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A new species of the genus *Pelmatosilpha* (Blattodea: Blattidae: Eurycotiinae) for Venezuela, South America

Una nueva especie del género *Pelmatosilpha* (Blattodea: Blattidae: Eurycotiinae) de Venezuela, Suramérica

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ABSTRACT

A new species of *Pelmatosilpha* Dohrn (Blattidae: Eurycotinae) was described based on a male specimen collected from Tepui Ichum in Venezuela, South America. We include general remarks on the Blattidae family as well as detailed observations regarding the habitat of the new species. The collecting site, along with the morphological characteristics of the novel species and its genital structures, are presented in accompanying illustrations. Comparative analyses were conducted with select species of *Pelmatosilpha* and *Euriycotis*. Additionally, we propose a profound study to reevaluate the taxonomic boundaries between these two genera.

Keywords: Bolivar State, *Eurycotis,* Neotropics, Tepui Ichum, Venezuelan Guayana.

RESUMEN

Se describe una nueva especie de *Pelmatosilpha* Dohrn (Blattidae: Eurycotinae) a partir de un espécimen recolectado en el Tepui Ichum, en Venezuela, Suramérica. Incluimos comentarios generales sobre la familia Blattidae, así como observaciones detalladas sobre el hábitat de la nueva especie. El lugar de recolección, junto con las características morfológicas de la nueva especie y sus estructuras genitales, se presenta en las ilustraciones adjuntas. Se realizaron análisis comparativos con especies seleccionadas de *Pelmatosilpha* y *Eurycotis*. Además, proponemos un estudio en profundidad para reevaluar los límites taxonómicos entre dichos géneros.

Palabras clave: estado Bolívar, *Eurycotis,* Guayana Venezolana, Neotrópico, Tepui Ichum.

INTRODUCTION

The Neotropical zone, encompassing South and Central America and the Caribbean Islands, has the highest diversity of cockroach species (Blattodea), with approximately 2,000 of the world's 5,500 cockroaches (Beccaloni 2026, Bell *et al.* 2007). The whole Order is still largely understudied, and the number of described species is in-

creasing, especially in the Neotropical region (Vidlička 2013). The order comprises approximately three to four superfamilies (including termites) and seven to 13 families, depending on the classification system used (Deng *et al.* 2026, Beccaloni 2026).

Blattidae is a family of large cockroaches within the Blattodea, characterized by dorsally more or less flattened (it could be slightly bulging in some species, such as *Pelmatosilpha convexa*) oval-to-elongate, leathery tegmina, long antennae, and fast-running legs (Bell *et al.* 2007).

Among the several families, while not the most diverse, Blattidae is widely distributed throughout the world and consists of approximately 659 species belonging to 65 genera, most of which are solitary and fast-moving, adapted to live in dark, humid places, often in hiding (Luo *et al.* 2025, Beccaloni 2026, Bell *et al.* 2007, Roth 2003), and is significant for including a small number of household pests, but also as decomposers, food sources for other organisms (i.e. birds, lizards), and vectors of pathogens like the widely known *Periplaneta americana* (L.), and *Validiblatta australasiae* (Fabricius, 1775) (Bastidas[sic] Pérez & Zavala Gómez 1995, González 2005b, Bell *et al.* 2007, Rubio Espina & Quirós de González 2013, Marshall 2017). Some are even used in medicine and food waste disposal in China, Mexico, and Brazil (Luo *et al.* 2025, Feng 2023, Hurtado-Noriega 2021, Ramos-Elorduy 2007, Costa-Neto 2005).

Blattidae is the oldest family of roaches, with representatives dating back to the Paleozoic (Laurentiaux 1951). However, modern forms of this family appeared in the Cretaceous along with Blattellidae and Polyphagidae (Roth 2003).

When the wings are fully developed, the anal area of the hind wing is generally folded in a fan-like configuration when at rest, or it may present a large appendicular field that is folded longitudinally and then reflected over the rest of the wing. The thickened clypeal shield is not present. Typically, the body does not show pilosity. The arrangement of thorns adheres to type A: the proximal spines are usually the longest, with the following spines gradually decreasing in length, while the terminal spines are longer. In some Blattidae that display atypical type A femurs, the stout spines may be of similar length, with the terminal spines being longer, or the arrangement may consist of a few large spines that are relatively spaced apart. Males have two simple, symmetrical, cylindrical styles that are widely separated, situated in the posterolateral corners of a symmetrical or slightly asymmetrical subgenital plate. The genitalia are quite complex. Males from the subfamilies Blattinae and Polyzosteriinae lack uricose glands. Females possess a subgenital plate that is divided into two valves by a longitudinal groove (bivalvular). They are oviparous, producing non-rotating oothecae without parental care; however, they protect their oothecae by attaching them to surfaces and covering them with surrounding substrate that hardens around the ootheca (Roth & Willis 1960, Roth 2003, Bell *et al.* 2007).

On the American continent, Blattidae is represented by the species *Henycotyle antillarum* (Brunner von Wattenwyl, 1892) and by the subfamily Eurycotinae, which was proposed by McKittrick (1964) as a tribe (Eurycotini), but later elevated to family by Deng *et al.* (2023) and Djernæs & Murienne (2022). Eurycotinae is characterized by a robust caudal metatarsus that is relatively short, distinctly shorter than the other tarsal joints, and strongly compressed. The ventral surfaces of the second and third joints of the caudal tarsi are unspined, while the ventral surface of the caudal metatarsus is spined (Hebard 1917, Beccaloni, 2026, Luo *et al.* 2025).

