


# A Checklist of the Lycidae (Coleoptera) of Colombia with a key to the genera

## Lista de chequeo de los Lycidae (Coleoptera) de Colombia con una clave a los géneros

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### ABSTRACT

A checklist of the genera and species of Lycidae occurring in Colombia is presented. After studying nine Colombian entomological collections, in addition to the information from the literature, 152 species and 27 genera are recorded from the country, of which four genera are newly recorded from Colombia: *Brasilycus*, *Ceratopriomorphus*, *Lycoplateros*, and *Teroplas*. The genus *Calopteron* presented the widest distribution (29 departments), the only genus occurring in Arauca, Córdoba, La Guajira, and Vaupés. Most genera in Colombia occur from lowland habitats (~500 m) up to 2000 m, whereas *Idiopteron* Bourgeois, 1905, showed the widest altitudinal range, from about 30 m to 3900 m. An illustrated key to identify the Colombian genera is provided.

**Keywords:** Elateriformia, geographic distribution, Lycinae, new records, Neotropical region

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## RESUMEN

Se presenta una lista de chequeo de los géneros y especies de Lycidae conocidos para Colombia. Luego de estudiar nueve colecciones entomológicas colombianas, adicionalmente a la información disponible en la literatura, se registran para el país 152 especies y 27 géneros, de los cuales cuatro géneros se registran por primera vez para Colombia: *Brasilycus*, *Ceratopriomorphus*, *Lycoplateros*, and *Teroplas*. El género *Calopteron* es el que presenta la más amplia distribución (29 departamentos), siendo el único presente en Arauca, Córdoba y Vaupés. La mayor parte de los géneros ocurren desde hábitats de tierras bajas (~500 m) hasta 2000 m, mientras que *Idiopteron* tiene la distribución altitudinal más amplia, desde cerca de 30 m hasta 3900 m. Se presenta una clave ilustrada de identificación a los géneros colombianos.

**Palabras clave:** Distribución geográfica, Elateriformia, Lycinae, nuevos registros, región Neotropical

## INTRODUCTION

The net-winged beetles are soft-bodied Coleoptera generally exhibiting aposematic coloration to warn about their chemical defenses to potential predators, thus being important as models in mimicry rings relationships (e.g., Ruxton *et al.* 2004, Nascimento 2009). They belong to the family Lycidae, of the Elateriformia series, and form a monophyletic clade within Elateroidea, which includes hard-bodied beetles, such as Elateridae, Eucnemidae and Throscidae, as well as soft-bodied families, such as Cantharidae, Lampyridae and the recently described families Iberobaeniidae (sister-group of Lycidae) and Jurasaidae (Bocak and Bocakova 2008, Kundrata *et al.* 2014, Bocak *et al.* 2016, Rosa *et al.* 2020).

Lycids are terrestrial beetles, mainly found in forest or shrub habitats (Bocak and Bocakova 2010). Larvae are associated with decayed wood, litter, and substrate rich in organic material, and adults are probably short-lived and hypothesized to not feed, with some flower-visiting species feeding on nectar (Bocak and Bocakova 2008). Most of the species are diurnal, although males of some species belonging to the tribes Metriorrhynchini and Platerodini have nocturnal habits (Bocak and Bocakova 2010).

Many species of lycids are mimetic models for many families of Coleoptera such as Cerambycidae, Cleridae, Chrysomelidae, Meloidae, Buprestidae, Belidae, Lampyridae, and Cantharidae, in addition to some putative mimetic species from Hemiptera, Lepidoptera, Hymenoptera and Diptera (e.g., Marshall and Poulton 1902, Nascimento 2009). When threatened, they have the capacity to rupture cuticular membranes from the abdominal and

thoracic segments, elytra, antennae, and legs, and expel hemolymph that is composed of acetylenic acids and lcidic acid, among other substances, and has a repulsive odor for predators (Eisner *et al.* 2005, Nascimento 2009).

Lycidae are cosmopolitan, comprising approximately 4600 species worldwide, distributed in about 160 genera, with high diversity in tropical regions (Bocak and Bocakova 2010). In the Neotropical region, only recently the knowledge of lycid taxonomy and biology has been expanded and developed, (e.g., Bocakova 2001, 2003, 2005, Nascimento and Bocakova 2009, 2010a, 2010b, 2012a, 2012b, 2017a, 2017b, 2016, 2019a, 2019b, 2022, Barancikova *et al.* 2010, Bocakova *et al.* 2012, Bocakova and Nascimento 2013, Bocakova *et al.* 2015, Ferreira 2015, 2016, 2019, Ferreira and Ivie 2016, 2018, 2022, Ferreira *et al.* 2018, Pérez-Hernández *et al.* 2019, Ferreira and Silveira 2020, Nascimento *et al.* 2020). However, despite the recent progress in the taxonomy of Neotropical Lycidae we still know very little regarding ecology and distribution patterns (e.g., Masek *et al.*, 2018), which are important sources of information for several areas such as evolutionary and biogeographical analyses, as well as conservation biology.

The catalogue of Kleine (1933) provides exceptional source of information regarding Neotropical Lycidae account and country distribution, and posterior checklists cited below are based mainly on this work. According to Costa (2000), there are 776 lycid species in 39 genera from the Neotropical region. In Brazil, there are 183 species and 32 genera (Nascimento 2013, Nascimento and Ferreira 2022). In Peru, Bocakova *et al.* (2015) recorded 23 genera and 126 species of Lycidae, and Pérez-Hernández *et al.* (2019) found 19 genera

and 94 species in the Mexican Neotropical region. Additionally, Constantin (2010) registered 21 genera from French Guiana. The previous data shows the increasing and recent interest on the Neotropical lycid fauna; however, except for Brazil, Peru, and Mexico, there is no recent lycid species checklist from other Neotropical countries.

In Colombia, there are no comprehensive studies on the lycid fauna apart from the original descriptions of species and genera and a few geographical distributional notes. Guarín-Candamil and Quiroz-Gamboa (2016) recently summarized some taxa collected in Colombia, mostly identified by the first author of the present article, although some species were previously identified by non-specialists, and thus, their occurrence for the country cannot be confirmed. Specimens belonging to different lycid species often show similar external appearance, leading to misidentifications. Therefore, dissection of male and female genitalia is necessary to correctly identify the species or to associate individuals belonging to the same morphospecies. The only available checklist of the species of Colombian Lycidae is that of Nascimento (2021).

Here we present a checklist of lycid taxa (genera and species) known to occur in Colombia, providing the geographic distribution of the genera based on the study of specimens deposited in Colombian entomological collections and on taxonomic literature. Additionally, we provide an identification key to separate the genera present in Colombia. This information will be the starting point for future studies of the Colombian and Neotropical net-winged beetle fauna.

## MATERIALS AND METHODS

To build the species list of Colombian Lycidae, information was compiled from the taxonomic catalogs of Kleine (1933) and Blackwelder (1945), and complemented with subsequent taxonomic works involving Colombian Lycidae (Nascimento and Bocakova 2009, Kazantsev 2011, Bocakova *et al.* 2012, Ferreira 2016, Ferreira and Ivie 2016), considering strictly the taxa formally described from the country, published by Nascimento (2021), using nomenclature and classification according to Bouchard *et al.* (2011), Motyka *et al.* (2017), Masek *et al.* (2018), Kusy *et al.* (2020), and Ferreira and Motyka (2023).

In addition to literature data, we examined 1420 adult lycid specimens from nine entomological collections in Co-

lombia. The collections are listed as follows: CTNI, Colección Taxonómica Nacional de Insectos Luis María Murillo, Agrosavia, Mosquera; IAVH, Instituto Alexander Von Humboldt, Villa de Leyva; ICN, Instituto de Ciencias Naturales, Universidad Nacional de Colombia, Bogotá; ME-FLG, Museo entomológico Francisco Luis Gallego, Universidad Nacional de Colombia, Medellín; MPUJ\_ENT, Museo Javeriano de Historia Natural, Pontificia Universidad Javeriana, Bogotá; UNAB, Facultad de Agronomía, Universidad Nacional de Colombia, Bogotá; CEUA, Universidad de Antioquia, Medellín; CBUCES, Universidad CES, Medellín; and MUSENUV, Museo de Entomología de la Universidad del Valle, Cali.

