

Fossil Platygastroidea in the National Museum of Natural History, Smithsonian Institution

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Abstract

Platygastroid wasps preserved in Dominican amber and oil shale from the Kishenehn formation (Montana, USA) in the National Museum of Natural History are catalogued. Compression fossils in Kishenehn oil shale yield a specimen of *Fidiobia*, a specimen of Telenominae, and a specimen with a *Scelio*-type ovipositor system. Twenty-five described genera are documented from Dominican amber, all of which are known from the extant fauna: *Allostemma* Masner & Huggert, *Aradophagus* Ashmead, *Calliscelio* Ashmead, *Calotelea* Westwood, *Duta* Nixon, *Embidobia* Ashmead, *Embioctonus* Masner, *Fidiobia* Ashmead, *Gryon* Haliday, *Idris* Förster, *Inostemma* Haliday, *Leptacis* Förster, *Leptoteleia* Kieffer, *Macroteleia* Kieffer, *Odontacolus* Kieffer, *Opisthacantha* Ashmead, *Parabaeus* Kieffer, *Paridris* Kieffer, *Platygaster* Latreille, *Plaumannion* Masner & Johnson, *Probarryconus* Kieffer, *Psilanteris* Kieffer, *Spiniteleia* Masner, *Telenomus* Haliday, and *Triteleia* Kieffer. Fourteen of these genera do not have previously published fossil records and are here documented for the first time. *Plaumannion fistulosum* Talamas, **sp. n.**, and *Paridris yumai* Talamas, **sp. n.** are described as new species. A phylogenetic analysis of *Paridris* including *P. yumai* is presented. A male specimen belonging to an undescribed scelionine genus is documented and illustrated, but not described, as the best features for circumscribing this taxon are found in the female, and monographic work on this group is currently underway by other workers. Four specimens from Baltic amber, belonging to *Leptacis*, *Platygaster*, and *Sembilanocera* Brues are presented for comparison to extant specimens and inclusions in Dominican amber.

Keywords

Platygastroidea, Platygastринаe, Scelioninae, Telenominae, Sceliotrachelinae, amber, Miocene, Eocene, taxonomy

Introduction

Our study of the amber collection of the National Museum of Natural History is preceded and enabled by the efforts of Alexandr Rasnitsyn, who identified hymenopteran inclusions to family in 1989. Here we continue this process and provide a finer taxonomic resolution for specimens of Platygastroidea. For most of the genera presented we did not describe the species as new for multiple reasons. First, examples exist of extant species that are found in amber (e.g. *Palaeogryon muesebecki* Masner) and we choose not to operate under the assumption that the species covered here are new simply because they are fossil specimens, particularly because Dominican amber is relatively young. Second, quality morphology-based taxonomy requires examination of primary types and specimens from a broad geographical range to provide a context for interpreting morphology and intraspecific variation. Without synthetic work that provides a sound basis for accurate identification, the description of new species is of little use to taxonomy and can result in the proliferation of unstable species names, which are ultimately detrimental to understanding biodiversity and evolutionary history. Lastly, specimen location and orientation, whether within an amber matrix or a compression fossil, often prevent a complete examination. From our perspective, it makes little sense to describe a new species (or genus) based on specimens with limited assessable morphology without knowing from examination of other species that it can be reliably identified.

We think it is noteworthy that more than half of the fossil platygastroid genera were described by authors who have not published on the extant fauna of Platygastroidea (Meunier 1917, Statz 1938, Schlüter 1978, Carpenter 1992, Nel and Azar 2005, Nel and Prokop 2005, Poinar and Buckley 2012, Ortega-Blanco et al. 2014). Such disjunction does not preclude these works from being useful, but a lack of experience with morphological diversity and character systems within the group is at times evident. We are particularly critical of Ortega-Blanco et al. (2014) who erected 12 new genera, many on the basis of characters that commonly vary within extant genera (notaulus, number of clavomeres, presence of an occipital carina, metasoma length). Perhaps most disappointing in Ortega-Blanco et al. (2014) is the lack of discussion or examination of previously described fossil taxa. Such purely additive taxonomy, without revision of pre-existing concepts, rapidly leads to a foggy classification, increasing the burden on future taxonomists. Furthermore, if intermediate stages of evolution are to be identified that link the stem and crown groups, then the terminals must first be understood well enough to make sense of the fossils and produce meaningful hypothesis about the evolution of this group.

In recent decades very few fossil species have been described from extant genera, and with varying degrees of quality. Perrichot et al. (2014) described a new species of *Macroteleia*, diagnosed on the basis of Muesebeck's (1977) revision of this genus in the New World. Their treatment provides excellent photographs and a reasonable description, but does not mention the examination of any specimens of *Macroteleia* other than the fossil at hand, despite the availability of Muesebeck's material in

North American collections. We compared their images of *M. yaguarum* to the lectotype of *M. surfacei* (USNMMENT00989887) and note that the diagnosis provided by Perrichot et al. (2014) lacks what we consider to be the most obvious characters to separate *M. yaguarum* and *M. surfacei*—the structure of the metascutellum and the sculpture of the posterior mesoscutum. The small amount of effort required to borrow relevant specimens would have greatly increased the diagnostic value of their work and, in our opinion, illustrates an unnecessary split between the taxonomy of the fossil and extant fauna. To facilitate future studies in *Macroteleia*, photographs of Muesebeck's primary types deposited in the USNM, and representatives of all other species identified by him for which we have material at hand, are now publicly available in *Specimage.osu.edu*.

Buhl (2002) described three species of platygastids from Baltic amber with descriptions, diagnoses and illustrations that are inadequate for species-level identification for these speciose genera, and will eventually require redescription, reillustration, and rediagnosis. This kind of casual taxonomy, providing little more than a name that must be formally dealt with by future taxonomists, is proving to be a great hurdle in the advancement of biodiversity science.

The careful circumscription of fossils has taken on an even greater importance in systematics with recent advancements in phylogeny dating techniques (reviewed by Brady 2011). In some cases of higher-level phylogenetic reconstruction, a solid genus-level identification of a fossil group can have a profound impact on determining the date of particular nodes in the resulting chronogram; in fact, some fossil calibration points can affect rather distant nodes in the tree (Buffington et al. 2014). For the purpose of dating phylogenies, generic identification alone is a useful contribution, and in cases where morphology is included in phylogenetic reconstruction (Ronquist et al. 2012), the morphology of the specimens can be used for node dating without formal designation of a name. It should be pointed out that, again, for a fossil to be included within the dating analysis as a terminal, the taxon itself should be well circumscribed and based on specimens with sufficiently visible characters. An error at this stage, due to taxonomic error or misinterpretation of a character, could result in misleading conclusions.

Our goals here are to provide generic identifications to facilitate incorporation of these fossils in thorough species-level revisionary work, including photographs that will allow a first-pass assessment of the specimens. Our photographic efforts focused on specimens that were well preserved, easily photographed, and of morphological interest. We here include images for all genera that we identified, even in cases where the images leave much to be desired. Our philosophy is that an imperfect photograph is better than none at all. Taking the above statements into account regarding haphazard description of fossil species, we are confident in assigning names to two new species discovered through the course of this research.

Plaumannion fistulosum Talamas, sp. n. and *Paridris yumai* Talamas sp. n., are herein described. *Plaumannion* has only two previously described species (Masner et al. 2007), and the New World fauna of *Paridris* was recently revised by Talamas et al. (2012). High quality images for all species were provided by both Masner et al. (2007)

and Talamas et al. (2012), enabling us to determine that these species are both new to science and identifiable by the characters presented here.

Specimens that fit easily into extant genera are presented here simply as fossil records at the generic level. For other taxa, nuanced commentary is warranted and can be found after the heading for each taxon.

Family-level classification

Classification in Platygastroidea at the family-level has undergone changes in the past decade, enacted by workers who do not specialize on the systematics of this taxon and who provided no new analysis of relationships within it (Sharkey 2007, McKellar and Engel 2012). McKellar and Engel (2012), without explanation, treated Platygastriidae as having a single subfamily. In the absence of analysis, formal or otherwise, we reject this change to the classification and here present fossil specimens organized by subfamily: Platygastriinae and Sceliotrachelinae in Platygastriidae, and Scelioninae and Telenominae in Scelionidae.

Materials and methods

Collection

All specimens, excluding those in Baltic amber, are housed in the Department of Paleobiology, National Museum of Natural History, Smithsonian Institution. Inquiries regarding examination or loan of material should be directed to Dr. Conrad Labandeira (labandec@si.edu). The material in Baltic amber was sent to us for identification, and where the specimens will ultimately be deposited is presently unclear, but can be tracked via the specimen CUIDs.

Informatics

Collecting unit identifiers (CUIDs) were assigned only to the specimens that we photographed, which includes all specimens treated taxonomically (*Paridris yumai* sp. n. and *Plaumannion fistulosum* sp. n.). Suppl. material 1 provides the complete list of specimens examined, taxonomic determinations, USNM catalog numbers, and CUIDs, when applicable. The collection data for these specimens can be found in the Hymenoptera Online Database (<http://purl.oclc.org/NET/hymenoptera/hol>) by entering the specimen identifier (CUID) in the search form.

Occurrence records were exported from xBio:D in a Darwin Core Archive, with records to specimen images included, using Audubon Core vocabularies. These

records were subsequently loaded into the xBio:D IPT <<http://xbiod.osu.edu/ipt/>> as a new resource titled, “Fossil *Platygastroidea* of the USNM.” The xBio:D IPT uses the GBIF Integrated Publishing Toolkit software (Robertson et al. 2014) to disseminate biodiversity with the research community via Darwin Core Archives and is the preferred data harvesting method for many biodiversity aggregators, e.g., iDigBio, GBIF, etc.

Photography

Images were produced using a Microvision Instruments imaging system with Cartograph software, a Z16 Leica lens and a JVC KY-F75U digital camera. Single montage images were produced from image stacks with the program CombineZP. In some cases, multiple montaged images were stitched together in Photoshop to produce larger images at high resolution and magnification. Full resolution images, and additional photographs of the taxa treated here, are archived in Specimage, the image repository associated with the Hymenoptera Online Database (<http://purl.oclc.org/NET/hymenoptera/specimage>) and MorphBank (<http://www.morphbank.net>).

Images in Morphbank are organized according to the their level of identification. Links to collections of the full resolution images are provided following the header for each taxon and include many images not included in the figures. In some cases, the photographs in the figures are flipped horizontally to provide consistent views of the specimens, with the head to the left. The images in Morphbank and Specimage are presented in their original orientations.

The images in Specimage may be retrieved by searching the CUID or the taxon name, and are organized in the project “Fossils of *Platygastroidea* in the USNM”.

Morphological terms

Our terminology largely follows Mikó et al. 2007, with a notable exception. We found that striation radiating from the pleurostomal condyle anterior to the malar sulcus and striation posterior to the malar sulcus are independent characters. We here provide an alternative concept for facial striae: “the anatomical cluster anterior to the malar sulcus that is composed of carinae radiating from the pleurostomal condyle”. Similarly, malar striae are defined as “the anatomical cluster posterior to the malar sulcus that is composed of carinae radiating from the pleurostomal condyle”. For specimens in which striation exists but there is no malar sulcus, we apply the term “periepistomal striation”. These terms, and others used in the text, are matched to anatomical concepts in the Hymenoptera Anatomy Ontology (HAO) (Yoder et al. 2010). A full list of morphological terms, definitions, and URLs to additional information in the HAO is provided in Suppl. material 2.

Character annotations

bs	basiconic sensillum (Figs 44–45)
eps	episternal foveae (Fig. 94)
fs	facial striae (Fig. 95)
mees	mesepimeral sulcus (Fig. 94)
mp	mesopleural pit (Fig. 94)
ms	malar striae (Figs 88, 90–91)
pssu	prespecular sulcus (Fig. 94)
sc	submedian carina on T1 (Fig. 80)
shms	mesoscutal suprahumeral sulcus (Fig. 80)
sk	sublateral keel (Fig. 80)
sv	submarginal vein (Fig. 12)

Platygastrinae

Allostemma Masner & Huggert

http://bioguid.osu.edu/xbioc_concepts/7818

Figures 1–4; Morphbank¹

Comments. Figures 1 and 3–4 illustrate specimens of *Allostemma* for which all of the characters were congruent with the diagnostic characters of Masner and Huggert (1989), with the exclusion of the tibial spurs, which we were unable to observe. The form of the extruded ovipositor system provides additional support for our generic determination (Fig. 2), given that this particular form of the ovipositor system is not known to us from other platygastrine genera. This specimen has a distinct break in the submarginal vein of the fore wing, directly proximal to the forked terminus- a character state that we have not yet observed in extant specimens of this genus.

Inostemma Haliday

http://bioguid.osu.edu/xbioc_concepts/7832

Figure 7; Morphbank²

Comments. Our determination of this specimen as *Inostemma* is based primarily on the 4-merous antennal clava and the submarginal vein of the fore wing terminating in a knob; the presence or absence of the felt field on metasomal S2 was not observable. The terminus of the submarginal vein is slightly bilobed in this specimen, a condition that we have not seen previously in *Inostemma*, but which we here attribute to intrageneric variability.

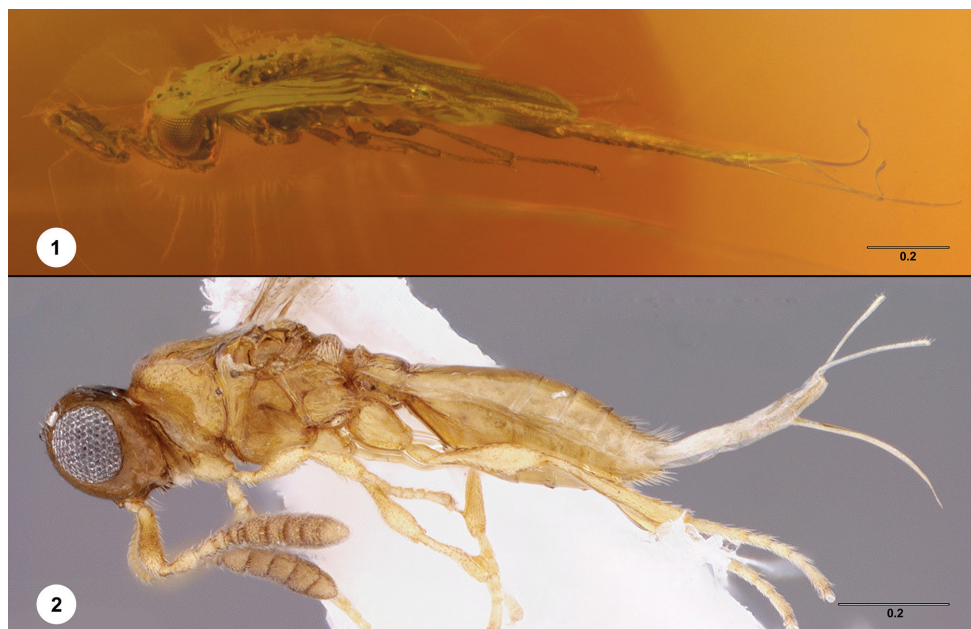


Figure 1–2. 1 *Allotemma*, female (USNMENT00764972), head, mesosoma, metasoma and ovipositor, lateral view 2 *Allotemma burnneum*, female (OSUC 334187), head, mesosoma, metasoma and ovipositor, lateral view. Scale bars in millimeters.

Leptacis Förster

http://bioguid.osu.edu/xbiod_concepts/7836

Figure 5–6; Morphbank³

Comments. *Leptacis* in Baltic amber (Fig. 6), as far as we can observe, exhibits characters used to identify this genus that appears entirely congruent with concepts of this genus based on extant specimens.

Platygaster Latreille

http://bioguid.osu.edu/xbiod_concepts/7843

Figures 8–13; Morphbank⁴

Comments. Hypotheses about the evolution of *Platygaster* are hampered by the nebulous limits of this genus and the huge number of species in the group that have yet to be divided into meaningful subgeneric groups. We found no characters among the species of *Platygaster* in Dominican amber that cannot be found in extant species. Examination of a specimen in Baltic amber (Figs. 12–13), which we here classify as *Platygaster*, exhibits two noteworthy characters: the submarginal vein in the fore wing is well defined and extends for about one quarter of the wing's length (Fig. 12) and A8–A9 strongly project anteroventrally (Fig. 13), similar to A7–A8 in *Allotropa* (Fig. 14).

