

## CALLISCELIO ASHMEAD EXPANDS (HYMENOPTERA: SCELIONIDAE)

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**Abstract.**— The generic concept of *Calliscelio* Ashmead is expanded to include variation in the shape of the metascutellum, the development of propodeal carinae, the presence of an epomial carina, the presence of malar striae, and the position of the toruli on the frons. This expansion follows circumscription of the genus based on the prioniform sensillum on the mandible, a character that is unique within Platygastroidea. We consider the prioniform state of the sensillum to be a synapomorphy for the genus, and treat *Crama* Galloway, *Lispoteleia* Galloway, *Xentor* Masner and Johnson, and *Yunkara* Galloway as junior synonyms of *Calliscelio*; the species of these genera are transferred herein. *Calliscelio yunkara* Talamas is provided as a replacement name for *Yunkara inornata* Galloway. A lectotype is designated for *Calliscelio albicoxa* (Dodd).

**Key Words:** Platygastroidea, parasitoid, synonymy, morphology

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Platygastroid genera are often identified by a unique combination of characters as opposed to synapomorphies, a condition stemming from convergence and loss of characters. However, we believe that many character systems have yet to be discovered and exploited for their use in classification and reconstructing phylogenetic relationships. To this end a survey of external morphology across the superfamily is underway. This effort began with a morphological

study of the frontal aspect of the head across Platygastroidea and has been rapidly successful in the discovery of novel character systems, including that of the prioniform sensillum in *Calliscelio* Ashmead.

The small size of some morphological structures may prevent their use for generic identification with light microscopy but they are extremely useful for the delimitation of putatively monophyletic groups and to determine which more

accessible characters can be used for identification of these groups. Our expanded concept of *Calliscelio* is an example of this, as it is based primarily on the description and treatment of the pioniform mandibular sensillum, a hitherto unrecorded character amongst Platygastroidea, and a hypothesized synapomorphy of the genus; secondarily, we expand the limits of *Calliscelio* on reinterpretation of previously observed characters. *Crama* Galloway, *Lispoteleia* Galloway, *Xentor* Masner and Johnson, and *Yunkara* Galloway are all more or less diagnosable entities that share the traditional diagnostic features of *Calliscelio* to at least some degree, and we assert that the characters used to place them outside *Calliscelio* are either homoplasious or autapomorphic within the genus.

#### MATERIALS AND METHODS

The numbers prefixed with “USM<sup>N</sup>ENT” or “OSUC ” are unique identifiers for the individual specimens (note the blank space after some acronyms). Details on the data associated with these specimens may be accessed at the following link, [purl.oclc.org/NET/hymenoptera/hol](http://purl.oclc.org/NET/hymenoptera/hol), and entering the identifier in the form. Persistent URIs for each taxonomic concept were minted by xBio:D in accordance with best practices recommend by Hagedorn et al. (2013). Morphological terms follow Mikó et al. (2007) and were matched to concepts in the Hymenoptera Anatomy Ontology (Yoder et al. 2010) using the text analyzer function. A table of morphological terms and URI links is provided in Appendix 1. Taxonomic synopses were generated by the Hymenoptera Online Database (hol.osu.edu).

Photographs were captured with a Z16 Leica®™ lens with a JVC KY-F75U digital camera using Cartograph®™ software, or a Leica®™ DMRB compound microscope with a GT-Vision®™ Lw11057C-SCI

digital camera attached. In both systems, lighting was achieved using techniques summarized in Buffington et al. (2005), Kerr et al. (2009) and Buffington and Gates (2009). Single montage images were produced from image stacks with the program CombineZP®™. In some cases, multiple montage images were stitched together in Photoshop®™ to produce larger images at high resolution and magnification. Full resolution images are archived at the image database at The Ohio State University ([purl.oclc.org/NET/hymenoptera/specimage](http://purl.oclc.org/NET/hymenoptera/specimage)).

Specimen heads were removed using a minuten probe and forceps. Heads were mounted to 12 mm slotted aluminum mounting stubs (EMS Cat. #75220) using carbon adhesive tabs (EMS Cat. #77825-12) by means of a fine paint brush and sputter coated with approximately 70 nm of gold/palladium using a Cressington®™ 108auto sputtercoater. Low magnification micrographs were captured using a Hitachi®™ TM3000 Tabletop Microscope at 15 keV. Graphite Conductive Adhesive 112 (EMS Cat. #12693-30) was applied to the contact point between the heads and stubs to improve conductivity and reduce movement when imaged at high magnification with a Carl Zeiss EVO MA15.

Author contributions—EJT: photography, manuscript preparation, character analysis, taxonomy, project planning; DJ-J: scanning electron microscopy, manuscript preparation, character discovery and analysis; MLB: manuscript preparation, project oversight.

Character annotations—

- fs facial striae (Figure 8)
- ec epomial carina (Figure 38)
- lmc lateral margin of clypeus (Figures 7–9)
- lpc lateral propodeal carina (Figures 21–25)
- mas malar sulcus (Figure 7)

mns	metanotal trough (Figures 21–23, 25)
ms	malar striae (Figures 7–8)
msct	metascutellum (Figures 21–25)
mse	mandibular sensillum (Figures 1–6, 8–10, 12, 14, 16, 18, 20; prioniform state in Figures 5–6, 10, 12, 14, 34)

**Type Material**—We examined holotypes of the type species for *Calliscelio*, *Lispoteleia*, and *Yunkara* and a paratype of the type species for *Xentor*. Images of the lectotype of *Crama albicoxa* Galloway, the type species of *Crama*, were provided by Norman F. Johnson (The Ohio State University) (Fig. 24). The mounting of the lectotype of *C. albicoxa* precluded observation of the mandible so we examined a specimen determined by Galloway to be this species (Fig. 14) and one determined by us (Figs 13, 29).

#### Collections—

This work is based on specimens deposited in the following repositories with abbreviations used in the text:

ANIC, Australian National Insect Collection, Canberra City, Australia
BPBM, Bernice P. Bishop Museum, Honolulu, HI, USA
CNC, Canadian National Collection of Insects, Ottawa, Canada
OSUC, C.A. Triplehorn Collection, The Ohio State University, USA
QM, Queensland Museum, South Brisbane, Australia
USNM, Smithsonian National Museum of Natural History, Washington, DC, USA