We dissected the specimens' genitalia to confirm the generic identifications. Each dissected individual had the abdomen detached from the body and placed in 10 % KOH for 24h to extract the genitalia. Later, they were conserved in a microtube with glycerin. The generic level identification was based on the classification proposed by Bocak and Bocakova (2008) and using taxonomic keys and revisions that also contain the general morphological characteristics presented in the illustrated key for generic identification of Lycidae from Colombia (Green 1949, 1952, 1953, Bocak and Bocakova, 1990, Bocakova 2001, 2003, Zaragoza-Caballero 2003, Kazantsev 2004, Ramsdale 2007, Nascimento and Bocakova 2009, 2010, Barancikova *et al.* 2010, Bocakova *et al.* 2012, Ferreira 2016, Ferreira and Ivie 2016, Motyka *et al.* 2017, Nascimento and Bocakova 2017b, 2019a, Kusy *et al.* 2020).

The dorsal habitus images that accompany the key were taken with a D5200 with a macro lens, and photos of genitalia were taken with Zeiss Axiocam ERc5s attached to Zeiss SteREO Discovery V8 stereoscopic microscope.

Distribution maps for each genus were generated based on the locality data of the examined specimens, and data from original descriptions besides taxonomic revisions, which were then georeferenced with the aid of the Geographic Names Server (GNS) (<https://geonames.nga.mil/geonames/GeographicNamesSearch/>). These geographic coordinates (Supplementary File 1) were then used to generate distribution maps in SimpleMappr (Shorthouse 2010). Maps were edited in Adobe Photoshop CS4. Altitude data from specimen labels, or from GNS, were used to estimate the altitudinal range for each genus.

## RESULTS

A total 152 species and four subspecies of Lycidae are recorded for Colombia (Table 1). These taxa belong to 27 genera, four of which are herein recorded for the first time from the country based on the identification of specimens deposited in national collections (marked with \*\*): *Brasilycus* Nascimento and Bocakova, 2010; *Caenia* Newmann, 1838; *Calocladon* Gorham, 1881\*\*; *Calopteron* Laporte, 1838; *Cartagonum* Pic, 1922; *Cavoplateros* Pic, 1913; *Celiasis* Castelnau, 1840; *Cephalolycus* Pic, 1926; *Ceratopriomorphus* Pic, 1922; *Cyrtopteron* Bourgeois, 1905; *Eurrhacus* Waterhouse, 1879\*\*; *Emplectus* Erichson, 1847; *Eros* Newmann, 1838; *Falsocaenia* Pic, 1922; *Haplobothris* Bourgeois, 1879; *Idiopteron* Bourgeois, 1905; *Leptoceletes* Green, 1952; *Lycomorphon* Pic, 1922; *Lycoplateros* Pic, 1922; *Macrolygisterus* Pic, 1929; *Mesopteron* Bourgeois, 1905; *Metapteron* Bourgeois, 1905; *Neolinoptes* Nascimento and Bocakova, 2017\*\*; *Neolycus* Bourgeois, 1883\*\*; *Plateros* Bourgeois, 1879; *Rhyncheros* LeConte, 1881; and *Teroplas* Gorham, 1884 (Table 1).

These taxa are organized in seven tribes; with one species (*Cephalolycus major* Pic, 1926) considered *incertae sedis* within Lycinae, the only subfamily recorded from the country (Table 1). Most Colombian species belong to Calopterini (93), followed by Platerodini (32), Calochromini (eleven), Eurrhacini (ten), Lycini (four), and Erotini (one species) (Table 1). Of the described species, 125 (82.2 %) are endemic, and except for *Leptoceletes*, the genera with one to three species are entirely endemic, as well as for *Emplectus* (nine species). In *Mesopteron*, *Caenia* and *Idiopteron*, just one species in each one was not endemic. Theodor Kirsch described most of the species (53), followed by Maurice Pic (45), and Jules Bourgeois (39). Other authors individually described, at most, three species each (Table 1).

Motyka et al. (2017) transferred all Neotropical *Lygisterus* Mulsant, 1838 *sensu* Kleine (1933) to *Macrolygisterus*, however, we reaffirm the name *Macrolygisterus umhangi* (Bourgeois, 1879), therein misspelled as “*umanghi*” (incorrect subsequent spelling, ICZN 1999, Article 33.3.1). Kusy et al. (2020) transferred all American species of *Lycus* Fabricius, 1787 to *Neolycus*, except for the species of *Lycus* (*Thoracocalon*) Bourgeois, 1883 and all American *Lycostomus* Motschulsky, 1861, which were transferred to *Rhyncheros*.

**Table 1.** List of Lycidae genera and species present in Colombia.

<b>Family LYCIDAE Laporte, 1838</b>
<b>Subfamily LYCINAE Laporte, 1838</b>
<b>Tribe Calochromini Lacordaire, 1857</b>
<i>Macrolygisterus</i> Pic, 1929
<i>buqueti</i> (Kirsch, 1865) *
<i>eximia</i> (Bourgeois, 1877)
<i>femoralis</i> (Pic, 1924) *
<i>guerini</i> (Kirsch, 1865) *
<i>humeralis</i> (Buquet, 1842) *
<i>imperialis</i> (Buquet, 1842) *
<i>lacordarei</i> (Kirsch, 1865)
<i>miles</i> (Kirsch, 1865) *
<i>succintus</i> (Latreille, 1811)
<i>trifasciatus</i> (Buquet, 1842) *
<i>umhangi</i> (Bourgeois, 1879) *
<b>Tribe Calopterini Green, 1949</b>
<b>Subtribe Acroleptina Bocakova, 2005</b>
<i>Brasilycus</i> Nascimento and Bocakova, 2010**
<i>Ceratopriomorphus</i> Pic, 1922**
<i>Cyrtopteron</i> Bourgeois, 1905
<i>bellum</i> (Kirsch, 1865) *
<i>muhlenbecki</i> (Bourgeois, 1879)
<i>pusillum</i> Kirsch, 1865 *
<i>quadrimaculatum</i> Kirsch, 1884 *
<i>Falsocaenia</i> Pic, 1922
<i>aurantiacocostata</i> (Pic, 1932) *
<i>melanopteron</i> Bocakova, Baciakova and Nascimento, 2012 *
<i>Lycomorphon</i> Pic, 1922
<i>bimaculatum</i> Nascimento and Bocakova, 2009 *
<i>fulvohumeralis</i> Nascimento and Bocakova, 2009 *
<i>nitidum</i> Pic (1926) *
<i>Mesopteron</i> Bourgeois, 1905
<i>amoenum</i> (Kirsch, 1865)
<i>antonianum</i> Pic, 1928 *
<i>aurantiacoapicale</i> Pic, 1928 *
<i>aurantiacoapicale brevecostatum</i> Pic, 1928 *
<i>bicuspe</i> (Kirsch, 1865) *
<i>cincticolle</i> Pic, 1932 *
<i>delicatum</i> (Kirsch, 1865) *
<i>fissum</i> (Kirsch, 1884) *

(Continues)

Lycidae are present in 29 Colombian departments, lacking records just in Cesar, Guainía and San Andrés, and Providencia. *Calopteron* is the genus with the widest distribution, recorded in the 29 departments, followed by *Plateros*, found in 19 departments, including a record from Caldas by Bourgeois (1899). Cundinamarca was the department with the highest number of genera (19), followed by Antioquia (18 genera), likely a result of more intense collecting activities from Bogotá (Cundinamarca) and Medellín (Antioquia). Arauca, Córdoba, La Guajira, and Vaupés had only recorded the genus *Calopteron* (Figs. 1-2).

Regarding the altitudinal range, *Idiopteron*, *Macrolygistopterus*, and *Mesopteron* are the genera with the widest distribution, from almost sea level (about 30 m) to about 3300 m (*Macrolygistopterus* and *Mesopteron*) and 3900 m (*Idiopteron*). Most genera in Colombia occur from lowland habitats (~500 m) up to 2000 m. Of the 27 genera analyzed, fifteen also occur above 2300 m. Four genera have altitudinal restricted distributions, two in high-altitude areas of the Andes, and two in lowland areas. *Ceratopriomorphus* is found between 2080–3100 m, and *Cephalolycus* occurs just in high Andean habitats (Páramo), between 3350–3660 m. On the other hand, *Neolinoptes* has been recorded just in lowland habitats, between 30–900 m, and *Brasilycus* has been found at 250 m (Fig. 3).

To facilitate the use of key to the genera, basic aspects of Lycidae morphology are herein provided. Adult Lycidae have the elytra and the abdominal cuticle lightly sclerotized. The body is elongate (2–28 mm length), dorsoventrally flattened and parallel-sided (Bocak and Bocakova 2010). The head is small, narrower than the prothorax, and partially to almost totally covered by the pronotum. The mouthparts are generally well-developed, in some taxa the head forms a rostrum that can be short or elongate (Figs. 4-5) (e.g., *Macrolygistopterus*, *Rhyncheros*), whereas other taxa present reduced mouthparts (e.g., *Ceratopriomorphus*). The eyes are laterally prominent, generally medium-sized, but in several taxa the males present large eyes (e.g., *Calocladon*, Fig. 10). The antennal insertions are widely separated. The antennae can be filiform, serrate, pectinate, or flabellate, and are usually eleven-segmented.