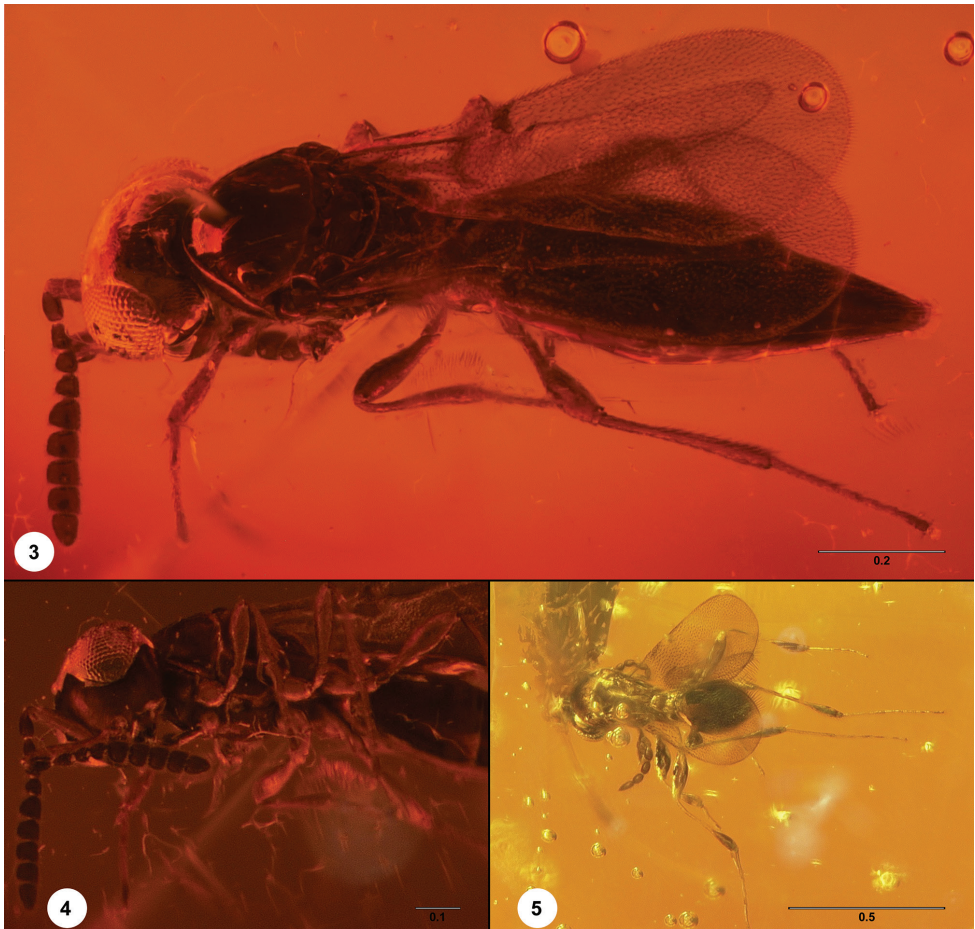


Figure 3–5. **3** *Allostemma*, female (USNMENT01059432), head, mesosoma, metasoma, dorsal view **4** *Allostemma*, female (USNMENT01059432), head, mesosoma, ventrolateral view **5** *Leptacis*, female (USNMENT00903167), head, mesosoma, metasoma, posterodorsal view.

Unplaced Platygastriinae

Morphbank⁵

Sceliotrachelinae

Fidiobia Ashmead

http://bioguid.osu.edu/xbiod_concepts/7866

Figures 15–18; Morphbank⁶

Comments. *Fidiobia* was the most abundant genus in the material we examined, undoubtedly the result of their association with the eggs of phytophagous beetles, Chrysomelidae and Curculionidae (Masner and Huggert 1989), many of which are associated with trees.

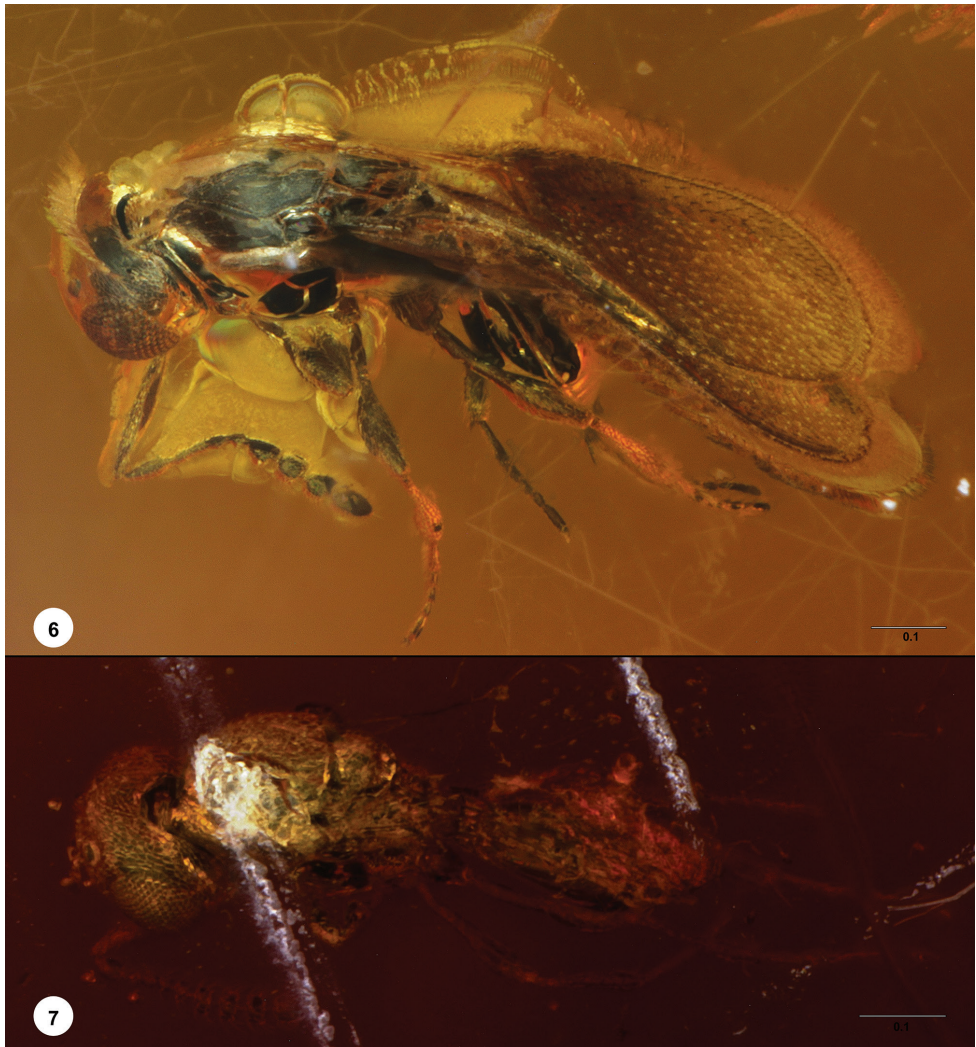


Figure 6–7.6 *Leptacis*, female (USNMENT01109283b), head, mesosoma, metasoma, dorsolateral view
7 *Inostemma*, female (USNMENT00764965), head, mesosoma, metasoma, dorsolateral view. Scale bars in millimeters.

***Parabaeus* Kieffer**

http://bioguid.osu.edu/xbiod_concepts/7872

Figure 19; Morphbank⁷

Telenominae

***Telenomus* Haliday**

http://bioguid.osu.edu/xbiod_concepts/605

Figures 20–24; Morphbank⁸

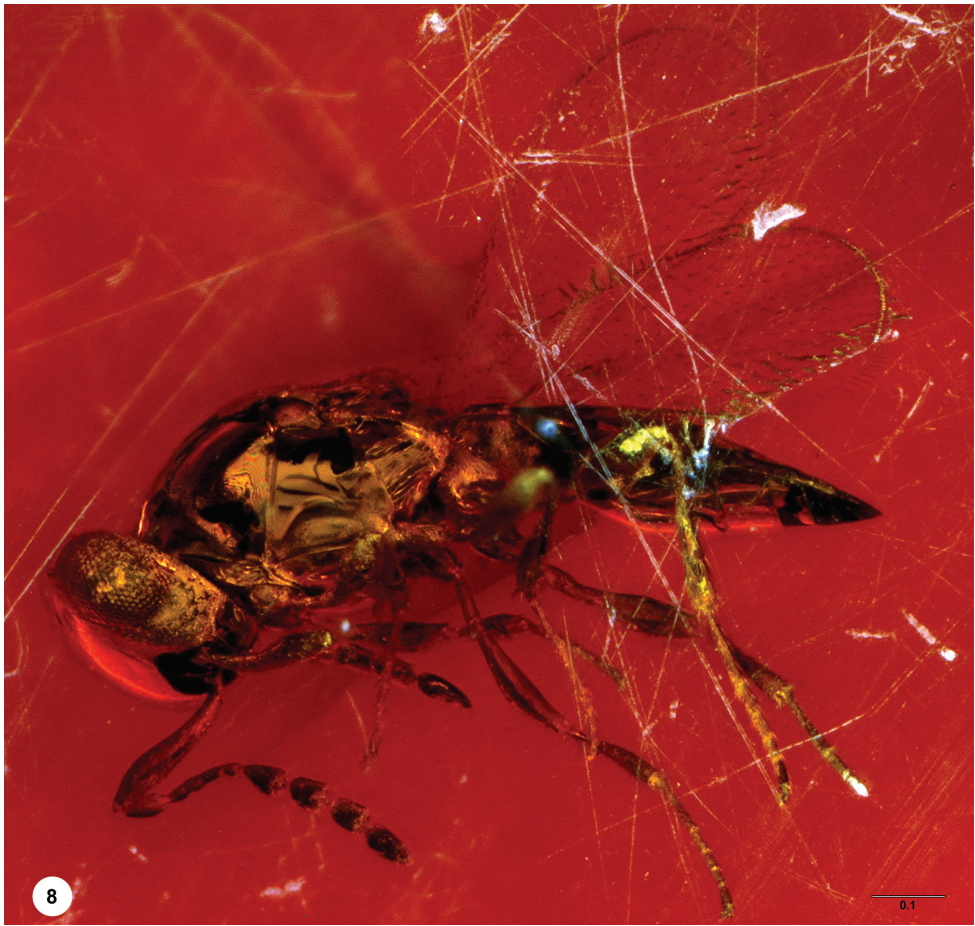


Figure 8. *Platygaster* female (USNMENT00764976), head, mesosoma, metasoma, lateral view.

Telenominae

Figure 25; Morphbank⁹

Comments. We interpret specimen USNMENT00877715 to be the oldest known telenomine based on T2 as the largest tergite, broad laterotergites loosely attached to the sternites, 11-merous antenna, and wing venation that is typical for Telenominae.

Brues (1940) described *Telenomus (Dissolcus) electrus* from Baltic amber with some characteristics that are not found in extant telenomines- 12-merous antennae with a 7-merous clava, neither of which are known to us from the extant fauna. These may represent plesiomorphic states for the subfamily or may indicate that *Telenomus electra* belongs to a scelionine genus with which these characters are consistent.

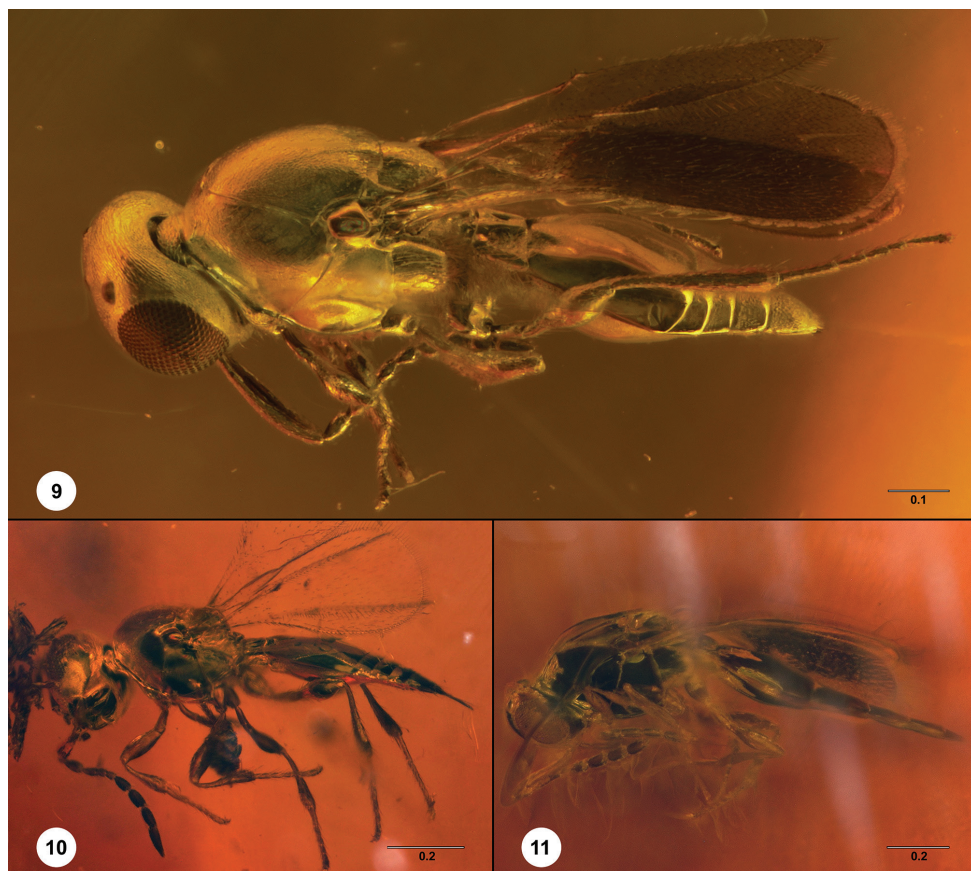


Figure 9–11. **9** female (USNMMENT01059275), head, mesosoma, metasoma, lateral view **10** female (USNMMENT00764988), head, mesosoma, metasoma, lateral view **11** female (USNMMENT00764975), head, mesosoma, metasoma, dorsolateral view. Scale bars in millimeters.

Scelioninae

Aradophagus Ashmead

http://bioguid.osu.edu/biod_concepts/451

Figure 27; Morphbank¹⁰

Comments. The presence of *Aradophagus* in amber is not surprising, given their association with spiders (Vetter et al. 2012), which is the presumed reason for the abundance of *Idris* in amber.

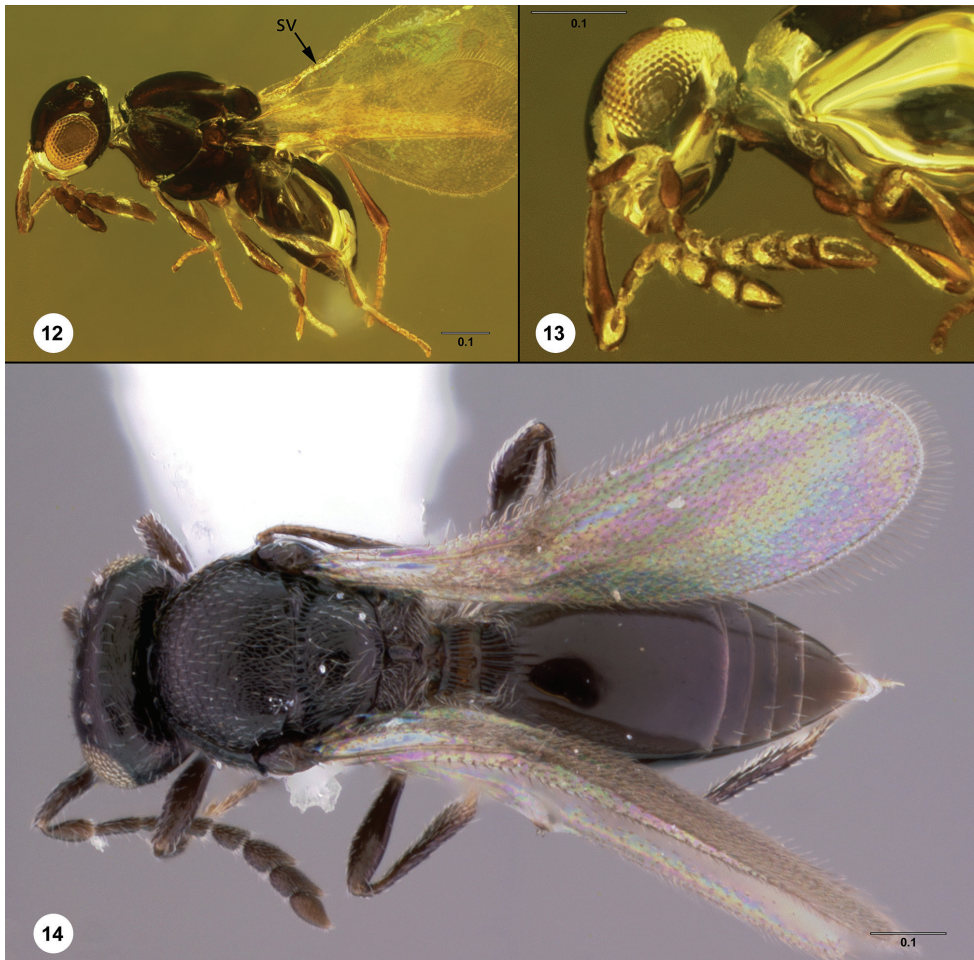


Figure 12–14. **12** *Platygaster*, female (USNMENT01109284), head, mesosoma, metasoma, lateral view **13** *Platygaster*, female (USNMENT01109284), head and antennae, lateral view **14** *Allotropa*, female (OSUC 404951), head, mesosoma, metasoma, dorsal view. Scale bars in millimeters.

