedially (usually more longitudinally striate or striate-alutaceous laterally), and with supraclypeal region sometimes partly meshlike coriaceous immediately above clypeus and often with limited, obliquely aligned sculpture lateral of clypeus to about dorsal level of clypeus, but face otherwise almost uniformly reticulate or more coriaceous-reticulate ventrally, but scrobal depression and parascrobal region both distinctly reticulate even if reticulations more or less aligned vertically on parascrobal region at least dorsally; malar space without a malar sulcus, and $0.47\text{--}0.60\times$ eye height (Fig. 98) and $0.69\text{--}83\times$ eye width. Antenna (Figs 97, 99) with at least scape, pedicel and anelli yellow to yellowish-orange, the flagellum often somewhat darker, at least distally, but at most brownish-yellow.

Mesosoma. Tegula yellow. Pronotum sometimes more or less distinctly carinate, but at least with abruptly angulate or raised ridge differentiating collar from collum, and margin incised laterally so as to be variably distinctly emarginate (Fig. 100). Mesopectus with at most slight, horizontal undulation across femoral depression at level of mesocoxa, but with carinate anterior margin of femoral depression (Figs 101, 102: arrows) continuous ventrally anterior to mesocoxa so as to differentiate variably conspicuous mesosternal shelf, and with setal line obviously separated from anterior angle of mesocoxa (Fig. 102). Fore wing (Fig. 104) with costal cell completely bare; disc (excluding admarginal setae) completely bare to level of base of marginal vein and glabrous to at least level of apex of stigmal vein anterior to medial fold (membrane usually with variably distinct spots representing remains of setal pores), and medial fold often with row of setae on ventral surface; dorsal surface sometimes with row of very short setae on cubital fold and sometimes with very short setae posterior to cubital fold; surface distal to stigmal vein variably distinctly setose, at least on ventral surface; admarginal area with 6–17 setae arranged in 1, 2 or distally 3 irregular rows; marginal fringe absent from postmarginal vein to about middle of apical margin of wing, but present along posteroapical margin; smv: mv: pmv: stv about 3.0–3.6: 2.0–2.5: 1.0–1.3 (base of marginal vein measured from abrupt angle between marginal vein and parastigma because often with slender band of membrane continuous from costal cell anterior to marginal vein along part or entire length). Legs (Fig. 97) beyond coxae, and sometimes coxae partly, yellow to yellowish-orange. Propodeum with oblique carina on callus (Fig. 103: arrow 2) extending posterolaterally from spiracle toward and sometimes continuous with vertical, posterolateral carina (Fig. 103: arrow 1) on callus above mesocoxa; with complete plical carina extending posteriorly to within nuchal furrow; plical region of at least larger individuals with distinct, carinate costula evenly recurved anteromesally from about midlength of plical carina, hence with quite large, obviously meshlike-reticulate, depressed anterior panel that is distinctly longer laterally than medially, and with median carina anterior to and posterior of costula, though smaller individuals sometimes lacking or with only partial, indistinct costula, and with weak median carina sometimes developed only anteriorly, but then median length of plical region at least about $1.75\times$ length of nucha.

Metasoma. Gaster (Figs 97, 99) usually with at least venter contrasting conspicuously in colour from mesosoma, sometimes more or less uniformly dark brown with metallic blue to purple lustre laterally, but usually yellowish-orange at least ventrally and sometimes extensively yellowish-orange (usually dark brown dorsally over at least about apical half and with at least slight metallic lustre laterally when brown); ovate-lanceolate, length only

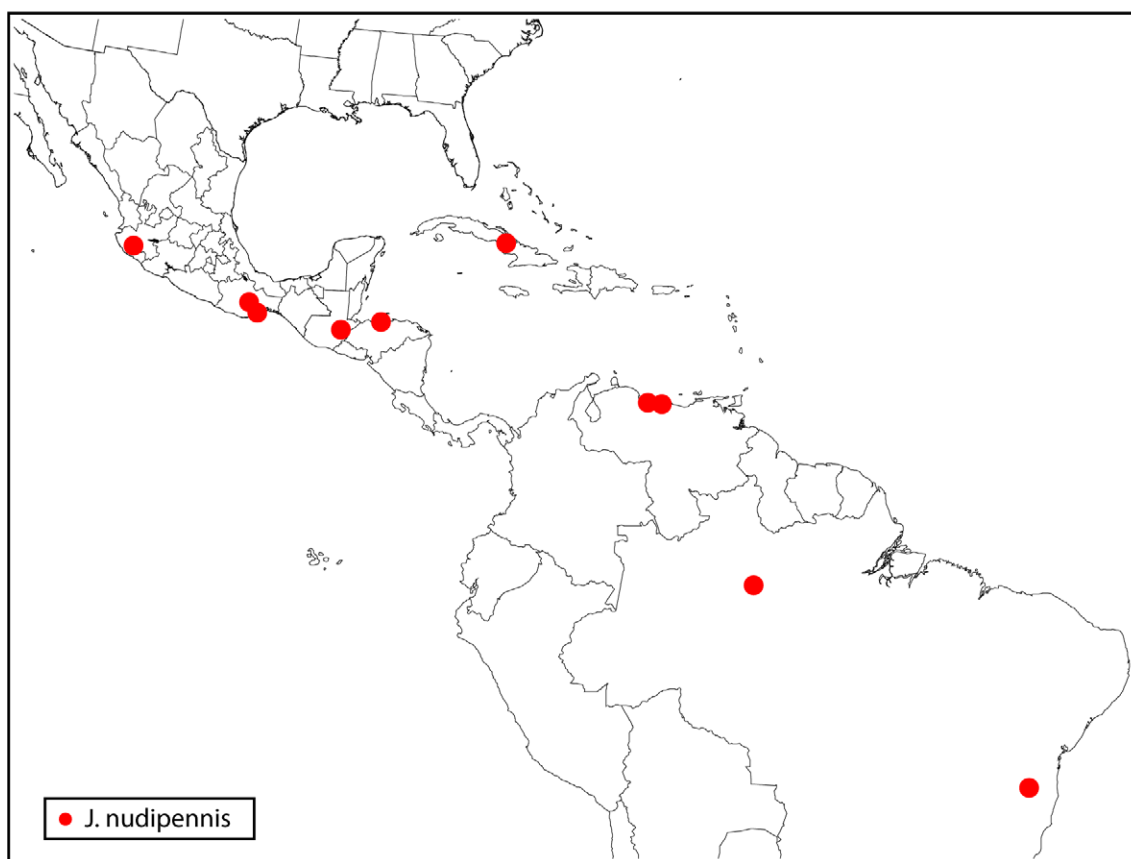
about 1.8–2.0× as long as wide (excluding specimens with a strongly collapsed and compressed gaster) and with Gt2–Gt4 having mediolongitudinal furrow or line of weakness (Fig. 99) and medially emarginate posterior margins; syntergum short, transverse-triangular or at most as long as wide and setose only along extreme posterior margin (often not visible because largely overlain by penultimate tergum); cercus distinctly peglike (digitiform).

MALE. Unknown.

Type information. The holotype was stated as deposited in TAMU, but subsequently was transferred to the USNM. Data given in the original description stated that the holotype was collected “6 km N of Autlan”, whereas it is given as “4.2 m. N Autlan” on the specimen label.

Material examined. *NEOTROPICAL. BRAZIL. Amazonas:* Manaus, ca. 60 km N, Hwy ZF 2, km 20.7, 02°30'S 60°15'W, 16.VIII.79, Terra firme, Canopy fogging project, Adis, Erwin & Montgomery, *et al.* (4♀ USNM). *Bahia:* Encruzilhada, 980m, X.74, M. Alvarenga (1♀ CNC). *CUBA.* Camaguey, 19.VI.50, Berg & Link, on *Citrus sinensis* leaf (1♀ USNM). *GUATEMALA.* Zacapa, Dpto San Lorenzo, 12.VII.86, L. LeSage (2♀ CNC). *HONDURAS.* La Ceiba, 10.VI.49, L. Becker (1♀ CNC). *MEXICO. Jalisco:* Autlan, 4.2 mi. N, Mine Road, 7.VIII.84, J.B. Woolley 84/023 (Holotype, USNM). *Oaxaca:* Salina Cruz, 27 mi. SW, 14.VII.87, P. Kovarik & J. Schaffner (1♀ TAMU). Totolapan, 10 mi. E, 4000', 20.VII.87, P. Kovarik & J. Schaffner (1♀ TAMU). *VENEZUELA.* Aragua, H. Pittier Nat. Park, Portachuelo Pass—1100m, 10°21'N 67°41'W, 14.V.98, J. Ashe, R. Brooks & R. Hanley (73♀ CNC, Photos 2011-25, 26, 32, 35, 36, 106); 1000m, 13.IV.94, L. Masner (1♀ CNC). Aragua—Rancho Grande Nat. Pk, 18.VIII-3.IX.92, L. Masner (1♀ CNC); 900m, 12.V.79, G. Gordh (5♀ UCRC).

Distribution. Map 5.

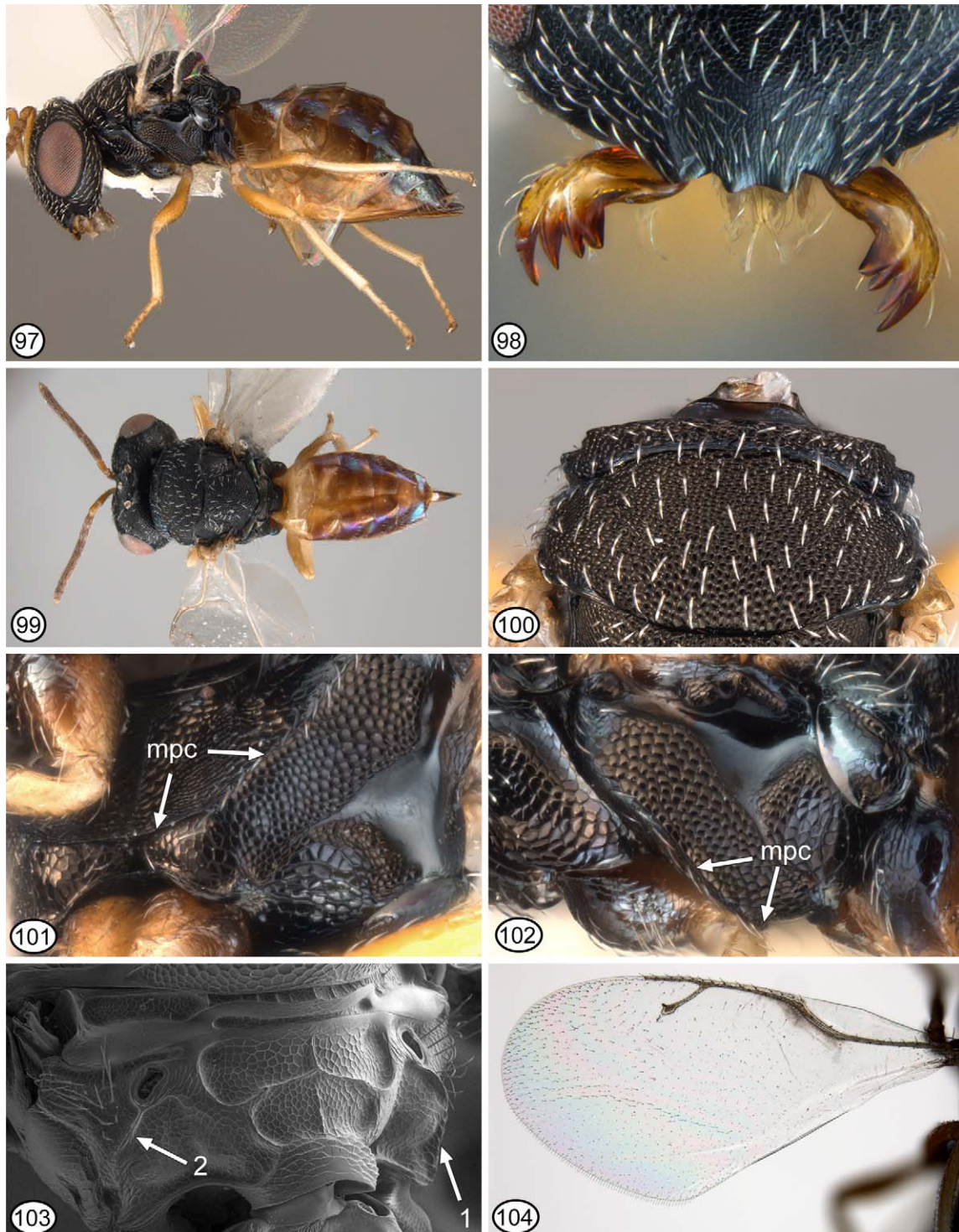


MAP 5. Distribution of *Jaliscoa nudipennis* Bouček.

Biology. Hosts and biology unknown, but undoubtedly a parasitoid of Curculionidae (Coleoptera) based on known host associations for other *Jaliscoa* species.

Discussion. Several features more readily differentiate females of *J. nudipennis* from the other recognized species of *Jaliscoa* than these are from each other. However, some of the colour features are unreliable for some specimens and not all of the differential features may be visible or obvious because of the condition of air-dried specimens and/or the method of mounting. Perhaps the most easily observed and stable feature is the unique,

oblique carina that extends posterolaterally from the propodeal spiracle (Fig. 103: arrow 2). Also unique is the presence of a carinately margined mesosternal shelf (Figs 101, 102), though this sometimes is not obvious depending on how the specimen is mounted, and a mediolongitudinally furrowed Gt2–Gt4 (Fig. 99), though this is not always apparent if the specimen is air-dried and the gaster is completely collapsed. Other differential features such as clypeal sculpture (Fig. 98) and most gastral features represent more subtle differences.



FIGURES 97–104. *Jaliscoa nudipennis* ♀. **97**, habitus, lateral (holotype); **98**, head, frontal (35); **99**, habitus, dorsal (holotype); **100**, pro- and mesonotum (32); **101**, mesopectus, ventrolateral (25); **102**, meso- and metapleuron (26); **103**, propodeum, posterolateral (106: SEM) [arrow 1 points to vertical and arrow 2 points to oblique carina on callus]; **104**, fore wing (36). No. in parenthesis = CNC 2011 photo no.

***Jaliscoa vulgaris* (Ashmead) n. comb.**

Figs 105–110

Catolaccus vulgaris Ashmead, 1894b: 164. Lectotype (♀, USNM, here designated). Lectotype labels: “St. Vincent, W.I., H.H. Smith, 238” / “Cotype No. 2449 U.S.N.M.” / “*Catolaccus vulgaris* Ash. ♀ Type” / “LECTOTYPE, *Catolaccus vulgaris* Ashmead 1894 (Gibson, 2012)”. Condition: entire; mounted left side on triangular card.

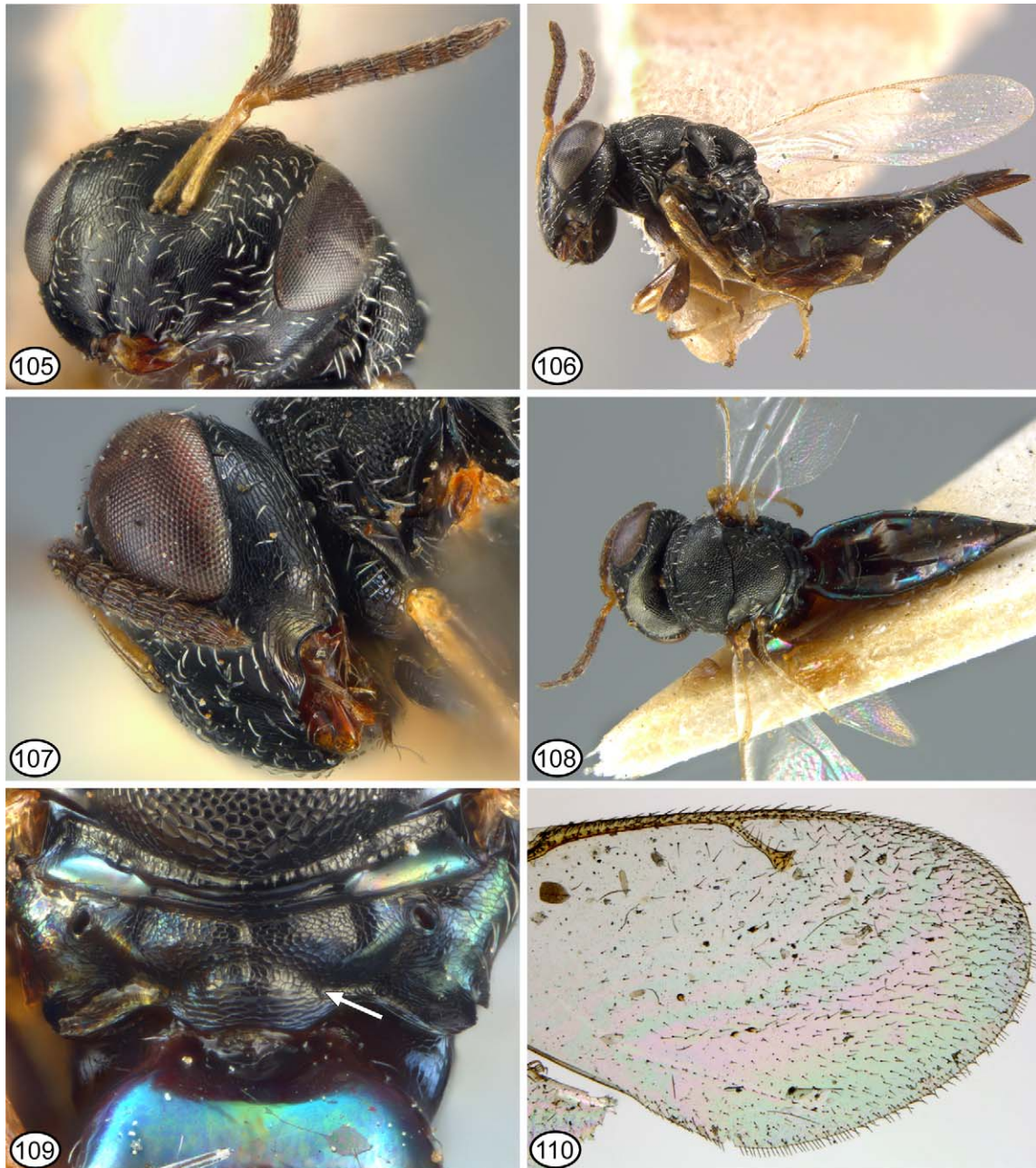
Heterolaccus vulgaris; Burks, 1954: 12.

Pteromalus vulgaris; De Santis, 1979: 151.

Description (based on type specimens, lectotype measurements in parenthesis). **FEMALE** (habitus: Figs 106, 108). Similar to *J. hunteri* with following restrictions: body length about 2.4–3.1 (2.6) mm. Head with clypeus finely strigose and supraclypeal region finely, meshlike reticulate below toruli, but with smoother, coriaceous circular region dorsad clypeus; malar space about 0.35–(0.39)× eye height and about 0.58–(0.61)× width of eye (Figs 105, 107). Scape and pedicel yellow. Fore wing (Fig. 110) without or with 1 seta within costal cell ventroapically; disc setose beyond broad, oblique speculum extending to about apex of marginal vein, though setae shorter posterobasally toward medial fold; admarginal area with (10)–14 setae in double row at least behind base of marginal vein; smv: mv: pmv: stv = 3.8–(4.1): 2.7–(2.9): 1.8–(2.2): 1.0. Legs with tibiae uniformly yellowish-white. Propodeum with median carina and at most rounded, transverse angulation across plical region, but without or with at most only very fine plical carina within nuchal furrow (Fig. 109: arrow) or posterior of anterolateral plical depression.

MALE. Body length about 1.4–2.0. Similar to female except gaster with large basal yellowish region and fore wing disc with longer, more conspicuous setae similar to male of *J. hunteri*; costal cell with 2–4 ventroapical setae; 6–10 admarginal setae; malar space 0.31–0.37× eye height and 0.48–0.56× eye width; smv: mv: pmv: stv = 3.6–3.7: 2.4–2.5: 1.8–1.9: 1.0.

Type information. Ashmead (1894b: 164) stated that *J. vulgaris* was described from St. Vincent and “a common species... described from many specimens”. In addition to the lectotype designated herein (Figs 105, 107–110), the USNM has another male with the same collection data except the number on the locality label is “207”. The USNM also has a male and female labelled “Leeward side, St. Vincent, W.I., H.H. Smith”. The female has the number “199”, whereas the male has the number “200” and is labelled “*Catolaccus vulgaris* Ashm. ♂ Type”. All individuals are *J. vulgaris* in the present sense. The BMNH has another female labelled as for the lectotype except it has the number “207” and four other labels—“W. Indies 99-331 / *Catolaccus vulgaris* Ashm. ♀ Type / Type / B.M. Type Hym. 5.689b”. Three other females and one male are labelled as the latter specimen except for the lack of a type label and one, which lacks its head, has the number “238”. Another male is labelled similarly except it has the number “239” and is from “Leeward side” of St. Vincent. At least four of the five specimens are *C. vulgaris* in the present sense. The female lacking a head with the number 238 is smaller than the others, has only a single row of 8 admarginal setae, 2 ventroapical setae in the costal cell, and the tibiae are quite distinctly darker mesally than basally or apically. The anterior margin of the metapleuron is uniformly curved and smooth, and the body is black and otherwise similar to *Jaliscoa* species. However, based on its fore wing setal pattern and leg colour, I suspect this female is a *Eurydinoteloides*. The BMNH has an additional 11 specimens, all labelled similarly as for the lectotype except only three have a number (207, 209, 210) on the locality label and all have the additional label “W. Indies 99-331”. Of these, two females and six males are an unidentified species of *Neocatolaccus*. One of the *Neocatolaccus* males has the label “*Catolaccus vulgaris* Ashm. ♂ Type” and a yellow BMNH cotype label, whereas one female has the label “not *Catolaccus vulgaris* Ash. ’94, Zd. Bouček det. 1970”. Yet another female labelled as “*Catolaccus vulgaris* Ashm. ♀ Type” is an unidentified species of *Eurydinoteloides* (quite distinctly metallic green with yellow tegula, without malar depression but with malar sulcus, bilobed clypeus, and evenly curved and smooth and shiny metapleuron). The remaining two specimens are male *Eurydinoteloides*. One of the males might be the opposite sex of the female, though it appears to have only a shallowly incurved clypeus, whereas the other is definitely a male of a second species (with malar depression and anterior margin of metapleuron angulate with slight sculpture). The BMNH has a further male with the label “W. Indies 99-331”, but collected from “Mount Gay est. (Leeward side), Grenada, W.I., H.H. Smith, 31”. The USNM has a similarly labelled female except for having the number “24” and lacking the “99-331” label. The BMNH male is a *Eurydinoteloides*, though a different species than the above male, whereas the USNM female is *C. vulgaris* in the present sense.



FIGURES 105–110. *Jaliscoa vulgaris* ♀. **105 and 106**, ♀ paratype (BMNH) (174): **105**, head and antenna, frontolateral; **106**, habitus, lateral. **107–110**, ♀ lectotype: **107**, head, lateral; **108**, habitus, dorsal; **109**, propodeum, posterior [arrow points to plical carina within nuchal furrow]; **110**, fore wing. No. in parenthesis = CNC 2011 photo no.

Of the specimens listed above, I do not consider the two from Grenada as part of the type series of *C. vulgaris* because the species was stated as described from St. Vincent. I do consider the other 20 specimens (in addition to the lectotype) as part of the type series and designate these as paralectotypes. All the specimens fit the general description given, including “species with scattered white hairs” and “legs honey-yellow or pallid; the coxae and femora, except tips, metallic”. Further, it is quite apparent from the original description that Ashmead (1894b) described the species from a mixed series. He stated that it is “variable in colour and size” and further described the colour as “variable from a bronze-green to blue-green or aeneous”. Individuals of *J. vulgaris* are dark and the description of metallic colour likely was more for the *Eurydinoteloides* and/or *Neocatolaccus* specimens. Further, although the male flagellum is stated as “much stouter than the scape and pedicel”, which fits the flagellum of *J. vulgaris*, the funiculars are also stated as “almost twice as long as thick”, which is not descriptive of *J. vulgaris* males. Males of *J. vulgaris* have all six funiculars quadrate or the first funicular slightly longer than wide (cf. Fig.

86). The former ratio best fits the males of *Neocatolaccus*, though none of the remaining males of the type series have the “first joint” of the funicle “twice as long as the pedicel”. Only the female *Neocatolaccus* have the first funicular segment approaching twice as long as the pedicel. Also anomalous is that the female flagellum is described as “6-jointed”, whereas females of both the *Eurydinoteloides* and *Neocatolaccus* considered as forming part of the type series have only five funicular segments. It is because the female is described as having six funiculars that I designated the lectotype in the present sense, even though the description does not fit exactly females or males of *J. vulgaris* in the present sense.