The pronotum can have a wide range of shapes and cuticular impressions, bearing important diagnostic characters for several genera (Figs. 7–15). The pronotum can be subrectangular to subquadrate, but is mostly subpentagonal, anterior-

*gracile* (Kirsch, 1865) \*

*gracilicorne* Pic, 1932 \*

*grande* Pic, 1922 \*

*longecostatum* Pic, 1928 \*

*longipenne* Pic, 1922 \*

*longipenne conjunctum* Pic, 1930 \*

*mesomelas* (Kirsch, 1865) \*

*nigrovittatum* Pic, 1932 \*

*nubilosum* (Kirsch, 1865) \*

*rete* (Kirsch, 1865) \*

*suave* (Kirsch, 1865) \*

*superbum* Pic, 1930 \*

#### Subtribe Calopterina Green, 1949

*Caenia* Newmann, 1838

*excisa* (Kirsch, 1865) \*

*loculata* Bourgeois, 1878 \*

*scutellare* (Kirsch, 1865) \*

*sinuata* (Kirsch, 1865)

*Calopteron* Laporte, 1838

*acuminatum* Bourgeois, 1878 \*

*acupalpe* Bourgeois, 1879

*agnatalense* Pic, 1938 \*

*basale* Kirsch, 1865

*blandulum* Bourgeois, 1879 \*

*breveaurantiacum* Pic, 1934 \*

*cancathalense* Pic, 1923 \*

*costatum* Kirsch, 1865

*cyaneum* Erichson, 1847

*dichroum* Kirsch, 1865

*dilatatum* Bourgeois, 1877 \*

*dives* Bourgeois, 1878 \*

*elongatum* Bourgeois, 1878 \*

*excellens* Kirsch, 1865 \*

*exile* Bourgeois, 1879 \*

*fallax* Kirsch, 1865

*fenestratum* Bourgeois, 1878 \*

*fenestratum infenestratum* Pic, 1938 \*

*flavicauda* Kirsch, 1865 \*

*genuinum* Bourgeois, 1889 \*

*gorhami* Bourgeois, 1880 \*

*insidiosum* Bourgeois, 1879 \*

*lebasi* Bourgeois, 1878

(Continues)

ly rounded, almost straight or bisinuate, and with the posterior angles acutely projected. The pronotal disc usually has a median longitudinal carina (e.g., *Calopteron*, *Lycoplateros*, Fig. 8), sometimes with median or posterior, thin to large, areola (e.g., *Caenia*, *Eurrhacus*, *Neolinoptes*, Fig. 11), posteriorly opened (e.g., *Lycomorphon*, *Cyrtopteron*, Fig. 12), or lacking carina (e.g., *Plateros*, *Teroplas*, Fig. 9).

The elytra usually have a reticulate pattern, which gives the group the common name of net-winged beetles and are important diagnostic characters for Lycidae, in general. The reticulation is formed by the longitudinal costae, and the transversal veins at intercostal intervals forming small to large oval, subquadrate, or subrectangular cells. The elytra are parallel-sided, sometimes enlarged medially or posteriorly, usually exhibiting an aposematic coloration, combining black, yellow, or orange to form several coloration patterns, with transversal or longitudinal stripes or spots that can be restricted to the humeral region (e.g., *Lycomorphon fulvohumeralis* Nascimento and Bocakova, 2009). Most adults are winged in both sexes, but in some genera the females are neotenic or paedomorphic, very similar to immature stages, or are unknown, thus presumed to be paedomorphic (see Ferreira and Ivie, 2022).

Male genitalia are essential for identification of Lycidae genera and species, presenting a phallobase, sometimes asymmetric (Eurrhacini), and a median lobe with several forms, short to elongate, straight to curved. Parameres are short to elongate, sometimes very reduced or lacking in some genera (e.g., *Eurrhacus*, *Plateros*, Figs. 43, 47). Female genitalia are quite similar among different taxa, having paired valvifers, coxites, and styli.

The following key does not include the genera *Eros* and *Celiasis*. *Eros* is found just in Palearctic, Nearctic and Oriental regions (Bocak and Bocakova, 2008), whereas the only *Eros* species from Colombia belong to *Plateros* (V.S. Ferreira, personal communication). *Celiasis* is known only from the original description and was never seen again since then (Bourgeois, 1906), especially after Laporte's collection destruction (Kusy et al. 2020).

**KEY TO THE GENERA OF COLOMBIAN LYCIDAE**

1. Pronotum without median longitudinal carina, head sometimes with rostrum (Figs. 4, 5, 7, 9) ..... 2

- lepidum* Bourgeois, 1879 \*
- melanoxanthum* Kirsch, 1870
- nigricauda* Kirsch, 1870 \*
- palpale* Kirsch, 1865
- pleioxanthum* Kirsch, 1865 \*
- posticum* Kirsch, 1870
- poweri* Bourgeois, 1878 \*
- pretiosum* Bourgeois, 1885 \*
- pyrrhomelas* Bourgeois, 1879 \*
- rubrotestaceum* Bourgeois, 1879
- segmentatum* Bourgeois, 1878 \*
- seileri* Pic, 1935 \*
- semivittatum* Bourgeois, 1879 \*
- steinheili* Bourgeois, 1878 \*
- subcruciatum* Bourgeois, 1878
- terminatum* (Latreille, 1833)
- terminatum nigricorne* (Latreille, 1833)
- thoracicum* Kirsch, 1870 \*
- vagepictum* Bourgeois, 1879 \*
- variegatum* Kirsch, 1865
- Cartagonum* Pic, 1922
- bernardi* Pic, 1922 \*
- Idiopteron* Bourgeois, 1905
- acroxanthum* (Kirsch, 1865) \*
- apicipenne* Pic, 1931 \*
- atrum* Pic, 1929 \*
- biplagiatum* (Kirsch, 1884)
- bisiganatum* (Kirsch, 1884) \*
- dictyon* (Kirsch, 1865) \*
- flavocinctum* (Bourgeois, 1878) \*
- flavolineatum* (Kirsch, 1884) \*
- latefasciatum* Pic, 1922 \*
- mariae* Pic, 1929 \*
- morio* (Kirsch, 1884) \*
- nervosum* (Kirsch, 1884) \*
- pleiomelas* (Kirsch, 1865) \*
- reductum* Pic, 1925 \*
- xanthomelas* (Kirsch, 1865) \*
- Leptoceletes* Green, 1952
- pennatum* (Bourgeois, 1879)
- Metapteron* Bourgeois, 1905
- bogotense* Pic, 1922 \*

(Continues)

-Pronotum with median longitudinal carina, head without rostrum (Figs. 8, 10–15) ... **7**

**2.** Head generally rostrate, pronotal disc with elevations forming deep median longitudinal groove (Figs. 4–6) ... **3**

- Head not rostrate; pronotal disc almost plain, sometimes forming shallow median longitudinal groove (Fig. 9) ... **5**

**3.** Pronotum with median linear longitudinal impression, with oblique folding on each side, anterior thoracic spiracles short, elytra mostly parallel-sided with reticulation strongly developed distally to vestigial or absent basally (Fig. 16) ... **Macrolygisterus**

- Pronotum not as above, Anterior thoracic spiracles prominent (Fig. 5), elytra somewhat widened medially or posteriorly with reticulate costae reduced, irregular ... **4**

**4.** Elytra apically strongly widened in males (Fig. 17) and slightly so in females; male genitalia with a pair of thorns in phallus midlength ... **Neolycus**

- Elytra quite parallel to slightly widened in both males and females (Fig. 18); male genitalia without a pair of thorns in phallus midlength ... **Rhyncheros**

**5.** Hind femora with long projections, heading to inner notch of tibiae (Fig. 41) ... **Cavoplateros**

- Hind femora without long projections ... **6**

**6.** Male genitalia with parameres almost as long as phallus (Figs. 42–43) ... **Teroplas**

- Male genitalia lacking parameres (Fig. 44) ... **Plateros**

**7.** Elytra with four primary costae and generally five secondary costae; if lacking secondary costae, the pronotum presents median lenticular areola ... **8**

- Elytra with four or three primary costae, sometimes rudiments of secondary costae present basally; if presenting secondary costae, the pronotum lacks median longitudinal carina ... **13**