Calliscelio Ashmead

http://bioguid.osu.edu/biod_concepts/461

Figures 31–32; Morphbank¹¹

Calotelea Westwood

http://bioguid.osu.edu/biod_concepts/462

Figures 33–36; Morphbank¹²

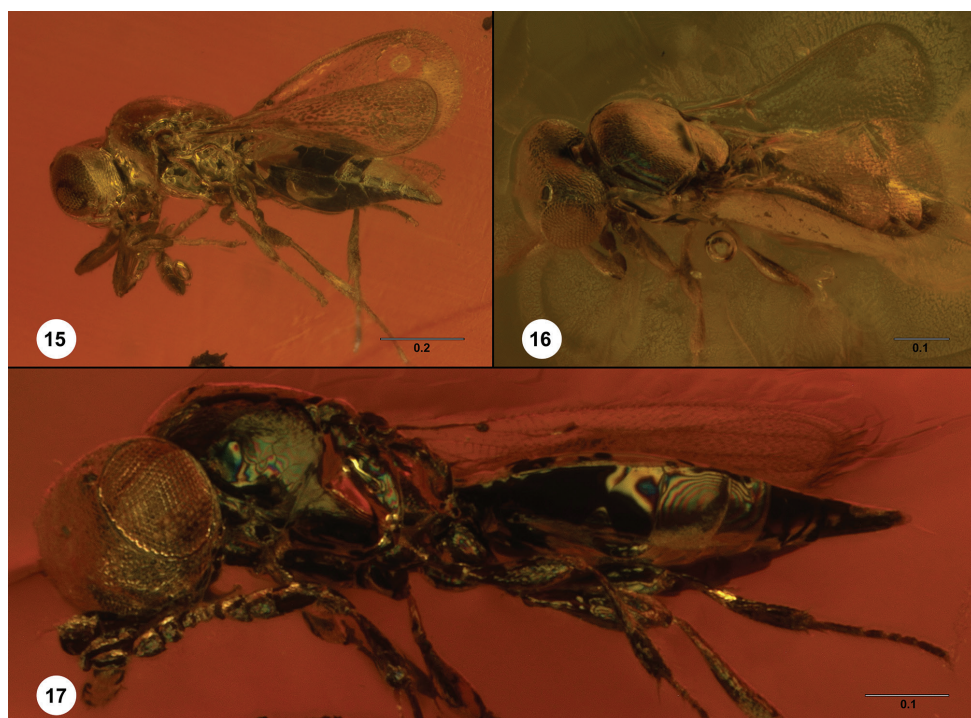


Figure 15–17. *Fidiobia* **15** female (USNMENT01029318), head, mesosoma, metasoma, lateral view **16** female (USNMENT01059277), head, mesosoma, metasoma, dorsolateral view **17** female (USNMENT01059431), head, mesosoma, metasoma, lateral view. Scale bars in millimeters.

Comments. *Calotelea* is abundant in Dominican amber, represented by perhaps half a dozen species in the USNM collection. Consequently, there are many beautifully preserved specimens that will be very useful for work at the species level when the Neotropical fauna of this genus is revised.

Duta Nixon

http://bioguid.osu.edu/xbiod_concepts/474

Figures 37–38; Morphbank¹³

Comments. Figures 37–38 illustrate what we consider to be a typical form of *Duta*. The robust skaphion, absence of malar and facial striae, and simple metascutellum are all useful diagnostic characters. Elongation of A3–A5 is commonly found in this genus, and is expressed here in a moderate form.

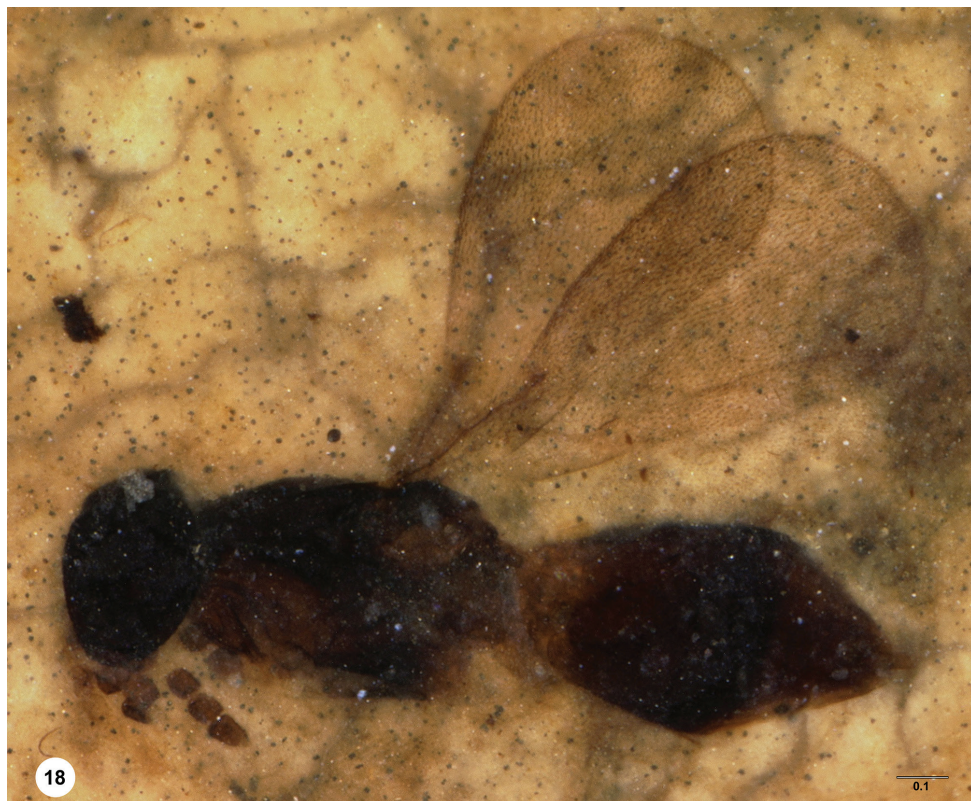


Figure 18. *Fidiobia*, female (USNMENT00877716), head, mesosoma, metasoma, lateral view. Scale bars in millimeters.

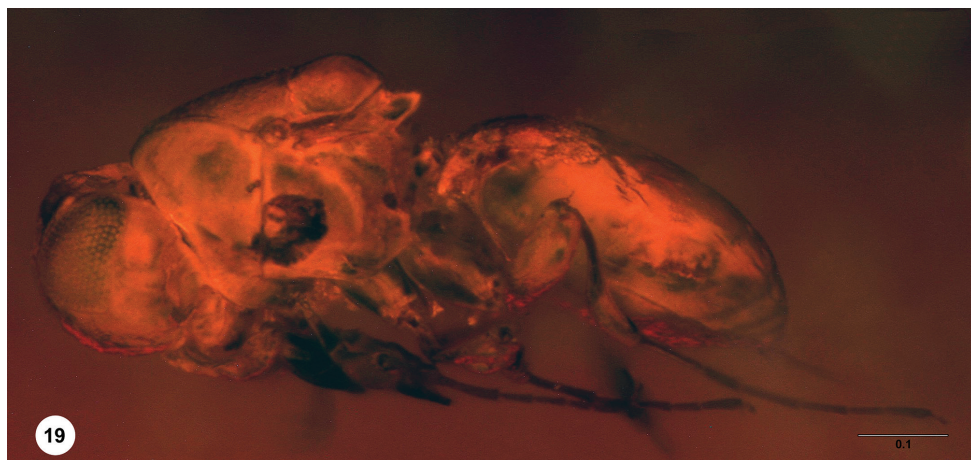


Figure 19. *Parabaeus*, female (USNMENT01059078), head, mesosoma, metasoma, lateral view. Scale bars in millimeters.



Figure 20. *Telenomus*, female (USNMENT00989561), head, mesosoma, metasoma, dorsal view. Scale bars in millimeters.

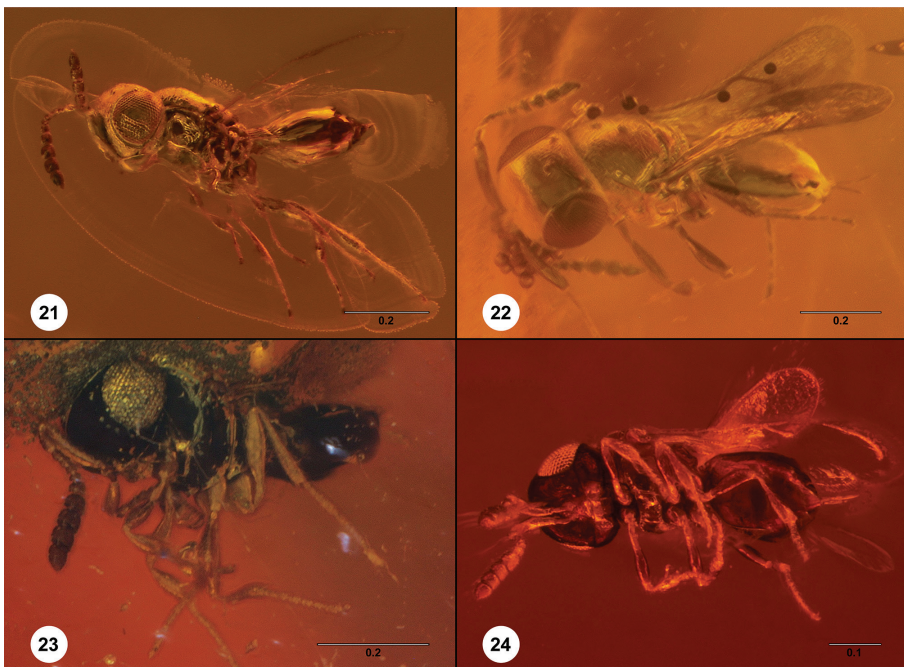


Figure 21–24. *Telenomus*, **21** female (USNMENT01059075), head, mesosoma, metasoma, lateral view **22** female (USNMENT00989564), head, mesosoma, metasoma, dorsolateral view **23** female (USNMENT00989562), head, mesosoma, metasoma, ventrolateral view **24** female (USNMENT01059092), head, mesosoma, metasoma, ventral view. Scale bars in millimeters.

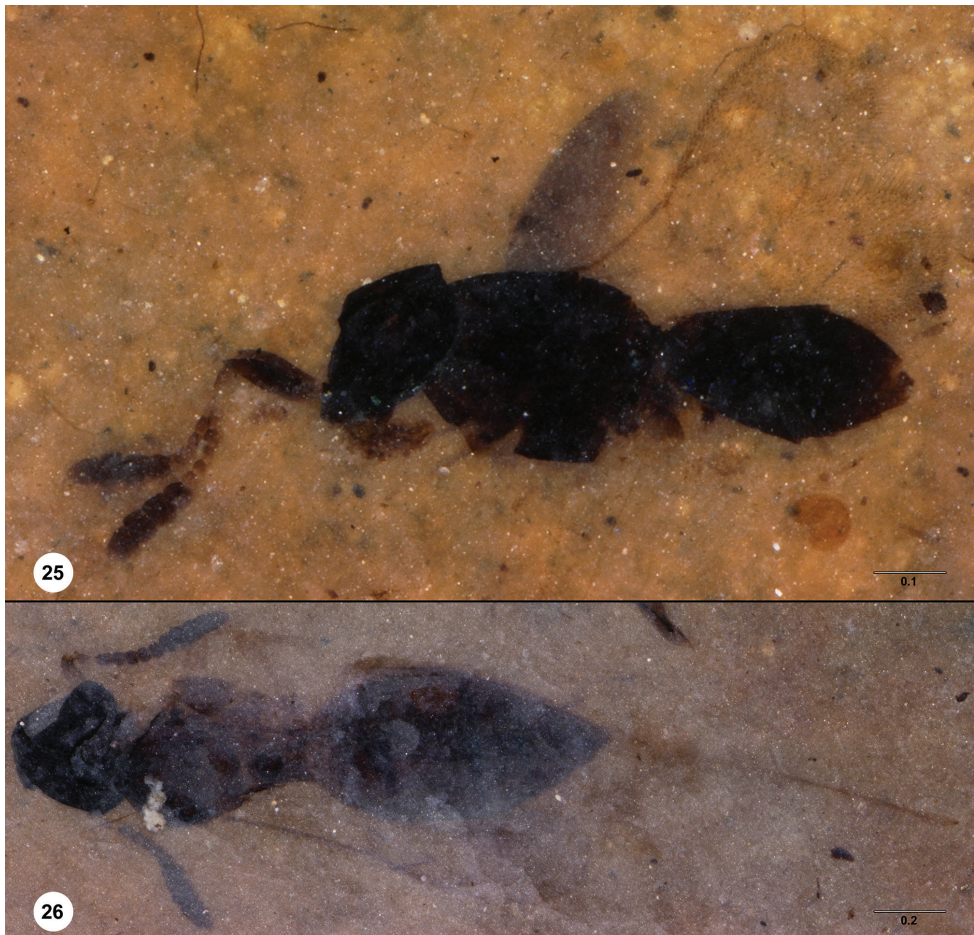


Figure 25–26. **25** Telenominae, female (USNMENT008777715), head, mesosoma, metasoma, lateral view **26** Scelioninae, female (USNMENT00979592), head, mesosoma, metasoma and ovipositor, dorsal view. Scale bars in millimeters.

Embiodobia Ashmead

http://bioguid.osu.edu/xbiod_concepts/478

Figures 28, 39–42, 45, 47; Morphbank¹⁴

Comments. The 3-merous clava of the specimen illustrated in Figures 39–42 initially led us to identify it as *Palaeogryon*. Figure 40 illustrates our first view of the specimen, including the wing venation, the stout bristles along the submarginal vein, and the 3-merous clava that are shared by *Embiodobia* and *Palaeogryon*. Upon cutting the amber to fully observe the number of antennomeres it became clear that this species belongs to *Embiodobia*, and we here reevaluate some of the characters used to diagnose these genera.

