



Review of *Cyphotes* Burmeister, 1835 (Hemiptera: Membracidae) with the description of a related new genus

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Abstract

The Neotropical treehopper genus *Cyphotes* Burmeister, 1835 (= *Aspona* Stål, 1862 **syn. nov.**) is redefined. *Cyphotes* contains only two species, the type species *Cyphotes nodosa* Burmeister, 1835 (= *Aspona bullata* Stål, 1862 **syn. nov.**) and *Cyphotes quadrinodosa* (Fonseca & Diringshofen, 1969) **reinstated. comb. Allocyphotes gen. nov.** (type species *Cyphotes insolita* Goding, 1929) is proposed to accommodate two other species previously placed in *Cyphotes*, *Allocyphotes pompanoni* (Boulard, 2011) **comb. nov.** and *Allocyphotes colombiensis* (González-Mozo, 2017) **comb. nov.**, and three new species from Ecuador: *A. flavus* **sp. nov.**, *A. waoraniorum* **sp. nov.** and *A. robertoi* **sp. nov.** for a total of six species. Illustrations, including genitalia images, new locality records and keys to genera and species are provided.

Key words: Morphology, *Allocyphotes*, *Aspona*, Darnini, Ecuador

Introduction

The family Membracidae (Hemiptera: Auchenorrhyncha) is well known because of their enlarged and uniquely shaped pronota. The pronotum in the tribe Darnini displays three well-differentiated pronotal syndromes (Fig. 1), which have been hypothesized to be related to mimetic strategies (Roy *et al.* 2007): ‘dewdrops’, ‘thorns’ or ‘bird droppings’. The “dewdrop” mimetic strategy (Fig. 1A); later referenced as the “raindrop” mimetic strategy (McKamey & Sullivan-Beckers 2019) applies to genera with an evenly convex pronotum, lacking horns, that covers the wings laterally. This morphology (found in the genera *Alobia* Stål, 1869, *Darnis* Fabricius, 1803, *Dectonura* Butler, 1878, *Hebetica* Stål, 1869, *Hebeticoidea* Fowler, 1894, *Leptosticta* Stål, 1869, *Ochrolomia* Stål, 1869, *Peltosticta* Sakakibara, 1976, and *Stictopelta*, Stål 1869) makes the insect look like a water droplet. The ‘thorny’ group (Fig. 1B) has the pronotum smooth, regular, and with suprahumeral horns developed laterally (found in, *Alcmeone* Stål, 1867 and *Sundarion* Kirkaldy, 1904), giving the treehoppers the appearance of a plant thorn. Lastly, the ‘bird dropping’ group (Fig. 1C) has a rugose, irregular, pronotum, and is considered to resemble bird droppings; the pronotum usually lacks horns, covers most of the wings laterally, and is often swollen laterally preapically, giving the treehopper the appearance of bird manure (found in the genera *Aspona* Stål, 1862, *Cyphotes* Burmeister, 1835, *Hypheodana* Metcalf, 1952, *Nasuconia* Sakakibara, 2006 and *Taunaya* Fonseca, 1934). Despite this morphological heterogeneity, Darnini has previously been recovered as a monophyletic group, supported by the presence of cucullate setae on the ventral sides of the femora (Fig. 2B) (Dietrich *et al.* 2001, Roy *et al.* 2007). Here, we present taxonomic and morphological remarks on the *Cyphotes*-group genera, a review of *Cyphotes* Burmeister, and a description of the new related genus *Allocyphotes* **gen. nov.** and three new species.



FIGURE 1. Darnini pronotal syndromes. **A.** Raindrop, *Darnis* sp.; **B.** Thorny, *Sundarion* sp.; **C.** Birdropping (*Cyphotes*-group), *Allocyphotes* sp.

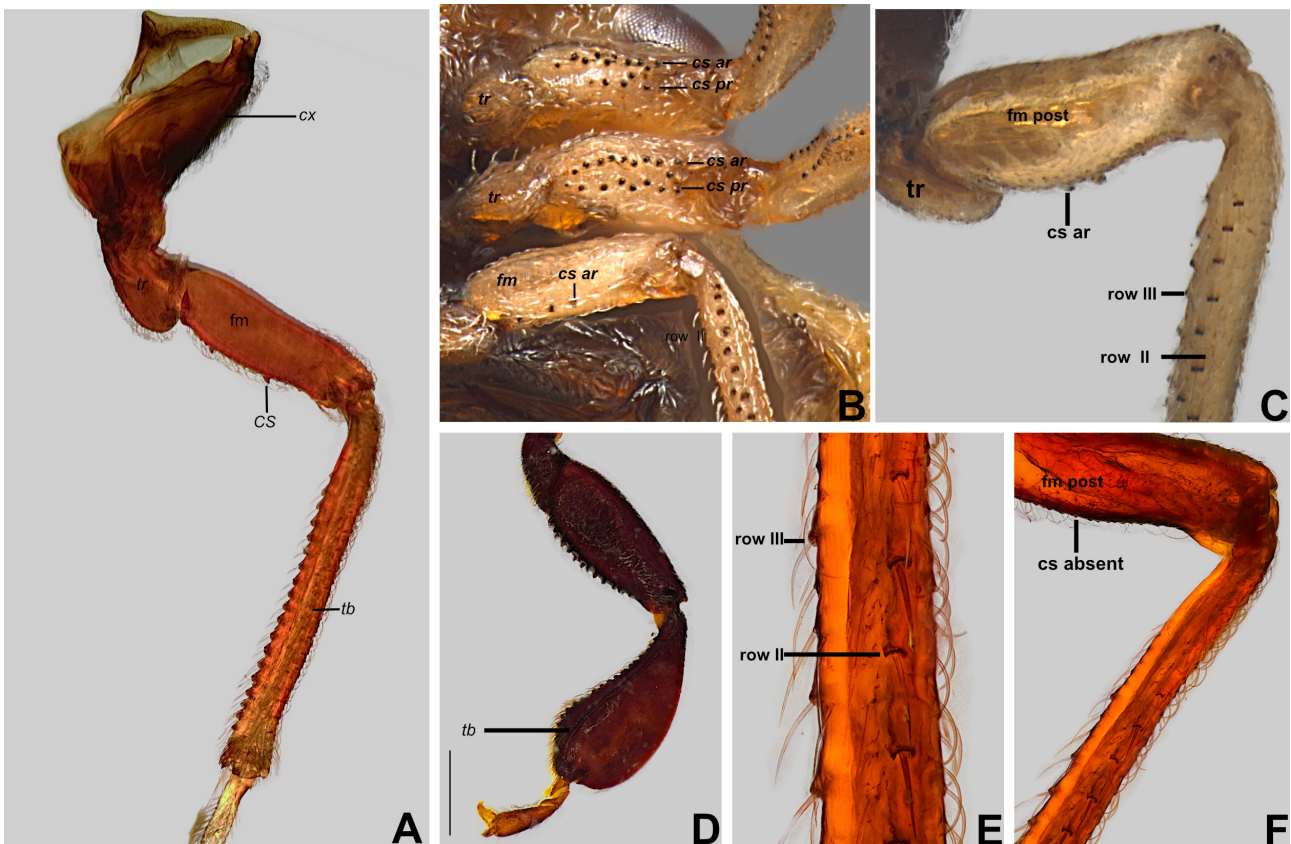


FIGURE 2. Cucullate setae Darnini (*Cyphotes*-group). **A.** Posterior leg *Allocyphotes flavus* sp. nov.; **B.** Pro, meso and meta femur ventral view, *Hypheodana acuta*; **C.** Posterior leg *Hypheodana acuta*; **D.** Anterior leg *Nasuconia* sp.; *Cyphotes quadrinodosa* posterior leg; **E.** Tibia; **F.** Femur. Abbreviations: **cs**: cucullate setae; **cs ar**: cucullate setae anterior row; **cs pr**: cucullate setae posterior row; **cx**: coxa; **fm**: femur; **tb**: tibia; **tr**: trochanter. Scale. 0.5 mm.

Methods

Specimens were examined with the aid of a Leica MZ16 stereomicroscope with 25× magnification and photographed with a Canon 80D, digital camera. Multiple photographic layers were stacked using Helicon Focus 8.1 to produce a single image. Photographs were then edited, and structures were labeled in Affinity Photo 1.9.3. Genitalia structures were dissected and macerated in 10% KOH to remove any unsclerotized tissue; specimens were then transferred to a water bath for five minutes. Genitalia were examined and photographed in glycerin, and then stored in microvials pinned beneath the specimen. Terminology used in species descriptions follows Deitz (1975), Harris (1979) and

Sakakibara (1988), genitalia terminology follows Mejdalani (1998) and Pecly *et al.* (2019). Measurements were taken with Image J software version 1.52. Distribution maps were created by using QGIS 3.28.1. SEM examinations were conducted in the Microscope Imaging Facility of the American Museum of Natural History, New York; specimens were mounted on aluminum stubs with double-sided adhesive, sputter coated with Au-Pd, and imaged under high vacuum pressure using a Hitachi S-4700 FESEM. Acronyms for Museum and entomological collections are as follows:

AMNH	American Museum of Natural History, New York, USA
CAS	California Academy of Science Entomology Collection, San Francisco, California, USA
DZUP	Universidade Federal do Parana, Museu de Entomologia, Curitiba, Parana, Brazil
FSCA	Florida State Collection of Arthropods, Gainesville, Florida, USA
IAvH	Instituto Alexander von Humboldt, Villa de Leyva, Boyacá, Colombia
MLUH	Martin-Luther-Universität, Zentralmagazin Naturwissenschaftlicher Sammlungen, Zoologische Sammlung, Halle (Saale), Germany
MNHN	Muséum National d'Histoire Naturelle, Paris, France
MZSP	Museu de Zoologia da Universidade de São Paulo, Brazil
NCSU	North Carolina State University Insect Collection, Raleigh, North Carolina, USA
QCAZ	Museo de Zoología of Pontificia Universidad Católica del Ecuador, Quito, Ecuador
USNM	National Museum of Natural History, Washington DC, USA

Results

Tribe Darnini

Cyphotes-group

Cyphotes-group genera (*Aspona*, *Cyphotes*, *Hypheodana*, *Nasuconia* and *Taunaya*) share a unique combination of morphological features that distinguishes them from other Darnini genera. These genera can sometimes be challenging to distinguish from each other due to an overlap of key characters and a scarcity of material in collections for reference. With the aim of providing a more stable classification of these genera, we identify diagnostic characters and propose a preliminary key. In cases where genera lack unique synapomorphies that define them, we propose a combination of characters to redefine them. For *Hypheodana*, we follow diagnostic characters established by Sakakibara (2006); because of its high morphological heterogeneity, however, a closer comparison of the species of this genus is necessary. A phylogenetic analysis is beyond the scope of this paper and all generic concepts here provided should be considered hypotheses that need to be tested in future research.

Morphological notes

The following are morphological features of the *Cyphotes*-group not present in other Darnini genera. **Head.** Coronal and frontoclypeal sutures well delimited (poorly delimited in raindrop genera) (Fig. 4A *sc, sfc*). The forward projected head is not a unique character to the *Cyphotes* group genera; this is a character also observed in other genera such as *Funkhouseriana* Creão-Duarte, 1999, *Tynelia* Stål, 1858, and *Neotynelia* Creão-Duarte and Sakakibara, 2000. Head orientation (vertex and frontoclypeus) varies from perpendicular, to obliquely projected forward forming an angle between the metopidum and vertex.

Pronotum. Covering forewings at rest, costal area visible (Fig. 4B); pronotum integument irregular, punctate, pubescent, with elevated lines, knots, or combinations of these present (Fig. 3) (sculpture even and smooth, in other Darnini genera); postocular area not extended beyond the eye (Fig. 4B) (postocular area lobulate or carinate in other Darnini genera); preapical part of posterior pronotal process enlarged (Fig. 4B), evenly convex, or tapered; median carina percurrent, elevated throughout (Fig. 4C) (not elevated in other genera); humeral angles projected laterally, triangular (Fig. 10A) to trilobate (Figs. 16A, E, D) (humeral angles not well projected laterally in other Darnini genera).

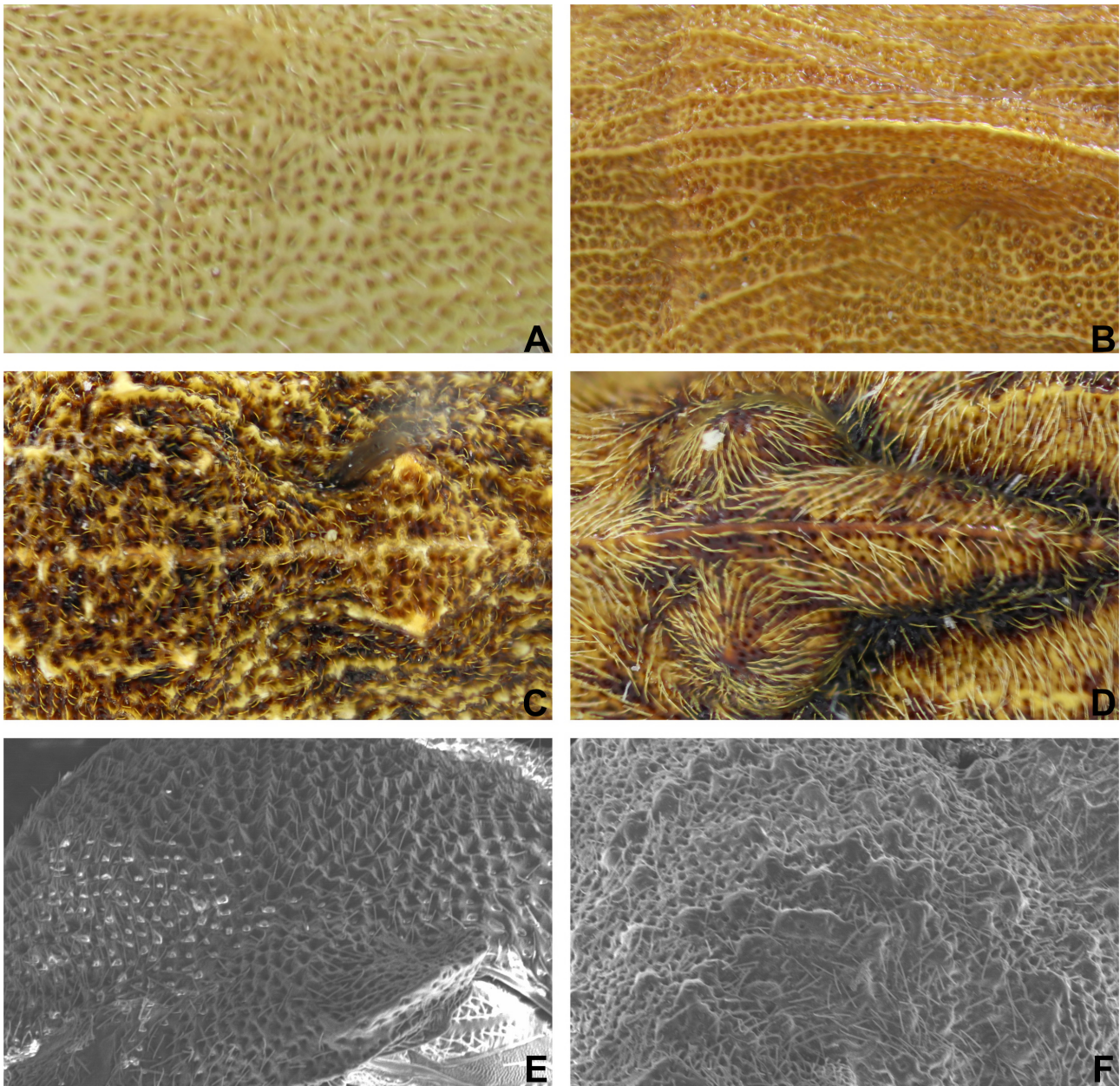


FIGURE 3. Pronotal integument in *Cyphotes*-group. Coarsely punctate A. *Hypheodana acuta*; punctate with elevated longitudinal lines B. *Cyphotes nodosa*; rugose C. *Hypheodana* sp.; D. *Allocyphotes flavus* sp. nov.; pubescent and punctate SEM images punctate pronotum E. *Hypheodana acuta*; rugose; F. *Hypheodana* sp.