The subfamily Eurycotinae consists of only two genera, *Eurycotis* Stål and *Pelmatosilpha* Dohrn. However, the separation between these two genera is ambiguous, needing further review (Hebard 1917, 1919, 1926, Estrada-Alvarez 2023, Estrada-Alvarez & Gutiérrez 2023, Estrada-Alvarez *et al.*, 2026).

According to Dohrn (1887) *Pelmatosilpha* contains two groups, one of which includes smooth, moderately shiny terrestrial non-domestic cockroaches, primarily found in the Neotropics. Although most species in the genus generally share morphological traits common to cockroaches, some specific characteristics allow them to be easily distinguished (Bell *et al.* 2007, Salazar 2004).

As in most non-pest cockroaches, detailed bionomics (life cycles, behavior, and specific environmental relationships) for most *Pelmatosilpha* species are mostly unknown, and this is especially true for Venezuela, where cockroach collecting and knowledge are scarce (Gutiérrez & Perez-Gelabert 2000, Cerdá 2003, Salazar 2004, González *et al.* 2025, Sormani *et al.* 2025).

MATERIAL AND METHODS

Collecting site

A large roach was discovered by one of us (JS) at a campsite while resting from a rafting cruising trip during an expedition to the headwaters of the Ichum River in the Tepui Ichum (also "Meseta" or "Cerro" Ichum), in Venezuela (Shea 2013, 2014). A "flat-topped" mountain as wide as the island of Trinidad, the Tepui Ichum is an oval, large, wide, and low altitude sandstone tepui located in Bolívar state, Venezuela (Montoya Lirola 1958, Reinoso 1962, Michelangeli Ayala 2005, Brewer-Carías 2010, Brewer-Carías and Audi 2011) (Fig. 1). This tepui acts as a basin

Figure 1. Northern South America map, showing the location and enhanced detail of Tepui Ichúm in Venezuela's Pantepui, Guiana Highlands. The red dot marks the approximate area where the cockroach *Pelmatosilpha ichumiensis* sp.n. was collected.

outpouring its waters through the Ichum falls (Montoya Lirola 1958, González *et al.* 2015).

Although the Guayana Shield is known for a high diversity of animal and plant life, due to under-sampling of insects, little is known about them from the Pantepui (a unique "archipelago" of ancient, flat-topped mountains [tepuis] in South America's Guiana Highlands) (González 2005a, Costa *et al.* 2014). This is also true for the order Blattodea (Cerdá 2003, Evangelista *et al.* 2015).

While resting beside the Ichum River, within the central region of the tepui, on March 4, 2014, a large roach, somehow similar to an American cockroach but sturdier, darker, and larger, was found wandering and slowly moving around some river rocks adjacent to the campsite. The exact coordinates of the collecting site are 04°31'13.242" N, 063°22'8.028" W with an altitude of approximately 607-m.

The roach was discovered at a camp made at the confluence of the Ichum River (which was itself about 25 meters wide at that point) and a small side stream. Numerous rocks of different sizes and flat surfaces were present (Fig. 2). The cockroach was placed on one of the larger rocks to be photographed; there it interacted with a fallen leaf and several stingless bees (Fig. 4). This area of the river was approximately 25 kilometers (in a straight line) upstream from (and 200 m higher than) the Ichum waterfall. This site was also near to the place where JS *et al.* discovered a specimen of the rare and interesting orthopteran *Bactrophora dominans* Westwood, 1842 (Orthoptera: Romaleidae) (See González *et al.* 2015). This place was also notable in that from here north to Ichum Falls, the river was characterized by a 200 m elevation difference over approximately 35 km of river run, whereas from here south (upstream), over the same 35 km distance, the elevation difference was approximately 50 m. Thus, this site marked what could be described as the boundary between the "Upper Ichum" (south) and the "Lower Ichum" to the north, forming a natural barrier.

The cockroach was immediately preserved in Everclear (neutral grain alcohol, 190 proof). It was subsequently removed from the container and dried to be dissected and examined for the preparation of this work.

Imaging and dissection

A detailed topographic map of northern South America, illustrating also the Tepui Ichum is included (Fig. 1).

Before dissection, the cockroach was again photographed with an iPhone with a dual 12MP front camera with a wide lens *f*/2.4 aperture, 23mm equivalent, with optical image stabilization (OIS) and 100% Focus Pixels for fast focusing (Fig. 3). While in the field, it was photographed with a Nikon D800E camera, with an AF-S VR Micro-Nikkor 105mm f/2.8G IF-ED lens (Figs. 4A-4E).

Figure 2. Side stream diverging from the Ichúm river, with the surrounding forest in the background. The campsite was located around the blue tarp observed behind Janeiro Lesama (with a blue shirt). This is the habitat and collecting site of the cockroach *Pelmatosilpha ichumiensis* sp.n.

Figure 3. Dorsal and ventral view of the holotype of *Pelmatosilpha ichumiensis* sp.n. before dissection. Scale: 10 mm.