Material examined. NEOTROPICAL. ST. VINCENT. H.H. Smith (Lectotype and 4♀ and 3♂ paralectotypes as discussed under type information). GRENADA. Mount Gay Est., H.H. Smith, 24 (1♀ USNM).

Distribution. Map 4.

Biology. Unknown, but undoubtedly a parasitoid of Curculionidae based known host associates for *J. hunteri*.

Discussion. *Jaliscoa vulgaris* may be conspecific with *J. hunteri* and represent nothing more than a regional population with an unusually short malar space, as discussed under the latter species. However, because of implications synonymy would have on the biological literature I prefer to retain both names as valid until species limits can be tested throughout the range of the *hunteri*-complex using molecular techniques.

Eurydinoteloides Girault

Eurydinoteloides Girault, 1913a: 55. Type-species: *Eurydinoteloides americana* Girault, by monotypy (♀ holotype, ZMHB, examined). Gender: feminine (ICZN: 30.1.4.4).

Aeronea Cameron, 1913: 127–128. Type-species: *Aeronea laticeps* Cameron, by monotypy (♀ syntype, BMNH, examined). Junior homonym of *Aeronea* Agassiz (1846) discovered by Ghesquière (1946: 370). Synonymy by Bouček (1988: 418).

Aeroneisca Ghesquière, 1946: 370. Replacement name for *Aeronea* Cameron nec Agassiz. Synonymy by Bouček (1993: 1250).

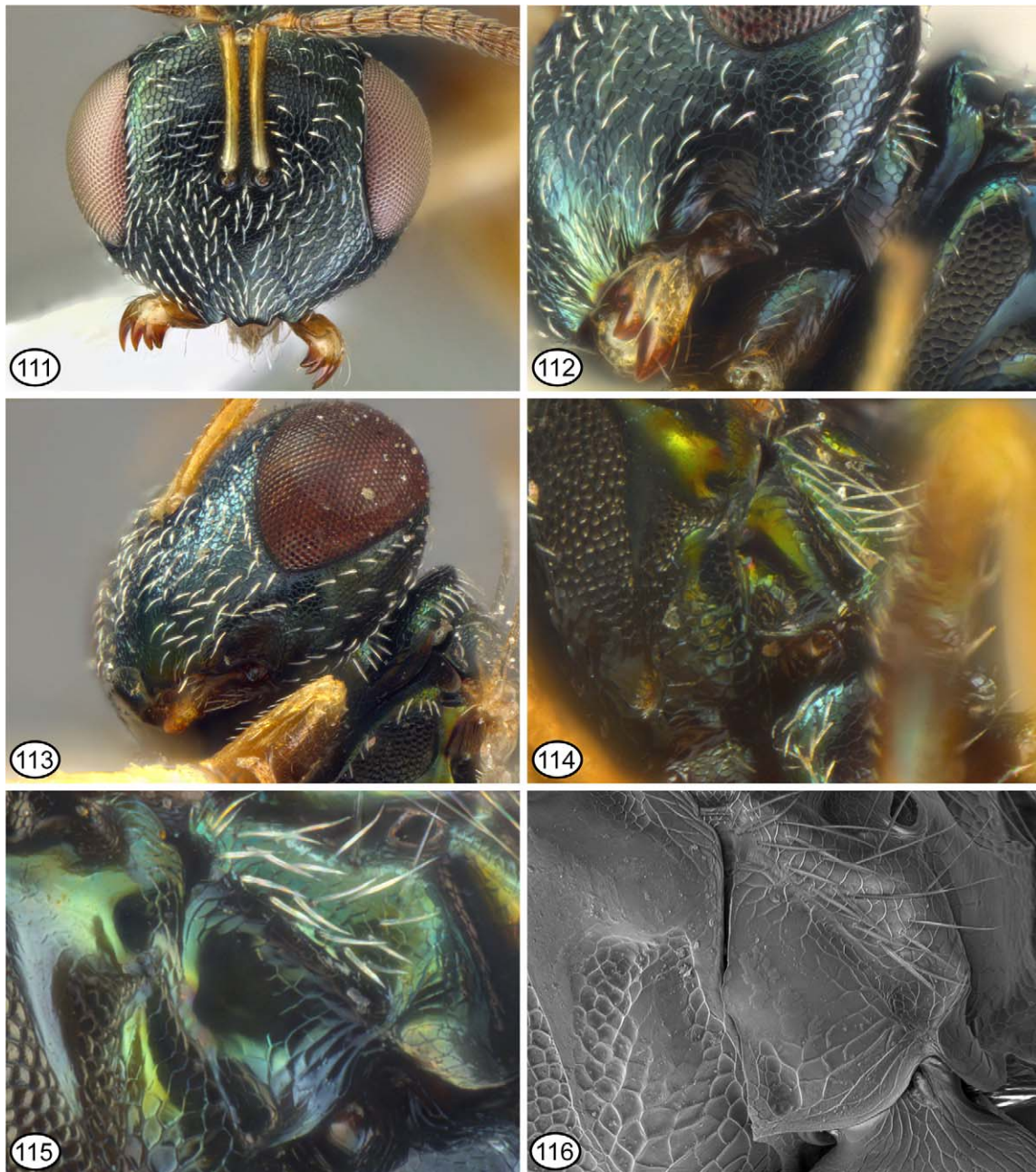
Protolaccus Burks, 1954: 15–16. Type-species: *Neocatolaccus syrphidis* Girault (1916), by original designation (♀♀ and ♂♂ syntypes, USNM, examined). Synonymy by Bouček (1988: 418).

Included species. *Eurydinoteloides americana* Girault (1913), *E. bacchadis* (Burks 1954), *E. dymnus* (Walker 1847) **n. comb.**, *E. eudubia* (Özdikmen 2011) **n. comb.**, *E. hermeas* (Walker 1847) **n. comb.**, *E. incerta* (Ashmead 1893) **n. comb.**, *E. laticeps* (Cameron 1913), *E. orontas* (Walker 1847) **n. comb.**, *E. perdubia* (Girault 1916) **n. comb.**, *E. platensis* (De Santis in De Santis et al. 1979) **n. comb.**, *E. syrphidis* (Girault 1916), *E. tepicensis* (Ashmead 1895) **n. comb.**, *E. timaea* (Walker 1847) **n. comb.**, *E. tortricidis* (Crawford 1921) **n. comb.**

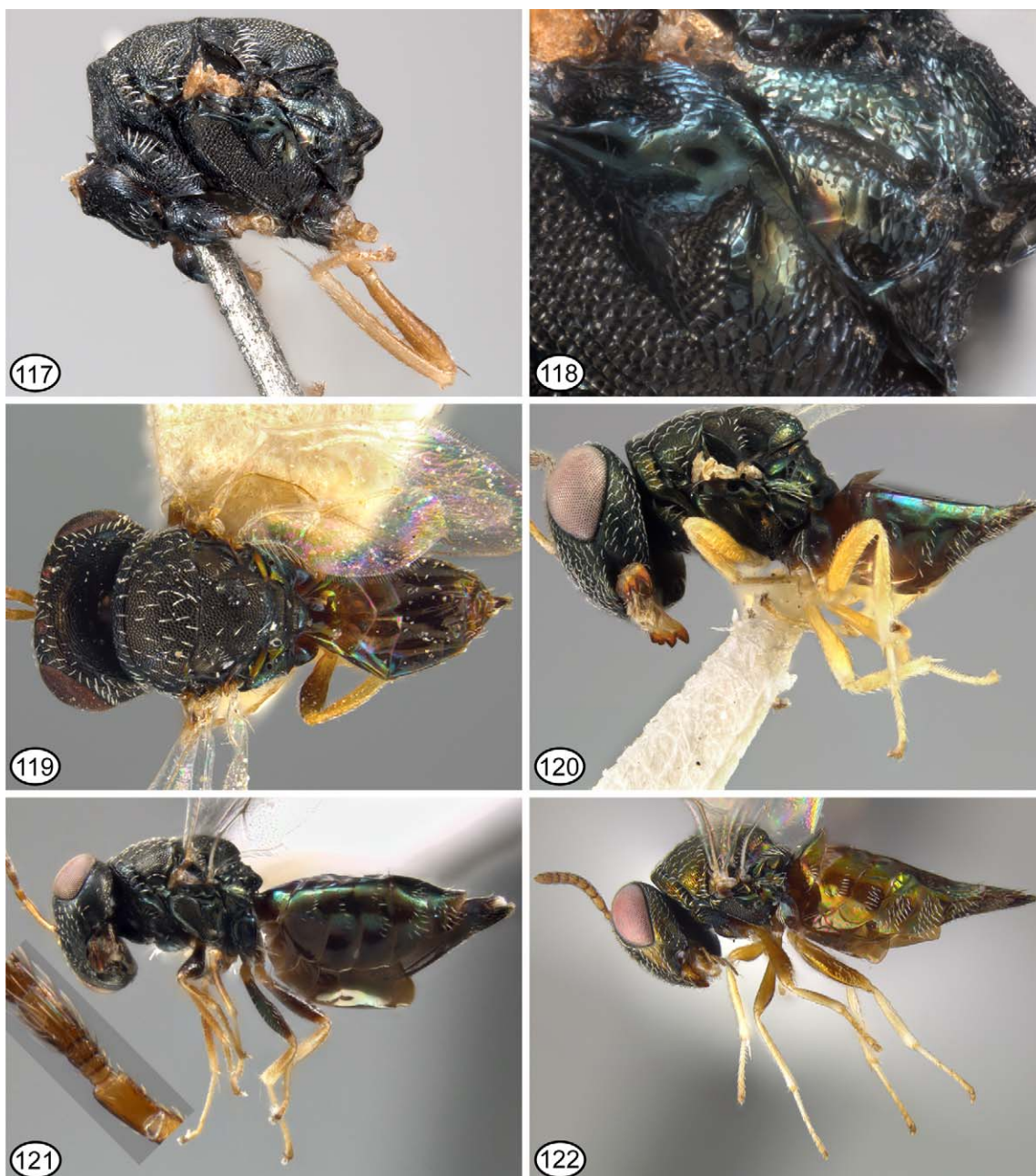
Diagnosis. Metapleuron variable, but at least partly smooth and shiny and with anterior margin raised at least slightly above level of posterior margin of mesopleuron (e.g. Figs 114–116, 137–142). Flagellum of female with 3 basal ringlike articles lacking mps and 5 funicular articles with mps (cf. Fig. 163); male with third flagellomere usually more closely resembling subsequent funiculars than basal two flagellomeres (Figs 129–132), but variable in length and setation, and with (Figs 131, 132) or without (Figs 129, 130) mps. Fore wing with length and number of rows of admarginal setae and extent of speculum variable (Figs 143–147). Head with or without distinct malar depression (Figs 133–136). Head and mesosoma dark or with variably distinct metallic lustres and almost always with variably conspicuous white setae on at least head of male and on head and mesosoma of female (e.g. Figs 119–122). Propodeum with (Figs 152, 154) or without (Figs 124, 156) plical carina posteriorly within nuchal furrow and with or without complete or partial costula, but without transverse carina within paraspircular region. Both mandibles with four similar teeth (Figs 111, 133, 136).

Description. Head and mesosoma brown, black or variably distinctly metallic green to blue or red, and usually with comparatively long, slender, almost parallel-sided white setae (Fig. 125) at least on head (some males) or both head and mesosoma (females and most males), though setae rarely conspicuously widened over about basal two thirds and abruptly narrowed to point in apical third (cf. Fig. 171) or very rarely (Neotropical species) with white setae on mesoscutum and brown setae on scutellar-axillar complex or all setae dark and hairlike. Eye bare or at least superficially bare with at most exceedingly short, sparse, inconspicuous setae. Mandibles quadridentate, with four similarly acute teeth (Figs 111, 133, 136). Head in frontal view transverse-oval to subcircular (Fig. 111); antenna inserted above lower margin of eyes near middle of face; tentorial pits not evident; clypeus with ventral margin virtually transverse to variably distinctly incurved and variably conspicuously vertically striate to coriaceous; face usually shallowly meshlike reticulate, without tiny bump or smoother and shinier spot at ocular

margin at midheight of eye. Head in dorsal view abruptly declined immediately behind posterior ocelli, hence strongly transverse with vaulted vertex. Head in lateral view with or without malar depression extending up to about half distance to lower orbit (Figs 133–136); malar space about 0.4–0.66× height of eye in female, but sometimes only about 0.3× in male; with or without malar sulcus/line. Antenna with scape most often extending dorsally only to about level of anterior ocellus, but rarely in female attaining and sometimes in male exceeding (Fig. 131) level of vertex; flagellum of female with 3 anelli and 5 funiculars with mps (*cf.* Fig. 163); flagellum of male with at least 2 very strongly transverse and similarly ringlike anelli (Figs 129–132) but third flagellomere variable in length, setation, and most often with reduced number (Fig. 131) or without (Figs 129, 130) mps so as to variably closely resemble subsequent flagellomeres; clava with apical clavomere uniformly conical without micropilose sensory region; flagellum of male usually with compacted articles, but sometimes at least apical flagellomeres separated by short tubular extension.

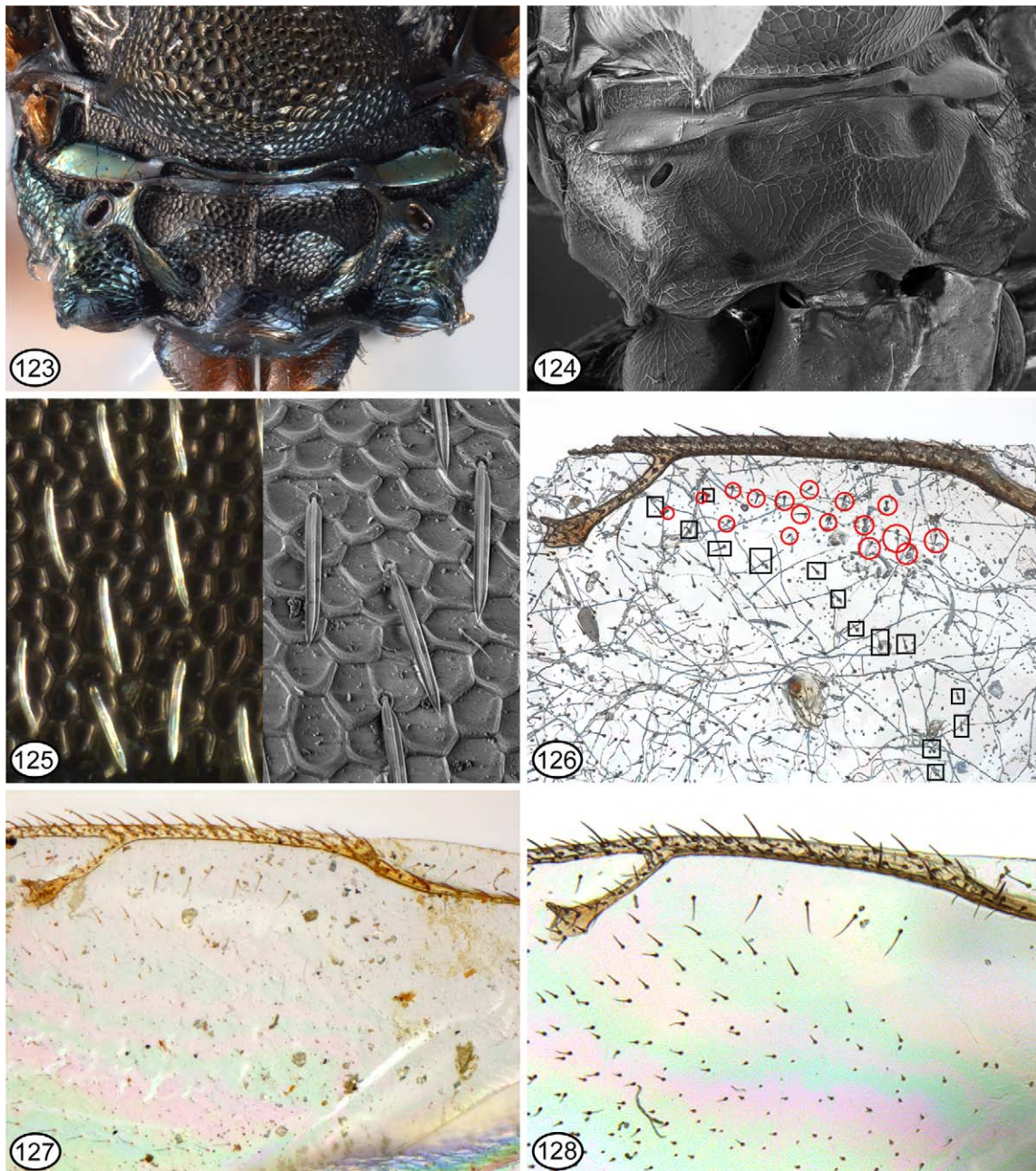


FIGURES 111–116. *Eurydinoteloides* spp. ♀. **111**, *E. bacchadis*, head, frontal (53). **112**, *E. bacchadis* (♀ paratype), lower face, frontolateral. **113 and 114**, *E. laticeps* (♀ syntype): **113**, head, lateral; **114**, meso- and metapleuron. **115 and 116**, *E. bacchadis*: **115**, meso- and metapleuron (54); **116**, metapleuron (54; SEM). No. in parenthesis = CNC 2011 photo no.



FIGURES 117–122. *Eurydinoteloides* spp. ♀. **117 and 118.** *E. americana* (holotype): **117**, mesosoma, lateral; **118**, meso- and metapleuron. **119**, *E. laticeps* (syntype), habitus, dorsal. **120**, *E. bacchadis* (paratype), habitus, lateral. **121 and 122**, habitus, lateral: **121**, *Eurydinoteloides* sp. (164) [insert: pedicel–fl4]; **122**, *Eurydinoteloides* sp. (59). No. in parenthesis = CNC 2011 photo no.

Pronotum with collar abruptly margined to steeply angled collum, but without carina. Mesonotum meshlike reticulate; mesoscutum with incomplete notauli; scutellum without frenum, in lateral view almost flat and in same plane as dorsal margin of metanotum or variably distinctly convex with apex curved to vertical posterior margin above metanotum (Fig. 121) or very rarely in lateral view with marginal rim reflexed posteriorly as short denticle (Fig. 120). Fore wing (Figs 126–128, 143–147) hyaline; marginal vein not thickened and about 1.3–2.2× length of stigmal vein and about 1.0–1.5× length of postmarginal vein; stigma small, not distinctly capitate; costal cell comparatively narrow, without setae dorsally but variably setose ventrally, usually with 1 or 2 rows of setae within at most about apical third but some Neotropical species with 1 or 2 setae also basally or rarely setose along length; basal cell, basal fold and mediocubital fold usually bare but some Neotropical species with setae on basal fold or apically within basal cell (Fig. 147); disc ventrally usually with 1 transverse or 2 irregular or partial rows of admarginal setae that often are longer than dorsal discal setae (Fig. 146), though sometimes in up to 3 or 4 partial rows (Fig. 145) and/or not noticeably longer than dorsal setae or hyaline and then less conspicuous in some species (Fig. 144); disc dorsally



FIGURES 123–128. *Eurydinoteloides* spp. ♀. **123**, *E. americana* (holotype), propodeum, posterior; **124**, *E. bacchadis* propodeum, posterolateral (101: SEM); **125**, *Eurydinoteloides* sp., mesonotal setae (31) (left: photo, right: SEM); **126**, *E. americana* (holotype), fore wing (circles = admarginal setae, rectangles = leading row of dorsal discal setae); **127**, *E. laticeps* (syntype), fore wing; **128**, *E. bacchadis*, fore wing (155). No. in parenthesis = CNC 2011 photo no.

usually uniformly setose beyond speculum (Figs 143, 147), but rarely setae reduced in density and length and then sometimes marginal fringe absent (Fig. 144); speculum usually extending to level about equal with middle of stigmal vein such that admarginal setae completely exposed (Figs 127, 128, 143–146) though some species south of USA with discal setae partly to completely (Fig. 147) overlying admarginal setae behind marginal vein. Metapleuron at least partly smooth and shiny and with anterior margin raised at least slightly above level of posterior margin of mesopleuron, but otherwise variable, sometimes only slightly angulate anteromesally and then margin variably distinctly sculptured (Figs 114–116, 137, 138) or with margin uniformly curved and smooth and then either recurved outward at abrupt angle relative to mesopleuron (Figs 141, 142) or with convex surface extending variably conspicuously over posterior margin of mesopleuron (Figs 48, 139, 140). Metacoxa bare dorsobasally; metatibia with single tibial spur. Propodeum with vertical carina or angulation posterolaterally (*cf.* Fig. 103: arrow 1), the ridge extending through furrow that differentiates metacoxal flange above metacoxa and in dorsal view variably distinctly

angulate so as sometimes to project posteriorly to posterolaterally as short denticle (Fig. 151); with Λ -shaped to transverse-rectangular, coriaceous-reticulate nucha, the furrow delineating nucha without longitudinal carinae except usually for posterior continuation of median carina and sometimes plical carinae; plica at least indicated by outer margin of anterolateral plical depression and often with plical carina within nuchal furrow or variably conspicuous, sinuate convexity or carina posterior of depression (Figs 151–154); paraspiracular region without transverse carina; median region meshlike coriaceous-reticulate, usually convex and often with transverse carina crossing median carina, hence often appearing +like (Figs 151, 152) or more distinctly raised medially so as to be transversely angulate and sometimes with angulation (Figs 123, 124) extending partly or entirely between plica and median carina at about midlength to differentiate variably distinctly concave anterior panel from posterior convex panel, though angulation not distinctly carinate (*cf.* Figs 158, 160).

Gaster of female (Figs 119–122) variably elongate-lanceolate with hypopygium extending at most about two-thirds length of gaster; gaster of male usually with pale or at least lighter brown region basally; petiole very short, transverse, smooth and shiny, and not braced ventrally by extension of first gastral sternite; cercal setae all of similar length.

Distribution. New World.

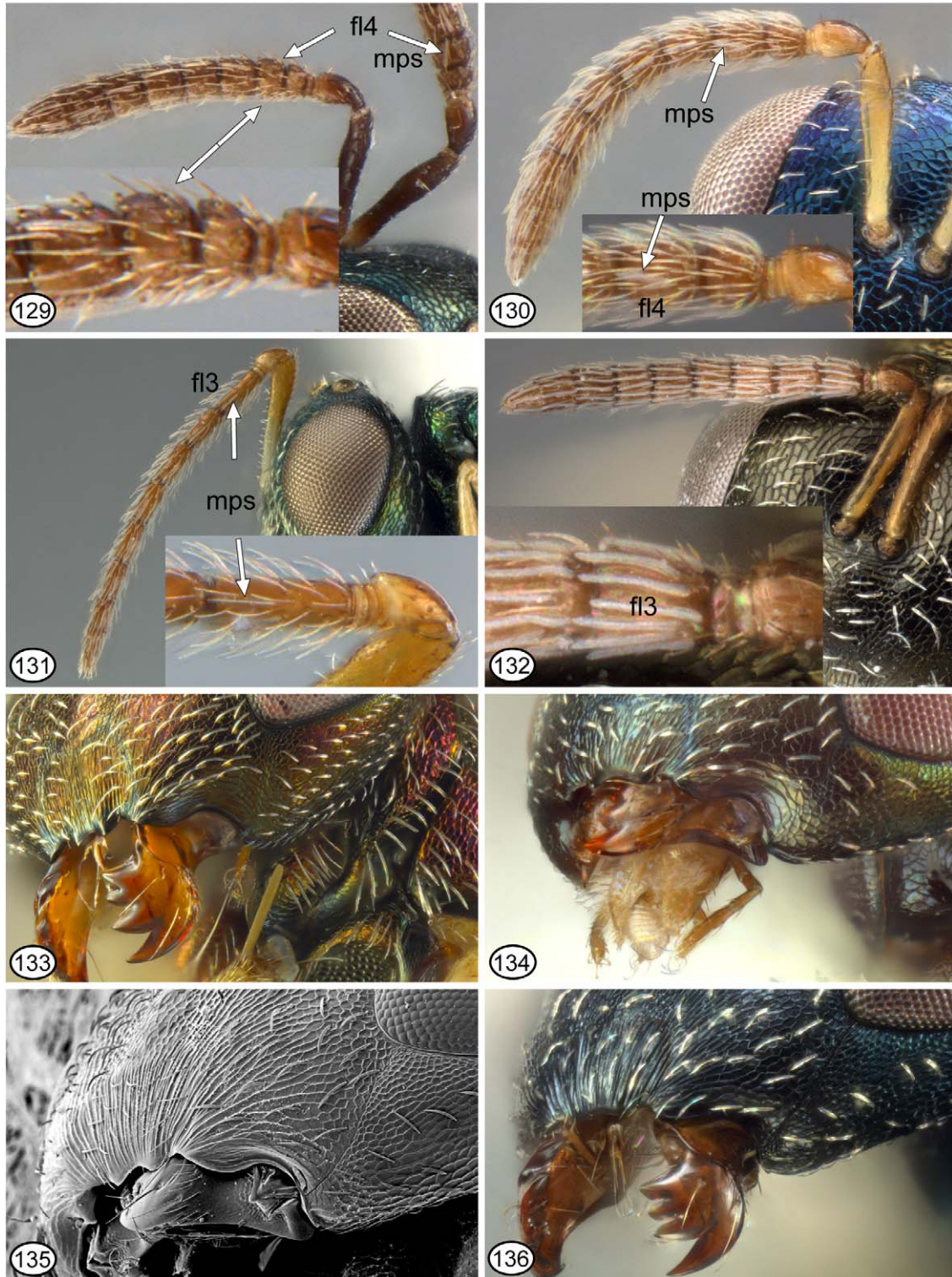
Hosts. See Noyes (2012) for included species listed above.