**8.** Elytra with four primary costae, lacking secondary costae; pronotum with median lenticular areola (Fig. 10); antennae filiform; male genitalia with short parameres (Fig. 44) ... **Haplobothris**

*melanurum* (Kirsch, 1870)

*oculare* (Kirsch, 1870) \*

*socium* (Kirsch, 1865)

**Tribe Erotini LeConte, 1881**

*Eros* Newmann, 1838

*antennalis* Kirsch, 1870 \*

**Tribe Eurrhacini Bocakova, 2005**

*Calocladon* Gorham, 1881 \*\*

*Emplectus* Erichson, 1847

*alternatus* Pic, 1931 \*

*atricollis* Bourgeois, 1882 \*

*erichsoni* Bourgeois, 1882 \*

*gratus* (Kirsch, 1865) \*

*illitus* (Kirsch, 1865) \*

*laetus* (Kirsch, 1865) \*

*lateniger* Pic, 1927 \*

*phoenicuroides* (Kirsch, 1884) \*

*xanthurus* (Kirsch, 1865) \*

*Eurrhacus* Waterhouse, 1879\*\*

*Haplobothris* Bourgeois, 1879

*apicalis* Pic, 1927 \*

*Neolinoptes* Nascimento and Bocakova, 2017 \*\*

*Lycoplateros* Pic, 1922 \*\*

**Tribe Lycini Laporte, 1838**

*Neolycus* Bourgeois, 1883 \*\*

*Rhyncheros* LeConte, 1881

*adumbratus* (Bourgeois, 1877) \*

*thoracicus* (Kirsch, 1865) \*

*umbraticeps* (Bourgeois, 1885) \*

*Celiasis* Castelnau, 1840

*mirabilis* Castelnau, 1840 \*

**Tribe Platerodini Kleine, 1929**

*Cavoplateros* Pic, 1913

*plicaticollis* Pic, 1926 \*

*Plateros* Bourgeois, 1879

*alternatus* Bourgeois, 1899 \*

*antennalis* Bourgeois, 1882 \*

*apicicornis* Pic, 1923 \*

*aurifex* Bourgeois, 1888

*bogotensis* (Kirsch, 1865)

*brevescutellaris* Pic, 1923 \*

*brunneolineatus* (Pic, 1934)

(Continues)

- Elytra with four primary costae and five secondary costae; pronotum with median longitudinal carina, sometimes with variable areola; antennae variable; male genitalia variable ... **9**

**9.** Pronotum with simple median longitudinal carina and basal margin with median projection covering the scutellum (Fig. 8); male antennae pectinate; male genitalia with short parameres, internal sac with a set of complex sclerites (Fig. 45) ... ***Lycoplateros***

- Pronotum with median longitudinal carina forming variable areola; male antennae variable ... **10**

**10.** Male antennae serrate; pronotum with extremely slender areola at basal half; male genitalia with apically rounded parameres in lateral view (Fig. 46) ... ***Neolinoptes***

- Male antennae pectinate or flabellate ... **11**

**11.** Terminal maxillary palpomere elongate, longer than palpomere two; pronotum with median longitudinal carina forming longitudinal areola posteriorly; male genitalia with parameres absent or reduced, integrated to phallus base (Fig. 47) ... ***Eurrhacus***

- Terminal maxillary palpomere short; male genitalia with parameres not integrated to phallus base ... **12**

**12.** Pronotum longer than wider medially, showing the prominent eyes in dorsal view (Fig. 7); male genitalia with phallus curved ventroapically (Fig. 48) ... ***Calocladon***

- Pronotum wider than long medially; phallus almost straight, parameres entirely integrated to phallus (Fig. 49) ... ***Emplectus***

**13.** Mouthparts well developed; pronotum with strong median longitudinal carina ... **14**

- Mouthparts reduced; pronotum presenting weak median longitudinal carina, often ribbed or absent in the apical region ... **24**

**14.** Pronotum with simple median longitudinal carina, lacking areola and median projection covering the scutellum ... **15**

- Pronotum with bifurcate median longitudinal carina, forming areola or posterior bifurcation (Figs. 12, 14) ... **20**

*carinatocollis* (Pic, 1928) \*

*chrysomelas* Bourgeois, 1882 \*

*citrinicollis* Bourgeois, 1882 \*

*claveri* (Pic, 1934) \*

*columbianus* Pic, 1923 \*

*dalmasi* (Bourgeois, 1903) \*

*dilatatus* (Pic, 1926) \*

*donckieri* (Pic, 1934)

*hickeri* (Pic, 1931) \*

*imparallelus* (Pic, 1928) \*

*kaszabi* Kleine, 1943 \*

*latinotatus* (Pic, 1926) \*

*longehumeralis* Pic, 1923 \*

*parabolus* Kazantsev, 2011 \*

*particularicornis* (Pic, 1928) \*

*phoenicurus* (Kirsch, 1865) \*

*quadrithorax* (Pic, 1928) \*

*reductus* Pic, 1923 \*

*satanas* (Pic, 1928) \*

*scutellaris* Bourgeois, 1889

*semirufus* (Pic, 1930) \*

*separatus* Kleine, 1942 \*

*thoracicus* Gorham, 1880

*waterhousei* Kirsch, 1884 \*

*Teroplas* Gorham, 1884 \*\*

**incertae sedis**

*Cephalolycus* Pic, 1926 \*

*major* Pic, 1926 \*

\*: endemic taxa; \*\*: new record from Colombia, without identified species.

**15.** Male antennae flabellate/pectinate ..... **16**

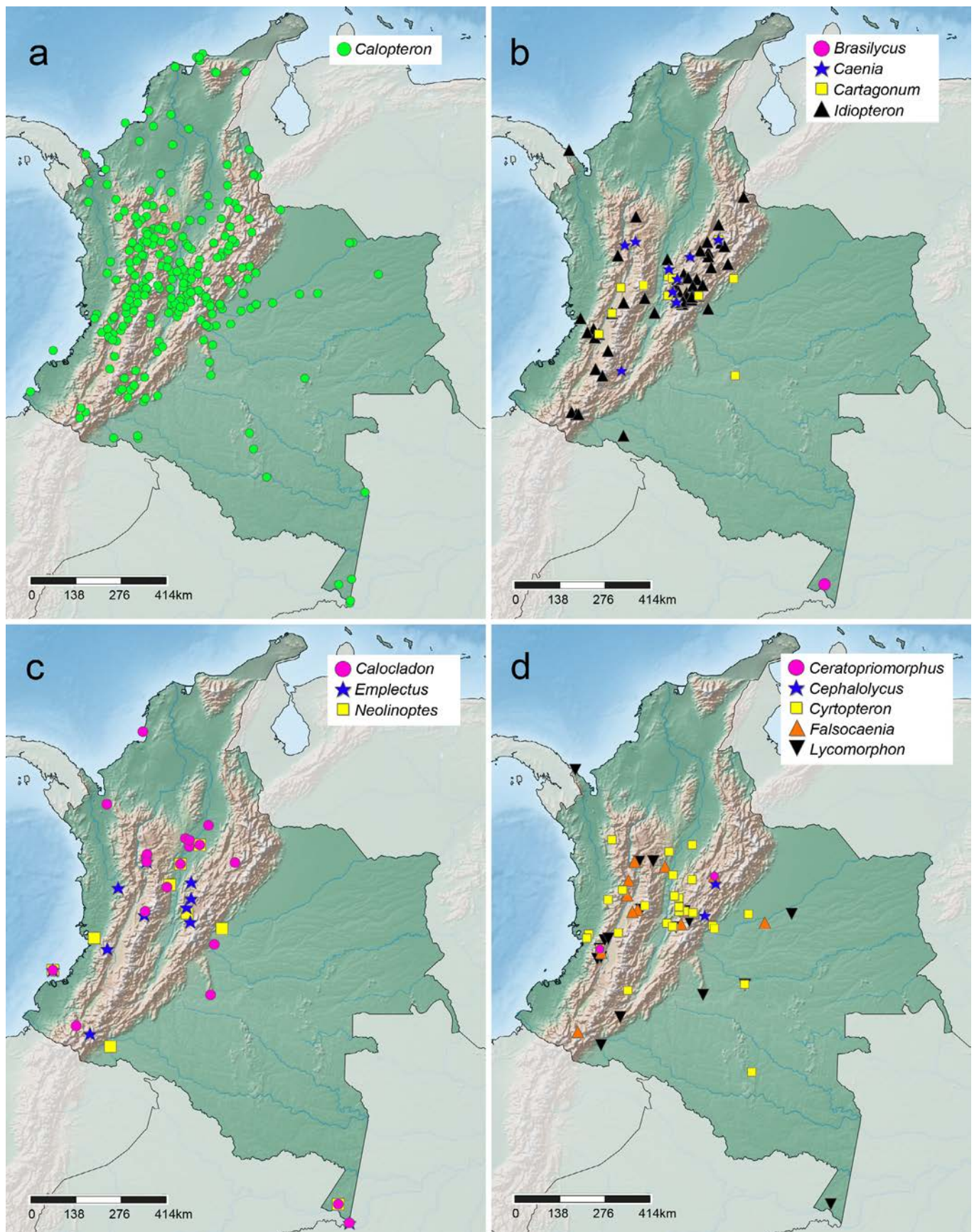
- Male and female antennae serrate ..... **18**