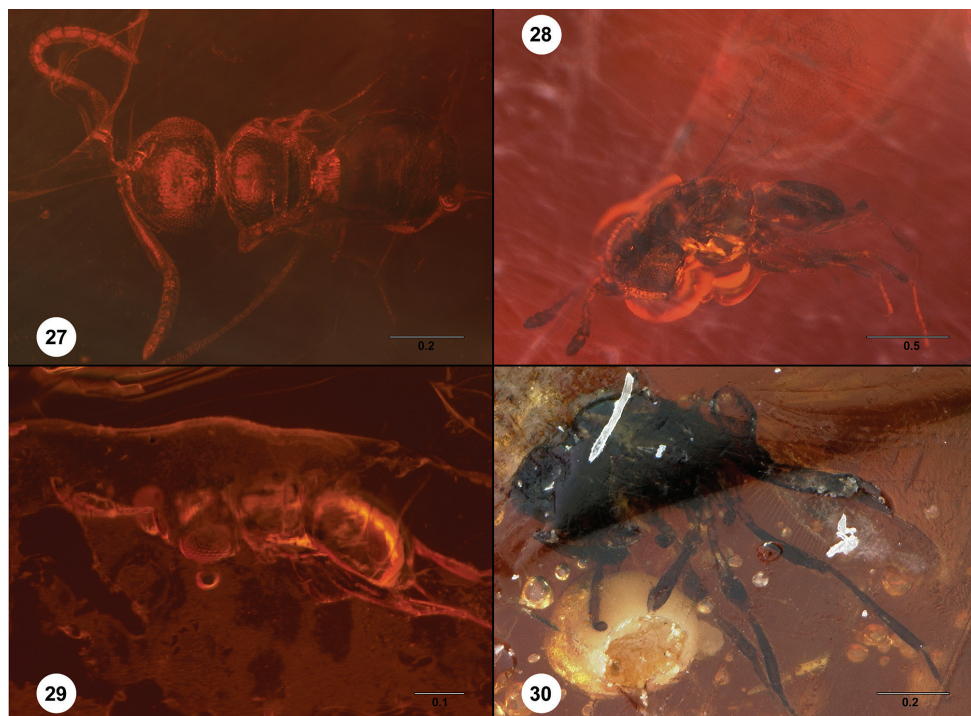


Figure 27–30. **27** *Aradophagus*, female (USNMENT01109096), head, mesosoma, metasoma, dorsal view **28** *Embidobia*, female (USNMENT01059276), head, mesosoma, metasoma, dorsolateral view **29** *Embioctonus*, female (USNMENT01059080), head, mesosoma, metasoma, dorsolateral view **30** *Odontacolus* (USNMENT00979980), head, mesosoma, metasoma, lateral view. Scale bars in millimeters.

The clava in platygastroids has been defined in two ways, by width of the antennomere and by the presence of basiconic sensilla (Bin 1981). Masner (1976) used size to define clavomeres, and in most *Embidobia* A8 is distinctly larger than A7, resulting in its designation as a clavomere. The presence of basiconic sensilla provide an unambiguous means of designating clavomeres but can be challenging to observe in small specimens. Despite this, we prefer the latter definition, and clarify that all *Embidobia* that we have examined have a 3-merous clava based on the presence of basiconic sensilla. Clavomeres tend to be larger than non-clavomeres, and so size is sometimes a useful, but imperfect, proxy for the the presence of sensilla when the sensillar structures are not within view.

Figure 48 illustrates the metascutellum of *Palaeogryon*, which is sufficiently developed posteriorly to be unreliable, in our opinion, for separating this genus from *Embidobia* (compare to Figures 40, 42). Masner (1976) also used the frontal depression (antennal scrobe) to separate *Embidobia* from *Palaeogryon*. We do not consider the dorsal limit of the antennal scrobe to be sufficiently defined to warrant its use in

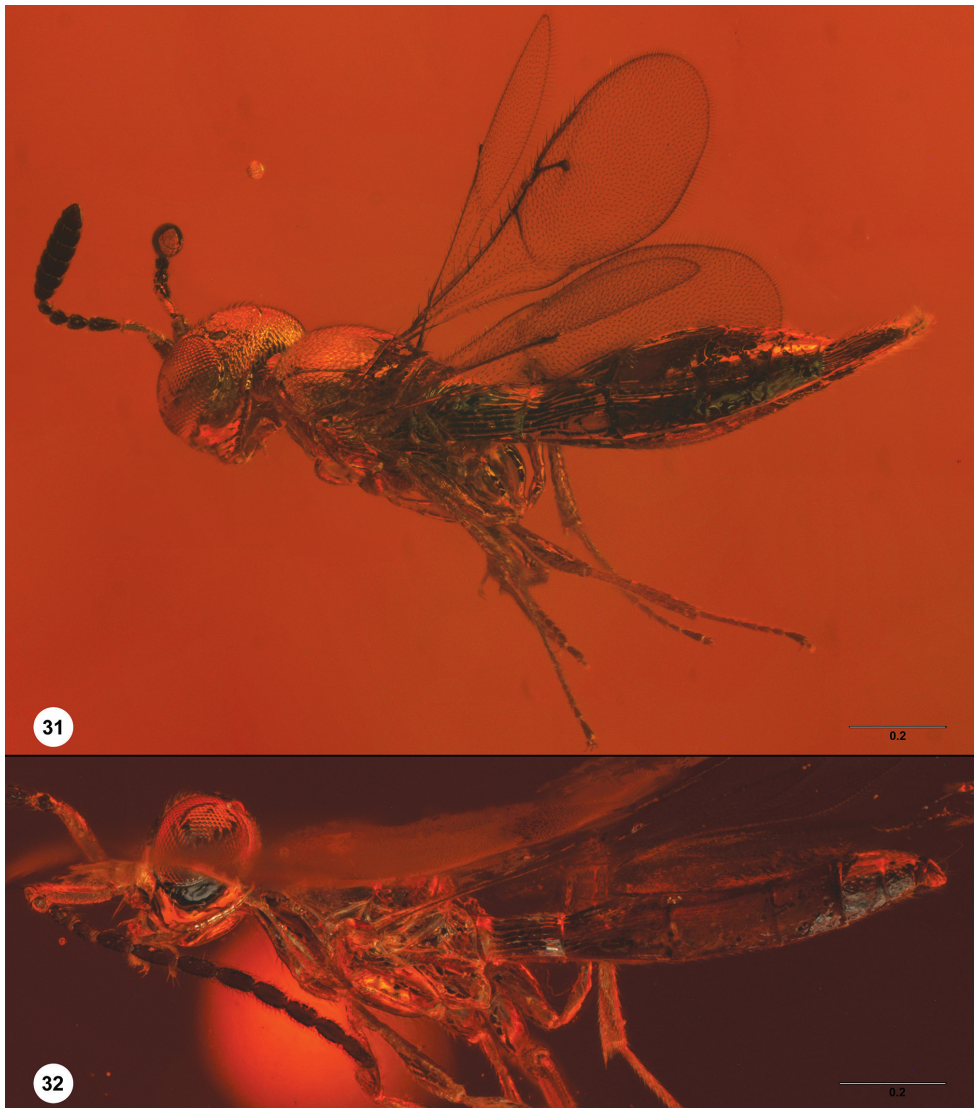


Figure 31–32. *Calliscelio* **31** female (USNMENT01059082), head, mesosoma, metasoma, postero-lateral view **32** male (USNMENT01109332), head, mesosoma, metasoma, lateral view. Scale bars in millimeters.

separating these genera (see Figs 46–47). However, *Embidobia* and *Palaeogryon* remain easily identifiable by the number of antennomeres, 9 in *Palaeogryon* and 11 in *Embidobia*, and so reliance on these subtly differing characters is not necessary.

Palaeogryon is remarkably similar to *Sembilanocera* Brues (Baltic amber, Figures 49–50) with which it shares 9-merous antennae with a 3-merous clava, and a sharp angle in the submarginal vein at its intersection with the basal vein (or remnants of

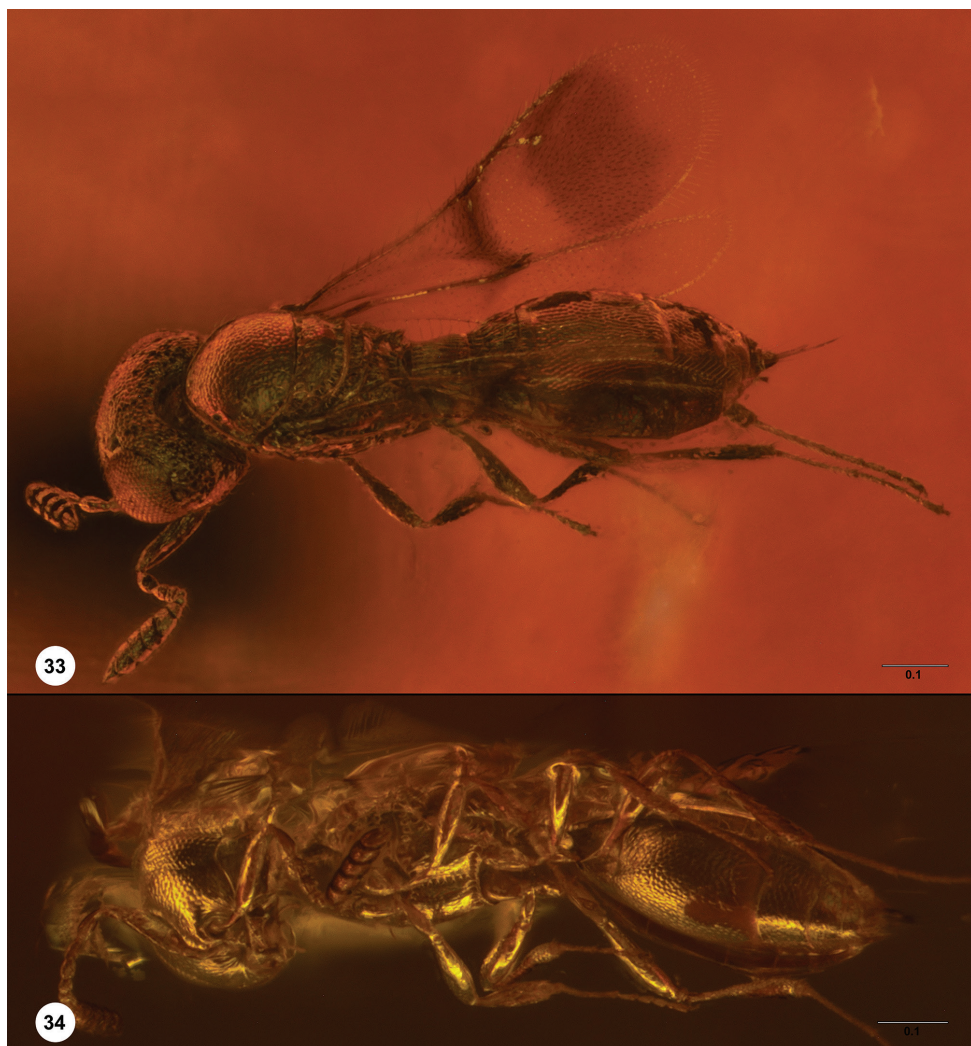


Figure 33–34. *Calotelea* **33** female (USNMENT01109103), head, mesosoma, metasoma, dorsolateral view **34** female (USNMENT01109126), head, mesosoma, metasoma, ventrolateral view. Scale bars in millimeters.

the basal vein). The two may be separated by characters used in the generic description of *Palaeogryon* (Masner 1969): postmarginal vein much longer than stigmal vein; submarginal, marginal, and postmarginal veins with large bristles; frontal depression present; ocelli distant from inner orbits of eye. In *Sembilanocera*, the postmarginal and stigmal vein are approximately equal in length; the wing veins lack bristles; the frontal depression is absent, and the ocelli are close to the inner orbits.

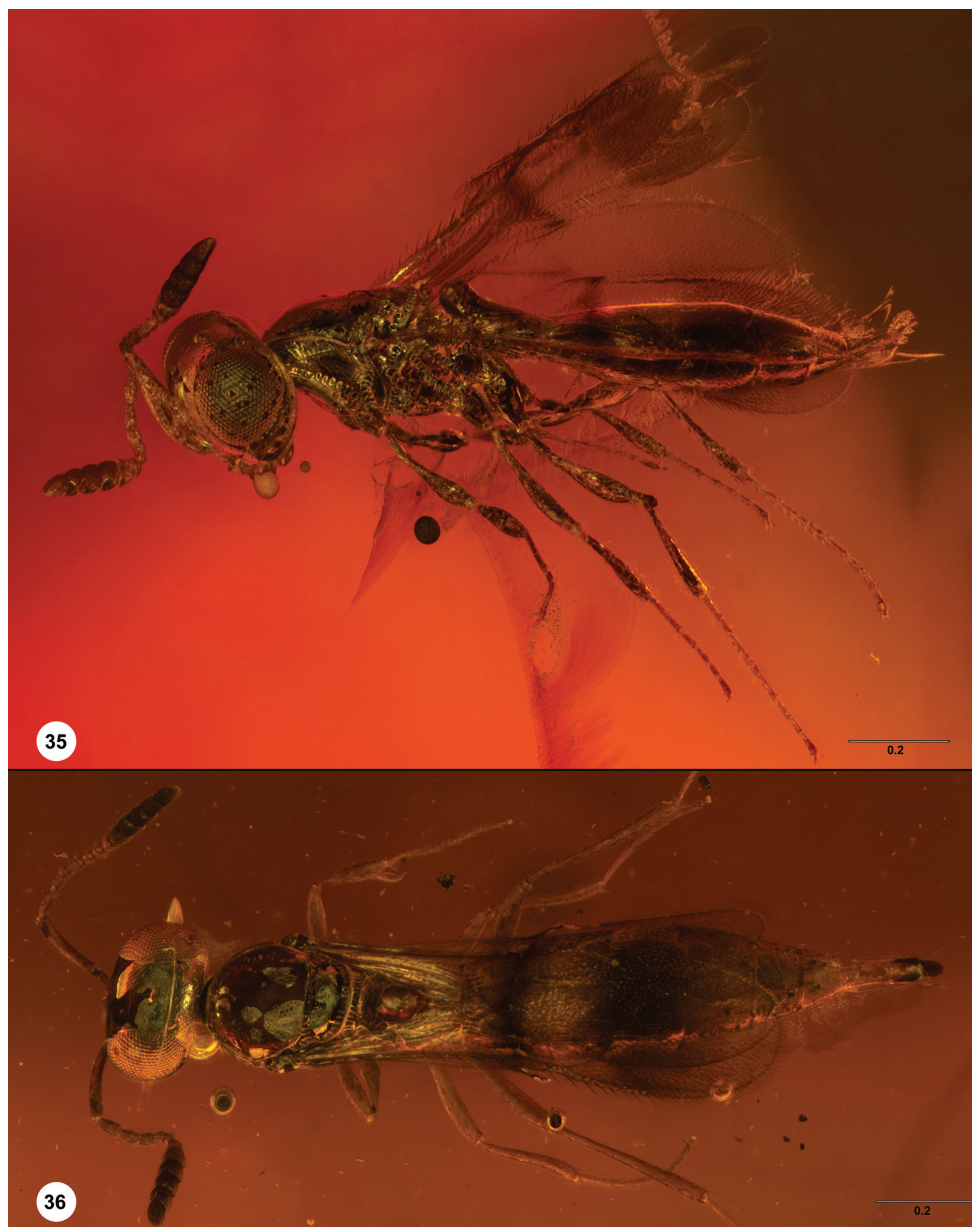


Figure 35–36 *Calotelea* **35** female (USNMENT01059376), head, mesosoma, metasoma, lateral view **36** female (USNMENT01109099), head, mesosoma, metasoma and ovipositor, dorsal view. Scale bars in millimeters.

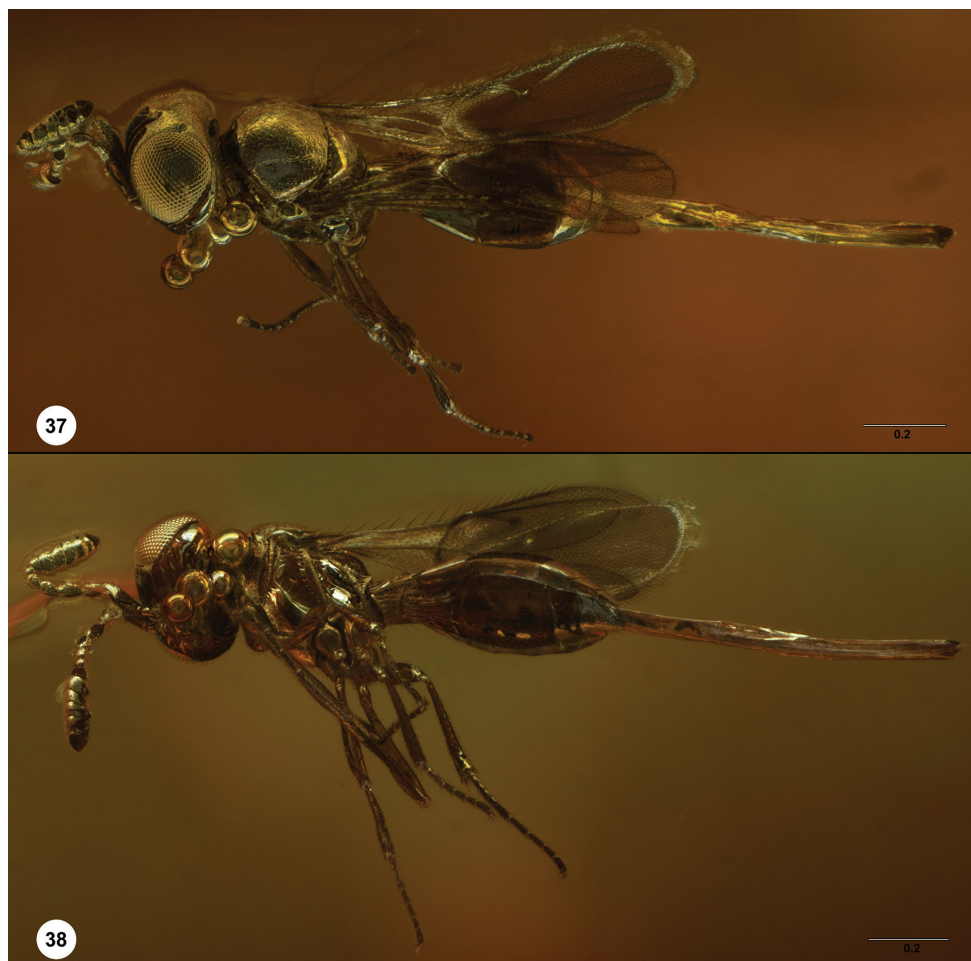


Figure 37–38. *Duta*, female (USNMMENT01059071) **37** head, mesosoma, metasoma and ovipositor, dorso-lateral view **38** head, mesosoma, metasoma and ovipositor, ventrolateral view. Scale bars in millimeters.

