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ANIMAL SCIENCE

Review of the Brazilian species of the genus *Climaciella* Enderlein (Neuroptera: Mantispidae), with the description of two new species

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Abstract: *Climaciella* Enderlein is a genus of the family Mantispidae (Neuroptera) restricted to the New World with records ranging from southern Canada to northern Argentina. The genus is currently represented by 12 valid species, three of them with records from Brazil: *C. amapaensis* Penny, *C. duckei* Navás, and *C. semihyalina* (Le Peletier & Audinet-Serville). Besides the relatively low number of species from Brazil, it is known that *Climaciella* species present some historical taxonomic problems. In this sense, the main goal of this study was to taxonomically revise the *Climaciella* species from Brazil, providing detailed (re)descriptions and illustrations of all species, an updated distribution map, and an identification key to the whole genus. The study resulted in some new taxonomic acts: *C. tincta* (Navás) is revalidated and *C. duckei* is considered a new synonym of *C. tincta*; two new species are described: *Climaciella hoffmani* **sp. nov.** and *Climaciella pennyi* **sp. nov.**

Key words: mantisflies, lacewings, taxonomy, distribution maps, identification keys.

INTRODUCTION

The family Mantispidae Leach (Neuroptera) is currently represented by nearly 400 extant species with a worldwide distribution (Ohl 2004, Oswald & Machado 2018). The family is traditionally divided into four subfamilies: Calomantispinae, Drepanicinae, Mantispinae and Symphrasinae. However, recent molecular and morphological phylogenetic studies had recovered the family paraphyletic, with Symphrasinae closely related to Rhachiberothidae which was transferred to the latter (Winterton et al. 2018, Ardila-Camacho et al. 2021). According to the new classification Drepanicinae and Mantispinae are recorded from Brazil with a total of 34 species (13 endemic) and ten genera, with Mantispinae accounting for 31 species and nine genera (Machado & Martins 2022).

Among the Brazilian Mantispinae the genus *Climaciella* Enderlein highlights because of its large and colorful species. The genus is restricted to the New World with distribution ranging from southern Canada to northern Argentina, and is currently represented by 12 valid species: *C. amapaensis* Penny, *C. brunnea* (Say), *C. cubana* Enderlein, *C. duckei* Navás, *C. elektroptera* Ardila-Camacho et al., *C. nigriflava* Ardila-Camacho et al., *C. obtusa* Hoffman, *C. personata* (Stitz), *C. porosa* Hoffman, *C. rafaeli* Calle et al., *C. risaraldensis* Ardila-Camacho, and *C. semihyalina* (Le Peletier & Audinet-Serville) (Ohl 2004, Oswald 2022, Ardila-Camacho et al. 2023).

Only three of these species are recorded from Brazil: *C. amapaensis* with records to the states of Amapá and Amazonas; *C. duckei* with records to the states of Amazonas and Pará; and *C. semihyalina* known from Amazonas, Espírito Santo, Paraná, Rio de Janeiro, Santa

Catarina, and São Paulo (Machado & Martins 2022). Among these three species *C. semihyalina* was the first recorded from Brazil, in fact, it was the first Neuroptera species recorded from the country (Machado & Martins 2022); it was originally placed in the genus *Mantispa* Illiger, but subsequently transferred to *Climaciella* by Handschin (1960).

The other two species were recorded from Brazil by Penny (1982) who revised the Amazonian species of Mantispidae and reported *C. duckei* from Brazil for the first time, and described *C. amapaensis*. However, as indicated by Hoffman (1992) in his unpublished thesis, some of the synonyms proposed by Penny (1982) were problematic, additionally undescribed species of *Climaciella* were known from Brazil. The last taxonomic review related to the Brazilian Mantispinae, Machado & Rafael (2010), did not address *Climaciella*. The aim of this work is to revise the Brazilian species of *Climaciella*, providing detailed descriptions and illustrations of the species, including two new species, updated distribution maps and an identification key to all *Climaciella* species.

MATERIALS AND METHODS

Examined material

The 29 analyzed specimens came from different insect collections, see list below. Name-bearing specimens of all valid and invalid species were studied locally or by high resolution images, but see discussion under *C. semihyalina*.

Identification and illustration

The genitalia of some specimens were studied following the protocol of Cumming (1992), the tip of the abdomen was cut out and placed in lactic acid 85%. Later the terminalia was transferred to glycerin and analyzed under a stereomicroscope (MOTIC SMZ -168). After examination. the dissected pieces were placed in microvials with glycerin, which were pinned under the original specimen. Terminology follows Breitkreuz et al. (2017) for wing venation and Lambkin (1986a, b) for genitalia.

Specimens were identified by identification keys, original descriptions, comparison with type specimens and illustrations in the literature (Penny 1982, Penny & Costa 1983, Hoffman 2002, Ardila-Camacho & Garcia 2015, Ardila-Camacho et al. 2018).

Images of the different species were taken using a LEICA M165C stereomicroscope and an automated Leica MC170HD camera, accompanying Leica software for z-stacking images. A Nikon D7100 camera was used for larger specimens. The software Adobe Photoshop CC 2015 was used to edit the images and to create the plates.

Acronyms and abbreviations

- CEUFT: Coleção de Entomologia da Universidade Federal do Tocantins, Porto Nacional, Tocantins, Brazil.
- DZUP: Coleção Entomológica Padre Jesus Santiago Moure, Universidade Federal do Paraná, Curitiba, Paraná, Brazil.
- INPA: Coleção de Invertebrados do Instituto Nacional de Pesquisas Amazônia, Manaus, Amazonas, Brazil.
- MCZ: Museum of Comparative Zoology, Cambridge, Massachusetts, USA.
- MNHN: Museum National d'Histoire Naturelle, Paris, France.
- MZUSP: Museu de Zoologia da Universidade de São Paulo, São Paulo, Brazil.
- NHMUK: The Natural History Museum, Londres, UK.
- NMBE: Naturhistorisches Museum, Bern, Switzerland.
- SDMC: San Diego Natural History Museum, San Diego, USA.
- ZMHB: Museum für Naturkunde der Humboldt Universität, Berlin, Germany.

cat. = catalogue, cit. = citation, desc. = original description, diag. = diagnosis, list. = list, redesc. = redescription, syn. = synonym, transf. = transference.

RESULTS

A total of five *Climaciella* species were analyzed and resulted in following actions: (I) revalidation as a separate species and redescription of *Climaciella tincta* (Navás, 1914) **stat. rev.**; (II) synonym of *Climaciella duckei* Navás, 1915 (**syn. nov.**) with *C. tincta*; (III) redescription of *C. amapaensis* Penny, 1982 and *C. semihyalina* (Le Peletier & Audinet-Serville, 1825); (IV) and the description of two new species: *Climaciella hoffmani* **sp. nov.** and *Climaciella pennyi* **sp. nov.**.

All species were (re)described including the genitalia. The genitalia of *C. tincta* and the female genitalia of *C. amapaensis* are described for the first time. The distribution of all species was revised (Fig. 4) and the new records are indicated with a "*" in text. Only *C. amapaensis* did not have its distribution expanded within the Brazilian territory.

TAXONOMY

Family Mantispidae Leach, 1815
Subfamily Mantispinae Leach, 1815
Genus *Climaciella* Enderlein, 1910

Type species: *Mantispa brunnea* Say in Keating, 1824: 309.

***Climaciella amapaensis* Penny, 1982**

(Figs 1-3)

Climaciella amapaensis Penny 1982: 450 (desc.); Penny & Costa 1983: 670 (redesc.); Ohl 2004: 166 (cat.); Machado & Rafael 2010: 6 (cit.); Brûlé et al. 2011: 224 (list.); Ardila-Camacho & García 2015: 432 (redesc.); Ardila-Camacho et al. 2018: 321 (list.); Machado & Martins 2022 (list.); Oswald 2022 (cat.); Ardila-Camacho et al. 2023: 44 (diag.).

Material Examined

Holotype (Fig. 3)

♂, BRAZIL: Amapá: Serra do Navio, 05.iii.1963, Mielke col., DZUP 381424, (DZUP).

Other material

(1♂, 1♀) BRAZIL: **Amazonas**: Manaus, Estrada ZF2, 1.xi.2005, arm. Luz móvel, J.A. Rafael, F.F. Xavier, R.J.P. Machado, A.A. Agudelo, Y.K. Dantas (1♀ INPA); Presidente Figueiredo, AM 240, km - 24,

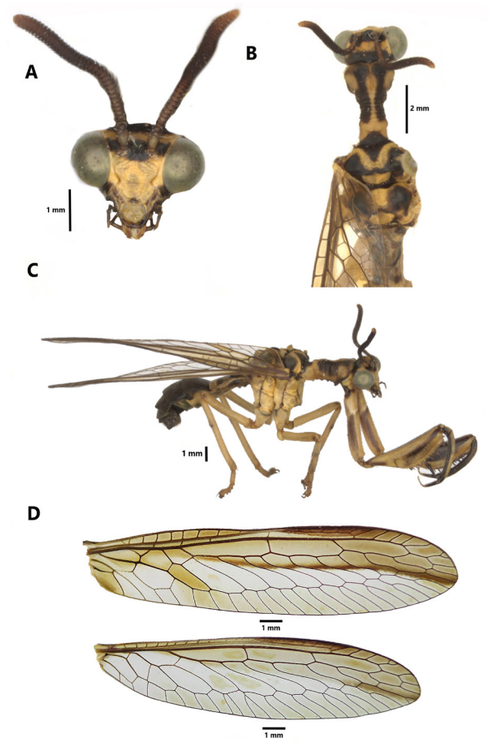

Figure 1. *Climaciella amapaensis*: head, frontal view (a); head and thorax, dorsal view (b); habitus, lateral view (c); fore and hind wings (d).

02°01'05''S – 59°49'40''W, 1-12.ix.2002, luz mista mercúrio, F.F. Xavier Filho, U.C. Barbosa (1♂ INPA).

Diagnosis

The body of *C. amapaensis* is predominantly yellow distinguishing it from the predominantly black species: *C. elektroptera*, *C. hoffmani* **sp. nov.**, *C. obtusa*, *C. porosa*, *C. rafaeli*, *C. semihyalina*, and *C. tincta*. The pronotum of *C. amapaensis* is also predominately yellow with some dark marks, separating it from the species with the pronotum mostly brown to black, with smaller yellow areas: *C. brunnea*, *C. cubana*, *C. personata*, and *C. risaraldensis*. The entirely yellow to light brown frons and vertex in the head of the remaining two species, *C. pennyi* **sp. nov.**, and *C. nigriflava*, distinguishes them from *C. amapaensis* that presents conspicuous black lines in these areas.

