

# A new genus of Phengodidae (Coleoptera) from the Neotropical Region

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**Abstract.** *Cleicosta*, a new genus of Phengodidae containing two new species, *C. equatoreana* sp. nov., and *C. monaguense* sp. nov., are described. Additionally, a new combination for *Cenophengus brevipilumatus* Wittmer, 1976 is included. *Cleicosta* gen. nov., is the thirty-eighth genus assigned to the beetle family Phengodidae in the new world and is also the most morphologically similar to *Cenophengus* LeConte, 1881. Both genera exhibit clearly separated tentorial pits, vertical frons and simple tarsomeres. In *Cleicosta* gen. nov., however, the antennal rami are 1.5 times longer than the corresponding antennomere, the pronotum is subquadrate and the elytra are short, reaching the first or second abdominal segment. In addition, it presents an aedeagus with lateral lobes slender, parallel exteriorly, narrowed medially to toothless apex.

**Key-Words.** Diversity; Taxonomy; *Cleicosta*; Elateroidea.

## INTRODUCTION

The coleopteran family Phengodidae LeConte, 1861 comprises 37 genera and 282 species in Americas. It has traditionally been classified into three subfamilies: Phengodinae LeConte, 1861; Mastinocerinae LeConte, 1881; and Penicillophorinae Paulus, 1975 (Constantin, 2014; Zaragoza-Caballero & Pérez-Hernández, 2014; Roza *et al.*, 2017, 2019; Vega-Badillo & Zaragoza-Caballero, 2019; Roza & Mermudes, 2019, 2020). These subfamilies are present in the New World, from southern Canada to the north of Chile and Argentina (Costa & Zaragoza-Caballero, 2010). Recently, Kundrata *et al.* (2019) by phylogenetic analysis, considered Cydistinae Paulus, 1972, to be part of the Phengodidae. Cydistinae consists of two genera distributed in Asia Minor: *Cydistus* Bourgeois, 1885 which includes six species, and *Microcydistus* Kundrata *et al.*, 2019 with one species. The collection records for this family are limited to local sites, and their low vagility suggests that its species present high levels of endemism (Roza *et al.*, 2017). Thus, several characteristics of the phengodid species could be related to their geographical boundaries (Viviani & Bechara, 1997). The aim of this study is to increase our knowledge of the family Phengodidae by describing a new genus based on two new species and transferring one previously described species into this genus.

## MATERIAL AND METHODS

We examined specimens deposited at MTEC (Montana Entomology Collection "From Ivie Michael Ivie Collection", Bozeman Montana, U.S.A.), plus the holotype of *Cenophengus brevipilumatus* Wittmer, 1976, deposited at NMNH (National Museum of Natural History, Smithsonian Institution, Washington D.C., U.S.A.) (Floyd Schockley, curator). All specimens are pinned. By means of a Zeiss Discovery V8 stereoscopic microscope equipped with a 1× lens and a 1.6× eyepiece, the following measurements were taken: body length, interantennal and interocular distance, length and width of head, pronotum, elytra, scape, antennomeres, antennal rami, maxillary and labial palps, and tarsomeres. Holotype measurements are expressed in millimeters. The aedeagus was extracted from six specimens, and a wing was detached from three; these were glued onto cardboard triangles and pinned under corresponding specimens. Photographs were taken with a Zeiss Axio Zoom V16 microscope equipped with a Plan NeoFluar Z 1×10.25 FWD 56 lens. Lastly, the aedeagi of the new species were examined by means of the Hitachi SU1015 SEM microscope at the Laboratorio de Microscopía y Fotografía de la Biodiversidad, Instituto de Biología, UNAM. General terminology follows Lawrence *et al.* (2011), except for membranous wing veins, that

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was taken from Kukalová-Peck & Lawrence (1993). Labels of the type specimens are arranged in sequence from top to bottom, where the data for each label are within double quotes (" "), a slash (/) separates the rows, and information between brackets ([ ]) provide the correct information for label mistakes.