Embioctonus Masner

http://bioguid.osu.edu/xbiod_concepts/479

Figures 29, 43–44; Morphbank¹⁵

Comments. In addition to the characters presented by Masner (1980), *Embioctonus* may be separated from *Embidobia* by the incomplete or absent malar sulcus (Fig. 43).

Gryon Haliday

http://bioguid.osu.edu/xbiod_concepts/487

Figures 51–54; Morphbank¹⁶



Figure 39–40. *Embidobia*, female (USNMENT01109100) **39** head, anterior view; mesosoma and metasoma, ventrolateral view **40** head, mesosoma, metasoma, posterolateral view. Scale bars in millimeters.



Figure 41–42. *Embidobia*, female (USNMENT01109100) **41** head, lateral view; mesosoma and metasoma, ventrolateral view **42** head, mesosoma, metasoma, anterodorsal view. Scale bars in millimeters.

***Idris* Förster**

http://bioguid.osu.edu/biod_concepts/496

Figures 55–62; Morphbank¹⁷

Comments. Two generic concepts exist for *Idris*. One includes species in which females have T1 expanded dorsally into a horn and the other concept excludes these species, placing them in *Ceratobaeus* Ashmead. Masner and Denis (1996) treated *Ceratobaeus* as a jun-

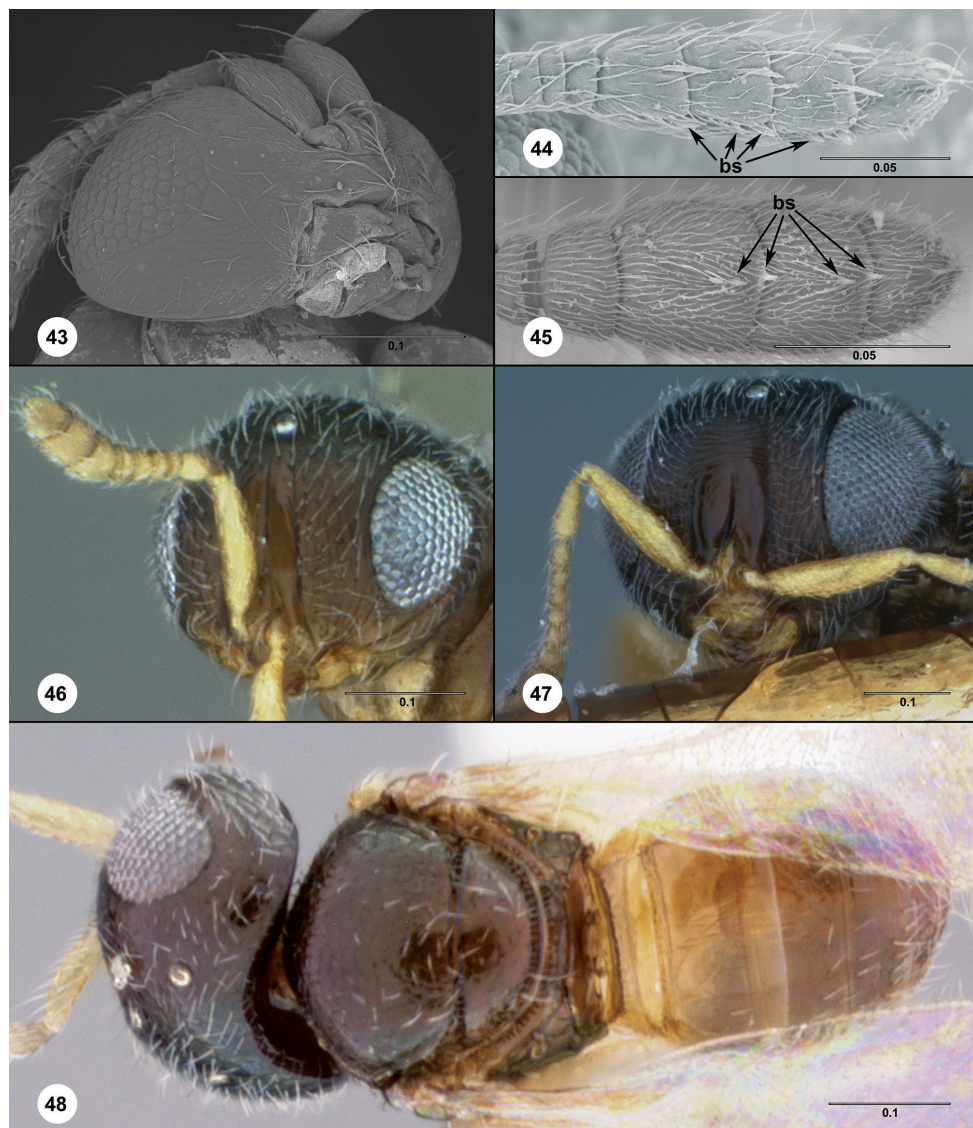


Figure 43–48. **43** *Embioctonus*, female (USNMENT01059112), head, ventrolateral view **44** *Embioctonus*, female (USNMENT01059113), antennal clava, lateral view **45** *Embidobia*, female (USNMENT01059111), antennal clava, ventral view **46** *Palaeogryon muesebecki*, holotype female (USNMENT01059240), head and antennae, anterolateral view **47** *Embidobia urichi*, paralectotype female (USNMENT01109249), head and antennae, anterior view **48** *Palaeogryon*, female (OSUC 404926), head, mesosoma, metasoma, dorsal view. Scale bars in millimeters.

ior synonym of *Idris* based on their analysis of Nearctic *Idris* in which they stated that the horn of T1 is variable within multiple species groups of *Idris*, and thus the horn does not correspond to a monophyletic group. Iqbal and Austin (2000) resurrected *Ceratobaeus* on more utilitarian grounds. They argued that *Ceratobaeus* provided a useful means of categorizing species for identification and that the possible polyphyly of *Idris* was justification for maintaining a polyphyletic *Ceratobaeus*. The molecular phylogeny of the tribe Baeini by Carey et al. (2007) retrieved both *Idris* and *Ceratobaeus* as polyphyletic, a state that could be resolved by treating *Ceratobaeus* and *Hickmanella* Austin as junior synonyms.

We here follow the classification of Masner and Denis (1996) and treat species with a horn on T1 as part of *Idris*. We are not making nomenclatural acts in either *Idris* or *Ceratobaeus* and without comprehensive study of them do not wish to do so, particularly because a phylogenetic study of generic relationships in Platygastroidea, conducted as part of the Platygastroidea Planetary Biodiversity Inventory (PBI) is currently in its final stages and will provide the most thorough analysis of the group to date.

***Leptoteleia* Kieffer**

http://bioguid.osu.edu/xbiod_concepts/501

Figure 63; Morphbank¹⁸

***Macroteleia* Westwood**

http://bioguid.osu.edu/xbiod_concepts/504

Figure 64; Morphbank¹⁹

***Odontacolus* Kieffer**

http://bioguid.osu.edu/xbiod_concepts/525

Figure 30; Morphbank²⁰

***Opisthacantha* Ashmead**

http://bioguid.osu.edu/xbiod_concepts/527

Figures 66–69; Morphbank²¹

***Paridris yumai* Talamas, sp. n.**

<http://zoobank.org/0BB0E67F-8B31-4DFC-93E9-CCEED5CD3FFB>

http://bioguid.osu.edu/xbiod_concepts/386112

Figures 70–73; Morphbank²²



Figure 49–50. *Sembilanocera*, female (USNMENT01109280) **49** habitus, dorsolateral view **50** habitus ventrolateral view. Scale bars in millimeters.



Figure 51. *Gryon*, female (USNMENT01059086), head, mesosoma, metasoma, lateral view. Scale bars in millimeters.

Description. Female body length: 1.57–1.79 mm ($n=3$). Male body length: 1.56–1.68 mm ($n=2$). Number of basiconic sensilla on A8: 1. Width of clypeus: equal to or less than width of interantennal process. Lateral corner of clypeus: projecting into acute angle. Development of interantennal process ventrally: not reaching clypeus. Number of mandibular teeth: three. Length of mediofacial striae: not extending above midpoint of eye. Shape of gena in dorsal view: moderately receding behind compound eye. Striae on gena: pronounced. Length of striae on gena: extending above ventral margin of eye. Distribution of microsculpture on head: absent. Length of OOL: greater than 2 ocellar diameters. Occipital carina above foramen magnum: present. Anterior margin of occipital carina: comprised of small to miniscule cells.



Figure 52–54. *Gryon* **52** female (USNMENT01059072), head, mesosoma, metasoma, lateral view **53** female (USNMENT00989156), head and mesosoma, anterodorsal view **54** female (USNMENT00989156), head and mesosoma, posteroventral view. Scale bars in millimeters.

Setation of postgena: sparse. Ventral extent of occipital carina: uncertain, extending to base of mandible.

Transverse pronotal carina: present in posterior half of pronotum. Shape of pronotal shoulder in dorsal view: narrow and striplike. Form of pronotal suprahumeral sulcus: areolate.

Macrosculpture of anterior medial mesoscutum: absent. Notaulus: percurrent, reaching suprahumeral sulcus as a smooth furrow. Orientation of notauli: parallel. Shape of notaulus at posterior apex: ovoid. Macrosculpture of mesoscutellum: absent.



Figure 55–58. *Idris* **55** female (USNMENT01059079), head, mesosoma, metasoma, dorsolateral view **56** female (USNMENT00903168), head, mesosoma, metasoma, lateral view **57** female (USNMENT00979982), habitus, dorsal view **58** female (USNMENT00979982), habitus, lateral view. Scale bars in millimeters.

Postacetabular sulcus: smoothly furrowed. Mesopleural carina: absent. Punctures on posterodorsal mesepimeral area: large. Sculpture of mesopleuron anteroventral to femoral depression: densely punctate anteriorly, smooth posteriorly and on ventral surface. Sculpture of posterior mesepimeral area: smooth.

Form of metascutellum in female: bispinose. Form of metascutellum in male: bispinose.

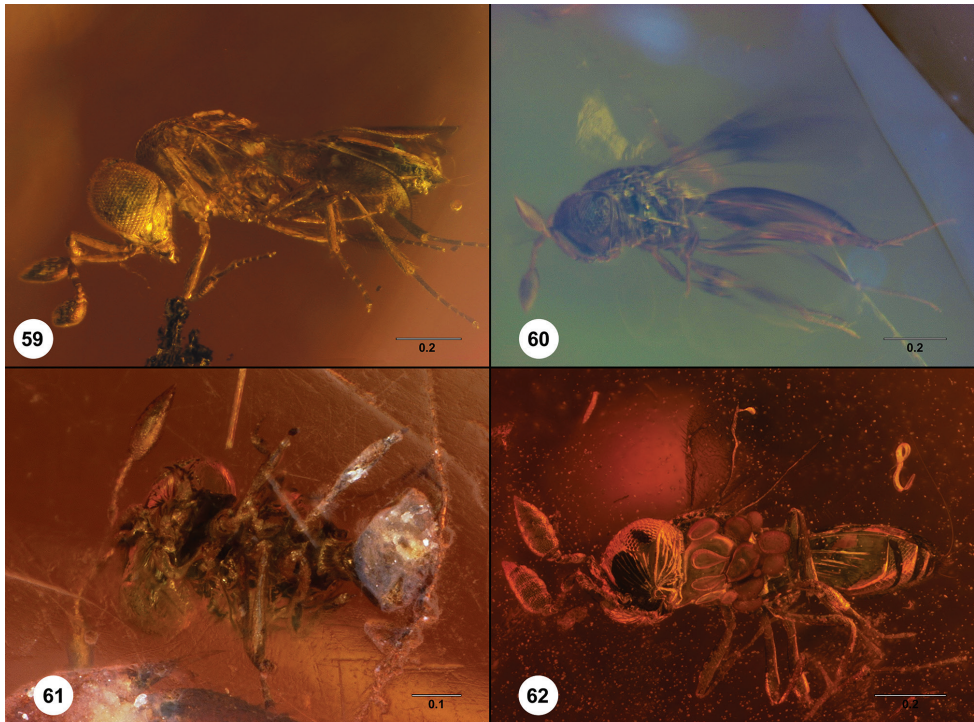


Figure 59–62. *Idris* **59** female (USNMENT01059089), habitus, lateral view **60** female (USNMENT00979983), habitus, lateral view **61** female (USNMENT01059091), habitus, ventral view **62** female (USNMENT01109097), habitus, ventrolateral view. Scale bars in millimeters.

Paracoxal and metapleural sulci: separate. Setation between metapleural triangle and metapleural sulcus: absent. Sculpture between metapleural triangle and metapleural sulcus: smooth. Sculpture of metapleural triangle: punctate rugose.

Anterior propodeal projection: absent. Setation of metasomal depression: absent. Sculpture of lateral propodeal area: punctate rugulose.

Macrosculpture of T1: longitudinally striate. Interstitial sculpture of T1: finely rugulose. Adornment of horn on T1 in female: transverse ridge at base of horn. Macrosculpture of T2 in female: longitudinally striate throughout. Macrosculpture of T2 in male: longitudinally striate throughout. Microsculpture on T2: absent. Posterior margin of transverse sulcus on T2: straight. Carina along posterior margin of transverse sulcus on T2 in male: absent. Carina along posterior margin of transverse sulcus on T2 in female: present. Macrosculpture of T3 medially in female: absent. Macrosculpture of T3 laterally in female: longitudinally striate. Macrosculpture of T3 medially in male: absent. Macrosculpture of T3 laterally in male: longitudinally striate. Constriction of apical T6 in female: present. Punctuation of T6 in female: densely and finely punctate throughout. Form of S2 felt field: longitudinal row or patch of setigerous punctures. Macrosculpture of S2 medially: longitudinally striate. Macrosculpture of S3: absent.