Redescription

Head (Fig. 1a-b). Yellow with black areas, vertex yellow with a transverse black line ending before the ocular margins. Frons yellow with a

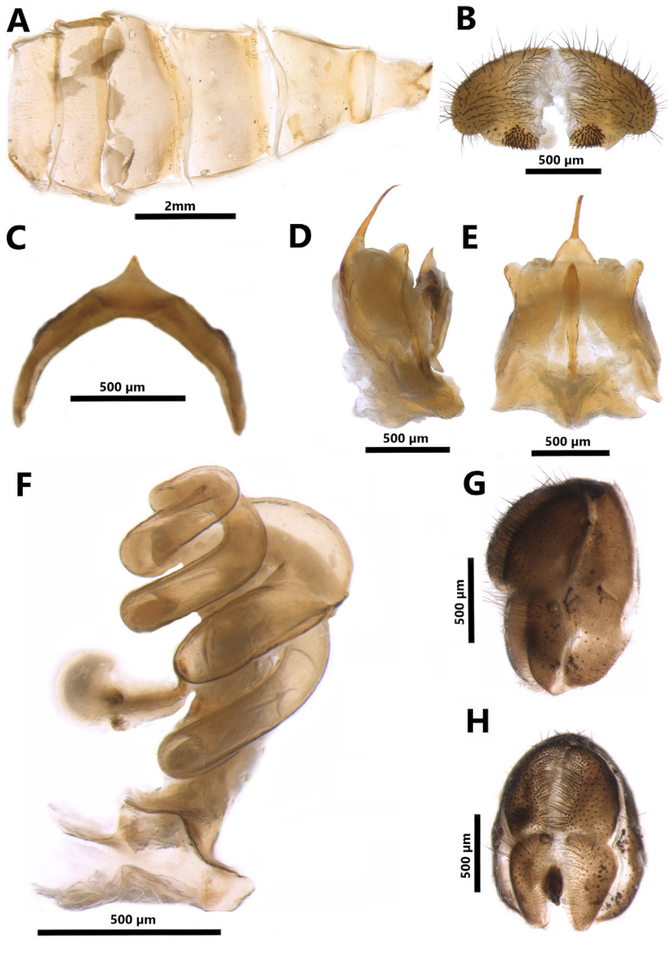

Figure 2. ***Climaciella amapaensis*****: male abdomen, dorsal view (a); male ectoprocts, posterior view (b); male gonarcus, dorsal view (c); male genitalia, lateral view (d); male genitalia, ventral view (e); female spermatheca, lateral view (f); female terminalia, lateral view (g); female terminalia, posterior view (h).**

broad transverse black band over interantennal region, reaching the ocular margins. Clypeus and labrum yellow, with a small black mark between them. Mandibles black, maxillary and labial palps black. Antennae: scape amber, pedicel black, flagellum black except for the final segments, yellow.

Thorax (Fig. 1b-c). Yellow, with black spots and marks. Prothorax with the dorsal margin irregular, with small bumps, in lateral view. Pronotum in dorsal view yellow with two mesad longitudinal black bands from the anterior margin to the final 1/3; anteriorly pointed triangle at the posterior margin; set with yellow setae spread at the dorsal surface. Mesonotum with a black triangle in the anterior margin, and a U-shaped, black mark in the posterior margin in dorsal view. Metanotum yellow with laterodorsal black spots. Pteropleura yellow.

Legs (Fig. 1c). Foreleg: coxa yellow with a longitudinal black line laterally; trochanter yellow; femur internal surface mostly black with the ventral margin yellow, external surface mostly yellow with a medial longitudinal black line, and a small black mark at the base, basal spine black, remaining yellow; tibia yellow dorsally and black ventrally; tarsi black but yellow distally. Mid and hind leg yellow, with few small dark marks in the femur and tibia.

Wings (Fig. 1d). Forewing length: 14-15mm; membrane mostly amber but darker at the anterior half, including the 1M-3M cells and all RA cells; pterostigma dark amber set with small setae; subcostal space dark amber; cells 1RA and 2RA with similar lengths, and longer than cell 3RA; seven to eight subcostal veinlets. Hind wing similar to the forewing in color.

Abdomen (Figs. 1c-2a). Tergites I-III and sternites I-IV yellow with irregular black spots; remaining sclerites black. Male tergites IV and V with two lines of small pores anterolaterally; tergite IV with nine pores and V with 12 pores in each line.

Male terminalia (Fig. 2b-e). Ectoproct ovoid in dorsal view; ventromedial lobe partially sclerotized, bearing approximately 50 thick short setae. Gonarcus medial lobe prominent, acute, much shorter than pseudopenis. Gonocoxites as long as mediuncus in dorsal view, longer than gonarcus in lateral view; posterior margin rounded, enlarged in lateral view; anterior and posterior margins curving outside in dorsal view. Mediuncus with apical projections reduced, in dorsal view associated with the gonarcal membrane, straight in ventral view, but curved in lateral view. Hypomeres resemble two small, sclerotized granules located anterolaterally in the pseudopenal membrane. Pseudopenis sclerotized, long, thin, acute, and with the tip

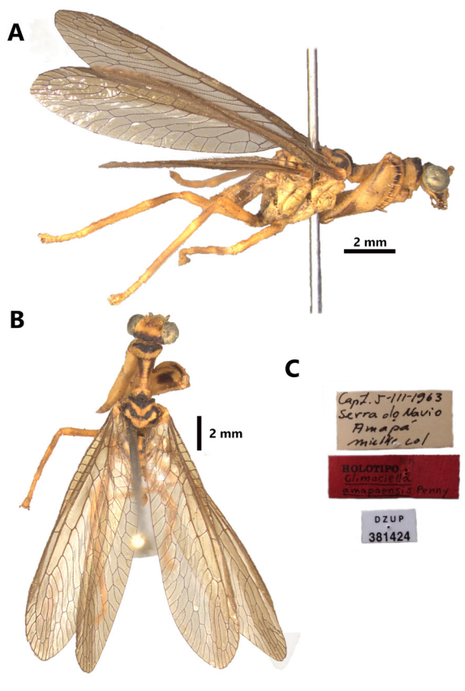

Figure 3. ***Climaciella amapaensis*** **Holotype: habitus, lateral view (a); habitus, dorsal view (b); labels (c).**

curving upwards in lateral view. Pseudopenal membrane with small lateral spines.

Female terminalia (Fig. 2f-h). Ectoproct larger than gonocoxite in lateral view, ovoid in posterior view. Gonocoxite triangular in posterior view. Spermatheca duct larger at base and coiled. Fertilization channel thin, with a well-developed capsule, covered by minuscule setae, and a small sclerotized protuberance at the apex.

Remarks

Climaciella amapaensis was described by Penny (1982) based solely on the male holotype. Hoffman (1992) mentioned that the holotype was lost, but it is deposited at DZUP (DZUP 381424) as mentioned in the original description (Penny 1982). It is in good condition, with genitalia dissected and stored in a microvial with glycerin (Fig. 3).

The female specimen is herein described for the first time to this species, and the shape of the ectoprocts and gonocoxites follow the overall shape of its congeneric species. In Brazil the species is restricted to the Amazon region with records to the states of Amapá and Amazonas Machado & Martins (2022). Ardila-Camacho & García (2015) recorded the species from Colombia for the first time, and provided a redescription and some images. However, more recently, Ardila-Camacho et al. (2023) reanalyzed this same specimen from Colombia and decided that it belongs to a new species, based on the size of the compound eyes and gena, color of the pronotum and the forked apex of the mediuncus in the male genitalia, and named it as *C. risaraldensis*. At the same time Ardila-Camacho et al. (2023) registered *C. amapaensis* to French Guiana for the first time, and discussed a previous record of the species from Peru. *Climaciella amapaensis* is easily identified and does not present any taxonomic problem since its description. The species coloration, with predominant yellow, is somewhat similar to *C. pennyi* **n. sp.**, *C. nigriflava*, and *C. risaraldensis* but easily distinguishable by the diagnostic characters.

Distribution (Fig. 4): Brazil (Amapá, Amazonas), Peru, French Guiana.

Climaciella hoffmani new species

(Figs 5-6)

Material Examined

Holotype

♂, BRAZIL: Maranhão: Cândido Mendes, Fazenda 7 irmãos, 01°51'37"S – 45°46'10"W, 3-06.x.08, Armad. Luminosa, F.L. Oliveira et. al. (INPA).

Paratypes:

(2♂, 1♀). BRAZIL: **Amazonas:** Reserva Ducke, 14.vi.1979, J. Arias (1♂ INPA); Presidente Figueiredo, Am-240 - Km 24, 02°01'05"S – 59°49'60", 14-18. ix.09, lençol iluminado, F.F. Xavier Filho; A. Paladini; A.C. Pires; F.W. Leivas leg. (1♀ INPA); **Rondônia**: Itapuã do Oeste, Flona do Jamari, 110m, 9.260°S - 62.913°W, 4.ix.2012, armadilha luminosa, Cavichioli, Melo, Rosa & Santos, DZUP 602118 (1♂ DZUP).

