






## Scientific Note

# Remarks on *Oligotoma saundersii* (Westwood, 1837), an invasive species of Embioptera in Brazil

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**Abstract.** There are five families of Embioptera recorded in Brazil, namely: Anisembiidae, Archembiidae, Clothodidae, Teratembidae, and Oligotomidae, the latter represented by *Oligotoma saundersii* (Westwood, 1837), an invasive species with worldwide distribution. In this work, we provide an update on *O. saundersii* distribution for three Brazilian states and the first record for Brazilian Amazon and Cerrado biomes. Additionally, we provide photographs of both sexes, a differential diagnosis for other families, and a distribution map with all records of *O. saundersii* for the country.

**Keywords:** Oligotomidae, Exotic species, Cerrado, Amazon, Distribution.

Insects of the order Embioptera Shipley, 1904 are popularly known as webspinners, due to their ability to weave silk (Szumik et al. 2019). They are terrestrial, dorsoventrally flattened, slightly sclerotized, and their body length ranges from 4 to 30 mm (Szumik 1999). Embiopterans have unique characteristics, such as modified fore basitarsus with the presence of numerous silk-producing glands and dilated posterior femora (Szumik 2012). The Order has 13 families, 101 genera, and 462 valid species distributed exclusively in warm and temperate areas of the globe (Szumik et al. 2008; Maehr et al. 2022). In Brazil it was recorded 56 species in 21 genera belonging to Anisembiidae, Archembiidae, Clothodidae, Teratembidae and an invasive species belonging to Oligotomidae (Rafael & Krolow 2023).

Oligotomidae has seven genera and 62 worldwide species (Poolprasert et al. 2011; Poolprasert 2012; Chen 2022; Maehr et al. 2022). The genus *Oligotoma* Westwood, 1837 has 13 valid worldwide species (Poolprasert 2012), of which three invasive species have been recorded for New World: *Oligotoma humbertiana* (Saussure, 1896) in Mexico (Poolprasert 2012), *Oligotoma nigra* Hagen, 1885 in Chile, Mexico, and USA (Poolprasert 2012; Brondi 2013), and *Oligotoma saundersii* (Westwood, 1837) described from India and with a worldwide distribution (Westwood 1837; Davis 1939; Ross 2007).

*Oligotoma saundersii* is the only invasive species registered in Brazil (Szumik et al. 2022). The Brazilian records are also based on its synonyms, namely: Bahia [Navás, 1922 as *Oligotoma latreillei* (Rambur, 1842)], Ceará (Navás, 1917 as *Oligotoma rochai* Navás, 1917), and Santa Catarina (Enderlein, 1912 as *O. latreillei*). According to Ross (1984) its distribution is likely to be related to the ornamental plant trade. The species has been recorded inhabiting the bark and crevices of plants such as: *Acacia auriculaeformis* (A.Cunn. ex Benth.), *Cassia javanica* L., *Mangifera indica* L., *Pithecellobium dulce* (Roxb.) Benth. and *Tamarindus indica* L. (Poolprasert 2012). Currently all of them are spread throughout the Brazilian territory (Drumond et al. 1999; Silva et al. 2000; Attias et al. 2013; Mendes et al. 2021).

Here we add new records for three Brazilian states and update the geographical records map, we also provide a differential diagnosis and photographs that allow a quick identification and distinction of local species.

The specimens used in the present study are housed at the Coleção

de Entomologia da Universidade Federal de Tocantins (CEUFT), Coleção de Invertebrados do Instituto Nacional de Pesquisas da Amazônia (INPA), and Coleção Zoológica de Referência da Universidade Federal de Mato Grosso do Sul (ZUFMS). All specimens are preserved in alcohol. The specimens were identified using the Poolprasert (2012) key. A comparative morphological analysis was made with the original description of the senior and junior synonymies (Westwood 1837; Davis 1939).