Figure 4. *Pelmatosilpha ichiumiensis* sp.n. in nature. A: Dorsal View; B: Slightly sideways showing the left fore-, mid-, and hind tibiae and tarsi. A stingless bee is about to perch on the cockroach. C: the cockroach in profile (left side) in the process of interacting with a fallen leaf. D: the cockroach, almost in a front view, grooming its left foreleg. E: Stingless bee standing on the pronotum of the cockroach.

To expose and allow the extraction of the genital structures, the specimen's abdominal sternites 7 to 9 were removed. The exposed parts of the abdomen's tip were treated with a few drops of 5% KOH for 12h to facilitate the removal of the genital capsule. After that time, the exposed section of the abdomen was cleaned with water and ethanol 98%. The genital capsule was removed and then submerged in 5% KOH for 24h. Photographs were taken, and the sclerites were separated for further photographing.

Dissections were performed using Dumont#5 forceps and Asta stainless steel insect pins (sizes 0 & 3). Following dissection, the specimen was dry-pinned after sclerites were removed. The removed sclerites, one tarsus (that fell off while handling the insect), and the genital sclerites (Figs. 7, 8I, 8J) were preserved in a vial with 98% ethanol.

The separated genitalia and their components were photographed using a Dino-Lite AM4113ZTL digital microscope, with an adjustable polarizer, a 1.3P sensor, and a magnification range of 10x to 90x.

For comparison purposes, genitalia images of *Pelmatosilpha larifuga* Gurney, 1965, *P. purpurascens* Kirby, 1903 (from Gurney 1965), *P. lenti* Rocha e Silva & Lopes, 1976 (from Rocha e Silva & Lopes 1976), were used (Figs. 8A-8H) as well as descriptions of other species. The original images from the cited references were altered to depict the sclerites 2 of right and left falomeres (gonapophyses) (R2 and L2), for comparison with the genitalia of *Pelmatosilpha ichumiensis* n. sp. The phalomeres' sections were labeled to more clearly indicate the differences between the species (Figs. 8A-8H). A comparative analysis of the *Pelmatosilpha* species was also conducted alongside species from the genus *Eurycotis*, using the sclerite R2 of the right phalomere, as illustrated in Gutierrez (1996, 2001, 2004, 2013, 2014) and Estrada *et al.* (2026), represented by the R1, R2, R3, and R4 sets of sclerites.

The sclerite R2 of the right phalomere in this study corresponds to the right "ventral" sclerite R2v as described by McKittrick and Mackerras (1965), illustrated in *Eurycotis floridana* and other species within the Blattidae fam-

ily. Furthermore, R2 (R1 in Estrada et al, 2026; clarified in his work) has two projections, "a" and "b", which are taxonomically important. Following Estrada *et al.* (2026), projections "a" and "b" correspond to R1a and R1b, while "c" corresponds to the base of R1, together with R2, R3, and R4. Likewise, the sclerite L2 of the left falomere corresponds to sclerite L2v, and projection "c" corresponds to the upper part, or base, of L2v, which divides apically into the projections "a" and "b," corresponding to L2va and L2vb in Estrada *et al.* (2026).

Given the geographical proximity of *P. guianae* and *P. lata* to *P. ichumiensis* n. sp., it was recommended that we conduct a more detailed comparison of additional structures, including the rostrum, ocelli, cerci, and supra-anal plate (see Fig. 9).

RESULTS

Order BLATTODEA Latreille, 1810
Family BLATTIDAE Latreille, 1810
Subfamily EURYCOTINAE McKittrick, 1964
Pelmatosilpha ichumiensis Sormani, Shea & González n. sp.
(Figs. 3, 4, 5, 6, 7, 8I, 8J, 9A, 9D, 9G, 9J, 9K)
http://zoobank.org/urn:lsid:zoobank.org:act:A1ECD8BF-F8F4-4A06-950F-8C78C3722C99

Material

Venezuela, Tepui Ichum, Shore of Ichum River, 04°31'13.242" N, 063°22'8.028" W, 607 m, 4.III.2014, Coll. J. Shea, 1 male (holotype). The holotype and a vial containing some of its sclerites and its genitalia are deposited in the entomological collection of the Academy of Natural Sciences of Drexel University, Philadelphia (ANSP), USA.

Diagnosis and description

Male (holotype). Large-sized cockroach (total length 440 mm) (Fig. 3). Overall coloration is mahogany brown. This species is close to *Pelmatosilpha lata* in length (400 to 460 mm) and, when comparing the apical section of the supra-anal plate, which is bilobed, subquadrate, and convergent; however, in *P. lata*, the supra-anal plate is narrower and lacks the pilosity found in *P. ichumiensis* n. sp. (Fig. 9). Furthermore, *P. lata* is the species with the closest geographic distribution (Guyana and Suriname), which could explain a possible phylogenetic proximity (Hebard 1929, Bruijning 1959, Princis 1963, 1966, Evangelista *et al.* 2015). Furthermore, *P. ichumiensis* **n. sp.** can be differentiated from other members of the genus by its distinctly rounded and wide caudal angles of the pronotum, which exhibit an almost elliptical shape. The species also shows the most developed tegmina and hind wings known for the genus. The insect's dorsal surface is glabrous, while the ventral one is velvety. Cerci and supra-anal plate with robust, long, and dense setae.