Diagnosis

The body *C. hoffmani* **sp. nov.** is predominantly dark brown to black distinguishing it from predominantly yellow to light brown species: *C. amapaensis, C. brunnea*, *C. cubana*, *C. pennyi* **sp. nov**, *C. nigriflava, C. personata*, and *C. risaraldensis*. The forewing of *C. hoffmani* **sp. nov.**, has the anterior half light amber, separating it from *C. obtusa* and *C. semihyalina*, which present most of their forewings dark amber. The lighter mid and hind tibia of *C. hoffmani* **sp. nov.** separates it from *C. elektroptera*, *C. rafaeli*, and *C. tincta*. The only remaining species is *C.*

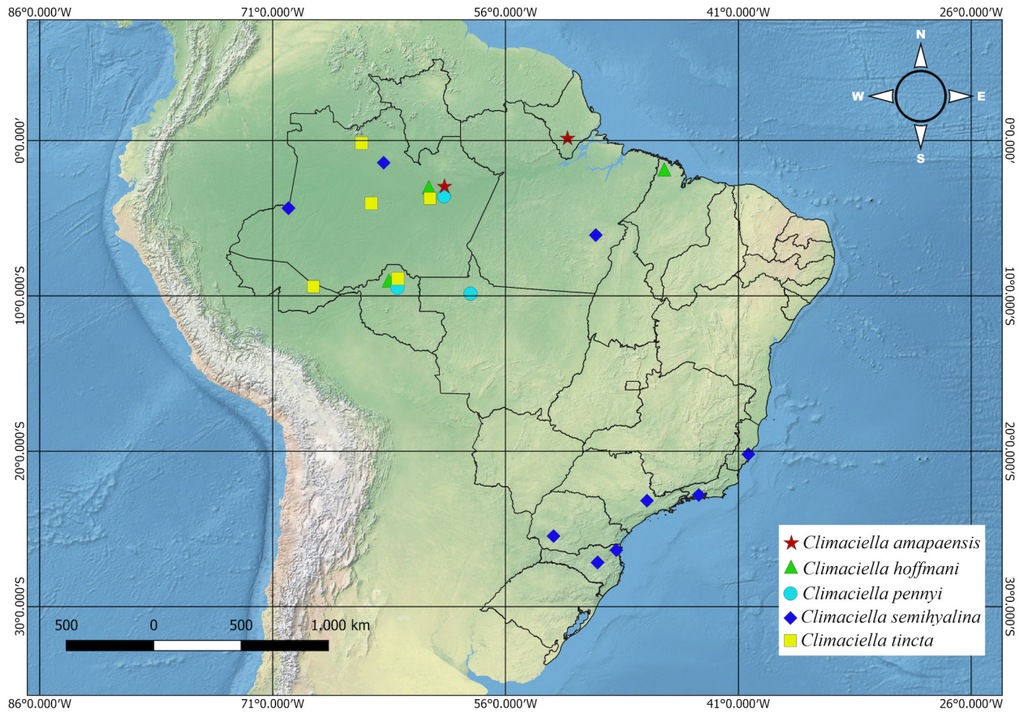

Figure 4. Distribution map of the *Climaciella* species from Brazil.

porosa, which can be separate from *C. hoffmani* **sp. nov.** by the presence of a prominent bump in the medial region of the pronotum (absent in *C. hoffmani* **sp. nov**), and by the pseudopenis shorter than pseudopenal membrane in the male genitalia (longer in the new species).

Description

Head (Fig. 5a, c). Dark brown to black, except for the yellow ocular margins and small yellow marks at vertex. Frons dark brown to black, with yellow margins, some specimens with a small yellow central mark. Clypeus and labrum brown with extremities yellow. Mandibles black, maxillary and labial palps black with yellow rings. Antennal scape and pedicel light brown to yellow, flagellum black except by the last segments, yellow.

Thorax (Fig. 5b-c). Prothorax gently curved with the dorsal margin irregular, with small bumps, in lateral view; entirely dark brown to black except by a small rounded yellow mark on the posteroventral area; pronotum covered with yellow setae on the dorsal surface. Pterothorax dark brown to black, margins of pleural yellow in some specimens, dark in others.

Legs (Fig. 5b-d). Foreleg: coxa dark brown to black, slightly lighter in the area where the coxa meet the trochanter; trochanter dark brown to black; femur dark brown to black (with the basal region yellow in some specimens), femoral spines, including the basal spine, dark brown to black with the apex yellow; tibia dark brown to black (external margin yellow in some specimens); tarsi dark brown to black with the distal extremity yellow. Mid and hind legs with

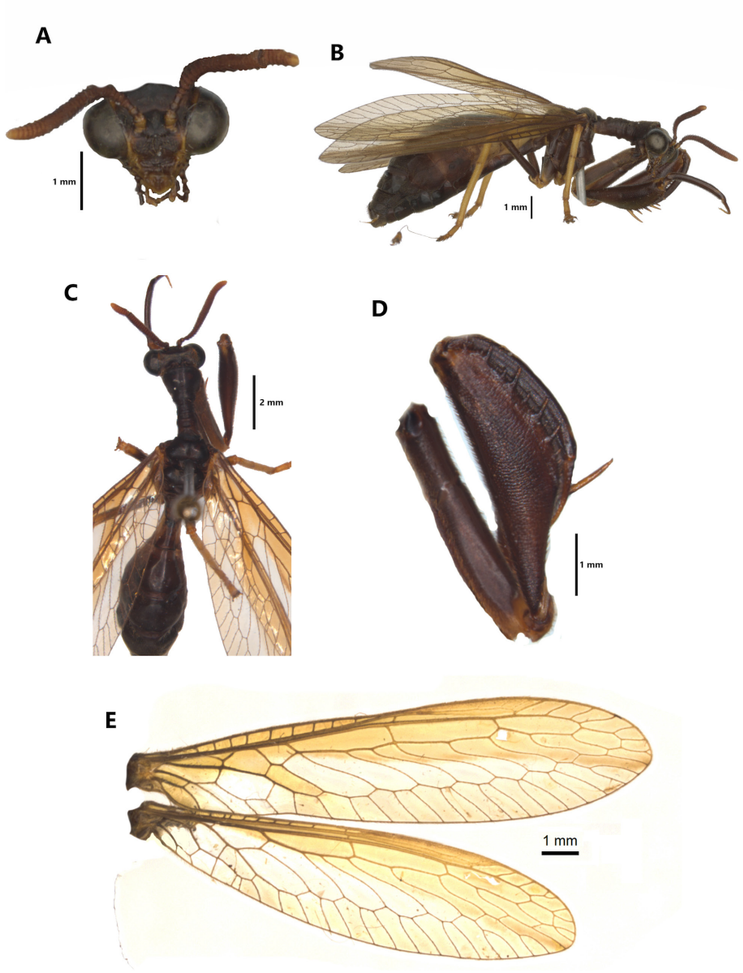

Figure 5. ***Climaciella hoffmani*** **sp. nov.**: head, frontal view (a); habitus, lateral view (b); habitus, dorsal view (c); fore leg external face (d); fore and hind wings (e).

coxa and femur dark brown to black, except by the yellow distal end of the femur; trochanter, tibia and tarsi lighter than femur, varying from light brown to yellow in different specimens.

Wings (Fig. 5e). Forewing length 10-12 mm; membrane mostly amber, with a large dark light amber mark on the anterior half that extends from the cell 1AA to the apex, including the 2M and 3M cells; pterostigma dark amber with short seta; subcostal space dark amber; cell 1R reduced; cells 1RA and 2RA similar in size and longer tha 3RA; cell 1AP with a black mark at base; nine subcostal veinlets. Hind wing similar to forewing in color; ten subcostal veinlets.

Abdomen (Figs. 5b-c-6a). predominantly dark brown to black, proximal third of pleural membrane yellowish, remaining sclerites dark brown to black. Male tergites IV and V with two rows of pores anterolaterally; each row composed of two lines of elliptical pores; tergite IV rows with approximately 20 pores in each row and approximately 25 on the tergite V rows.

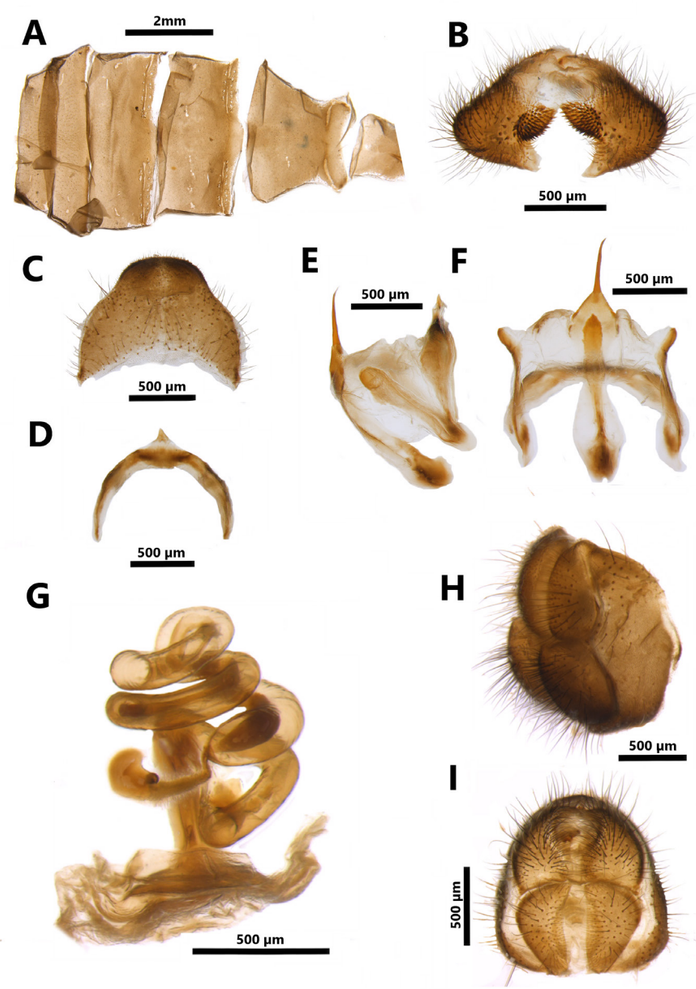

Figure 6. ***Climaciella hoffmani*** **sp. nov.**: male abdomen, dorsal view (a); male ectoprocts, posterior view (b); male IX sternite, ventral view (c); male gonarcus, dorsal view (d); male genitalia, lateral view (e); male genitalia, ventral view (f); female spermatheca, lateral view (g); female terminalia, lateral view (h); female terminalia, posterior view (i).

Male terminalia (Fig. 6b-f). Ectoproct ovoid in dorsal view, ventromedial lobe partially sclerotized and covered by 65 short thickened setae. Sternite IX broader than long and trapezoid. Gonarcus median lobe short, slender and acute, shorter than pseudopenis in lateral view. Gonocoxite straight and as long as gonarcus in lateral view; with rounded apex; in dorsal view with the posterior end curving outwards. Mediuncus in dorsal view with the basal half broader than the apical half; in lateral view the base is straight and the apical margin is rounded. Hypomeres as large sclerotized granules on each side of the pseudopenal membrane. Pseudopenis sclerotized, long, slender, acute, mostly straight but gently curving upwards at the apex.