**16.** Posterior margin of mesoventrite bilobate; each elytron with four primary longitudinal costae and four to five secondary costae ... ***Caenia***

- Posterior margin of mesoventrite convex; elytra with secondary costae absent ... **17**

**17.** Each elytron with four longitudinal costae, costae one and three sometimes reaching elytral midlength; phallus with apical emargination (Fig. 50) ... ***Leptocletes***





**Figure 1.** Geographical distribution map of Lycidae genera from Colombia. a. *Calopteron*; b. *Brasilycus*, *Caenia*, *Cartagonum*, and *Idiapteron*; c. *Calocladon*, *Emplectus*, and *Neolinoptes*; d. *Ceratopriomorphus*, *Cephalolycus*, *Cyrtopteron*, *Falsocaenia*, and *Lycomorphon*.

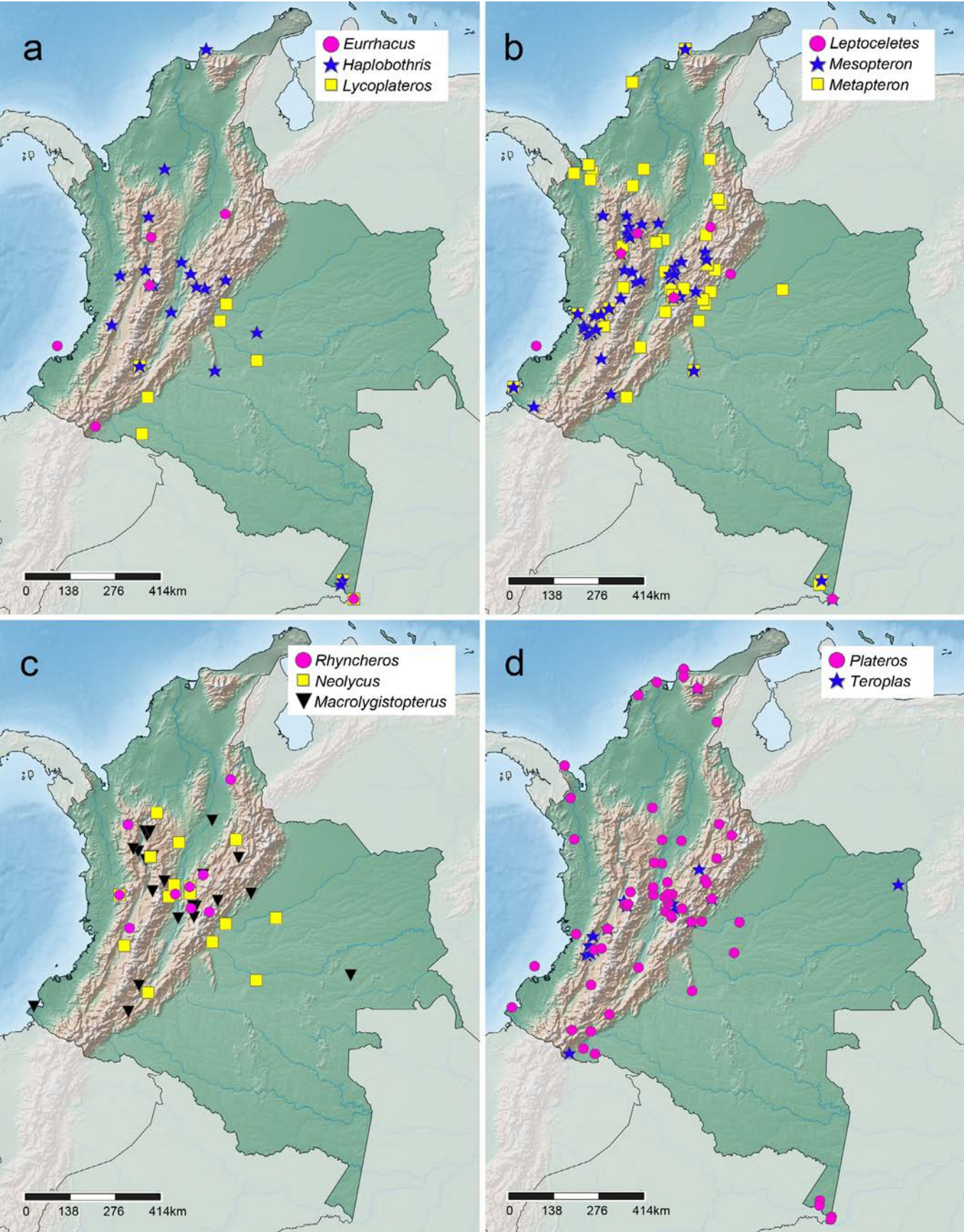


Figure 2. Geographical distribution map of Lycidae genera from Colombia. a. *Eurrhacus*, *Haplobothris*, and *Lycoplateros*; b. *Leptoceletes*, *Mesopteron*, and *Metapteron*; c. *Rhyncheros*, *Neolycus*, and *Macrolygistoferus*; d. *Plateros* and *Teroplas*.

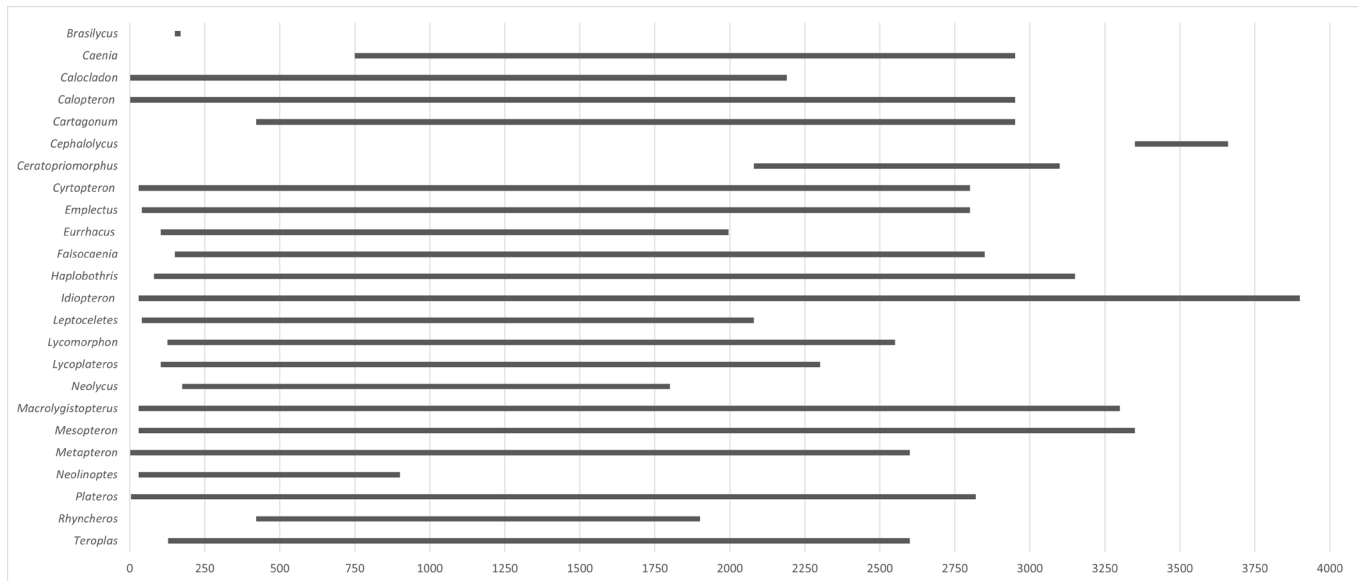


Figure 3. Altitudinal distribution of Lycidae genera from Colombia.