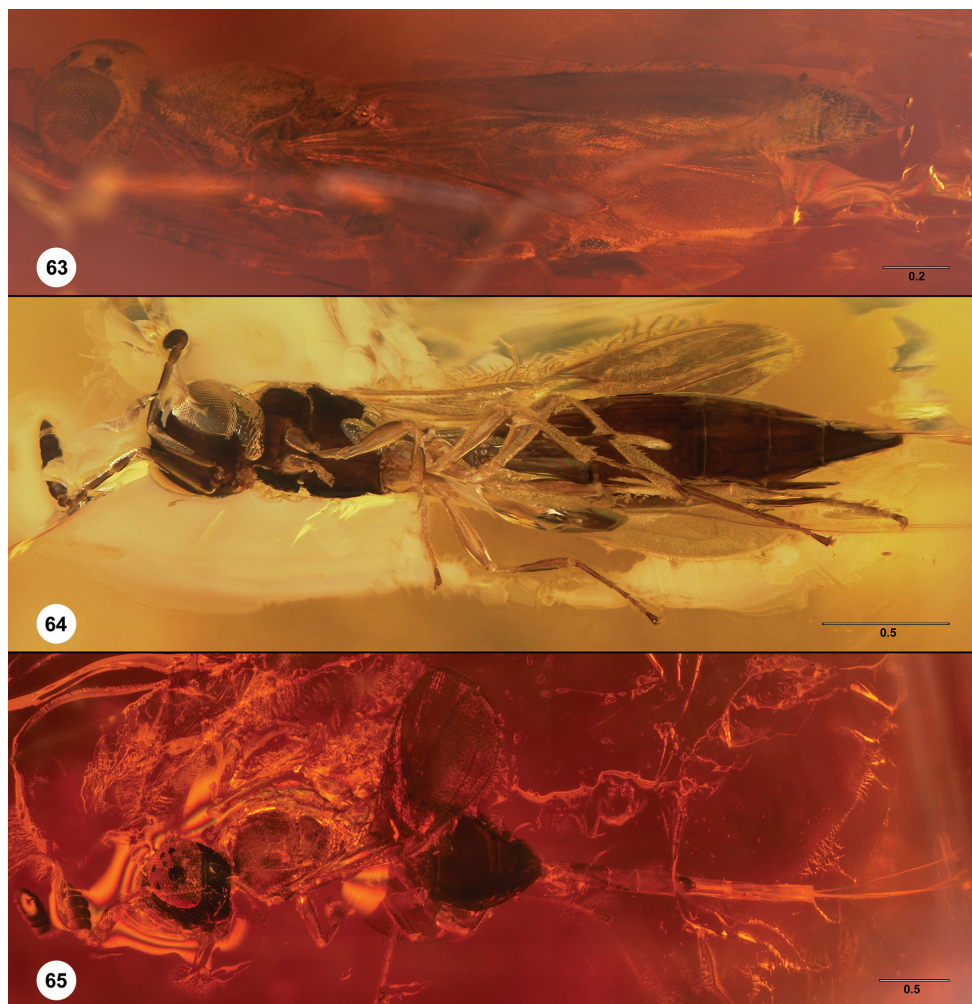


Figure 63–65. **63** *Leptoteleia*, male (USNMENT01059088), head, mesosoma, metasoma, lateral view **64** *Macroteleia*, female (USNMENT01059074), head, mesosoma, metasoma, ventrolateral view **65** *Psilanteris*, head, mesosoma, metasoma, dorsal view. Scale bars in millimeters.

Wing development: macropterous. Basal vein in hind wing: spectral. Length of postmarginalis: approximately equal to length of stigmalis. RS+M in fore wing: spectral.

Diagnosis. *Paridris yumai* can be separated from most species of *Paridris* by the smooth clypeus that is narrower than the width across the toruli (Fig. 72, as in Fig. 77). In the vast majority of species the clypeus is distinctly wider than the distance across the toruli and ventrally serrate. This narrow form of the clypeus is shared in the New World by just one other species, *P. armata* Talamas (Fig. 77). *Paridris lemete* Talamas & Masner is similar in that the clypeus is not wider than the distance across the toruli, but the ventral margin is serrate (Fig. 76).

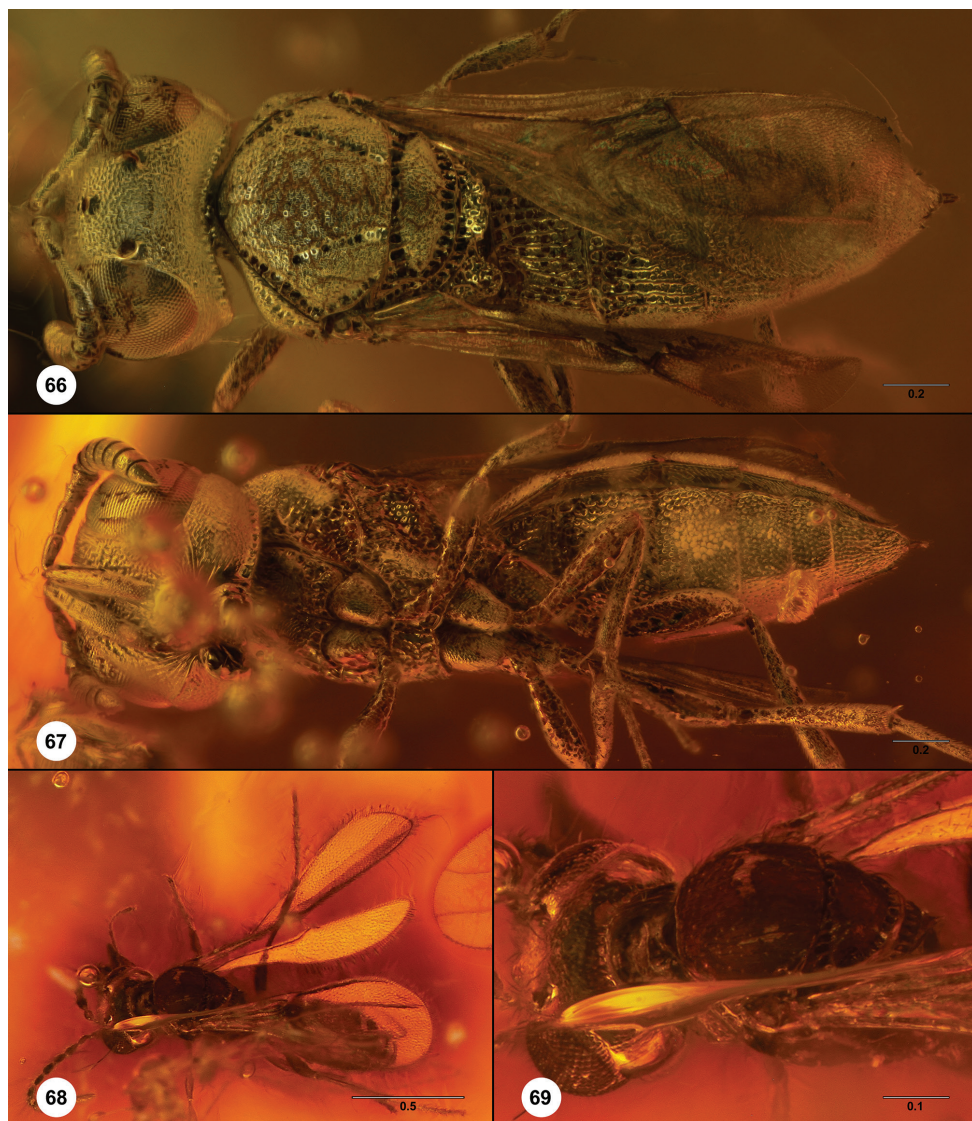


Figure 66–69. *Opisthacantha* **66** female (USNMENT01059085), head, mesosoma, metasoma, dorsal view **67** female (USNMENT01059085), head, mesosoma, metasoma, ventrolateral view **68** male (USNMENT01059081), head, mesosoma, metasoma, dorsolateral view **69** male (USNMENT01059081), head and mesosoma, dorsolateral view. Scale bars in millimeters.

In *P. yumai* the metascutellum is posteriorly emarginate, forming two lateral spines, separating it from *P. lemete* in which the posterior margin of the metascutellum is straight, forming a transverse strip (Fig. 74). Females of these species may also be separated by the basiconic sensilla on A8: two are present in *P. lemete* and one in *P.*

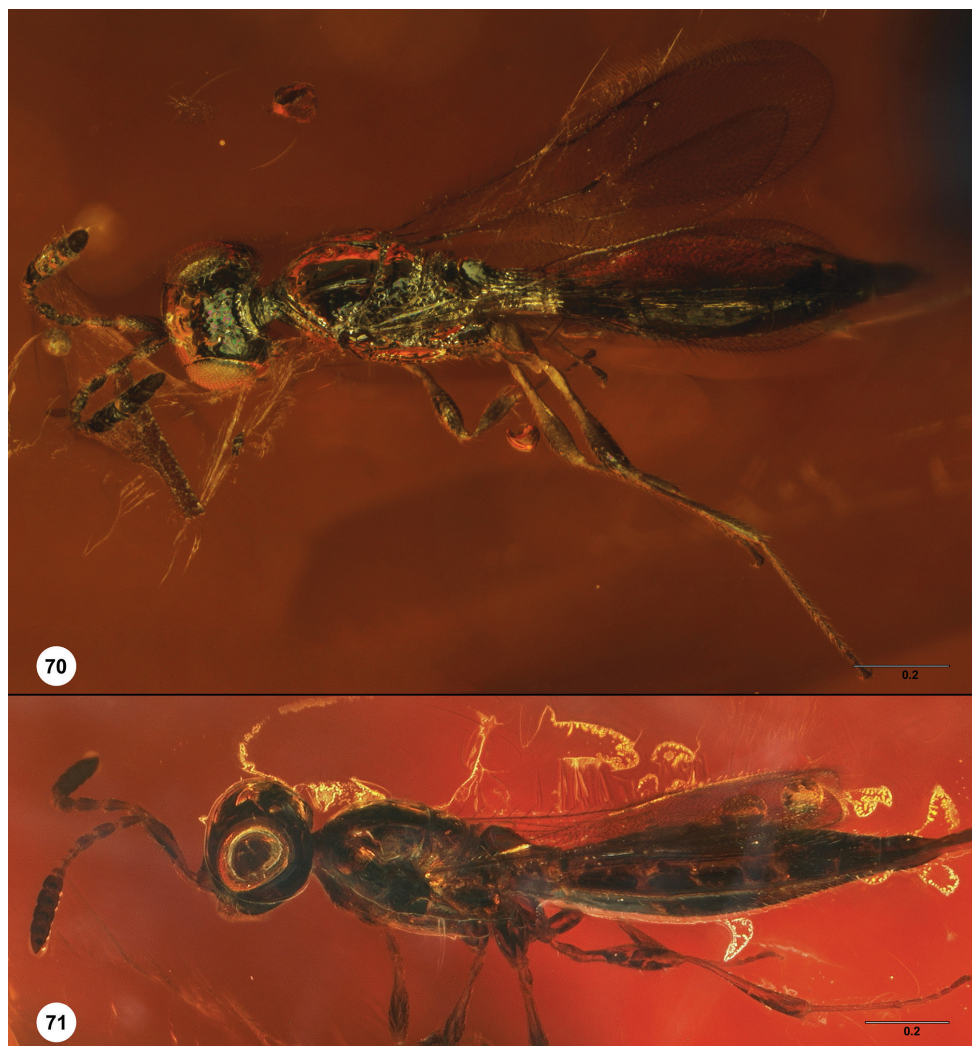


Figure 70–71. *Paridris yumai* **70** holotype female (USNMENT01059095), head, mesosoma, metasoma, dorsolateral view **71** paratype female (USNMENT01059100), head, mesosoma, metasoma, lateral view. Scale bars in millimeters.

yumai. *Paridris armata* is known only from a male specimen, which can be separated from males of *P. yumai* by the coarsely foveate mesoscutellum (Fig. 75).

Etymology. This species is named for djembe teacher and herbalist, Yuma "Dr Yew" Bellomee, as an expression of appreciation. Yuma's influence has increased the mental and physical health of the first author, in turn producing a positive effect on scientific productivity and general happiness.

Phylogenetic analysis. We coded the morphology of *P. yumai* in the matrix provided in Talamas et al. (2013) and reran the combined analysis of molecular and morphological



Figure 72–73. *Paridris yumai* **72** paratype male (USNMENT01059077), head, mesosoma, metasoma, ventrolateral view **73** paratype male (USNMENT00977548), head, mesosoma, metasoma, dorsal view. Scale bars in millimeters.

data using the same tree search parameters in TNT (Goloboff et al. 2008). Inclusion of *P. yumai* decreased the resolution between species within *Trichoteleia* Kieffer, and in *Paridris*, but not within the *nephta* and *pallipes* species groups (Fig. 78). The characters of *Paridris yumai* that we were unable to code due to artifacts associated with the amber matrix are likely culprits in adding ambiguity to the phylogenetic matrix, and thus the decreased resolution.

Link to distribution map. [<http://hol.osu.edu/map-large.html?id=386112>]

Material examined. Holotype, female: **DOMINICAN REPUBLIC:** USNMENT01059095 (deposited in USNM). **Paratypes:** **DOMINICAN REPUBLIC:** 2 females, 2 males, USNMENT00977548, USNMENT01059077, USNMENT01059094, USNMENT01059100 (USNM).

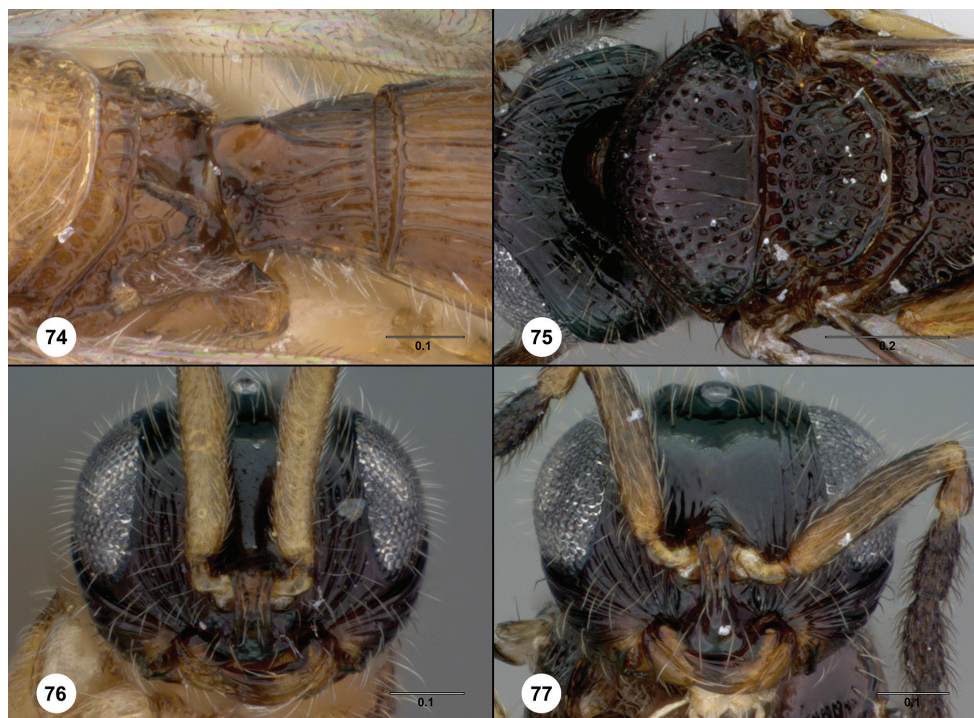


Figure 74–77. **74** *Paridris lemete*, paratype female (OSUC 334091), mesosoma and T1, dorsolateral view **75** *Paridris armata*, holotype male (OSUC 181352), head and mesosoma, dorsal view **76** *Paridris lemete*, holotype female (OSUC 334096), head, anterior view **77** *Paridris armata*, holotype male (OSUC 181352), head, anterior view. Scale bars in millimeters.

***Plaumannion fistulosum* Talamas, sp. n.**

<http://zoobank.org/C32D000A-111C-4E96-B0EC-4C1DBFA649AF>

urn:lsid:biosci.ohio-state.edu:osuc_concepts:344197

Figures 79–82; Morphbank²³

Description. Female body length: 1.40 mm (n=1). Sculpture of head: finely rugulose throughout. Occipital carina: complete. Cells along anterior margin of occipital carina: increasing in size ventrally.

Anterior margin of pronotum in dorsal view: transverse. Sculpture of dorsal pronotum: rugulose. Transverse pronotal carina anterior to epomial carina: present. Transverse pronotal carina posterior to epomial carina: present. Sculpture of lateral pronotum posterior to epomial carina: finely transversely striate. Pronotal cervical sulcus: indicated ventrally by line of large cells. Mesoscutal suprahumeral sulcus: comprised of deep cells across anterior margin of mesoscutum. Sculpture of mesoscutum: coarsely and deeply areolate rugose. Sculpture of mesoscutellum: coarsely and deeply areolate rugose. Lateral margin of axillar area: with line of cells in dorsal view. Size of cells along anterior margin of mesoscutellum: larger than cells of surrounding sculpture.