Female terminalia (Fig. 6g-i). Ectoproct shorter than gonocoxite in lateral view, drop shape in posterior view. Gonocoxite triangular in

posterior view. Spermatheca duct broad basally and coiled. Fertilization channel thin; capsule well developed and slender, covered by short setae and with a sclerotized protuberance in the distal margin.

Remarks

Climaciella hoffmani **sp. nov.** has a predominantly dark brown to black body, similar to *C. semihyalina* and *C. tincta*, perhaps the reason why Penny (1982) and Penny & Costa (1983) identified the male paratype from Amazonas of *Climaciella hoffmani* **sp. nov.** as *C. duckei* (herein synonymized with *C. tincta*). As in the comments section of *C. tincta*, Penny did not have access to the *C. duckei* holotype, which might have caused some taxonomic confusion. However, the new species and *C. tincta* are very different: the wing membrane of *C. tincta* is much lighter than the wings of *C. hoffmani* **sp. nov.**, and the color pattern of the legs is also different. Furthermore, the male genitalia of *C. hoffmani* **sp. nov.** is easily distinguishable, particularly the shape of the pseudopenis, which is long, slender, and straight with just the tip gently curving upwards in lateral view. The body and wings colors are also different from *C. elektroptera*, *C. obtusa*, *C. porosa* and *C. rafaeli*, the other mostly dark species in the genus.

The color of the male paratype from Rondônia state is slightly different from the other specimens. It has some additional yellow marks on the head and fore legs, and mid- and hind legs the tarsi are brown to light brown, but yellow in the remaining specimens. Despite these differences, the overall shape of the male genitalia is identical, suggesting a single species.

Climaciella hoffmani **sp. nov.** to some extent matches the description of a specimen bearing the unpublished and therefore invalid name "*Climaciella procurva*" from the thesis of Hoffman (1992). While the wings of *C. hoffmani* **sp. nov.** are particularly similar to the Hoffman's description, the legs are quite different. As per Hoffman (1992), the specimen is deposited in SDMC. All attempts to contact the author or the collection facility were unsuccessful and the specimen could thus not be examined. The description of *C. hoffmani* **sp. nov.** might therefore include what Hoffman referred to as "*Climaciella procurva*", but since this could not be established, the name could not be used which led to the erection of *C. hoffmani* **sp. nov.** in honor of the descriptor.

Etymology: Named after Dr. Kevin M. Hoffman who immensely contributed to the knowledge of the New World Mantispidae.

Distribution (Fig. 4): Brazil (Amazonas, Maranhão, Rondônia).

Climaciella pennyi **new species**

(Figs. 7-8)

Material Examined

Holotype

♂, BRAZIL: Mato Grosso: Cotriguaçu, Faz. São Nicolau, 09.8559°S, 58.2486°W, 230m, light trap, 26-29.vi.2017, RR Cavichioli & AC Domahovski, DZUP 381630 (DZUP).

Paratypes

(2♂, 1♀, 1 specimen without terminalia). BRAZIL: **Amazonas**: Manaus, Reserva Ducke, 4.xi.76 (1? INPA); **Rondônia**: Itapuã do Oeste, Flona do Jamari, 110m, 9.260°S - 62.913°W, 4.ix.2012, armadilha luminosa, Cavichioli, Melo, Rosa & Santos (2♂, 1♀ DZUP).

Diagnosis

The body of *C. pennyi* **sp. nov.** is predominantly light brown, distinguishing it from the predominantly black species: *C. elektroptera*, *C. hoffmani* **sp. nov.**, *C. obtusa*, *C. porosa*, *C.*

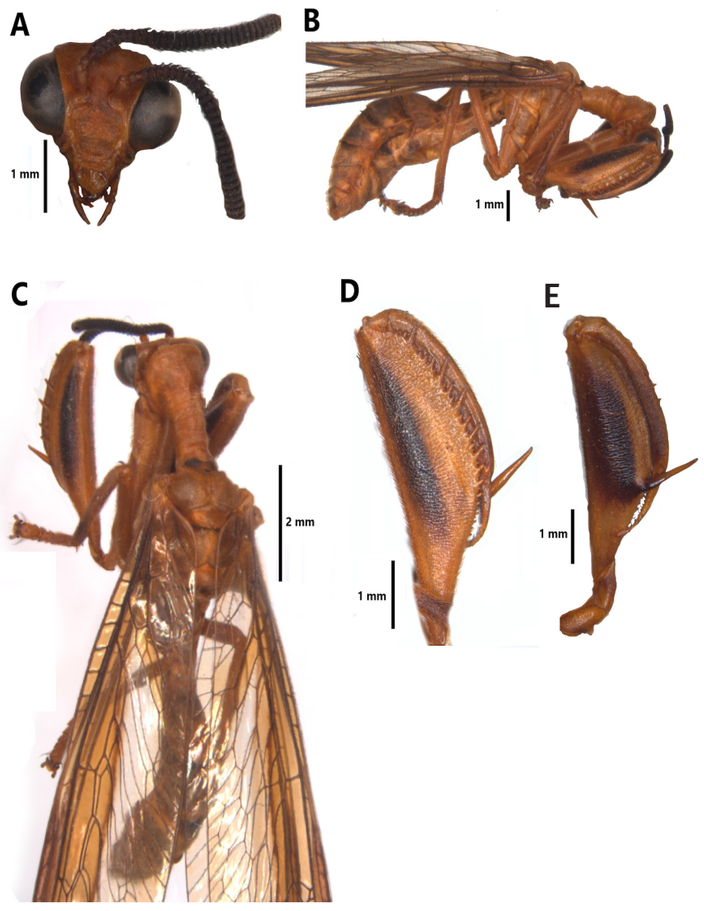

Figure 7. ***Climaciella pennyi*** **sp. nov.: head, frontal view (a); habitus, lateral view (b); habitus, dorsal view (c); fore femur external face (d); fore femur internal face (e).**

rafaeli, *C. semihyalina*, and *C. tincta*. The head of *C. pennyi* **sp. nov.** without black or dark brown marks/areas in the frons and vertex separates it from *C. amapaensis, C. brunnea*, *C. cubana*, *C. personata*, and *C. risaraldensis*. The only remaining species is *C. nigriflava*, which can be separate from *C. pennyi* **sp. nov.**, by the presence of large black spots at the thorax in dorsal view (absent in the new species), and the shape of the male pseudopenis that is longer than the gonocoxite, highly bent upwards, and with the apex truncate in *C. nigriflava*, but shorter than the gonocoxite, gently curving upwards, and with acute apex in *C. pennyi* **sp. nov.**.

Description

Head (Fig. 7a). Head entirely light brown, except for two small dark brown to black spots near the mandible base. Clypeus and labrum light brown. Mandibles dark brown, maxillary and labial palps light brown. Antennal scape and pedicel light brown, flagellum black.

Thorax (Fig. 7b-c). Prothorax slightly curved with the dorsal margin irregular, with small bumps, in lateral view. Pronotum light brown

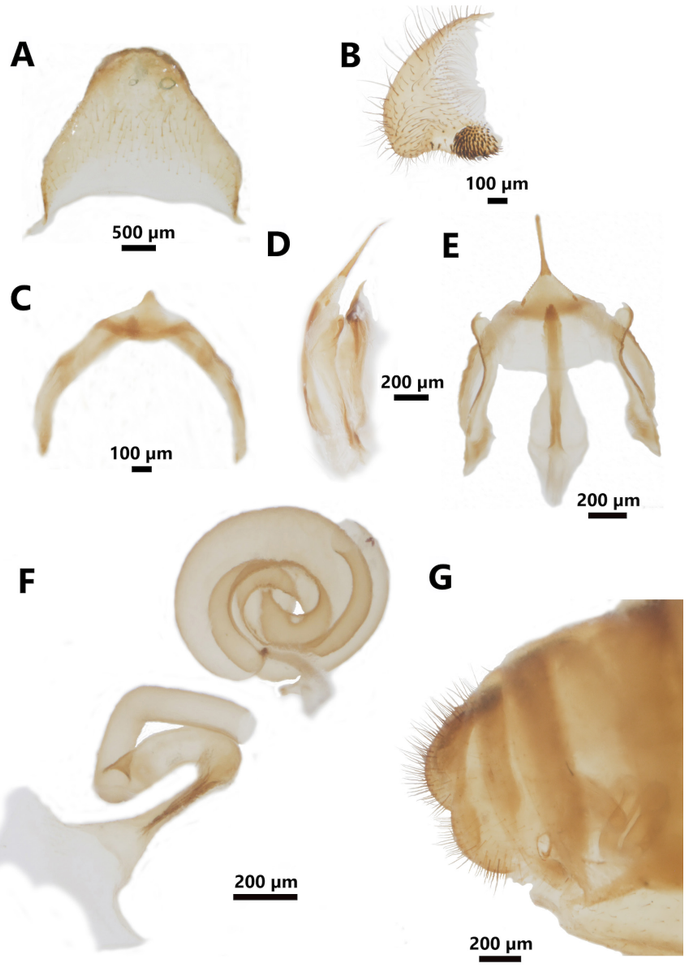

Figure 8. ***Climaciella pennyi*** **sp. nov.: male sternite IX, ventral view (a); male ectoproct, posterior view (b); male gonarcus, dorsal view (c); male genitalia, lateral view (d); male genitalia, ventral view (e); female spermatheca (f); female terminalia, lateral view (g).**

except for a small dark brown spot at the posterodorsal margin, covered with scattered yellow short setae. Pterothorax light brown.

Legs (Fig. 7b-e). Foreleg: coxa light brown with the lateral surfaces partially dark brown; trochanter light brown, femur light brown with a large dark brown mark at the lateral surfaces, being the mark in the internal surface larger; femoral spines light brown with apex darker; basal spine dark brown basally and brown in the remaining; tibia light brown with posterior half darker. Tarsi light brown, except for the first tarsomere, dark brown. Mid and hind legs light brown with the apex of tibia and tarsi dark brown.

Wings (Fig. 7c). Forewing length 10-12 mm. Membrane mostly hyaline, with a large amber mark at the anterior half, extending from cell 1M to the apex, slightly darker at posterior margin; pterostigma dark amber with short

setae; subcostal space amber; cells 1RA and 2RA similar in size and larger than 3RA; cell 1AP with a black mark at base; eight to nine subcostal veinlets. Hind wing similar to forewing in color, four to six subcostal veinlets.

