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LISTS OF SPECIES

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The robber flies (Diptera, Asilidae) from Marambaia Island, Rio de Janeiro, Brazil

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Abstract: During studies on tabanids (horse-fly) populations on Marambaia Island, Rio de Janeiro, Brazil, the authors collected specimens of robber flies, which are predatory flies belonging to the dipteran family Asilidae. Robber fly species were identified as *Lecania leucopyga* (Wiedemann, 1828), *Mallophora calida* (Fabricius, 1787), *Triorla striola* (Fabricius, 1805) and an undetermined specimen of *Taurhynchus* genus. *Lecania leucopyga* (Wiedemann, 1828) and *Triorla striola* (Fabricius, 1805) are recorded for the first time in Rio de Janeiro state, Brazil.

Key words: biodiversity; horse-flies; natural enemies; Neotropical region; Atlantic island

INTRODUCTION

Robber flies are predators of other insects and belong to the family Asilidae, which is one of the largest families in the order Diptera. In total there are 529 genera and more than 7,531 described species, as well as 18 genera and 39 fossil species (Geller-Grimm 2004; Pape et al. 2011; Artigas and Vieira 2014). Robber flies are found worldwide, except Antarctica, and particularly inhabit the warm tropical temperate zones in savanna, steppe, and desert regions. They are less abundant in forests, where they are found mainly along streams and riverbanks (Wood 1981; Fisher 2009). They are voracious flies that hunt other insects, inject proteolytic enzymes, and suck body fluids using a well-adapted proboscis (Lehr 1988). Asilids have ecological importance because they prey on and control populations of crop pest insects and arthropods and because they are now being considered a viable alternative for control of pests in Integrated Pest Management agricultural crops projects (Joern and Rudd 1982).

During faunal studies of horse-flies on Marambaia Island, Rio de Janeiro state, Brazil, robber flies were observed catching adult horse-flies.

MATERIALS AND METHODS

The captures of tabanids were made in 1981 and 2013 on Marambaia Island, Mangaratiba municipality, Rio de Janeiro state, Brazil. These studies were conducted at two sites. The first site is an ecotone area between sandbank forest and meadow, near Praia da Armação (23°02′54″ S, 043°57′07″ W). The second site is an area of ecotone between Atlantic Rainforest and meadow, next to a pond known as Vacaria Velha (23°03′47″ S, 043°59′16″ W). Specimens of robber flies were observed preying on tabanids (and were trapped with the same method employed to capture the horse-flies, i.e., using an insect hand net.

The publications by Almeida et al. (2006), Papavero et al. (2009) and Vieira et al. (2006) were used for identification of robber flies. Tabanids were identified according to Lutz (1913) and Fairchild (1969, 1972, 1983). Voucher specimens are deposited in Centro de Educação e Pesquisas em Medicina Ambiental (CEMA).

The list of species presented here is in alphabetic order by genus and species and the species citations are according to the most recent catalogue of Neotropical asilids (Papavero 2009). Information on horse-flies preys is according Lavigne (2013).

The study and the collections of biological material were registered with and authorized by SISBIO-IBAMA (number 33382-1).

RESULTS

In this study, 11 specimens of robber flies belonging to four different species were caught and of which three were identified. The species *Triorla striola* was the most abundant and was captured at both study sites.

Genus *Lecania* Macquart, 1838

Lecania leucopyga (Wiedemann, 1828)

Asilus leucopygus Wiedemann, 1828: 586; *Erax leucopyga* Schiner, 1866: 690 (Papavero 2009).

Type locality: Brazil (without further locality data).

Material examined — Brazil: Rio de Janeiro: Mangaratiba: Ilha da Marambaia: Praia da Armação, 27.iv.1981, Guimarães col., *Lecania leucopyga* (Wiedemann, 1828), Vieira det. (1♂ CEMA); same label data, except: 07.x.1981, *Lecania* sp. Vieira det. (1♂ CEMA).

Distribution — Brazil (Rio de Janeiro).

Prey — *Diachlorus bivittatus* Wiedemann, 1828 (Tabanidae). Material examined: same label data as above, except 27.iv.1981, Guimarães det. (1 ♂ CEMA). Distribution: Brazil (Amazonas, Bahia, Mato Grosso, Rio de Janeiro to Santa Catarina) and Peru (Loreto).