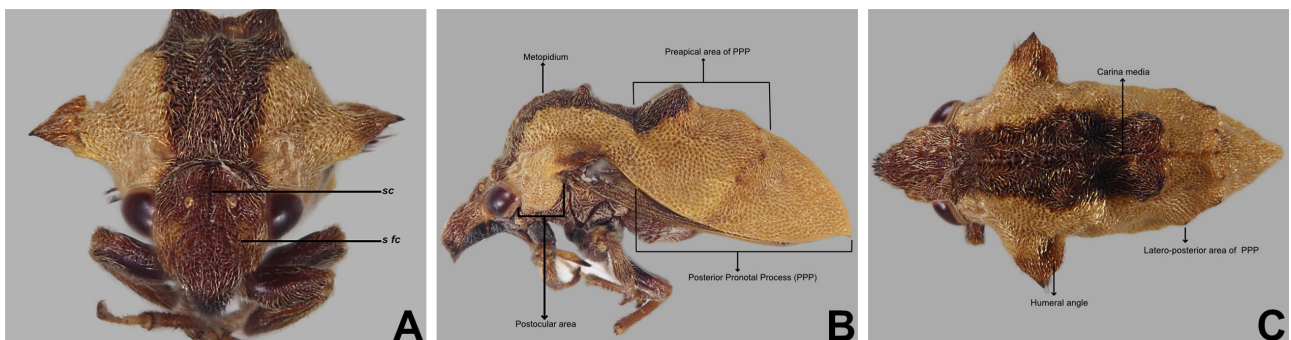


FIGURE 4. Head and pronotal characters. *Allocyphotes insolita* A. anterior view; B. Lateral view; C. Dorsal view. Abbreviations: **sc: coronal suture; **s fc**: frontoclypeal suture; **ppp**: pronotal posterior process.**

Legs. Pro- and mesothoracic tibia subfoliaceous (Fig. 2D) (slender in other Darnini genera); metathoracic femur with row of cucullate setae absent or, if present, restricted to basal or distal area (Fig. 2B); metathoracic tibia with row I reduced or absent (Figs. 2E–F).

Forewing. Vein M approaching and closely parallel to R in basal half of wing; vein R_{4+5} strongly curved toward costal margin, forming nearly right angle (Figs. 5A; 11; 17) (M equidistant between M and Cu; R_{4+5} straight in other Darnini) (Figs. 5B, C).

Abdomen. Sternum notably more sclerotized than tergum (Figs. 6A, C); abdominal sternites with conspicuous punctation (Figs. 6C–H) (uniformly sclerotized, without conspicuous punctations in other Darnini genera) (Figs. 6A, B).

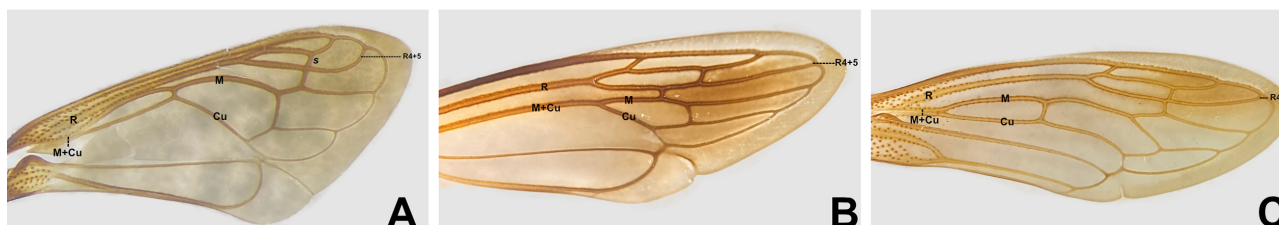


FIGURE 5. Forewing Darnini. A. *Allocyphotes* sp.; B. *Stictopelta* sp.; C. *Sundarion* sp.

Key to *Cyphotes*-group genera

- 1 Head in profile with anterodorsal margin perpendicular to the rest of body, produced downwards (Figs. 7A, C) 2
- Head in profile with anterodorsal margin oblique (Fig. 7I) or subparallel (Figs. 7B, 7K, 7M) to the rest of the body, produced forward 3
- 2 Frontoclypeus not extended beyond suprantennal ledges (Fig. 7D), head in anterior view subrectangular, wider than long *Taunaya*
- Frontoclypeus extended at least 1/3 of its length beyond suprantennal ledges, head in anterior view usually triangular, longer than wide *Hypheodana*
- 3 Frontoclypeus conical (Fig. 7H) *Nasuconia*
- Frontoclypeus oblong (Fig. 7I) or tubular (Fig. 7J) 4
- 4 Head in anterior view subtriangular, wider than long, frontoclypeus with lateral margins continuing contour of suprantennal ledges (Fig. 7I); in dorsal view, posterolateral area of pronotum enlarged, extended beyond humeral angles (Fig. 10); humeral angles triangular, not projected laterally; forewing with *s* crossvein absent (Fig. 11) *Cyphotes*
- Head in anterior view subrectangular, longer than wide, frontoclypeus abruptly extended beyond suprantennal ledges (Fig. 7J); in dorsal view, posterolateral area of pronotum not extended beyond humeral angles (Fig. 16); humeral angles usually trilobate or, if triangular, well projected laterally (Fig. 7I); forewing with *s* crossvein present (Fig. 4A) *Allocyphotes* **gen. nov.**

Cyphotes Burmeister, 1835

Taxonomic considerations

Burmeister (1835) erected the monotypic genus *Cyphotes*, with *C. nodosa*, from Pará, Brazil (Figs. 8A; 9A; 10A), as the type species. He defined the genus based on the following features: head truncate, obtuse, with two ventral pits in which the antennae are inserted; pronotum with a longitudinal ridge in the middle and extending laterally and posteriorly into two conspicuous swellings; hind tibiae gradually expanded. No illustration of the species was provided. Silbermann (1836) described and illustrated a specimen identified as *C. nodosa*, from Pará, Brazil, and in this work considered the main defining character for the genus as the presence of one oval cell in the forewing. This oval cell, based on his illustration, results from two fused basal veins (M and Cu), which then divide and connect distally through a crossvein ($m-cu_1$). However, comparison of Silbermann's illustration with a photograph of the holotype of *C. nodosa* suggests that he was describing and referring to a different species (Silberman, 1936 Plate: 36 Figs. 1–4). Goding (1926) described the species *Cyphotes insolita* from Tena, Ecuador. Funkhouser (1927) cataloged *Cyphotes* in Smiliinae, retaining both described species in the genus. Goding (1929) transferred *Cyphotes* into the tribe Darnini and provided a key to both species. Metcalf and Wade (1965) maintained *Cyphotes* in Darninae-Darnini, with the two species *C. insolita* and *C. nodosa* comprising the genus. Fonseca and Diringshofen (1969) described *Cyphotes quadrinodosa* (as *quadrinodosos*) from Santa Catarina, Rio Vermelho, Brazil. McKamey (1998) listed three species of *Cyphotes*, including *C. insolita*, *C. nodosa*, and *C. quadrinodosus*.

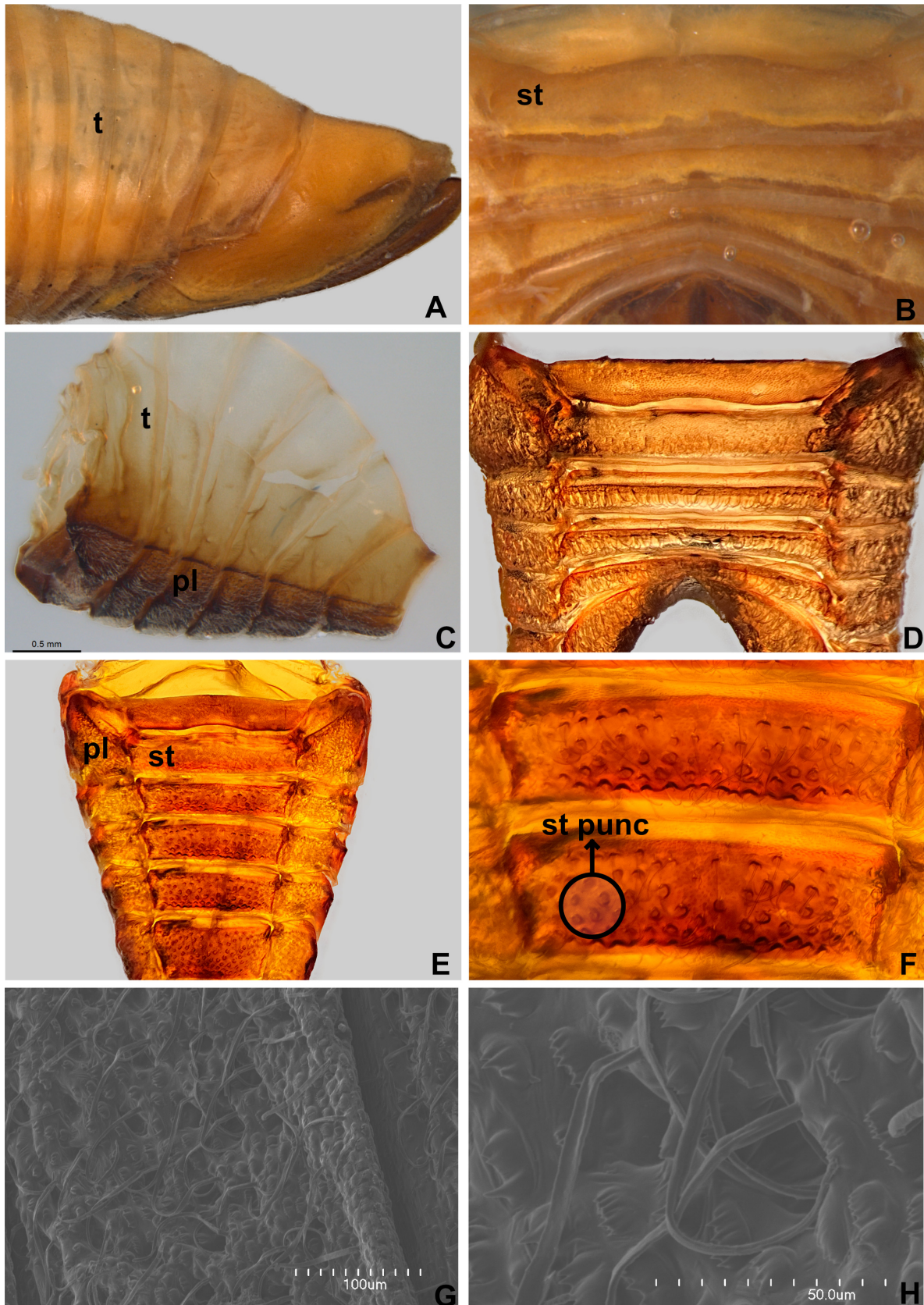


FIGURE 6. **A.** Abdomen lateral view *Stictopelta* sp.; **B.** Abdomen ventral view *Stictopelta* sp.; **C.** Abdomen lateral view *Hypheodana* sp.; **D.** Abdomen female ventral view *Allocyphotes flavus* **sp. nov.**; **E.** Abdomen male ventral *Allocyphotes flavus* **sp. nov.**; Abdominal puncturations *Cyphotes*-group **F.** *Allocyphotes flavus* **sp. nov.**; SEM images showing microtexture abdominal punctations in *Cyphotes*-group **G.** *Allocyphotes insolita*; **H.** *Hypheodana* sp. Abbreviations: **pl**: pleurites; **st**: sternum; **st punc**: sternite punctation; **t**: tergum.

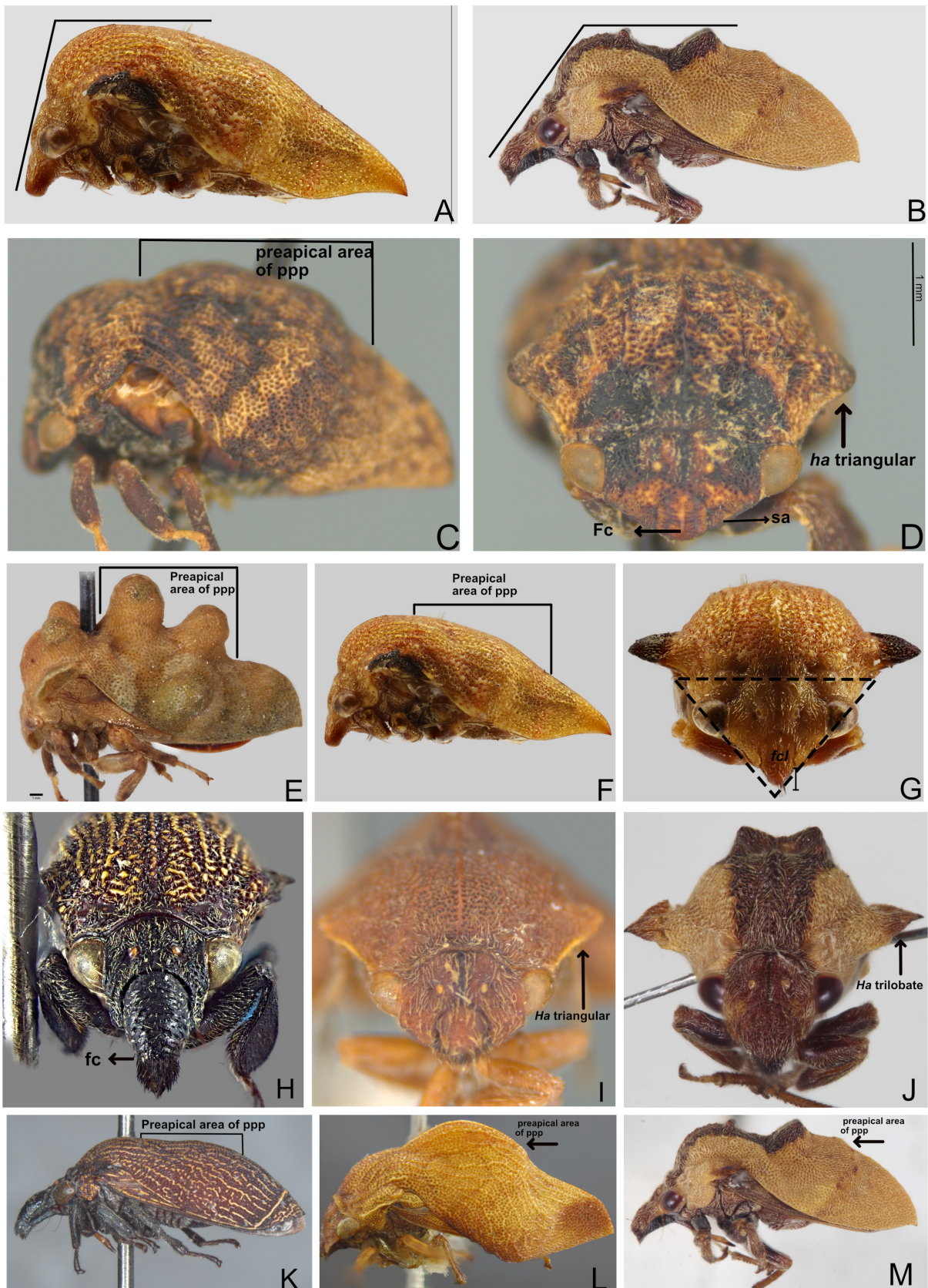


FIGURE 7. *Cyphotes*-group. A. *Hypheodana intermedia* (Fowler); B. *Allocyphores insolita* (Goding); C–D. *Taunaya rugosa* Fonseca; E. *Hypheodana sakakibarai* Gonzalez-Mozo & McKamey; F–G. *Hypheodana intermedia*; H. *Nasuconia curculionoida* Skakibara; I. *Cyphotes nodosa* Burmeister; J. *Hypheodana intermedia*; K. *Nasuconia curculionoida*; L. *Cyphotes nodosa* Burmeister; M. *Allocyphores insolita*. Abbreviations: Fc: frontoclypeus; ha: humeral angle; sa: suprantenal margin; ppp: pronotal posterior process.