Lateral section of the sternites and basal section of the sub genital plate are orange-brown. Head is wider than it is long. Convex face, with a central area of a lighter - brighter mahogany tone, arched vertex, and interocular space as wide as the space between the antennal sockets (Fig. 5A). Clypeus with ochre-colored lateral and apical edges, as well as its central area; labium with apical edge ochre (Fig.5A). Triangular ocelli are ochre-colored (Fig. 5A).

Maxillary palpi are hairy; all their segments are dark brown, except for the apical one, which is light brown. Palps 4th and 5th are of similar size, and 3rd is slightly longer than the others (Fig. 5A). Antennae with brown segments that lighten to chestnut tones as they approach the apical portion (Fig. 5A). Pronotum slightly convex, parabolic-elliptical in shape, uniformly dark reddish brown in color (The almost elliptical effect of the pronotum comes from the very broad and rounded caudal angles), caudal margin slightly convex, nearly straight. Eighth tergite with rounded lateral tips, markedly different from the tips of the remaining tergites (Fig. 5D).

Metanotum and 1st abdominal tergite with glandular modification, gland hidden beneath the metanotum, 8th and 9th tergites greatly reduced, 8th tergite with rounded lateral tips (Fig. 5C). Subgenital plate is broad, short, and bilobed; its surface is velvety (Fig. 5D). Closely associated cerci are large with sharp tips, hirsute with long, disordered setae (Figs. 5D, 5E, 5F). Medium-sized styles are the same length as the subgenital plate and measure half the length of the cerci (Fig. 5D, 5E). Supra-anal plate of the same length as the subgenital plate, slightly curved downward, bilobed, and hirsute with long, dense setae (Figs. 5E, 5F). Tegmina and hind wings extending well beyond the apex of the cerci (Figs. 5D, 5E) (It should be noted that in some species of the genus, the tegmina barely reach the tips of the cerci, while *P. ichumiensis* n. sp., and *P. lata* seem to be the only two species in the group whose tegmina extend beyond the tip of the cerci; but *P. ichumiensis* n. sp. definitely exhibits a much more developed process on the wings).

Wings with clearly marked and complete venation from the base. Tegmina of uniform mahogany brown color, all veins of the same thickness, evenly distributed (except for the base of the costal vein, which is thicker and bright reddish in color) without reticulations. The costal vein

Figure 5. *Pelmatosilpha ichumiensis* sp.n. A: ventral view, face.; B: dorsal view, vertex, pronotum; C: Metanotum and 1st abdominal tergite with glandular modification (arrow); D: subgenital plate, ventral view; E: Supra anal plate, dorsal view; F: Supra anal plate, ventral view.

has three levels of branching and 16 branches; the other veins have five to six branches; the wing has a very wide anal field, wider than the outer field, and half as long as the tegmina. Functional hind wings, with the same length as the tegmina, ochre-orange in color, opaque, with the same venation pattern as the tegmina, anal field paler than the external field (Fig. 6).

Antero-ventral femoral spines on the first pair of legs with 9 to 10 short, robust spines plus two large apical spines (Type A2, sensu Roth 2003). Antero-dorsal portion with four basal spines plus two apical spines. Metatarsus is almost as long as the apical tarsus, pulvilli well developed. Unspecialized, symmetrical tarsal claws. Body length: 44 mm; Pronotum length: 9 mm; Length of the widest section of the pronotum: 16 mm; Tegmina: 35 mm. Head width: 9 mm. Interocular space at the vertex (cephalic vertex or forehead): 4 mm.

Regarding the genitalia, sclerite L2 corresponds to sclerite L2v, and projection "c" corresponds to the upper part, or base, of L2v, which divides apically into branches "a" and "b"; these correspond to L2va and L2vb as seen in Estrada *et al.* (2026). In *P. ichumiensis* n. sp., projection "c" features a slightly trilobulate apical tip (pointing downward), while the remainder is of a more or less rounded-trapezoidal shape. The right-hand arm connecting "a" and "b" is thickened at the base and tapers toward the apex, resembling an inverted teardrop, terminating in a hook-like structure; together with branches "a" and "b," it forms a loop, with both branches being notably short relative to the group under study. Branch "a" is shorter and slimmer, whereas projection "b", which is thickened from its base, gradually thins out and curves toward the left at the apex, giving the structure as a whole the general appearance of a semi-closed hand or fist.

Sclerite R2 corresponds to sclerite R1 according to Estrada-Alvarez *et al.* (2026) and is characterized by projection "c" (a complex comprising sclerites R2, R3, and R4 according to Estrada-Alvarez *et al.*, 2026), which is quadrangular at its base and tapers toward the right, featuring a slight bilobulation of a lighter shade at the apex, similar to that observed in *P. purpurascens, P. coriacea*, and *P. lenti*. The base of projections "a" and "b" is thickened and more or less circular, with no distinct arm discernible, as is the case in the other species. As in the other species, except *P. coriacea*, projection "a" is slimmer than "b"; however, it differs from the other species in being equal in length to "b" and in "twisting" somewhat in the manner of a corkscrew, curving toward the right. Projection "b", which is thickened, curves in the same direction, a feature that also distinguishes it from the other species; its apex is rounded, as in *P. lenti*.