Both specimens were from the ecotone area between sandbank forest and meadow near Armação Beach. *Lecania leucopyga* was observed here preying on the horse-fly *Diachlorus bivittatus*, which is the most common tabanid at this site. Other *Lecania* spp. prey on muscids (Diptera), membracids (Homoptera) and crisomelids (Coleoptera) (Lavigne 2003). This is the first record of this species in Rio de Janeiro state.

Genus *Mallophora* Macquart, 1838

Mallophora calida (Fabricius, 1787)

Asilus calida Fabricius, 1787: 358; *Laphria callida* Fabricius, 1805: 159; *Asilus callida* Wiedemann, 1821: 210; *Trupanea callida* Walker, 1855: 590; *Mallophora nigritarsis* Fabricius of Macquart, 1838: 86; *Mallophora albicincta* Bromley, 1929: 47; *Mallophora callida* Curran, 1934: 5; *Mallophora abana* Curran, 1934: 5; *Mallophora clavitarsis* Curran, 1941: 271 (Papavero 2009).

Type locality — Cayenne, French Guiana.

Material examined — Brazil: Rio de Janeiro: Mangaratiba: Ilha da Marambaia: Vacaria Velha, 10.x.2013, Guimarães col., Vieira det., (1 ♂ CEMA).

Distribution — Argentina (Chaco, Jujuy, Salta, Santa Fe, Santiago del Estero), Bolivia (Beni, Cordillera, Sara), Brazil (Amazonas, Bahia, Ceará, Goiás, Pará, Mato Grosso, Mato Grosso do Sul, Minas Gerais, Paraná, Paraíba, Rio de Janeiro, Rio Grande do Norte, Rio Grande do Sul, Santa Catarina, São Paulo), Colombia (Santander), Guyana, French Guiana, Mexico (Veracruz), Paraguay (Guairá), Peru (San Marytín), Uruguay and Venezuela.

Prey — *Tabanus occidentalis* Linnaeus, 1758 (Tabanidae). Material examined: Same data label as above, except: Guimarães det., (1 ♂ CEMA).

Mallophora calida is a medium-sized species, with yellowish pubescence, mostly distributed at the apex of tergites, mimicking *Apis mellifera* Linnaeus, 1758 (Apidae) (Almeida et al. 2006). Known prey includes the dipteran *Stylogaster stilota* (Conopidae), as well as the hymenopterans: *Apis mellifera, Trigona ruficis*, *Tetragona mombuca* and *S. postica* (all Apidae); *Brachygasttra lecheguana* and *Polybia occidentalis* (Vespidae); *Belonuchus haemorhoidalis* (Staphylinidae); *Fastidioscula sampa* and *Chloralictus* sp. (Halictidae) (Artigas and Ângulo 1980; Lavigne 2003).

Most of the material examined by Almeida et al. (2006) in Bahia was caught during summer. Similarly, specimens of *M. calida* examined by Artigas and Ângulo (1980) were collected, mostly between the months of October to March. On Marambaia Island, one single specimen was collected in October 2013, on Vacaria Velha, an ecotone area between Atlantic Forest and meadow, next to a pond, where several tabanids species are abundant.

Genus *Taurhynchus* Artigas & Papavero, 1995

***Taurhynchus* sp.**

Type locality — Brazil.

Distribution — Rio de Janeiro, Brazil.

Material examined — Brazil: Rio de Janeiro: Mangaratiba: Ilha da Marambaia: Armação Beach, 27.iv.1981, Guimarães col., Vieira det. (1 ♂ CEMA); same label data, except: 03.iii.1981 (1 ♂ CEMA).

Prey — *Tabanus occidentalis* (Tabanidae). Material examined: Same data label as above, except: Guimarães det., (1 ♂ CEMA).

Distribution — Mexico to Argentina. Brazil (Amazonas, Mato Grosso, Paraná, Rio de Janeiro).