**Depositories:** The specimens are deposited in, National Museum of Natural History, Smithsonian Institution, Washington D.C., U.S.A. (NMNH), the Colección Nacional de Insectos (CNIN) of the Universidad Nacional Autónoma de México (UNAM) and the Museo del Instituto de Zoología Agrícola Francisco Fernández Yépez (MIZA) of the Universidad Central de Venezuela (UCV).

## RESULTS

A key, only for the mastinocerine genera exhibiting distinctly separated tentorial pits, is provided, adapted from Zaragoza-Caballero & Pérez-Hernández (2014) with modifications in couplet 2'.

2. Labial palpi 2-segmented; tarsomeres simple ..... 3  
2'. Labial palpi 3-segmented; first tarsomeres of pro- and/or mesothoracic legs with ventral 'comb' of bristle-like setae ..... 4  
3. Elytra long; last 3 tergites exposed; gular sutures divergent anteriorly; lateral lobes of aedeagus parallel, with apical teeth .....  
..... *Cenophengus* LeConte  
3'. Elytra short, last 7 tergites exposed; gular sutures parallel anteriorly; lateral lobes of aedeagus narrowed medially to toothless apex .....  
..... *Cleicosta* gen. nov.  
4. Fifth and sixth sternites with apical crescent-shaped area containing transverse line of dense setae; first tarsomere of pro- and mesothoracic legs with complete 'comb' ..... *Distremocephalus* Wittmer  
4'. Fifth and sixth sternites without crescent-shaped area; first tarsomere of prothoracic legs with complete ventral 'comb' .....  
..... *Mastinowittmerus* Zaragoza

### *Cleicosta* gen. nov.

**Type species:** *Cenophengus breviplumatus* Wittmer, 1976.

**Diagnosis:** *Cleicosta* gen. nov., is morphologically similar to *Cenophengus* LeConte, 1881: both genera exhibit clearly separated tentorial pits, vertical frons and simple tarsomeres. *Cleicosta* gen. nov., differs from *Cenophengus* in the arrangement of the gular sutures: parallel anteriorly in the new genus and divergent anteriorly in *Cenophengus*. Additionally, in *Cleicosta* gen. nov., pronotum is subquadrate in shape and elytra are short (reaching only first or second abdominal segment). In *Cenophengus* the pronotum is rectangular, and elytra long, last 3 tergites exposed. Other important characteristics in *Cleicosta* gen. nov., are: aedeagus with lateral lobes parallel, elongate, narrowed medially to toothless apex; in *Cenophengus* with lateral lobes parallel, with apical teeth.

**Head:** Wider than long (Fig. 1A), fully exposed; integument smooth, glossy, coarsely punctate: antennae 12-articulated serrated, extending slightly beyond pronotal posterior margin; antennomeres 4<sup>th</sup> to 11<sup>th</sup> with lanceolate rami, 1.5 to twice times longer than respective antennomere; frons vertically produced; interantennal distance nearly equal to first antennomere length; eyes finely faceted, hemispherical, variable in length; labrum 3 times wider than long; mandibles simple, thin, falcate; maxillary palpi 4-segmented; terminal palpomere bullet-shaped with apex acute, longer than preceding 3; 3<sup>rd</sup> palpomere shorter than 2<sup>nd</sup>; labial palpi 2-segmented; terminal palpomere fusiform, 5 times longer than preceding one; tentorium with 2 distinctly separated pits; gular sutures parallel anteriorly (Fig. 1B).

