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A new species of *Drepatelodes* (Lepidoptera: Bombycoidea: Apatelodidae) from Floresta Nacional do Tapajós, Pará, Brazil

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ABSTRACT

Drepatelodes (Lepidoptera: Bombycoidea: Apatelodidae) is a genus of moths with very similar species, most of them described from the Amazon region, mainly from the Guiana Shield. Recent field samplings in the Floresta Nacional (FLONA) do Tapajós (Pará, Brazil) revealed the existence of a new species of *Drepatelodes*, described based on morphological characters. *Drepatelodes cabana* Orlandin, Piovesan & Carneiro **sp. nov.** presents wing morphology (structure and coloration) similar to *Drepatelodes quadrilineata* (Schaus, 1921), *Drepatelodes decaensi* Herbin, [2024] and *Drepatelodes parallela* Herbin, [2024] but can be differentiated from them by characters found in the male genitalia: sacculus with a spiniform process, located approximately 2/3 of the valvae length (process located at the base of the valvae in *D. parallela*), uncus without a pair of socii (present in *D. quadrilineata* and *D. decaensi*), aedeagus straight (L-shaped in *D. quadrilineata* and *D. decaensi*) and vesica with cornutus (absent in *D. quadrilineata*, *D. parallela* and with five cornuti in *D. decaensi*). The new species was recorded from FLONA do Tapajós and northern Mato Grosso, Brazil. With the description of the new species, *Drepatelodes* now includes 13 species, nine of which are described from the Amazon region, although only three in the Brazilian Amazon. Therefore, collections in other regions of the Amazon are necessary to expand the distribution of known species or even discover new species for the genus.

KEYWORDS: biodiversity, cryptic species, genitalia characters, protected areas, taxonomy, type species

Uma nova espécie de *Drepatelodes* (Lepidoptera: Bombycoidea: Apatelodidae) da Floresta Nacional do Tapajós, Pará, Brasil

RESUMO

Drepatelodes (Lepidoptera: Bombycoidea: Apatelodidae) é um gênero de mariposas com espécies muito parecidas entre si com a maioria das espécies descritas para a região amazônica, principalmente para o Escudo das Guianas. Amostragens de campo recentes na Floresta Nacional (FLONA) do Tapajós (Pará, Brasil) revelaram a existência de uma nova espécie de *Drepatelodes*. Aqui nós descrevemos essa nova espécie, baseados em caracteres morfológicos. *Drepatelodes cabana* Orlandin, Piovesan & Carneiro **sp. nov.** apresenta morfologia alar similar a *Drepatelodes quadrilineata* (Schaus, 1921), *Drepatelodes parallela* Herbin, [2024] e *Drepatelodes decaensi* Herbin, [2024] mas pode ser separada destas por características encontradas na genitália masculina: sacculus com um processo espiniforme, localizado aproximadamente a 2/3 do comprimento da valva (processo espnifomre localizado na base da valva em *D. parallela*), uncus sem par de socii (presente em *D. quadrilineata* e em *D. decaensi*), aedeagus retilíneo (em forma de L em *D. quadrilineata* e em *D. decaensi*) e vesica com cornutus (ausente em *D. quadrilineata* e *D. parallela* e com cinco cornuti em *D. decaensi*). A nova espécie tem registros para a FLONA do Tapajós e norte do Mato Grosso. Com a descrição da nova espécie, *Drepatelodes* passa a contar com 13 espécies, nove delas descritas para a região amazônica, no entanto apenas três para a Amazônia brasileira. Portanto, coletas em outras regiões da Amazônia são necessárias para expandir a distribuição das espécies conhecidas ou mesmo descobrir novas espécies para o gênero.