Figure 6. *Pelmatosilpha ichumiensis* sp.n. tegmina and hind wings.

Etimology

The species is named after the isolated sandstone Tepui Ichum (Cerro Ichum), located in Bolívar State, Venezuela, which is part of Pantepui and the distinctive Guiana Highlands, and the place where the species was collected. Tepui Ichum is the typical locality of the species. The specific epithet "*ichumiensis*" should be treated as a feminine adjective indicating that the species "originates from Ichum."

DISCUSSION

The overall coloration of *P. ichumiensis* n. sp. is brown. The species has well-developed tegmina and functional hind wings with finely marked venation; the shape of its bilobed terminal tergites and sternites places it within the *alaris* group *sensu* Rehn (1930). *Pelmatosilpha ichumiensis* n. sp. alignes with *P. kevani* Princis, 1955, from the *occidentalis* group, in the velvety ventral surface. However, in *P. kevani* the dorsal surface is also velvety, while in *P. ichumiensis* sp. n. is glabrous.

The robust head and convex face of *P. ichumiensis* sp. n. (Fig. 5A) resemble those of *P. guianae* Hebard, 1926, and *P. rotundata* Scudder, 1900, but in these two species, the vertex is straight, while in *P. ichumiensis* sp. n. it is convex (Figs. 5A, 5B), as in *P. lata* Hebbard, 1929. The subgenital plate of *P. ichumiensis* sp. n. is bilobed (Fig. 5D), as in *P. guianae*, *P. lata*, *P. micra* Hebard, 1919, and *P. rotundata*,

but it is wider and the styles are proportionally shorter. As for the species within the *alaris* group, the cerci of *P. ichumiensis* sp. n. are elongated and significantly exceed the length of the supra-anal plate (Figs 5D, 5E, 5F), as in *P. lata*, *P. guianae*, and *P. alaris* (Saussure, 1864), while in *P. rotundata*, *P. macu* Rehn, 1930, and *P. miranha* Rehn, 1930, they are only slightly longer than the supra-anal plate.

Likewise, the supra-anal plate of *P. ichumiensis* sp. n. (Fig. 5E) is similar to those of *P. alaris* and *P. rotundata*, while in *P. guianae* and *P. lata* it is narrower. *Pelmatosilpha ichumiensis* sp. n. can also be easily separated from the Colombian *P. erythrocephala* Salazar, 2004, by its general brown color, its well-developed tegmina and wings, and the shape of the pronotum, among other morphological features.

Male genital sclerites are crucial for Blattodea classification, shifting the focus of taxonomy from strictly external morphology to the detailed study of genitalia in cockroaches (McKittrick 1964, Salazar 2004, González *et al.* 2019, Evangelista 2020, Deng *et al.* 2026). However, the genitalia of *Pelmatosilpha* have been scarcely studied; thus, we have been able to compare the genitalia of *P. ichumiensis* sp. n. with four other species in the genus (three from the Caribbean islands and one from Venezuela) (Estrada-Álvarez & Gutiérrez 2023).

Moreover, the genus *Pelmatosilpha* has been separated from the genus *Eurycotis* based on traits associated with the length of the tegmina. Nevertheless, the two genera are so similar that they may require more accurate differentiation (Hebard 1919, Estrada-Alvarez & Gutiérrez 2023). In this study, we illustrate the genitalia of *P. ichumiensis* sp. n. (Figs. 7, 8I, 8J) and compare it with other species within the genus *Pelmatosilpha,* in an effort to better understand how the new species fits within the group. Furthermore, we also compare it with species in the genus *Eurycotis* to deepen our comprehension of the interspecific relationships between the two genera.

Pelmatosilpha ichumiensis sp. n. genital structures are highly sclerotized (Figs. 7, 8I, 8J), and the phallic appendages cannot be distinguished unless they are separated. Two of them (L2 and R2) were selected for comparison with other species, and significant differences were observed. The left phallic appendage (L3) is illustrated only for *P. ichumiensis* sp. n. (Fig. 7) and *P. lenti.* (Fig. 8A).

Gurney (1965) provides detailed illustrations of the genitalia for three *Pelmatosilpha* species found in some Caribbean islands, utilizing diagrams that effectively differentiate the L2 and R2 sclerites. In the case of *P. lenti*, the presentation of the phalomeres is less clear, exhibiting partial representation and insufficient distinction, attributable to the low-quality images presented in Rocha e Silva and Lopes (1976). The comparison with *Eurycotis* species was made possible by using the focusing on the sclerite R2, illustrated in some species found in a few Caribbean islands (Gutiérrez 2014, 2013, 2004, 2001, 1996).

The structure "c" of the sclerite L2, shows significant differences among most analyzed species. However, *P. ichumiensis* n.sp. (Fig. 8I) and *P. larifuga* (Fig. 8G) show remarkable similarity, whereas *P. purpurascens* (Fig. 8C) and *P. coriacea* (Fig. 8E) are quite distinct. The incomplete image of *P. lenti* (Fig. 8A) prevents a valid comparison of this structure. Furthermore, structures "a" and "b" of *P. purpurascens* and *P. coriacea* are separated at their apices, while in *P. lenti, P. larifuga,* and *P. ichumiensis* sp. n., their tips touch each other, forming a ring. However, it is important to note that the size and shape of "a" and "b" in *P. lenti* differ significantly from those observed in *P. larifuga* and *P. ichumiensis* n.sp. (Figs. 8A, 8C, 8E, 8G, 8I).