Images were obtained using a Leica MC120 HD digital camera coupled to a Leica M165 C stereomicroscope. Photographs were taken of the body (dorsal and ventral view) head (dorsal and ventral view), wing (anterior and posterior), and terminalia (dorsal and ventral view). Photos and plates were edited with Adobe Photoshop 2021 software, version 22.0.0.35. The geographical distribution map was elaborated with SimpleMappr web software (Shorthouse 2010). In the material examined section two slashes "/" indicate different labels. Anatomical structures are abbreviated as follows: Head: Sm, submentum; Wing: R1, anterior radius; Ma, anterior media; Cu, cubitus; Terminalia: 10Rp1, caudal process of the tenth right hemitergite (10R); LC1, basal left cercus; RC1, basal right cercus; Hp, process of Hypandrium; Lpp, left paraproct; 1°Vfs, rudiments of first valvifers.

***Oligotoma saundersii*** (Westwood, 1837)  
(Figs. 1A-J, 2)

***Embia (Oligotoma) saundersii*** Westwood, 1837: 373, pl. 2, fig. 2.

***Oligotoma saundersii***; Burmeister, 1839: 770; Walker, 1853: 531; Waterhouse, 1881: 436; Waterhouse, 1881:436; Wood-Mason, 1883: 628; Hagen, 1885: 144; Davis, 1939: 181; Ross, 1940: 668; Rafael & Krolow, 2022.

***Embia latreillei*** Rambur, 1842: 312. Lucas, 1883: XXVI, CVI.

***Oligotoma latreillei*** (*sic*); Enderlein, 1910: 56; 1912: 74; Rimsky-Korsakow, 1914: 179; Navás, 1918: 91; Friederichs, 1923: 2; Okajima, 1926: 422; Navás, 1929: 109; Navás, 1929: 388; Friederichs, 1934: 413; Mukerji, 1935: 8; Davis, 1936: 243; 1938: 254; 1939: 183 (syn.).

***Olyntha cubana*** Hagen (*nomen nudum*), 1866: 221, 222; M'Lachlan,

1877: 381.

*Oligotoma cubana*; Hagen, 1885: 141; Kraus, 1911: 44. Davis, 1939: 183 (syn.).

*Oligotoma insularis* McLachlan, 1883: 227. Blackburn, 1884: 413; Hagen, 1885: 143; Perkins, 1897: 56; Perkins, 1899: 88; Friederichs, 1906: 236; Krauss, 1911: 40; Navás, 1918: 14; Bryan, 1926: 91; Mills, 1932: 652; Bryan, 1933: 239, 246; Friederichs, 1934: 413; 1935: 3; Davis, 1939: 183 (syn.).

*Embia bramina* de Saussure, 1896: 352.

*Oligotoma bramina*; Krauss, 1911: 23, fig. 6. Davis, 1939: 184 (syn.).

*Embia hova* de Saussure, 1896: 354; Verhoeff, 1904: 202; Friederichs, 1907: 51.

*Oligotoma hova*; Krauss, 1911: 38; Davis, 1939: 183.

*Oligotoma rochai* Navás, 1917: 281; Krauss, 1917: 316 (syn.); Davis, 1939: 184.

*Oligotoma inaequalis* Banks, 1924: 421. Davis, 1939: 184 (syn.).