PALAVRAS-CHAVE: áreas protegidas, biodiversidade, caracteres da genitália, espécies crípticas, espécie tipo, taxonomia

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INTRODUCTION

The genus *Drepatelodes* Draudt, 1929 was described to include six species: one from Central America: *Drepatelodes tanais* (Druce, 1898); one from the Atlantic Forest: *Drepatelodes friburgensis* (Schaus, 1924); and four from the Amazon region, three from French Guiana: *Drepatelodes ostenta* (Schaus, 1905), *Drepatelodes trilineata* (Dognin, 1912) and *Drepatelodes umbrilinea* (Schaus, 1905), and one from Rondônia (Brazil): *Drepatelodes quadrilineata* (Schaus, 1921 (Draudt, 1929). Later, Herbin and Monzón (2015) described two new species from Central America: *Drepatelodes landolti* Herbin & Monzón, 2015 (synonymized with *D. tanais* by Orlandin et al. (2024)) and *Drepatelodes zacki* Herbin & Monzón, 2015. Recently, Herbin ([2024]) described four new species from the Amazon region: three from French Guiana: *Drepatelodes hermieri* Herbin, [2024], *Drepatelodes inexpectata* Herbin, [2024] and, *Drepatelodes parallela* Herbin, [2024]; and one from the West of Maranhão and North of Pará (Brazil): *Drepatelodes decaensi* Herbin, [2024]. In this study, Herbin ([2024]) also illustrated the genitalia of all species described from French Guiana and, in addition, images of the genitalia of the type of *D. quadrilineata*, a species described from a specimen collected in Porto Velho de Santo Antônio [Porto Velho, Rondônia].

The *Drepatelodes* species are quite similar, and it's not always possible to identify them based on their wing characters. However, the *Drepatelodes* species are easily distinguished by characters of the male genitalia. Therefore, the availability of genitalia images from all species described for the genus (Herbin and Monzón 2015; Orlandin et al. 2021; Herbin [2024]) is crucial to identifying the already described species and discovering new species. Recent field samplings in the Floresta Nacional (FLONA) do Tapajós (Pará, Brazil) revealed the existence of a new species of *Drepatelodes*. Therefore, here we describe this new species, thus contributing to increasing knowledge about the richness of the genus, especially in the Amazon region.

MATERIAL AND METHODS

The type was collected during a scientific expedition to the FLONA do Tapajós (Pará, Brazil), managed by ICMBio (Instituto Chico Mendes de Conservação da Biodiversidade) (license number 71581-4).

For the description, the abdomens were detached, soaked in hot 10% potassium hydroxide solution (KOH) for approximately 3 min, washed in water, examined, illustrated, and then stored in glass vials containing glycerin. Images of the genitalia were taken using an optical stereomicroscope adapted with focus stacking (Leica Application Suite Version 4.12.0 [Build 86]) and a Sony DSCHX100V digital camera. The terminology follows Kristensen (2003), but the term "fultura inferior" (= juxta) is applied *sensu* Petersen (1904); the term aedeagus is applied *sensu* Snodgrass (1935).

The specimens used to describe the new species were deposited at the DZUP – Coleção Entomológica Padre Jesus Santiago Moure, Departamento de Zoologia, Setor de Ciências Biológicas, Universidade Federal do Paraná; Curitiba, Paraná, Brazil (DZUP voucher number: DZ 45.793, DZ. 45.779 and DZ 53.134).

A leg from the type specimen was removed and sent for sequencing of the COI barcode region at the Canadian Centre for DNA Barcoding (CCDB) (Hebert et al. 2003). DNA extraction, PCR amplification, and sequencing of the COI barcode region followed standard protocols (CCDB 2013). The COI barcode sequence is available at GenBank (code PP952710).