Generic synonymy. Girault (1913a) stated that the minutien-pinned holotype of *E. americana* lacked the gaster and had the head, hind legs and antennae on a slide. I did not examine the parts on the slide, but did examine the remaining mesosoma of the holotype (Fig. 117). The left hind wing, apex of the left fore wing, and both right wings are missing, as are the legs except for the left front and middle legs. The original description states that it was “olive green, the abdomen and metathorax metallic”, but the thorax and propodeum medially are black and there is only a very slight greenish lustre elsewhere. The colour of the tegula and remaining legs is as described, though the “brown” femora may have faded over time, in particular the mesofemur being only slightly darker, more orange than brown. The metapleuron has only a comparatively small smooth and shiny region anteromesally, being quite distinctly reticulate dorsally, posteriorly and ventrally, with the anterior margin angulate and raised only very slightly above and over the posterior margin of the mesopleuron (Fig. 118). The propodeum has distinct plical carinae extending posteriorly to the nucha and a slightly sinuate, fine but complete, ridge-like costula dividing the plical region into anterior and posterior panels (Fig. 123). Although artefacts obscure setal pattern of the remaining left fore wing, the speculum extends to about the basal third of the stigmal vein (single broken seta within speculum near apex of marginal vein) and the dorsal discal setae are not reduced in length or density. There are 17 admarginal setae (Fig. 126: circles) arranged into 2–3 indistinct rows (most obviously behind about basal half of marginal vein) and the admarginal setae are not conspicuously longer than the discal setae (Fig. 126: rectangles).

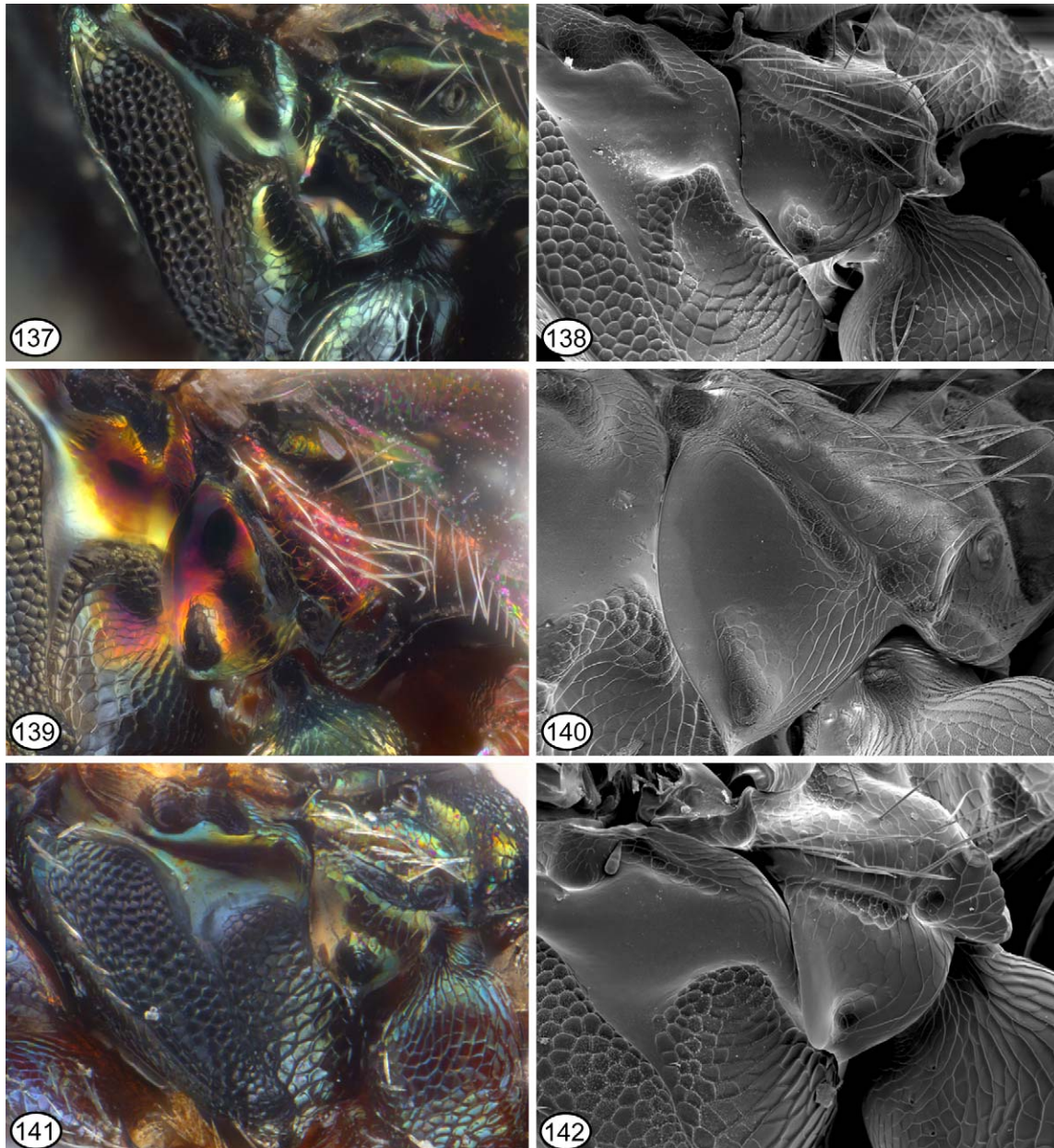
Bouček (1988: 418) did not provide any explanation for his synonymy of *Aeronea* and *Protolaccus* under *Eurydinoteloides* except that his actions were based on study of the type specimen of “*E. americanus* Girault”¹. Bouček (1993: 1250) was more explicit in stating that the synonymy was based on “notes and sketches from the headless holotype”, suggesting that he also did not see the slide with the head. Girault (1913a) did not mention the presence of a distinct malar depression in the original description of *E. americana*. However, Burks (1954) established *Protolaccus* for two species with an arch-like malar depression, *E. bacchadis* (Burks 1954) (Fig. 112) and *E. syrphidis* (Girault 1916). The type species of *Aeronea*, *E. laticeps* (Cameron 1913), also has an arch-like malar depression (Fig. 113). *Eurydinoteloides bacchadis*, *E. syrphidis* and *E. laticeps* are all very similar to each other (*cf.* Figs 111–116, 119, 120, 127, 128), but differ from *E. americana* in several features, including fore wing setal pattern and propodeal structure. Type females of the three putative species have the discal setae reduced in length and density behind the marginal vein and there is only a single row of comparatively long admarginal setae behind the length of the marginal vein (Figs 127, 128). Further, the propodea lack plical carinae posterior to the anterolateral plical depression and the costulae are directed mesally from the posterior margin of each depression toward the median carina so that paraspiracular regions and relatively large posterior plical panels form a continuous U-shaped region (Fig. 124). Based on the above observations, I consider it likely that *E. americana* has an arch-like malar depression similar to *E.*

1. Bouček (1993) emended *americana* to *americanus* because based on Article 30(b) of the 1985 International Code of Zoological Nomenclature “*oides*” is masculine. However article 30(b) was superseded by Article 30.1.4.4. of ICZN (2000), which states that “*oides*” is to be treated as masculine unless the author, when the name was established, “stated that it had another gender or treated it as such by combining it with an adjectival species-group name in another gender form”. Consequently, based on current ICZN rules, *Eurydinoteloides* should be treated as feminine.

bacchadis, *E. laticeps* and *E. syrphidis*, and therefore concur with the generic synonymy proposed by Bouček (1988). Further, although *E. americana* represents a distinct species, *E. bacchadis*, *E. laticeps* and *E. syrphidis* are all very similar except for colour of the femora. The type specimens of *E. bacchadis* have yellow femora (Fig. 120), whereas *E. laticeps* has brown femora (Fig. 119) similar to *E. syrphidis*. It is therefore very possible that at least *E. syrphidis* is a junior synonym of *E. laticeps*, but confident synonymy is not possible until the Neotropical species of *Eurydinoteloides* are revised and leg colour can be assessed as a species character.

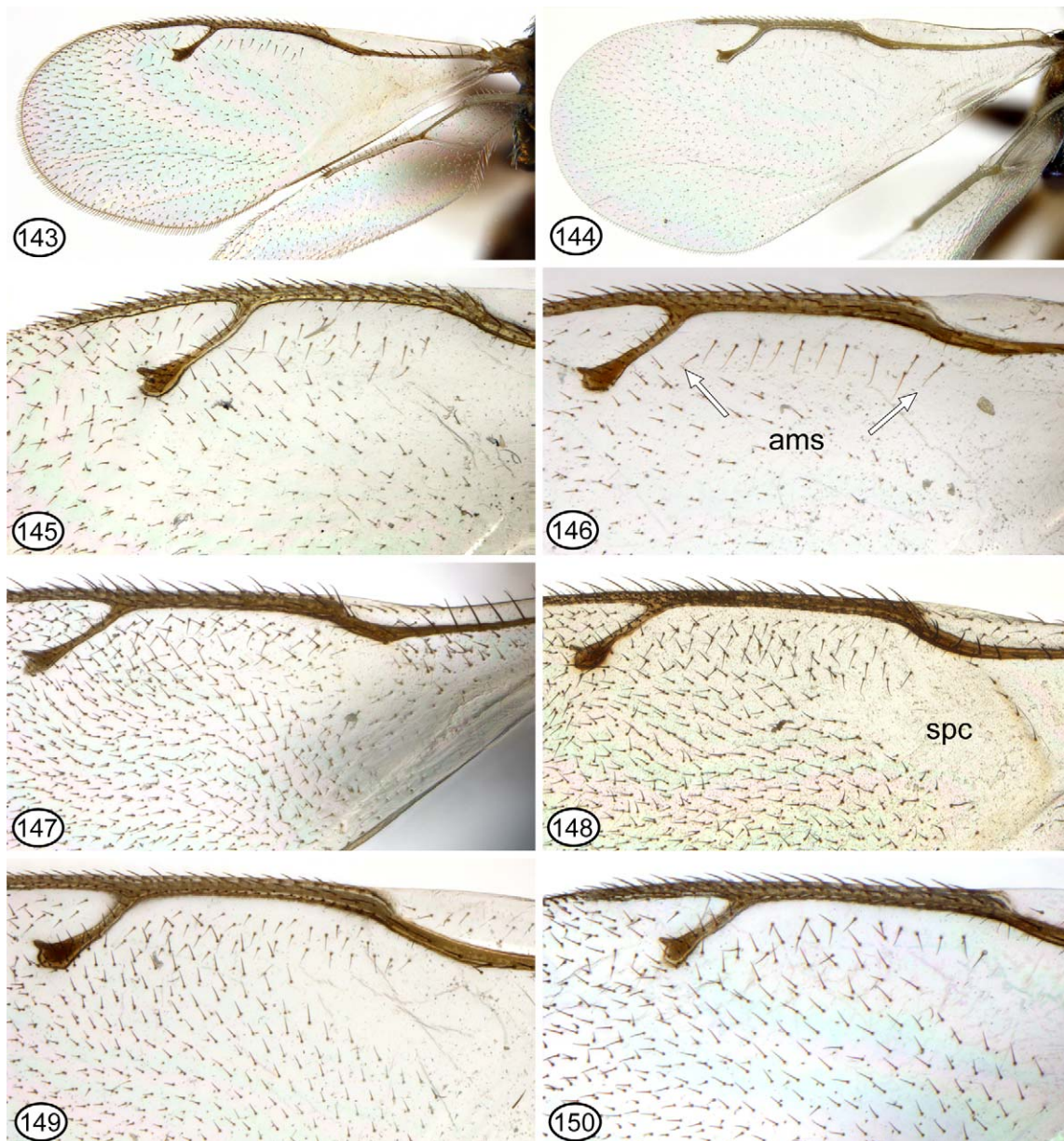


FIGURES 129–136. *Eurydinoteloides* spp. **129–132,** ♂ antenna: **129,** *Eurydinoteloides* sp. (190) [insert: pedicel–fl5]; **130** *Eurydinoteloides* sp. (171) [insert: pedicel–fl4]; **131,** *E. bacchadis* (147) [insert: pedicel–fl3]; **132,** *Eurydinoteloides* sp. (189) [insert: pedicel–fl3]. **133–136,** ♀ lower face, frontolateral: **133,** *Eurydinoteloides* sp. (133); **134,** *Eurydinoteloides* sp. (64); **135,** *Eurydinoteloides* sp. (SEM); **136,** *Eurydinoteloides* sp. (89). No. in parenthesis = CNC 2011 photo no.



FIGURES 137–142. *Eurydinoteloides* spp., ♀ metapleuron. **137 and 138,** *Eurydinoteloides* sp.: **137,** (91); **138,** SEM. **139 and 140,** *Eurydinoteloides* sp.: **139,** (60); **140,** (60: SEM). **141 and 142,** *Eurydinoteloides* spp. No. in parenthesis = CNC 2011 photo no.

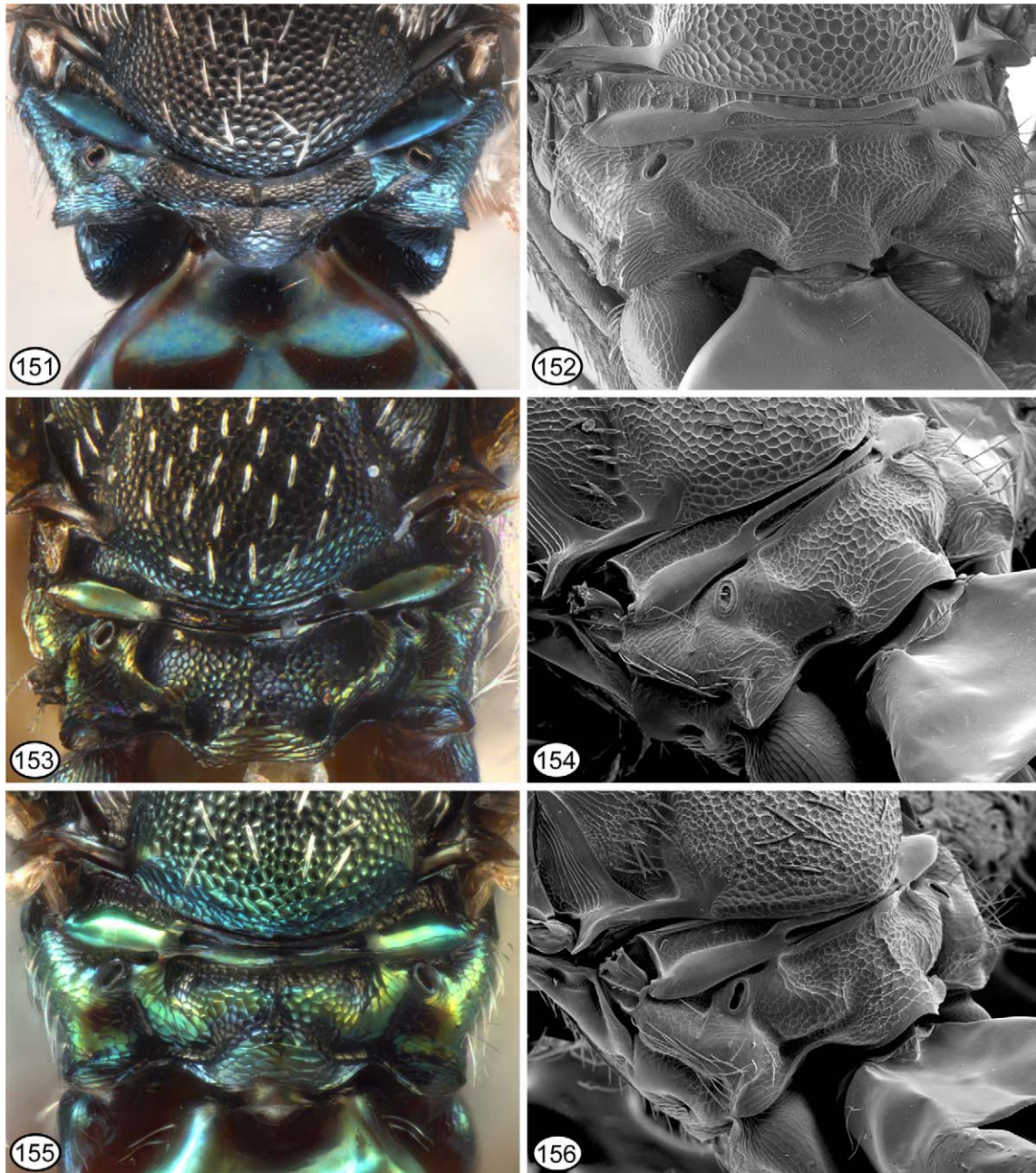
Discussion. Males of *E. americana* are not currently recognized, but those of *E. bacchadis* and *E. syrphidis* are atypical for *Eurydinoteloides* in having a comparatively long scape that extends to or exceeds the level of the vertex (Fig. 131) rather than just to the ventral margin of the anterior ocellus as for most species of the genus. This feature is correlated with six elongate funiculars with sparse mps, including on the third flagellomere (Fig. 131). However, males of an undescribed species from Florida with a distinct malar depression (Fig. 133) have six shorter, more robust funiculars encircled by mps (Fig. 132) as well as a more typical scape that extends only to about the level of the anterior ocellus. Further, males of a few other Neotropical *Eurydinoteloides* species without a malar depression have a scape that extends to the level of the vertex. Consequently, presence or absence of an elongate scape in males does not appear to correlate with presence or absence of a malar depression.



FIGURES 143–150. ♀ fore wing. **143–147**, *Eurydinoteloides* spp.: **143**, (61); **144**, (179); **145**, (48); **146**, (177), **147**, (119). **148**, *Heteroschema* sp. (149). **149**, *Neocatolaccus tylodermae* (178). **150**, *Neocatolaccus* sp. (125). No. in parenthesis = CNC 2011 photo no.

Development of a malar depression is highly variable in *Eurydinoteloides*. Some species have a distinct, arch-like depression that extends about half way (Figs 112, 113, 133) or somewhat less (Fig. 134) to the lower orbit, others have the gena abruptly incurved only above the base of the mandible as a very short, transverse depression along the oral margin (Fig. 135), and still others lack an evident depression (Fig. 136). Development of the metapleuron is similarly variable. As noted above, individuals of *E. americana*, *E. bacchadis*, *E. laticeps* and *E. syrphidis* all have an anteromesally angulate metapleuron with the margin finely sculptured and raised only slightly above the posterior margin of the mesopleuron, and the surface with only a comparatively small smooth and shiny region (Figs 114–116, 118). In such instances, careful observation is necessary to observe the difference in structure from that of *Lycus*, in which the metapleuron is uniformly, though sometimes very faintly sculptured, and the anterior margin abuts the posterior margin of the mesopleuron on the same level (Figs 19, 174). Further, some *Eurydinoteloides* species without a broad malar depression have a similarly angulate metapleuron (Figs 137, 138). Others, with or without a distinct malar depression, have the metapleuron extensively smooth and shiny with the anterior margin evenly curved, unsculptured, and either convex and extending slightly over the posterior margin of

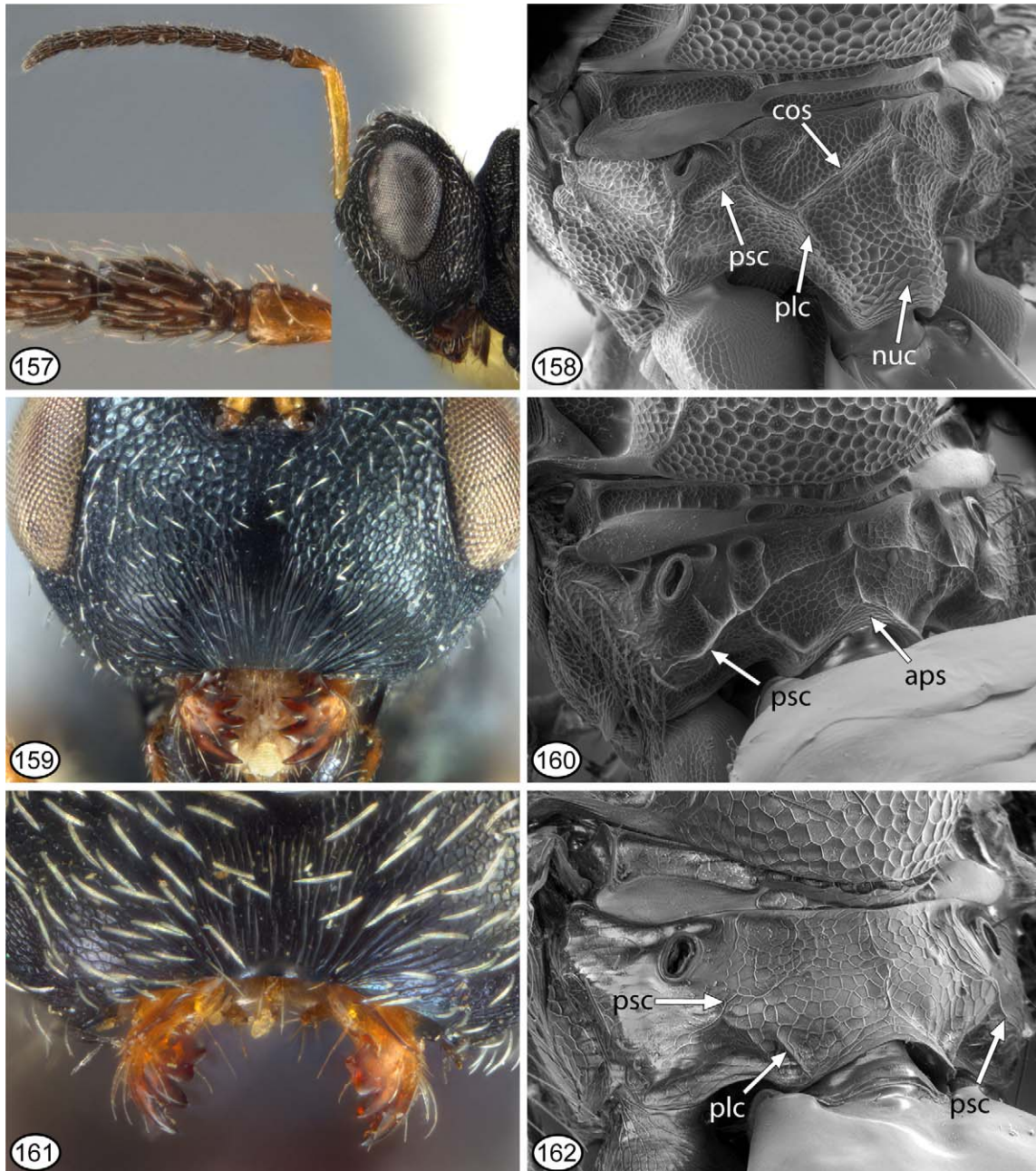
the mesopleuron (Figs 48, 139, 140) or, less commonly, recurved outward at abrupt angle relative to the mesopleuron so that the latter abuts the inner surface (Figs 141, 142). Similar to presence or absence of a malar depression, the different metapleural structures appear to form a continuum and neither character appears to be valid for the recognition of subgenera within *Eurydinoteloides*. Based on a greater similarity to the metapleuron of most pteromalids (Figs 19, 27, 28, 174, 212, 213), the only slightly angulate metapleural structure of such species as *E. americana* likely is the groundplan structure for *Eurydinoteloides*. The groundplan structure of the gena, that is, with or without an arch-like malar depression, is more difficult to propose confidently.



FIGURES 151–156. *Eurydinoteloides* spp., ♀ propodeum. **151 and 152,** *Eurydinoteloides* sp. (31): **151,** posterior; **152,** posterolateral (SEM). **153 and 154,** *Eurydinoteloides* sp.: **153,** posterior; **154,** posterolateral (SEM). **155 and 156,** *Eurydinoteloides* sp.: **155,** posterior (90); **156,** posterolateral (SEM). No. in parenthesis = CNC 2011 photo no.