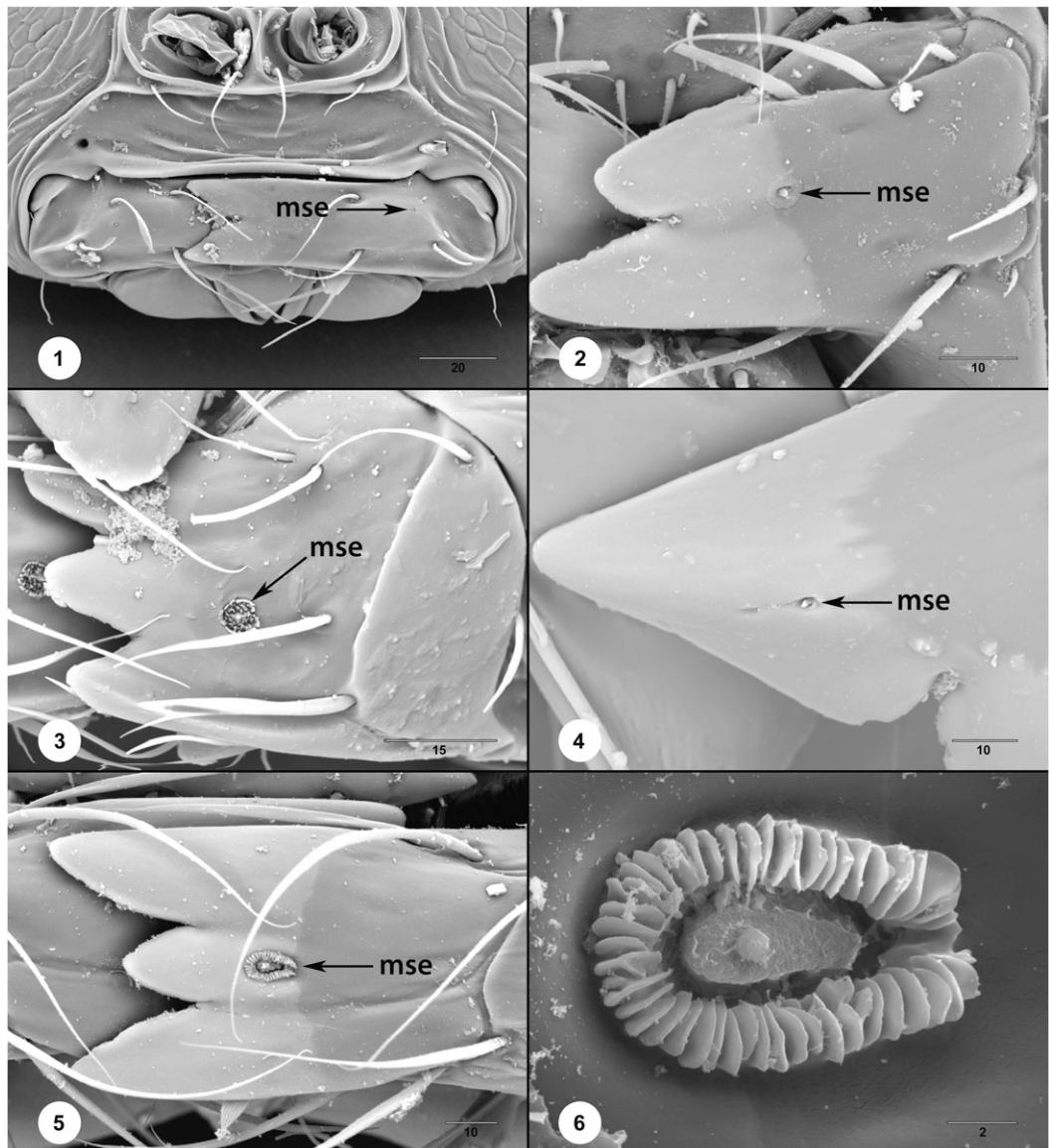
#### RESULTS AND DISCUSSION

**Mandibular sensillum**—To date, more than 100 genera, representing all subfamilies in Platygastroidea, have been examined in a survey of external head morphology conducted with a scanning electron microscope (SEM). We observed a peg-like sensillum on the mandibles in

nearly all genera, the exceptions being *Heptascelio* Kieffer, *Piestopleura* Förster, *Allotropa* Förster and *Paratelenomus* Dodd. The mandibles of the latter two genera taper distally, such that they have the appearance of unidentition, although two distinct teeth are visible in the mandible of *Allotropa* under the electron microscope. This constriction likely affects the expression of the sensillum, which is either absent or simply not observed by us in the specimens at hand.

The sensillum is typically located in the center of the mandible directly proximal to the mandibular teeth (teeth defined in most cases by the lighter color indicating cuticular metal content (Quicke et al. 1997, Polidori et al. 2013). However, the position of the sensillum may vary between and within genera. It can be found distally within the metallic mandibular teeth, as in *Platyscelio* Kieffer (Figs. 4), or near the base of the mandible, as in *Synopeas* Förster (Fig. 1).

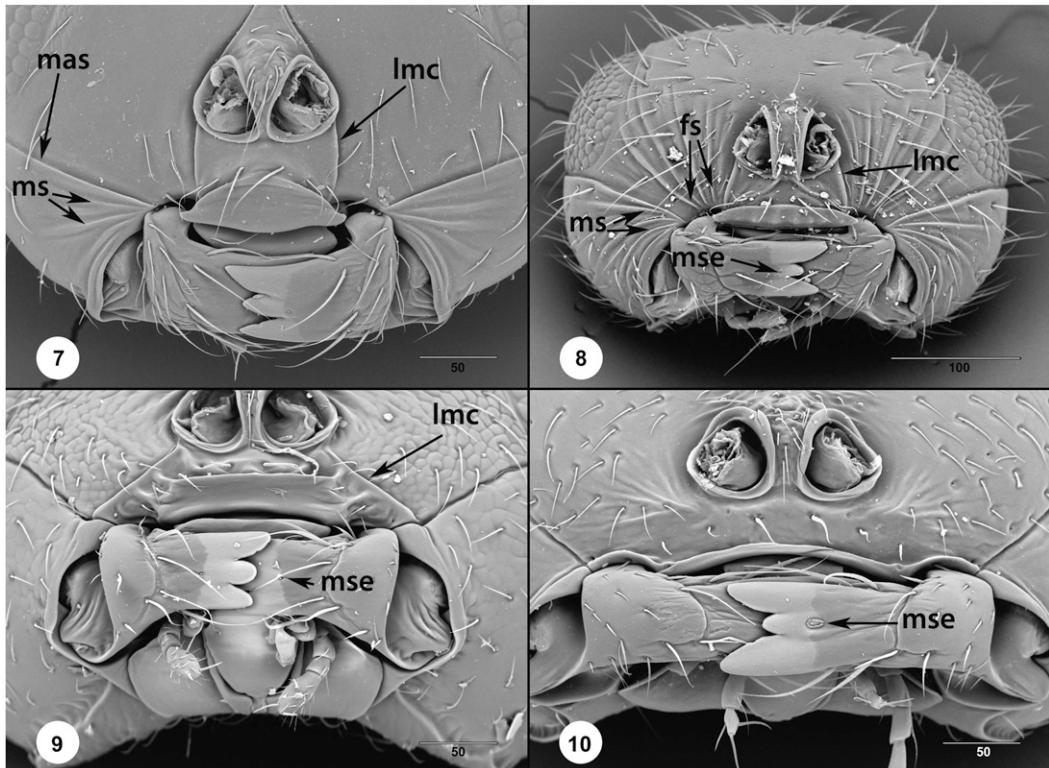
In most of Platygastroidea the sensillum appears as a simple peg (Figs. 1, 4) and from an external perspective is identical to the coeloconic sensillum illustrated in Romani et al. (2010, Fig. 3.5c). In *Palpoteleia* the sensillum is surrounded by a flat circle that appears paler in electron micrographs (Fig. 2). The sensillum in *Acolomorpha* consists of a central peg surrounded by a circular depression filled with spines (Fig. 3). In *Calliscelio* it takes the form of a peg embedded in a pit that is surrounded by a ring of plate-like structures, and we refer to this state as prioniform, meaning “serrated” (Figs. 5–6, 10, 12, 14). The forms of the sensilla in *Acolomorpha* and *Calliscelio* match the general description of coeloconic sensilla provided in Romani et al. 2010 as “short pegs set in pits”. In the absence of ultrastructural analysis, we tentatively treat this mandibular sensillum as coeloconic.



Figs. 1–6. 1 *Synopeas*, female (USNMENT00872642), mandibles, ventral view 2 *Palpoteleia*, female (USNMENT00872744), mandible, ventral view 3 *Platyscelio abnormis*, male (OSUC 207848), mandible, ventral view 4 *Platyscelio abnormis*, male (OSUC 207848), mandibular sensillum, ventral view 5 *Calliscelio*, female (USNMENT01029166), mandibles, ventral view 6 *Calliscelio*, female (USNMENT01029170), mandibular sensillum, ventral view. Scale bars in micrometers.

Specimens of *Calliscelio* from Africa, Asia, North and South America were examined with SEM, and in all of them the mandibular sensillum was prioniform. Images of these specimens can be found

in [Specimage.osu.edu](http://Specimage.osu.edu) with the following CUIDs: Kenya: USNMENT00872673, USNMENT01029166. United States: USNMENT01029156, USNMENT01029168-USNMENT01029170. Dominica:



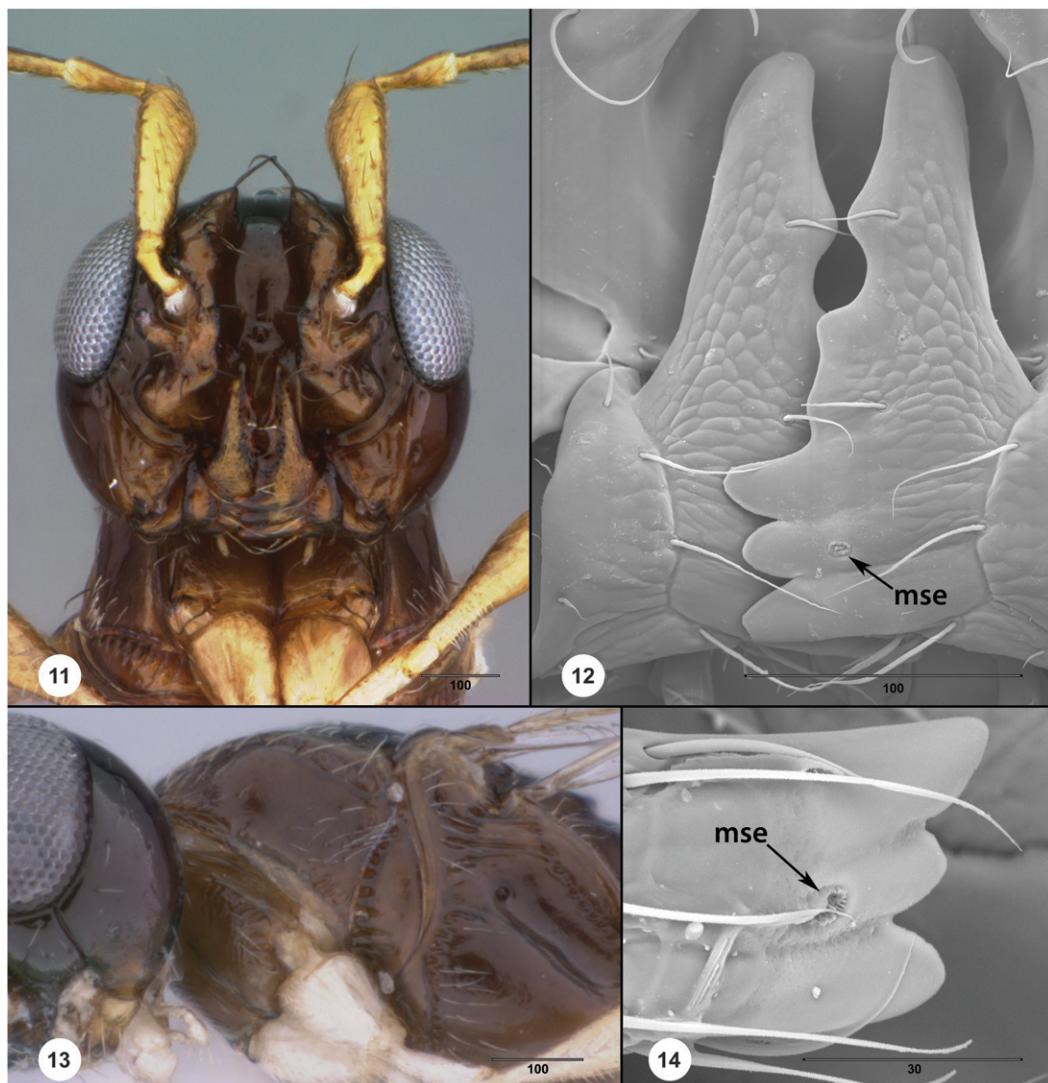
Figs. 7–10. 7 *Spiniteleia*, female (USNMENT00989622\_1), ventral head, anteroventral view 8 *Paridris anikulapo*, female (USNMENT00872752), head, anteroventral view 9 *Holoteleia*, female (USNMENT01029173), ventral head, ventral view 10 *Calliscelio*, female (USNMENT01029156), ventral head, anteroventral view. Scale bars in microns.