Abdomen (Figs. 7b). Predominantly light brown with small black spots scattered in all sclerites, with larger spots at the posterior tergites. Male tergites IV and V with two rows of pores anterolaterally; each row composed of two lines of approximately 20 elliptical pores each.

Male terminalia (Fig. 8a-e). Ectoproct ovoid in dorsal view, ventromedial lobe partially sclerotized and covered by more than 80 short thickened setae. Sternite IX broader than long and trapezoid; posterior margin rounded. Gonarcus median lobe short, slender and acute, shorter than pseudopenis in lateral view; triangular in dorsal view. Gonocoxite in lateral view with posterior region enlarged and slightly curved; in ventral or dorsal view with a small medial inward curvature and with apex rounded. Mediuncus in dorsal view with the basal half enlarged; in lateral view curved. Hypomeres resemble two small, sclerotized granules located anterolaterally in the pseudopenal membrane. Pseudopenis sclerotized, slender, acute, in lateral view straight but gently curving upwards at the apex.

Female terminalia (Fig. 8f-g). Ectoproct and gonocoxite about the same length in lateral view. Spermatheca duct broad basally and coiled. Fertilization channel thin; capsule well developed and slender, covered by short setae and with a sclerotized protuberance in the distal margin.

Remarks

Based on its color pattern *Climaciella pennyi* **sp. nov.** can be related to the other *Climaciella* species with body color predominantly yellow to light brown, like: *C. amapaensis*, *C. brunnea*, *C. cubana*, *C. nigriflava*, and *C. risaraldensis*. However, the major difference between the new species and these other five species is that its head and thorax are almost completely light brown, with only small dark marks, differing from the other species that present some very specific conspicuous dark marks, particularly at the thorax. *Climaciella pennyi* **sp. nov.** wing coloration is somewhat more similar to *C. amapaensis*, but the RP is curved in the new species, and straight in *C. amapaensis*. The general shape of the female genitalia fits the overall pattern of the genus, but the male genitalia can be used to separate *C. pennyi* **sp. nov.** from its congeners, particularly the medial curvature of the gonocoxite in dorsal view. In this sense, we confidently present *Climaciella pennyi* as a new species known by the holotype and four paratypes.

Etymology: Named after Dr. Norman D. Penny who immensely contributed to the overall knowledge of Neuroptera, particularly in Brazil.

Distribution (Fig. 4): Brazil (Amazonas, Mato Grosso, Rondônia).

Climaciella semihyalina (Le Peletier & Audinet-Serville, 1825)

(Figs 9-11)

Mantispa semihyalina Le Peletier & Audinet-Serville 1825: 270 (desc.); Rambur 1842: 434 (redesc.); Westwood 1852: 253 (diag.); Walker 1853: 214 (list.); Hagen 1861: 322 (list.); Hagen 1866: 428 (list.); McLachlan 1868: 261 (list.); Navás 1909: 473.

Euclimacia semihyalina: Enderlein 1910: 367 (transf.); Stitz 1913: 39 (redesc.); Navás 1926: 87 (list.); Navás 1927a: 27 (list.); Navás 1927b: 39 (list.); Navás 1928: 137 (list.); Navás 1930: 69 (cit. as *Euclimaria semihyalina*); Costa-Lima 1943: 85; Williner & Kormilev 1958: 9 (diag.); Handschin 1961: 258 (list.).

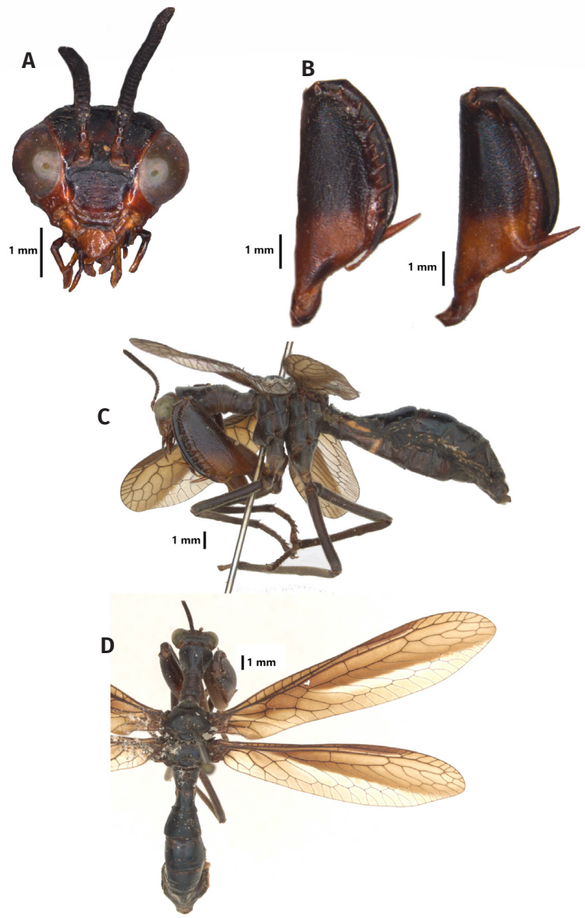

Figure 9. ***Climaciella semihyalina***: head, frontal view (a); fore femur external and internal face (b); habitus, lateral view (c); habitus, dorsal view (d).

Climaciella semihyalina: Handschin 1960: 554 (redesc./transf.); Stange 1967: 17 (list.); Penny 1977: 34 (list.); Poivre 1978: 194 (list.); Poivre 1982: 376 (list.); Penny 1982: 453 (redesc.); Penny & Costa 1983: 674 (redesc.); Poivre 1986: 87 (redesc.); Ohl 2004: 167 (cat.); Reynoso-Velasco & Contreras-Ramos 2008: 708 (list.); Reynoso-Velasco & Contreras-Ramos 2019: 274 (list.); Ohl 2012: 116 (cit.); Ardila-Camacho & García 2015: 438 (diag.); Ardila-Camacho et al. 2018: 313 (cit.); Gruppe et al. 2019: 250 (list.); Machado & Martins 2022 (list.); Ardila-Camacho et al. 2023: 56 (diag.).

Mantispa chalybea Erichson 1839: 160 (desc.); Burmeister 1839: 967 (*cit.*); Westwood 1852: 253 (syn. under *M. semihyalina*); Gerstaecker 1888: 113 (list.); Williner & Kormilev 1958: 9 (misspelling [M. chalibea]); Penny 1982: 453; Penny & Costa 1983: 674 (misspelling [M. chalybaea]); Ohl 2012: 108 (lectotype designation).

Material Examined

Whereabouts of the type specimen(s) of *Mantispa semihyalina* unknown.
Lectotype (Fig. 11) *Mantispa chalybea*: ♂, Brazil, ZMHB 940269 (ZMHB)

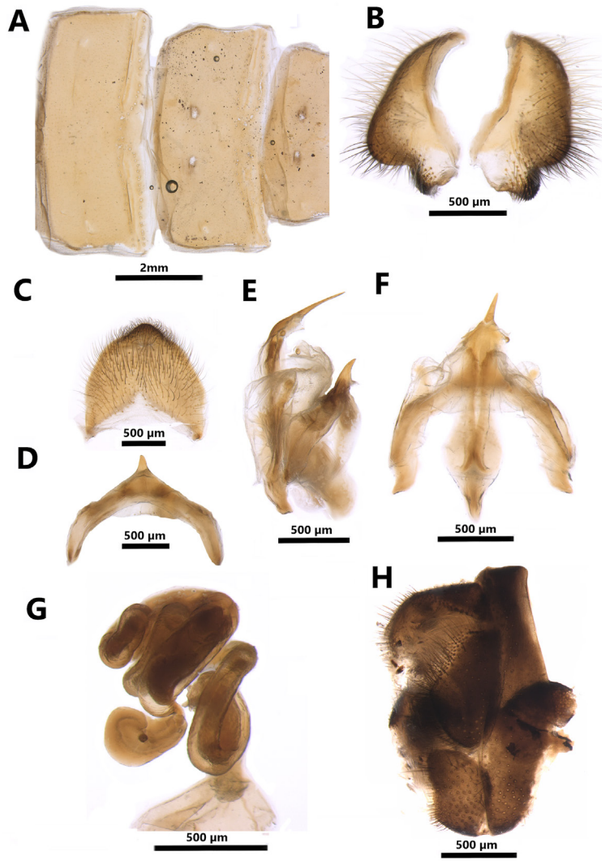

Figure 10. ***Climaciella semihyalina***: male abdomen, dorsal view (a); male ectoprocts, posterodorsal view (b); male IX sternite, ventral view (c); male gonarcus, dorsal view (d); male genitalia, lateral view (e); male genitalia, ventral view (f); female spermatheca, lateral view (g); female terminalia, lateral view (h).

Other material

(7♂; 5♀): BRAZIL: **Amazonas**: Barcelos, Igarapé Erere/Coruja, 00°06'16''N-63°51'01''W, 18-25.vi.2008, arm. luz, F.F. Xavier (1♂ INPA); Tabatinga, 041215S- 695432W, 3-8.ix.2005, arm. luz, J.A. Rafael e F.F. Xavier (1♀ INPA); **Pará**: Serra Norte, 3 ALFA, 16.x.1984, M.F. Torres (1♂ INPA). **Paraná**: Guarauna, 1940, DZUP 381306 (1♀ DZUP). **Rio de Janeiro**: Angra-Jussaral 3-025, Travassos F., DZUP 381305 (1♂ DZUP); Angra – Jussaral, II.1935, Travassos e O.T. Cica F. (1♂ INPA) **Santa Catarina**: Blumenau: Pq. Nac. Serra do Itajaí: Terceira Vargem: 27°03'S – 49°05'W, 390m, 24.i.2007, R.P. Hasckel (1♀ DZUP); Joinville, 22.iii.80 O. Mielke leg, DZUP 381307 (1♂ DZUP); Joinville, 10-220m, 2.iv.78. Miers leg., DZUP 381794 (1♂ DZUP); Joinville, 10-220m, 11.i.76. Mielke e Miers leg., DZUP 381795 (1♀ DZUP). **São Paulo**: Japi-Jundiaí, 30.iv.97, Nunes, L.B.M-Leg., DZUP 381308 (1♂ DZUP). PERU: **Cusco**: Quincemil, Central Eletrica, 13°17'03''S–70°46'53''W, 760m, 26.viii.2012, sweep. J.A. Rafael, R.R. Cavichioli (1♀ INPA).