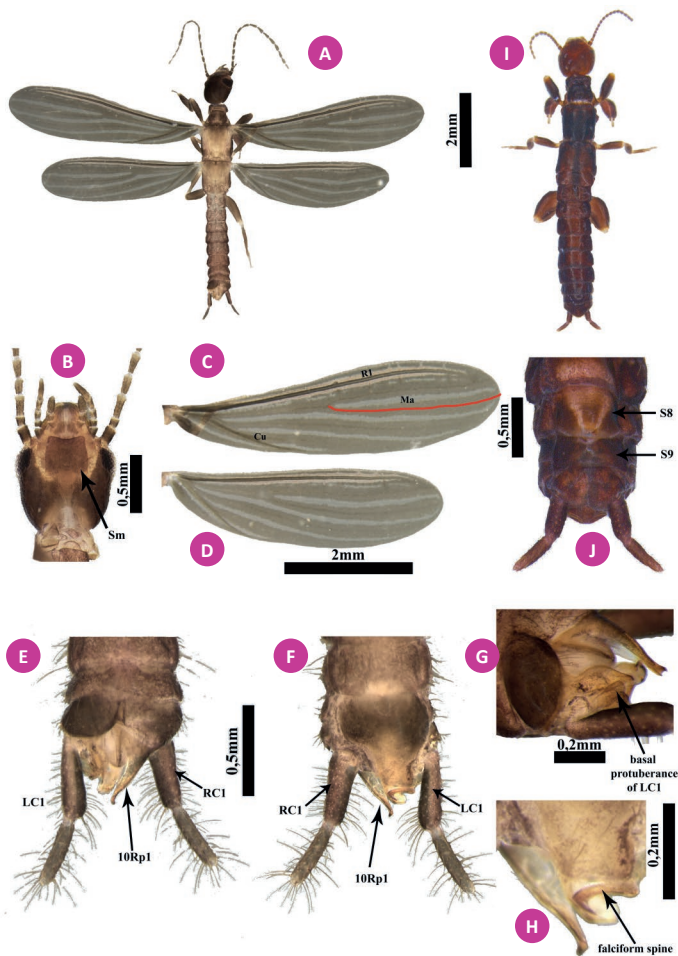
**Diagnosis:** Male. Medium size (around 6.6 mm), head almost black, thorax and abdomen brownish (Fig. 1A); Sm completely sclerotized (Fig. 1B); wings grayish brown (around 5.1 mm), R1 and Cu dark brown, Ma vein simple (Fig. 1C, D); 10Rp1 long and gradually acuminate at posterior end with apex curved to right (Fig. 1E); LC1 and RC1 symmetrical (Fig. 1E-F) with basal protuberance in LC1 (Fig. 1G); Hp very elongated tube-shaped with a subapical falciform spine (Lpp) (Fig. 1H). Female. Medium size (around 8 mm), head, thorax, and abdomen dark brown (Fig. 1I). Sternite 8 with three well-defined

sclerotized areas, two lateral (1°Vfs) and one central (central plate), between them, a little sclerotized V-shaped area (Fig. 1J). Sternite 9 completely sclerotized except for a small central area, the opening of the secondary gland (Fig. 1J).

**Morphological variation:** According to other authors the specimens vary in shades of brown (Davis 1939) and length of body, 6.4-9 mm for males and 6.1-12 mm for females (Davis 1939; Ross 1940; Poolprasert 2012).

**Discussion:** *Oligotoma saundersii* is the unique species of Oligotomidae registered for Brazil, so this family (and species) can be easily distinguished from other Brazilian families considering that only two of the five families found in Brazil have Ma vein simple (Anisembiidae and Oligotomidae). Of the two families, the tympanic organ is present in the femora of all three legs in Anisembiidae but only on the fore and middle legs in Oligotomidae. Moreover, *O. saundersii* has a remarkable Hp very elongated tube-shaped with a subapical falciform spine.