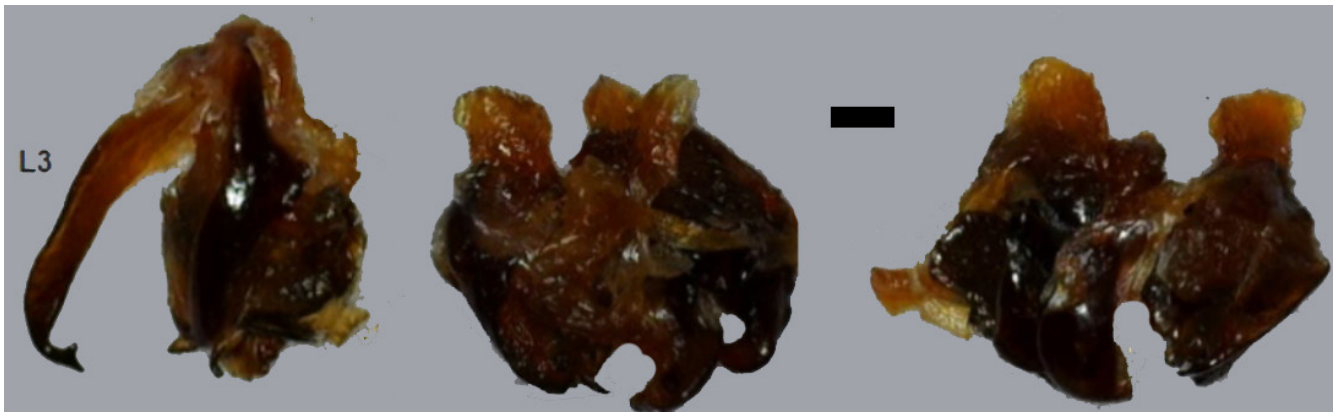

Figure 7. General views (in different positions) of the genitalia of *Pelmatosilpha ichumiensis* sp.n. Note the sclerotized nature of the structures. L3: phallic appendage. Scale: 1 mm.

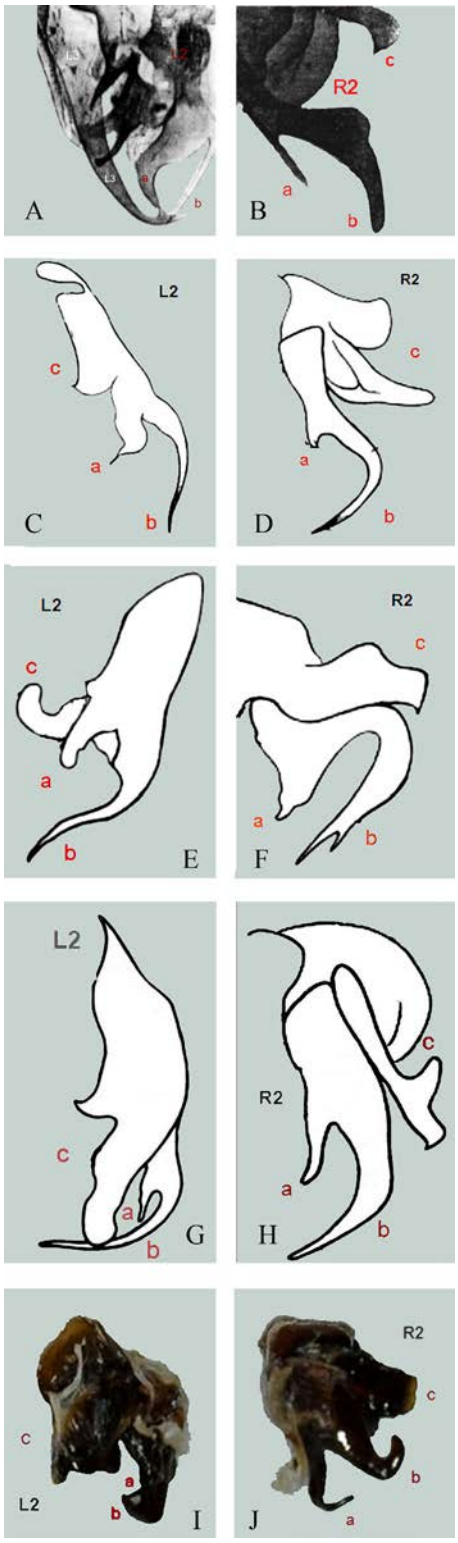

Figure 8. Images of the left (L2) (left boxes) and right (R2) (right boxes) phalomeres of several species of *Pelmatosilpha*, as published by several authors, to compare with the new species. A & B: *Pelmatosilpha lenti* (modified from Rocha & Lopes 1976); C & D: *Pelmatosilpha purpurascens*; E & F: *Pelmatosilpha coriacea*; G & H: *Pelmatosilpha larifuga* (modified from Gurney 1965); I & J: *Pelmatosilpha ichumiensis* sp.n. (this work).