**Thorax:** Pronotum subquadrate (Fig. 1C); anterior angles rounded, posterior angles acute, lateral margins rounded; integument smooth, glossy, densely punctured (Fig. 1D); prosternal anterior margin almost straight; sternal suture complete. Elytra short, reaching 1<sup>st</sup> or 2<sup>nd</sup> abdominal segment, 3 to 4 times longer than wide, subparallel, apex rounded. Posterior wings with posterior medium vein (MP 1 + 2) always present; posterior radial vein (RP) absent; radial cell open; venation otherwise variable. Length of legs gradually increasing from pro- to metathoracic legs; tarsi simple; in all pairs of legs, length of 4<sup>th</sup> tarsomere equal to half the length of 5<sup>th</sup>; claws simple.

**Abdomen:** Integument shiny, punctured, densely setose; penultimate sternite with posterior margin sinuate; last sternite deeply notched. Aedeagus with median lobe cylindrical, with apex rounded; lateral lobes elongate, parallel externally, narrowed medially to toothless apex (Figs. 1E-G).

**Etymology:** The new genus is named *Cleicosta* in recognition of the outstanding work of Dr. Cleide Costa, on her eightieth birthday. Her first name was abbreviated as "Cleï" in order to avoid homonymy with the elaterid genus *Cleidecosta* Johnson, 2002. Gender feminine.

### *Cleicosta breviplumata* (Wittmer, 1976) comb. nov. (Figs. 2A-D)

*Cenophengus breviplumatus* Wittmer, 1976: 450.

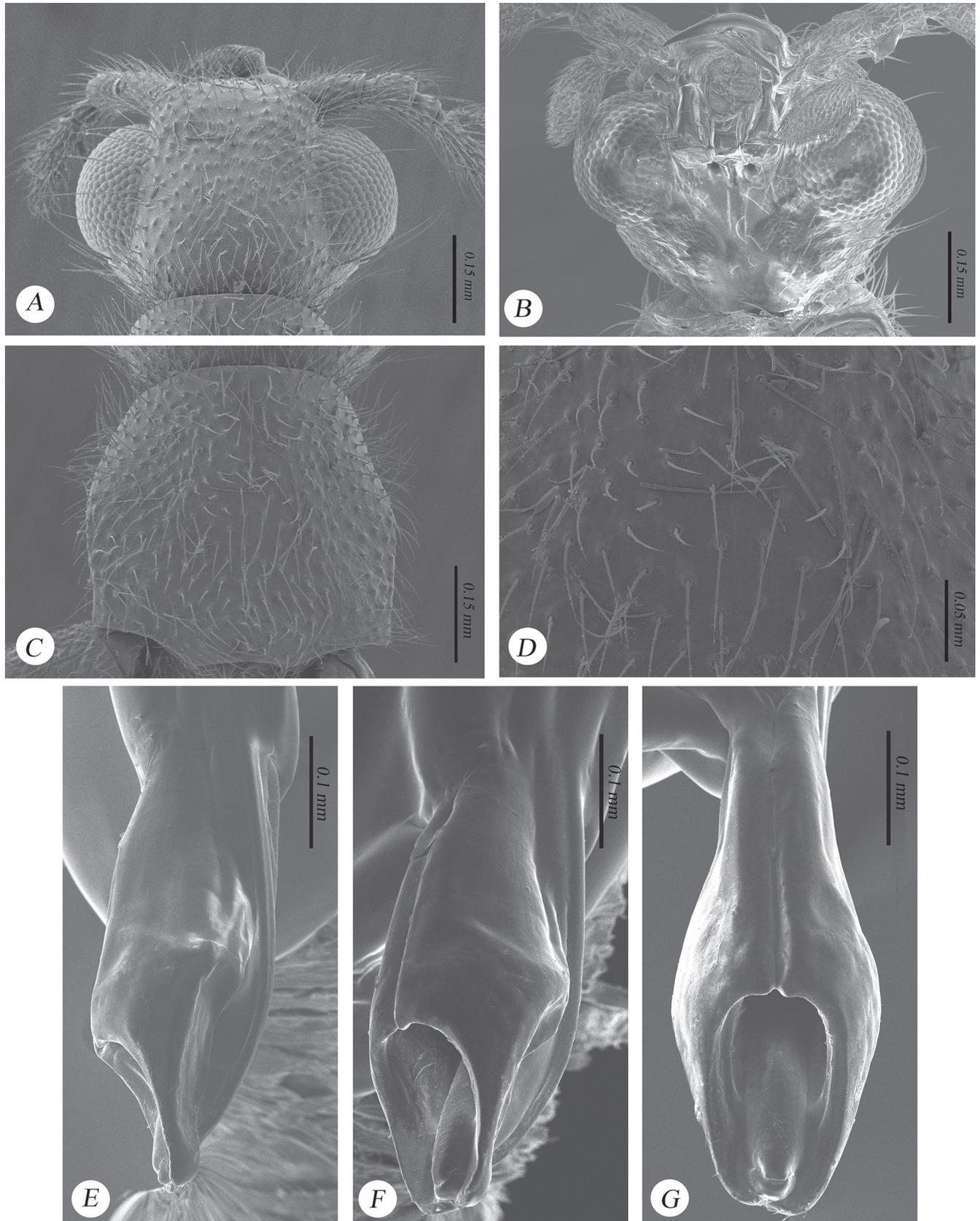
**Type material:** Holotype (♂ NMNH): "Monserrate/ Bogota/ Colombia/ 10,000/ ALT 03.V.46/ E.A.Chapin" "*Cenophengus breviplumatus*/ det. W. Wittmer" "Type No./ 73885/ USNM" "Loan from/ USNMNH/ 2081909".