- Each elytron with three longitudinal costae, costa three vestigial, present basally; male genitalia with phallus apically rounded, phallobase almost as long as parameres (Fig. 51) ... **Idiopteron**

**18.** Pronotum almost square; each elytron with three or four costae, costa three shortened, secondary costae absent, with irregular reticulated cells (Fig. 32) ... **Cartagonum**

- Pronotum trapezoidal, with lateral margins divergent posteriorly, each elytron with four primary costae, square to rectangular reticulated cells ... **19**

**19.** Terminal maxillary palpomere transverse, apically widened; apically widened elytra, mostly with rectangular intercostal cells; male genitalia with parameres longer than half the phallus (Fig. 52) ... **Calopteron**

- Terminal maxillary palpomere elongate; elytra almost parallel-sided, mostly with square intercostal cells; male genitalia with short parameres (Fig. 53) ... **Mesopteron**

**20.** Pronotum with median longitudinal carina apically (Fig. 12); elytra sometimes with three longitudinal costae and irregular intercostal cells ... **21**

-Pronotum with areola slightly constricted at basal third (Fig. 14); elytra parallel-sided, with four primary costae, mostly with square intercostal cells (Fig. 34) ... **Metapteron**

**21.** Elytra with four primary longitudinal costae; male genitalia with slender aedeagus (Fig. 54) ... **Cyrtopteron**

- Elytra with three primary longitudinal costae, costa three if present then discontinuous ... **22**

**22.** Elytra with costa one not reaching elytral apex (Fig. 31); male genitalia with phallus straight to slightly widened medially, parameres mostly shorter than phallus half length (Fig. 55) ... **Lycomorphan**

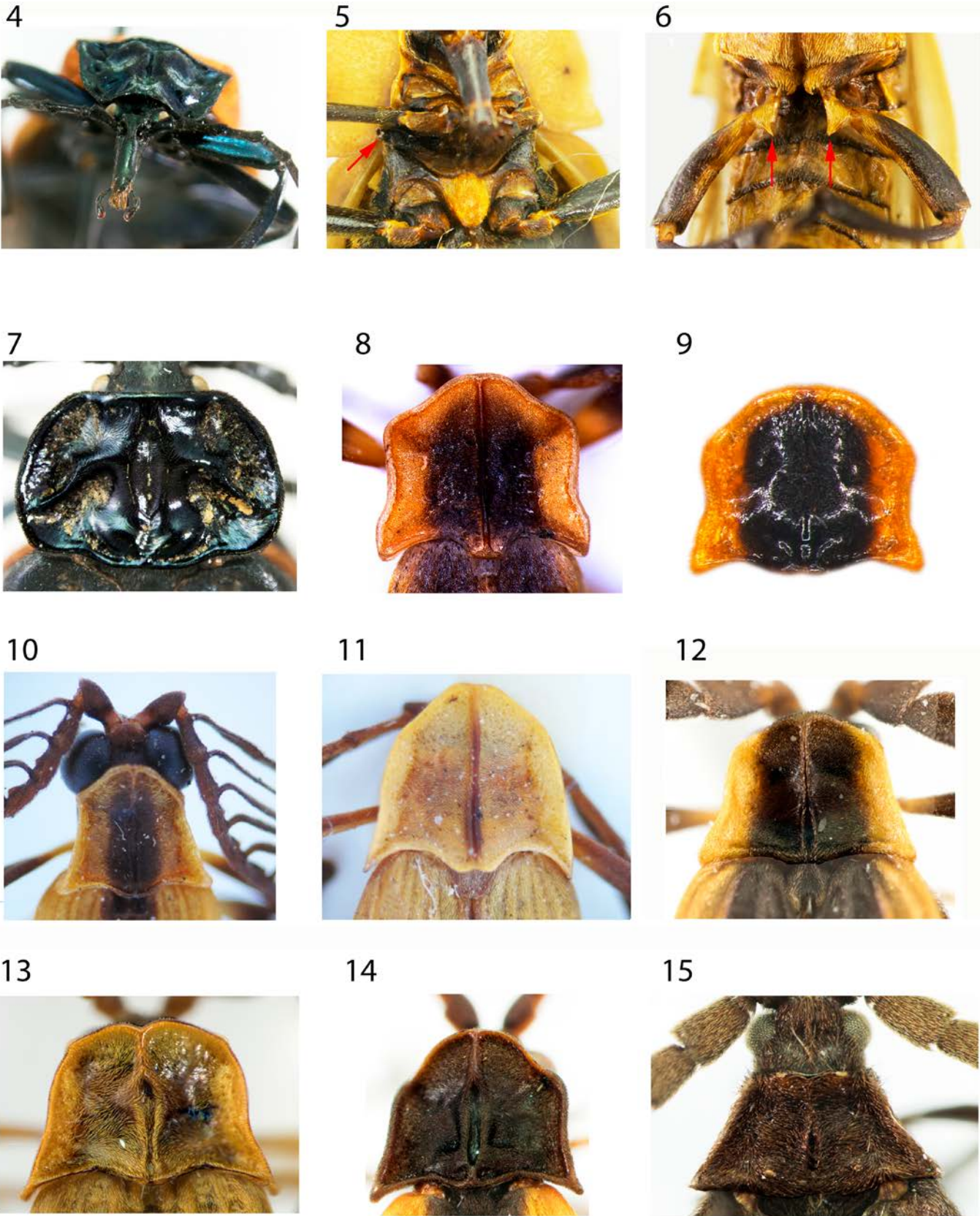
- Elytra with costa one reaching elytral apex; male genitalia with phallus medially widened or with distal portion oval or circularly enlarged (Fig. 53), parameres longer than phallus half length (Figs. 56, 57) ... **23**

**23.** Elytra with large rectangular to square cells; male genitalia with phallus presenting distal portion oval or circularly enlarged (Fig. 56) ... **Falsocaenia**

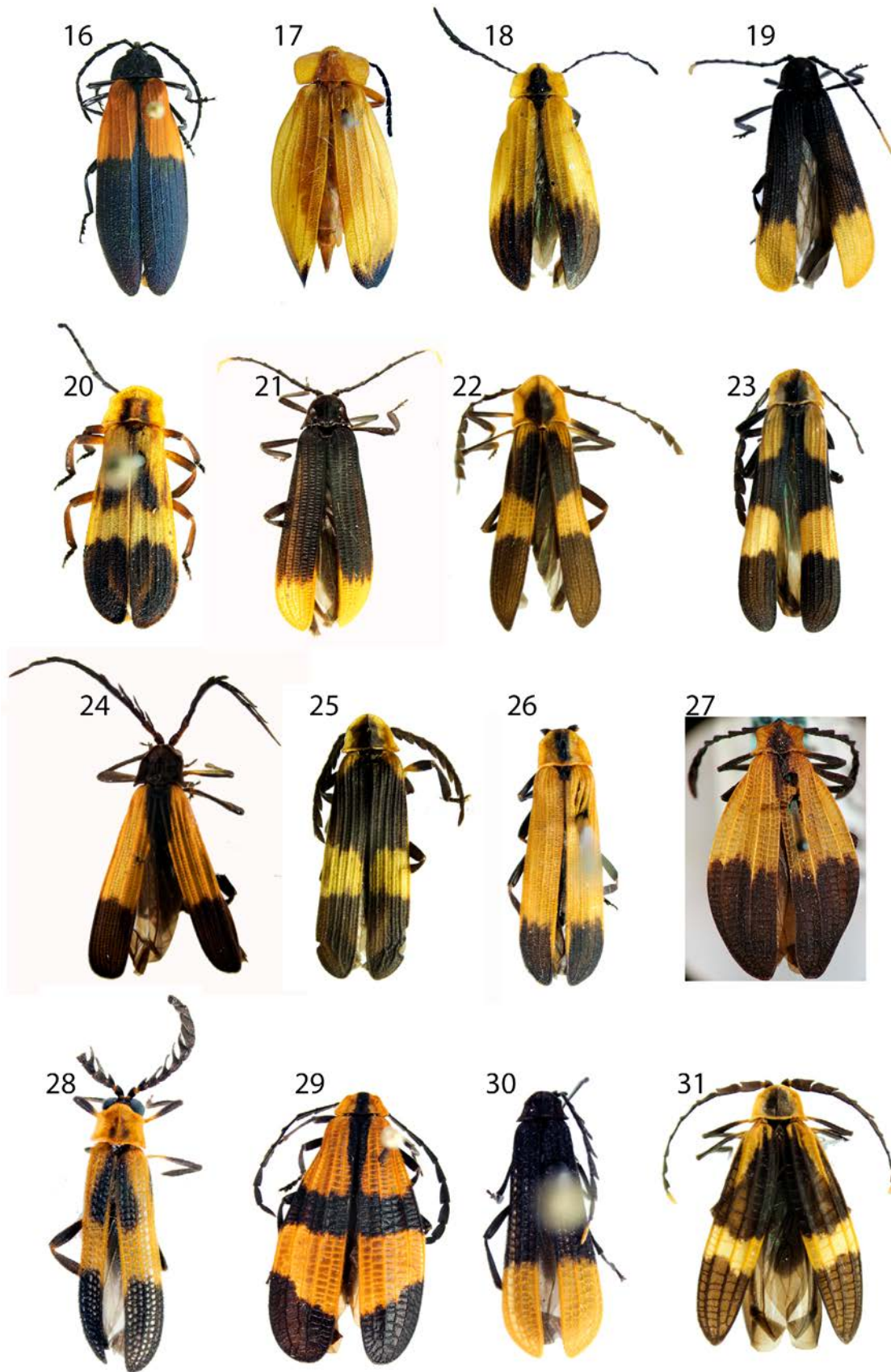
- Elytra with small and irregular intercostal cells; male genitalia with phallus medially widened (Fig. 57) ... **Brasilycus**