The sclerite R2 of four species of *Pelmatosilpha* was compared with that of fifteen species of the genus *Eurycotis,* revealing remarkable similarities. In this analysis, it can be seen that structure "b" in *Pelmatosilpha lenti* as documented by Rocha e Silva and Lopes (1976) (Fig. 8B), is very similar to structure "b" of *Eurycotis isabeltorres*, as well as to other related species described by Gutierrez (1996, 2013, 2014). In addition, structures "a" and "b" project to the right in all analyzed species of *Eurycotis* and *Pelmatosilpha*, but not in *Pelmatosilpha ichumiensis* n.sp., which has a distinctive morphology, and projects to the opposite side (Fig. 8J).

A comprehensive analysis of the genitalia across a greater number of *Pelmatosilpha* species, particularly those belonging to the alaris group, which are characterized by their coloration and functional flight organs (Rehn 1930), would facilitate comparisons with other *Eurycotis* species, thereby offering a more precise understanding of the relationships among species within the Eurycotinae (Blattidae). It would also be beneficial to examine the genitalia of the Colombian species *P. erythrocephala* Salazar, 2004, which appear to exhibit various geographical morphs that differ in coloration, as observed in iNaturalist photographs (https://www.inaturalist.org/) and in collected material (Valero-Pérez, 2021). This species, *P. erythrocephala*, shares similarities with the Venezuelan species *P. lenti* in coloration patterns, contours, a slender, elongated body shape, and reduced, rounded tegmina, suggesting they may be part of a group of related species, as corroborated by their genitalia. However, as mentioned above, *P. ichumiensis* n.sp. can be easily separated from them.

Additionally, we compared four different structures that allow us to separate *P. ichumiensis* n.sp. from *P. lata* and *P. guianae*, species with close geographic distributions, which also belong to the *alaris* group (Fig. 9). Relatively close characteristics can be observed among the three species, thereby bringing them phylogenetically closer in terms of their morphology (Fig. 9).

When examining the subgenital plate of *P. ichumiensis* n.sp. (Fig. 9A), a notable contrast emerges compared to *P. lata* (Fig. 9B) and *P. guianae* (Fig. 9C). In the latter two species the subgenital plates are glabrous, with a uniform coloration, and a distinctive curved offset in the basal portion. These features lend their subgenital plates a smooth, unicolored appearance with a slight curvature, a key morphological trait shared by the two species. In contrast, *P. ichumiensis* n.sp. exhibits a pilose subgenital plate and is distinctly bicolored. Moreover, its subgenital plate is straight, lacking the curved offset present in the other two species. These differences clearly separate *P. ichumiensis* n.sp. from *P. lata* and *P. guianae*.