RESULTS

Drepatelodes cabana Orlandin, Piovesan & Carneiro, 2025 **sp. nov.** (Figures 1–2)

ZooBank: urn:lsid:zoobank.org:act:D5FA53BA-1EC7-406F-8D46-951EDC3DFDBE

Type material: ♂ with the following labels: /HOLOTYPUS/ BRASIL, PARÁ, BELTERRA, 100 KM N RURÓPOLIS, FLONA TAPAJÓS, 3°22'24"S, 54°58'14"W, 25, 26-VII-2022, CARNEIRO, ORLANDIN, CASAGRANDE & MIELKE LEG. / Holotype *Drepatelodes cabana* Orlandin, Piovesan & Carneiro det. 2025/ DZ 53.134/ GEN. PREP. E. ORLANDIN 2024/. GenBank access code PP952710 (DZUP).

Paratypes 2♂♂. BRAZIL – Mato Grosso: Vera, X.1973, Tangerini leg., DZ 45.793 and DZ. 45.779 (DZUP).

Diagnosis: *Drepatelodes cabana* **sp. nov.** exhibits the same habitus as *D. decaensi*, *D. parallela* and *D. quadrilineata* (see Herbin [2024]). These species can be easily differentiated from other *Drepatelodes* by the dorsal region of the forewings with a straight and non-lunulate line in the marginal area. However, *D. cabana* **sp. nov.** has a wingspan (42-44 mm) smaller than *D. quadrilineata* (48 mm), and larger than *D. parallela* (40 mm) and *D. decaensi* (37 mm). Additionally, *D. cabana* **sp. nov.** can be differentiated from *D. decaensi* and *D. quadrilineata* by the following genitalia characters: lack of a pair of socii at the base of the uncus (present and pointed in *D. quadrilineata* and rounded in *D. decaensi*), aedeagus straight (L-shaped in *D. quadrilineata* and *D. decaensi*) with strongly sclerotized, curved and pointed process near the apex (absent in *D. quadrilineata* and *D. decaensi*), and vesica with cornutus (absent in *D. quadrilineata* and presence of five cornuti in *D. decaensi*). *Drepatelodes cabana* **sp. nov.** can be differentiated from *D. parallela* by the following genitalia characters: sacculus with a spiniform process, located approximately 2/3 of the valvae length (in *D. parallela* this process is located at the base of the valvae), aedeagus shorter and thicker than in *D. parallela* and vesica with cornutus (absent in *D. parallela*).

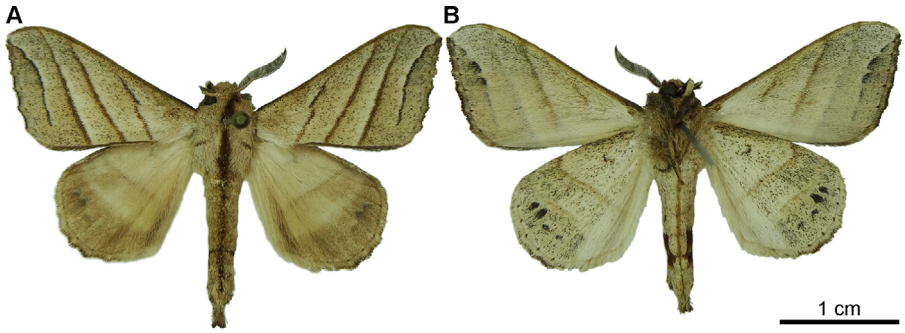

Figure 1. *Drepatelodes cabana* Orlandin, Piovesan & Carneiro **sp. nov.**, male holotype. **A** – dorsal; **B** – ventral.