USNMENT00896490. Chile: USNMENT 01029167. India: USNMENT01059302.

The prioniform sensillum under light microscopy appears as a depression proximal to the median mandibular tooth, and no depression appears in genera with the simple form of the sensillum. Colleagues Huayan Chen (The Ohio State University) and Rajmohana Keloth (Zoological Survey of India) examined specimens from the New World and India, respectively, and found that a depression matching this description was present on the mandibles of all species. The first author examined *Calliscelio* from all biological regions with light microscopy and found this form and location of this depression to be ubiquitous.

**Taxonomy of Australian Genera**—Ian Galloway described *Crama*, *Lispoteleia*, and *Yunkara* to accommodate character combinations that he believed to be unique in Scelioninae (Galloway and Austin, 1984). His published treatments of scelionines did not extend beyond Australia and we suspect that his concepts of intrageneric variation were not based on the world fauna. In combination with the previously undocumented forms found in Australia, this contributed to creation of genera that can be accommodated by a slight expansion of the concept of *Calliscelio*, even when the form of the mandibular sensillum is not considered.

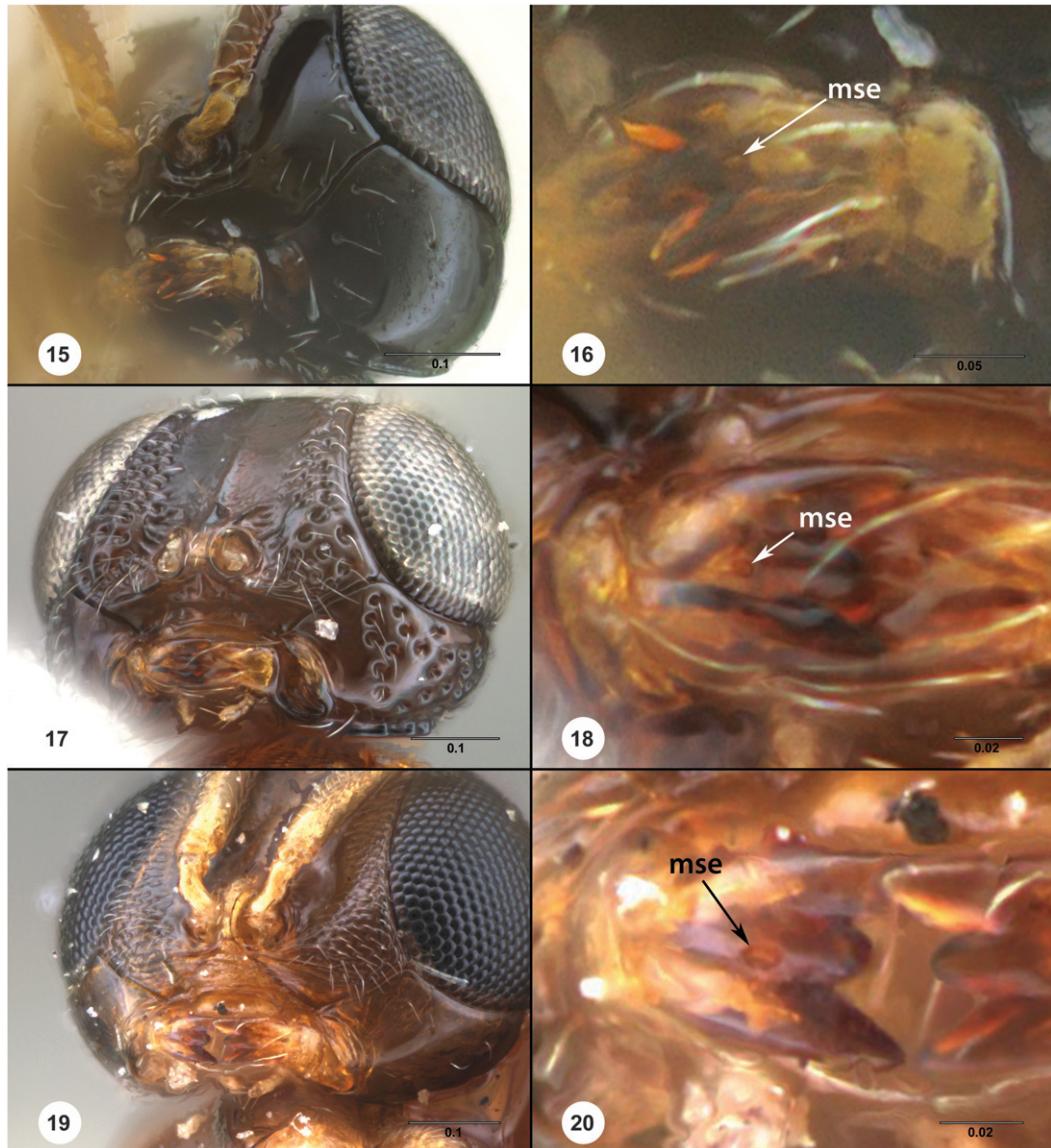
Our examination of Galloway's character states for these genera, primarily



Figs. 11–14. 11 *Calliscelio schlingeri* comb. n., female paratype (FBA021441), head, anterior view 12 *Calliscelio schlingeri* comb. n., female paratype (FBA021441), mandibles, anterior view 13 *Calliscelio albicoxus* comb. n., female (OSUC 56268), head and mesosoma, ventrolateral view 14 *Calliscelio albicoxus* comb. n., female (USNMENT01109093), mandible, anterolateral view. Scale bars in micrometers.

the “armature” of the metanotum and propodeum, and the length of T2, reveals that they are not significantly different from characters found in within *Calliscelio*. Galloway’s use of the term “armed” follows the style of Masner (1976), connoting the presence of a protruding structure, but it circumvents the details of where