Stål (1862) described the genus *Aspona*, with one species, *Aspona bullata*, from Rio de Janeiro, Brazil (Figs. 8C; 9C; 10C). One of the diagnostic characters described was the presence of one discoidal cell in the forewing, resulting from the absence of the *s* crossvein. The original description of *Cyphotes* did not mention forewing venation. In subsequent works (Deitz, 1975; Sakakibara, 2005a), the distinction between *Cyphotes* and *Aspona* was based on the absence of the *s* crossvein in the forewing of *Aspona* and the presence of this crossvein in *Cyphotes*. This character was considered by Sakakibara (2005a) to validate the transfer of *Cyphotes quadrinodosa* into *Aspona*; in that paper he also synonymized *Aspona bullata* Stål, 1862 (= *Aspona gibosa* Fonseca & Diringshofen, 1969 (Figs. 8B; 9B; 10B), and *Taunaya gibbosa* Remes-Lenicov, 1973 and recognized only two valid species in *Aspona*: *A. bullata* Stål, 1862 and *A. quadrinodosa* (Fonseca & Diringshofen, 1969). The venation of the holotype of *C. nodosa* is examined here for the first time in detail and the *s* crossvein was found to be absent (Fig. 11A). This trait is found in *Aspona* and *C. quadrinodosa* (Fig. 11D). We therefore propose *Aspona* to be a junior synonym of *Cyphotes* and transfer both species previously included in *Aspona* to *Cyphotes*. *Aspona bullata* is here treated as a junior synonym of *C. nodosa* (see comments of *C. nodosa*). Thus, *Cyphotes* includes two valid species: *C. nodosa* and *C. quadrinodosa* **reinstated. comb.** The other species previously placed in *Cyphotes* are transferred to *Allocyphotes* **gen. nov.** described below: *A. insolita* (Goding, 1926) **comb. nov.**, *A. pompanoni* (Boulard, 2011) **comb. nov.**; and *A. colombiensis* (Gonzalez-Mozo, 2017) **comb. nov.**

Description

Cyphotes Burmeister, 1835: 143. Type species: *Cyphotes nodosa* Burmeister, 1835: 143. Metcalf & Wade, 1965a: 615 [Catalogued]; McKamey, 1998: 469 [Catalogued].

Aspona Stål, 1862: 29. Type species: *Aspona bullata* Stål, 1862, by monotypy; Metcalf & Wade, 1965a: 613 [Catalogued]; McKamey, 1998: 149 [Catalogued]. **syn. nov.**

Diagnosis. Length 6–8 mm. (1) Frontoclypeus oblong, not extended beyond suprantennal ledges (margin ventral of suprantennal ledges in a continuous line with frontoclypeus); (2) In dorsal view, posterolateral area of pronotum enlarged into to semicircular swellings extended beyond lateral margin (Fig. 10); (3) Humeral angles triangular (Fig. 7I); (4) Forewing *s* crossvein absent (Fig. 11).

Description. Color. Light brown, sometimes with black marks over the pronotum. **Sculpture.** Strongly punctured, pronotum tuberculate and with irregular longitudinal lines. **Head.** Subtriangular in anterior view, wider than long, oblique to body axis, in lateral view metopidium convex, vertex and frontoclypeus in the same straight line (Fig. 8); in anterior view, dorsal margin of head straight to sinuate, while ventral margin convex; vertex usually with weak rugae; coronal and frontoclypear sutures distinctly delimitate in vertex running complete from the midline to the inferior margin; frontoclypeus oblong, not extended beyond suprantennal ledges, apex truncate (Fig. 8A). **Thorax. Pronotum.** In lateral view, preapical part of posterior pronotal process elevated, shape variable from bilobate (Fig. 9D) to trapezoidal-shaped (Fig. 9A); in dorsal view, humeral angles triangular, slightly projected laterally; posterolateral area of pronotum rounded, extended laterad of humeral angles (Figs. 10A–D), posterior pronotal process triangular, gradually acute (Figs. 10A–D). **Legs.** Pro—and mesothoracic legs with femora and tibia subcylindrical, with cucullate setae ventrally arranged in two longitudinal rows: metathoracic leg, femur without rows of cucullate setae (Figs. 2E, F). **Forewings.** costal area strongly punctate (same as pronotal pattern) (Fig. 10A), *s* crossvein absent (Fig. 11). **Abdomen. Male.** Aedeagus in lateral view scoop-shaped, corona concave with denticuli on dorsal margin, style strongly curved. **Female.** First valvulae VID variable among species; second valvulae without teeth on dorsal surface. Gonoplac, in lateral view narrow, notably expanded in the apical portion with long setae in the ventral margin, gonoplac structure is similar among species.

Distribution. Argentina and Brazil. Species distributed between 75 and 710 meters of altitude.

Key to the species of *Cyphotes*

- 1 Pronotum in lateral view with preapical part of posterior pronotal process trapezoidal (Fig. 9A); first valvulae, VID bent in midsection (Fig. 12A); pronotum coloration uniform without black spots *C. nodosa*
- Pronotum in lateral view with preapical part of posterior pronotal process conical (Fig. 9D); first valvulae, VID convex, not bent in midsection (Fig. 12B); pronotum with a black dorsal spot *C. quadrinodosa*, **reinstated. comb.**

***Cyphotes nodosa* Burmeister, 1835**

(Figures 8A–C; 9A–C; 10A–C; 11A–C; 12A, 12C; 13)

Cyphotes nodosa Burmeister, 1835: 143 [New genus; type loc: Brazil]; Metcalf & Wade, 1965a: 616 [Catalogued], McKamey, 1998: 150 [Catalogued]; *Aspona bullata* Stål, 1862: 29 (type loc: Brazil, Rio de Janeiro); Metcalf & Wade, 1965: 618; Deitz, 1975: 70; McKamey, 1998: 150 [Catalogued]. Sakakibara, 2005a: 463 [taxonomic notes, photograph].

Aspona gibosa Fonseca & Diringshofen, 1969: 154, fig. 8 (type loc: Brazil, Santa Catarina: Rio Vermelho); McKamey, 1998: 150. Sakakibara, 2005a:463 [Synonym of *A. bullata*]. *Taunaya gibbosa* Remes-Lenicov, 1973: 137 (type loc: Argentina, Misiones); McKamey, 1998: 155. Sakakibara, 2005a:463 [Synonym of *A. bullata*].

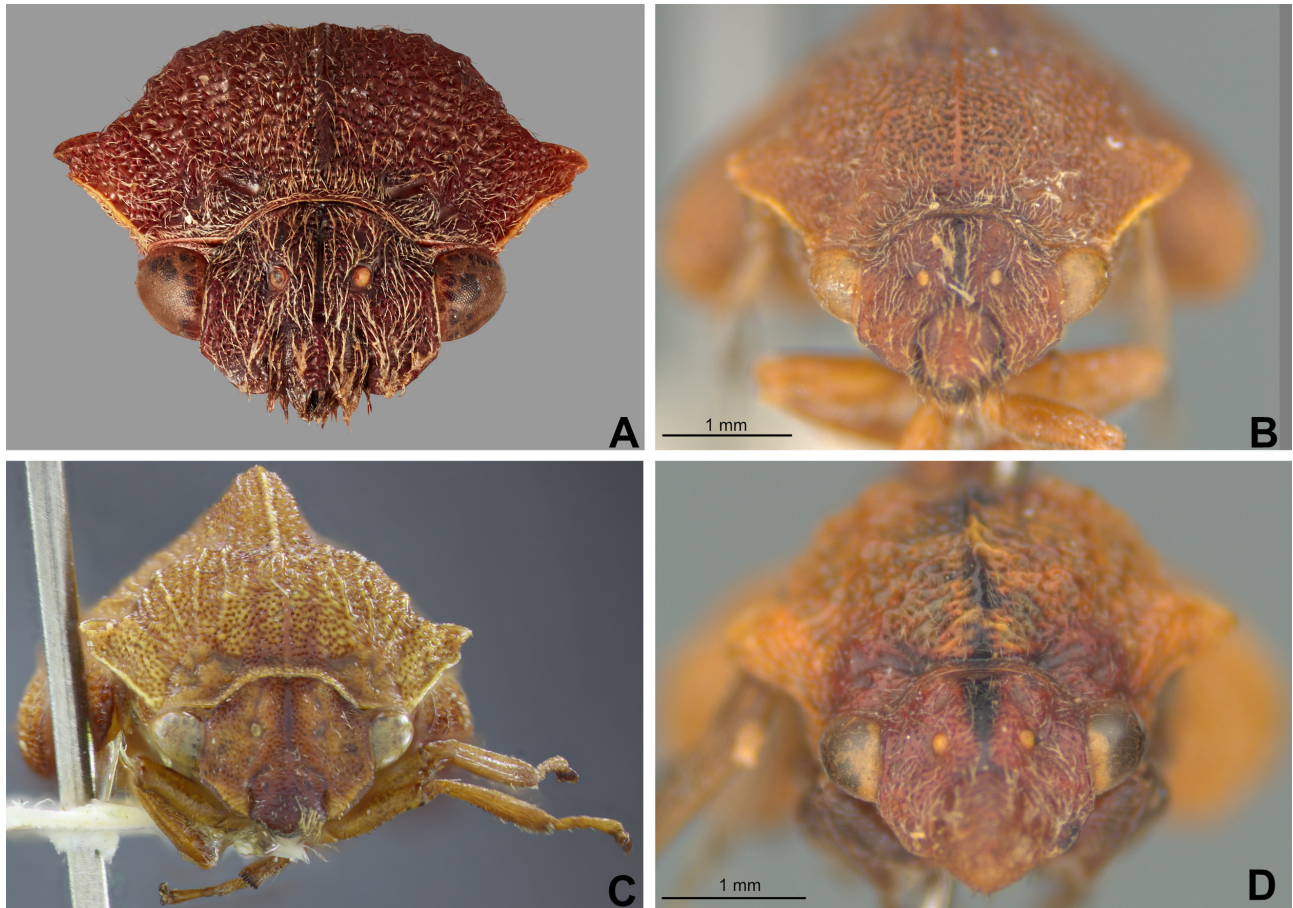


FIGURE 8. Anterior view *Cyphotes* Burmeister. **A.** Holotype *Cyphotes nodosa* Burmeister.; **B.** *Aspona gibosa* Fonseca & Diringshofen, 1969 (DZPU); **C.** *Aspona bullata* Stål new. syn. of *Cyphotes nodosa* Burmeister (DZPU); **D.** *Cyphotes quadrinodosa* Fonseca & Diringshofen 1959 reinstated. comb. (MZSP).

Diagnosis. (1) Pronotum in lateral view with preapical part of posterior pronotal process trapezoidal (Fig. 9D); (2) first valvulae, VID bent in midsection (Fig. 12A); (3) pronotum coloration uniform without marked black spots.

Description. Color. General color dark red or yellow, vertex, frontoclypeus, basal margin, metopidium, humeral angles, and middorsal portion dark red; posterior process behind the posterolateral pronotal area with a transversal yellow band. **Sculpture.** Densely pubescent, pronotum reticulate, punctuate. **Head.** Frontoclypeus with a longitudinal rugae (Fig. 8A). **Thorax. Pronotum.** In lateral view, preapical part of posterior pronotal process raised abruptly in a narrow ridge (Figs. 9A–C); in dorsal view, lyriform, humeral angles triangular, posterolateral area of pronotum rounded, gradually narrowing with posterior process (Figs. 10A–C). **Forewings.** without macula in apical cells (Figs. 11A–C). **Abdomen. Male.** Subgenital plate fused basally, dorsal margin rounded; lateral plate not fused to pygofer, margin dorsal truncate (Fig. 13B); aedeagus scoop-shaped (Fig. 13D), in posterior view parallel sided (Fig. 13F), corona denticulate (Fig. 13E), style in posterior view distal area curved anteriorly (Fig. 13F). **Female. First Valvulae.** Ventral interlocking device (VID) bent downward at midlength (Fig. 12A). **Second valvulae.** Without teeth on dorsal margin (Fig. 12C).