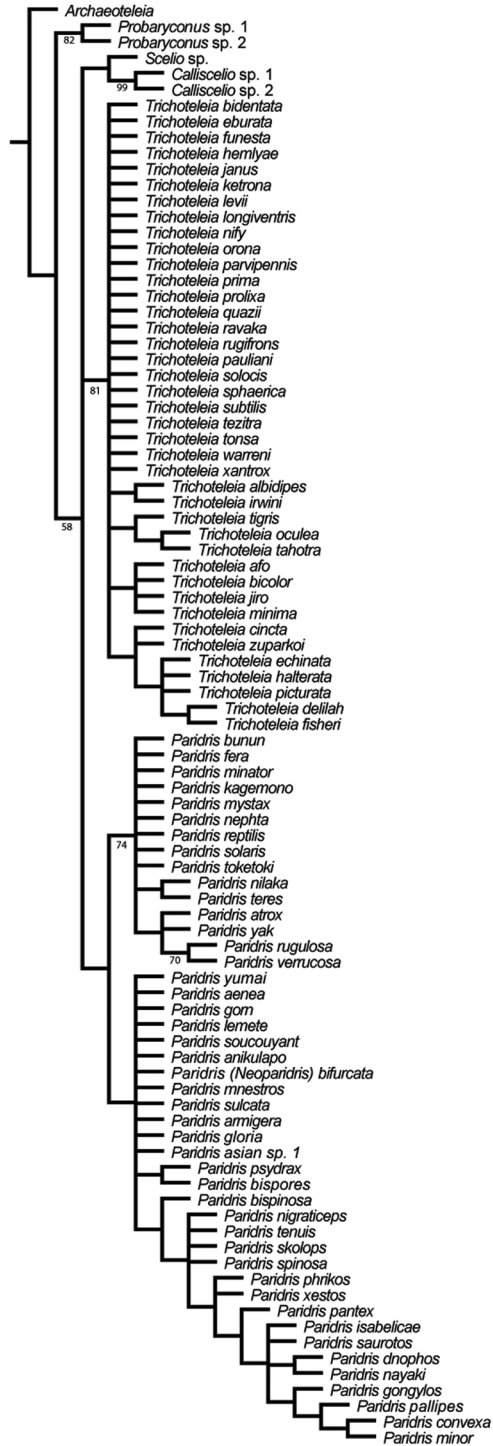


Figure 78. Strict consensus of 1001 most parsimonious trees. Bootstrap values above 50 indicated on tree.



Figure 79. *Plaumannion fistulosum*, holotype female (USNMENT00903996), head, mesosoma, metasoma, ventral view. Scale bar in millimeters.

Mesopleural carina: present as a strong ridge. Cells along dorsal margin of mesopleural carina: present. Sculpture of femoral depression: transversely rugose. Posterior mesepimeral sulcus: indicated by line of cells. Ventral mesopleuron: extending anteriorly between forecoxae.

Sculpture of anteroventral metapleuron: coarsely punctate-rugose. Sculpture of posterodorsal metapleuron: finely striate. Lateral portion of metanotal trough: comprised of large cells. Posterior propodeal projection: flat lamella that overlaps T1, fitting between sublateral keel and a short submedian carina.

Number of visible tergites: 6. Number of visible sternites: 6. Sublateral keels: present on T1–T4. Patch of fine setae on anterior part of lateral T1: present. Sculpture of T1–T4: coarsely areolate rugose. Sculpture of S1–S4: coarsely areolate rugose. Antecostal sulci of T2–T3: indicated by line of cells larger than surrounding sculpture. Sculpture of T6: finely punctate. Posterior margin of T6: emarginate. Patch of microsculpture on posteromedial S1: present. Cerci: visibly protruding from apex of metasoma.

Diagnosis. *Plaumannion fistulosum* is closest to *P. fritzi* with which it shares a submedian carina on T1, coarse sculpture of the mesonotum and tergites, and a distinguishable mesoscutal suprahumeral sulcus. These two species can readily be separated by the sculpture of the head: finely rugulose in *P. fistulosum* and coarsely areolate in *P. fritzi*; and by the sculpture in the dorsal part of the lateral pronotum: finely striate in *P. fistulosum* and smooth in *P. fritzi*. *Plaumannion fistulosum* is best separated from *P. yepezi* by the coarse and deep sculpture of the mesoscutum and mesoscutellum, the distinct mesoscutal suprahumeral sulcus, and the presence of submedian carinae on T1. *Plaumannion fistulosum* has 6 visible sternites, whereas *P. yepezi* and *P. fritzi* each have 5. We here expand the generic concept of *Plaumannion* to include species with 6 sternites.

Etymology. The epithet *fistulosum*, meaning “full of holes” refers to the deeply areolate rugose sculpture found on this species.

Link to distribution map. [<http://hol.osu.edu/map-large.html?id=344197>]

Material examined. Holotype, female: **DOMINICAN REPUBLIC:** USNMMENT00903996 (deposited in USNM).

Comments. *Plaumannion* is an exceptionally rare genus, known from only a handful of specimens. Its presence in amber suggests the possibility that this genus was more common in the past, and perhaps its biology, although unknown, predisposes it to preservation in tree resin.

Probarycnus Kieffer

http://bioguid.osu.edu/xbiod_concepts/544

Figures 83–86; Morphbank²⁴

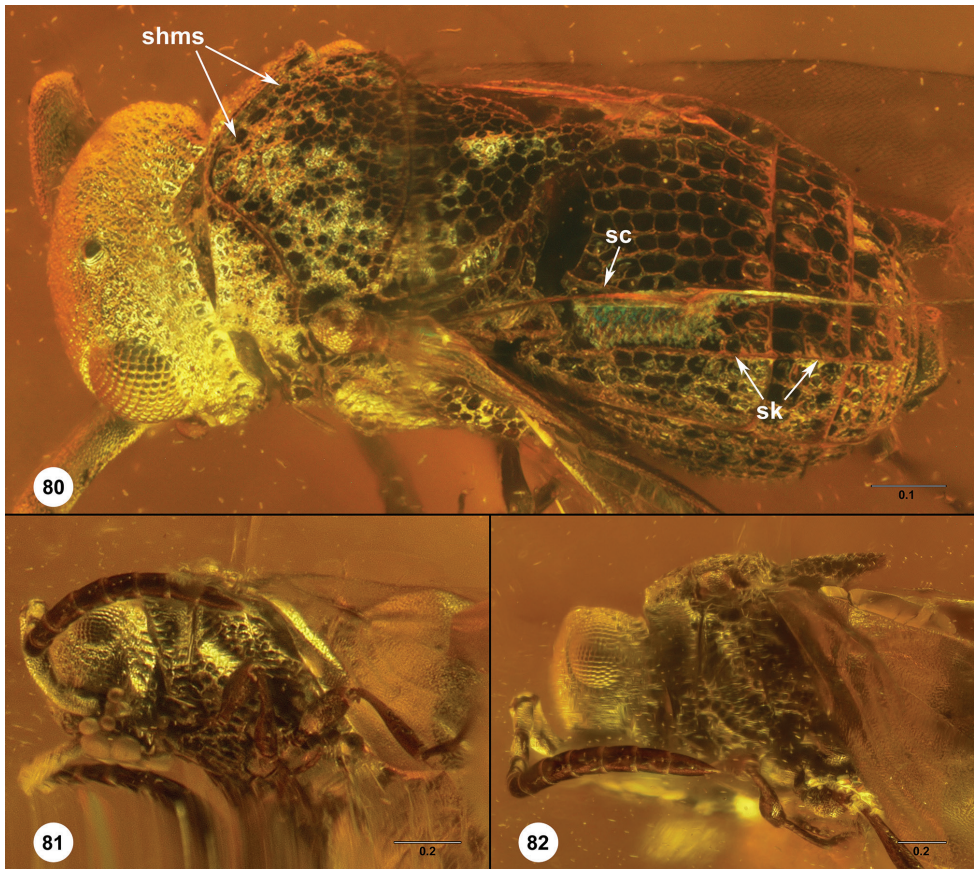


Figure 80–82. *Plumannion fistulosum*, holotype female (USNMMENT00903996) **80** head, mesosoma, metasoma, dorsolateral view **81** head and mesosoma, ventrolateral view **82** head and mesosoma, lateral view. Scale bars in millimeters.

***Psilanteris* Kieffer**

http://bioguid.osu.edu/biod_concepts/549

Figure 65; Morphbank²⁵

***Sembilanocera* Brues**

http://bioguid.osu.edu/biod_concepts/560

Figures 49–50; Morphbank²⁶

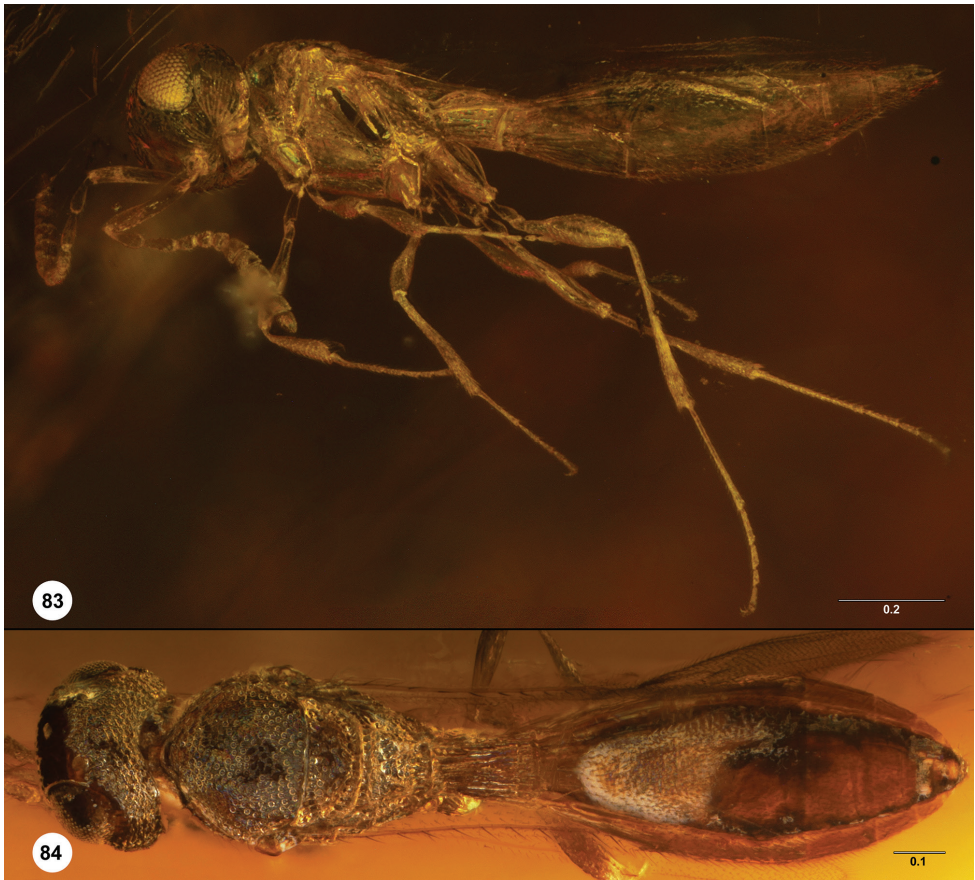


Figure 83–84. *Probaryconus* **83** female (USNMENT01109098), head, mesosoma, metasoma, lateral view **84** male (USNMENT01059379), head, mesosoma, metasoma, dorsal view. Scale bars in millimeters.

Spiniteleia Masner

http://bioguid.osu.edu/xbiod_concepts/563

Figures 87–92; Morphbank²⁷

Comments. We here expand the concept of *Spiniteleia* to include a species without a spine on the posterior of the mesoscutellum. Figures 87–89 illustrate a specimen that exhibits nearly all of the diagnostic characters for *Spiniteleia*: malar striae present; facial striae absent; skaphion absent; metascutellum present as a simple smooth strip; *Scelio*-type ovipositor. The dorsal head, mesosoma and anterior metasoma were sufficiently visible for us to observe the smooth and simple mesoscutellum, and the mesoscutum on which we saw no evidence of a skaphion. However, turbidity of the amber precluded us from capturing photographs of these characters. Before expanding the concept of *Spiniteleia*, we considered three similar genera: *Duta*, *Holoteleia* Kieffer, and *Masnerel-*

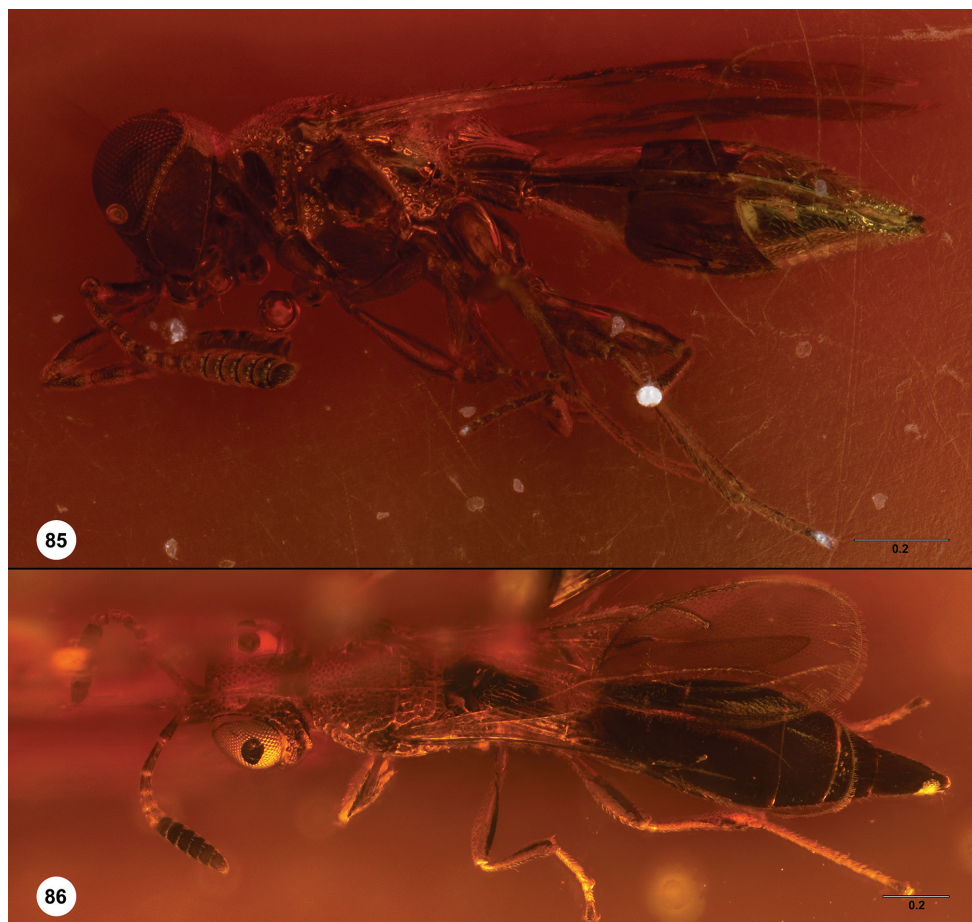


Figure 85–86. *Probaryconus* **85** female (USNMENT00764974), head, mesosoma, metasoma, lateral view **86** female (USNMENT01050360), head, mesosoma, metasoma, dorsal view. Scale bars in millimeters.

la Özdikmen. *Masnerella* is similar in its lack of a skaphion (Fig. 93), but we excluded this genus because it has facial striae (Fig. 95), the mesepimeral and prespecular sulci on the mesopleuron are comprised of elongate cells (Fig. 94), and the episternal foveae extend dorsally to the mesopleural pit (Fig. 94). None of these are found in the amber specimen. We excluded it from *Duta* because this genus has a skaphion and lacks malar striae, and excluded *Holoteleia* because this genus lacks malar striae.