As noted above, the admarginal setae are completely exposed and similar in length to the dorsal discal setae in *E. americana* (Fig. 126). All North American and most Neotropical species of *Eurydinoteloides* are characterized by one or two rows of clearly exposed but obviously longer admarginal setae (Figs 127, 128, 143, 146). However, a relatively few species from south of the USA do not have the admarginal setae differentiated in length from the

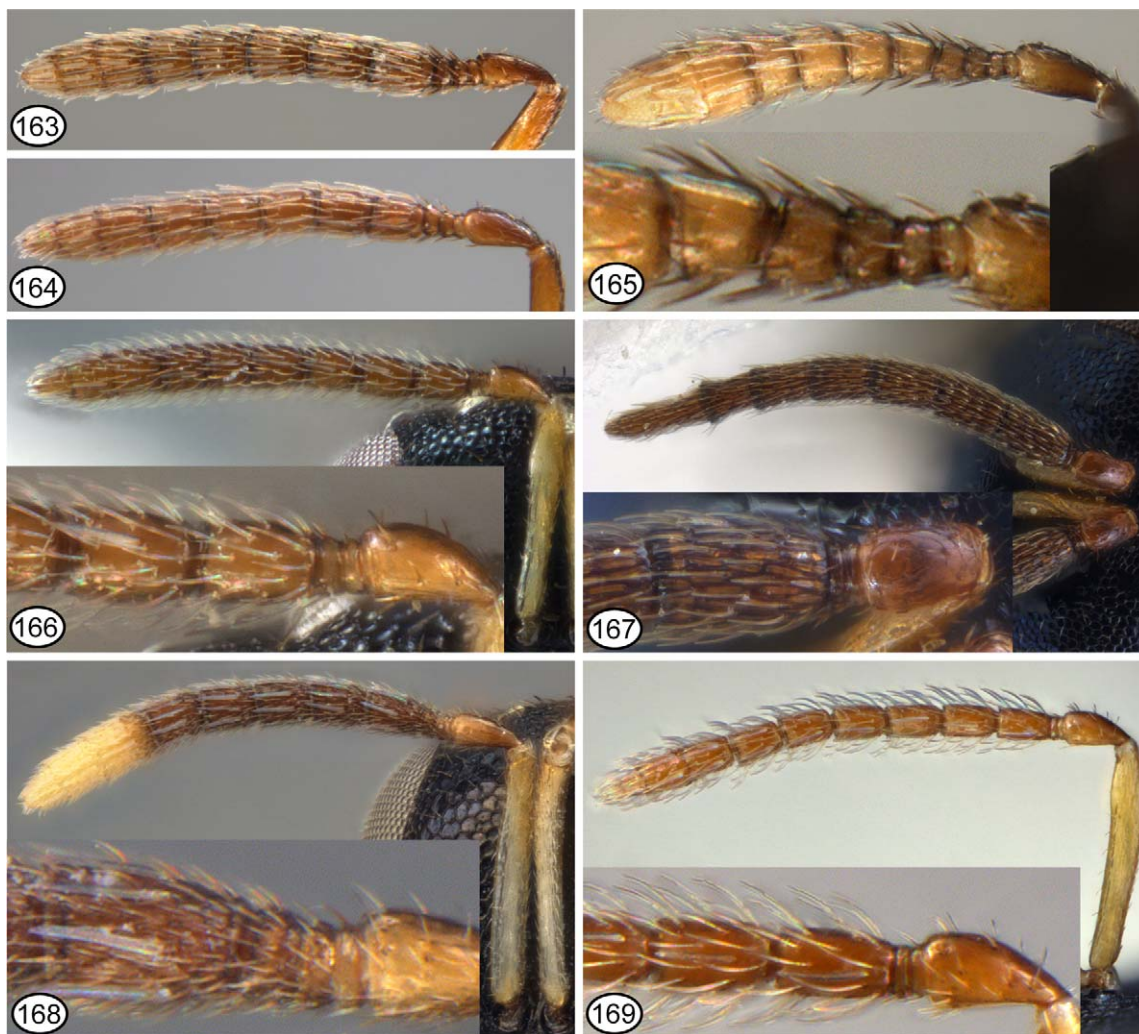
dorsal discal setae and/or have up to three or four partial rows of admarginal setae (Fig. 145) and/or the dorsal discal setae extending variably extensively along the length of the marginal vein, very rarely to its base, so as to partly or completely obscure the admarginal setae (Fig. 147). Such species often also have the fore wing more extensively setose than for typical species, including one or more of the costal cell, basal fold, basal cell, and the triangular region between the stigmal and postmarginal veins having setae (Fig. 147). Although these latter setal patterns are relatively uncommon, they make confident hypothesis of the groundplan fore wing setal pattern difficult.



FIGURES 157–162. 157–159, *Heteroschema* spp.: 157, ♂ head, lateral (139) [insert: pedicel–fl3]; 158, ♀ propodeum, posterolateral (95); 159, ♀ lower face and mandibles, frontal (145). 160 and 161, *Neocatolaccus tylodermae* ♀: 160, propodeum, posterior (114: SEM); 161, clypeus and mandibles (146). 162, *Neocatolaccus* sp. ♀, propodeum, posterolateral (125: SEM). No. in parenthesis = CNC 2011 photo no.

The male flagellar structure of the undescribed species from Florida with two strongly transverse anelli and six similar funiculars encircled by mps (Fig. 132) could represent the groundplan structure for *Eurydinoteloides* (see further under *Lycus*). However, males of most *Eurydinoteloides* species have structures of the third flagellomere

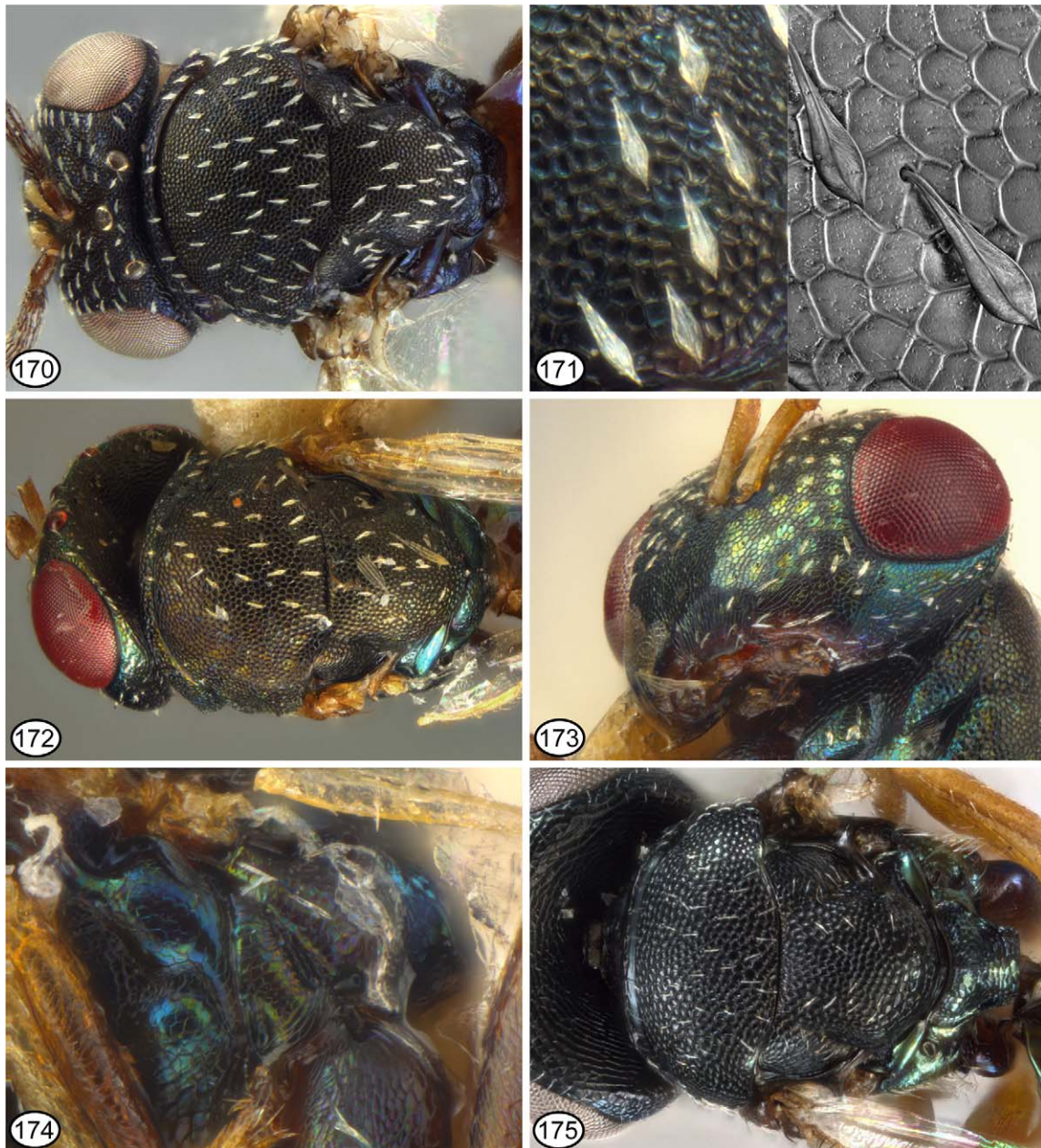
that are intermediate between a typical funicular and an anellus. The mps can be reduced in number (Fig. 131) or completely lacking (Figs 129, 130), though the flagellomere usually is variably longer and more setose than the basal two anelli so as to more closely resemble the subsequent flagellomeres than the basal two anelli. If such males were interpreted as having only two anelli then they would key to *Lyracus* at couplet 263 using Bouček and Heydon (1997). However, rather than keying *Lyracus*, this couplet differentiates mostly *Jaliscoa* species. *Eurydinoteloides* females and those males with the third flagellomere interpreted as an anellus will key either to *Eurydinoteloides* (couplet 286) or *Lyracus* (couplet 287) depending, respectively, on the presence or absence of a distinct malar depression.



FIGURES 163–169. Antenna. **163 and 164**, *Lyracus nigroaeneus*: **163**, ♀ (187); **164**, ♂ (172). **165–167**, *Lyracus* spp.: **165**, *Lyracus* sp. ♀ (186) [insert: fl1–fl5]; **166**, *Lyracus* sp. ♂ (138) [insert: pedicel–fl4]; **167**, *L. nigraeneus* ♂ (137) [insert: pedicel–fl3]. **168 and 169**, *Oaxa albiclava* antenna: **168**, ♀ (118) [insert: fl1–fl4]; **169**, ♂ (140) [insert: pedicel–fl4]. No. in parenthesis = CNC 2011 photo no.

Although the presence of lanceolate, more or less parallel-sided white setae that contrast conspicuously with the cuticle (Fig. 125) certainly is not unique to *Eurydinoteloides* among pteromaline genera, such setae differentiate at least North American females of *Eurydinoteloides* from most *Lyracus* species. Most *Lyracus* lack contrasting setae or, if there are flattened white setae, then they usually are conspicuously widened over about the basal two-thirds and narrowed abruptly to a point in the apical third (Fig. 171) as well as typically originating from small blue to green spots (Figs 170, 173). However, *L. cyaneus* (Figs 14–16) as well as at least two other North America species have slender white setae (Fig. 175) similar to typical *Eurydinoteloides*. Rare *Eurydinoteloides* also have more conspicuously lanceolate setae, indicating this feature is homoplastic. Under high magnification, both types of flattened setae have a median rib-like thickening whether they are parallel-sided (Fig. 125) or more

broadly lanceolate (Fig. 171), but studies of flattened setae in other genera have not been conducted to determine whether this similarity has any phylogenetic significance or is simply a functional feature. I also observed two females of *Eurydinoteloides* from Guatemala (CNC) with dark hairlike setae, and females and males from Costa Rica, Ecuador and Trinidad (CNC) that have white, slightly lanceolate setae on the head and mesoscutum, but brown setae on the scutellum similar to some species classified in *Lariophagus*. Males of *Eurydinoteloides* also sometimes lack conspicuous setae, having only very slender, more hairlike and comparatively inconspicuous white setae on the face and often laterally on the pronotum. Such males are easily mistaken for *Lycrus* males if metapleural structure is not visible.



FIGURES 170–175. **170 and 171,** *Lycrus nigroaeneus* ♀: **170**, head and mesosoma, dorsal (130); **171**, mesonotal setae (left: photo (130), right: SEM (94)). **172–174,** *Lycrus albopilosella* (♀ lectotype): **172**, head and mesosoma, dorsal; **173**, head, frontolateral; **174**, metapleuron. **175,** *Lycrus* sp., ♀ mesosoma, dorsal (168). No. in parenthesis = CNC 2011 photo no.

The propodeum of *Eurydinoteloides* sometimes has a variably distinctly differentiated transverse angulation or ridge across the plical region (Figs 123, 124, 151, 152) that is very similar to some species of *Jaliscoa* (Figs 71, 84, 96). Although then evident as a costula, the transverse ridge is usually less distinct than the more carinate costula that characterizes some other genera with conspicuous white setae as well as three anelli in females, such as

Heteroschema (Fig. 158: cos) and *Neocatolaccus* (Fig. 160). In addition to having a plesiomorphic metapleural structure, both sexes of these latter two genera are characterized by two metatibial spurs and/or a comparatively long scape that extends to or beyond the level of the vertex (Fig. 157), though the scape is not always long and two metatibial spurs are not always evident. The inner metatibial spur is often very short and inconspicuous, and apparently even missing from some *Heteroschema*. At least described North American species of *Heteroschema* have the left mandible tridentate (Fig. 159), whereas *Neocatolaccus* have both mandibles more or less quadridentate (sometimes dorsal two teeth appearing more like a truncation, Fig. 161) similar to *Eurydinoteloides* (Fig. 111), *Lyrcus* and *Jaliscoa* (Fig. 87). Whether or not the different mandibular structures of *Neocatolaccus* and *Heteroschema* is a valid generic difference is questionable because I am uncertain of the limits of the two genera. *Heteroschema* differs from *Neocatolaccus* primarily by the presence of a distinct nucha (cf. figs 158, 160), but species with intermediate structures exist that might be assigned to either genus (see further under *Lyrcus*).

Lyrcus Walker

Lyrcus Walker, 1842: 114–115. Type-species: *Lyrcus origo* Walker, by monotypy (♀ lectotype, BMNH, examined). Gender: masculine.

Zatropis Crawford, 1908: 159. Type-species: *Zatropis catalpae* Crawford, by original designation (♀ holotype, USNM, examined). Synonymy by Bouček (1993: 1250).

Oluspa Cameron, 1913: 129. Type-species: *Oluspa albopilosella* Cameron, by monotypy. (♀ lectotype, BMNH, examined). Synonymy by Bouček (1993: 1250).

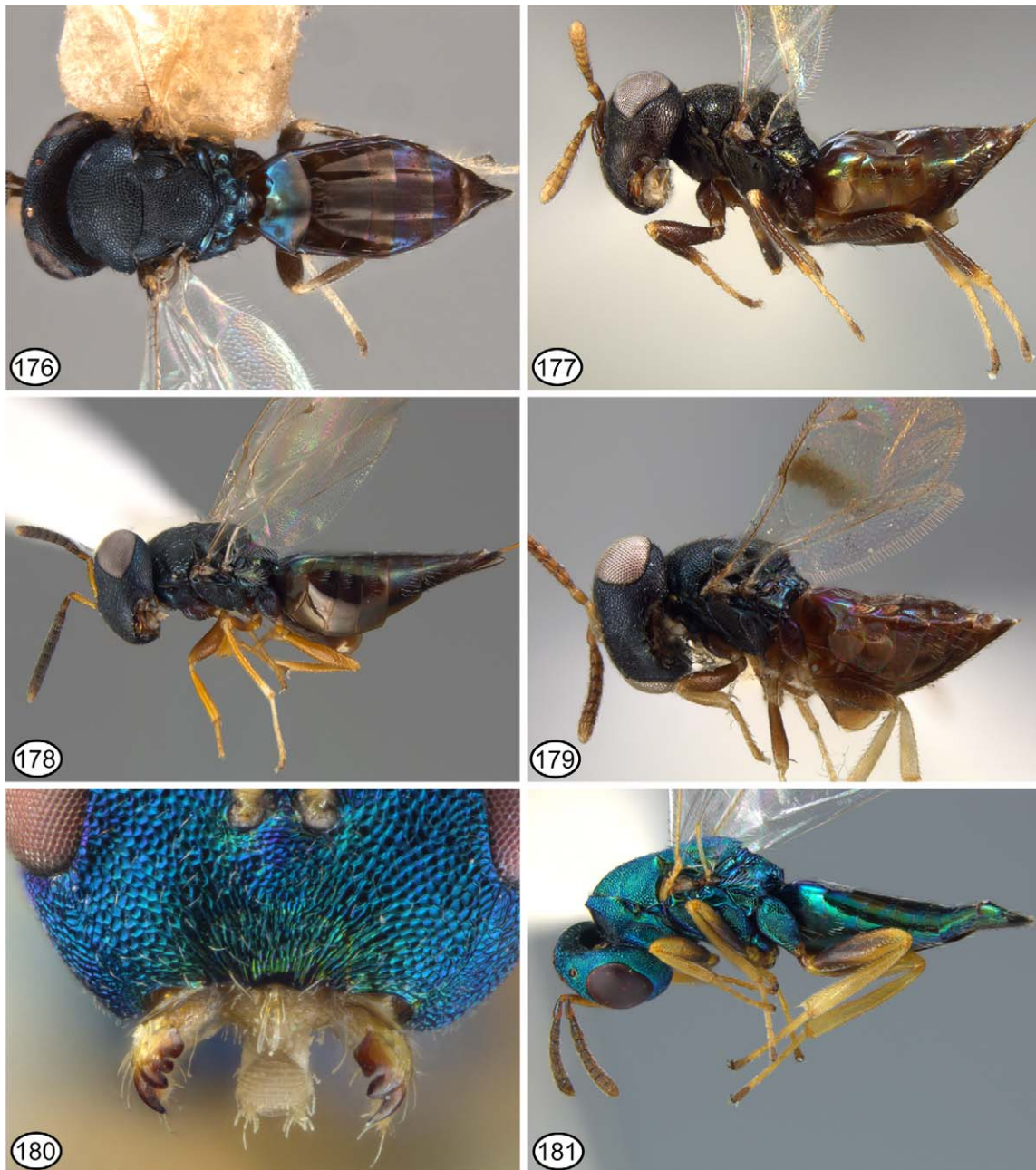
Neocylus Bouček, 1988: 235, 420. Type-species: *Polycysteloides nigraeneus* Girault (1913b), by original designation (♀ holotype, QMBA, examined). **N. syn.**

Included species. *L. albiclavus* (Girault 1917c) **n. comb.**, *L. albopilosella* (Cameron 1913), *L. capitis* (Burks 1955) **n. comb.**, *L. catalpae* (Crawford 1908), *L. chalcis* (Burks 1955) **n. comb.**, *L. coelioidis* (Ashmead 1896) **n. comb.**, *L. cyaneus* (Girault 1911) **n. comb.**, *L. deuterus* (Crawford 1911) **n. comb.**, *L. golbachi* (De Santis in De Santis & Armesto 1983), *Lyrcus helice* (Walker 1843) **n. comb.**, *L. justicia* (Girault 1917), *L. nigraeneus* (Girault 1915) **n. comb.**, *L. nigroaeneus* (Ashmead 1894a) **n. comb.**, *L. origo* Walker 1842, *L. rosaecolis* (Burks 1955) **n. comb.**

Diagnosis. Metapleuron completely though often finely sculptured and with anterior margin abutting posterior margin of mesopleuron on same level (Figs 19, 174). Flagellum of female with at least 3 basal ringlike articles lacking mps and at least 4 (usually 5) funicular articles with mps (Fig. 163); male of New World species with third flagellomere lacking mps and usually noticeably shorter than fourth flagellomere, but variable in length and setation (Figs 164, 166). Fore wing usually with 1 (Figs 182, 183) or sometimes 2 (Fig. 185) or extremely rarely 3 (Fig. 184) partial rows of admarginal setae that usually are quite obviously longer than dorsal setae and most often at least partly exposed because of extensive speculum, though extent of speculum variable (Figs 182–187). Head (Figs 14, 35, 173) only extremely rarely with distinct malar depression, though sometimes narrowly depressed along base of mandible. Head and mesosoma brown to black or with variably distinct metallic lustre, sometimes as numerous small green to blue spots from which setae originate (Figs 171, 173), and with setae short, brown and hairlike (Figs 176–179) to white and variably long and broadly lanceolate so as to then contrast conspicuously with cuticle (Figs 16, 170–173, 175). Propodeum with plical carina at least posteriorly within nuchal furrow (Figs 20, 36, 190–197) and often with transverse carina on paraspircular region or within paraspircular furrow (Figs 190–194, 196: psc), but only rarely with complete costula (Figs 190, 191). Both mandibles with four similar teeth.

Description. Head and mesosoma uniformly brown to black or dark with variably distinct metallic blue or green lustre (Figs 15, 33, 34, 176–179) or with metallic green to blue spots from which broadly lanceolate setae arise (Figs 171, 173); head and mesosoma with setae most commonly comparatively inconspicuous, short, brown and hairlike (Figs 33, 34, 176–179), but sometimes white and then usually elongate-slender (Figs 16, 175) to broadly lanceolate (Figs 170–173) and contrasting conspicuously with cuticle. Eye bare or at least superficially bare with at most exceedingly short, sparse, inconspicuous setae. Mandibles quadridentate, with four similarly acute teeth or with three ventral teeth and rounded dorsal lobe or narrow truncation, but dorsal dent separated from third tooth by narrow, acutely angled incision. Head in frontal view transverse-oval to subcircular; antenna inserted

obviously above lower margin of eyes near middle of face; tentorial pits not evident; clypeus with ventral margin usually transverse to slightly incurved, but very rarely bidentate, and variably conspicuously vertically striate; face usually shallowly meshlike reticulate, without tiny bump or smoother and shinier spot at ocular margin at midheight of eye. Head in dorsal view abruptly declined immediately behind posterior ocelli, hence strongly transverse with vaulted vertex. Head in lateral view with (Figs 14, 35, 173) or without distinct malar sulcus/line, but only extremely rarely with distinct malar depression; malar space about 0.15–0.6× height of eye. Antenna with scape usually extending dorsally only to about level of anterior ocellus, but rarely to about level of vertex; flagellum of female (Fig. 163) and usually male (Fig. 164) with 3 or very rarely 4 (Fig. 165) transverse basal flagellomeres lacking mps, but third anellus of male sometimes similar in appearance to subsequent flagellomeres except for lack of mps (Fig. 166) and one Australasian species with mps on third flagellomere (Fig. 167); clava with apical clavomere uniformly conical without micropilose sensory region.



FIGURES 176–181. 176–179, *Lyrcus* spp. ♀: 176, dorsal (18); 177, lateral (186); 178, lateral (167); 179, lateral (166). 180, *Mesopolobus verditer* ♀, lower face and mandibles (141). 181, *Mesopolobus* sp., ♀ habitus, lateral (142). No. in parenthesis = CNC 2011 photo no.

Pronotum with collar usually smoothly to abruptly margined relative to steeply angled collum, but sometimes separated by smooth, shiny carina. Mesonotum meshlike reticulate to coriaceous-reticulate in small specimens; mesoscutum with incomplete notauli; scutellum without frenum, in lateral view almost flat and in same plane as dorsal margin of metanotum or variably distinctly convex with apex curved to vertical posterior margin above metanotum, but not reflexed into distinct marginal rim. Fore wing usually hyaline (Figs 17, 182) but one known species with brownish region behind parastigma and base of marginal vein (Fig. 179); marginal vein not thickened and about 1.2–2.3× length of stigmal vein and about 0.9–1.5× length of postmarginal vein; stigma small, not distinctly capitate; costal cell comparatively narrow, without setae dorsally but variably setose ventrally, most often with row of setae only within about apical third but sometimes with setae apically and basally or with row along entire length; basal cell, basal fold and mediocubital fold often bare but sometimes with up to 2 lines of setae along basal fold; disc ventrally usually with 1 transverse or 2 partial or irregular rows of comparatively long admarginal setae relative to length of dorsal setae (Figs 182, 183), though extremely rarely in up to 3 partial rows (Fig. 184) and sometimes not distinctly differentiated in length from dorsal setae; disc dorsally uniformly setose beyond speculum; speculum extending at least to base of marginal vein (Figs 18, 186, 187) and usually partly (Figs 184, 185) or completely (Figs 182, 183) to stigmal vein. Metapleuron completely though often finely sculptured, and with anterior margin on same level as and abutting mesopleuron (Figs 19, 174). Metacoxa bare dorsobasally; metatibia with single tibial spur. Propodeum usually with vertical carina or stronger flange posterolaterally on callus (*cf.* Fig. 103: arrow 2), though in dorsal view only very rarely projecting laterally as tiny denticle (Fig. 197: arrow); usually with transverse-rectangular or more or less Λ -shaped coriaceous-reticulate nucha (Figs 190–194), though propodeum sometimes variably strongly transverse (Figs 194–196) and then sometimes comparatively smooth and shiny (Fig. 196) with posteromedian region delineated anteriorly by anteromesally convergent ridges or carinae so as to more or less resemble an adpetiolar strip (Figs 195, 196), the convergent carinae rarely extending almost to anterior margin or, more commonly, forming inverted Y-shaped carinal complex in combination with median carina (Fig. 196); plica at least indicated by outer margin of anterolateral plical depression and carina within nuchal furrow, and if complete then usually quite distinctly sinuate at about midlength (Figs 190–193, 197); plical region usually reticulate to coriaceous-reticulate, with or without median carina, and sometimes with transverse carina crossing median carina (then appearing +-like) or raised medially so as to be transversely angulate, but only rarely with complete costula between plica and median carina (Figs 190, 191); paraspicular region sometimes with transverse carina in paraspicular furrow (Figs 193, 194, 196: psc) or extending mesally to plica (Figs 190–192: psc).