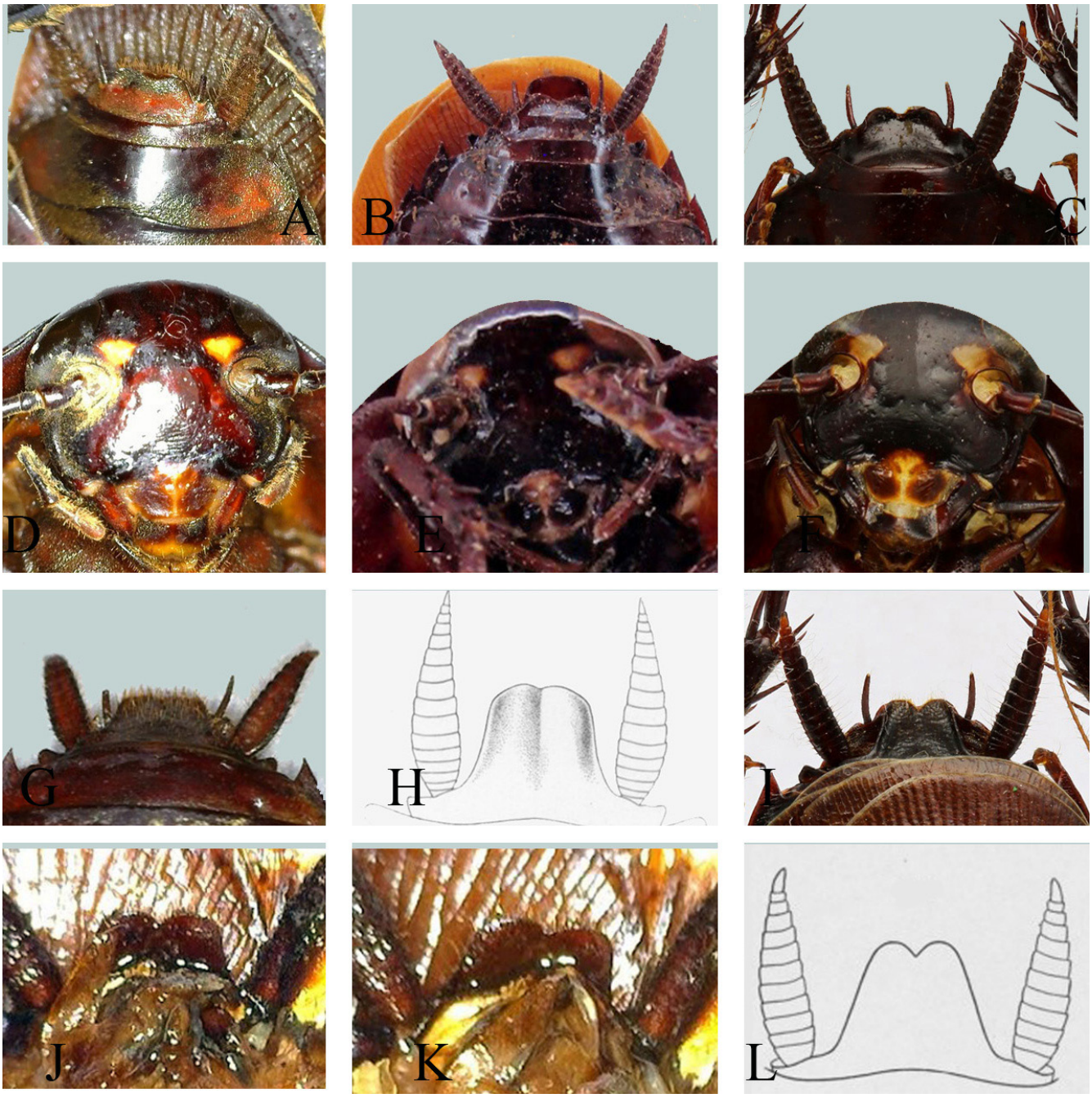

Figure 9. Comparison of four morphological structures in three species of the alaris group, *Pelmatosilpha ichumiensis* n.sp. (a, d, g, j, k), P. lata (b, e, h), and *P. guianae* (c, f, i, l). Images A, D, G, J, K are from this work; Those of P. lata were taken from https://cockroach.speciesfile.org/otus/863508/overview (B, E) and Hebard 1929; those of *P. guianae* were taken from https://cockroach.speciesfile.org/otus/863504/overview (C, F, I) and Hebard 1926 (L).

When comparing the rostra of the three species (Figs. 9D, 9E, 9F), it can be noticed that in *P. ichumiensis* n.sp. is similar to *P. guianae*, as they appear convex, while that of *P. lata* is completely flat (the specimen was handled very carefully with no pressure applied to it, as it was preserved immediately upon collection and not opened for the intervening 12 years). In contrast, the ocelli of *P. lata* look similar to those of *P. ichumiensis* n.sp. in that they are smaller than the antennal sockets, whereas in *P. guianae* they are of nearly equal size (though this character might not be entirely reliable, as we do not know whether there is variability in these dimensions among individuals of the same species) (Fig. 9).

Similarly, the supraanal plates of *P. lata*, and *P. guianae* (Figs. 9H, 9I), are glabrous and distinctly narrower

in the middle and apical portions when compared to *P. ichumiensis* n. sp. (Fig 9G). Therefore, we included two images depicting the supraanal plate of *P. ichumiensis* n.sp. (Figs. 9J, 9K), with the subgenital plate removed to better observe the apical bilobulation, slightly subquadrate and convergent as in *P. lata* (Fig. 9H), but with a more pronounced central incision, quite similar to that of *P. guianae* (Fig. 9L).

CONCLUDING REMARKS

Pelmatosilpha ichumiensis sp. n. is the first species of cockroach described from the remote Tepui Ichum and the third species recorded and/or described from the genus in Venezuela. Likewise, *P. ichumiensis* n.sp. is an interesting species within the genus *Pelmatosilpha* due to the unusual development of its tegmina and hind wings, and the distinctive genitalia that separate it from other species in its species-group.

Morphologically, this new species falls within the *alaris* group, as evidenced by distinct characteristics that differentiate it from other *Pelmatosilpha* species. Notably, it lacks the lighter, contrasting margins typically observed in related species and exhibits tegmina that are neither brachypterous nor of the intermediate sizes and shapes characteristic of the genus *Eurycotis*. *Pelmatosilpha ichumiensis* n.sp. (Figs. 8I, 8J) shows limited morphological affinity with *P. larifuga* (Figs. 8G, 8H), particularly concerning the left sclerite L2; however, it is entirely distinct from other representatives of *Pelmatosilpha* and *Eurycotis* regarding the right sclerite R2. Furthermore, it does not exhibit a discernible similarity with *P. coriacea* (Figs. 8E, 8F) as it is also dissimilar to the other *Pelmatosilpha* species in both sclerites L2 and R2, as well as to *Eurycotis* in sclerite R2.

As for the right sclerite R2, the five species of *Pelmatosilpha* can be differentiated from the species of *Eurycotis* of the insular Caribbean by having a more developed structure "c" and a robust base connecting branches 'a' and "b." However, the shape of "a" and "b" in *P. lenti, P. purpurascens*, and *P. larifuga* (Figs. 8B, 8D, 8H) are similar in species of *Eurycotis.* Likewise, the *Eurycotis* species that we were able to compare using the right sclerite R2 belong to three neighboring Caribbean islands (Cuba, Hispaniola, and Puerto Rico) and appear closely related.

Although our findings and comparisons serve to describe this new species, they also confirm the need to analyze the genitalia of a larger number of *Pelmatosilpha* and *Eurycotis* species from different geographical areas, to clearly assess the boundaries between those two genera.

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