**Material examined:** BRASIL: AMAZONAS, Manaus, Aleixo, Av. São José, número 08/B, 15.iii.2006, Alecrim, V.P. leg. // Coleta Manual Ordem Embioptera // Família Oligotomidae, Alecrim, V.P. Det. // *Oligotoma saundersii* (Westwood, 1837) Det.: P. Pinto, 2019 (1 male INPA); Manaus, Embrapa Amazônia Ocidental, 02°53'27"S-59°58'12"W, Coleta manual em tronco de palmeira, T.M. Almeida col., 29.iv.2015 // Clothodidae // *Oligotoma saundersii* (Westwood, 1837) Det.: P. Pinto, 2019 (1 male INPA); Manaus, Chapada, 3°5'38,4"S - 60°2'05,2"W, 19.iv.2019, Freitas-Silva, R.A.P. // *Oligotoma saundersii* (Westwood, 1837) Det.: P. Pinto, 2019 (1 male INPA); Manaus, Condomínio Sol Morar, Aleixo, 03°05'28.3"S - 59°59'21.9"W, Coleta ativa, 05.vi.2019, Guimarães, D.L.P. col. // Embioptera: Oligotomidae, D.L.P, Guimarães, det. 2019 // *Oligotoma saundersii* (Westwood, 1837) Det.: P. Pinto, 2019 (1 male INPA); Manaus, Condomínio Sol Morar, Aleixo, 03°05'28.3"S - 59°59'21.9"W, Coleta ativa, Guimarães, D.L.P. col // *Oligotoma saundersii* (Westwood, 1837) Det.: P. Pinto, 2019 (1 male INPA); Manaus, Zumbi 3, casa de alvenaria, noite, 01.vii.2019. Coleta ativa, D. Pantoja & R. Guimarães col. // *Oligotoma saundersii* (Westwood, 1837) Det.: P. Pinto, 2019 (1 male INPA); Manaus, INPA II, 3°05'48.0" S - 59°59'23.1"W, Coleta ativa, 09.vii.2019, Guimarães, D.L.P. col. // Embioptera: Oligotomidae, Torres, E.C.P. det. 2019 // *Oligotoma saundersii* (Westwood, 1837) Det.: P. Pinto, 2019. (1 male INPA). MATO GROSSO DO SUL, Campo Grande, 20°32'01.9"S - 54°40'10.8"W, Col.: Olivier, R.S. 20.ii.2013, *Oligotoma saundersii* (Westwood, 1837) Det.: Olivier, R.S. (2015) // ZUFMS-EMB00025 (1 male ZUFMS); same data, but 17.vii.2013 // ZUFMS-EMB00023 (1 male ZUFMS); same data, but 1.i.2014 // ZUFMS-EMB00018 (1 male ZUFMS); same data, 8.i.2014 // ZUFMS-EMB00010 (1 male ZUFMS); same data, but 06.iii.2014 // ZUFMS-EMB00012 (1 male ZUFMS); same data, but 27.iii.2014 // ZUFMS-EMB00029 (1 male ZUFMS); same data, but 14.vii.2015, atraído por luz // 14.vii.2015, casa // ZUFMS-EMB00017 (1 male ZUFMS); Campo Grande, Jd. Vila Kellen, 20°32'01.9"S - 54°40'10.8"W, col.: OLIVIER, R.S., 16.x.2015, *Oligotoma saundersii* (Westwood, 1837) Det.: P. Pinto 2019 // ZUFMS-EMB00024 (1 male ZUFMS); same data, but 20°32'00.0"S - 54°40'13.13"W, 18.vi.2018 // ZUFMS-EMB00032 (1 male ZUFMS). CEARÁ, Trairi, Mundaú, 3°10'41.2"S - 39°22'03.4"W, 10m, em estipe de palmeira, 2.i.2022, Col.: Costa-Pinto, P.J. // *Oligotoma saundersii* (West. 1837) Det.: Costa-Pinto 2022 // ZUFMS-EMB00035 (2 males ZUFMS). TOCANTINS, Porto Nacional, 10°14'45.21"S - 48°07'24.07"W, Coleta manual, 06.iii.2015, Ganns, B.A.C col. // *Oligotoma saundersii* (Westwood, 1837) Det.: Andrade, B.S., 2022 (1 male CEUFT); Porto Nacional, Novo Planalto, 10°14'45.21"S - 48°07'24.07"W, Coleta manual, 31.x.2021, Montanuci, P.S.B. col. (1 male CEUFT); Porto Nacional, Jardim dos Ipês, 10°41'38.25"S - 48°22'47.24"W, Coleta manual, 02.xii.2021, Andrade, B.S. col. // *Oligotoma saundersii* (Westwood, 1837) Det.: Andrade, B.S., 2022 (18 males CEUFT); Palmas, 10°11'04"S - 48°20'01"W, Coleta manual, 06.v.2016, Ganns, B.A.C. col. // *Oligotoma saundersii* (Westwood, 1837) Det.: Andrade, B.S. 2022 (1 male CEUFT); Palmas, Bela Vista, 10°20'40.6"S - 48°17'45.028"W, Coleta manual, 12.x.2021, Andrade, B.S. col. // *Oligotoma saundersii* (Westwood, 1837) Det.: Andrade, B.S., 2022 (18 males, 1 female, CEUFT); Palmas, Bela Vista,