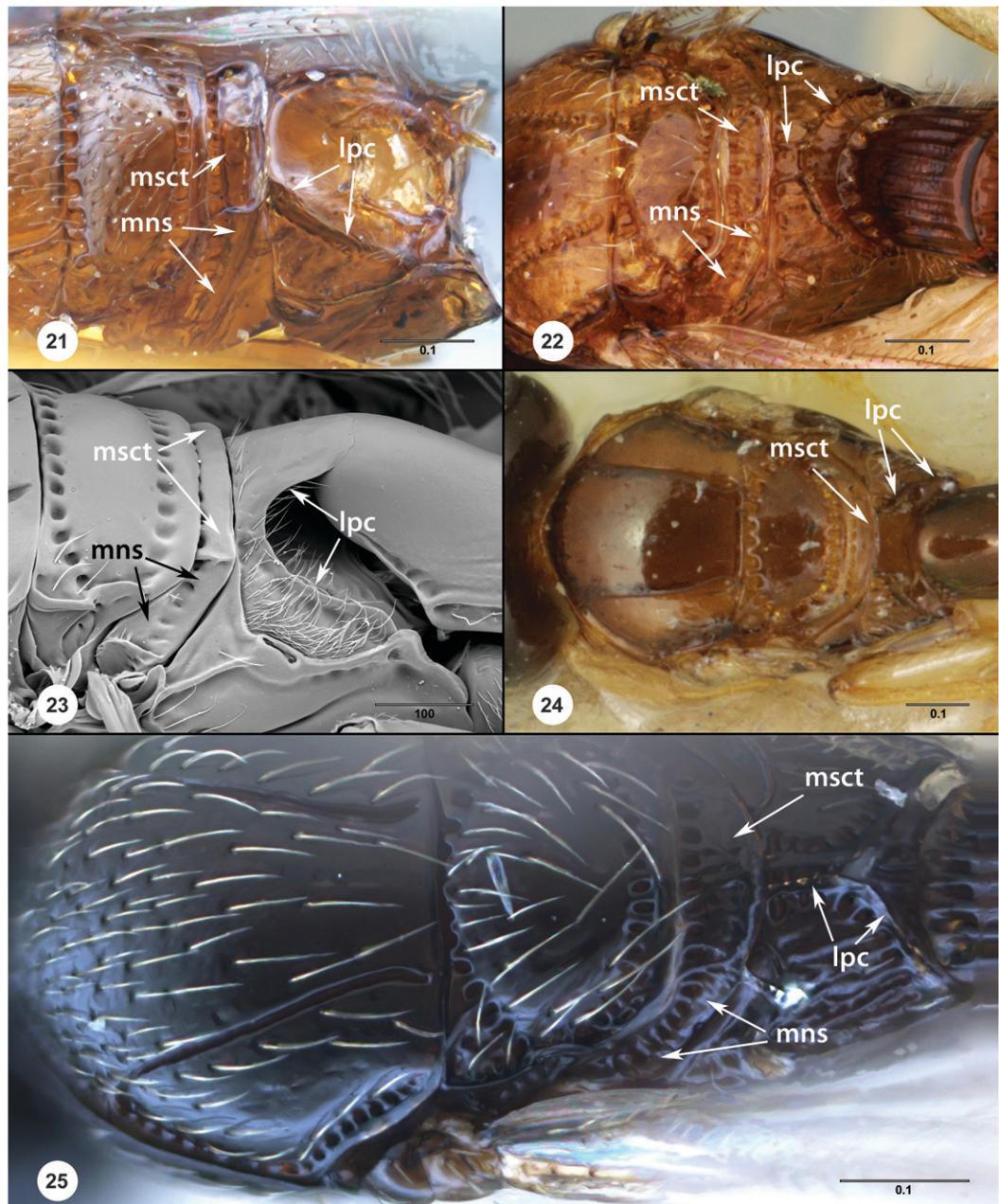
and from which anatomical entity it arises, and can result in a superficial understanding of characters and relationships. Our analysis of the metascutellum and propodeum in these genera illustrates a continuous spectrum of forms that cannot be sufficiently described by the term “armed” alone.



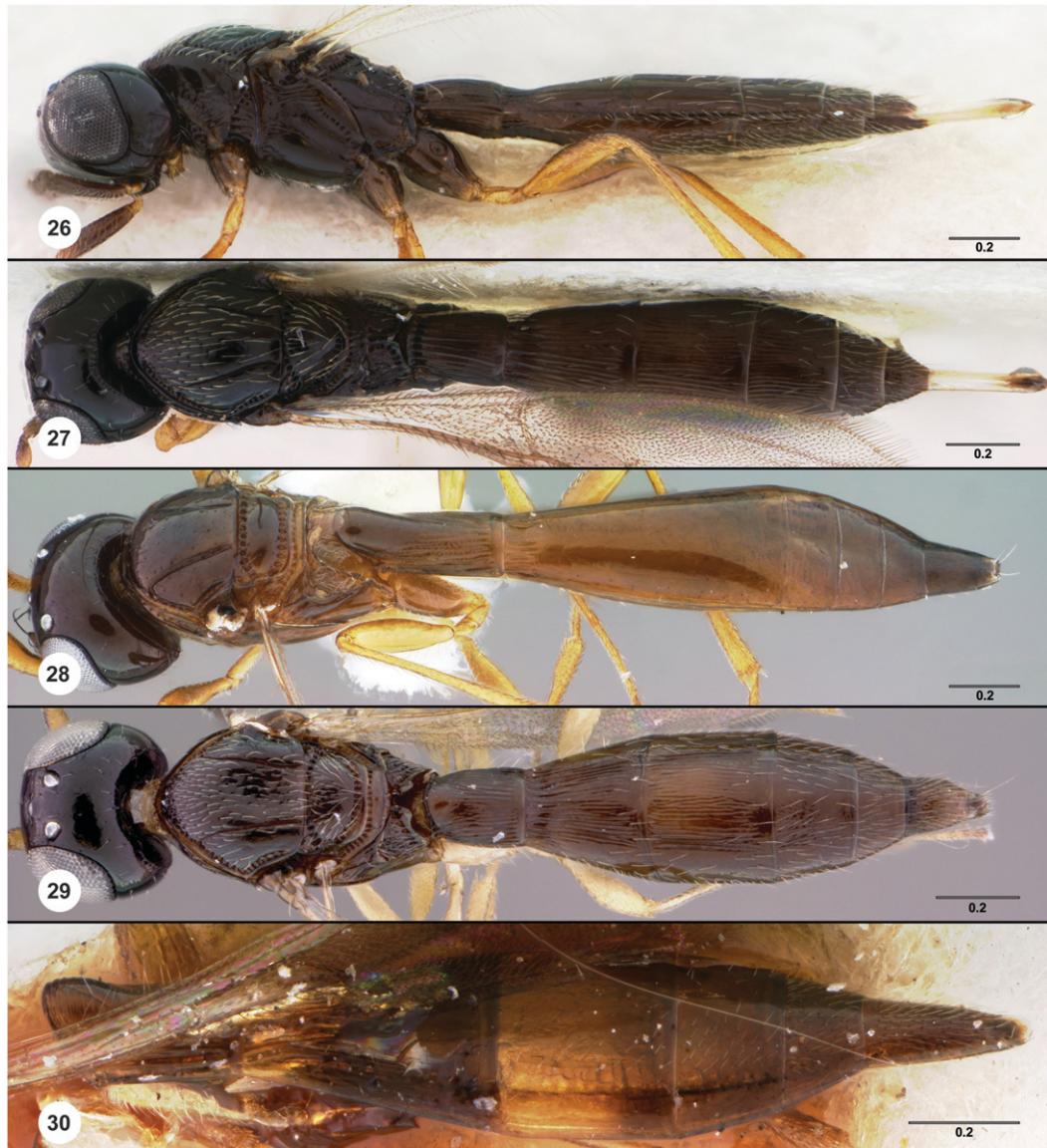
Figs. 15–20. 15 *Calliscelio collinus* comb. n., female holotype (QM Reg. No. T152122), head, ventrolateral view 16 *Calliscelio collinus* comb. n., female holotype (QM Reg. No. T152122), mandible, anteroventral view 17 *Calliscelio yunkara* sp. n., (ANIC DB 32-020270), head, ventrolateral view 18 *Calliscelio yunkara* sp. n., (ANIC DB 32-020270), mandible, anteroventral view 19 *Calliscelio laticinctus*, female lectotype (USNMENT01059105), head, ventrolateral view 20 *Calliscelio laticinctus*, female lectotype (USNMENT01059105), mandible, anteroventral view. Scale bars in millimeters.

**Metascutellum**—Galloway and Austin (1984) separated *Yunkara* and females of *Lispoteleia* from *Calliscelio* on the basis of having an “unarmed metanotum”. This armature refers to the metascutellum, which

in most *Calliscelio* projects posteriorly as a flat lamella. In the type specimens for both *Lispoteleia collina* Galloway and *Yunkara inornata* Galloway the metascutellum is clearly differentiated from the metanotal



Figs. 21–25. 21 *Calliscelio laticinctus*, female paralectotype (USNM 01059354), mesosoma, dorsal view 22 *Calliscelio yunkara* comb. n., female holotype (ANIC DB 32-020270), mesosoma, dorsal view 23 *Calliscelio schlingeri* comb. n., female paratype (FBA 021441), mesosoma, dorsolateral view 24 *Calliscelio albicoxus* comb. n., female lectotype (SAMA DB 32-001474), mesosoma, dorsal view 25 *Calliscelio collinus* comb. n., female holotype (QM Reg. No. T152122), mesosoma, dorsal view. Scale bars in millimeters.



Figs. 26–30. 26 *Calliscelio collinus* comb. n., female holotype (QM Reg. No. T152122), head, mesosoma, metasoma, lateral view 27 *Calliscelio collinus* comb. n., female holotype (QM Reg. No. T152122), head, mesosoma, metasoma, dorsal view 28 *Calliscelio schlingeri* comb. n., female paratype (FBA021441), head, mesosoma, metasoma, dorsolateral view 29 *Calliscelio albicoxus* comb. n., female (OSUC 56268), head, mesosoma, metasoma, dorsal view 30 *Calliscelio laticinctus*, female lectotype (USNMENT01059105), metasoma, dorsolateral view. Scale bars in millimeters.

trough (Figs 22, 25), but it does not form a conspicuous plate or lamella that would be interpreted as armature. In our broadened concept of *Calliscelio*, the degree to which the metascutellum extends posteriorly is

variable. The lamellar form of the metascutellum is the most common in *Calliscelio* and it remains useful for identification, but it should not be used to exclude species from the genus.