Papavero (2009) listed 20 species in the genus *Taurhynchus*, of which only *T. leonides* (Walker, 1851) and *T. rubricornis* (Macquart, 1838) are recorded in Rio de Janeiro state. However, these two species of robber flies are more robust and darker in color than the specimens recorded in this study. *Taurynchus* spp. prey on *Lucilia eximia* (Wiedemann, 1819) (Diptera: Calliphoridae) and *Melipona fasciata rufiventris* (Lepeletier, 1836) (Hymenoptera: Apidae) (Lavigne 2003). In March and April 1981, two specimens of *Taurhynchus* were caught, near Armação Beach, in the ectotone between forest sandbank and meadow. The specimen collected on March was trapped with a predated *Tabanus occidentalis*, a species of horse-fly also common at the study site. Several specimens were observed resting on warm, whitish, sandy soil and on branches of shrubs in the area of meadow, which confirms previous observations by Fisher (2009).

Genus *Triorla* Parks, 1968

Triorla striola (Fabricius, 1805)

Dasypogon striola Fabricius, 1805: 172; *Asilus striola* Wiedemann, 1821: 199; *Erax maculatus* Macquart, 1838: 116; *Asilus sicyon* Walker, 1849: 432; *Erax stimicon* Walker, 1851: 129; *Erax dilectus* Walker, 1855: 632; *Erax striola* Schiner, 1866: 686; *Erax zetterstedti* Jaennicke, 1867: 362; *Erax currani* Bromley, 1951: 27; *Efferia striola* Martin, 1961: 1; *Erax striola* Hull, 1962: 479; *Eicherax striola* Carrera & Machado-Allison, 1963: 254 (Papavero 2002).

Type locality — South America (without further locality data).

Material examined — Brazil: Rio de Janeiro, Mangaratiba, [Ilha da] Marambaia, Armação Beach, 10.xi.1981, Guimarães col., Vieira det. (1 ♂ CEMA); same label data, except: 03.iii.1981 (4 ♂ CEMA); same label data, except: 10.iii.1981 (1 ♂ CEMA).

Distribution — Brazil (endemic in the States of Amazonas, Bahia, Mato Grosso and Santa Catarina), Colombia, Guyana and Surinam south to Paraguay, Panama, Peru and Venezuela.

Prey — *Diachlorus bivittatus* (Tabanidae). Material examined: Same label data as above, except: 10.xi.1981, Guimarães det., (1 ♂ CEMA). Comments: *Triorla striola* is here reported from Rio de Janeiro state for the first time.

Malloch (1917) recorded the larvae of *Triorla striola* predating larvae of polyphagous beetles. This large, robust species is known to prey on the lepidopterans *Lasaia agesila* (Latreille, 1809) (Riodinidae), *Eurema leuce* (Boisduval, 1836), *Hesperocharis anguitia* (Godart, 1819) and *Itaballia mandella molione* (Fruhstorfer, 1908) (Pieridae), *Dynamine aerata* (Butler, 1877) (Nymphalidae), *Euptychia eous* Butler, 1867 (Satyridae) as well as the blattarian *Blatella* sp. (Carrera 1947; Lavigne 2003). Carrera and Vulcano (1961) recorded this species in Corumbá, Mato Grosso, in December 1960, predating nymphalids. Pupae of *T. striola* were collected by Dennis and Knutson (1988) in Pernambuco, Brazil, in January. Pamplona and Aires (1999) revising of the genus *Triorla* examined 20 specimens of *T. striola* collected in the states of Goiás, Minas Gerais, Paraná, all between the months of December and March, but also collected in July in Rio Grande do Norte. On Marambaia Island, one specimen was collected in November 1980 and three in March 1981, all near Armação Beach, in the ecotone between sandbank forest and meadow, where several tabanids species are concentrated. Several specimens of *T. striola* were observed preying on horse-flies, but one was collected along with a captured specimen of *Diachlorus bivittatus*, the most common tabanid found at that site.

DISCUSSION

The importance of predatory insects or parasitoids to the ecological dynamics of other insects has been ostensibly studied in order to obtain new perspectives in control of several pests of crops and livestock. Robber flies, in particular, have the potential to affect populations of other insects (Baker and Rischer 1975; Ghahari et al. 2007), but unfortunately, there has been no measure of the real impact of robber fly predation on the horse-fly fauna. On Marambaia Island, there are at least 31 species of tabanids (Guimarães 2015) and the impact of predation by robber flies on this fauna in unknown.

At just two sites sampled on Marambaia Island, this study found four species of robber flies, including two recorded for the first time from Rio de Janeiro state. These results, along with new prey records, suggest that there is still much to learn about the asilid fauna of the state.

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