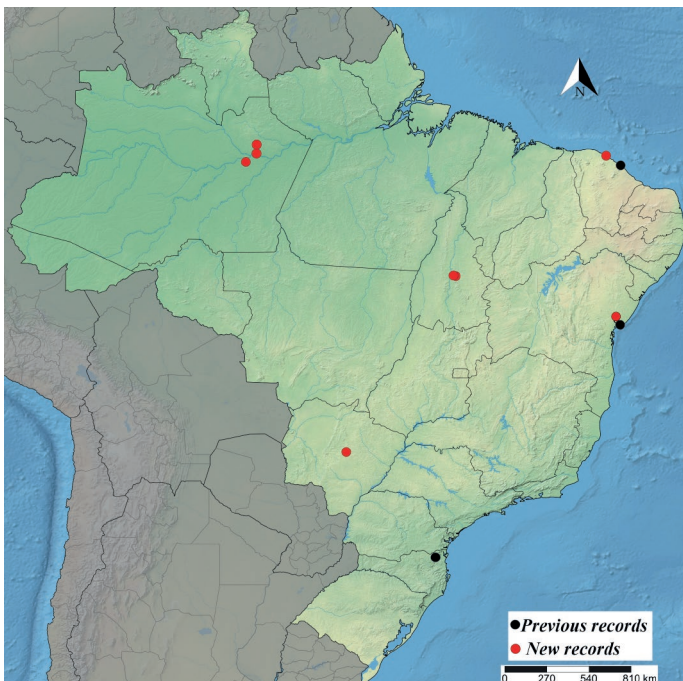
**Figure 1A-J, 2.** *Oligotoma saundersii* (Westwood, 1837), male: A) habitus (dorsal view); B) head (ventral view); C) forewing (dorsal view); D) hind wing (dorsal view); E) terminalia (dorsal view); F) terminalia (ventral view); G) basal protuberance in LC1; H) process of hypandrium (ventral view). Female: I) habitus (dorsal view); J) terminalia (ventral view). Abbreviations: S8 = eighth abdominal sternite, S9 = ninth abdominal sternite.

10°20'40.6"S - 48°17'45.28"W, Coleta manual, 03.xi.2021, Andrade, B.S. col. // *Oligotoma saundersii* (Westwood, 1837) Det.: Andrade, B.S., 2022 (10 males CEUFT); Palmas, Quadra 912 Sul alameda 15, 30 - arse, 10°20'44.48"S - 48°17'33.10"W, Coleta manual, 23.xi.2021, Krolow, T.K. col. // *Oligotoma saundersii* (Westwood, 1837) Det.: Andrade, B. S., 2022 (11 males, 1 female, CEUFT). Palmas, Setor Sul, 10°14'20.32"S - 048°18'54.54"W, Coleta manual, 09.xii.2021, Andrade, B.S. col. // *Oligotoma saundersii* (Westwood, 1837) Det.: Andrade, B.S., 2022 (1 male CEUFT).

**Distribution (\*new records):** New Word: **Argentina; Brazil** (*Amazonas\**, *Bahia*, *Ceará*, *Mato Grosso do Sul\**, *Santa Catarina* and *Tocantins\**); **Belize; Bolívia; Caribe** (*Virgin Islands*); **Costa Rica; Cuba; French Guiana; Honduras; Mexico; Peru; United States of America; Venezuela.** Africa: **Madagascar.** Asia: **India; Indonesia; Japan:** (*Marcus Island*); **South Korea; Taiwan; Thailand.** Oceania: **Australia.**

Although it is almost impossible to trace the arrival of *O. saundersii* in Brazil, the first records of this species were made based on species presently considered synonymy of *O. saundersii*. The first in the state of Ceará based on *O. rochai* and the second in the states of Bahia and Santa Catarina (Davis 1939) based on *O. latreillei*. With the new records provided in the present work, the species extends its distribution to six states (Fig. 2), making it one of the species with the greatest Brazilian distribution encompassing the biomes of Amazonia, Cerrado (savannah), Caatinga and Atlantic Forest. It is expected that the species occurs throughout Brazil.

Distribution of embiopterans species within the Brazilian territory remains insufficiently known. The present state of knowledge seems to be strongly related to the geographical distribution of collectors/experts rather than the actual distribution of the taxon. The records presented here highlight differences in the intensity of works carried out in the Brazilian States and makes evident that the collections and researches take place where specialist were or are working currently in the country.



**Figure 2.** Distribution records of *Oligotoma saundersii* (Westwood, 1837) in Brazil.

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## Authors' Contributions

TKK and JAR designed the project. PJCP, PSBM and BSA conducted the fieldwork and identified the specimens. PSBM and BSA produced the digital images. PJCP produced the map. All authors contributed to the writing, revised the manuscript, and approved the final version.

## Conflict of Interest Statement

The authors have no conflicts of interest.

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