Propodeum—The “armature” of the propodeum was treated by Galloway (Galloway & Austin, 1984) as a sexually dimorphic character in *Crama* and *Lispoteleia*, and also used as a generic character. This armature is derived from the lateral propodeal carinae, the form of which is related to the size of the horn on T1. In cases where the horn is large, the carinae form lamellae that flank the metasomal depression, as in *Calliscelio laticinctus* Ashmead (Fig. 21). In males and in species where the horn is small or absent, the carinae are present along the propodeal midline, which Galloway interpreted as “medially bispinose” in male *Lispoteleia* (Fig. 25).

The variety of form in the lateral propodeal carinae mirrors that of another cosmopolitan scelionine genus, *Paridris* Kieffer, in which the lateral propodeal carinae may be simple, or form spines or points both posteriorly and anteriorly (Talamas et al. 2013). Galloway’s treatment of an anteriorly enlarged lateral propodeal carina as a generic character is likely based on Masner’s (1976) use of this character for generic determination for *Probaryconus* Kieffer and *Oethecoctonus* Ashmead, in which propodeal spines are a more stable character.

Metasomal T2—Galloway (1984) diagnosed *Yunkara* on the basis of T2 as the longest tergite, a character rarely encountered in Scelioninae outside of Gryonini. T2 is indeed unusually long in *Y. inornata*, but T2 as the longest tergite is not uncommon in *Calliscelio* and is present in the type species of the genus, *C. laticinctus* (Fig. 30). In the context of a cosmopolitan view of *Calliscelio*, *Yunkara* simply exhibits an extreme of a developmental spectrum.

Synonymy of Australian genera—

#### *Crama* Galloway syn. n.

[http://bioguid.osu.edu/osuc\\_concepts/466](http://bioguid.osu.edu/osuc_concepts/466)

#### *Lispoteleia* Galloway syn. n.

[http://bioguid.osu.edu/osuc\\_concepts/503](http://bioguid.osu.edu/osuc_concepts/503)

#### *Yunkara* Galloway syn. n.

[http://bioguid.osu.edu/osuc\\_concepts/578](http://bioguid.osu.edu/osuc_concepts/578)

Generic transfers for Australian species—

#### *Calliscelio albicoxa* (Dodd) comb. rev.

[http://bioguid.osu.edu/osuc\\_concepts/4219](http://bioguid.osu.edu/osuc_concepts/4219)

Figures 13–14, 24, 29

*Baryconus albicoxa* Dodd, 1915: 446 (original description); Galloway, 1976: 112 (type information, systematic position).

*Calliscelio albicoxa* (Dodd): Masner, 1976: 37 (generic transfer).

*Crama albicoxa* (Dodd): Galloway and Austin, 1984: 29 (generic transfer, description, variation, keyed).

Link to Distribution Map. [<http://hol.osu.edu/map-large.html?id=4219>]

Material Examined. Lectotype, female, *B. albicoxa*: AUSTRALIA: QLD, decayed logs / jungle, Cairns Dist., 1200–2500ft, IV-1915 – V-1915, A. P. Dodd, SAMA DB 32-001474 (deposited in SAMA). Other material: (4 females, 1 unknown) AUSTRALIA: 4 females, ANIC DB 32-020273, 32-020274, 32-020275, 32-020276 (ANIC).

Lectotype designation. Alan Dodd’s original description of *Baryconus albicoxa* lists a male and a female specimen as the type material. Galloway (1976) and Galloway and Austin (1984) subsequently treated the female specimen as the holotype and the male as an allotype. Here we designate the female specimen (SAMA DB 32-001474) as the lectotype of this species.

#### *Calliscelio reticulatus* (Galloway) comb. n.

[http://bioguid.osu.edu/osuc\\_concepts/4220](http://bioguid.osu.edu/osuc_concepts/4220)

*Crama reticulata* Galloway, 1984: 29, 31 (original description. Keyed).

- Link to Distribution Map. [<http://hol.osu.edu/map-large.html?id=4220>]
- Calliscelio collinus* (Galloway) comb. n.**  
[http://bioguid.osu.edu/osuc\\_concepts/4763](http://bioguid.osu.edu/osuc_concepts/4763)  
 Figures 15–16, 25–27
- Lispoteleia collina* Galloway, 1984: 37 (original description. Keyed).
- Link to Distribution Map. [<http://hol.osu.edu/map-large.html?id=4763>]
- Calliscelio hirtus* (Galloway) comb. n.**  
[http://bioguid.osu.edu/osuc\\_concepts/4764](http://bioguid.osu.edu/osuc_concepts/4764)
- Lispoteleia hirta* Galloway, 1984: 37, 38 (original description. Keyed).
- Calliscelio inornatus* (Dodd) comb. n.**  
[http://bioguid.osu.edu/osuc\\_concepts/4765](http://bioguid.osu.edu/osuc_concepts/4765)
- Ceratoteleia inornata* Dodd, 1913: 141, 144, 175 (original description. Keyed).
- Macroteleia inornata* (Dodd): Dodd, 1913: 176 (generic transfer); Dodd, 1915: 13 (keyed).
- Macroteleia infuscata* Dodd, 1915: 13, 14 (original description. Keyed. Synonymized by Galloway, in Galloway and Austin (1984)); Galloway and Austin, 1984: 39 (junior synonym of *Lispoteleia inornata* (Dodd)).
- Monoteleia inornata* (Dodd): Kieffer, 1926: 545, 546 (generic transfer, description, keyed).
- Baryconus infuscatus* (Dodd): Dodd, 1933: 75 (generic transfer); Galloway, 1976: 109 (type information).
- Baryconus inornatus* (Dodd): Dodd, 1933: 75 (generic transfer); Galloway, 1976: 110 (type information).
- Lispoteleia inornata* (Dodd): Galloway and Austin, 1984: 37, 39 (generic transfer, description, keyed).
- Link to Distribution Map. [<http://hol.osu.edu/map-large.html?id=4765>]
- Calliscelio marroo* (Galloway) comb. n.**  
[http://bioguid.osu.edu/osuc\\_concepts/4766](http://bioguid.osu.edu/osuc_concepts/4766)
- Lispoteleia marroo* Galloway, 1984: 37, 40 (original description. Keyed).
- Calliscelio minimus* (Dodd) comb. n.**  
[http://bioguid.osu.edu/osuc\\_concepts/4767](http://bioguid.osu.edu/osuc_concepts/4767)
- Macroteleia minima* Dodd, 1913: 150, 151 (original description. Keyed); Dodd, 1915: 13 (keyed); Kieffer, 1926: 523, 542 (description, keyed).
- Baryconus minimus* (Dodd): Dodd, 1933: 75 (generic transfer); Galloway, 1976: 110 (type information).
- Lispoteleia minima* (Dodd): Galloway and Austin, 1984: 37, 40 (generic transfer, description, keyed).
- Link to Distribution Map. [<http://hol.osu.edu/map-large.html?id=4767>]
- Calliscelio striatus* (Galloway) comb. n.**  
[http://bioguid.osu.edu/osuc\\_concepts/4768](http://bioguid.osu.edu/osuc_concepts/4768)
- Lispoteleia striata* Galloway, 1984: 36, 41 (original description. Keyed).
- Calliscelio tamborina* (Galloway) comb. n.**  
[http://bioguid.osu.edu/osuc\\_concepts/4769](http://bioguid.osu.edu/osuc_concepts/4769)
- Lispoteleia tamborina* Galloway, 1984: 37, 42 (original description. Keyed).
- Calliscelio tricolor* (Dodd) comb. n.**  
[http://bioguid.osu.edu/osuc\\_concepts/4770](http://bioguid.osu.edu/osuc_concepts/4770)
- Macroteleia tricolor* Dodd, 1913: 176 (original description); Dodd, 1915: 13 (keyed); Kieffer, 1926: 523, 541 (description, keyed).
- Macroteleia polita* Dodd, 1914: 78 (original description. Synonymized by

Galloway, in Galloway and Austin (1984)); Dodd, 1915: 13 (keyed); Kieffer, 1926: 523, 542 (description, keyed); Galloway and Austin, 1984: 43 (junior synonym of *Lispoteleia tricolor* (Dodd)).

*Macroteleia varicornis* Dodd, 1914: 127 (original description. Synonymized by Galloway, in Galloway and Austin (1984)); Dodd, 1915: 13 (keyed); Kieffer, 1926: 523, 540 (description, keyed); Galloway and Austin, 1984: 43 (junior synonym of *Lispoteleia tricolor* (Dodd)).

*Macroteleia simillima* Dodd, 1915: 13, 14 (original description. Synonymized by Galloway, in Galloway and Austin (1984)); Galloway and Austin, 1984: 43 (junior synonym of *Lispoteleia tricolor* (Dodd)).