**Diagnosis:** *Cleicosta breviplumata* comb. nov., is similar to *C. monaguense* sp. nov., but they differ in their interantennal and interocular distances. In *C. breviplumata* comb. nov., the interantennal distance equals the width of the antennal fossa, whereas in *C. monaguense* sp. nov., it is greater. The interocular distance is four times greater than eye width in *C. breviplumata* comb. nov.; in *C. mona-*

*guense* sp. nov., it is three times greater. Additionally, in *C. brevipumata* comb. nov., the first and second tarsomeres are equal in length in all three pairs of legs, whereas in *C. monaguense* sp. nov., the first tarsomere is shorter than the second in all legs.

**Redescription:** Holotype, male. Body length 4.0; maximum body width 0.46. Body color brown.

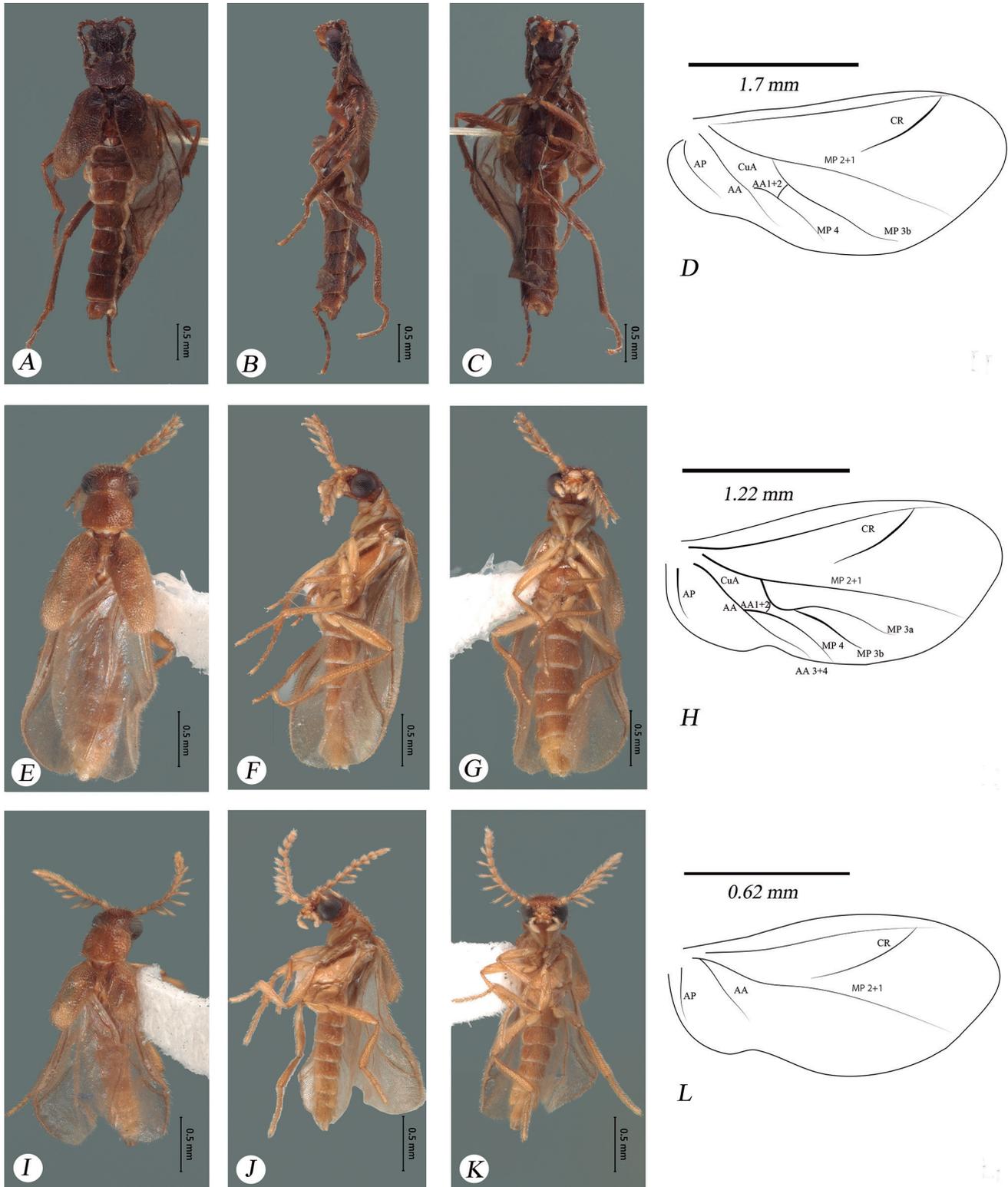
**Head:** Surface concave, wider (0.50) than long (0.44); at eye level, wider (0.50) than pronotum (0.46); integument



**Figure 1.** *Cleicosta monaguense* sp. nov., SEM images: (A) head dorsal; (B) head ventral; (C, D) pronotum. Aedeagus: (E) dorsal; (F) lateral; (G) ventral.

smooth, coarsely punctate, each puncture bearing a brown seta; interantennal distance (0.12) equal to antennal fossa width (0.11); eyes small, hemispherical, finely faceted, not prominent, longer (0.2) than wide (0.08); interocular distance (0.33) 4 times greater than eye width; antennae short (1.63), barely reaching pronotal posterior-

or margin; 1<sup>st</sup> antennomere (0.15) as long as 2<sup>nd</sup> and 3<sup>rd</sup> combined; 3<sup>rd</sup> cup-shaped and short (0.05), 4<sup>th</sup> in length 0.12, 5<sup>th</sup> to 10<sup>th</sup> about equal in length (0.16); 11<sup>th</sup> 0.1 in length; 12<sup>th</sup> (terminal) bullet-shaped with apex acute (0.15); antennal rami lanceolate, 1.5 times longer than respective antennomere; labrum bilobed; terminal max-