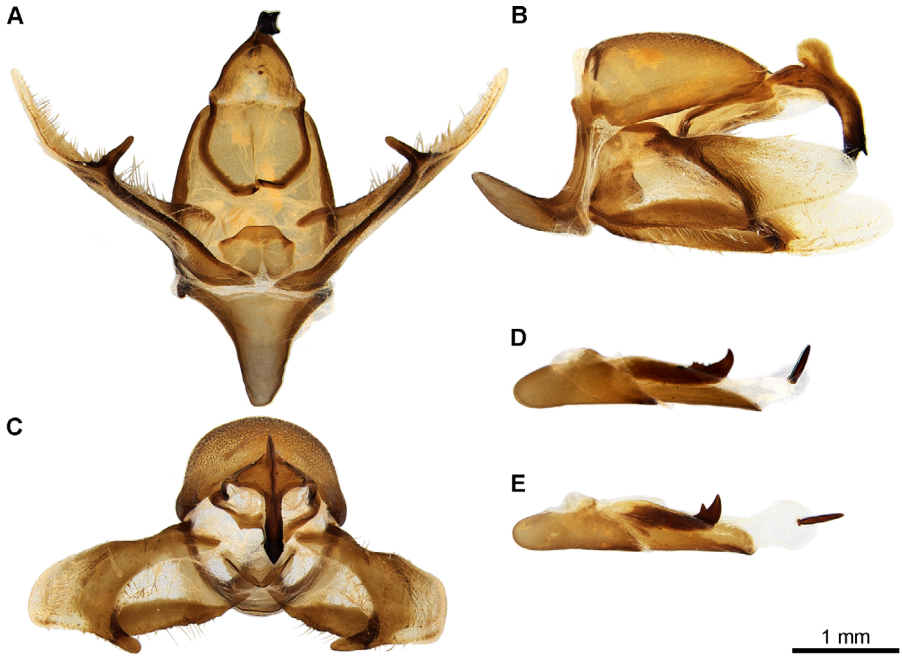

Figure 2. Male genitalia of *Drepatelodes cabana* Orlandin, Piovesan & Carneiro **sp. nov.**, holotype. **A** – ventral; **B** – lateral; **C** – posterior; **D** – aedeagus lateral. **E** – aedeagus lateral, variation from paratypus DZ 45.779.

Description: Male (Figures 1–2). Wingspan: 42–44 mm (n=3). **Head**. Antenna brownish beige, approximately 1/3 the length of the forewing costal margin, bipectinate at the tip. Labial palpus, first and second segments covered by large beige and brown scales. **Thorax**. Brownish beige, dorsally with a brown central longitudinal line. Forewing. Length: 18-20 mm. Upperside: Brownish beige speckled with brown scales, with three transverse parallel brown lines from costal to inner margin; close to the submarginal region, a brown line from Rs_4 to CuA_2. Underside: Similar to the upperside, but ground color paler, without speckled brown scales and barely visible brown lines. Hindwing. Upperside: Brownish beige, postdiscal region browner. Underside: Brownish beige speckled with brown scales. **Abdomen**. Brownish beige, ventrally and dorsally with a brown central longitudinal line. **Genitalia**. Tegumen shield-like, sclerotized, wider than uncus. Anterior projection of saccus as long as the saccus arms, dorsally curved, rounded at its extremity. Uncus more sclerotized than tegumen, long, thick, ventrally curved from the middle, abruptly narrower from the curvature; with a crest in the dorsal region close to the curvature; pointed apex with two small spines; gnathos hook-shaped and pointed apically, mesally fused by a membrane; socii absent. Valvae less sclerotized than tegumen, parallel-sided, with rounded apex exceeding the uncus apex; sacculus, located approximately 2/3 of the valvae length, with a sclerotized spiniform process. Fultura inferior trapezoidal. Aedeagus thin and straight, laterally in the apical half, with a more sclerotized projection, similar to a curved, pointed blade, with one or several small teeth. Vesica with sclerotized cornutus.

Female. Unknown.

Immature stages. Unknown.

Distribution. Brazilian states of Pará and Mato Grosso (Figure 3)

Figure 3. Geographical distribution (red squares) of *Drepatelodes cabana* Orlandin, Piovesan & Carneiro **sp. nov.** Map created using the Free and Open Source QGIS.

Etymology. The name is a tribute to the Cabanos, indigenous, black, and mixed-race people who, between 1835 and 1840, led the Cabanagem, one of the largest popular movements in Brazil against the exploitation of the ruling class. The Cabanagem Revolt occurred in the province of Grão-Pará, a region that today comprises the Amazonian states of Amapá, Amazonas, Pará, Rondônia, and Roraima.