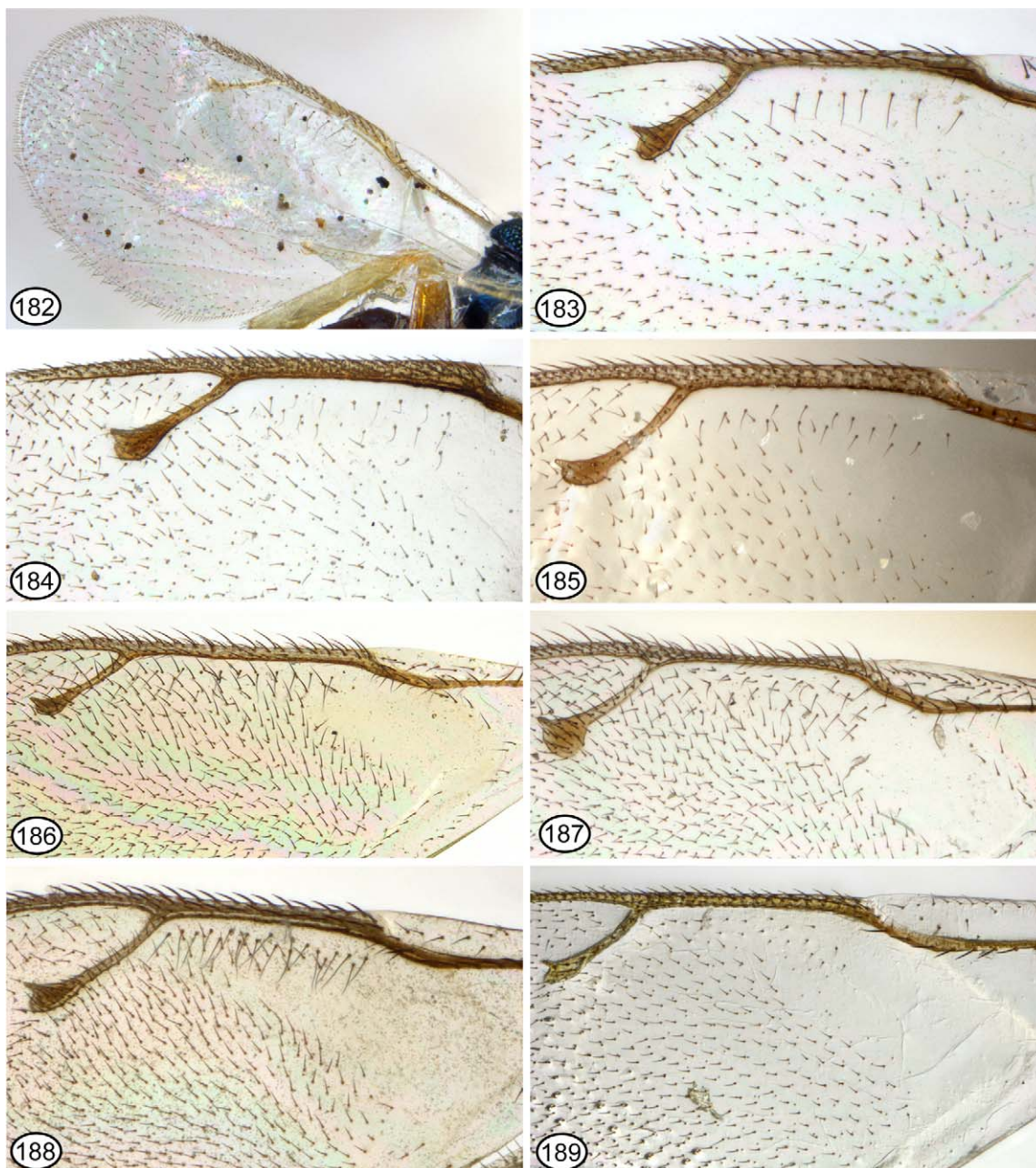
Gaster of female lanceolate (Figs 176–179), variable in length relative to combined length of head and mesosoma with hypopygium extending at most about two-thirds length of gaster; gaster of male (at least Nearctic species) usually without evident paler region basally; petiole very short, transverse, smooth and shiny, and not braced ventrally by extension of first gastral sternite; cercal setae all of similar length.

Distribution. New World and Australasian region (Australia, Papua New Guinea).

Hosts. See Noyes (2012) for included species listed above.

Discussion. Bouček (1988) described his new genus *Neocylus* based on *Polycysteloides nigraeneus* Girault (1913b) from Australia. In his key to the genera of Pteromalidae he keyed it and compared it to *Neocatolaccus* (couplet 224) because of the presence of a costula (couplet 221). He also stated that there were two species of *Neocylus*. I examined the type specimens of *N. nigraeneus* and its junior synonym *N. reticulata* (Dodd in Girault 1915) (QMBA), plus four females from Australia (two each in BMNH and QMBA) and four females and two males from Papua New Guinea (BMNH) identified as *Neocylus* by Bouček. Based on a manuscript name on one of the females, he considered the New Guinea specimens as the second species. This was likely because of a tibial colour difference, but based on additional specimens I believe the New Guinea and Australian specimens comprise a single species. All the specimens have a carinate costula (Fig. 190: cos) that is continuous with a transverse carina on the paraspicular region (Fig. 190: psc). The paraspicular carina extends over the callus about midway between the spiracle and posterior margin of the propodeum to more or less connect with the posterolateral, vertical carina on the callus (*cf.* Fig. 103: arrow 1). The propodeum also has a distinct nucha delimited laterally by parallel posterior portions of complete, strongly sinuate plical carinae. Posterior to the costula the median carina variably distinctly bifurcates so that anteriorly the nucha is delimited by an inverted Y-shaped carinal complex (Fig. 190), which is somewhat intermediate in structure between a typical nucha and a typical adpetiolar strip. Females are similar to New World *Lyriscus* in all other features, including having three anelli, quadridentate mandibles, an

unmodified metapleuron, and the speculum extending along the marginal vein so that one to two rows of admarginal setae are clearly exposed behind at least the basal half of the marginal vein (Fig. 185). The admarginal setae usually are obviously longer than the discal setae, though they are only about as long as the discal setae in small specimens.



FIGURES 182–189. 182–187, *Lyrcus* spp., ♀ fore wing: 182, *L. albopilosella* (lectotype); 183, *Lyrcus* sp. (128); 184, *L. rosaeocollis* (129); 185, *L. nigraeneus* (127), 186, *Lyrcus* sp. (123); 187, *Lyrcus* sp. (124). 188, *Oaxa albioclava*, ♀ fore wing (118). 189, *Mesopolobus finlaysoni*, ♀ fore wing (201). No. in parenthesis = CNC 2011 photo no.

The two *Neocylus* males have a similar propodeal sculpture pattern and fore wing setal pattern as for females, except a few setae on the basal fold differentiate the apex of the basal cell from the speculum. More conspicuously different, males have only two ringlike anelli and six elongate funiculars that are similar in length, setation, and presence of mps (Fig. 167). All known New World males of *Lyrcus* lack mps from the third flagellomere, which usually (Fig. 164) resembles that of females (Fig. 163), though sometimes it more closely resembles the subsequent flagellomeres except for the absence of mps (Fig. 166). Males of one such species from Ecuador (CNC) are associated with females that have quite a similar propodeal sculpture pattern to *N. nigraeneus* (cf. Figs 190, 191).

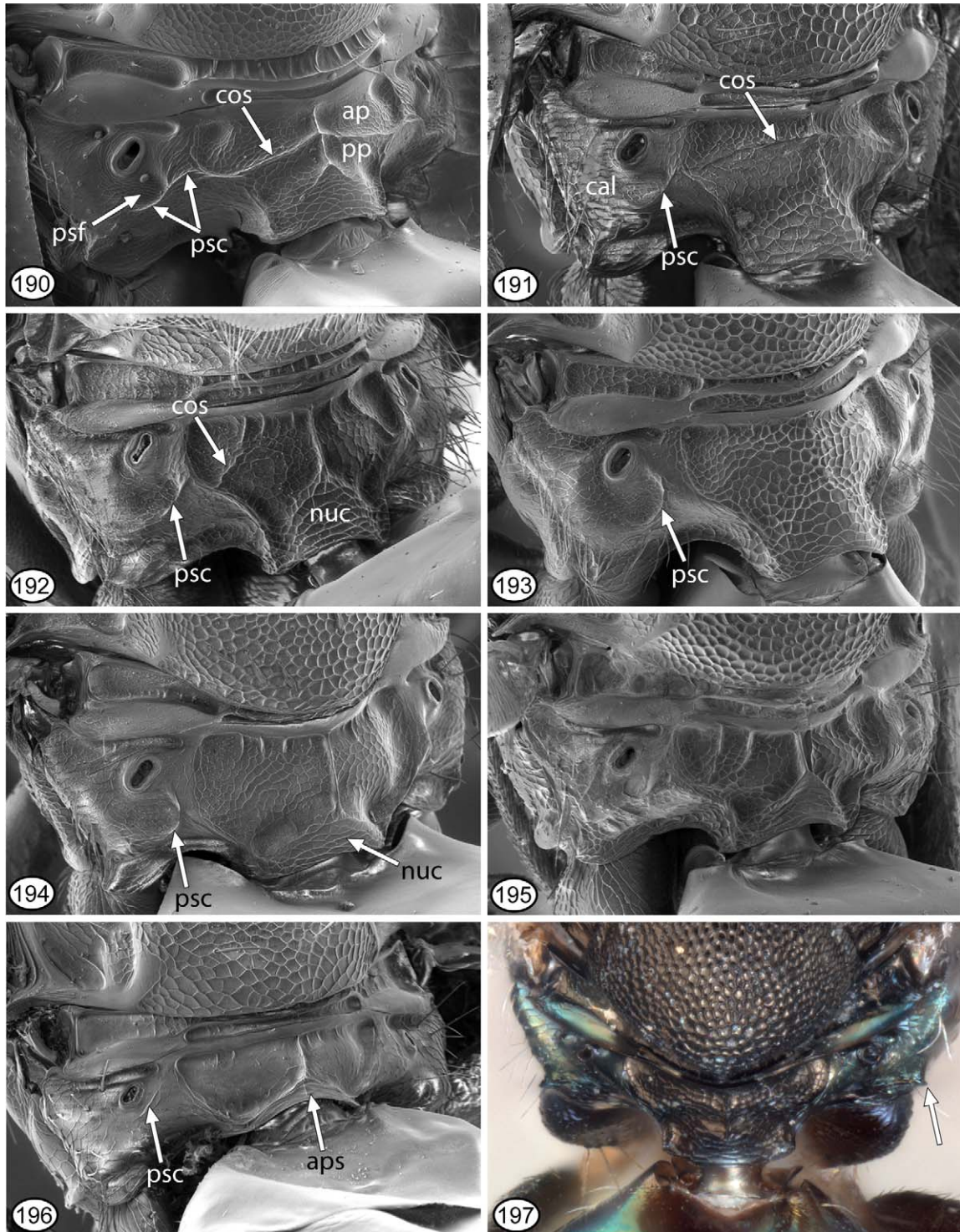
Though somewhat variable (apparently correlated with body size), at least larger females have a distinct, carinate costula (Fig. 191: cos) that extends more or less completely to the plical carina as well as a transverse carina on the paraspiracular region (Fig. 191: psc) that is continuous with the plical carina. Both sexes of this species also have the speculum extending only to the base of the marginal vein such that the dorsal discal setae overlies a mostly single row of admarginal setae that are obviously longer than the discal setae (Fig. 186). Other New World *Lyracus* I have seen lack a complete, carinate costula, though some species have an incomplete costula (Fig. 192: cos) or transverse ridge across the plical region and/or a paraspiracular carina (Figs 193, 194, 196: psc) within the paraspiracular furrow or even across the paraspiracular region from the plical carina (Fig. 192: psc). I interpret the propodeal sculpture patterns illustrated by figures 190–193 to constitute a structural transformation series, though with uncertain polarity. A complete, carinate costula that is continuous with a paraspiracular carina (Figs 190, 191: cos) could be apomorphic and indicate a sister-group relationship between *N. nigraeneus* and the species from Ecuador. Equally possible is that it is a symplesiomorphic pattern from which other New World *Lyracus* propodeal sculptural patterns were derived through reduction and secondary loss of the costula and, sometimes, the paraspiracular carina (Figs 190–194, 196: psc). The other principal genera treated in this work (*Catolaccus*, *Jaliscoa*, *Eurydinoteloides* and *Trimeromicrus*) lack a paraspiracular carina. However, almost all *Neocatolaccus* (Fig. 160) and at least some *Heteroschema* (Fig. 158) possess both a complete costula and a paraspiracular carina. If a paraspiracular carina is part of the groundplan propodeal sculpture pattern for *Lyracus*, then it suggests a possible common ancestor for *Lyracus* and one or both of these latter two genera. Both *Neocatolaccus* and *Heteroschema* are further characterized by the presence of three anelli in females and two anelli in males similar to *N. nigraeneus* and, as discussed above, both mandibles of *Neocatolaccus* are more or less quadridentate (Fig. 161). I have also seen a single female (CNC) of an undescribed species of *Neocatolaccus* from Alabama (USA) that could easily be mistaken for a species of *Lyracus* except for the presence of slender white setae (but also possessed by rare *Lyracus*) and the presence of two metatibial spurs. This female is comparatively small for a *Neocatolaccus*, only about 2 mm in length, and perhaps because of its small body size lacks a complete costula (Fig. 162). There is an angulation across the plical region so that indistinct anterior and posterior panels are differentiated, but the angulation is carinate only laterally near each plica and is continuous with a somewhat stronger carina on the paraspiracular region (Fig. 162: psc). Unlike the fore wing of other known *Neocatolaccus* (Fig. 149), there is only a single row of admarginal setae (Fig. 150), though like other species these are covered by dorsal discal setae over about the apical half of the marginal vein and they are only as long as the discal setae (Figs 149, 150). Species of *Lyracus* with either slender or broadly lanceolate white setae display the typical fore wing setal pattern for *Lyracus*, that is, only a single row of conspicuously long and completely exposed admarginal setae (Figs 182, 183).

The features discussed above may or may not reflect a relationship among *Heteroschema*, *Neocatolaccus*, *Neocylus nigraeneus* and New World *Lyracus*. However, the only feature differentiating *Neocylus* and New World *Lyracus* is the presence of two anelli in males of *N. nigraeneus* and three anelli in males of *Lyracus*. Males of *Eurydinoteloides* are highly variable in structure of the third flagellomere, some species lacking mps from two and others from the basal three flagellomeres, and structure of the third flagellomere varies from more or less anelliform to elongate and similarly setose as more distal flagellomeres (Figs 129–132). Structure of the third flagellomere also varies in New World *Lyracus* (Figs 164, 166), though mps are always lacking. I do not consider presence or absence of mps on the third flagellomere in males sufficient for maintaining *Neocylus* and *Lyracus* as separate genera. I therefore synonymize *Neocylus* under *Lyracus* and consider two anelli in males as the likely groundplan structure for *Lyracus*. Propodeal sculpture pattern and the different number of anelli between the sexes may indicate *L. nigraeneus* as the basal lineage of *Lyracus*, and represent symplesiomorphies that are shared with some other genera such as *Neocatolaccus* and *Heteroschema*. If so, *Lyracus* did not originate in the New World as thought previously.

Oaxa Bouček also shares some important differential features with *Lyracus*, including quadridentate mandibles and three anelli in females (Fig. 168). The fore wing setal pattern is also similar to some *Lyracus* (e.g. Fig. 186), having one to two closely set rows of admarginal setae that, although largely overlain by a band of discal setae along the marginal vein, are conspicuously longer than the discal setae (Fig. 188). When Bouček (1993) described *O. albiclava*, supposedly from a single female from Mexico, he stated that the species “may be regarded as similar to certain small *Lyracus*”. This comment probably was based at least in part on the similar fore wing setal patterns. Bouček (1993) differentiated *Oaxa* based on large eyes (malar space 0.26× eye height), rather deep scrobes, and a deeply emarginate clypeus (Bouček 1993, fig. 64), cercus with one curved seta more than twice as long as any

other seta (Bouček 1993, fig. 65), strongly modified pronotum (essentially a vertical collum without horizontal collar, but subdorsally with a fine transverse carina and line of setae differentiating an almost vertical, strongly transverse, shiny collar), and propodeum (Fig. 203) without any trace of a transverse swelling or costula (also with nucha abruptly, Λ -like margined anteriorly so as to somewhat resemble an adpetiolar strip, and paraspiracular region without a paraspiracular carina). Bouček and Heydon (1997) used a combination of these features to key *Oaxa* in couplet 298 prior to keying *Lyracus* in couplet 303. As its name implies, females of *O. albiclava* also have a white clava (Fig. 168). In addition to the holotype (stated as deposited in TAMU, but now in USNM), I saw another female (TAMU) collected by the same individuals one day earlier in the same state (Oaxaca) but from a different locality than the holotype. This female is labelled as a “paratype” of *O. albiclava*, apparently by Bouček in 1993, though the original description provides no indication that the type series consisted of more than the holotype. The CNC also has one female, but collected in Chiapas, and TAMU has a long series of the undescribed males of *O. albiclava* collected from both Oaxaca localities on the same days as the females. Males have quite a different flagellar structure than females (*cf.* Figs 168, 169), the flagellum being filiform with two ringlike anelli and six similarly long and setose funiculars, the third flagellomere (first funicular) usually having a single mps on either side (Fig. 169). I also saw a single female and eight males from French Guiana (CNC) that are very similar to *O. albiclava* except the female has superficial coriaceous rather than raised-reticulate mesonotal sculpture, and only about the apical half of the admarginal setae are covered by the dorsal discal setae. Another female from Brazil (CNC) resembles *Oaxa* in having a white clava, large eyes (malar space about 0.28 \times eye height), and a similar propodeal structure though the Λ -like posteromedian region is not as abruptly delimited and is slightly more convex. However, the flagellum has only two anelli and six funicular segments, the cercus lacks a conspicuously long seta, the clypeus is only very shallowly emarginate, the fore wing has a single row of conspicuously long and mostly exposed admarginal setae, and the pronotum has a more distinct, horizontal, sculptured collar. Mandibular dentition is not visible. Another female from Ecuador (CNC) with a white clava and even larger eyes (malar space only about 0.17 \times eye height), has three anelli and a single row of conspicuously long admarginal setae that are completely covered by the dorsal discal setae, but differs from *O. albiclava* by a having a shallowly incurved clypeus, a distinct, horizontal, sculptured pronotal collar, cercal setae that do not appear to be conspicuously differentiated in length, and a distinct transverse carina within the paraspiracular region. Again, mandibular dentition is not visible. I am uncertain of the generic identity of the Brazilian female because of its flagellar structure, but the female from Ecuador likely belongs to *Lyracus* based on its fore wing setal pattern and the presence of three anelli and a paraspiracular carina. Some species of *Lyracus* have a lighter coloured clava and I have seen females of an undescribed species from Florida (CNC) with a deeply incised clypeus similar to *O. albiclava* and with comparatively large eyes, the malar space being only about one-third the height of an eye. It is quite possible that *O. albiclava* is nothing more than an unusually modified *Lyracus*, but if so it is characterized by at least one postulated symplesiomorphy (third flagellomere of male with mps) and one apomorphy (one cercal seta much longer than others). I therefore prefer to retain *Oaxa* as separate from *Lyracus*. Further study of Neotropical pteromalines is necessary to assess more confidently the morphological limits of *Oaxa* relative to *Lyracus* and determine the correct generic placement for the species from Brazil.

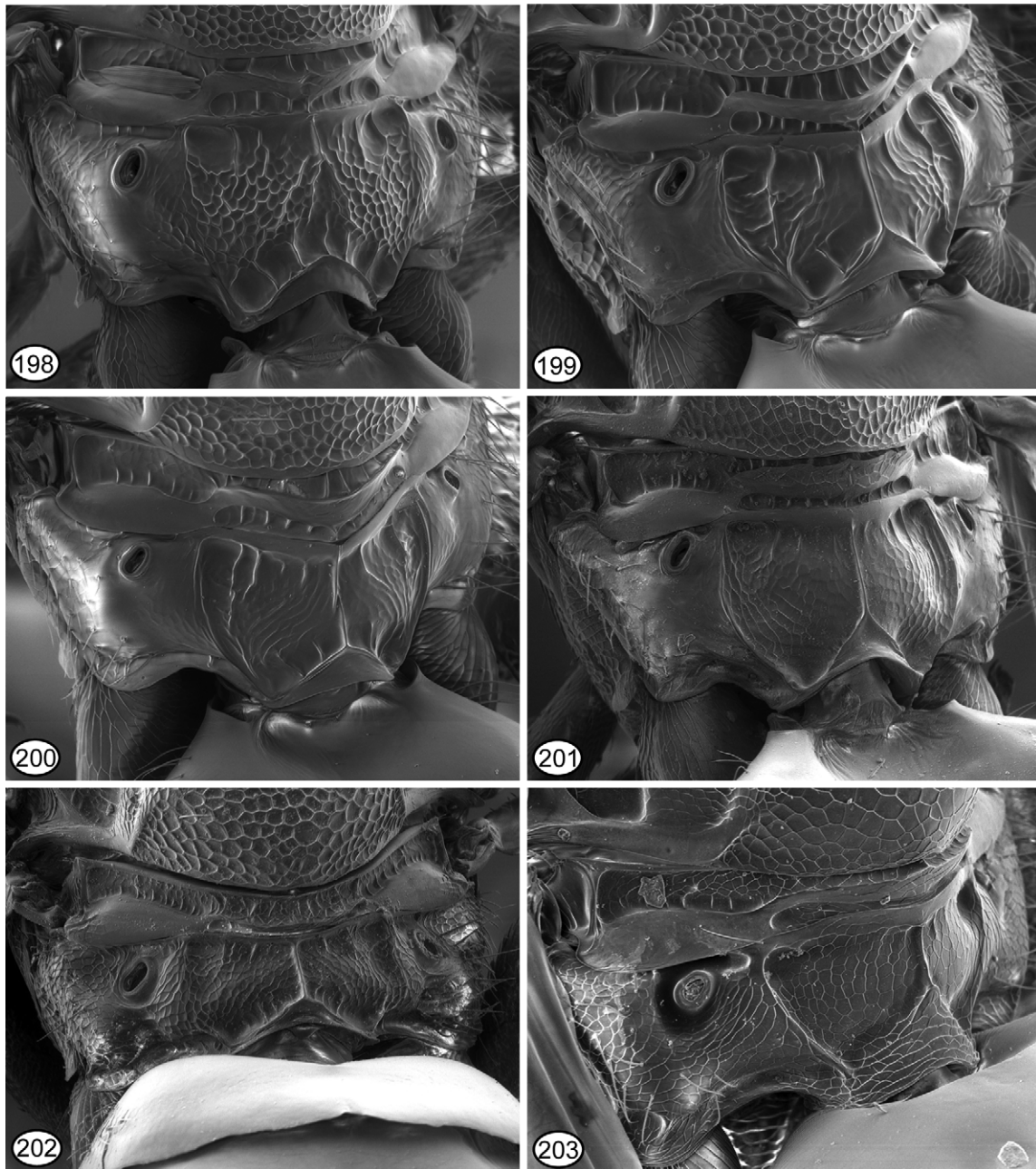
Monophyly of *Lyracus* remains unsubstantiated and different species intergrade in structure with those of other genera, particularly *Eurydinoteloides* and *Mesopolobus* (see below), but also *Neocatolaccus*. It is therefore uncertain whether white and variably conspicuously widened setae represent apomorphic setal structures derived convergently in some *Lyracus*, *Eurydinoteloides* and several other pteromaline genera, or whether the presence of such setae in only a few species of *Lyracus* indicates it is paraphyletic relative to *Eurydinoteloides* and/or other genera. Dark, hairlike setae that do not contrast conspicuously with the cuticle is undoubtedly symplesiomorphic for Pteromalinae. It perhaps is also the most likely groundplan state for *Lyracus* based on commonality within the genus and the setal structure of *L. nigraeneus*. However, if *Lyracus* and *Neocatolaccus* share a common ancestor, as discussed above, slender white setae (Fig. 125) could be the groundplan setal structure for both *Lyracus* and *Eurydinoteloides*. This would then indicate that the dark, hairlike setae shared by most *Lyracus* species represents a secondary reversal, and that the more broadly spatulate white setae (Fig. 171) of rare *Eurydinoteloides* and species formerly classified in *Zatropis* represent secondary, apomorphic modifications. If so, *Zatropis* represents a separate clade from the vast majority of *Lyracus* that could be recognized as a separate taxon. However, exact relationships remain obscure and the different setal structures appear to form a continuum. I do not consider the recognition of separate genera or subgenera in *Lyracus* warranted at present based on white versus dark or hairlike versus flattened-lanceolate or spatulate setae.