**Figure 2.** *Cleicosta brevipumata* comb. nov., habitus: (A) dorsal; (B) lateral; (C) ventral; (D) posterior wings. *Cleicosta monaguense* sp. nov., habitus: (E) dorsal; (F) lateral; (G) ventral; (H) posterior wing. *Cleicosta equatoreana* sp. nov., habitus: (I) dorsal; (J) lateral; (K) ventral; (L) posterior wing. Venation: posterior medium vein (MP 1 + 2), posterior radial vein (RP), radial cell (CR); posterior anal vein (AP), anterior anal vein (AA) divided into AA 1 + 2 and AA 3 + 4, the cubital-anal vein (CuA) and MP 4, MP 3a, MP 3b posterior veins.

illary palpomere robust, spindle-shaped (0.12), longer than preceding 3 combined; terminal labial palpomere spindle-shaped (0.05), 5 times longer than preceding one.

**Thorax:** Pronotum wider (0.49) than long (0.45); integument smooth, coarsely punctate; each puncture bearing a brown seta; disc convex, anterior margin almost straight, anterior angles rounded, lateral margins convergent anteriorly, posterior margin rounded, posterior angles acute; scutellum spatulate, with small notch on posterior margin; integument shiny, densely punctured; each puncture bearing a brown seta; elytra short, 3.5 times longer (1.3) than wide (0.37); posterior wings (Fig. 2D) with posterior medium vein (MP 1 + 2) distinct, posterior radial vein (RP) absent, radial cell (CR) open; cubital-anal area of wings with posterior anal vein (AP) distinct, anterior anal vein (AA) incomplete and distinct, cubital-anal vein (CuA) distinct, mid-posterior veins MP 4 and MP 3b present; 1<sup>st</sup> and 2<sup>nd</sup> tarsomeres of pro-, meso- and metathoracic legs about equal in length.

**Abdomen:** Integument shiny, punctured, with silky appearance due to dense setosity; penultimate sternite with posterior margin emarginate; last sternite with posterior margin deeply notched; pygidium with posterior margin emarginate; aedeagus slender.

**Females and immatures:** Unknown.

**Distribution:** Bogota, Colombia (Fig. 3).

### *Cleicosta monaguense* sp. nov. (Figs. 2E-H)

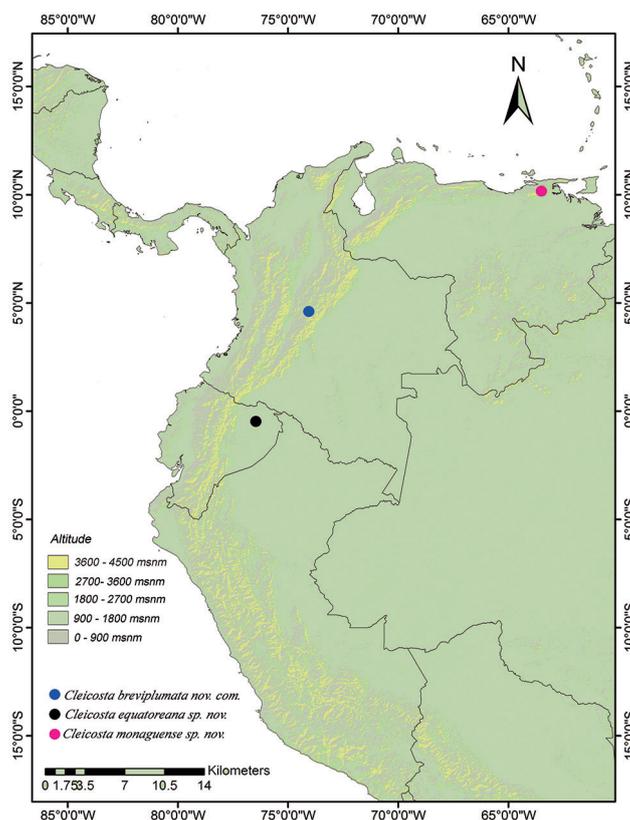
**Type material:** Holotype (♂ MIZA): "VENEZUELA: Monagus [Monagas], 700 m/ Caripe, Cueva #87-82/ Guacharo, 20-30 July 1987/ Forest over coffee/ S & J Peck, Malaise FIT""From the Michael Ivie Collection". Paratypes: "VENEZ: Monagus, 700 m/ Caripe, Cueva #87-82/ Guacharo, 20-30 July 87/ Forest over coffee/ S & J Peck, Malaise""Michael Ivie Collection" (3♂ CNIN, 3♂ MTEC).