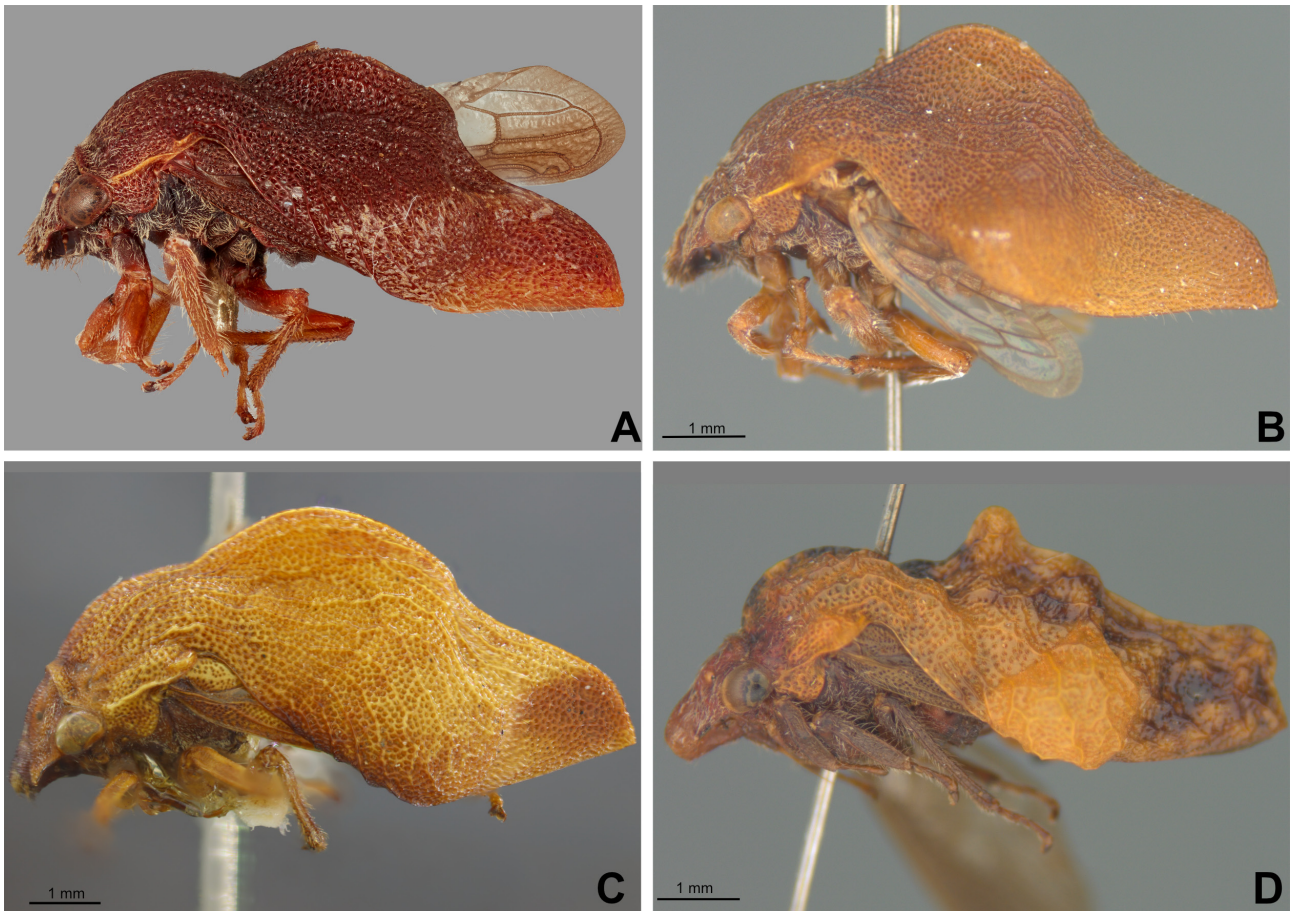


FIGURE 9. Lateral view *Cyphotes* Burmeister. A. *C. nodosa*; B. *A. gibosa*; C. *A. bullata*; D. *C. quadrinodosa*.

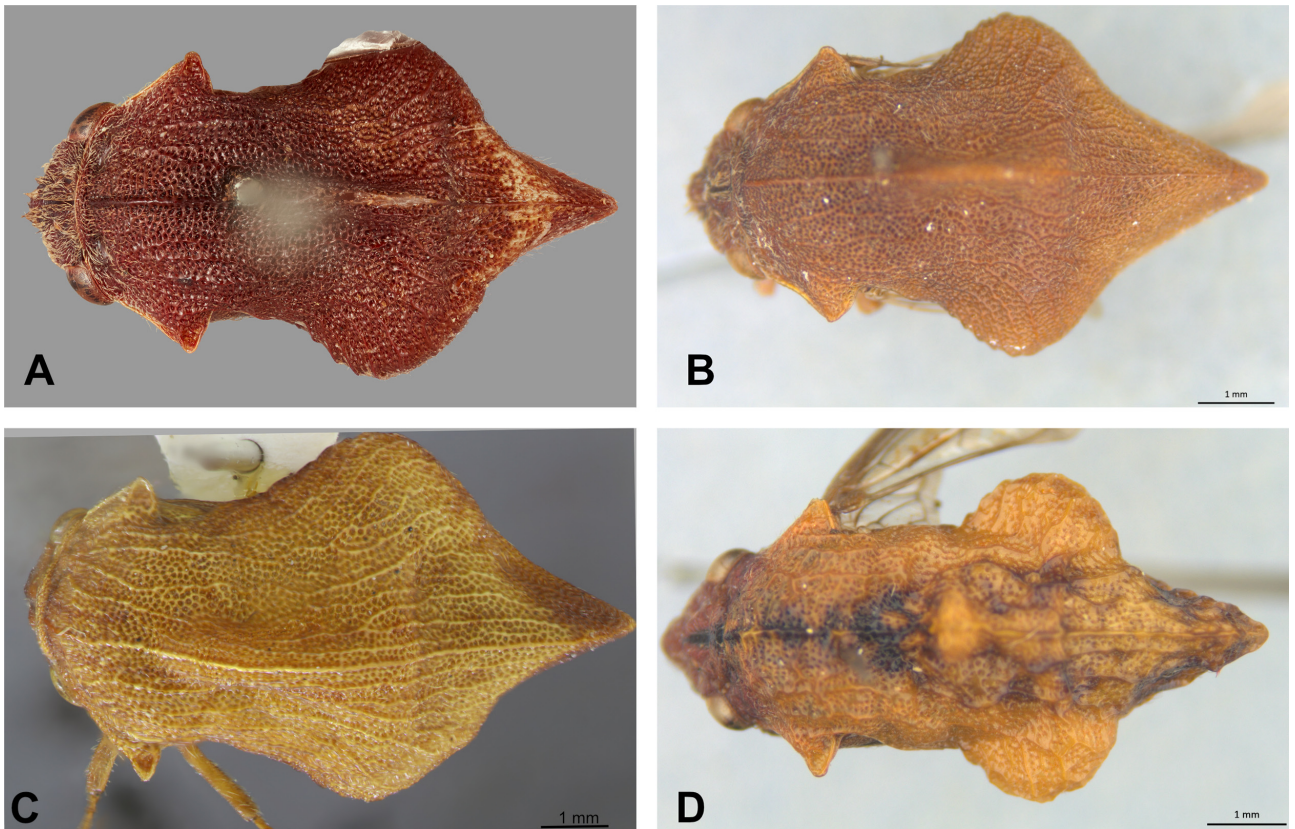


FIGURE 10. Dorsal view *Cyphotes* Burmeister. A. *C. nodosa*; B. *A. gibosa*; C. *A. bullata*; D. *C. quadrinodosa*.

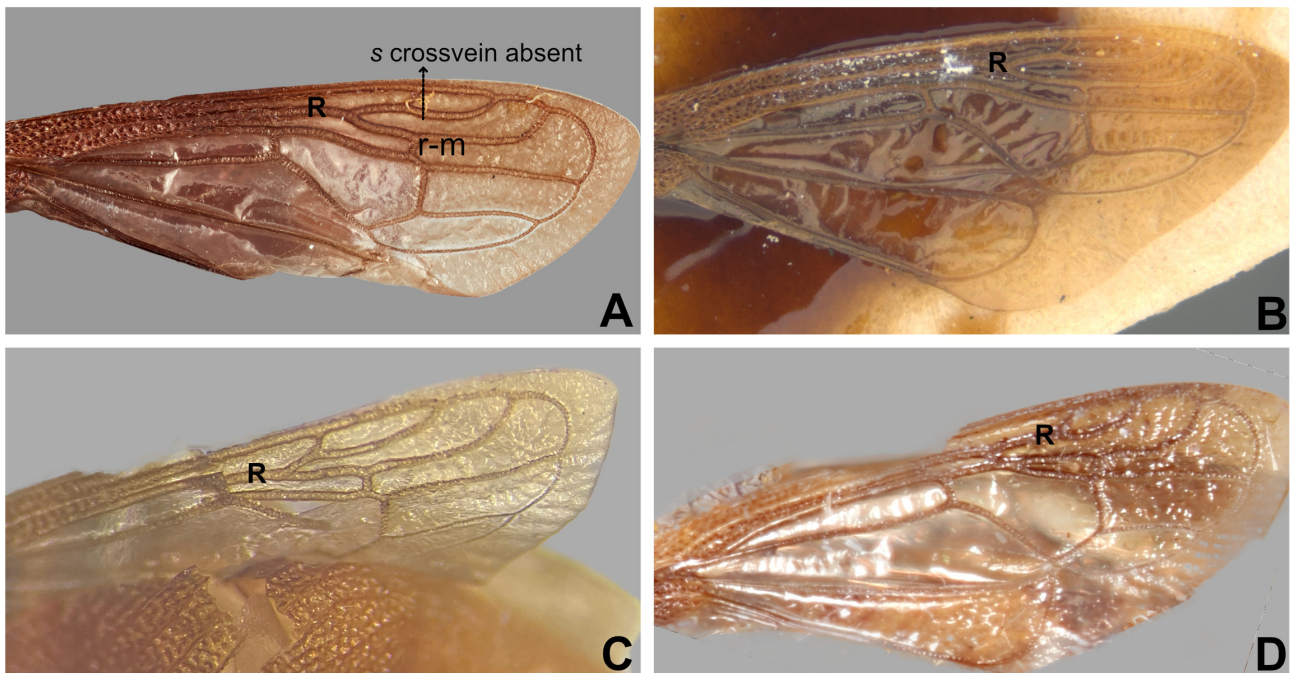


FIGURE 11. Forewing *Cyphotes* Burmeister. A. *C. nodosa*; B. *A. gibosa*; C. *A. bullata*; D. *C. quadrinodosa*. Abbreviations: R: Radial.

Measurements. male/female (mm): Total length 6.71/7.98; head width 2.20/2.59; head length 1.29/1.59; pronotum length 6.22/7.52; width between humeral angles 3.10/ 3.89.

Distribution. Argentina (Remes-Lenicov, 1973), Brazil.

Material examined. Photograph of holotype. “*nodosa* Label information: Bras. [Bmr?]”, “Martin-Luther-Universität, Halle-Wittenberg, Zentralmagazin Naturw.Sammlungen, 2/3/2009.05.2016” (MLUH: 1 female). || **BRAZIL**, Santa Catarina, Benedito Nova. S. C. 16-XI-1874 (DZUP: 1 male) || **BRAZIL**, Guanabara, Corcovado, 30-IX-1972. Alveranga & Seabra. (DZUP: 1 female). || Photograph in Remes-Lenicov (1973). Label: “**ARGENTINA**, Misiones, Dto. Concepcion, Santa Maria, XI-1956. Viana Leg. Division Entomología Museo de Ciencias Naturales ‘Bernardino Rivadavia: 3 females”.

Comments. This is the type species of the genus. *Cyphotes nodosa* has the following synonyms: *Aspona bullata* Stål, 1862 *Aspona gibosa* Fonseca & Diringshofen; *Taunaya gibbosa* Remes-Lenicov (1973). We follow Sakakibara (2005) in treating *Aspona gibosa* Fonseca & Diringshofen, 1969 (Figs. 8B; 9B; 10B) and *Taunaya gibbosa* Remes-Lenicov (1973) as junior synonyms of *A. bullata* (now *C. nodosa*). After morphological examination and in correlation with the geographic distribution of the specimens (Fig. 21), *A. bullata* (Figs. 8C; 9C; 10C) is considered here a synonym of *C. nodosa*. Specimens of *C. nodosa* have only been reported from southeastern South America and lower elevations from 130–740 meters.

***Cyphotes quadrinodosa* Fonseca & Diringshofen, 1959 reinstated comb.**

(Figures. 2E, F; 8D; 9D; 10D; 12B, 12D)

Cyphotes quadrinodosos [sic] Fonseca & Diringshofen, 1969: 155 (New species, type loc.: Brazil, Santa Catarina: Rio Vermelho).

Cyphotes quadrinodosus [sic] Fonseca & Diringshofen, 1969: 156; McKamey, 1998: 469 [Catalogued]; Sakakibara, 2005: 464 [comb. nov.: *Aspona quadrinodosa*; photograph].

Description. (Modified from Fonseca & Diringshofen, 1959). **Color.** General color light brown, coronal suture, dorsal area of pronotum, and posterior pronotal process dark brown. **Sculpture.** Pubescent, pronotum with longitudinal and transversal elevated irregular lines (lines: denominated keels by Fonseca & Diringshofen, 1959) forming reticulate appearance. **Head.** Vertex and coronal suture grooved from superior margin until ocelli (Fig.

8D). **Thorax. Pronotum.** In lateral view, preapical part of posterior pronotal process (denominated protuberances by Fonseca & Diringshofen, 1959) with an elevated bilobulate hump (Fig. D); in dorsal view, posterolateral area of pronotum semicircular, abruptly narrowing in the posterior process (Fig. 10D). **Forewing.** with distinctive macula in apical cell IV (Fig. 12D) otherwise hyalin. **Abdomen. Male.** Unknown. **Female. First Valvulae.** Ventral interlocking device (VID), convex (Fig. 12B); ventral sculptured area (VSA) without preapical prominence. **Second valvulae.** without teeth on dorsal surface (Fig. 12D).

Measurements. Female (mm): Total length 8.52; head width 2.47; head length 1.78; pronotum length 7.47; width between humeral angles 3.47.

Distribution. Brazil.

Material examined. BRAZIL, S. Catharina, Corupa. (Hansa Humboldt) XI-1946. (AMNH: 1 female). Photograph of Holotype, label information (Fonseca & Diringshofen, 1959: 157): “BRAZIL, Santa Catarina, Rio Vermelho. Collection R.v. Diringshofen, Sao Paulo, Brasil” (MZSP: 1 female).

Comments. *C. quadrinodosa* is only recorded from Brazil. The pronotal sculpture is distinctively reticulate; contrasting with *C. nodosa* the posterolateral part of pronotum is semicircular abruptly narrowing to the posterior process. The head and pronotal morphology along with the absence of the forewing *s* crossvein support the reinstatement of *Aspona quadrinodosa* into *Cyphotes*. This species have only been reported in Santa Catarina, Brazil distributed in lower elevations from 75–339 meters.

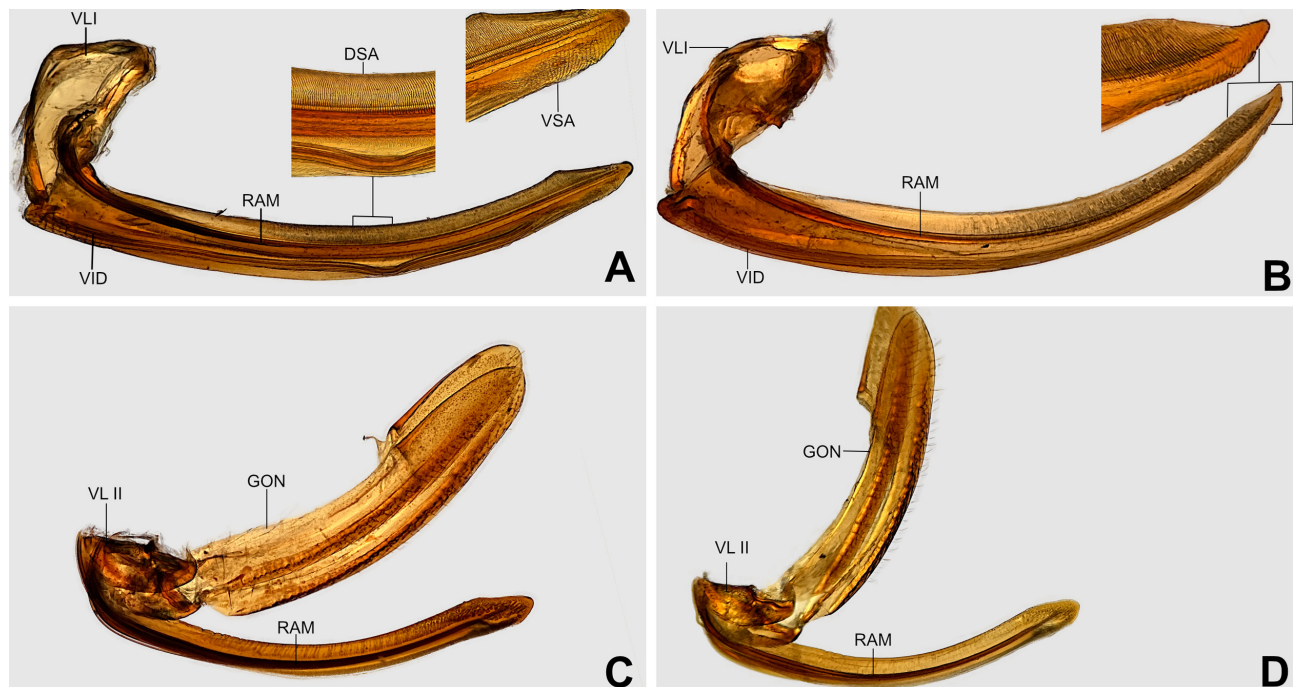


FIGURE 12. Female genitalia *Cyphotes*. Valvulae I A. *C. nodosa*; B. *C. quadrinodosa*; Valvulae II C. *C. nodosa*; D. *C. quadrinodosa*. Abbreviations: (DSA) dorsal sculptured area; (GON) gonoplac; (VID) ventral interlocking device; (RAM) ramus; (VSA) ventral sculptured area; (VL I) Valvifer I; (VL II) Valvifer II.