Diagnosis

The body of *C. semihyalina* is predominantly black, distinguishing it from the predominantly yellow to light brown species: *C. amapaensis*, *C. brunnea*, *C. cubana*, *C. pennyi* **sp. nov**, *C. nigriflava*, *C. personata*, and *C. risaraldensis*.

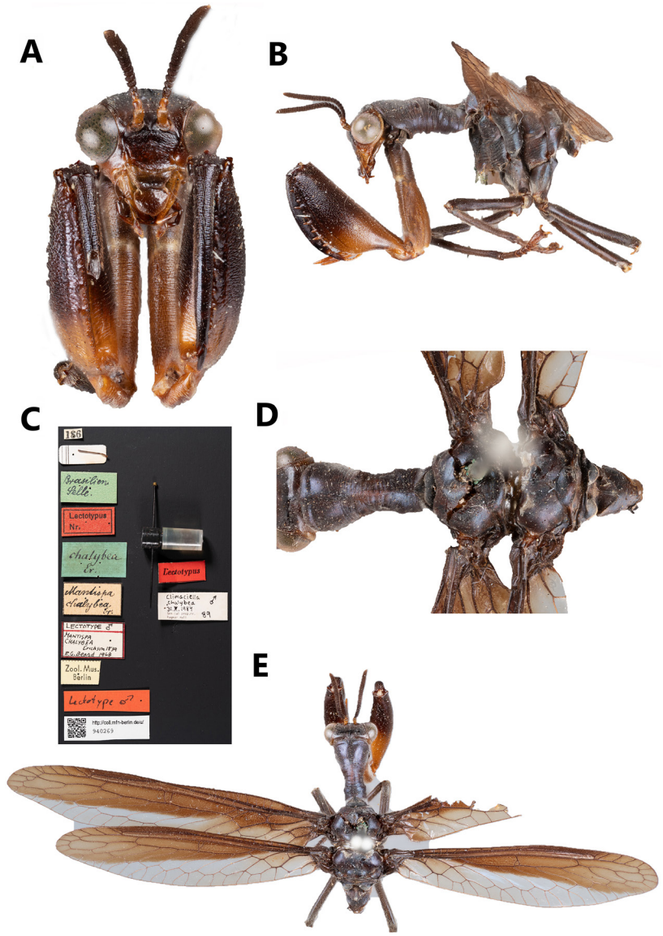

Figure 11. ***Mantispa chalybea*** **Lectotype: head and forelegs, frontal view (a); head and thorax, lateral view (b); labels (c); head and thorax, dorsal view (d); habitus, dorsal view (e).**

The forewing of *C. semihyalina* is almost entirely infuscate of dark amber, this separates it from *C. elektroptera*, *C. hoffmani* **sp. nov.**, *C. porosa*, *C. rafaeli*, and *C. tincta,* all with at most the anterior half of the wing amber. The only remaining species is *C. obtusa*, which also has the forewing almost entirely infuscate of dark amber, but with the posterior margin hyaline, differing from *C. semihyalina* that the posterior margin is amber. The shape of the male pseudopenis also distinguishes these two species, in *C. semihyalina* the its apex is acute and bent upwards, while in *C. obtusa* the apex is truncate and not bent upwards.

Redescription

Head (Fig. 9a, d). Black with ocular margins amber. Vertex black. Frons black with margins amber. Clypeus and labrum amber; mandibles amber; maxillary and labial palps black at base and remaining amber. Antennal scape amber, pedicel and flagellum black.

Thorax (Fig. 9c-d). Prothorax curved and with dorsal surface irregular in lateral view. Entirely black with some yellow setae across the pronotal surface.

Legs (Fig. 9b-c). Foreleg: coxa black with apex amber; trochanter amber; femur with the basal third amber and remaining black; basal spine amber, remaining minor spines black; tibia black; tarsi proximally black turning amber towards distal apex. Mid and hind legs black.

Wings (Fig. 9d). Forewing length: 10-20 mm; narrow with apex rounded. Membrane infuscate of dark amber with the posterior half lighter, including a small longitudinal hyaline line; pterostigma dark amber with short setae; cells 1RA and 2RA similar in size and longer than 3RA; 10-12 subcostal veinlets. Hind wing very similar to the forewing, but the basal portion of the posterior half is light amber; seven to ten subcostal veinlets.

Abdomen (Figs. 9c-d; 10a). Sclerites black except for the yellow lateral margins of tergite III and the posterior margin of sternite III; pleural membrane covered with small yellow spots; tergites IV and V with two rows of pores anterolaterally; each row with two long lines of elliptical pores with approximately 40 pores per tergite.

Male terminalia (Fig. 10b-f). Ectoproct ovoid in dorsal view, ventromedial lobe with approximately 40 short thickened setae. Sternite IX longer than broad and triangular. Gonarcus median lobe prominent and acute, broader than pseudopenis in lateral view, but shorter in dorsal view. Gonocoxite slightly curved, shorter than gonarcus and with apex rounded in lateral view; straight with a small medial curvature in dorsal view. Mediuncus with apical projection reduced, in dorsal view is broad but getting thinner near the apex, and in lateral view with basal margin curved. Hypomeres as small sclerotized granules on each side of the pseudopenal membrane. Pseudopenis sclerotized, short, narrow, acute and bent upwards in lateral view. Pseudopenal membrane without lateral spines.

Female terminalia (Fig. 10g-h). Ectoproct longer than gonocoxite in lateral view, and oval in posterior view. Gonocoxite rounded in posterior view. Spermatheca duct basally broad and coiled. Fertilization channel thin; capsule well developed, without setae and with a sclerotized protuberance in the distal margin.

Remarks

Mantispa semihyalina was described by Le Peletier & Audinet-Serville (1825) from Brazil. Fourteen years later Erichson (1839) described *Mantispa chalybea,* from Brazil and Suriname. Subsequently, Hagen (1861) synonymized *M. chalybea* with *M. semihyalina*. Enderlein (1910) described the genus *Euclimacia* and transferred *M. semihyalina* to it, where it was kept until the revision published by Handschin (1960), who transferred the species to *Climaciella*, which was followed in all subsequent publications

The type series of *C. semihyalina* remains a mystery; it is not known if it is a single holotype or several syntypes, the sex of the type(s) is unknown, the repository is unknown and the type locality is vague, Brazil. Le Peletier & Audinet-Serville (1825) did not indicate the number and sex of the examined specimen(s) nor did they mention a repository in the original description. Penny (1982) and Penny & Costa (1983) subsequently mentioned that the type location is unknown. Finally, Ohl (2004) in his catalogue stated: “holotype (or syntypes): sex unknown, Brazil (MNHN?)”, and indicated that he did not have access to the type material. Ardila-Camacho & García (2015) and Ardila-Camacho et al. (2018) mentioned that the type is probably a holotype that would be at MNHN, but they also did not have access to it.

We contacted MNHN about this possible type specimen(s) and received images of

one specimen collected in Brazil, labelled as *Mantispa semihyalina* Serv. and marked at the collection database as the holotype. While the specimen clearly fits *C. semihyalina* description the label data state "Sainte-Catherine Deyrolle 1847", negating the possibility of being the holotype. Sainte-Catherine certainly means the state of Santa Catarina in Brazil; and Deyrolle, probably refers to Narcisse Deyrolle, a French insect collector who was in Santa Catarina in that specific year, 1847, according to the Annales de la Société Entomologique de France, Séance du 27 Octobre 1847. Since the species was described 22 years before the collection date it cannot be the holotype. Most of the Serville collection is deposited at the Royal Belgian Institute of Natural Sciences today, but we did not get any feedback if the targeted holotype is deposited at this institution. We therefore consider the holotype/syntypes of *Mantispa semihyalina* as probably lost.

On the other hand, the history of types of *Mantispa chalybea* is better known. Erichson (1839) did not state the number and sex of the examined specimens, and did not explicitly designated a holotype, in the original description. However, Ohl (2004) established that the type series of *Mantispa chalybea* was composed of syntypes deposited in ZMHB and MCZC. Later, Ohl (2012) confirmed the presence of three male specimens at ZMHB from the type series and selected one of them as the lectotype (male ZMHB 940269 (Fig. 12)). The lectotype is in relatively good shape, with part of the right forewing missing, the hind legs are glued onto a card and the abdomen is preserved in glycerin (Fig. 11). We also studied images of the MCZC *Mantispa chalybea* syntype mentioned by Ohl (2004); it is a female with a red type label and is considered here as a paralectotype.

Distribution (Fig. 4). Brazil (Amazonas, Espírito Santo, Pará*, Paraná, Rio de Janeiro, Santa Catarina, São Paulo). Argentina, Bolivia, Colombia, Costa Rica, Ecuador, French Guiana, Mexico, Paraguay, Peru, Suriname, Uruguay.

Climaciella tincta (Navás, 1914) status revalidated

(Figs 12-15)

Nobrega tinctus Navás 1914: 233 (desc.); Penny 1977: 36 (list); Penny 1982: 453 (jr. syn. of *M. semihyalina*).

Climaciella tincta: Ardila-Camacho et al. 2023: 58 (diag.).

Climaciella duckei Navás 1915: 196 (desc.); Handschin 1960: 524 (list.); Penny 1977: 34 (list.); Penny 1982: 451 (redesc.); Penny & Costa 1983: 672 (redesc.); Ohl 2004: 167 (cat.); Oswald 2022 (cat.). **New synonym**.

Material Examined

Holotype Nobrega tinctus (Fig. 14):
♂ [monotypy], Brazil: Amazonas: Tefé, NHMUK 012505245 (NHMUK).
Holotype Climaciella duckei (Fig. 15):
♂ [monotypy], Peru: Iquitos, NMBE 940263 (NMBE).

Other material:

(4♀; 2♂): BRAZIL: **Acre**: Bujari, F.E.S. Antimary, 9°20'01''S, 68°19'17''W, 25.viii.2016, arm. luz, A.A. Agudelo, F.F. Xavier, D.M.M. Mendes & J.A. Rafael (1♀ INPA); **Amazonas**: Manaus, Reserva Ducke, 27.ii.1981, E.V. da Silva (1♂ INPA); idem – 24.iv.1990, M.O.R. Ribeiro (1♂ INPA); Presidente Figueredo, Am-240 - Km 24, 02°01'05"S – 59°49'60", 14-18. ix.09, lençol iluminado, F.F. Xavier Filho; A. Paladini; A.C. Pires; F.W. Leivas leg. (1♀ INPA); Rio Negro, Tapuruquara, x.1965, E. Dente (1♀ MZUSP); **Rondônia**: Itapuã do Oeste, Flona do Jamari, 90m, 9.146°S - 63.012°W, 5.ix.2012, B. Rosa (1♀ DZUP).