This species keys to couplet 36 in Masner's (1980) key to Holarctic Scelioninae, where it agrees with all of the characters listed for *Spiniteleia*, excluding the spine on the posterior of the mesoscutellum. The mesoscutellar spine of *Spiniteleia* is presumably derived, and thus it is not unreasonable to discover a specimen with the characters of *Spiniteleia* that predates the emergence of the spine. Alternatively, the spine may simply be variable within the genus. Our placement of this species in *Spiniteleia* is sup-

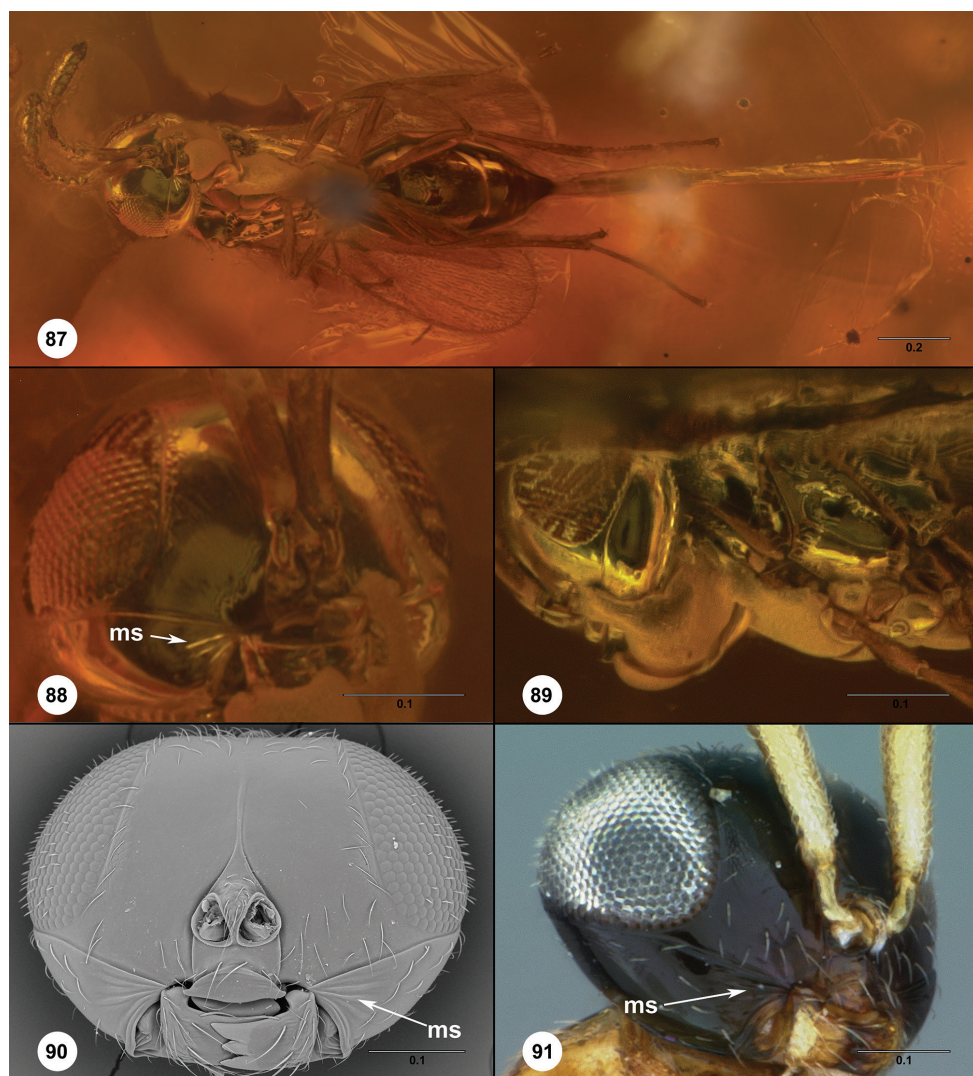


Figure 87–91. *Spiniteleia* **87** female (USNMENT01059070), head, mesosoma, metasoma and ovipositor, ventral view **88** female (USNMENT01059070), head, anteroventral view **89** female (USNMENT01059070), head and mesosoma, lateral view **90** female (USNMENT00989622_1), head, anterior view **91** *Spiniteleia campbelli*, paratype female (USNMENT01029349), head, anterolateral view. Scale bars in millimeters.

ported by a study of external head morphology in Platygastroidea currently being conducted by the first author. Among the specimens and genera analyzed in this project, *Spiniteleia* alone has the combination of malar striae present, facial striae absent, and a *Scelio*-type ovipositor system. To accommodate the fossil species, either the concept of

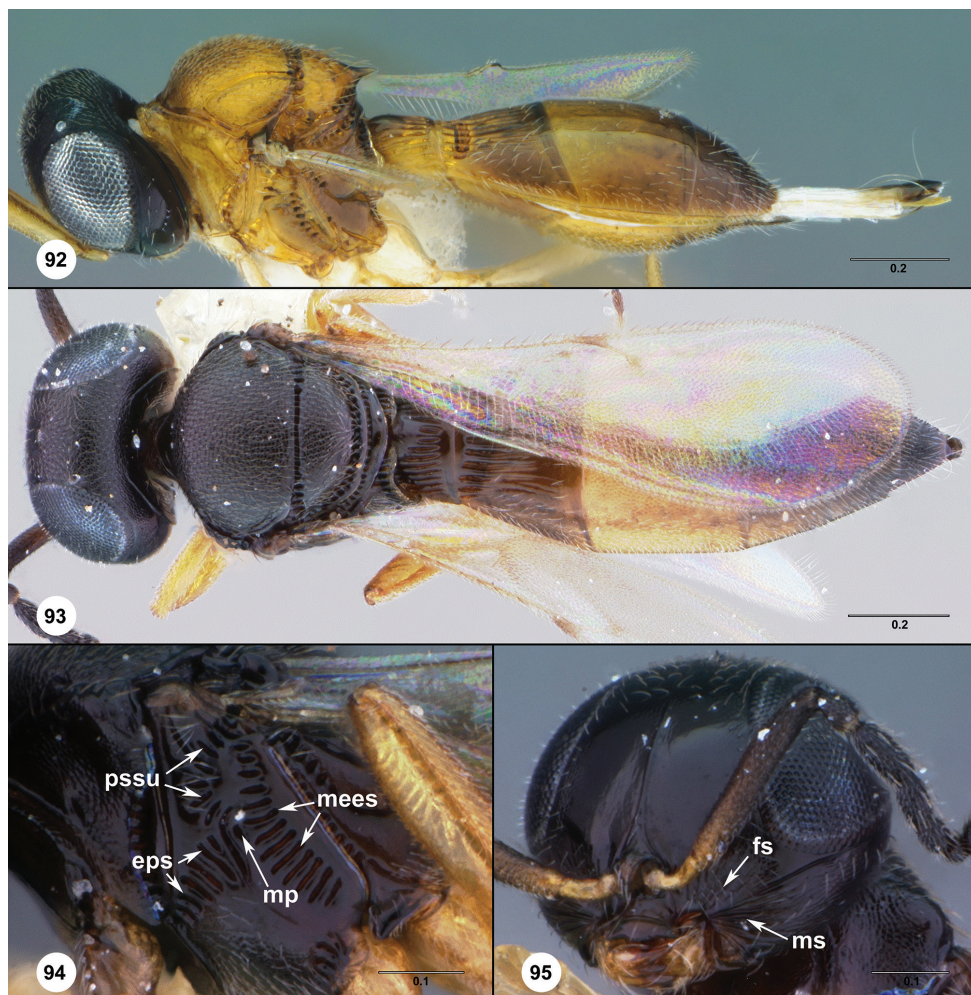


Figure 92–95. **92** *Spiniteleia campbelli*, paratype female (USNMENT01029349), head, mesosoma, metasoma, lateral view **93** *Masnerella cincta* (USNMENT01081153), head, mesosoma, metasoma, dorsal view **94** *Masnerella cincta* (USNMENT01081153), mesosoma, lateral view **95** *Masnerella cincta* (USNMENT01081153), head, anterolateral view. Scale bars in millimeters.

Holoteleia would be expanded to include species with malar striae, or *Spiniteleia* would be expanded to include species without a mesoscutellar spine. We rejected expanding the concept of *Holoteleia* because the state of lacking both facial and malar striae is found in many genera in addition to those mentioned above (*Calliscelio*, *Telenomus*, *Gryon*, *Trissolcus*, *Macroteleia*, *Palpoteleia* Kieffer) and we prefer to lean in the direction of diagnosability when making taxonomic decisions.

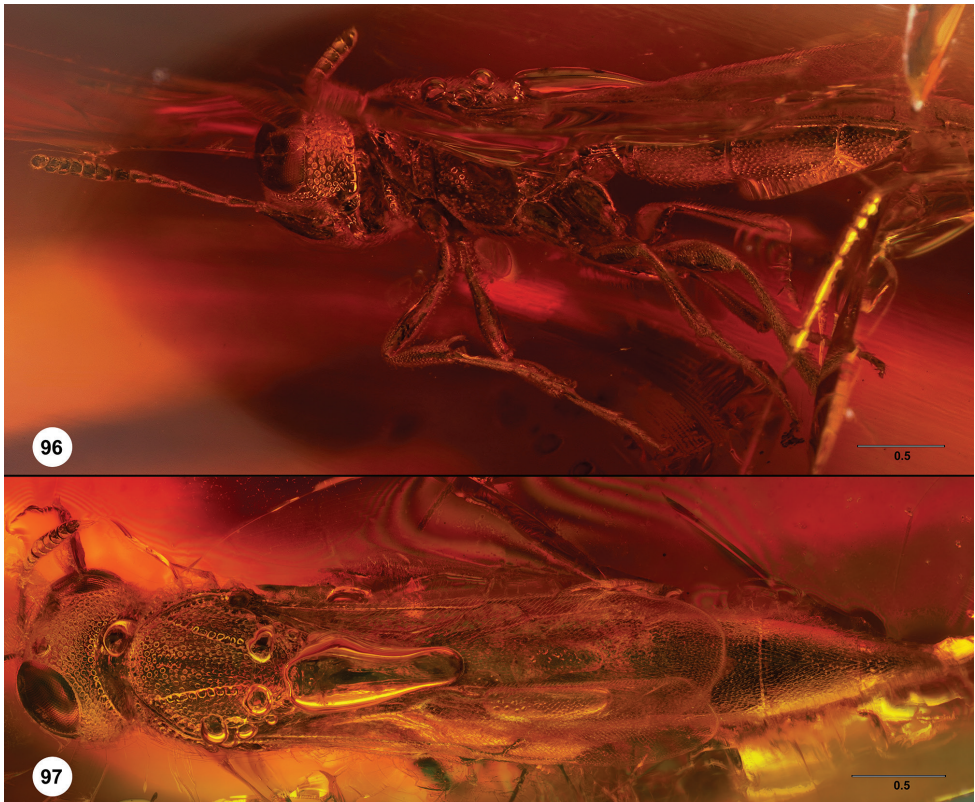


Figure 96–97. *Triteleia*, female (USNMENT01059083) **96** head, mesosoma, metasoma, lateral view **97** head, mesosoma, metasoma, dorsal view. Scale bars in millimeters.

Triteleia Kieffer

<http://bioguid.osu.edu/biodiversity/575>

Figures 96–97; Morphbank²⁸

Unplaced Scelioninae

Figures 98–99; Morphbank²⁹

Ovipositor specimen

Figure 26; Morphbank³⁰

Specimen USNMENT00979592 (Fig. 26) is not identifiable to genus but it is a useful record of a *Scelio*-type ovipositor system, which we determined by the following char-



Figure 98–99. Scelioninae, male (USNMENT01059096) **98** head, mesosoma, metasoma, lateral view **99** head, anterior view. Scale bars in millimeters.

acteristics: The length that the ovipositor extends beyond the apex of the metasoma is as long as the metasoma itself, but the ovipositor itself is visible only in the distal half. Second, near the tip of the ovipositor is a dark area that corresponds to the typical location of sclerotized T7+8 when it is extruded with the ovipositor. Lastly, exsertion of the ovipositor at the time of death occurs commonly in extant scelionines with a *Scelio*-type ovipositor, but in scelionines with a *Ceratobaeus*-type ovipositor this is rare, and when it does occur it is not so far extruded.

Among described fossil species with a *Scelio*-type ovipositor, *Chromoteleia theobaldi* Maneval, described from Baltic amber, and *Macroteleia renatae* Szabó & Oehlke, 1986 are potentially the oldest. However, use of these determinations for dating a phylogenetic node may be problematic for multiple reasons. First, Baltic amber is typically dated at 40–60 million years of age, which is a very broad range, and the precise age is

debated (Buffington et al. 2014). The Kishenehn formation has a relatively narrow age range, with the largest window of error spanning from 38.6 to 48.4 mya, providing a significantly more accurate date (Constenius 1996, Greenwalt et al. in press). Second, we have reservations about accepting this determination of *Chromoteleia theobaldi* at face value. Neither the description nor the illustration of this species indicates the presence of a metascutellar plate, a defining character of this genus. The illustration also shows seven visible tergites whereas T7 is internal in extant *Chromoteleia*, unless extruded with the ovipositor system. Maneval's (1938) illustration may document the preservation of a partially extruded T7 or may simply be incorrect. Alternatively *Chromoteleia* may have exhibited an alternative arrangement of tergites, or this species may belong to a different genus.

The phylogeny of Platygastroidea by Murphy et al. (2007) retrieved genera with a *Scelio*-type ovipositor (*Nyleta* Dodd, *Probaryconus*, *Neoscelio* Dodd) at the base of the main scelionid clade that contains *Idris*, known from Baltic amber, and Telenominae, now known from Kishenehn shale. *Archaeoteleia*, which also has a *Scelio*-type ovipositor system but was not included in the analysis of Murphy et al. (2007), retains many plesiomorphies that suggest its location in the phylogeny is even closer to the split between Platygastriidae and Scelionidae. Specimen USNMMENT00979592 can easily be distinguished from *Archaeoteleia* on the basis of wing venation and antennal characters (see Early et al. 2007). This record of a *Scelio*-type ovipositor at 45 mya is not particularly illuminating given the age of the group, but it demonstrates the kind of information that a specimen can provide without assigning a taxonomic name.

Discussion

With the advent of increasingly sophisticated methods of ancestral state reconstruction, phylogeography and divergence time estimation, the importance of accurate recognition and description of fossil insect specimens continues to increase. Hand in hand, inaccurate paleontological research can undermine these advances, as the methods rely solely on the accuracy of various aspects of calibration and morphological interpretation. This concern is amplified by the fact that fossil species are represented by a paucity of specimens, some of which can be exceedingly difficult to obtain for research purposes (and hence, the universe of characters for examination is very limited). We hope that future work with fossils of this group, as well as all insect paleontology, will be done in concert with research on the extant fauna. Parallel, or even worse, divergent, insect systematics programs lead to a waste of time and resources, neither of which are in surplus in the current research climate.

This publication also highlights the wealth of data potentially available in a research museum, data that is unlocked by the keen eye of trained researchers. In this case, the eyes were separated by a generation and over 25 years, yet without the combined efforts

of A. Rasnitsyn and the authors of this publication, all of the specimens surveyed here would remain in the dark, hopefully awaiting future discovery. This would be a loss for platygastroid systematics, as now we have data indicating that generic limits and ovipositor systems were well formed, in some cases, more than 40 million years ago, and these data may inform current research programs on platygastroids that are of considerable economic importance, e.g. *Paratelonomus* (Gardner et al. 2013) and *Trissolcus* (Talamas et al. 2015). As in all taxonomic research, fossils are a work in progress, and we hope future contributors to the field will find this work useful.

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Endnotes

- 1 <http://www.morphbank.net/?id=853932>
- 2 <http://www.morphbank.net/?id=854209>
- 3 <http://www.morphbank.net/?id=854215>
- 4 <http://www.morphbank.net/?id=854258>
- 5 <http://www.morphbank.net/?id=855179>
- 6 <http://www.morphbank.net/?id=854204>
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- 36 <http://dx.doi.org/10.3897/JHR.34.4714>
- 37 <http://dx.doi.org/10.1371/journal.pone.0015991>

Supplementary material 1

URI table of HAO morphological terms

Authors: Elijah J. Talamas, Matthew L. Buffington

Data type: Microsoft Excel Spreadsheet (.xls)

Explanation note: This table lists the morphological terms used in this publication and their associated concepts in the Hymenoptera Anatomy Ontology.

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Supplementary material 2

Specimen determinations

Authors: Elijah J. Talamas, Matthew L. Buffington

Data type: Microsoft Excel Spreadsheet (.xls)

Explanation note: This table lists the determinations and specimen identifiers for fossil specimens of Platygastroidea housed in the National Museum of Natural History.

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Supplementary material 3

Phylogenetic matrix

Authors: Elijah J. Talamas, Matthew L. Buffington

Data type: TNT matrix (.tnt)

Explanation note: This matrix is that of the combined morphological and molecular data in Talamas et al. (2013) with the inclusion of *Paridris yumai*.

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