FIGURES 190–197. 190–196, *Lyrcus* spp., ♀ propodeum, posterolateral (SEM): 190, *L. nigraeneus* (98); 191, *Lyrcus* sp. (99); 192, *Lyrcus* sp. (102); 193, *Lyrcus* sp. (104); 194, *L. nigroaeneus* (94); 195, *Lyrcus* sp. (108); 196, *Lyrcus* sp. (107). 197, *Lyrcus* sp., ♀ propodeum, posterior (30) [arrow points to denticle]. No. in parenthesis = CNC 2011 photo no.

Heydon and Bouček (1992) specifically mentioned *Acaenacis* as being similar to *Zatropis* in having flattened white setae. Individuals of *Acaenacis* could be mistaken for some *Lyrcus* because they also have three anelli, an unmodified metapleuron, and one or two rows of admarginal setae that typically are mostly exposed although not conspicuously longer than the dorsal discal setae. The propodeum varies in structure in females, often being comparatively strongly transverse, though always with a carinately margined Λ -like adpetiolar strip and usually a median carina such that there is an inverted Y-shaped carinal complex. However, at least one species of *Lyrcus*

from Trinidad (BMNH) with flattened white setae similar to *L. nigroaeneus* has a similar propodeal structure except the anteromesally convergent median region extends almost to the anterior margin of the propodeum. Heydon and Bouček keyed *Acaenacis* prior to *Lyracus* using several features. Of those listed, the most distinctive is the unusually high placement of the toruli, within the upper third of the face. However, some *Heteroschema* have the antennae inserted similarly high on the face, particularly males (Fig. 157). Individuals of *Acaenacis* also have comparatively deep, hole-like anterior tentorial pits, though this is a less obvious feature, and the flagellomeres are always elongate and sometimes quite conspicuously setose. Girault (1917a) described the mandibles of *A. taciti* (Girault) as being tridentate, but I have not seen specimens with exposed mandibles to confirm this as a valid generic feature.



FIGURES 198–203. 198–202, *Mesopolobus* spp., ♀ propodeum, posterolateral (SEM): 198, *M. tortricidis* (110); 199, *M. finlaysoni* (111); 200, *Mesopolobus* sp. (112); 201, *Mesopolobus* sp. (113); 202, *Mesopolobus* sp. (39). 203, *Oaxa albiclava*, ♀ propodeum, posterolateral (203: SEM). No. in parenthesis = CNC 2011 photo no.

Because of the absence of mps from the third flagellomere of both sexes of New World *Lycrus*, species will key, respectively, to either couplet 303 (*Lycrus*) or couplet 306 (*Meraporus* Walker 1834 and *Mesopolobus*) using Bouček and Heydon (1997) depending on whether the admarginal setae are exposed or extensively covered by the dorsal discal setae. *Meraporus*, like *Lycrus*, has quadridentate mandibles, but the head and mesosoma are comparatively bright metallic green rather than dark and the propodeum has a reticulate-rugose to obliquely strigose median region in combination with an adpetiolar strip (cf. Fig. 198; Bouček and Heydon 1997, fig. 492). Fully winged individuals also have one or two rows of admarginal setae that are similar in length to and mostly overlain by the dorsal discal setae (cf. Fig. 147). Male *Meraporus* are differentiated further by a pattern of smooth lines on the head (Bouček and Heydon 1997, fig. 289; Graham 1969, fig. 325). Bouček and Heydon (1997) noted that the mesoscutum (and head) of *Meraporus* has irregular reticulation because of intermixed shallow setiferous punctures. The head and mesoscutum of *Lycrus* are uniformly meshlike reticulate to coriaceous, though species of *Mesopolobus* classified in the subgenus *Xenocrepis* Förster (Gibson *et al.* 2006, fig. 14) are sculptured similar to *Meraporus*.

As noted above, structure and sculpture of the propodeum is quite variable in *Lycrus* (Figs 190–197). There always appears to be a plical carina at least posteriorly within the nuchal furrow, though sometimes this is not obvious in very small males or some individuals with a strongly transverse propodeum. Most species also have a convex, meshlike sculptured nucha (Figs 190–195, 197) and usually the plical carinae are quite strongly sinuate near midlength of the propodeum so to be subparallel posteriorly (Figs 192, 193, 197), though length:width ratio of the propodeum, shape of the plicae (cf. Figs 192, 196), and nucha versus an adpetiolar strip (cf. Figs 193, 196) are all variable. Correlated with a more strongly transverse propodeum is often more uniformly outcurved plical carinae and a more strongly transverse nucha, which sometimes is delineated anteriorly by a furrow with an abrupt margin (Fig. 195) or even rarely a distinct Λ -like carina and is more or less flattened and/or not meshlike sculptured (Fig. 196) so as to more closely resemble an adpetiolar strip than a convex nucha. Although longitudinal carinae may extend from the anterior margin of the propodeum partly through the plical region (Figs 192, 194–196), the nuchal furrow lacks longitudinal carinae except for the plical carinae and sometimes a median carina (Figs 190–196). Those species with a more transverse propodeum and particularly those with outcurved plicae and the posteromedian region resembling an adpetiolar strip can be mistaken for *Mesopolobus*, another genus that almost always is characterized by three anelli in both sexes. Most *Mesopolobus* have quite a smooth and shiny, slender, transverse-triangular or Λ -like margined adpetiolar strip in combination with the plical carinae being quite uniformly out-curved, only slightly sinuate or sinuate only posteriorly at the lateral margin of the adpetiolar strip (Figs 198–202). The plical region is often also more coarsely sculptured than for typical *Lycrus*, including some short longitudinal carinae within the nuchal furrow anterior to the adpetiolar strip in addition to the median and plical carinae (Figs 198–200, 202), and/or more extensive oblique carinae, striae or rugosity on the panels (Figs 198–200). However, all of these propodeal features are variable and there is no distinct division between structures possessed by *Lycrus* and those by *Mesopolobus*. A much brighter metallic lustre (Figs 180, 181) is characteristic of many *Mesopolobus* species, though smaller-bodied individuals are often comparatively dark or dull-metallic similar to typical *Lycrus*. Most *Mesopolobus* also have at least the left mandible tridentate, consisting of two ventral teeth and a broader dorsal truncation (Fig. 180), though the truncation can be shallowly concave and a few species have both mandibles quadridentate similar to *Lycrus*. The single most reliable feature to differentiate members of the two genera is fore wing setal pattern. Although the number of rows of admarginal setae and the size of the speculum varies in *Mesopolobus* as for *Lycrus*, the admarginal setae are always as short as or shorter than the dorsal discal setae even if there is two or rarely only a single row of admarginal setae and these are entirely or mostly visible because of an extensive speculum (Fig. 189).

Trimeromicrus maculatus Gahan is intermediate in features between species I classify in *Lycrus* and *Mesopolobus* and its correct relationships and classification remain problematic (see further under *Trimeromicrus*). Exclusion of *T. maculatus* and species with a modified metapleuron from *Lycrus* makes it less likely that *Lycrus* is polyphyletic. However, even with removal of these species there is no evidence that *Lycrus* is monophyletic or at least not paraphyletic relative to some other genera. The genus is differentiated not by autapomorphies but by a combination of features that, although unique in combination, are shared individually with members of other genera.

***Trimeromicrus* Gahan revised status**

Trimeromicrus Gahan, 1914: 161–162. Type-species: *Trimeromicrus maculatus* Gahan, by original designation. Synonymy under *Zatropis* proposed by Heydon & Bouček (1992: 480); synonymy under *Lycrus* proposed by Bouček (1993: 1250). Gender: masculine.

Included species: *Trimeromicrus maculatus* Gahan (1914).

***Trimeromicrus maculatus* Gahan revived combination**

Figs 206–215

Trimeromicrus maculatus Gahan, 1914: 162. Holotype (♀, USNM, examined).

Zatropis maculatus; Heydon & Bouček, 1992: 480.

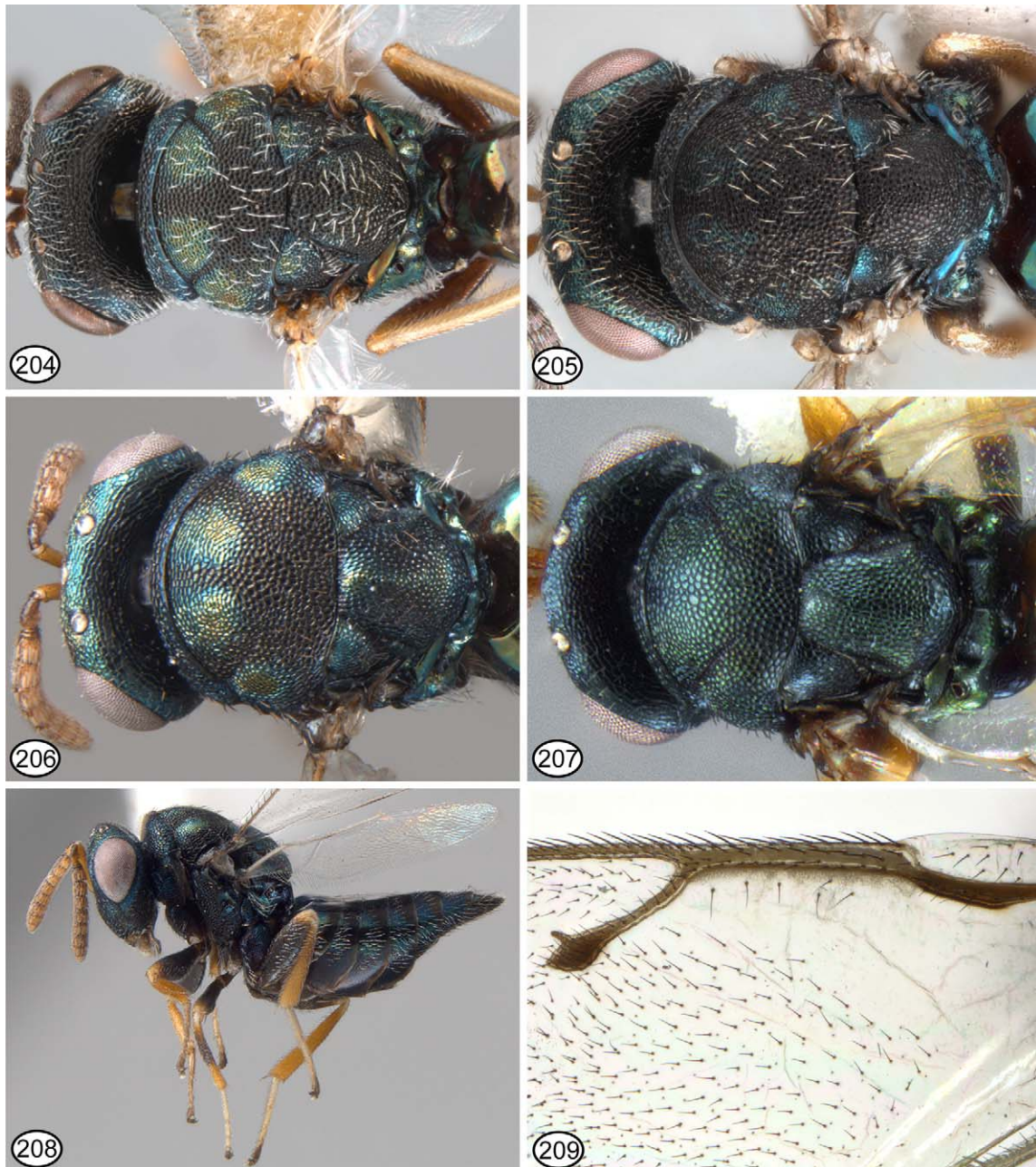
Lycrus maculatus; Bouček, 1993: 1250. Combination by implication through synonymy of *Zatropis* under *Lycrus* by Bouček (1993: 1250).

Diagnosis. Metapleuron entirely sculptured and with anterior margin abutting posterior margin of mesopleuron on same level (Figs 212, 213). Flagellum (Fig. 210) with 3 basal ringlike articles lacking mps and 5 funicular articles with mps in both sexes. Fore wing disc with 1 to 2 irregular rows of distinctly longer admarginal than dorsal discal setae, and speculum extending to level usually about equal with middle of stigmal vein (Fig. 209). Head without malar depression (Fig. 211); parascrobal region usually with tiny bump or smooth and shiny spot adjacent to inner orbit at about mid height (Figs 210, 211: arrow), though absent from some smaller individuals. Head (Fig. 210) and mesosoma (Figs 206, 212) usually with distinctive pattern of bluish to green markings, including anteriorly on each mesoscutal lateral lobe and axilla, paramedial areas anteriorly on mesoscutal medial lobe, and medial area on scutellum, and with short, brownish, hairlike setae not contrasting with cuticle. Propodeum with plical carina and often additional carinae within nuchal furrow delimiting inverted Y-like margined adpetiolar strip, and without paraspiracular carina (Fig. 215). Both mandibles tridentate with two acute ventral teeth and dorsal truncation (Fig. 214).

Description. Female habitus: Fig. 208. Head (Fig. 210) and mesosoma (Figs 206, 212) of female dark except for variably distinct bluish to green markings, usually most conspicuously on mesonotum with paramedial spots anteriorly on mesoscutal medial lobe and anterior spot on each of mesoscutal lateral lobe, axilla and scutellum, though male sometimes more uniformly green to bluish (Fig. 207); head and mesosoma with brownish, hairlike setae. Eye bare or at least superficially bare with at most exceedingly short, sparse, inconspicuous setae. Mandibles tridentate, with two ventral teeth and dorsal, often slightly concave truncation (Fig. 214). Head in frontal view (Fig. 210) subcircular to slightly transverse-oval; antenna inserted obviously above lower margin of eyes near middle of face; tentorial pits not evident; clypeus very slightly incurved, vertically striate (Figs 211, 214); face almost uniformly meshlike reticulate, except usually for tiny bump or smoother and shinier spot adjacent to eye at about midheight (Figs 210, 211: arrow), though absent from some smaller individuals. Head in dorsal view (Fig. 206) abruptly declined immediately behind posterior ocelli, hence strongly transverse with vaulted vertex. Head in lateral view without malar depression, but with malar sulcus (Figs 211, 212); malar space about 0.6× height of eye. Antenna (Figs 208, 210) with scape extending to level of anterior ocellus; flagellum with 3 very strongly transverse basal flagellomeres without mps and with 5 quadrate to slightly transverse funiculars with mps; clava with apical clavomere uniformly conical without micropilose sensory region.

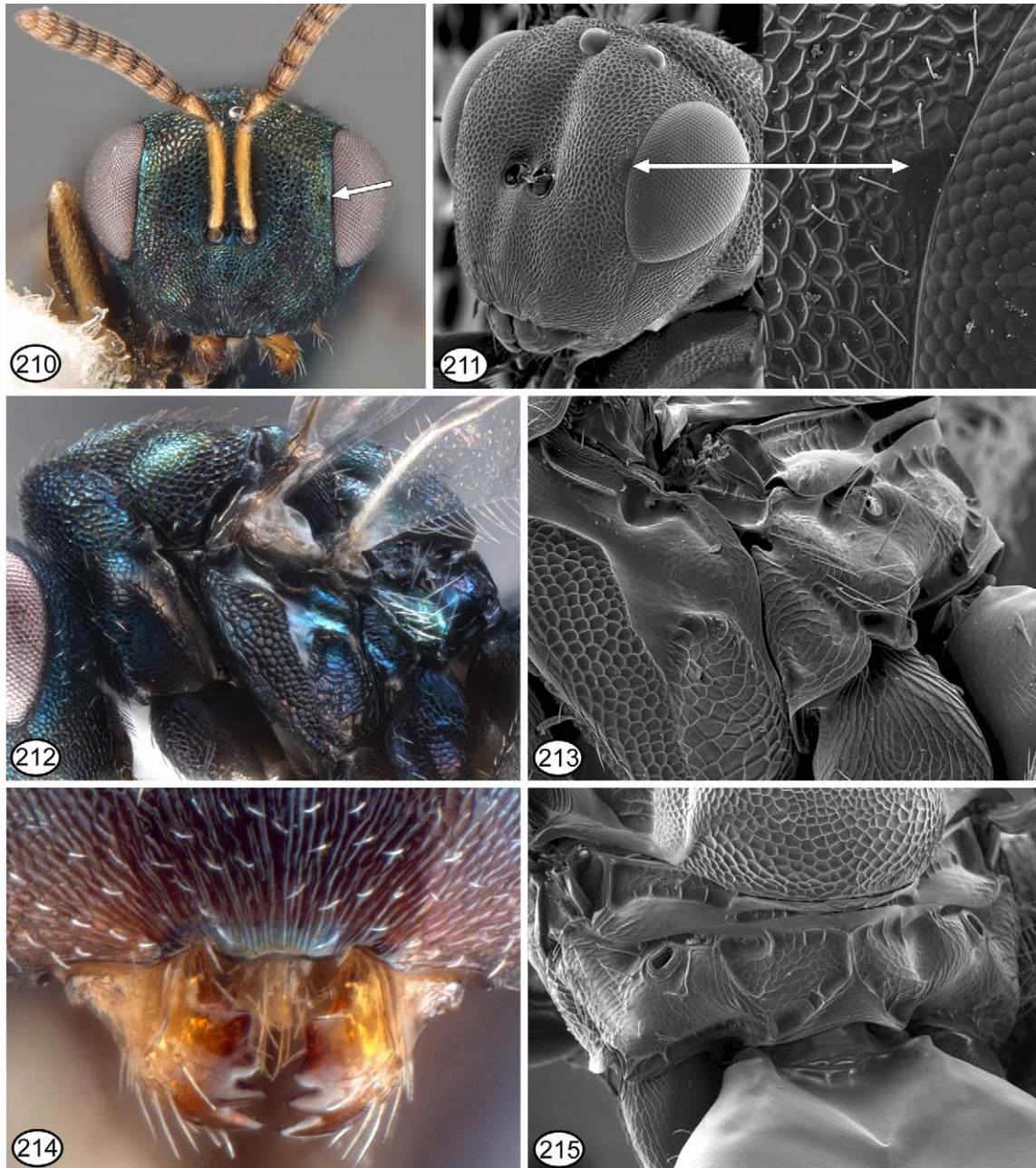
Pronotum with collar smoothly rounded into steeply angled collum (Figs 208, 212). Mesonotum (Fig. 206) meshlike reticulate; mesoscutum with incomplete notauli; scutellum without frenum, in lateral view apex rounded with posterior margin vertical to metanotum, not reflexed into distinct marginal rim (Fig. 212). Fore wing hyaline (Fig. 208); marginal vein not thickened and about 1.0–1.4× length of stigmal vein and subequal in length to postmarginal vein; stigma small, not distinctly capitate; costal cell comparatively narrow, without setae dorsally but ventrally with line of setae along length; basal cell, basal fold and mediocubital fold bare in female or basal cell apically/basal fold with 1–3 setae in male; disc ventrally with 1 to 2 irregular rows of long admarginal setae relative to discal setae; disc dorsally uniformly setose beyond speculum; speculum extending usually to level about equal with middle of stigmal vein (Fig. 209). Metapleuron completely sculptured and with anterior margin on same level

as and abutting mesopleuron (Figs 212, 213). Metacoxa bare dorsobasally; metatibia with single tibial spur. Propodeum (Fig. 215) with short vertical carina posterolaterally on callus (*cf.* Fig. 103: arrow 2) within furrow differentiating slender supracoxal flange, but in dorsal view neither distinct or projecting denticle-like; with transverse-triangular adpetiolar strip variably distinctly delineated by inverted Y-shaped carinal complex; plicae variably distinct, but at least carinate posteriorly on either side of adpetiolar strip; plical region meshlike coriaceous-reticulate except for short longitudinal carinae extending posteriorly from anterior margin and usually with 1 or more short carinae within furrow between plical and median carina, but without any indication of costula or paraspiracular carina.



FIGURES 204–209. 204 and 205, ♀ head and mesosoma, dorsal: 204, *Neocatolaccus* sp. (5); 205, *Mesopolobus* sp. (39). 206–209, *Trimeromicrus maculatus*: 206, ♀ habitus, dorsal (2); 207, ♂ habitus, dorsal (143); 208, ♀ habitus, lateral (1); 209, ♀ fore wing (126). No. in parenthesis = CNC 2011 photo no.

Gaster of female lanceolate (Fig. 208), about 1.2× combined length of head and mesosoma; Gt1 with posterior margin slightly emarginate; syntergum short; cercus with all setae of similar length; hypopygium extending at most about two-thirds length of gaster. Petiole smooth, shiny, and transverse.



FIGURES 210–215. *Trimeromicrus maculatus* ♀. **210**, head and antenna, frontal (3); **211**, head, frontolateral (SEM) [insert: inner orbit magnified]; **212**, mesosoma, lateral (1); **213**, meso- and metapleuron (SEM); **214**, lower face and mandibles (4); **215**, propodeum, posterolateral (109: SEM). [Arrow in Figs 210 and 211 points to smooth bump on inner orbit.] No. in parenthesis = CNC 2011 photo no.

Type information. Gahan (1914) did not specifically designate a holotype, simply stating that the species was described from many specimens and that the “type” was USNM catalogue number 18332. The USNM has a single female in the type collection labelled as “Type No. 18332 U.S.N.M.”. Photographs of this specimen and its labels are available at <http://www.chalcidtypes.com/>. The general collection has one male labelled as “Allotype” and another 24 females and 17 males as “Paratype” under the same number. The putative holotype lacks its gaster, but some of the female paratypes are entire.

Material examined. *NEARCTIC.* (1 USNM). *CANADA. ALBERTA:* Coaldale, ca. 1 km NE, 49°44.92'N 112°30.05'W, 16, 25, 29, 30.VII.2002, em. 1.VIII or later, ex *Ceutorhynchus obstrictus* (Marsham) reared from pods of *Brassica napus* (2 CNC). Edmonton, Univ. Alberta, 49°44.94'N 112°45.23'W, 23.VII.2004, B. Ulmer & L. Dossdall (5 CNC). nr Lethbridge, B. Ulmer & L. Dossdall —49°27'N 112°39'W, coll. 13.VIII.2004, em.