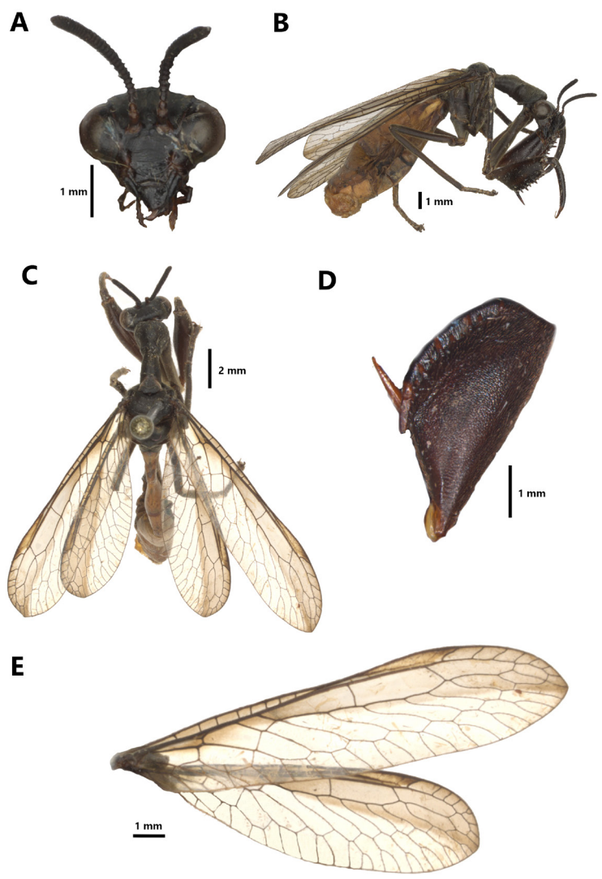

Figure 12. ***Climaciella tincta*****: head, frontal view (a); habitus, lateral view (b); habitus, dorsal view (c); fore femur external face (d); fore and hind wings (e).**

Diagnosis

The head and thorax of *C. tincta* is predominantly black, distinguishing it from the predominantly yellow to light brown species: *C. amapaensis, C. brunnea, C. cubana, C. pennyi* **sp. nov**, *C. nigriflava, C. personata,* and *C. risaraldensis*. The forewing of *C. tincta* has the anterior half light amber, separating it from *C. obtusa* and *C. semihyalina*, which present most of their forewings dark amber. The reddish-brown abdomen of *C. tincta* distinguishes it from the remaining species, all with abdomen predominantly dark brown to black: *C. elektroptera, C. hoffmani* **sp. nov**., *C. porosa*, and *C. rafaeli.*

Redescription

Head (Fig. 12a, c). Mostly black. Frons black with margins amber. Clypeus black with ventral margin amber. Labrum dark brown with margins amber. Mandibles black, maxillary and labial palps black with yellow rings. Antennae entirely black.

Thorax (Fig. 12b-c). Prothorax curved and with the dorsal surface irregular in lateral view; pronotum black and set with yellow setae on the dorsal surface. Meso and metanotum black. Pteropleura black sometimes with two yellow rounded marks between the mesanepimeron and metanepisternum.

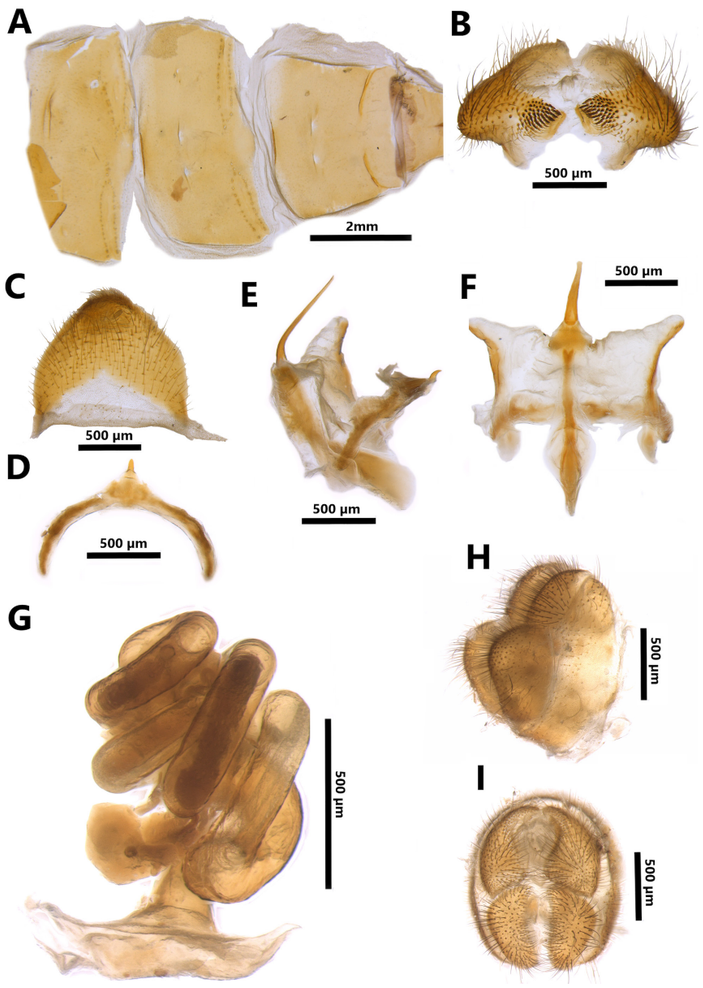

Figure 13. ***Climaciella tincta***: male abdomen, dorsal view (a); male ectoprocts, posterior view (b); male IX sternite, ventral view (c); male gonarcus, dorsal view (d); male genitalia, lateral view (e); male genitalia, ventral view (f); female spermatheca, lateral view (g); female terminalia, lateral view (h); female terminalia, posterior view (i).

Legs (Fig. 12b-d). Foreleg entirely black except by the amber apex of the femoral spines; distal tarsomere sometimes amber apically. Mid and hind leg black with the tarsi ventral surface slightly lighter.

Wings (Fig. 12c, e). Forewing length: 15-18 mm, membrane with anterior half, from the cell 1M to the apex, infuscate of light amber to amber; pterostigma dark amber with short setae; cells 1RA and 2RA about the same size and larger than 3RA cell; cell 1AP with a black mark at the base; seven subcostal veinlets. Hind wing similar to forewing in color; four subcostal veinlets.

Abdomen (Figs. 12b-c-13a). Reddish-brown. Male tergites IV and V with two rows of pores anterolaterally; each row composed of two lines of elliptical pores; tergite IV rows with 35 pores in each row, and approximately 40 on the tergite V rows.

Male terminalia (Fig. 13b-f). Ectoproct ovoid in dorsal view, ventromedial lobe partially

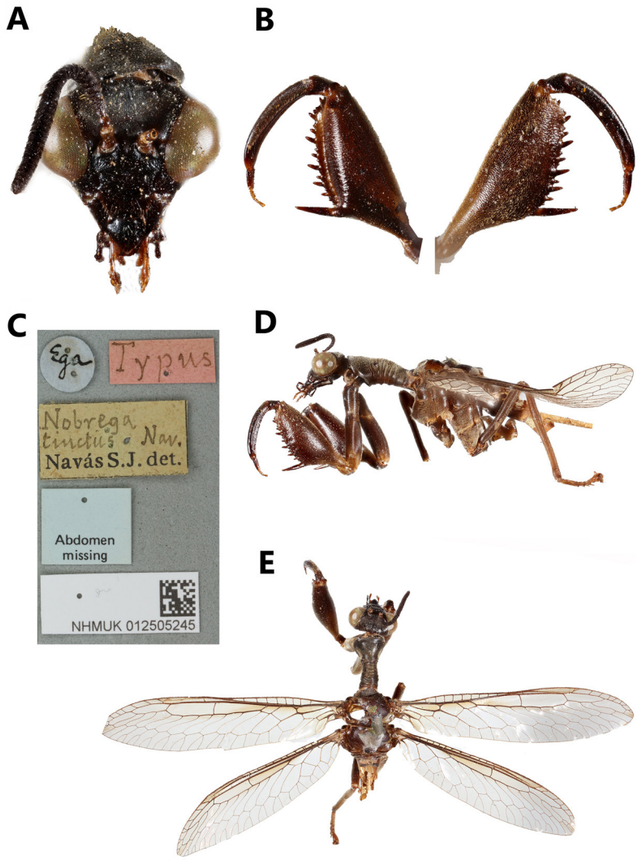

Figure 14. ***Nobrega tinctus*** Holotype: head, frontal view (a); fore femur internal and external faces (b); labels (c); habitus, lateral view (d); habitus, dorsal view (e).

sclerotized and covered by 58 short thickened setae. Sternite IX longer than broad and triangular. Gonarcus median lobe prominent and acute, shorter than pseudopenis in lateral view. Gonocoxite with rounded apex and broader than mediuncus in lateral view; in dorsal view with the posterior end strongly curving outwards. Mediuncus with an apical fork in dorsal view; the basal portion is broader in dorsal view and rounded in lateral view. Hypomeres as small sclerotized granules on each side of the pseudopenal membrane. Pseudopenis sclerotized, long, acute, almost as broad as the pseudopenal membrane basally, and apex strongly bent upwards in lateral view. Pesudopenal membrane without lateral spines.

Female terminalia (Fig. 13g-i). Ectoproct shorter than gonocoxite in lateral view, and oval in posterior view. Gonocoxite triangular in posterior view. Spermatheca duct broad basally and coiled. Fertilization channel thin; capsule well developed, covered by short setae and with a sclerotized protuberance in the distal margin.