DISCUSSION

The Amazon Forest is the most biodiverse region on the planet (Garda et al. 2010). However, this region is strongly threatened by growing degradation, resulting from the exploitation inherent to capitalism, which drives environmental crimes and crimes against humanity carried out by land grabbers, miners, big farmers, and multinationals (Coelho et al. 2014; Mendes-Oliveira et al. 2017; Sonter et al. 2017; Paiva et al. 2020; Villén-Pérez et al. 2020). Biodiversity loss is already occurring (Lapola et al. 2023) and possibly, many species have already disappeared without ever being registered. In this context, protected areas (PAs) play a fundamental role in conservation since the progression of destruction is much lower in PAs than in non-protected areas (Gonçalves-Souza et al. 2021). The presently described new species was found in a PA attesting for their importance to conservation.

The genus *Drepatelodes* is easily distinguishable from other genera of Apatelodidae, mainly by the presence of three parallel transverse lines on the forewings. However, *Drepatelodes* species are quite similar and, in most cases, are distinguished by the differences found in the genitalia, mainly in the male genitalia, since that of females is not always known. In Apatelodidae, similarity among species of the same genus is common. In recent years, more detailed studies, which included genitalia dissection and the use of molecular data of specimens from different regions, have demonstrated that the family is much more diverse than previously believed. For example, Herbin (2017) discovered that *Apatelodes satellitia* (Walker, 1855), a species that apparently had a distribution from Central America to southern Brazil, was, in fact, a complex of species with a restricted distribution and with genitalia characters so exclusive that they justified the description of a new genus to allocate the species of the complex. Subsequently, Herbin et al. (2021) reviewed *Arotros* Schaus, 1892, a monotypic genus, whose species *Arotros striata* Schaus, 1892 was considered to be distributed throughout South America, reaching the same results, and Orlandin et al. (2023) demonstrated that *Olceclostera bifenestrata* Schaus, 1912 was also part of a species complex.

Given this scenario, it is not surprising the number of new species of Apatelodidae recently described for the Amazon region. Of the 56 species described for the family in the last 30 years (Wagner and Knudson 2014; Herbin 2015; 2017; 2018, 2021*a*; *b*; [2024]; Herbin and Monzón 2015; Herbin and Beccacece 2018; Herbin and Mielke 2018; Herbin et al. 2021; Orlandin and Carneiro 2021; Orlandin et al. 2023), 21 are from this region (Herbin 2015; 2017; 2021*b*; [2024]; Herbin et al. 2021; Orlandin et al. 2023). However, the disparity regarding the description/occurrence records for these species is huge: 19 of the 21 species were described from the Guiana Shield, with French Guiana being the type locality for most of them. This pattern is likely more related to the increased collection of the French Guiana fauna by French researchers (professionals and amateurs) than to biogeographic processes, and it may change as more collections are conducted in the Brazilian Amazon.

CONCLUSIONS

Here we described a new species of *Drepatelodes*, a genus with species whose wing morphology is very similar but with characters in the male genitalia that allow the separation of the species. With the new species described, the genus now has 13 species, nine of which are described for the Amazon region. However, of these nine, six are from French Guiana, and only three from the Brazilian Amazon: *D. decaensi*, with records for western Maranhão and northern Pará, *D. cabana* **sp. nov.** with records for the lower Tapajós and northern Mato Grosso, and *D. quadrilineata* with records for Rondônia. Collections in other regions of the Amazon could expand the distribution of these species or even discover new species for the genus.

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DATA AVAILABILITY: The DNA sequence corresponding to the partial gene sequence (COX1, 658 pb) of Drepatelodes cabana Orlandin, Piovesan & Carneiro sp. nov. is available at BOLD Systems under accession CMBUT1907-23 and at GenBank accession code PP952710. The other data that support the findings of this study are not publicly available.