13.VIII.2004, ex *Brassica napus* (4 CNC); 49°09'N 111°48'W, 29.VII.2004, ex *Brassica juncea* (1 CNC). **BRITISH COLUMBIA:** Apex Mountain, 49°24.993'N 119°47.117'W, coll. 22.VII.2010, em. 5, 10, 26, 29.VII.2010, Gillespie & Clarke, ex *Lesquerella douglasii* (20 CNC). Enderby, 50°32.380'N 119°06.605'W, coll. 28.VI.2005, em. 8, 11.VII.2005, A. Silversides & D. Gillespie, ex *Brassica rapa* pods (2 CNC). Chilliwack, 49°09.153'N 121°58.315'W, coll. 7.VII.2005, em. 8.VII.2005, A. Silversides & D. Gillespie (1 CNC). Keremeos, 49°15.863'N 120°00.861'W, coll. 22.VII.2010, em. 26.VII.2010, Gillespie & Clarke, ex *Lesquerella douglassii* (11 CNC, Photo 2011-1). **ONTARIO:** Bruce Co., Chesley, 44°18.409'N 81°3.31'W, coll. 27.VII.2005, em. 15.VIII.2005, A. Badiss & M. Wogin, ex *Ceutorhynchus obstrictus* on *Brassica napus* (1 CNC). Grey Co., Chatsworth, 44°29.564'N 81°0.636'W, coll. 27.VII.2005, em. 15.VIII.2005, A. Badiss & M. Wogin, ex *Ceutorhynchus obstrictus* on *Brassica napus* (1 CNC). Allisonville, 44°0.705'N 77°23.664'W, coll. 13.VII.2006, em. 1.VIII.2006, Mason, Miall & Wogin, ex winter *B. napus* pods (2 CNC). Bothwell, 42°37.052'N 81°57.781'W, coll. 22.VI.2006, em. 12.VII.2006, Mason, Miall & Wogin, ex winter *B. napus* pods (7 CNC). Brigden, 42°45.013'N 82°17.002'W, coll. 22.VI.2006, em. 30.VI.2006, Mason, Miall & Wogin, ex winter *B. napus* pods (4 CNC). Brooklin, 43°58.108'N 78°53.679'W, coll. 26.VII.2006, em. 3.VIII.2006, Mason, Miall & Wogin, ex *B. napus* pods (1 CNC). Flesherton, 43°38.010'N 80°23.477'W, coll. 25.VII.2006, em. 16.VIII.2006, Mason, Miall & Wogin, ex *B. napus* pods (3 CNC). Metcalfe, Tamarack Farm, 45°10.120'N 75°29.269'W, coll. 14.VI.2006, em. 23.VI.2006, Mason, Miall & Wogin, ex *Capsella bursa-pastoris* (11 CNC). Osgoode, Gino's Garlic Farm, 45°11.165'N 75°34.842'W, coll. 14.VI.2006, em. 06.VII.2006, Mason, Miall & Wogin, ex *Capsella bursa-pastoris* pods (6 CNC). Ottawa, Central Experimental Farm, 45°21.978'N 75°43.842'W, coll. 24.VII.2006, em. 4.VIII.2006, Mason, Miall & Wogin, ex *E. cherianthoides* stems (2 CNC). Port Darlington, 43°54.038'N 78°38.900'W, coll. 14.VII.2006, em. 3.VIII.2006, Mason, Miall & Wogin, ex *B. napus* pods (1 CNC). Sarnia, 42°51.602'N 82°14.902'W, coll. 22.VI.2006, em. 5.VII.2006, Mason, Miall & Wogin, ex winter *B. napus* pods (1 CNC). Solna, Leask Rd, 43°58.462'N 78°50.281'W, coll. 26.VI.2006, em. 2.IX.2006, Mason, Miall & Wogin, ex *E. cherianthoides* pods (22 CNC). Thamesville, Mason, Miall & Wogin, ex winter *B. napus* pods—42°32.052'N 81°55.352'W, coll. 22.VI.2006, em. 5.VII.2006 (6 CNC); 42°32.483'N 81°59.436'W, coll. 21.VI.2007, em. 3.VII.2007 (2 CNC). **QUEBEC:** St.-Jean-sur-Richelieu, r. Pierre - Caisse & Hwy 219, 45°19.739'N 73°17.916'W, 2.VIII.2007, em. 23.VIII.2007, J. Miall & P.G. Mason, ex *Erysimum cherianthoides* (1 CNC). **SASKATCHEWAN:** RM 111 SW 15 11 28, 30.VIII.2004, M. Braun & O. Olfert (1 CNC). Bracken, 49°13.325'N 108°5.467'W, 9.VIII.2005, M. Braun & O. Olfert, ex canola seedpods (1 CNC). Downey Lake Hutterite Colony, 49°48.520'N 109°44.452'W, 8.VIII.2005, M. Braun & O. Olfert, ex canola seedpods (3 CNC, Photo 2011-126). Golden Prairie, 50°13.384'N 109°47.158'W, 8.VIII.2005, M. Braun & O. Olfert, ex canola seedpods (2 CNC, Photo 2011-143). Val Marie, 49°15.705'N 107°39.152'W, 16.VIII.2005, M. Braun & O. Olfert, ex canola seedpods (1 CNC).

USA. ARIZONA: *Apache Co.*, Alpine, 7.5 mi. N, 8.IV.29, V.E. Romney, *C. serrulata* (1 USNM). St. Johns, 12, 13.VI.32, E.E. Russell, reared from Loco pods, Tempe No. 6879 (5 USNM). *Cochise Co.*, Bisbee—ca. 6000', 6.X.72, em. 24.X.72, C.D. Johnson, reared seeds *Mimosa dysocarpa* (1 TAMU); 3 mi. W, 16.VIII.77, em. 27.XII.77, C.D. Johnson, reared seeds *Acacia constricta* (1 TAMU). Bisbee-Douglas Int. Airport, 8 mi. N Douglas, ca. 4000', C.D. Johnson, reared seeds *Astragalus thurberi* (2 TAMU). Cochise Stronghold, 14.X.73, em. 13.XI.73, C.D. Johnson, reared seeds *Mimosa biuncifera* (2 TAMU). Douglas—4 mi. W, ca. 4000', 11.VI.77, em. 13.VI.77, C.D. Johnson, reared seeds *Astragalus thurberi* (1 TAMU); V.57, J.H. Russell, *Astragalus mollissimus* (3 USNM). Portal—5.7 mi. SE, 12.IX.78, G. Gordh (1 UCRC); 1 mi. NE, 28.VIII.79, C.W. Melton (1 UCRC), J. LaSalle (1 UCRC); 1 mi. NE, 14.IX.78, J. LaSalle, sweeping *Acacia constricta* (1 UCRC). San Simon Rd., 26.VIII.97, B.G. Carey, sweep *Larrea*, *Parthenium*, *Sphaeraicea*, *Senecio* (2 UCRC). Tempe, Webster No. 7270—27.VI.11, 3, 13, 14, 18, 19, 21, 22, 24, 27, 28.VII.11, 11, 12, 14, 15, 16.VIII.11, 14.IX.11 (91 USNM). Tombstone, 7 mi. S, 6.XI.76, em. 12.X.77, C.D. Johnson, reared seeds *Acacia vernicosa* (2 TAMU). *Coconino Co.*, Flagstaff—IV.78, Barber & Schwarz (1 USNM); IX.66, C.D. Johnson, reared from seeds *Astragalus* sp. (1 TAMU). Tuba City, 3 mi. SE, 29.VIII.67, J.C. Hall (2 UCRC). *Gila Co.*, Globe, 22.VII.73, em. 2.VIII.73, K. Walker, reared *Acacia constricta* (1 TAMU). *Maricopa Co.*, Buckeye, 21.IX.12, T.D. Urbahns, Webster No. 7219 (11 USNM). Camp Creek, 12, 18, 25.IV.33, L.L. Stitt, reared par. *Bruchophagus*, alfalfa (9 INHS). Scottsdale, 10 mi. N, 25.VII.83, M. Hetz, reared seeds *Cercidium microphyllum* (1 UCDC). *Navajo Co.*, Snowflake, 31.V.32, E.E. Russell, reared from Loco pods, Tempe No. 6894 (1 USNM). *Pinal Co.*, Casa Grand[e], V.L. Wildermuth, Webster No. 6180 (2 USNM). Sacaton—14.VI.09, sweeping pomegranate (8 USNM); Webster No. 5540—9.IX.09, reared from alfalfa pods (2

USNM); 6.IX.09 (2 USNM), C.N. Ainslie. **Santa Cruz Co.**, San Rafael Valley, 31°28'48"N 110°34'09"W, 1551m, tank in oak savanna, coll. 9.V.2007, em. 16.V.2007, K. Mauz, from sporocarp of *Marsilea mollis* B.L. Rob. & Fernald (6 CNC). Sycamore Canyon, 9mi W Peña Blanca Lk, 4100', 12.VIII.83, R. Anderson (1 CNC, Photo 2011-37). **Yavapai Co.**, Beaver Creek Ranger Sta., 2 mi. NE Montezuma Well, 11.IX.69, em. 23.IX.69, G.W. Forister, reared seeds *Mimosa biuncifera* (1 TAMU). Clarkdale—entrance to Tuzigoot Nat'l Monument, 22.VI.70, em. 11.VII.70 (1 TAMU), em. 7.VII.70 (1 USNM), T.D. Center, reared seeds *Astragalus lentiginosus*; 1 mi. E, 9.V.72, em. 15.V.72, 5.VI.72, C.D. Johnson, reared seeds *Astragalus wootoni* (2 TAMU); 1 mi. E, 5.VI.70, em. 21.VI.70, C.D. Johnson reared seeds *Astragalus lentiginosus* (1 TAMU); 1 mi. E, 5.VI.70, em. 22.VII.70, T.D. Center, reared seeds *Astragalus calycosus* (1 TAMU). Camp Verde—10 mi. S, 24.VII.69, em. 1.VIII.89 (1 TAMU), 14.VIII.89, em. 28.VIII.89 (1 TAMU), reared seeds *Acacia constricta*, G.W. Forister. Camp Verde, 11 mi. N, 9.VI.70, em. 25.VI.70, T.D. Center, reared seeds *Astragalus lentiginosus* (1 TAMU). Chavez Crossing [Campground], 14.VI.70, reared seeds *Lotus mearnsii*, T.D. Center (1 USNM). W Clear Creek Cp., 7.5 mi. ESE Campe Verde, 3500'—21.VII.78, 29.IX.78, R. Conway, reared seeds *Prosopis velutina* (5 TAMU); 4.IX.69, em. 23.IX.69, G.W. Forister, reared seeds *Acacia constricta* (1 TAMU); 2,8.IX.83, M. Hetz, reared *Acacia constricta* (2 TAMU); 2.IX.73, em. 2.X.73, C.D. Johnson, reared seeds *Acacia constricta* (2 TAMU); 22.VII, 15.VIII 20,29.IX, 6.X.78, R. Conway, reared seeds *Acacia greggii* (9 TAMU). Clear Creek Campgrounds, 8 mi. SE Camp Verde, 26.IX.70, em. 2, 9.X.70, T.D. Center, reared seeds *Acacia constricta* (2 TAMU). Cornville, 14 mi. N, 9.V.72—em. 5.VI.72, C.D. Johnson, reared seeds *Astragalus lentiginosus* (2 TAMU); em. 15.V.72, C.D. Johnson, reared seeds *Astragalus wootoni* (1 TAMU). Cottonwood, 4 mi. NE, 5.VI.70, C.D. Johnson, reared seeds *Astragalus lentiginosus* (5 TAMU). Jerome, 7 mi. SW, G.W. Forister—30.VII.69 (1 UCDC); potato patch, 30.VII.69 (1 UCDC). **Yuma Co.**, Yuma, 11, 25.VIII.13, 11, 12, 14, 20, 24, 25.VIII.13, 12.VI.14, T.D. Urbahns, Webster No. 7202 (69 USNM). **CALIFORNIA: Contra Costa Co.**, Moraga, 19.VI.93, R.L. Zuparko (2 EMEC). **Eldorado Co.**, Meyers—23.VII.51, E.I. Schlinger (1 UCDC); 1 mi. S, 24.VII.55, E.I. Schlinger (1 UCDC). **Fremont Co.**, Colorado Springs, 23 mi. SE, Hwy 115, 5800', 17.VI.82, G. Gibson (1 CNC). **Inyo Co.**, Antelope Springs—7 mi. W Deep Springs, 2.VII.65, M.E. Irwin (1 UCRC); 20.VI.1960, H.K. Court (3 UCDC). China Lake Naval W.C. [weapons center], Coso Mtns, Silver Peak Springs on west side, 27.VII.99, M. Gates (1 UCRC). S Coso Peak, 2340m, 36°11'42"N 117°43'21"W, 17.VII.99, M. Gates (1 UCRC). Darwin, 14km NW, 25.V.94, S.L. Heydon (1 UCDC). Lone Pine, 25 mi. E, 27.VI.80, T.W. Schoener & C.A. Toft (3 UCDC). **Kern Co.**, Lebec, 2 km SW, 12.IX.92, S.L. Heydon (1 UCDC). **Kings Co.**, Corcoran, 1.V.13, 22, 24, 26.VII.13, 2.VIII.13, T.D. Urbahns, Webster No. 6712 (12 USNM); Hanford, Webster No. 3687—Rankin (2 USNM); C. Piper (1 USNM). **Lassen Co.**, Eagle Lake (NE shore), Hwy 139, ca. 3 mi. S, Jct. A1, 24.VII.92, J. Pinto, *Salix*, nettle, etc. (5 CNC, Photo 2011-2, 3). Hallelujah Jct.—16.VII.70 (8 UCDC, 3 FSCA), 1.VII.70 (1 UCDC), E.E. Grissell; 13.VII.72, S.K. Ault (2 UCDC); 28.VI.72, R.A. Belmont (1 UCDC). **Los Angeles Co.**, Castaic, 1 mi. N, 28.VI.65, em. 10.VIII.65, C.D. Johnson, ex reared seeds *Astragalus antiselli* (6 TAMU). Glendale, Webster No. 6044—7.IX.12 (2 USNM); 7, 13, 16, 23, 28.III.14, reared from *Bruchophagus funebris*, T.D. Urbahns (5 USNM). Los Angeles, 10, 11, 19.VI.13, 19.VII.13, T.D. Urbahns, Webster No. 6723 (6 USNM). **Maricopa Co.**, Phoenix, VII.11, A.W. Morrill, Webster No. 9231, reared from alfalfa seed (5 USNM). **Mendocino Co.**, Philo, 8 km W, 39°03'N 123°29'W, 4.VII.97, 92m, R.B. & L.S. Kimsey (1 UCDC). **Monterey Co.**, Salinas, 21.VII.50, E.C. Carlson (1 UCDC). **Nevada Co.**, Sagehen Creek [Field] Station—12.VII.72, C. Goodpasture (1 UCDC); 6 km NW Hobart Mills, 29.VII.2002, S.L. Heydon (2 UCDC). **Orange Co.**, Huntington Beach, 12, 20.VII.83 (2 UCRC), 25, 26.V.85 (4 UCRC), 9, 23.VI.85 (7 UCRC), H. Andersen. Irvine—San Joaquin, Fresh Water Marsh Reserve, 11.VI.86, J. LaSalle (4 UCRC); University of California, 14.VII.65, G.A. Marsh (1 EMEC). Santa Ana Mtns, San Juan Creek @ San Juan Fire Sta., 10.IX.97, Gates, Buffington & Carey (1 UCRC). **Placer Co.**, Yuba Gap, pond east of, 6km W Cisco Grove, 1750m, 39°19'N 120°36'W, 28.VIII.2003, S.L. Heydon (1 UCDC). **Riverside Co.**, Blythe, 18 mi. W, 11.X.71, C. Goodpasture (1 UCDC). Cabazon, 5 mi. E, 27.IX.78, G. Gordh (1 UCRC). Indio, 25.IX.58, E.J. Dietrick, ex *Bruchophagus gibbus* (1 UCRC). Lake Elsinore, 31.III, 1.IV.89, H.J. Andersen (1 UCRC). Mecca, alfalfa, Webster No. 3678 (1 USNM). Menifee Valley (hills on W end), 33°39'N 117°13'W, 1800', 19.VII-1.VIII.95, J. Pinto (1 UCRC). Pinyon Flat, 1.VII.65, C.D. Johnson, reared seeds *Astragalus douglasii* (1 TAMU). P.L. Boyd Desert Research Center, 3.5 mi. S Palm Desert, 1-4.VI.70, S. Frommer & R. Worley (2 UCRC). Santa Rosa Mtn., 27.V.85, 7000', G. Gordh, ex *Quercus* (1 UCRC). **Sacramento Co.**, Need, reared from alfalfa seed, Sacramento No. 26114—20.VIII.26, C.C. Wilson (2 USNM); 30.VIII.26, W.B. Cartwright (5 USNM). Port of Sacramento, 7.VII.77, R.O. Schuster (1 UCDC). Sacramento, 11, 16, 23.VIII.26, M. Marshall, reared from alfalfa seed,

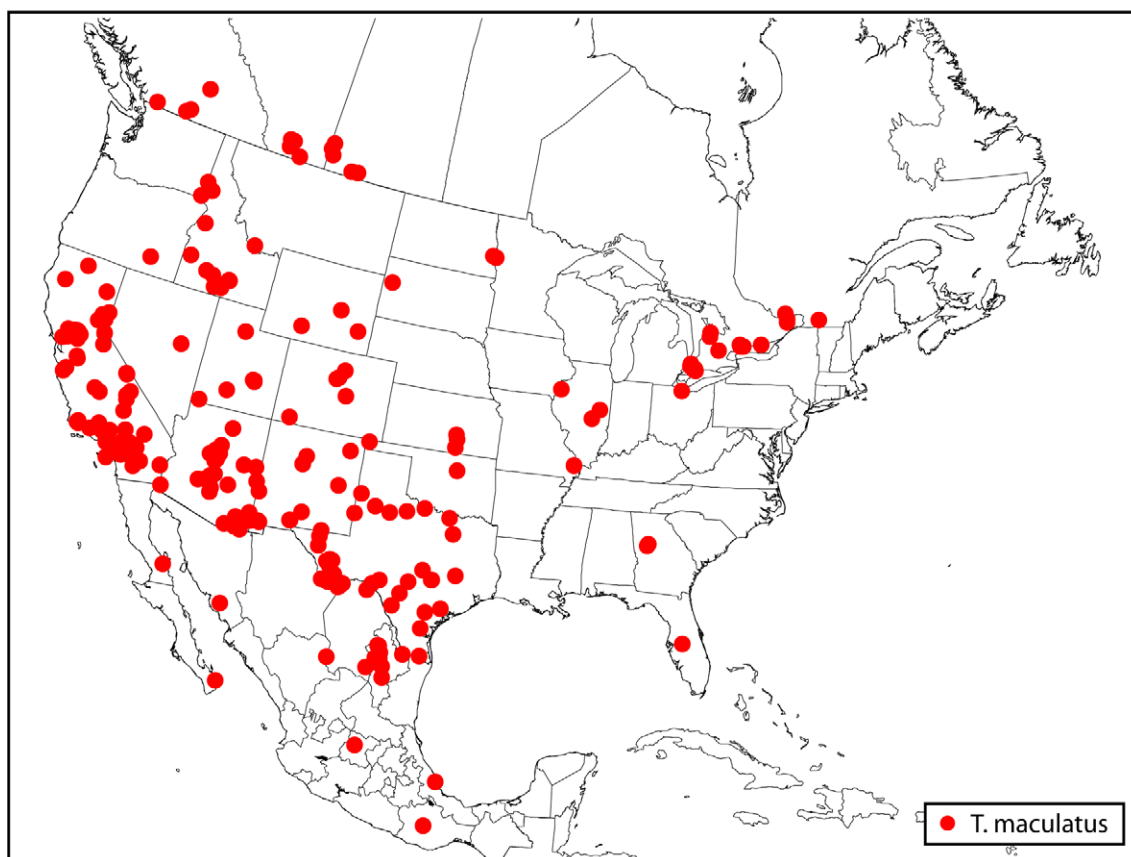
Sacramento No. 26117 (13 USNM). **San Bernardino Co.**, 8.V.85, J.D. Pinto (1 CNC). Arrowhead Lake Rd., 3 mi. N Hwy 73, 18.VIII.83, H. Andersen (1 CNC). Bear Valley, 13.IV.79, J. LaSalle, ex *Eriogonum fasciculatum* (1 UCRC). Big Bear City Rd., 1mi. N, J.N09, 16.VI.88, R.K. Velten (1 CNC). Burns Piñon Ridge Reserve, 1260m, 34°08'57"N 116°27'11"W, 21-23.V.2005, K. Will *et al.* (1 EMEC). Chino, 4.XI.12, T.D. Urbahns, Webster No. 6041 (4 USNM). Hodge, 1 mi. N, 13.VI.79, J.C. Hall (3 UCRC). San Bernardino National Forest—Fish Creek Trail, 30.VII.81, G. Gordh (1 UCRC); Hitchcock Ranch S of USFS Rt. 3N 16, 2120m, T3N, R1E, S31, 16.VIII.95, H.E. Andersen (1 UCRC). Lucerne Valley, 16.5 mi. N, 2.VI.85, J.D. Pinto (6 CNC). **San Diego Co.**, Anza-Borrego State Park, Culp Valley Trail at pass, 1000m, 23.V.98, J.M. Heraty (3 UCRC). **San Joaquin Co.**, Thornton, 7.VI.51, E.C. Carlson (3 UCDC). **San Luis Obispo Co.**, Simmier, 8 mi. ESE, (San Diego Creek), T30S R28E Sect.8, 22-30.VI.87, W.E. Wahl (3 CNC). **Santa Barbara Co.**, Santa Ynez Mts., 24.VI.59, P.M. Martin (1 UCDC). Solvang, 2 mi. E, 28.VI.65, J.S. Buckett (1 UCDC). Santa Barbara, 45 km NW, Sedgewick Ranch Reserve, 308m, 21.V.97, E. Schlinger (1 UCDC). **Sierra Co.**, Yuba Pass, 2060m, 21 km S Portola, 8.VIII.98, S.L. Heydon (1 UCDC). **Siskiyou Co.**, Mt. Shasta, Springhill North, 25, 31.VII.85, L.A. Andres, ex *Carduus nutans* stems infested with *Rhinocyllus conicus* (8USNM). **Solano Co.**, Cold [Canyon] Reserve, 11 km W Winters, S.L. Heydon—13.VII.91, on *Daucus pusillus* (8 UCDC); 17.VII.91, *Daucus* (5 UCDC). Suisun Marsh, 6 km S Suisun City, 14.VI.93, S.L. Heydon & L. Guo (4 UCDC). Vallejo, 30.VI.93, R.L. Zuparko (1 EMEC). **Stanislaus Co.**, Crows Landing, 13.VI.11, bred from rattleweed (1 USNM). Pattersen, 17 mi. W, Del Puerto Canyon, 19.VII.75, R.B. Kimsey (1 UCDC). **Toulumne Co.**, Stanislaus Natl For., 0.25 mi. W of Dardanelle, Hwy 108, meadow at For. Service office, 38°20'43"N 119°50'18", 5715', 9.VII.2006, W.S. Fullerton, E. Zoll, S. Kelly & P. Russell (2 UCFC). **Trinity Co.**, Hayfork Ranger Station, 22.V.73, J. Chemsak (1 EMEC). **Tulare Co.**, 11, 19, 22, 23, 24, 31.VII.13, 24.IX.13, T.D. Urbahns, Webster No. 6045 (21 USNM). **Ventura Co.**, Wheeler Springs, 3 mi. S, 1000', 28.VI.65, C.D. Johnson, reared from seeds *Astragalus antiselli* (14 TAMU). **Yolo Co.**, Davis—13.VII.74, R. Harris (2 UCDC); 24.VIII.56, 2.IX.56 (2 UCDC), A.T. McClay. **COLORADO: Boulder Co.**, Boulder, 5500', 11.VI.61, W.R.M. Mason (1 CNC). **Clear Creek Co.**, Mt. Evans—14,000', 27.VII.61, S.M. Clark (1 CNC); Doolittle Ranch, 9800', 17.VII.61, S.M. Clark (1 CNC). **La Plata Co.**, Durango, 7 mi. W, ca. 7000', 15.VII.77, em. 18.VII.77, C.D. Johnson, reared seeds *Astragalus bisulcatus* var. *haydenianus* (1 TAMU). **FLORIDA: Polk Co.**, Barton [Bartow], 22.IV.81, G. Gordh (1 UCRC). **GEORGIA: Spalding Co.**, 5.IX.38, T.L. Bissell (1 USNM). [*sic* = **Pike Co.**], nr Griffin, Bledsoe Research Farm, 33°10.635'N 84°24.354'W, 13.V.94-4.VI.96, G.D. Buntin, reared from *B. napus* seedpods (926 CNC, Photo 2011-4, 109). **IDAHO: Canyon Co.**, Melba, 2 mi. N, 18.VI.57, H.W. Homan, carrot flower (1 WFBM). **Elmore Co.**, Glenns Ferry, Rank rosea, 5.IX.27, W. Carter, 4395 SAR (2 USNM). **Gooding Co.**, Tuttle, *Iva axillaris*—1, 12.VII.30 (2 WFBM), 22.VII, 16.VIII.30 (3 USNM). **Jerome Co.**, Blue Lakes, Snake River Canyon, 3000', 13.VII.17, A.C. Burrill, *B. funebris* (1 USNM). Hazelton, 20.VI.30, *N. altissima* (1 USNM). **Latah Co.**, Moscow, 13.VII.79, A. Ahmad, cabbage seedpod weevil (1 WFBM). **Lincoln Co.**, Kimama, 22.VI.31, #5a, D.E. Fox, *N. altissima* (2USNM). **Minidoka Co.**, Adelaide, 7.VII.27, W. Carter, *S. altissimum*, 4395 SAR (1 USNM). **Nez Perce Co.**, Gifford, 11.VI.49, 2900', host *C. assimilis*, A.J. Walz (1 WFBM). **Twin Falls Co.**, Hollister—No. 7, 16.V.31, D.E. Fox, *Sophia sophia* (1 USNM); No. 6, 16.V.31, D.E. Fox, *Sophia sophia* (1 USNM); Castleford St #7, 5.IX.30, *S. pestifer* (1 USNM); No. 7, inside Green N. alt., 13.VI.31 (1 USNM); C[astleford?] Stn., 5.VI.29, sparse *S. sophia* (1 WFBM); Plot 2, inside, 13.VI.31, D.E. Fox (1 USNM); Plot 5, 16.VII.29 (1 WFBM); Roseworth, 25.VI.32, D.E. Fox, *S. pestifer* (1 USNM). **Valley Co.**, New Meadows, 8.VIII.65, L.S. Hawkins, reared from *Linaria vulgaris* (1 USNM). **ILLINOIS: Champaign Co.**, Univ. Illinois, South Farm, 8.IX.83, S.L. Heydon (1 INHS). **Henderson Co.**, Oquawka, 30.VII.36, Sand Prairie, Mohr & Burks (1 INHS). **Moultrie Co.**, 1.XI.32, Bigger, with *Desmoris fulvus* (1 USNM). **KANSAS: Harvey Co.**, Sedgwick, E.G. Kelly, *Bruchophagus* (4 USNM). **Sedgwick Co.**, Wichita, 18.VI.96, H.E. Andersen (1 UCRC). **Sumner Co.**, Wellington, Webster No. 4488, H.T. Osborn (6 USNM), E.G. Kelly (2 USNM). **MISSOURI: Scott Co.**, Benton, 19, 29.IX.28, Satterthwait, sunflower (4 USNM). **NEVADA: Eureka Co.**, Eureka, 7.VII.71, E.E. Grissell, *Juniperus* (1 UCDC). **White Pine Co.**, 45 km SSE Eureka, 39°24'N 115°30'W, 19.VII.95, S.L. Heydon & R.M. Bohart (1 UCDC). **NEW MEXICO: Bernalillo Co.**, Sandia, Indian Res., 12.XII.83, G. Gordh (1 UCRC). **De Baca Co.**, Ft. Sumner, 3 mi. S Jct. 84 & 284 on 284, near irrigation ditch, 4.VII.77, S. & S. Frommer (1 UCRC). **Catron Co.**, Alma, 3.VIII.29, V.E. Romney, *Salsola pestifer* (1 USNM). **Doña Ana Co.**, Mesilla, 4.V.09, C.N. Ainslie (1 USNM); Mesilla Park, C.N. Ainslie, Webster No. 5071, bred alfalfa (16 USNM). **Harding Co.**, Yates, 6.3 mi. N, 15.VII.29, V.E. Romney, *Salsola pestifer* (1 USNM). **Hidalgo Co.**, Animas, 9.3 mi. W, 4400', 26-30.VII.82, G. Gibson (1 CNC). Lordsburg, 5 mi. NE, 20.VIII.71, E.E. Grissell & R.F. Denno, *Helianthus* (1 UCDC). US Hwy 80, from State Line Rd to NM Hwy 9, 19.VIII.97 (3 UCRC).