**24.** Maxillary palpi four-segmented; antennomere three elongate, as long as four; pronotum with slight median longitudinal carina, channeled medially; elytra parallel with four primary costae (Fig. 38) ... **Ceratopriomorphus**

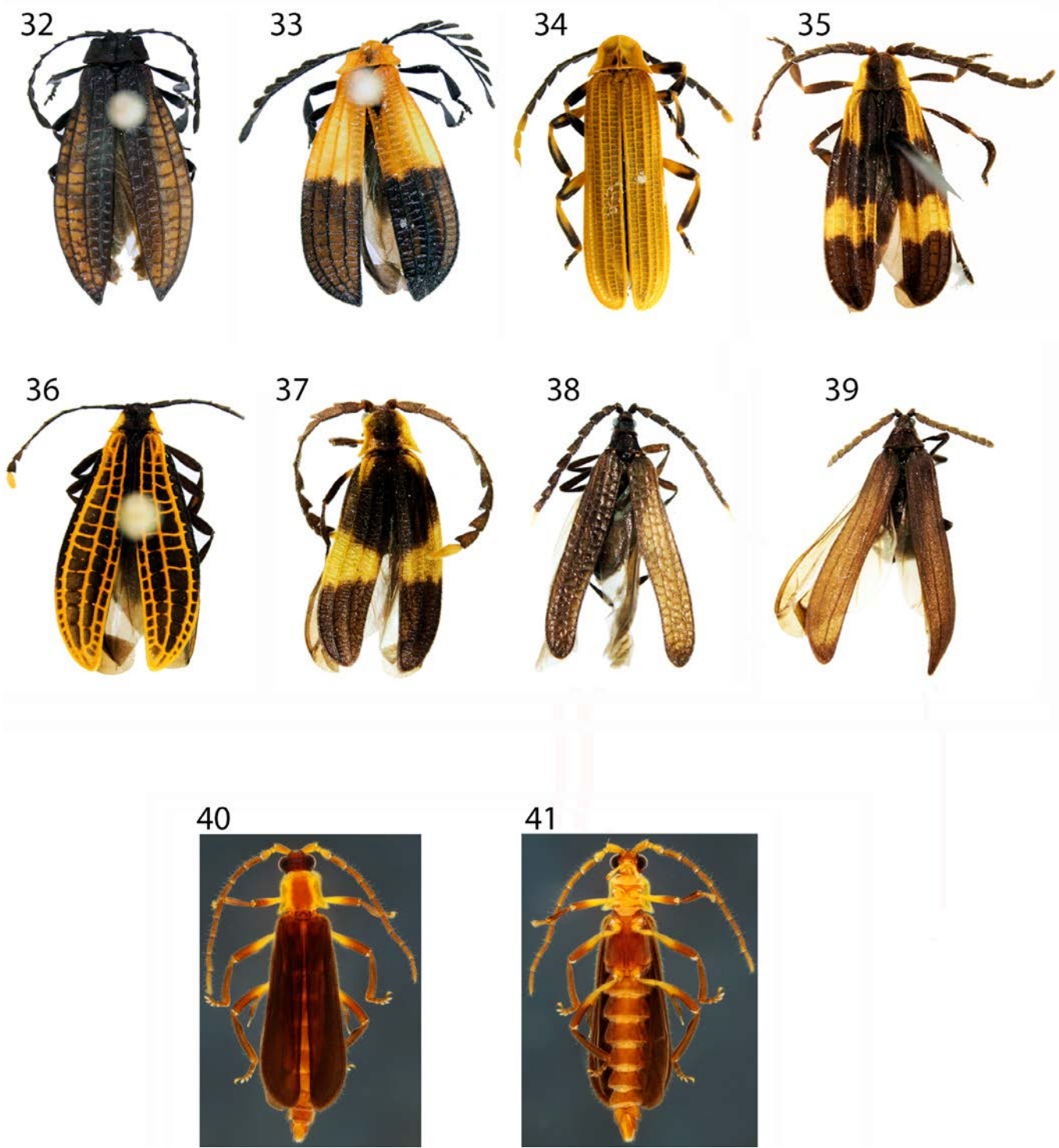
- Maxillary palpi three-segmented; antennomere three minute; pronotum with weak longitudinal carina in the anterior portion of pronotum, bifurcated posteriorly (Fig. 15); elytra widened apically, with three primary costae (Fig. 39) ... **Cephalolycus**



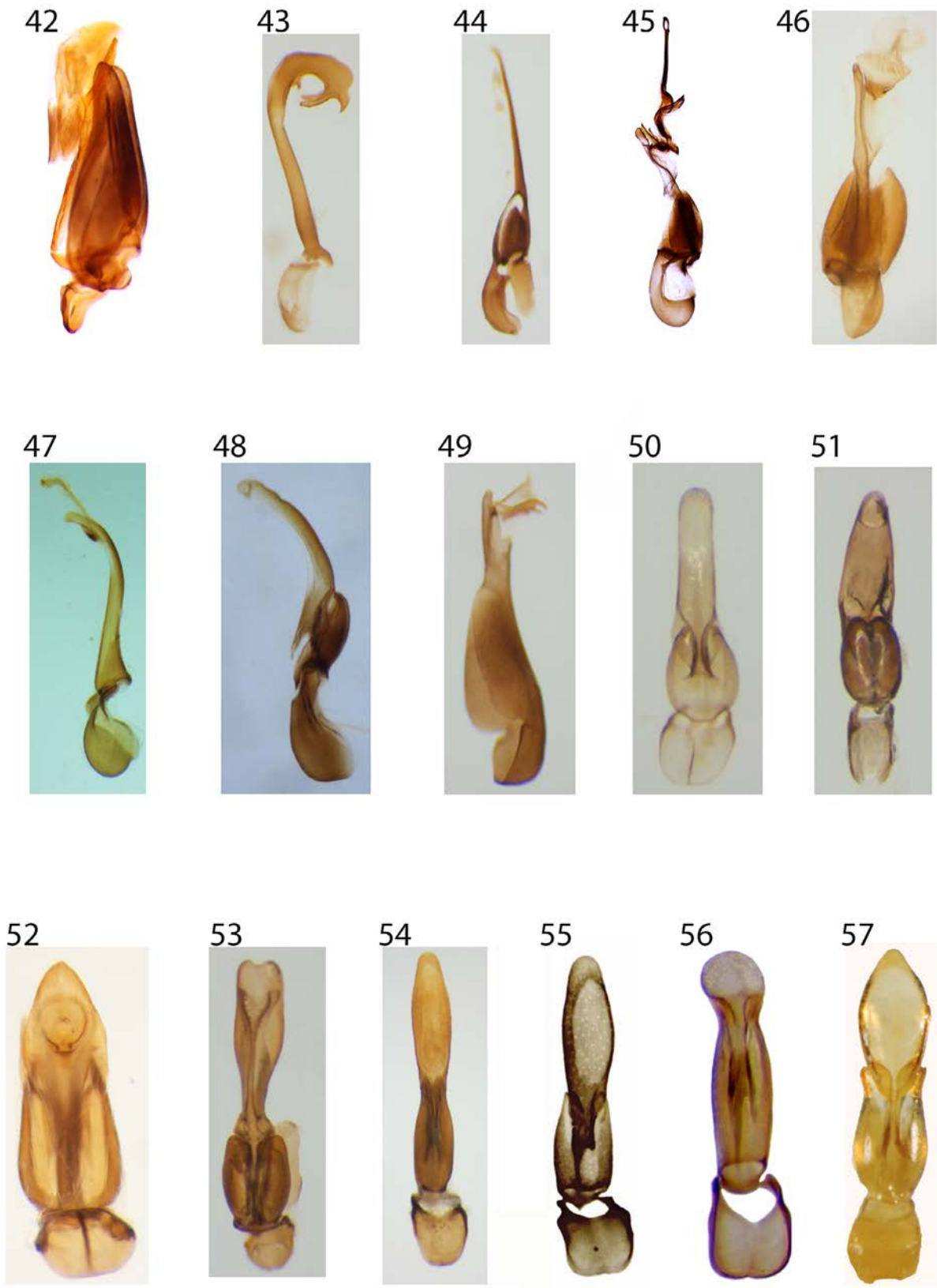
Figures 4–15. 4. *Macrolygistopterus* cf. *succintus* head in frontal view. 5. *Neolycus* sp. head and thorax in ventral view (arrow indicates anterior thoracic spiracle). 6. *Rhyncheros* sp. hind legs (arrows showing spiny trochanters). 7–15. Pronotum. 7. *Macrolygistopterus* cf. *succintus*. 8. *Lycoplateros* sp. 9. *Tero-plas* sp. 10. *Calocladon eppiphium*. 11. *Neolinoptes* sp. 12. *Cyrtopteron* sp. 13. *Metapteron* sp. 14. *Emplectus* sp. 15. *Cephalolycus* sp. Photos: D. Moreno