Allocyphotes Gonzalez-Mozo new genus

Type species. *Cyphotes insolita* Goding, 1926, here designated.

Diagnosis. Length 5–7 mm. (1) Frontoclypeus tubular, in anterior view extended beyond suprantennal ledges (ventrolateral margin of suprantennal ledges and frontoclypeus not in a continuous line) (Fig. 14); (2) in dorsal view posterolateral area of pronotum not extended laterad of humeral angles (Fig. 16); (3) humeral angles trilobate (Fig. 16 *ha*); (4) forewing *s* crossvein present (Fig. 17 *s*).

Description. Color. Brown usually with black marks over pronotum and legs. **Sculpture.** Punctured, pronotum tuberculate, some species densely pubescent or longitudinal lines. **Head.** Subrectangular, longer than wide, subparallel to body axis, in lateral view metopidium, vertex and frontoclypeus not in a straight line (forming an

angle) (Fig. 15); frontoclypeus tubular, in anterior view extended more than 1/3 beyond suprantennal ledges, apex acute or truncate (Fig. 14). **Thorax.** *Pronotum.* In lateral view, preapical part of posterior pronotal process variable among species from evenly convex (Fig. 15D), to enlarge rounded (Fig. 15C), to conical, some species subdivided into two or more humps (Figs. 15A, E); in dorsal view, humeral angles usually trilobate (Fig. 16A), if triangular strongly projected laterally (Fig. 16C); posterolateral area of pronotum usually not extended beyond the extension of humeral angles (Figs. 4C; 16), posterior pronotal process triangular, gradually acute. *Forewings.* *s* crossvein present (Fig. 17). **Abdomen.** *Male.* Aedeagus variable in lateral view from compressed (Figs. 20K, O), to scoop-shaped (Figs. 20C, G), corona concave with (Figs. 20C, K, O) or without denticuli (Fig. 20K) on dorsal margin, style variable among species. *Female.* *First valvulae.* ventral interlocking device (VID) variable convex (Figs. 18A, E) or bent (Figs. 18B, C, D), apex variable from acute (Figs. 18A, D, E) to truncate (Figs. 18B, C). *Second valvulae.* With (Figs. 19D, E) or without teeth (Figs. 19A, B, C) on dorsal margin. *Gonoplac.* Strongly sclerotized ventrally, expanded apically, with long setae along ventral margin, not variable among species (Fig. 19F).

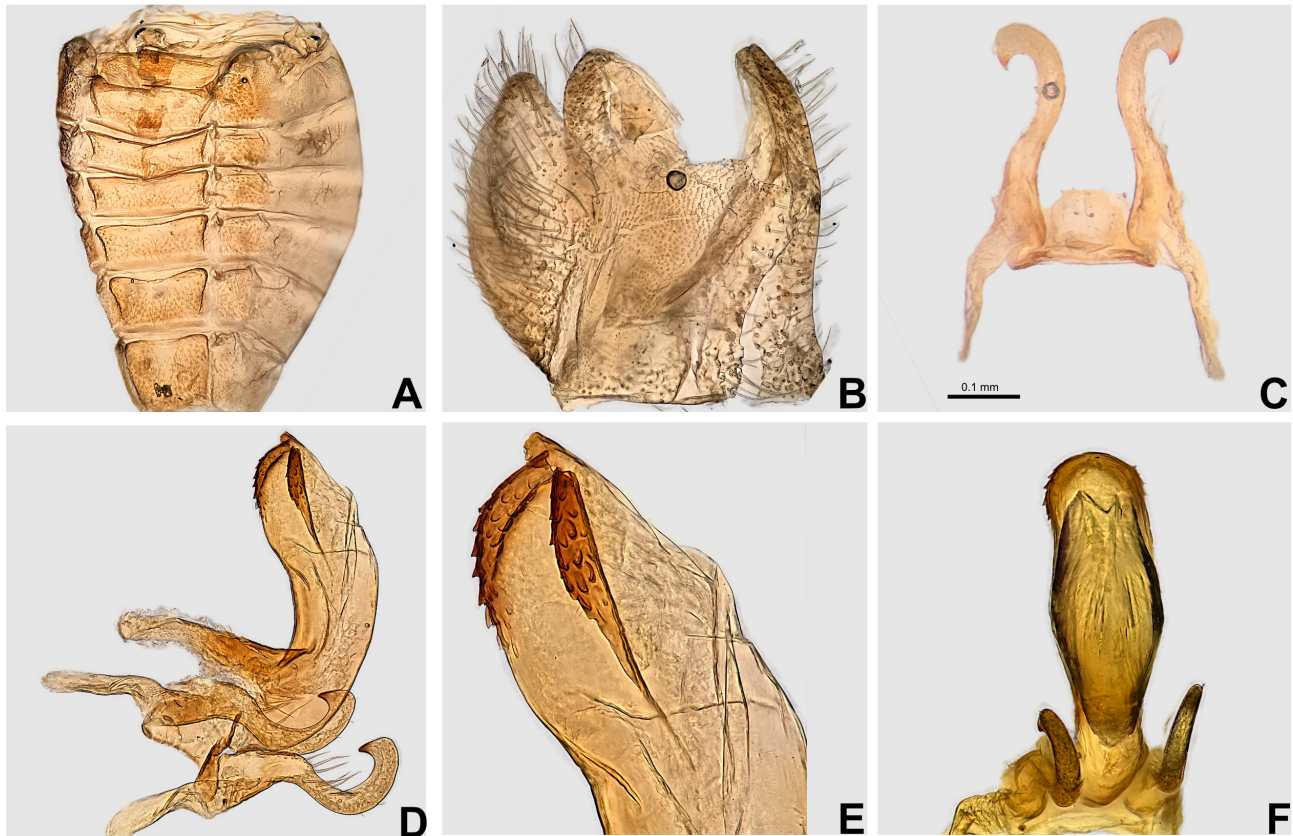


FIGURE 13. Male genitalia *Cyphotes nodosa*. A. Abdomen ventral view; B. Lateral and subgenital plate; C. Style posterior view; D. Aedeagus lateral view; E. Aedeagus distal area; F. Aedeagus posterior view.

Etymology. *Allo* - Gr. *allos*, (others); *Cyphotes* Gr. *kyphos*, (humpbacked)—feminine.

Distribution. Bolivia, Brazil, Colombia, Ecuador, French Guiana, Paraguay, Peru, and Venezuela (Fig. 22). Species distributed between 40–2420 meters of altitude.

Comments. Despite the morphological heterogeneity among the species, all included species exhibit the same proposed diagnostic characters that support including them in the same genus. The preapical part of the pronotal posterior process is highly variable and is here considered a reliable character only at the species level. Two species are transferred from *Cyphotes*, (*C. insolita* and *C. colombiensis*), one species is transferred from *Aspona* (*A. pompanoni*), and three new species are described for a total of six species. In contrast to *Cyphotes*, the distribution *Allocyphotes* is wider (Fig. 22). “*Cyphotes* sp.” figured in Godoy *et al.* (2006; pp. 121–123) represents a new species of *Allocyphotes* but was not available for study; it will be treated in a separate paper.

Key to the species of *Allocyphotes* new genus.

- 1 Pronotum with small knots on metopidium and median carina; in dorsal view posterolateral area of pronotum projected laterally (Fig. 16E) *Allocyphotes pompanoni* (Boulard) **comb. nov.**
- Pronotum without small knots on metopidium and median carina (if knots are present posterolateral part of pronotum not strongly enlarged); in dorsal view posterolateral area of pronotum not well projected laterally (Fig. 16A) 2
- 2 In lateral view, preapical part of pronotum low; coloration homogeneous without black marks (Fig. 15D) *Allocyphotes waoraniorum* **sp. nov.**
- In lateral view, preapical part of pronotum elevated; coloration heterogenous with black marks (Figs. 15A, C; F) 3
- 3 In dorsal view, posterolateral area of pronotum extended beyond humeral angles *Allocyphotes colombiensis* (Gonzalez-Mozo) **comb. nov.**
- In dorsal view, posterolateral area of pronotum not extended beyond humeral angles (Fig. 16) 4
- 4 Humeral angle triangular (Fig. 16C); pronotum densely pubescent; female first valvulae with VID bent (Fig. 18C) *Allocyphotes flavus* **sp. nov.**
- Humeral angle trilobate (Figs. 16A, F); pronotum not densely pubescent; female first valvulae with VID convex (Figs. 18A, E) 5
- 5 Pronotum in lateral view with two rounded swellings (Fig. 15C); female second valvula with five teeth on dorsal surface (Fig. 19E) *Allocyphotes robertoi* **sp. nov.**
- Pronotum in lateral view with one conical swelling (Fig. 15A); female second valvula with one tooth on dorsal surface (Fig. 19A) *Allocyphotes insolita* (Goding) **comb. nov.**

Allocyphotes insolita (Goding, 1926), **comb. nov.**

(Figures. 4; 14A,B; 15A,B; 16A,B; 17A; 18A; 19A; 20A–D; 23; 24)

Cyphotes insolita Goding 1926:106–107 [new species, type loc: Tena, Ecuador]; Metcalf & Wade, 1965a: 616 [Catalogued]; McKamey, 1998: 469 [Catalogued].

Diagnosis. Length 7 mm; humeral angles trilobate (Fig. 16A *ha*); pronotum, preapical part of posterior pronotal process with two distinctive cone-shaped swellings (Fig. 15A); female second valvulae with one tooth on dorsal surface (Fig. 19A).

Description. (Modified from Goding, 1926). **Color.** Pronotum light brown with a broad brown stripe extending from the apex of head to the posterior swellings, humeral angles, vertex and frontoclypeus dark brown. Male dark brown stripe markedly wider than female extending dorsolaterally, light brown coloration restricted to a small area in the sides of pronotum (Figs. 15B, 16B; 23; 24). **Sculpture.** Pubescent with yellow setae over the pronotum, pronotum punctured, finely tuberculate on metopidium, with irregular raised lines on each side of carina media. Head. In anterior view, frontoclypeus extended about 0.5 mm beyond margin of suprantennal ledges apex acute (Fig. 14A). **Thorax. Pronotum.** In lateral view, metopidium tuberculate, a small peak raises above humeral angles, preapical area of pronotum conical, apical part of posterior process with an elevated transversal line of knots ending gradually in an acute apex (Fig. 15A). In dorsal view, humeral angles extended laterally in an auricular process (Fig. 17A). **Forewings.** Hyalin, without macula on apical cells, *s* crossvein at same point of *r-m* (Fig. 17A). **Abdomen. Male.** Subgenital plate, view dorsal margin truncate (Fig. 20A); lateral plate, dorsal margin rounded (Fig. 20B), aedeagus with corona markedly concave, margin lateral and dorsal with denticulli (Fig. 20C); style sigmoidal, superior margin notably pointed, in posterior view distal area of style curved laterally (Fig. 20D). **Female. First valvulae.** Ventral interlocking device convex, without preapical prominence in dorsal or ventral margin (Fig. 18A). **Second valvulae** blade-shaped with one tooth on dorsal surface (Fig. 19A).

Measurements. male/female (mm). Total length 5.63/6.28; head width 1.88/1.65; head length 1.34/1.45; pronotum length 4.73/5.38; distance between apices of humeral angles 3.04/3.76.

Distribution. Bolivia, Brazil, Ecuador, Peru, Venezuela.

Material examined. **BOLIVIA**, Santa Cruz, 3.7 Km SSE Buena Vista, hotel Flora & Fauna, 430 m. 14–19X-2000. Coll M. C. Thomas Tropical Transition Forest (FSCA: 1 female) || **BRAZIL**, Rondonia, 62 km SW Ariquemea, nr Fzda. Rancho Grande, 5–17-X-1993, JE Eger & LB & CW O'Brien. (USNM: 1 female); 1 male, || Santa Catarina. [no other data. (CAS: 1 female), || **ECUADOR**, Orellana, Reserva Etnica Waorani, 1k S, Onkone Gare Camp Transect Ent, 216.3m, 00° 39' 25.7" S 076° 27' 10.8" W, 3-X-1996, Fogging terre firme forest, Lot #1730, #1722 T.L. Erwin, (USNM:1 female; 1 male) || **PERU**, Madre de Dios, Rio Tambopata, Res. 30km (air) SW, Pto. Maldonado, 290M, 12°50'S, 069°17'W, [no date given], Smithsonian Institution Canopy Fogging Project,

T.L. Erwin *et al.* (USNM: 3 females) || Madre de Dios, Rio Tambopata, Res. 30km (air) SW, Pto. Maldonado, 290M, 12°50'S, 069°17'W, Smithsonian Institution Canopy Fogging Project, T.L. Erwin *et al.* colls 10-IX-1984, 02/02/067, (USNM: 1 female) || VENEZUELA, Territorio, Amazonas: Cerro de la Neblina, base camp. 140 m. alt. 19-FEB-1984. Rozen & Stupakoff (AMNH: 1 female).