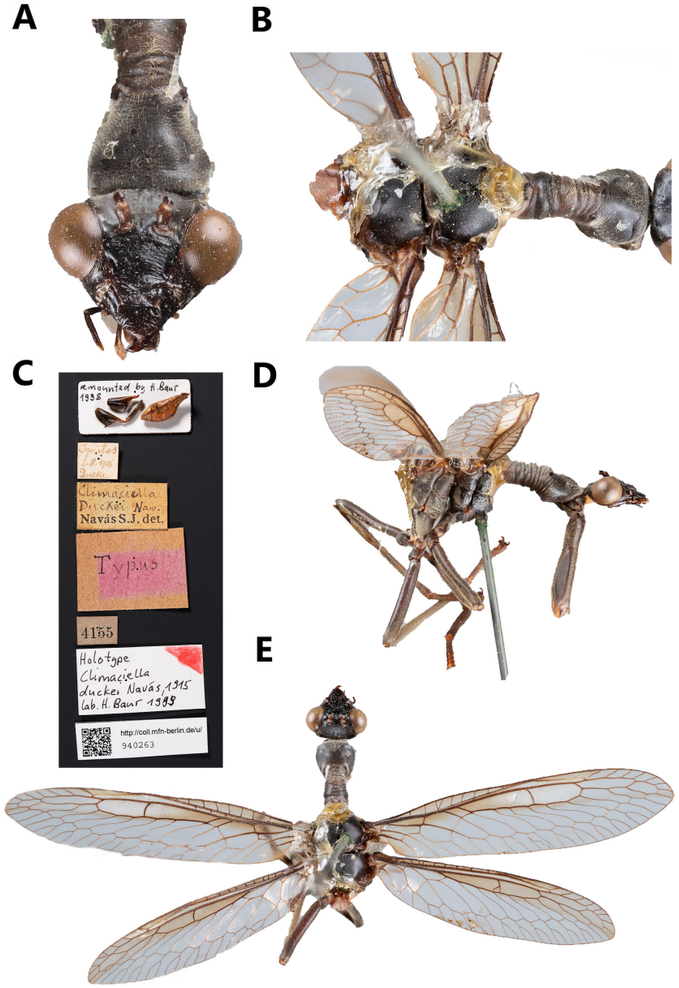

Figure 15. ***Climaciella duckei*** **Holotype: head and thorax, dorso-frontal view (a); thorax, dorsal view (b); labels (c); habitus, lateral view (d); habitus, dorsal view (e).**

Remarks

In the original description of *Nobrega tinctus* Navás (1914) did not specify the sex and number of specimens analyzed. While he did not designate a holotype, it is mentioned that the material is deposited at NHMUK. Subsequently, Penny (1982), requested the type material from the NHMUK and received a single specimen with a missing abdomen. Penny found this to mean that Navás studied only this specimen for the original description, and therefore considered it to be the holotype.

In turn, the original description of *Climaciella duckei* Navás (1915) mentioned one specimen deposited at NMBE, but did not explicitly state the sex of the specimen. Some subsequent authors referred to the holotype at NMBE, but it is not stated if they actually examined the specimen (Penny 1977, 1982, Penny & Costa 1983, Ohl 2004). The specimen analyzed herein has a typical red Navás "Typus" label, as

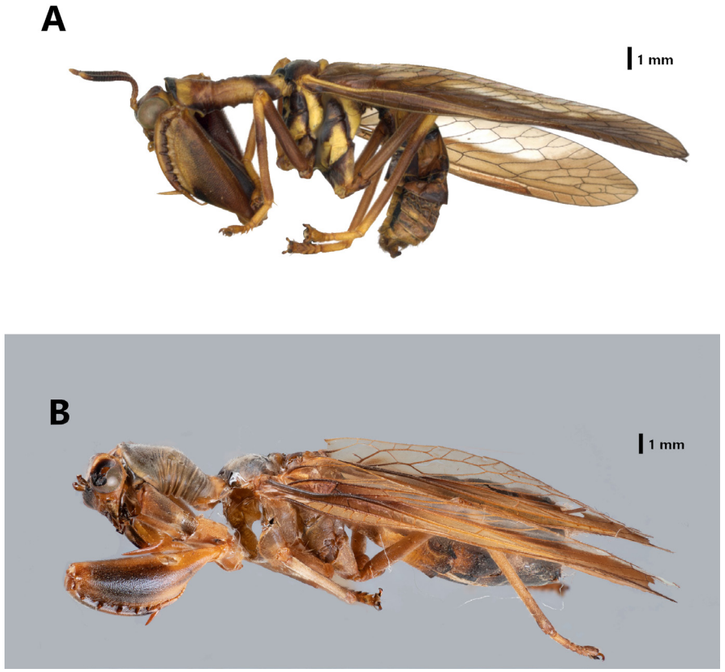

Figure 16: ***Climaciella brunnea*****: habitus, lateral view (a).** ***Euclimacia personata*** **Holotype: habitus, lateral view (b).**

well as a holotype label added by H. Baur in 1998, leaving no doubt that this is the holotype.

The genus *Nobrega* still considered as a synonym of *Climaciella*, despite the species being revalidated here. In the original description, Navás (1914) provided a description of the major characters and an illustration of the forewing. After, Navás (1915) described *C. duckei*, providing a description of the major characters and an illustration of the forewing.

Penny (1982) synonymized *N. tinctus* with *C. semihyalina*, when comparing the holotype of the former and a few regular specimens of the latter. However, Penny did not have access to the type specimens of *C. semihyalina* nor *M. chalybea*. In fact, Penny (1982) mentioned a clear difference in the wings of the holotype of *N. tinctus* and the specimens identified as *C. semihyalina*, but he opted to disregard this difference mentioning that the very similar body coloration was more important. Penny (1982) did not examine the genitalia of the various specimens leading to an unfortunate, but erroneous synonymy, which was followed by subsequent authors (Penny & Costa 1983, Ohl 2004, Ardila-Camacho & García 2015, Oswald 2022, Machado & Martins 2022).

There are several noteworthy differences between *C. tincta* and *C. semihyalina*. Wings of *C. semihyalina* is mostly dark amber while in *C. tincta* only the anterior half is infuscate but much lighter. The differences are even more pronounced when comparing the male genitalia: in *C. tincta* the pseudopenis is long, very broad at the base and strongly curved upwards in lateral view, while in *C. semihyalina* it is short, slender and mostly straight in lateral view. The gonocoxite of *C. tincta* presents a strong outwards curvature posteriorly, different to what is seen in *C. semihyalina*. We therefore opted to revalidate *N. tinctus*, transferring it to *Climaciella*.

Our comparisons between the holotypes and original descriptions of *C. duckei* (Fig. 15) and *N. tinctus* (Fig. 14) clearly demonstrated the same species. Therefore, *C. duckei* is hereby designated as a junior synonym of the newly reinstated *C. tincta*.

Distribution (Fig. 4).: Brazil (Acre*, Amazonas, Rondônia*), French Guiana, Peru.

Key to the *Climaciella* species, with information on distribution:

1) Head and thorax almost entirely dark brown to black (Fig. 12a-c).....2
2) Head and thorax mostly light brown to yellow, or at least with large yellow areas (Fig. 1a-c).....8
3) Forewing mostly dark amber (Fig. 9d).....3
4) Forewing at most with the anterior half light amber to amber (Fig. 12e).....4
5) Forewing posterior margin amber (Fig. 9d). Male pseudopenis apex acute and bent upwards (Fig. 10e).....*C. semihyalina* (South America, Costa Rica)
6) Forewing posterior margin hyaline (Fig. 19c in Ardila-Camacho & García 2015). Male pseudopenis apex truncate and not bent upwards.....*C. obtusa* (Colombia, Costa Rica, Ecuador, Panama)
7) Abdomen reddish brown (Fig. 12b-c).....*C. tincta* (Brazil, French Guiana)
8) Abdomen dark brown to black (might present small yellow spots, mostly at the pleura) (Fig. 5b-c).....5
9) Mid and hind tibias light brown to yellow (Fig. 5b) 6
10) Mid and hind tibias black (Fig. 7b in Ardila-Camacho et al. 2018).....7
11) Pronotum with a prominent medial bump in lateral view (Fig. 20b in Ardila-Camacho & García 2015). Male pseudopenis shorter than pseudopenal membrane .....*C. porosa* (Colombia, Costa Rica)
12) Pronotum without a prominent medial bump in lateral view (Fig. 5b). Male pseudopenis longer than pseudopenal membrane (Fig. 6e-f)..... *C. hoffmani* **sp. nov** (Brazil)
13) Forefemur mostly black with a transverse light brown stripe at the level of the basal spine (Fig. 7e-f in Ardila-Camacho et al. 2018).....*C. rafaeli* (Colombia)
14) Forefemur entirely black (Fig. 4b-c in Ardila-Camacho et al. 2023).....*C. elektroptera* (French Guiana)
15) Head frons and vertex, entirely light brown to yellow, without dark spots or stripes (Fig. 7a).....9
16) Head frons and vertex with black to dark brown spots or stripes (Fig. 1a-b).....10
17) Thorax yellow with large black areas on the pronotum distal half, and margins of the meso and metanotum (Fig. 6a in Ardila-Camacho et al. 2023). Male pseudopenis bent upwards and with apex truncate (Fig. 8d in Ardila-Camacho et al. 2023)....*C. nigriflava* (French Guiana)
18) Thorax entirely light brown (Fig. 7b-c). Male pseudopenis gently curving upwards and with apex acute (Fig. 8d) ..... *C. pennyi* **sp. nov** (Brazil)
19) Pronotum distinctly bent ventrad at midlength in lateral view (Fig. 16b).....*C. personata* (Bolivia)
20) Pronotum straight in lateral view (Fig. 16a).....11
21) Pronotum with a medial longitudinal light brown to yellow line (Fig. 1b)....12
22) Pronotum without a medial longitudinal light brown to yellow line (Fig. 17b in Ardila-Camacho & García 2015) 13
23) Head vertex with a transversal yellow stripe (Fig. 1a-b). Mid and hind femur yellow (Fig. 1c)....*C. amapaensis* (Brazil, French Guiana, Peru)

24) Head vertex without a transversal yellow stripe. Mid and hind femur black (Fig. 1 in Hoffman et al. 2017)....*C. cubana* (Cuba, Dominican Republic, Puerto Rico)
25) Head: eyes small, gena broadened, antennae entirely black (Fig. 17d in Ardila-Camacho & García 2015). Male: tergites IV and V with anterolaterally pores organized in two parallel rows; mediuncus apex forked....*C. risaraldensis* (Colombia)
26) Head: eyes regular, gena not broadened, antennae black with tip yellow (Fig. 1f in Ardila-Camacho *et al*. 2021). Male: tergites IV and V with anterolaterally pores organized in five to eight parallel rows; mediuncus apex not forked....*C. brunnea* (Canada south to Costa Rica)

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