**Figures 16–31.** Habitus. 16. *Macrolygistopterus* cf. *succintus*. 17. *Neolycus* sp. 18. *Rhyncheros* sp. 19. *Teroplas* sp. 20. *Plateros* sp. 21. *Haplobothris* sp. 22. *Lycoplateros* sp. 23. *Neolinoptes* sp. 24. *Eurrhacus* sp. 25. *Calocladon* sp. 26. *Emplectus* sp. 27. *Caenia excisa* (Kirsch, 1865). 28. *Leptoceletes* sp. 29. *Calopteron* sp. 30. *Mesopteron* sp. 31. *Lycomorphon* sp. Photos: D. Moreno (16–26, 28–31), V.S. Ferreira (27).



Figures 32–41. Habitus, 32–40. 32. *Cartagonum* sp. 33. *Idiopteron* sp. 34. *Metapteron* sp. 35. *Cyrtopteron* sp. 36. *Falsocaenia* sp. 37. *Brasilycus* sp. 38. *Ceratopriomorphus* sp. 39. *Cephalolycus* sp. 40. *Cavoplateros* sp. 41. *Cavoplateros* sp. in ventral view. Photos: D. Moreno (31-39), G. Biffi (40–41).



**Figures 42–57.** Male genitalia in lateral (42–49) and ventral views (50–57). 42. *Teroplas* sp. 43. *Plateros* sp. 44. *Haplobothris* sp. 45. *Lycoplateros eliasi*. 46. *Neolinoptes* sp. 47. *Eurrhacus ecuadorensis*. 48. *Calocladon testaceum* (Gorham, 1884). 49. *Emplectus* sp. 50. *Leptoceletes* sp. 51. *Idiopteron* sp. 52. *Calopteron* sp. 53. *Mesopteron* sp. 54. *Cyrtopteron* sp. 55. *Lycomorphon fulvohumeralis* (modified from Nascimento and Bocakova, 2009). 56. *Falsocaenia santateresa* Nascimento and Bocakova, 2019. 57. *Brasilycus* sp. Photos: E.A. Nascimento (42–52, 54), modified from Bocakova, 2003 (53), modified from Nascimento and Bocakova, 2009 (55), modified from Nascimento and Bocakova, 2019 (56), D. Moreno (57).

## DISCUSSION

Despite being heavily understudied, Colombia is the second most diverse country regarding Lycidae taxa in the Neotropics, being ahead of Peru and the Neotropical part of Mexico, and just behind Brazil (Nascimento 2013, Bocakova *et al.* 2015, Pérez-Hernández *et al.* 2019, Nascimento and Ferreira 2022) on number of species, demonstrating the high importance of the country for the study of the Lycidae. Due to the lack of data, the mentioned countries are the only ones that a comparison can be established for Neotropical lycids, given that previous catalogs and checklists are heavily outdated. This only highlights the need for more detailed taxa accounts for other Neotropical countries (E.A. Nascimento, in prep.).

Colombian Lycidae fauna can be considered representative among Neotropical net-winged beetles, with a few genera currently known as endemic to the country, such as *Celiasis* (e.g., Bourgeois 1906; but see also Kusy *et al.* 2020) and *Cephalolycus*, besides *Cartagonum*, which was just recently recorded outside Colombia (Castelnau 1840, Pic 1922, 1926, Nascimento and Bocakova 2010a, Ferreira and Ivie 2016). Although many Neotropical Lycidae are endemic, part of the high degree of endemism found in Colombia is probably due to the gap in studies from the Neotropical region provoked by the historical lack of interest and specialists in the group, as well as the descriptions based on single individuals, without comparisons from previous described species.

Some genera presented widespread distribution, and this is influenced by several factors, such as the number of species in each, and body size (e.g., *Calopteron*). On the other hand, genera such as *Cephalolycus* present a restricted geographical distribution, despite the statements cited above regarding geographical collection gaps, as well as lack of specialized traps and/or collection methods. The genera *Brasilycus*, *Ceratopriomorphus*, *Lycoplateros* and *Teroplas* are recorded from the country for the first time. Although Guarín-Candamil and Quiroz-Gamboa (2016) registered *Neolinoptes*, *Calocladon*, *Eurrhacus*, and *Neolycus* from Colombia based on D. Moreno identifications, they overlooked that these taxa were new for the country. All these newly recorded taxa were expected to occur in Colombia, because they are present in neighboring countries (e.g., Bocakova 2001, 2003, Barancikova *et al.* 2010;

Nascimento 2013, Bocakova *et al.* 2015, Nascimento and Bocakova, 2017b, 2019a).

Many of the known species of Lycidae from Colombia are known from “Bogotá”. Theodor Kirsch mostly studied material from “Bogotá” collected by H. A. Lindig (Kirsch 1865). Similar to what happens with other insects from Colombia, such as some Reduviidae species (Hemiptera) (e.g., Forero 2006), labels indicating “Bogotá” could be referring just to the shipping place of the specimens going to Europe and not the actual collection place, similar to what happened with bird skins from “Bogotá” (Paynter 1997). In fact, Lindig collected in several localities in Colombia in the second half of the XIX century, some of them in lowland areas under 2000 meters of altitude (Horn and Kahle 1935, Hertel and Schreiber 1988). Thus, until the species described by Kirsch are identified from localities with accurate geographic data, all the localities from “Bogotá” should be regarded as an uncertain place within Colombia.

The information on the distribution of Lycidae according to the altitudinal gradient in the Neotropical region is mainly limited to original descriptions or redescriptions (e.g., Gorham 1884, Ferreira and Ivie 2016). *Idiopteron* and *Mesopteron* are speciose genera, widely distributed, and thus, presenting an ample altitudinal range along the Neotropical Region. On the other hand, *Ceratopriomorphus* presents only three described species, recorded from ca. 1200m in Peru and two other inaccurate localities (Barancikova *et al.*, 2010). Moreover, it is important to stress that *Neolinoptes* is also found above 1000m (e.g., Gorham 1884) and the type locality of *Cephalolycus major* Pic, 1926 is at 2200 m (Ferreira and Ivie 2016).

## CONCLUSION

Here we have shown the great Lycidae diversity exhibited in Colombia, based on the scant previous published information for the family and on the abundant specimens deposited in Colombian entomological collections. From these data, the number of taxa listed is an underestimation of the real Lycidae diversity found in Colombia. This lycid fauna is understudied, mainly due to a lack of specialists working or collecting in Colombia, which in turn affects the number of specimens available to other colleagues for



taxonomic research. As has been shown here, Colombian entomological collections harbor important Lycidae taxa, including several potential new species. To advance the knowledge of Colombian Lycidae is necessary to engage new Colombian taxonomists, and to actively cooperate with other lycid researchers, to help sample the great habitat and ecosystem diversity of the country, and thus help improve future taxonomic research on Colombian Lycidae. Therefore, we hope that the present work can stimulate interest in net-winged beetle fauna, both in Colombia and other places in the Neotropical region.

## PARTICIPATION OF AUTHORS

DM: data collection and analysis, images acquisition and elaboration of figures, EAN and DF: conceptualization, data analysis, writing, elaboration of figures.

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## CONFLICT OF INTEREST

The authors have no conflicts of interest to declare.

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