*Baryconus politus* (Dodd): Dodd, 1933: 75 (generic transfer); Galloway, 1976: 110 (type information).

*Baryconus simillimus* (Dodd): Dodd, 1933: 75 (generic transfer); Galloway, 1976: 110 (type information).

*Baryconus tricolor* (Dodd): Dodd, 1933: 75 (generic transfer); Galloway, 1976: 110 (type information).

*Baryconus varicornis* (Dodd): Dodd, 1933: 75 (generic transfer); Galloway, 1976: 110 (type information).

*Lispoteleia tricolor* (Dodd): Galloway and Austin, 1984: 37, 43 (generic transfer, description, keyed).

Link to Distribution Map. [<http://holos.edu/map-large.html?id=4770>]

***Calliscelio unicolor* (Dodd) comb. n.**  
[http://bioguid.osu.edu/osuc\\_concepts/4771](http://bioguid.osu.edu/osuc_concepts/4771)

*Macroteleia setosa* Dodd, 1914: 128 (original description. Synonymized by Galloway, in Galloway and Austin (1984)); Dodd, 1915: 13 (keyed); Kieffer, 1926: 523, 541 (description, keyed); Galloway and Austin, 1984:

44 (junior synonym of *Lispoteleia unicolor* (Dodd)).

*Macroteleia unicolor* Dodd, 1914: 128 (original description); Dodd, 1915: 13 (keyed); Kieffer, 1926: 523, 541 (description, keyed).

*Baryconus setosus* (Dodd): Dodd, 1933: 75 (generic transfer); Galloway, 1976: 110 (type information).

*Baryconus unicolor* (Dodd): Dodd, 1933: 75 (generic transfer); Galloway, 1976: 110 (type information).

*Lispoteleia unicolor* (Dodd): Galloway and Austin, 1984: 37, 44 (generic transfer, description, keyed).

Link to Distribution Map. [<http://holos.edu/map-large.html?id=4771>]

***Calliscelio yunkara* Talamas name n.**  
[http://bioguid.osu.edu/osuc\\_concepts/5542](http://bioguid.osu.edu/osuc_concepts/5542)

Figures 17–18, 22, 31–32

*Yunkara inornata* Galloway, 1984: 34 (original description).

Etymology. The generic transfers of *Lispoteleia inornata* and *Yunkara inornata* to *Calliscelio* make the latter a junior homonym, requiring the creation of a replacement name. We use the now invalid generic name “yunkara” as a replacement species name for this species, which, according to Galloway and Austin (1984) is an aboriginal word for “stranger”. The name is treated as a noun in apposition.

Link to Distribution Map. [<http://holos.edu/map-large.html?id=5542>]

Material Examined. Holotype, female, *Y. inornata*: AUSTRALIA: QLD, Cape York Peninsula, Iron Range, 1. VI–9.VI.1971, S. R. Monteith, ANIC DB 32-020270 (deposited in ANIC).

*Xentor*—The presence of the prioniform sensillum on the mandible directly posterior to the median mandibular tooth in *Xentor schlingeri* Masner & Johnson is identical to the location and

form of the sensillum in *Calliscelio*. It is on the basis of this character, and the congruence of other characters with *Calliscelio* (see Diagnosis of *Calliscelio*), that we treat *Xentor* as a junior synonym. Masner & Johnson (2007) separated *Xentor* from *Calliscelio* on the basis of the configuration of the toruli, which in *Xentor* are closer to the inner orbits of the eye than to each other. We agree that the position of toruli close to inner orbits in *Xentor* is apomorphic, but consider it to be derived from within *Calliscelio*.

The form of the propodeal carinae in *Xentor schlingeri*, in which the lateral propodeal carinae are continuous dorsally and form a lamella that extends over the horn, is unknown to us from other *Calliscelio* and represents an extreme of the variation that can occur on the propodeum within this genus.

Masner and Johnson's (2007) description of the dorsellum (=metascutellum) as "clearly differentiated, unarmed" again highlights the pitfalls of the term "armed". Without an explanation of how one differentiates "armed" from "unarmed" this term is ambiguous and subject to varying interpretation.

***Xentor* Masner and Johnson syn. n.**  
[http://bioguid.osu.edu/osuc\\_concepts/211604](http://bioguid.osu.edu/osuc_concepts/211604)

***Calliscelio schlingeri* (Masner and Johnson) comb. n.**

[http://bioguid.osu.edu/osuc\\_concepts/211607](http://bioguid.osu.edu/osuc_concepts/211607)

Figures 11–12, 23, 28

*Xentor schlingeri* Masner and Johnson, 2007: 14, 17 (original description, keyed).

Link to Distribution Map. [<http://hol.osu.edu/map-large.html?id=211607>]

***Calliscelio filicornis* (Masner and Johnson) comb. n.**

[http://bioguid.osu.edu/osuc\\_concepts/211606](http://bioguid.osu.edu/osuc_concepts/211606)

*Xentor filicornis* Masner and Johnson, 2007: 14, 15 (original description, keyed).

Link to Distribution Map. [<http://hol.osu.edu/map-large.html?id=211606>]

***Calliscelio convexifrons* (Masner and Johnson) comb. n.**

[http://bioguid.osu.edu/osuc\\_concepts/211605](http://bioguid.osu.edu/osuc_concepts/211605)

*Xentor convexifrons* Masner and Johnson, 2007: 14 (original description, keyed).

Link to Distribution Map. [<http://hol.osu.edu/map-large.html?id=211605>]

Synopsis of *Calliscelio*—

*Calliscelio* Ashmead

[http://bioguid.osu.edu/xbiot\\_concepts/461](http://bioguid.osu.edu/xbiot_concepts/461)

Figures 5–6, 10–29

*Calliscelio* Ashmead, 1893: 209, 218 (original description. Type: *Calliscelio laticinctus* Ashmead, by monotypy and original designation. Keyed); Ashmead, 1894: 216 (keyed); Dalla Torre, 1898: 501 (catalog of species); Ashmead, 1900: 327 (list of species of West Indies); Ashmead, 1903: 91 (keyed); Kieffer, 1908: 122 (keyed); Brues, 1908: 27, 28, 33 (diagnosis, list of species, keyed); Kieffer, 1910: 66 (keyed); Kieffer, 1913: 232 (description); Kieffer, 1926: 273, 499 (description, keyed, key to species); Muesebeck and Walkley, 1956: 338 (citation of type species); Baltazar, 1966: 185 (cataloged, catalog of species of the Philippines); Masner, 1976: 34, 36, 43 (description; key to *Calliscelio* Ashmead, *Paridris* Kieffer, *Oethococtonus* Ashmead, and *Probaryconus* Kieffer; key to *Calotelea* Westwood and *Calliscelio* Ashmead); Mani and Sharma, 1982: 178 (description); Galloway and Austin, 1984: 8, 27, 28 (description, list of species described from Australia, keyed); Kozlov and Kononova, 1985: 19 (description, key to species of the Palearctic); Kozlov and Kononova, 1990: 19, 173, 183 (description, key to species of the USSR, keyed); Johnson, 1992: 355 (catalog of world species); Kononova, 1995: 61, 69 (keyed, diagnosis, key to species of Russian

Far East); Austin and Field, 1997: 20, 68 (structure of ovipositor system, discussion of phylogenetic relationships); Narendran and Ramesh Babu, 1999: 2 (key to species of India); Lê, 2000: 31, 46 (keyed, description, key to species); Loíácono and Margaríá, 2002: 557 (catalog of Brazilian species); Mineo, 2004: 174 (distribution in Sicily); Rajmohana K., 2006: 116, 119, 120 (description, keyed, key to species of India); Kononova and Fursov, 2007: 98 (description); Kononova and Fursov, 2007: 57 (description); Kononova and Kozlov, 2008: 23, 257, 258 (description, keyed, key to species of Palearctic region); Rajmohana K. and Peter, 2013: 76 (key to species for *rugosus* and *agaliensis*).

*Ceratoteleia* Kieffer, 1908: 121 (original description. Type: *Caloteleia grenadensis* Ashmead, designated by Kieffer (1926). Keyed. Synonymized by Masner (1976)); Kieffer, 1910: 65, 66, 88 (description, list of species, keyed); Dodd, 1913: 131, 144 (key to species of Australia); Dodd, 1913: 176 (comparison with *Macroteleia* Westwood); Kieffer, 1913: 232 (description); Kieffer, 1913: 222 (description); Kieffer, 1914: 315 (description, key to species of Europe and Algeria); Kieffer, 1926: 273, 500 (description, keyed, key to species); Nixon, 1931: 356 (keyed, key to species of Africa); Nixon, 1933: 292 (keyed); Maneval, 1940: 114 (keyed); Brues, 1940: 82 (key to species of Baltic amber); Risbec, 1950: 603 (key to species of Ethiopian region); Muesebeck and Walkley, 1951: 705 (catalog of species of U. S. and Canada); Muesebeck and Walkley, 1956: 341 (citation of type species); Masner, 1976: 36 (junior synonym of *Calliscelio* Ashmead).