**Diagnosis:** *Cleicosta monaguense* sp. nov., can be separated from the similar *C. brevipumata* comb. nov., by its greater interantennal distance which equals twice the antennal fossa width (interantennal distance equals antennal fossa width in *C. brevipumata* comb. nov.). The interocular distance is three times greater than eye width in *C. monaguense* sp. nov., and in *C. brevipumata* comb. nov., it is four times greater. Additionally, in *C. monaguense* sp. nov., the first tarsomere is shorter than the second in all legs, whereas in *C. brevipumata* comb. nov., the first and second tarsomeres are equal in length in all three pairs of legs.

**Description: Male:** Body length 3.50, maximum body width 0.46. Light brown body.

**Head:** Surface concave, wider (0.53) than long (0.41); at eye level, wider (0.53) than pronotum (0.46); integument smooth thick and roughly dotted densely and coarsely punctate, each puncture bearing a brown seta, interantennal distance (0.12) equal to twice antennal fossa width (0.07); eyes large, hemispherical, finely faceted, prominent, longer (0.22) than wide (0.01); interocular distance (0.31) 3 times greater than eye width; antennae short (1.17), barely reaching pronotal posterior margin, 1<sup>st</sup> antennomere (0.10) longer than next 2 combined, 3<sup>rd</sup> cup-shaped and short (0.03), 4<sup>th</sup> in length 0.10, 5<sup>th</sup> to 10<sup>th</sup> about equal in length (0.11), 11<sup>th</sup> measuring 0.09, 12<sup>th</sup> (terminal) bullet-shaped with apex acute (0.12); antennal rami lanceolate, 1.5 times as long as respective antennomere; labrum bilobed; terminal maxillary palpomere robust, spindle-shaped, as long as preceding 3 combined (0.15); terminal labial palpomere spindle-shaped (0.07), 6 times as long as preceding one.

**Thorax:** Pronotum wider (0.46) than long (0.42), integument smooth, densely and coarsely punctate; each puncture bearing a brown seta; disc convex, anterior margin almost straight, anterior angles rounded, lateral margins slightly curved, posterior margin curved, posterior angles acute; scutellum spatulate, with small notch on posterior margin, integument shiny, densely punctate, each puncture bearing a yellow seta; elytra short, 2.5 times longer (0.95) than wide (0.33); posterior wings (Fig. 2H) with posterior medium vein (MP 1 + 2) long and distinct, posterior radial vein (RP) absent, radial cell (CR) open; wing cubital-anal area with anterior anal vein (AA) (divided into AA 1 + 2 and AA 3 + 4) and posterior anal



**Figure 3.** Geographical distribution of *Cleicosta* gen. nov., species.

vein (AP) distinct, cubital-anal vein (CuA) divided into MP 4, MP 3a and MP 3b mid-posterior veins; 1<sup>st</sup> tarsomere of all legs shorter than 2<sup>nd</sup>.

**Abdomen:** Integument shiny, punctuate, with silky appearance due to dense setosity; penultimate sternite with posterior margin sinuate, last sternite with posterior margin notched; pygidial posterior margin straight.

**Female and immatures:** Unknown.

**Distribution:** Monagas, Venezuela (Fig. 3).

**Etymology:** Specific epithet alludes to the type locality.

***Cleicosta equatoreana* sp. nov.**  
(Figs. 2I-L)

**Type material:** Holotype (♂ NMNH): "ECUADOR: Sucumbios/ Sacha Lodge, 270 m/ 00.5°S, 76.5°W/ 04-14 May 1994/ P. Hibbs, Malaise""Michael Ivie Collection".