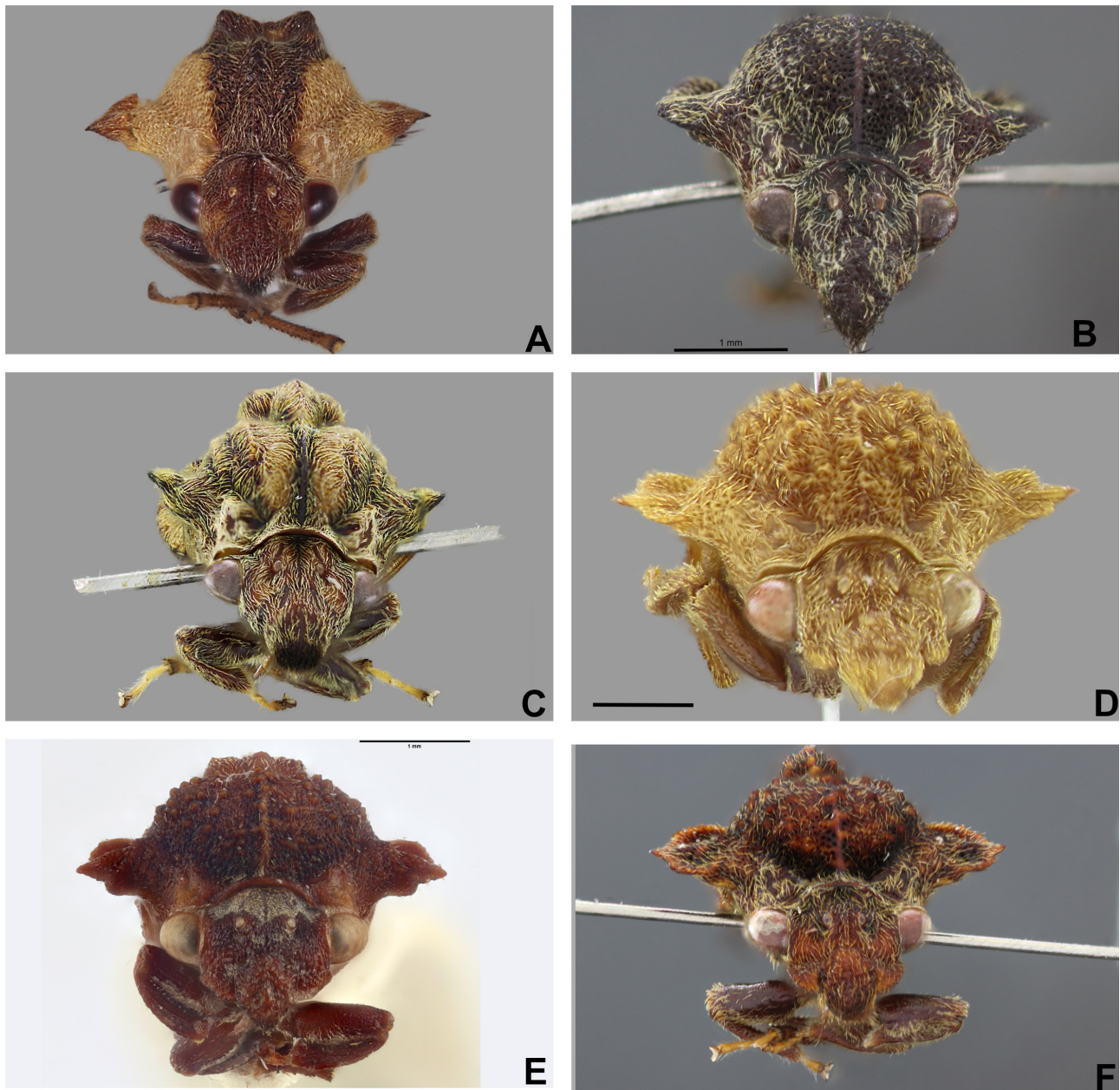


FIGURE 14. Anterior view *Allocyphotes* gen. nov. **A.** *Allocyphotes insolita* (Goding) (♀USNM); **B.** *Allocyphotes insolita* (♂ USNM); **C.** *Allocyphotes flavus* sp. nov. (Paratype ♀ QCAZ); **D.** *Allocyphotes waorianorum* sp. nov. (Paratype ♀ USNM); **E.** *Allocyphotes pompanoni* (Holotype ♀ MNHN); **F.** *Allocyphotes robertoi* sp. nov. (Holotype ♂ QCAZ).

Comments. Male genitalia of *A. insolita* is similar to *A. waorianorum* but differ in the dentition of the aedeagal corona, which is present in *A. insolita*, the dorsal margin of style, which is pointed in *A. waorianorum* sp. nov., and pronotal morphology, which is strongly reticulate in *A. waorianorum*. *Allocyphotes insolita* shows a marked sexual dimorphism (Figs. 14B; 15B; 16B; 23; 24), with male color pattern and size differing from females: males are darker, and females are approximately 0.8 mm longer than males. This species is newly recorded from Bolivia, Brazil, Peru, and Venezuela (Fig. 22). Specimens were collected in lowlands between 130–430 meters altitude. Specimens of *A. insolita* have been found on *Citrus* sp. (Rutaceae) and *Trema micrantha* (Cannabaceae), although breeding host plants have not yet been determined. Field observations of species in the *Cyphotes*-group are scarce,

here we present two photos of live *A. insolita*; the first made by Chris Dietrich in Coca (Puerto Francisco de Orellana), Napo, Ecuador (Fig. 23) and the second by Kelly Swing at the Tiputini Biodiversity Station, Orellana, Ecuador (Fig. 24).

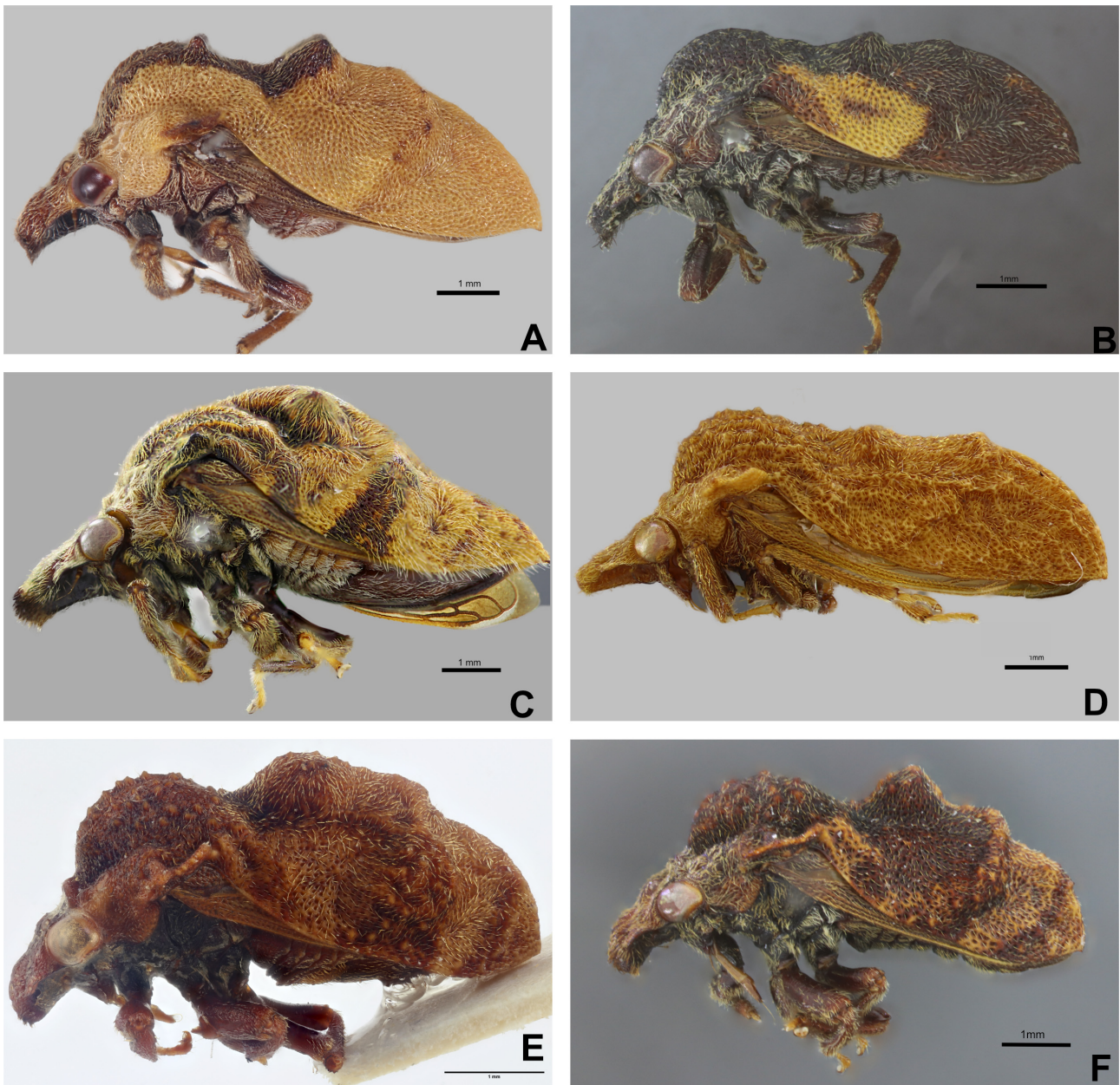


FIGURE 15. Lateral view *Allocyphotes* gen. nov. **A.** *Allocyphotes insolita* (Goding) (♀USNM); **B.** *Allocyphotes insolita* (♂ USNM); **C.** *Allocyphotes flavus* sp. nov. (Paratype ♀ QCAZ); **D.** *Allocyphotes waoraniorum* sp. nov. (Paratype ♀ USNM); **E.** *Allocyphotes pompanoni* (Holotype ♀ MNHN); **F.** *Allocyphotes robertoi* sp. nov. (Holotype ♂ QCAZ).

***Allocyphotes colombiensis* (Gonzalez-Mozo, 2017) comb. nov.**

(Figures. 18B, 19B)

Cyphotes colombiensis Gonzalez-Mozo, 2017: 110 [new species, photograph]

Diagnosis. Base of pronotum, in dorsal view, with four lateral longitudinal rugae; two conical middorsal peaks behind humeral angles; posterolateral area of pronotum projected laterally.

Description. Abdomen. *Female. First valvulae.* Ventral interlocking device bent, without preapical prominence in dorsal or ventral margin (Fig. 18B). *Second valvulae* blade-shaped without tooth on dorsal surface (Fig. 19B). For addition detail see Gonzalez-Mozo *et al*, 2017.

Measurements. Female. Total length 7.4; head width 2.5; head length 1.5; pronotum length 6.6; width between humeral angles 4.6.

Distribution. Colombia.

Material examined. Holotype female: Label information: “COLOMBIA, Boyacá, SFF de Iguaque, 5°25’N, 73°27’W, 2.300 m. Golpeteo. 22-vi-1998. D. Díaz” (IAvH, Catalogue No. IAvH-E-141117).

Comments. The original description (Gonzalez-Mozo *et al.*, 2017), did not provide a description or images of the genitalia, which are provided here. In contrast to other *Allocyphotes* species, in *A. colombiensis* the posterolateral area of the pronotum is well projected laterally but does not extend beyond the humeral angles (as in *A. pompanoni*). Other characters that support the new placement of this species in *Allocyphotes* are its trilobate humeral angles, the presence of an *s* crossvein in the forewing, and its geographic distribution. *Allocyphotes colombiensis* is also the only species recorded for Colombia and recorded in highlands at 2300 meters of altitude.

Allocyphotes pompanoni (Boulard, 2011) **comb. nov.**

(Figures. 14E, 15E, 16E)

Aspona pompanoni 2019: 97 [new species; illustration]

Diagnosis. Pronotum with small knots on metopidium and carina media area, in dorsal view posterolateral area of pronotum rounded, projected laterally.

Description. (Modified from Boulard, 2011). **Color.** General color dark red, with a scattered black spot in dorsal and lateral areas of pronotum, vertex black, frontoclypeus dark red. **Sculpture.** Tuberculate, pronotum with elevated knots in carina media, metopidium and posterolateral area of pronotum. **Head.** Frontoclypeus with acute apex, extended beyond suprantennal ledges. **Thorax. Pronotum.** In lateral view, preapical part of posterior pronotal process subdivided in two even rounded humps, in dorsal view, humeral angles auriculate and well developed laterally, posterolateral pronotal area rounded, not surpassing humeral angle projection.

Measurements (mm). (Boulard, 2011): Total length 5.5; head width; head length 2.12; pronotum length 4.62; width between humeral angles 3.5.

Distribution. French Guiana.

Material examined. Photograph of Holotype. Label information (Boulard, 2011): “Guyane, Haut-Itany, Carbet Lavaud (rive surinamienne), 3–4.XII.1975, Mission Michel Boulard, Pierre Jauffret & Pierre Pompanon leg”. (MNHN: 1 female).

Comments. *A. pompanoni* **comb. nov.** is transferred here into *Allocyphotes* based on the following characters: pronotal sculpture, frontoclypeus tubular, extended 1/3 beyond supraantennal ledges, humeral angles trilobate and posterolateral area of pronotum not well projected laterally; characters of genitalia and forewing venation are not treated in Boulard’s description. Therefore they are not discussed here. Further analysis of these characters is required, however, we consider the available characters sufficient to support the new combination. *A. pompanoni* **comb. nov.** is closely related to *A. robertoi* **sp. nov.** they differ however in the morphology of the preapical portion of pronotum. This is the only species of *Allocyphotes* recorded for French Guiana.

Allocyphotes flavus **sp. nov.** Gonzalez-Mozo

(Figures. 2A, 3D, 14C; 15C; 16C; 17B; 18C; 19C; 20E–H)

Diagnosis. Humeral angle triangular, pronotum densely pubescent, female first valvulae with VID bent second valvulae without teeth on dorsal margin; male style expanded posteriorly.

Description. Color. General color dark yellow and black; head dark brown, apex of frontoclypeus black; pronotum, two longitudinal yellow bands in metopidium, mesially with irregular dark brown bands that fade in posterior pronotal process, which is light brown; legs dark brown, tarsi light brown. **Sculpture.** Densely pubescent (Fig. 3F), two elevated lines in the dorsal area of metopidium at each side of carina media. **Head.** Vertex grooved between ocelli and superior margin; frontoclypeus apex truncate (Fig. 14C). **Thorax. Pronotum.** In lateral view, preapical part pronotum arched, gradually descending to pronotal apex, posterolateral pronotal area enlarged slightly

compressed (Fig. 15C). In dorsal view, humeral angles subtriangular, projected laterally, two middorsal conical peaks are raised at each side of carina media (Fig. 16C). *Forewing. s* crossvein posterior to r-m, macula present in I-II apical cells (Fig. 17B). **Abdomen. Male.** Subgenital and lateral plate with dorsal margin acuminate (Figs. 20E, F), aedeagus in lateral view slightly flattened (Fig. 20G), distinctly concave distally, corona denticulate, style expanded posteriorly (Fig. 20H). *Female. First valvulae,* ventral interlocking device (VID) sinuate, prominence preapical present in ventral margin (Fig. 18C). *Second Valvulae,* without tooth in dorsal margin (Fig. 19C).