*Prosanteris* Kieffer, 1908: 121, 136 (original description. Type: *Anteris nigriceps* Ashmead, designated by Kieffer (1910). Keyed. Synonymized with *Ceratoteleia* Kieffer by Muesebeck (1958)); Kieffer, 1910: 65, 87 (description, key to subgenera, keyed); Kieffer, 1913: 232 (description); Kieffer, 1926: 272, 437 (description, keyed, key to species); Muesebeck and Walkley, 1951: 704 (catalog of species of U.S. and Canada); Muesebeck and Walkley, 1956: 391 (citation of type species); Muesebeck, 1958: 93 (junior synonym of *Ceratoteleia* Kieffer). *Prosanteris* (*Prosanteris*) Kieffer: Kieffer, 1910: 87 (description, list of species, keyed).

*Uroscelio* Kieffer, 1914: 291 (original description. Type: *Uroscelio luteipes* Kieffer, by monotypy and original designation. Synonymized by Masner (1976)); Kieffer, 1926: 268, 409 (description, keyed); Muesebeck and Walkley, 1956: 408 (citation of type species); Baltazar, 1966: 180 (cataloged, catalog of species of the Philippines); Masner, 1976: 36 (junior synonym of *Calliscelio* Ashmead).

*Mesoteleia* Kieffer, 1917: 51 (original description. Type: *Mesoteleia pallida* Kieffer, by monotypy and original designation. Synonymized by Masner (1976)); Kieffer, 1926: 271, 441 (description, keyed); Muesebeck and Walkley, 1956: 369 (citation of type species); Baltazar, 1966: 182 (cataloged, catalog of species of the Philippines); Masner, 1976: 36 (junior synonym of *Calliscelio* Ashmead).

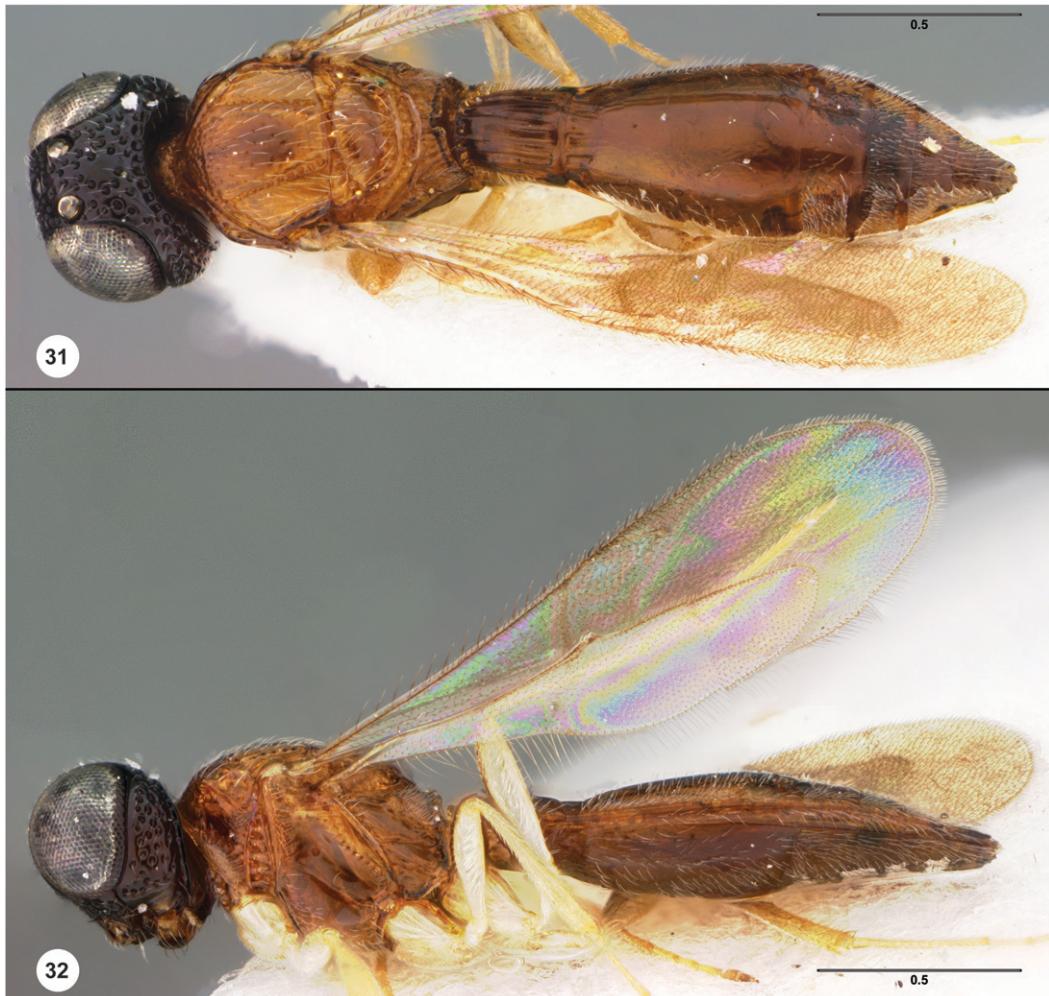
*Baryteleia* Kieffer, 1926: 273, 544 (original description. Type: *Macroteleia nigriceps* Kieffer, by original designation. Keyed, key to species. Synonymized by Masner (1976)); Muesebeck and Walkley, 1956: 336 (citation of type species); Masner, 1976: 36 (junior synonym of *Calliscelio* Ashmead).

*Caenoteleia* Kieffer, 1926: 266, 550 (original description. Type: *Caloteleia elegans* Perkins, by monotypy. Keyed); Muesebeck and Walkley, 1956: 338 (citation of type species); Johnson, 1992: 355 (catalog of world species); Masner, Johnson and Musetti, 2009: 60 (junior synonym of *Calliscelio* Ashmead, discussion).

*Glyptoteleia* Kieffer, 1926: 272, 487 (original description. Type: *Baryconus bisulcatus* Kieffer, by monotypy. Keyed. Synonymized by Masner (1976)); Muesebeck and Walkley, 1956: 356 (citation of type species); Szabó, 1962: 241 (diagnosis); Masner, 1976: 36 (junior synonym of *Calliscelio* Ashmead); De Santis, 1980: 312 (catalog of species of Brazil).

**Crama Galloway syn. n.**, 1984: 7, 8, 28 (original description. Type: *Baryconus albicoxa* Dodd, by original designation. Key to Australian species, keyed); Johnson, 1992: 364 (catalog of world species).

*Lispoteleia Galloway syn. n.*, 1984: 7, 9, 35 (original description. Type: *Lispoteleia collina* Galloway, by original designation. Key to species of Australia, keyed); Johnson, 1992: 421 (catalog of world species); Austin and Field, 1997: 22, 68 (structure of ovipositor



Figs. 31–32. 31 *Calliscelio yunkara* sp. n., female holotype (ANIC DB 32-020270), head, mesosoma, metasoma, dorsal view 32 *Calliscelio yunkara* comb. n., female holotype (ANIC DB 32-020270), head, mesosoma, metasoma, lateral view. Scale bars in millimeters.

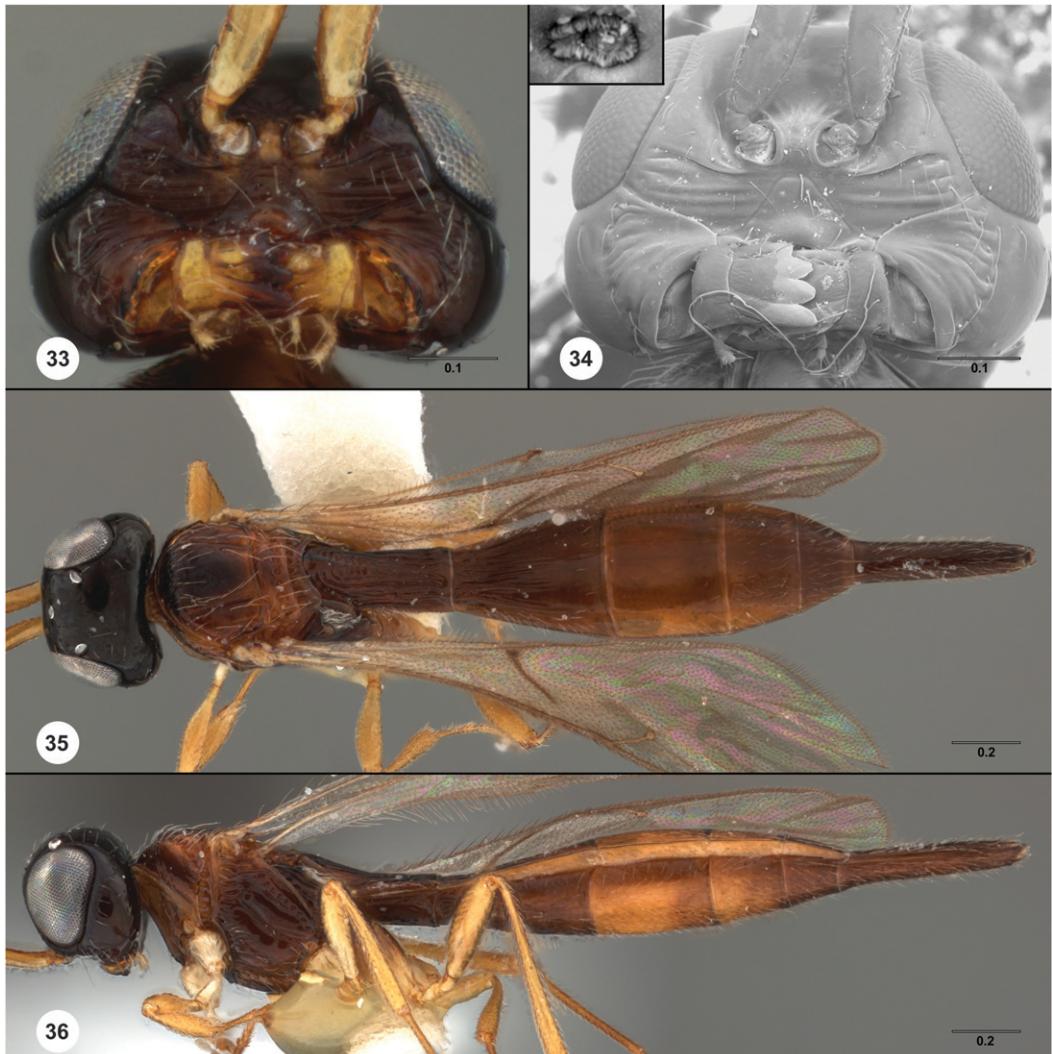
system, discussion of phylogenetic relationships).