**Diagnosis:** *Cleicosta equatoreana* sp. nov., is similar to *C. monaguense* sp. nov., however they differ in their inter-antennal distance. In *C. equatoriana* sp. nov., it is equal to antennal fossa width; in *C. monaguense* sp. nov., interantennal distance is greater than fossa width. Additionally, in *C. equatoreana* sp. nov., the terminal maxillary palpomere is 1.5 times longer than the preceding three combined, whereas in *C. monaguense* sp. nov., the terminal palpomere is equal in length as the preceding three combined.

**Description: Male:** Body length 2.4, maximum width 0.38. Body color light brown.

**Head:** Surface concave; wider (0.42) than long (0.32); at eye level, wider (0.42) than pronotum; integument smooth, coarsely punctuate, each puncture bearing an amber seta; interantennal distance (0.06) equal to antennal fossa width (0.07); eyes large, hemispherical, finely faceted, prominent, longer (0.18) than wide (0.08); interocular distance (0.24) 3 times greater than eye width; antennae short (0.81), barely reaching pronotal posterior border; 1<sup>st</sup> antennomere longer (0.1) than next 2 combined, 3<sup>rd</sup> cup-shaped, small (0.03), 4<sup>th</sup> 0.07 in length, 5<sup>th</sup> to 10<sup>th</sup> about equal in length (0.08), 11<sup>th</sup> 0.06 in length, 12<sup>th</sup> (terminal) bullet-shaped with apex acute (0.06); antennal rami lanceolate, twice as long as respective antennomere; labrum bilobed; terminal maxillary palpomere robust, spindle-shaped (0.12), 1.5 times longer than preceding 3 combined; terminal labial palpomere spindle-shaped (0.04), 4 times longer than preceding one.

**Thorax:** Pronotum wider (0.38) than long (0.31); integument smooth, coarsely punctuate, each puncture bearing an amber seta; disc convex, anterior margin almost straight, posterior margin convex with small notch; scutellum spatulate, posterior margin with small notch

on posterior margin, integument shiny, densely punctuate, each puncture bearing an amber seta; elytra short, 3 times longer (1.02) than wide (0.32); posterior wings (Fig. 2L) with posterior medium vein (MP 1 + 2) distinct, posterior radial vein (RP) absent, radial cell (CR) open; cubital-anal wing area with undivided anterior anal vein (AA) and posterior anal vein (AP) visible; 1<sup>st</sup> and 2<sup>nd</sup> tarsomeres of all legs about equal in length.

**Abdomen:** Integument shiny, punctuate, with silky appearance due to dense setosity; penultimate sternite with posterior margin emarginate.

**Female and immatures:** Unknown.

**Distribution:** Sucumbios, Ecuador (Fig. 3).

**Etymology:** Specific epithet alludes to the type locality.

**Key to species of *Cleicosta* gen. nov.**

1. Body length 2.4 mm; 4<sup>th</sup> (terminal) maxillary palpomere 1.5 times longer than preceding 3 combined; antennal rami lanceolate, twice as long as respective antennomere ..... *Cleicosta equatoreana* sp. nov.
- 1'. Body length greater than 3 mm; 4<sup>th</sup> (terminal) maxillary palpomere as long as preceding 3 combined; antennal rami lanceolate, 1.5 times longer than respective antennomere ..... 2
2. Body color light brown; interocular distance 3 times greater than eye width; 1<sup>st</sup> tarsomere of all legs shorter than respective 2<sup>nd</sup> tarsomere.. ..... *Cleicosta monaguense* sp. nov.
- 2'. Body color brown; interocular distance 4 times greater than eye width; 1<sup>st</sup> and 2<sup>nd</sup> tarsomeres of all legs about same length ..... *Cleicosta brevipilumata* comb. nov.

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