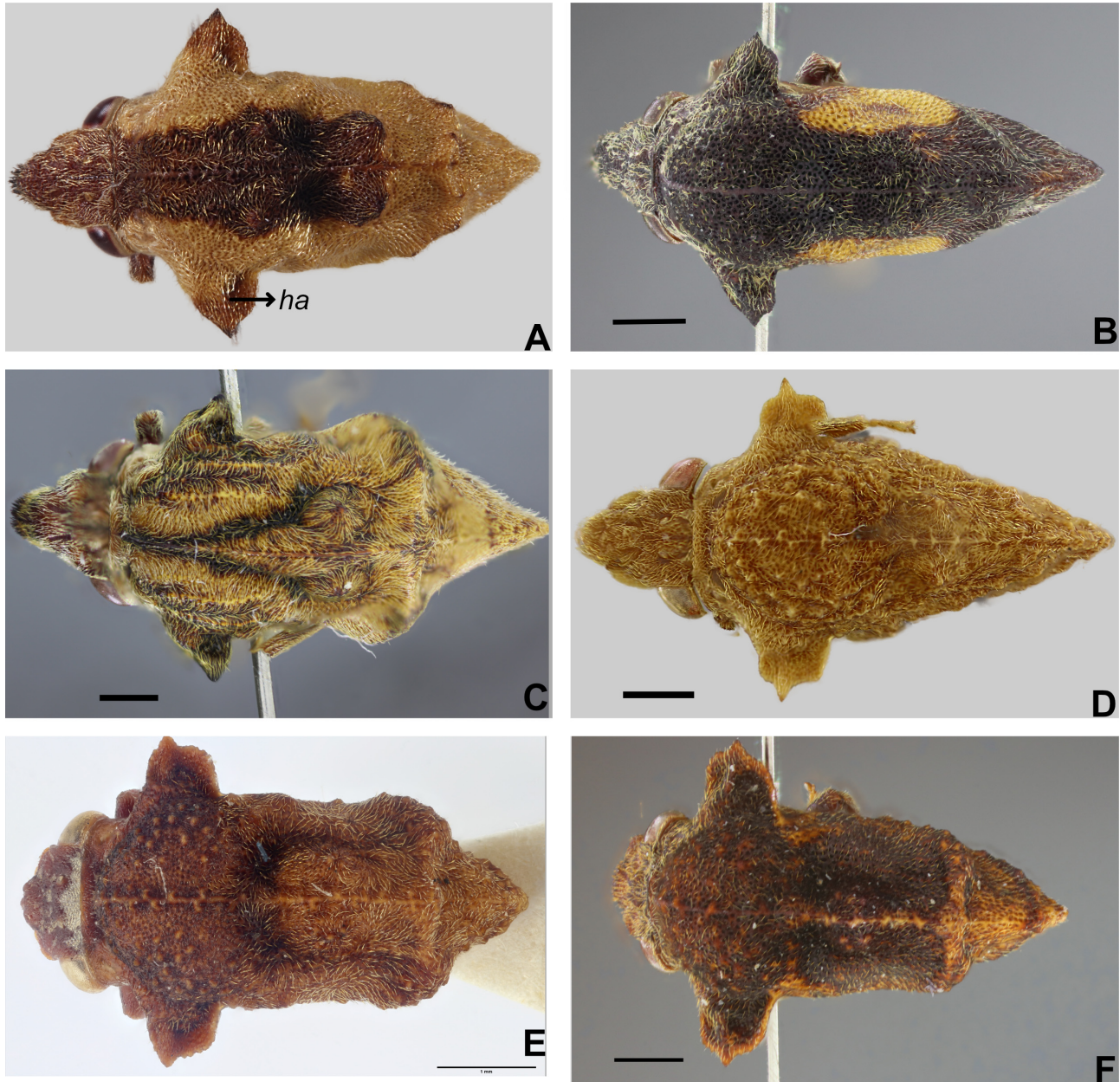


FIGURE 16. Dorsal view *Allocyphotes* gen. nov. **A.** *Allocyphotes insolita* (Goding) (♀USNM); **B.** *Allocyphotes insolita* (♂ USNM); **C.** *Allocyphotes flavus* sp. nov. (Paratype ♀ QCAZ); **D.** *Allocyphotes waoraniorum* sp. nov. (Paratype ♀ USNM); **E.** *Allocyphotes pompanoni* (Holotype ♀ MNHN); **F.** *Allocyphotes robertoi* sp. nov. (Holotype ♂ QCAZ). Scale 1 mm.

Measurements. male/female (mm): Total length 6.71/7.98; head width 2.20/2.59; head length 1.29/1.59; pronotum length 6.22/7.52; width between humeral angles 3.10/ 3.89.

Etymology. The name is based on the yellow (*flavus*, golden-yellow) setae covering the head, pronotum, legs, and abdomen.

Distribution. Ecuador.

Material examined. Holotype male, pinned. (♂ QCAZ 273212). Original label “ECUADOR, Orellana,

Reserva Etnica Waorani, 1k S. Onkone Gare Camp Transect Ent, 216.3m, 00° 39' 25.7" S 076°27'10.8" W, 3-Jul-1995, T.L. Erwin *et al*: Fogging terre firme forest, Lot #1106." || **Paratype female**, pinned. (♀ QCAZ 273213). Original label "ECUADOR, Orellana, Reserva Etnica Waorani, 1k S. Onkone Gare Camp Transect Ent, 216.3 m, 00° 39' 25.7" S 076° 27' 10.8" W, 2-JUL-1995, T.L. Erwin, Fogging terre firme forest, Lot #1068". **Paratype male**, pinned, abdomen and genitalia in vial. (USNM:1 male) Original label "ECUADOR, Orellana, Reserva Etnica Waorani, 1k S. Onkone Gare Camp Transect Ent, 216.3 m, 00° 39' 25.7" S 076° 27' 10.8" W, 8-OCT-1995, T.L. Erwin, Fogging terre firme forest, Lot #11267.

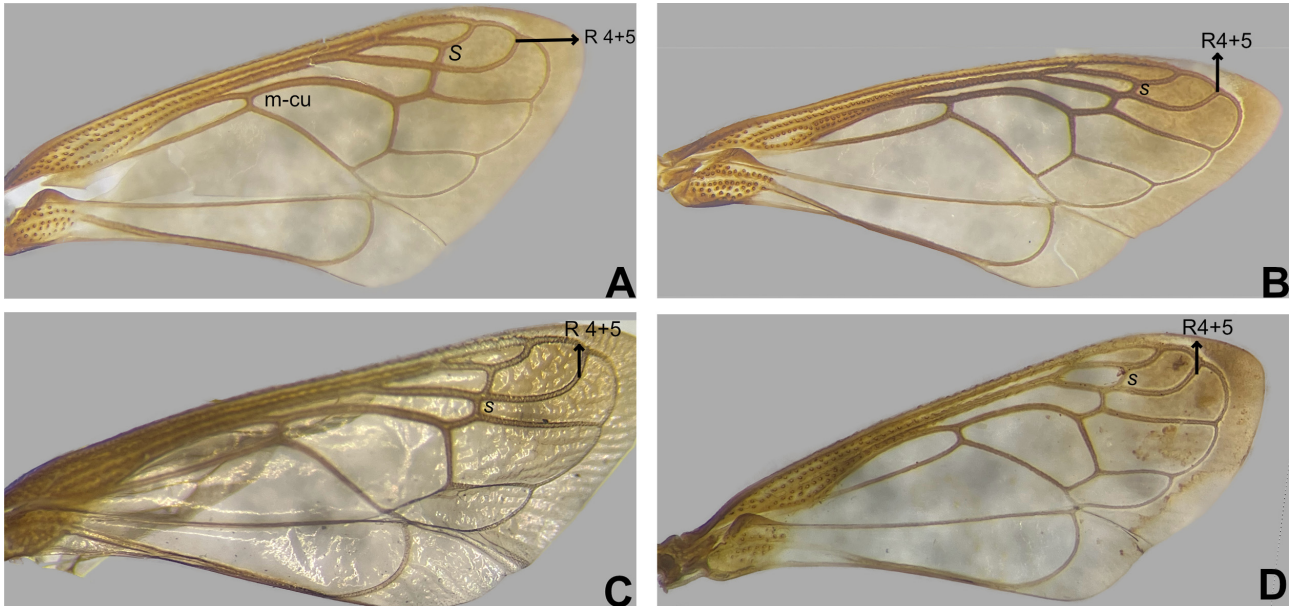


FIGURE 17. Forewing *Allocyphotes* gen. nov. A. *A. insolita* (♀USNM); B. *A. flavus* sp. nov. (Paratype ♀ QCAZ); C. *A. waoraniorum* sp. nov. (Paratype ♀ USNM); D. *A. robertoi* sp. nov. (Holotype ♂ QCAZ).

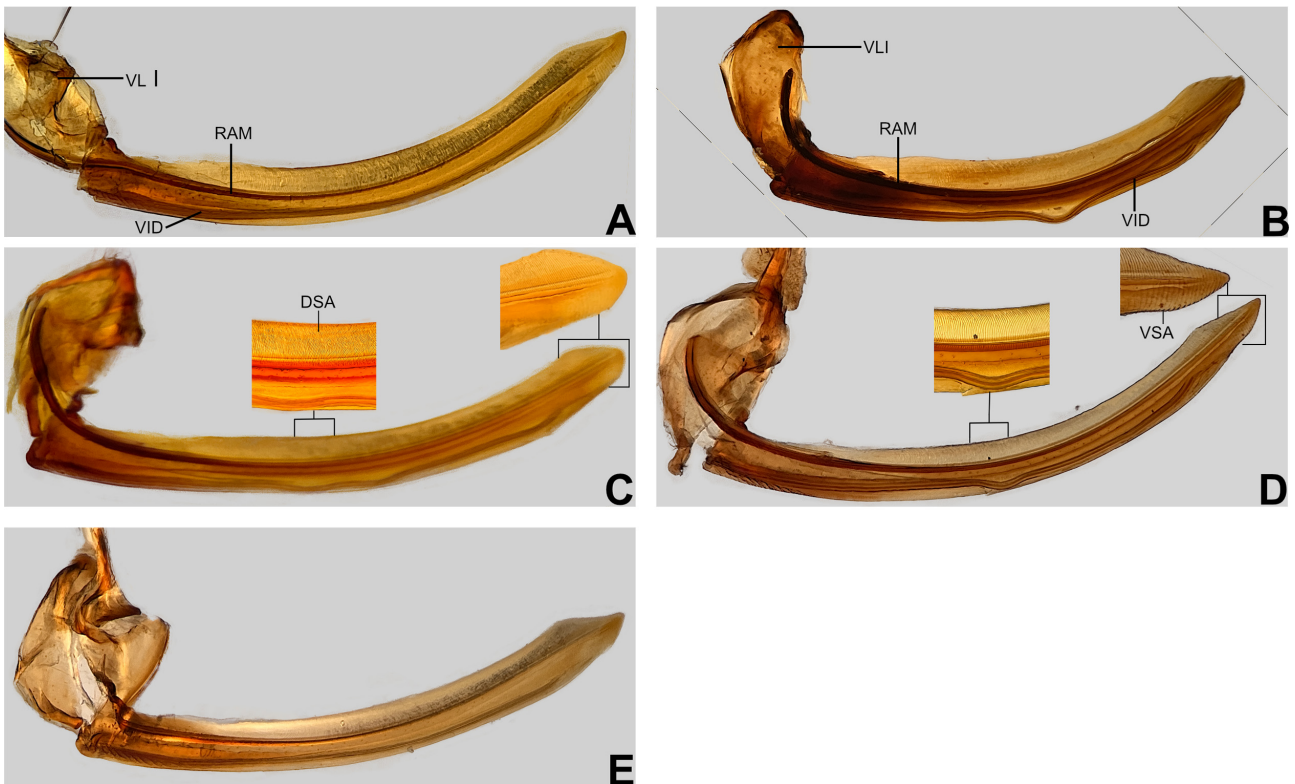


FIGURE 18. Female genitalia. Valvulae I *Allocyphotes* gen. nov. A. *A. insolita* (USNM); B. *A. colombiensis* (IAvH); C. *A. flavus* sp. nov. (Paratype ♀ QCAZ); D. *A. waoraniorum* sp. nov. (Paratype ♀ USNM); E. *A. robertoi* sp. nov. Abbreviations: (DSA) dorsal sculptured area; (RAM) ramus; (VID) ventral interlocking device; (VL I) Valvulae I; (VSA) ventral sculptured area.

Comments. *A. flavus* **sp. nov.** can be distinguished from other *Allocyphotes* species by the following characters: male with style expanded posteriorly, densely pubescent pronotal sculpture. Although the humeral angles are not trilobate, they are projected laterally. Other characters such as presence of the *s* crossvein, posterolateral pronotal area compressed and not extended beyond humeral angles, and frontoclypeus tubular, extended 1/3 beyond suprantennal ledges support its placement in *Allocyphotes*.

***Allocyphotes waoraniorum* Gonzalez-Mozo sp. nov.**

(Figures. 14D; 15D; 16D; 17C; 18D; 19D; 20I–L)

Diagnosis. In lateral view pronotum evenly convex; coloration homogeneous without black marks over the pronotum; humeral angle strongly trilobate.

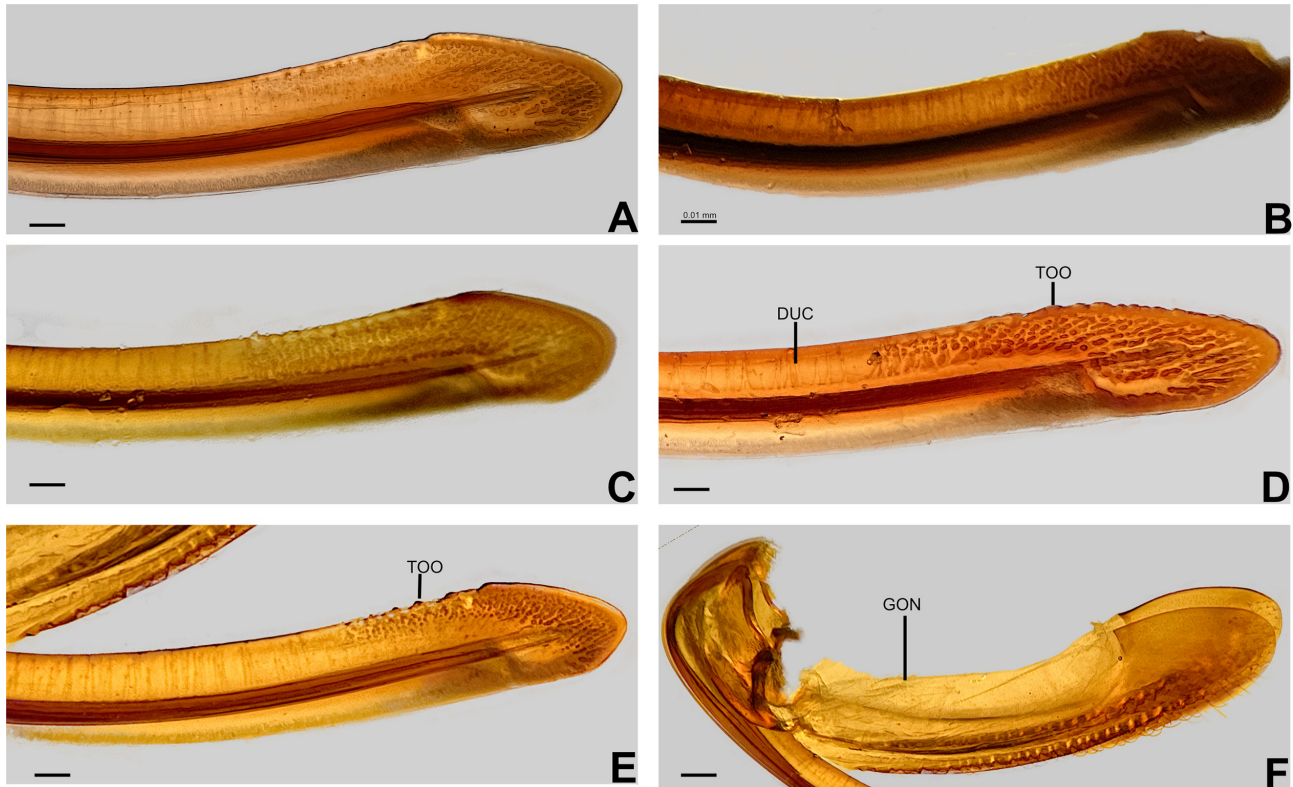


FIGURE 19. Female Genitalia. Valvulae II *Allocyphotes* gen. nov. A. *A. insolita*; B. *A. colombiensis*; C. *A. flavus* **sp. nov.** (Paratype ♀ QCAZ); D. *A. waoraniorum* **sp. nov.** (Paratype ♀ USNM); E. *A. robertoi* **sp. nov.**; F. Gonoplac. *A. robertoi* **sp. nov.** Abbreviations. Ducts (DUC); (GON) gonoplac; (TOO) Tooth.