***Yunkara Galloway syn.n.***, 1984: 9, 33 (original description. Type: *Yunkara inornata* Galloway, by monotypy and original designation. Keyed); Johnson, 1992: 510 (catalog of world species).

***Xentor Masner and Johnson syn. n.***, 2007: 12, 14 (original description. Type: *Xentor schlingeri* Masner and Johnson, by original designation. Key to species).

**Diagnosis of *Calliscelio*—**The prioniform state of the sensillum on the mandible

of *Calliscelio* provides an unambiguous means of generic determination for both males and females. However, the small size of this character makes it challenging to observe in small specimens or those in which the mandible is occluded. In the vast majority of cases, *Calliscelio* may still be separated from other scelionines without the use of the prioniform sensillum, metascutellum, propodeum or mandible by the following combination of characters: metasoma with



Figs. 33–36. *Calliscelio* sp., female (CNC494851) 33 head, anteroventral view 34 head, anteroventral, inset of mandibular sensillum 35 head, mesosoma, metasoma, dorsal view 36 head, mesosoma, metasoma, lateral view. Scale bars in millimeters.

*Scelio*-type ovipositor; skaphion absent; netrion present; epomial carina absent; striae absent from ventral frons and gena, including the malar region; frons without dorsoventral furrows or carinae extending from the toruli along lateral margins of clypeus (lmc: Figs 7–9).

We encountered two species of *Calliscelio* that prevent the above diagnosis from being universally applicable. The

first is a species from Vanuatu (Figs 33–36), in which transverse striae are present on the frons, and these we do not consider to be facial striae because they do not radiate from the anterior articulation of the mandible. In this species there also are sculptural lines on the gena that can be interpreted in two ways: as striae radiating from the anterior articulation of the mandible, or as elongation



Figs. 37–39. *Calliscelio rugosus*, female (USNMENT01197889) 37 head and mesosoma, dorsal view 38 head and pronotum, ventrolateral view 39 head, mesosoma, metasoma, lateral view. Scale bars in millimeters.

of the foveae that extend from the lower margin of the eye to the posterior articulation of the mandible. The former interpretation implies that the absence of malar striae is not a ubiquitous generic character for *Calliscelio*. We here do not prefer one interpretation over the other, and simply give this character special attention because it has the potential to result in an incorrect determination of genus for this species.

*Calliscelio rugosus* Rajmohana & Peter (Figs. 37–39) is the only species of *Calliscelio* known to us with an epomial carina (Fig. 37). It is otherwise congruent with classical concepts of *Calliscelio*.

#### CONCLUSION

Our study of morphological characters in Platygastroidea with a scanning

electron microscope has yielded a wealth of characters, many of which will provide new insights and hypotheses about relationships within the group. This paper represents the first product of this work and demonstrates the value in purely exploratory research projects, particularly in a lineage as understudied as Platygastroidea. Given that morphological characters are the basis for the identification, and in most cases delimitation of taxa, we consider their thorough examination to be requisite for a stable and useful classification.

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Table 1. Morphological terms and concepts in the Hymenoptera Anatomy Ontology.

Term	URI
carina	<a href="http://purl.obolibrary.org/obo/HAO_0000188">http://purl.obolibrary.org/obo/HAO_0000188</a>
clypeus	<a href="http://purl.obolibrary.org/obo/HAO_0000212">http://purl.obolibrary.org/obo/HAO_0000212</a>
epomial carina	
facial striae	<a href="http://purl.obolibrary.org/obo/HAO_0002376">http://purl.obolibrary.org/obo/HAO_0002376</a>
frons	<a href="http://purl.obolibrary.org/obo/HAO_0001523">http://purl.obolibrary.org/obo/HAO_0001523</a>
gena	<a href="http://purl.obolibrary.org/obo/HAO_0000371">http://purl.obolibrary.org/obo/HAO_0000371</a>
head	<a href="http://purl.obolibrary.org/obo/HAO_0000397">http://purl.obolibrary.org/obo/HAO_0000397</a>
lateral propodeal carina	<a href="http://purl.obolibrary.org/obo/HAO_0001919">http://purl.obolibrary.org/obo/HAO_0001919</a>
malar striae	<a href="http://purl.obolibrary.org/obo/HAO_0002373">http://purl.obolibrary.org/obo/HAO_0002373</a>
malar sulcus	<a href="http://purl.obolibrary.org/obo/HAO_0000504">http://purl.obolibrary.org/obo/HAO_0000504</a>
mandible	<a href="http://purl.obolibrary.org/obo/HAO_0000506">http://purl.obolibrary.org/obo/HAO_0000506</a>
mesoscutum	<a href="http://purl.obolibrary.org/obo/HAO_0000575">http://purl.obolibrary.org/obo/HAO_0000575</a>
mesosoma	<a href="http://purl.obolibrary.org/obo/HAO_0000576">http://purl.obolibrary.org/obo/HAO_0000576</a>
metanotal trough	<a href="http://purl.obolibrary.org/obo/HAO_0000600">http://purl.obolibrary.org/obo/HAO_0000600</a>
metanotum	<a href="http://purl.obolibrary.org/obo/HAO_0000603">http://purl.obolibrary.org/obo/HAO_0000603</a>
metascutellum	<a href="http://purl.obolibrary.org/obo/HAO_0000625">http://purl.obolibrary.org/obo/HAO_0000625</a>
metasoma	<a href="http://purl.obolibrary.org/obo/HAO_0000626">http://purl.obolibrary.org/obo/HAO_0000626</a>
metasomal depression	<a href="http://purl.obolibrary.org/obo/HAO_0000627">http://purl.obolibrary.org/obo/HAO_0000627</a>
netrion	<a href="http://purl.obolibrary.org/obo/HAO_0000644">http://purl.obolibrary.org/obo/HAO_0000644</a>
ovipositor	<a href="http://purl.obolibrary.org/obo/HAO_0000679">http://purl.obolibrary.org/obo/HAO_0000679</a>
process	<a href="http://purl.obolibrary.org/obo/HAO_0000822">http://purl.obolibrary.org/obo/HAO_0000822</a>
pronotum	<a href="http://purl.obolibrary.org/obo/HAO_0000853">http://purl.obolibrary.org/obo/HAO_0000853</a>
propodeal carina	<a href="http://purl.obolibrary.org/obo/HAO_0000864">http://purl.obolibrary.org/obo/HAO_0000864</a>
propodeum	<a href="http://purl.obolibrary.org/obo/HAO_0001249">http://purl.obolibrary.org/obo/HAO_0001249</a>
sensillum	<a href="http://purl.obolibrary.org/obo/HAO_0000933">http://purl.obolibrary.org/obo/HAO_0000933</a>
skaphion	<a href="http://purl.obolibrary.org/obo/HAO_0000940">http://purl.obolibrary.org/obo/HAO_0000940</a>
sulcus	<a href="http://purl.obolibrary.org/obo/HAO_0000978">http://purl.obolibrary.org/obo/HAO_0000978</a>
tergite	<a href="http://purl.obolibrary.org/obo/HAO_0001005">http://purl.obolibrary.org/obo/HAO_0001005</a>
tooth	<a href="http://purl.obolibrary.org/obo/HAO_0001019">http://purl.obolibrary.org/obo/HAO_0001019</a>

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