Otero Co., James Canyon Campground, 152 mi. E Cloudcroft, Hwy 82, 6800', 24.VII.82, G. Gibson (1 CNC). White Sands National Monument, 20.VI.69, R.M. Bohart (4 UCDC). **Roosevelt Co.**, Blackwater Draw nr. Portales, 4000', desert, 24-30.V.91 (1 CNC), 1-7.VI.91 (1 CNC), O'Hara & Jorgensen. **NORTH DAKOTA: Cass Co.**, Fargo, North Dakota State Univ. 7.XII.76, R. Carlson, host *Micronyx fulvus* (7 USNM). Prosper, 1.IX.88, Sunflower Plot, L. Charlet & T. Gross, taken from seeds of wild *Helianthus* nursery before harvest, *Smicronyx fulvus* (3 USNM). **OHIO: Erie Co.**, Venice, 19.VI.19, G.A. Runner, on grape, Quaintance No. 3666 (1 USNM). **OKLAHOMA: Payne Co.**, Stillwater, 28.VIII.51, F.A. Fenton (1 USNM). **OREGON: Harney Co.**, Catlow Valley, 25 mi. NW Fields (rd. 205), 9.VII.99, J.D. Pinto (1 UCRC). **Linn Co.**, Scio, 14.V.57, K. Goeden, seed house (1 USNM). **SOUTH DAKOTA: Butte Co.**, Newell, 19.VIII.13, reared from alfalfa seed, C.N. Ainslie (1 USNM). **TEXAS: Bandera Co.**, Lost Maples St. Park, 18.VI.88, J.B. Woolley (1 TAMU). **Bee Co.**, Mineral, 9.VI.08, W112.I.2, 16.VI.08, C.R. Jones, bred *Helenium* head (1 USNM). **Brazos Co.**, 29.VI.70, V.V. Bord, *Endalus celatus* (1 USNM). **Brewster Co.**, Alpine, 32 mi. S, 7.VI.72, W.E. Clark, ex pods of *Astragalus mollissimus* (1 TAMU). Big Bend Nat'l Park—Maple Canyon, 5100', 9.VI.82, G. Gibson (2 CNC); basin, 23.V.83, R.S. Anderson (1 CNC); 3900', 5.3 mi. W Panther Jct., 10-14.VII.82, G. Gibson (2 CNC); Government Spr., 3.VII.86, 3000', J. Heraty (1 UCRC). Chisos Mtns—24.VI.08, Hunter No. 1649, par. *Bruchus* (1 USNM); 12.X.08, Mitchell & Cushman (2 USNM). Government Springs, 3 mi. W Panther Jct., 31.VIII.71, E.E. Grissell (4 FSCA). Green Gulch, 14.V.59, W.R.M. Mason (1 CNC). **Burnet Co.**, Inks Lake St. Pk, J. Heraty—28-29.VI.86 (1 UCRC); North Trail, 2.V.87 (1 UCRC, 1 TAMU). **Cooke Co.**, Gainesville, 24.VIII.63 (1 TAMU). **Culberson Co.**, Guadalupe Nat'l Park, McKittrick Canyon, 21.VII.82, G. Gibson (1 CNC). Pine Springs, 3.6 mi. S, Old Guadalupe Pass, 5200', 20-22.VII.82, G. Gibson (8 CNC). Van Horn, 14.5 mi. N, Hwy 54, 19.VII.82, G. Gibson (1 CNC). **Dallas Co.**, Dallas, C.R. Jones (1 USNM). **Dickens Co.**, Spur, 7.VI.29, R.K. Fletcher (1 USNM). **Hartley Co.**, Romero, 22.VI.40, R.H. Beamer (1 UCRC). **Hidalgo Co.**, Bentsen-Rio Grande S.P. 16.III.84, R. Wharton (1 TAMU). Westlaco, X.88 (1 UCDC). **Jeff Davis Co.**, Ft. Davis—1.VI.59, W.R.M. Mason (2 CNC); Point of Rocks, 29.V.59, W.R. Mason (1 CNC); 5 mi. S, Chiricahua Desert Inst. Preserve, 4750', 19.VII.82, G. Gibson (7 CNC). Kent, 38 km S, 15.VIII.96, L.A. Baptiste (4 UCDC). **Jim Wells Co.**, Ben Bolt, 8 mi. W, La Copita Res. Sta. 20.V.87, J.B. Woolley (4 TAMU). **Kerr Co.**, Kerrville, 4.V.60, L.J. Bottimer (1 CNC). **Knox Co.**, 30.V.72, C.E. Rogers, ex *Sibinia sulcatulus* (1 TAMU). 22.VI.73, Rogers, *Microlarinus lareynii* (1 USNM). **Lubbock Co.**, Lubbock, III.70, D.R. Rummel, on weed (1 USNM). **Presidio Co.**, Big Bend Ranch, St. Nat. Area—Aqua Adentro Spring, 15.8 mi. NE Rt. 170, 29°29'N 104°6'W, 2.IX.93, E.E. Grissell & R.F. Denno, on *Bacharris* sp. (9 USNM); Marfa, 5.VI.08, par. *Bruchus*, Hunter No. 1662 (8 USNM); 1.7 mi. NE McGuirks Tank, 29°29'N 103°48'W, 4.IX.93, E.E. Grissell & R.F. Denno, on *Rhus virens* (2 USNM); Ojito Adentro, 29°29'N 104°3'W, 3.IX.93, E.E. Grissell & R.F. Denno, on *Phaseolus atropurpureus* (2 USNM); Duck Pond, 5 mi. W Saucedo Ranch, 29°29'N 104°1'W, 4-5.IX.93, E.E. Grissell & R.F. Denno, on *Solanum* sp. (1 USNM); 0.5 mi. NE Saucedo Ranch, 29°28'N 103°56'W, 4.IX.93, E.E. Grissell & R.F. Denno (1 USNM). Presidio, 15.VI.50, in *Acacia vernicosa* pods with bruchids—2815, J.H. Russell, (1 USNM); 2814 (20 USNM). **Travis Co.**, Austin—20.VII.13, C. Hartmann, ex alfalfa seed, (3 USNM); 11 mi. S, Heep Farm, 2.VIII.72, E.E. Grissell, ex *Parthenium hysterophorus* (3 TAMU); Zilker Pk, Barton Ck., 13.X.79, T. Friedlander (1 TAMU). **Val Verde Co.**, Seminole Cyn. St. Park—1400', 15.IV.89, J.M. Heraty (5 UCRC); 40 mi. W of Del Rio, 19.VII.86, Heraty (1 UCRC); Devils River [State Natural Area], 5.IV.07, Hunter No. 1408, bred *Mimosa borealis* pod (2 USNM). **Victoria Co.**, Victoria, 26.XII.88, J.D. Mitchell, bred *Solanum rostrat.* (1 CNC, Photo 2011-5). **Wichita Co.**, 1-7.X.73, C.E. Rogers, ex *Microlarinus* sp. (1 TAMU). **Zavala Co.**, Nueces R., 11.VIII.60, H.R. Burke (1 TAMU). **UTAH: Emery Co.**, Buckskin Spring, 3 mi. N Goblin Valley, 30.VIII.81 (1 USNM). Goblin Valley State Reserve, 6 mi. E, 29.VIII.81, E.E. Grissell (3 USNM). Little Gilson Butte, 3m, 1570 km, 3-7.VIII.97, M&J Wasbauer (1 UCDC). **Salt Lake Co.**, Salt Lake—30.VIII.11, 11.IX.11 (2 CNC); Webster No. 6612—12, 28, 30.VIII.11, 2, 5, 11, 12.IX.11, (75 USNM), H.S. Smith. Salt Lake Lab, 6.IV.15, L.P. Rockwood, ex *Bruchophagus funebris* (1 CNC). Salt Lake Station, 15.IX.15, T.R. Chamberlain, Webster No. 6612, reared from *B. funebris* (3 USNM). **Washington Co.**, St. George, 15.VI.30, E.W. Davis, *Heliotropium xerophilum* (1 USNM). **WASHINGTON: Asotin Co.**, Field Springs St. Pk., south of Anatone, 28.VII.85, Finnamore & Thormin (1 CNC). **WYOMING: Natrona Co.**, Casper, 30.VII.63, G. Gordh (4 UCRC). **Platte Co.**, Wheatland, 11 mi. N, 4820', 16.VI.82, G. Gibson (2 CNC). **Sweetwater Co.**, Point of Rocks, 11.6 mi. E, 3.VIII.83 (1 UCRC), 30.VII.83 (2 UCRC), J.D. Pinto.

NEOTROPICAL. MEXICO. Baja California Norte: Bahia de Los Angeles, 1 mi. from coast, 15.V-15.VI.95, T. Jackson (1 CNC). **Baja California Sur:** Las Barracas, 1.VI.85, P. DeBach (1 UCRC). **Coahuila:** Saltillo, 12.4 mi. S, 4.VII.85, J. Woolley & G. Zolnerowich (1 TAMU). Torreon, (Laredo POE [point of entry]), 28.VII.58,

Acacia seeds (1 USNM). **Guanajuato:** Guanajuato, 3.6 mi. NE, 5.VII.85, J. Woolley & G. Zolnerowich (1 TAMU). **Nuevo León:** Bustamante, Santo Thomas, 18.V.84, Gordh, Sierra & Rodrigues (1 UCRC). Galeana, Cerro Potosi, 2347m, 4.VI.83, M. Kaulbars (1 CNC). Monterrey, 9 mi. S, 11.VIII.72, E.E. Grissell (1 TAMU). Municipio El Carmen—Hda. Bernabe Villarreal, 10.VII.83, A. Gonzalez H. (2 UCRC); El Carmen, 10.VII.83, A. Gonzalez H. (2 UCRC). Municipio Escobedo, Hda. El Canada, 12.VII.83, G. Gordh (3 UCRC). Municipio Santiago, El Cercado, Hda. Las 3 Blanquitas, 9.VII.83, A. Gonzalez H. (1 UCRC). Salinas Victoria, 20 km N, Carr. 40, 13.VII.83, A. Gonzalez H. (2 UCRC). Villadamas [Villaldama?], 18.V.84, J.D. Pinto (1 UCRC). Villa de Santiago, San Juan Bautista, 17.V.84, Sierra & Rodrigues (2 UCRC). **Sonora:** Valle del Yaqui, 21.VI.60, alfalfa seeds (1 USNM). **Oaxaca:** La Cumbre, 1.4 mi. NE, 18.VII.85, J. Woolley & G. Zolnerowich (1 TAMU). **Veracruz:** Cardel, 3 mi. N, by Rio Actopan, 31.X.82, J.T. Huber & A. Gonzalez (12 UCRC).

Distribution. Map 6.



MAP 6. Distribution of *Trimeromicrus maculatus* Gahan.

Hosts. A primary parasitoid of Curculionidae (Coleoptera) and seed-infesting species of *Bruchophagus* Ashmead (Hymenoptera: Eurytomidae), and a hyperparasitoid of the alfalfa gall midge, *Asphondylia websteri* Felt (Diptera: Cecidomyiidae) (Gibson *et al.* 2006). Based on material examined, new host records include—**Chrysomelidae:** *Bruchus* sp. **Curculionidae:** *Endalus celatus* Burke; *Microlarinus lareynii* (Jacquelin du Val); *Sibinia setosa* (LeConte) [= *S. sulcatulus*].

New plant associates (most apparently reared from seeds) include—**Asteraceae:** *Helenium* sp.; *Helianthus* sp.; *Iva axilaris* Pursh; *Parthenium hysterophorus* L. **Brassicaceae:** *Brassica juncea* (L.); *Capsella bursa-pastoris* (L.); *Descurainia* [= *Sophia*] *sophia* (L.); *Erysimum cheiranthoides* L.; *Lesquerella douglasii* S. Watson. **Fabaceae:** *Acacia constricta* Bentham, *A. greggii* A. Gray, *A. neovernicosa* Isely [= *A. vernicosa*]; *Astragalus antiselli* A. Gray, *A. bisulcatus* var. *haydenianus* (A. Gray), *A. calycosus* Torrey, *A. douglasii* (Torrey & A. Gray), *A. lentiginosus* Bentham, *A. mollissimus* Torrey, *A. thurberi* A. Gray, *A. wootonii* E. Sheldon; *Lotus mearnsii* (Britton); *Mimosa aculeaticarpa* var. *biuncifera* Ortega, *M. borealis* A. Gray, *M. dysocarpa* Bentham; *Parkinsonia* [= *Cercidium*] *microphylla* Torre; *Prosopis velutina* Wooton. **Marsileaceae:** *Marsilea mollis* B.L. Robinson. **Scrophulariaceae:** *Linaria vulgaris* Miller. **Solanaceae:** *Solanum rostratum* Dunal.

Discussion. When Heydon and Bouček (1992) synonymized *Trimeromicrus* under *Zatropis* they noted that *T. maculatus* was unique among *Zatropis* species in having metallic blue-green patches on an otherwise dark mesonotum (Fig. 206). However, the spots are sometimes quite obscure, particularly in males, which are sometimes more uniformly green to bluish (Fig. 207), or in very small females. Furthermore, although the colour pattern is quite distinctive, it is not unique among Pteromalinae. I saw single females from Florida (CNC) and Oregon (UCDC) that represent two species with a mesonotal colour pattern (Fig. 205) similar to *T. maculatus*. I tentatively identify both species as *Mesopolobus*, though the female from Oregon has only two anelli and six funiculars. I have also seen some *Neocatolaccus* (Fig. 204) and *Pteromalus* with a similar colour pattern to *T. maculatus*, though typically the spots are not as distinct or as well defined.

An apparently unique feature of *T. maculatus* is a tiny, finely sculptured or shiny bump or at least spot on the ocular margin at about midheight of the eye (Figs 210, 211: arrow). Though this requires close observation and is not always evident in smaller specimens, it is an important secondary feature to assist recognition of individuals in which the normally distinctive colour pattern is not conspicuous and/or that have concealed mandibles. Furthermore, except often for the pedicel, the antenna, including the scape, is more or less uniformly orange to yellowish or, if the flagellum is darker orangey-brown, then at least the scape is light in colour, more yellowish (Fig. 210). This contrasts with *Lyracus* species, which more commonly have the flagellum brown to whitish or at least the scape partly dark.

Heydon and Bouček (1992) did not state explicitly why they synonymized *Trimeromicrus* under *Zatropis*, but undoubtedly this was partly because of the conspicuously long and completely exposed admarginal setae (Fig. 209) similar to most *Lyracus* species. However, as discussed previously, the distinctive setal pattern shared by *Trimeromicrus* and most *Lyracus* is also shared with most *Eurydinoteloides*. The mandibular dentition of *T. maculatus* (Fig. 214), its propodeal sculpture pattern (Fig. 215), and possibly similar mesonotal colour patterns of some *Mesopolobus* (Fig. 205), may indicate *T. maculatus* is more closely related to species classified in *Mesopolobus* than to *Lyracus*. Species of various genera are characterized by a single row of exposed admarginal setae and it is possible that the conspicuously long admarginal setae of *T. maculatus* is simply convergent to that of *Oaxa* and most *Lyracus* and *Eurydinoteloides*.

Although monotypic genera serve little function within classifications for communicating relationships through nomenclature, they do serve to indicate taxa for which correct phylogenetic relationships are uncertain. For this reason, I resurrect *Trimeromicrus* from under synonymy with *Lyracus*.

Summary

Heydon and Bouček (1992) concluded that more study was required on the relationships between what is here interpreted as *Lyracus* and other similar pteromaline genera such as *Eurydinoteloides* and *Mesopolobus*. The present study more precisely differentiates *Lyracus* from *Eurydinoteloides* and *Mesopolobus*, which required clarifying also the generic limits of *Catolaccus*, *Jaliscoa* and *Trimeromicrus*. Nine of thirteen New World species of *Catolaccus* were transferred to other genera, though this was necessitated more because of misinterpretation of *Catolaccus* by historical authors than because of any changes made to the prevailing concept of the genus. The concept and limits of *Eurydinoteloides*, *Jaliscoa*, *Lyracus* and *Trimeromicrus* were modified, which affects keying individuals of these genera using Bouček and Heydon (1997). *Jaliscoa nudipennis* correctly keys to *Jaliscoa* at couplet 153 because of the presence of a mesosternal shelf, but all other *Jaliscoa*, *Eurydinoteloides*, *Lyracus* and *Trimeromicrus* key to and through couplet 184. Most species of *Jaliscoa* and *Eurydinoteloides* have a fore wing marginal fringe, but those with strongly reduced discal setae sometimes lack a fringe and have a relatively short postmarginal vein (e.g. Figs 94, 144). These latter species will key through the first half of couplet 184 to couplet 196. Although all *Jaliscoa* have a distinct malar depression, not all *Eurydinoteloides* with glabrous wings do. Further, males of the genera present a problem if keyed through the second half of couplet 184 because couplet 242, which represents a major dichotomy for pteromalines with two anelli, is constructed only for females. It is therefore more efficient to key Nearctic *Eurydinoteloides* and *Jaliscoa* before couplet 184 based on their derived metapleural structure. Consequently, the lead couplet number in the second half of couplet 183 should be changed from 184 to 184a, and the following couplet inserted:

- 184a(183) Metapleuron variably extensively smooth and shiny and with anterior margin raised at least slightly above level of posterior margin of mesopleuron, often extensively smooth and convexly extended over posterior margin or outward at abrupt angle relative to mesopleuron, though sometimes smooth only anteromesally and with angulate anterior margin only comparatively inconspicuously separated from mesopleuron; head and mesonotum with white, elongate-flattened setae contrasting conspicuously with cuticle. 184b
- Metapleuron entirely sculptured with anterior margin abutting posterior margin of mesopleuron on same level; head and mesonotum often with dark hairlike setae not contrasting conspicuously with cuticle 184
- 184b(184a) *Both sexes*: Flagellum with six funiculars having mps; head and thorax black or with only very slight bluish lustre under some angles of light; gena with distinct malar depression extending about half distance to lower orbit; metapleuron extensively smooth and shiny with anterior margin evenly curved and convexly extended over posterior margin of mesopleuron **Jaliscoa** Bouček
- *Female*: Flagellum with five funiculars having mps. *Male*: Flagellum either with five or six funiculars having mps, but if with six then head and thorax with quite distinct metallic lustre and usually head without broad malar depression and/or metapleuron with anterior margin only slightly angulate and slightly separated from posterior margin of mesopleuron. **Eurydinoteloides** Girault

The above two couplets will not work for all Neotropical specimens because a very few Neotropical *Eurydinoteloides* lack contrasting white setae from the body. Further, what is thought to represent an undescribed Neotropical genus near *Toxeumelloides* is characterized by a modified metapleuron similar to *Jaliscoa*, but has only five funiculars with mps, dark hairlike setae, and a long, smooth and shiny petiole in both sexes.

If *Jaliscoa* and *Eurydinoteloides* are correctly identified through couplet 184a, none of the genera should key through the first half of couplet 236 to couplet 263 (*Catolaccus* and *Lyracus*) because all New World *Lyracus* and *Trimeromicrus* have three anelli and five funiculars. However, if metapleural structure is not visible then female *Jaliscoa* would key to couplet 263. To assist correct differentiation of *Catolaccus* from *Jaliscoa* couplet 263 should be changed to:

- 263(262) Costal cell ventrally setose along entire length; head and mesosoma with hairlike setae not contrasting conspicuously with cuticle; mandibular dentition variable, but at least left mandible often tridentate or middle tooth with additional shorter, ventral, subapical tooth. **Catolaccus** Thomson
- Costal cell ventrally setose only within about apical third; head and mesonotum with parallel-sided, white setae contrasting conspicuously with cuticle; mandibles with four similar teeth. **Jaliscoa**

Both sexes of *Lyracus* and *Trimeromicrus*, and those females and most males of *Eurydinoteloides* with structure of the metapleuron concealed, would key through the second half of couplet 236 to couplet 279. Bouček and Heydon (1997) keyed those with a costula-like transverse ridge on the propodeum through the first half of couplet 279 to couplets 286 (*Eurydinoteloides*) and 287 (*Holcaeus* and *Lyracus*). However, not all *Eurydinoteloides* with a costula have a malar depression. To assist correct identification couplet 286 should be modified as follows:

- 286(285) Head and mesonotum with white, typically elongate-flattened setae contrasting with cuticle **Eurydinoteloides**
- Head and mesonotum with dark hairlike setae not contrasting conspicuously with cuticle. 287

Bouček and Heydon (1997) keyed those *Lyracus* without a costula through the second half of couplet 279 to couplet 303. However, comparatively rare *Lyracus* have a reduced speculum with the admarginal setae extensively concealed by dorsal discal setae. Further, *Trimeromicrus* is resurrected under proposed concepts. Features to distinguish *Lyracus* from *Meraporus* and *Mesopolobus* are discussed under *Lyracus*, but to avoid misidentifications couplet 303 should be modified as follows:

- 303(302) Fore wing with speculum extending to or near stigmal vein such that 1 or 2 rows of conspicuous admarginal setae visible on ventral surface (Figs 349, 350) or if admarginal setae rarely extensively covered by dorsal discal setae then obviously longer than discal setae 303a
- Fore wing with speculum almost always reduced such that 3 or more rows of admarginal setae extensively covered by discal setae, but at least admarginal and discal setae not conspicuously differentiated in length. 304
- 303a(303) Mandibles tridentate, with two teeth and a dorsal truncation; mesonotum usually dark with symmetrical pattern of blue to green spots on mesoscutal medial and lateral lobes, axillae, and scutellum, and with dark hairlike setae; inner orbit usually with tiny bump or smooth and shiny spot at about mid height. **Trimeromicrus** Gahan
- Mandibles with four similar teeth; mesonotum uniformly dark to comparatively bright green with dark hairlike setae or with scattered, small blue to green spots from which broadly lanceolate white setae originate; inner orbit uniformly sculptured **Lyracus** Walker

The new generic concepts resulting from this study better reflect observed distribution of morphological features within Pteromalinae and, presumably, a more natural classification. However, the most important features for distinguishing *Jaliscoa*, *Eurydinoteloides*, *Lycrus* and *Trimeromicrus*, including differences in structure of the metapleuron, fore wing setal pattern, structure and colour of body setae, and even the presence of two versus three anelli, were all shown to be homoplastic or to intergrade. Monophyly of the genera has yet to be demonstrated conclusively and Heydon and Bouček's (1992) conclusion that more study is required to correctly determine relationships between them and other similar forms, particularly in the Neotropical region, remains as valid as when first proposed.

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