Description. Color. Head, pronotum and legs light brown. **Sculpture.** Pubescent, pronotum tuberculate, covered with small knots more conspicuous in metopidium and carina media (Fig. 16D), three longitudinal elevated rugae on each side of carina media extended and subdivide irregularly from humeral angles. **Head.** Vertex with a linear groove between ocelli and superior margin of the head, frontoclypeus apex acute (Fig. 14D). **Thorax. Pronotum.** In lateral view, low, metopidium strongly convex, elevated, preapical part of posterior pronotal process evenly convex, posterior process gradually descending (Fig. 15D); in dorsal view, humeral angle auriculate, markedly trilobate, with two small mesal conical swellings, posterolateral area of pronotum not extended laterally (Fig. 16D). **Forewings.** *s* crossvein present anterior of *r-m* (Fig. 17C). **Abdomen. Male.** Subgenital and lateral plate margin dorsal rounded (Fig. 20I, J); aedeagus in lateral view scoop-shaped, concave, corona without conspicuous denticuli (Fig. 20K), style superior margin pointed, in posterior view distal area of style curved anteriorly (Fig. 20L). **Female. First valvulae.** Ventral interlocking device sinuate (VID) bent downwards (Fig. 18D). **Second valvulae.** Dorso-apical margin finely serrate (Fig 19D).

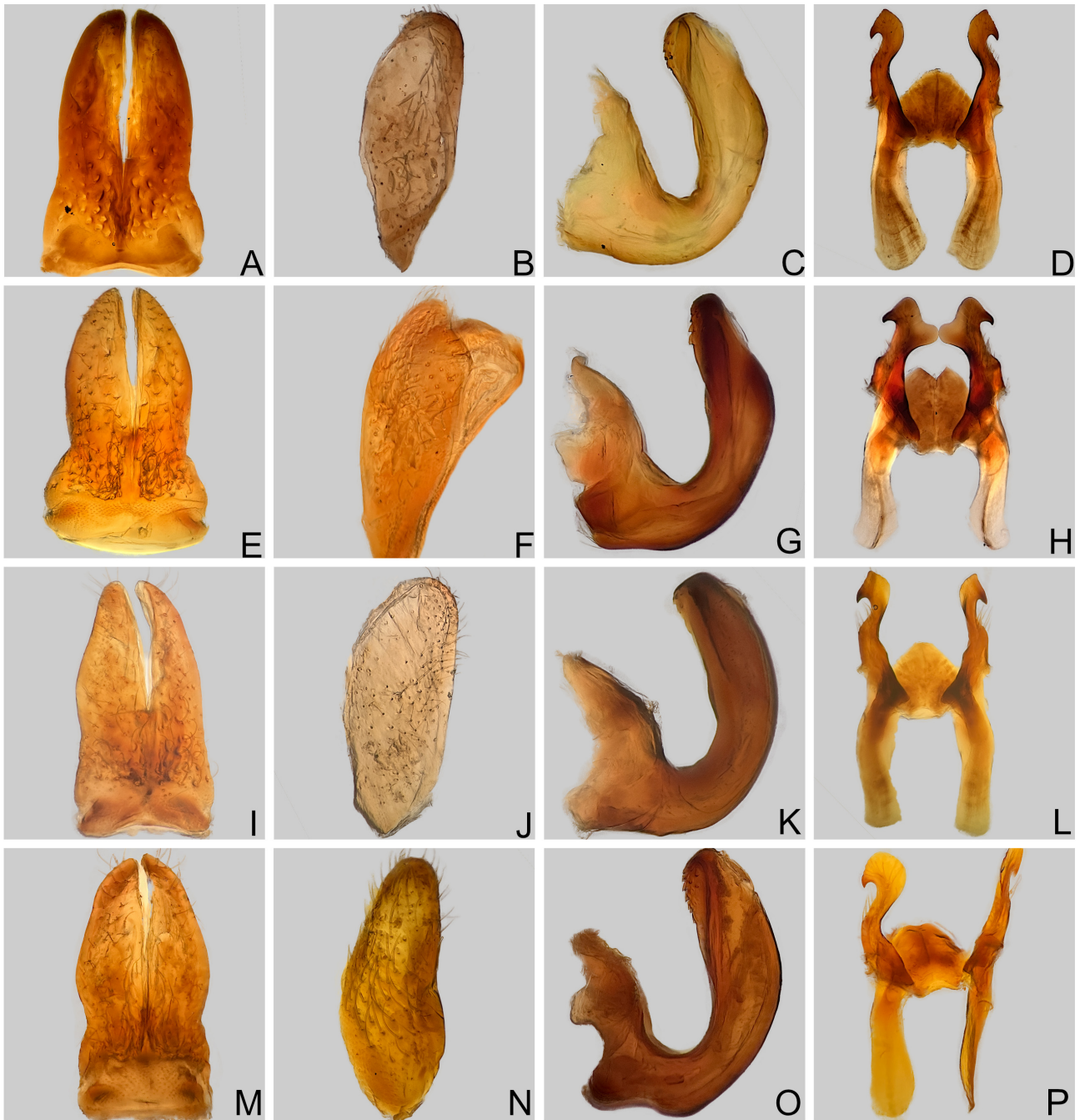


FIGURE 20. Male genitalia. A–D. *A. insolita* (Goding) (USNM); E–H. *A. flavus* sp. nov. (Paratype ♂ USNM); I–L. *A. waoraniorum* sp. nov. (Paratype ♂ USNM); M–P. *A. robertoi* sp. nov. (Paratype ♂ USNM).

Measurements. male/female (mm): Total length 5.62/7.08; head width 1.70/1.92; head length 1.36/1.42; pronotum length 4.54/6.06; width between humeral angles 3.16/ 4.03.

Etymology. This species is named after the indigenous people, Waorani, who inhabit the protected area in the Amazonian region of Ecuador where this and other Darnini species were collected.

Distribution. Ecuador.

Material examined. **Holotype male**, pinned. (♂ QCAZ 273214). Original label “ECUADOR, Orellana: Reserva Etnica Waorani, 1k S. Onkone Gare Camp Transect Ent, 216.3m, 1-Oct-1996, 00° 39’ 25.7” S 076° 27’ 10.8” W, T. L Erwin *et al.* Fogging terre firme forest, Lot #1700”. **Paratype female**, pinned. (♀ QCAZI 273215). Original label “ECUADOR, Orellana: Reserva Etnica Waorani, 1k S. Onkone Gare Camp Transect Ent, 216.3m, 21-Jun-1996, 00° 39’ 25.7” S 076° 27’ 10.8” W, T. L Erwin *et al.* Fogging terre firme forest, Lot #1560”. Paratype

male, pinned abdomen and genitalia in vial. (USNM:1 male) Original label “ECUADOR, Orellana: Reserva Etnica Waorani, 1k S. Onkone Gare Camp Transect Ent, 216.3m, 1-OCT-1996, 00° 39’ 25.7” S 076° 27’ 10.8” W, T. L Erwin *et al.* Fogging terre firme forest, Lot #1700”. **Paratype female**, pinned abdomen and genitalia in vial. (USNM:1 female). “ECUADOR, Orellana: Reserva Etnica Waorani, 1k S. Onkone Gare Camp Transect Ent, 216.3m, 3-JUL-1995, 00° 39’ 25.7” S 076° 27’ 10.8” W, T. L Erwin *et al.* Fogging terre firme forest, Lot #1099”.

Comments. Closely resembling *A. insolita* (see *A. insolita* comments). In contrast to other *Allocyphotes* species, preapical part of pronotum of *A. waoraniorum* **sp. nov.** is evenly convex, and the coloration is homogeneous without black marks over the pronotum. As *A. pompanoni*, knots are present over the metopidium in *A. waoraniorumi*, but the posterolateral area of pronotum is not projected laterally.

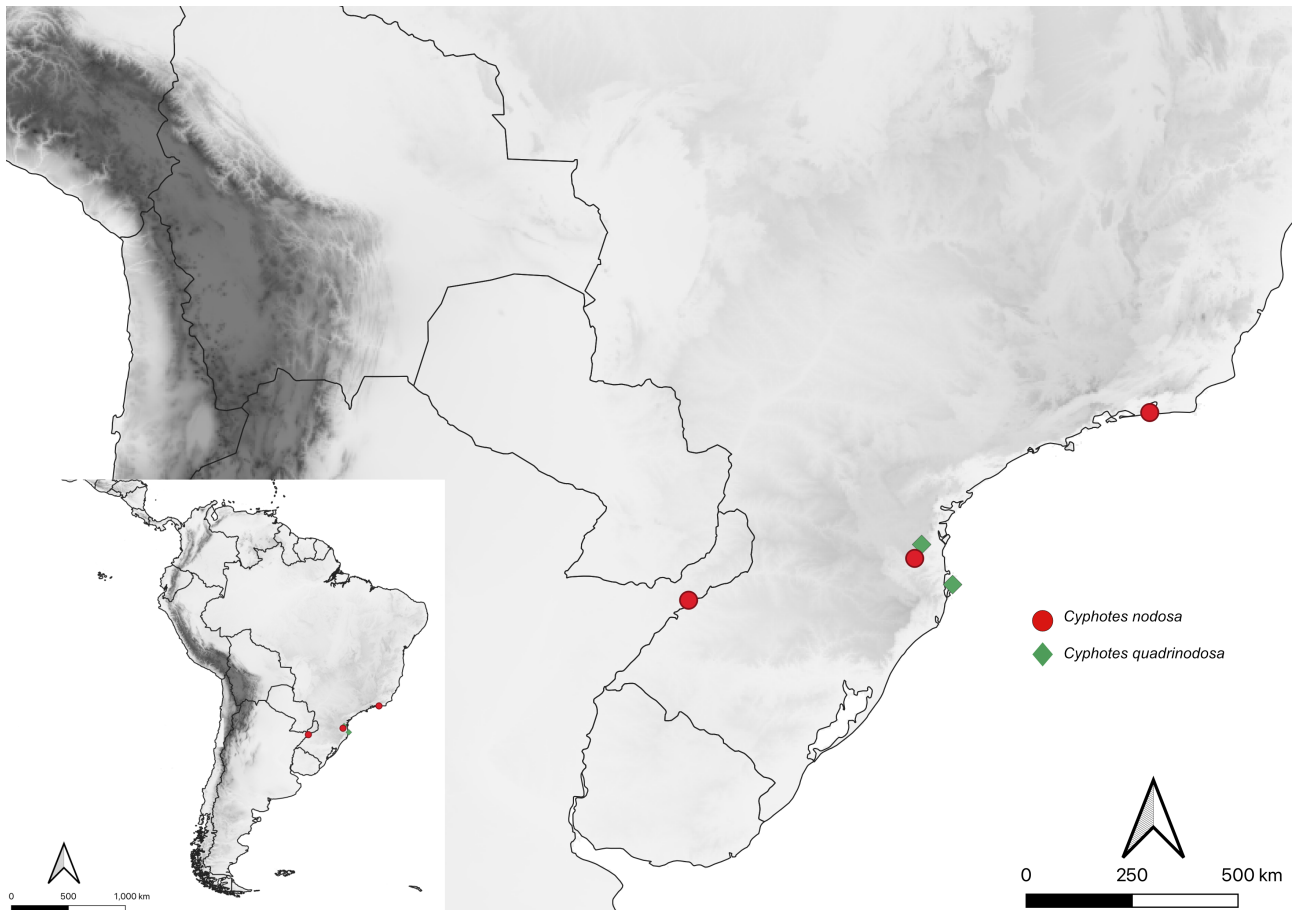


FIGURE 21. Known distribution of *Cyphotes* Burmeister.

***Allocyphotes robertoi* Gonzalez-Mozo sp. nov.**

(Figures. 14F; 15F; 16F; 17D; 18E; 18E, F; 20M–P)

Diagnosis. Pronotum in lateral view, with two rounded swellings; female second valvula with five teeth on dorsal surface.

Description. Color. General color light brown, head and legs dark brown, metopidium with a V-shaped black band, pronotum with black band behind humeral angles, posterior process with a small transversal black line. Male, dark brown with light brown bands in posterior process. **Sculpture.** Metopidium and carina media tuberculate, covered with small knots, apex of pronotum with a transversal line of knots. **Head.** In lateral view vertex concave (Fig. 15F), frontoclypeus apex truncate (Fig. 14F). **Thorax. Pronotum.** In lateral view sinuate, preapical part of posterior pronotal process subdivided into two selling one anterior elevated, rounded, followed by a smaller conical-shaped swelling (Fig. 15F); in dorsal view, humeral angles strongly developed laterally (Fig. 16F). **Forewing.** *s* crossvein present, posterior to *r-m*, macula present in apical cells I, II, III, and limbo apical (Fig. 17D). **Abdomen. Male.** Subgenital and lateral plate margin dorsal truncate (Figs. 20M, N); aedeagus in lateral view scoop-shaped,

concave, corona denticulate, gonopore membrane slightly produced posteriorly (Fig. 20O); style slender throughout with apex acute, margin dorsal curved (Fig. 20P). *Female. First valvulae.* VID convex, apex acute (Fig.18E). *Second valvulae.* with four teeth in dorso-apical margin (Fig. 19E).



FIGURE 22. Known distribution of *Allocyphotes* gen.nov.



FIGURE 23. Male of *Allocyphotes insolita* Napo, Ecuador, 1988. Photograph by, Chris Dietrich. Used by permission.



FIGURE 24. Female of *Allocyphotes insolita*, Tiputini Biodiversity Station, Orellana, Ecuador, 2012. Photograph by, Kelly Swing. Used by permission.

Etymology. This species is named in loving memory of Roberto Emilio Mozo Sanchez.

Material examined. **Holotype male**, pinned. (♂ QCAZ 273216). Original Label “**ECUADOR**, Orellana, Reserva Etnica Waorani, 1 Km S. Onkone Gare Camp Transect Ent. 216.3 m alt S 00°39’25.7” 76°27’10.8” 21-Jun-1996 T.L Erwin *et al.* Fogging terre firme forest lot#1557 || **Paratype female**, pinned. (♀ QCAZ 273217). Original label “**ECUADOR**, Orellana, Reserva Etnica Waorani, 1 Km S. Onkone Gare Camp Transect Ent. 216.3 m alt S 00°39’25.7” 76°27’10.8” 2-Jul-1995 T.L Erwin *et al.* Fogging terre firme forest lot#1083.

Comments. This species is most similar to *A. pompanoni* **comb. nov.** (see comments *A. pompanoni*). Males of *A. robertoi* differ in being smaller and lighter in coloration than females. The three new species here described are from Ecuador (see Fig. 22), all from the same location: Reserva Etnica Waorani in Orellana, Ecuador, collected by T. Erwin *et al.* The distribution of these species may be wider but their discovery in one small area suggests that many membracid species remain to be discovered in the canopy of the neotropical forest.

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