



## Medical-veterinary and economic importance of the Tabanidae family

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### Abstract

The Tabanidae females of these insects present several adaptations related to the hematophagous habit, which increase their potential as vectors of infectious agents. Among these adaptations, anautogeny, telmophagy, the large volume of blood meal, the longtime of blood meal, and the interruption of feeding are highlighted. It is emphasized that these insects are important because, in addition to bothering humans by attacking them in search of a blood meal, they are potential transmitters of diseases to animals and humans, being capable of mechanically transporting viruses, bacteria, protozoa, and helminths, through the fact that these pathogens adhere to the structure of the proboscis. The objective of the article is to verify the medical-veterinary and economic importance of the Tabanidae family. The methodological basis of the present work consists of bibliographical research of scientific articles published in national and international academic journals classified by the Coordination for the Improvement of Higher Education Personnel (CAPES). Document analysis was used as a data collection method to gather information from theoretical books, these banks, university dissertations, scientific journals, documents, and digital platforms: The search criterion for articles was to prioritize articles that dealt with the topic. Document analysis was used as a data collection method to gather information on theoretical books, these banks, university dissertations, scientific journals, documents, and websites: [https://www.researchgate.net/post/How\\_to\\_increase\\_the\\_research\\_results\\_visibility](https://www.researchgate.net/post/How_to_increase_the_research_results_visibility). (<https://goo.gl/gLTTTs>), HAL (<https://hal.archives-ouvertes.fr/submit/index>), SSRN (<https://hq.ssrn.com/login/pubsigninjoin.cfm>) and ResearchGate (<https://www.researchgate.net/signup.SignUp.html>) HAL SSRN.

**Keywords:** Damage; Female; Hematophagy; Irritation; Sting; Vector; Wounds

### 1. Introduction

Tabanidae are a family of diptera in the suborder Brachycera. Within the Infraorder Tabanomorpha, there are some other hematophagous. Some species of Rhagionidae and Atherecidae, called snipe flies, bite humans, sometimes insistently, especially in the Palearctic and Nearctic regions. The genus *Suragina* Walker, 1858 (Atherecidae) in Panama is suspected of mechanical transmission of agents causing tuleremia and anaplasmosis. Popularly, flies from this family are known as buttock, estrus, gusano, gadfly, motuca, horsefly, and tavão. Females are hematophagous (Figure 1) [1-2].

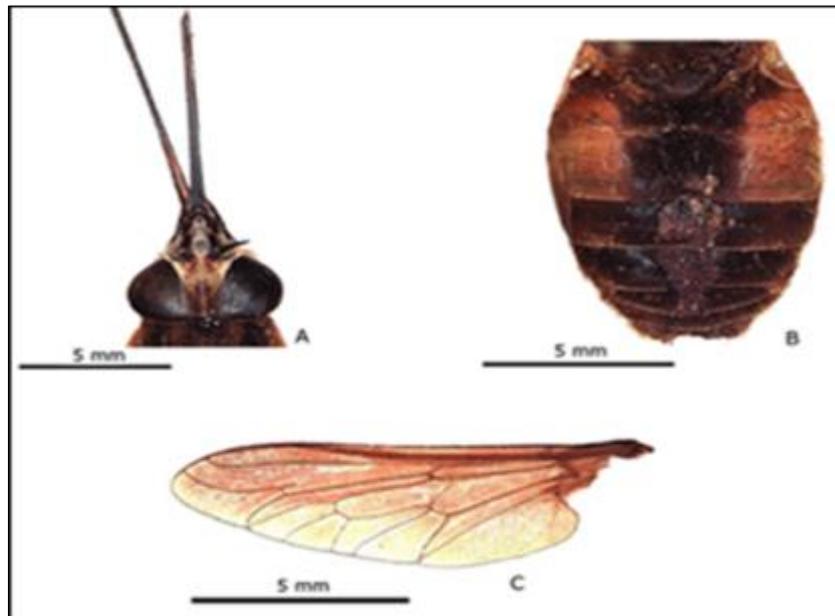
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Source: [https://www.brisbaneinsects.com/brisbane\\_Tabanoidae/Tabanidae.htm](https://www.brisbaneinsects.com/brisbane_Tabanoidae/Tabanidae.htm)

**Figure 1** *Saptia concolor* (Walker, 1850) Proboscis for piercing and sucking

The Tabanidae females of these insects present several adaptations related to the hematophagous habit, which increase their potential as vectors of infectious agents. Among these adaptations, anautogeny, telmophagy, the large volume of blood meal, the long time of blood meal, and the interruption of feeding are highlighted. It is emphasized that these insects are important because, in addition to bothering humans by attacking them in search of a blood meal, they are potential transmitters of diseases to animals and humans, being capable of mechanically transporting viruses, bacteria, protozoa, and helminths, through the fact that these pathogens adhere to the structure of the proboscis (Figure 2) [1-3].

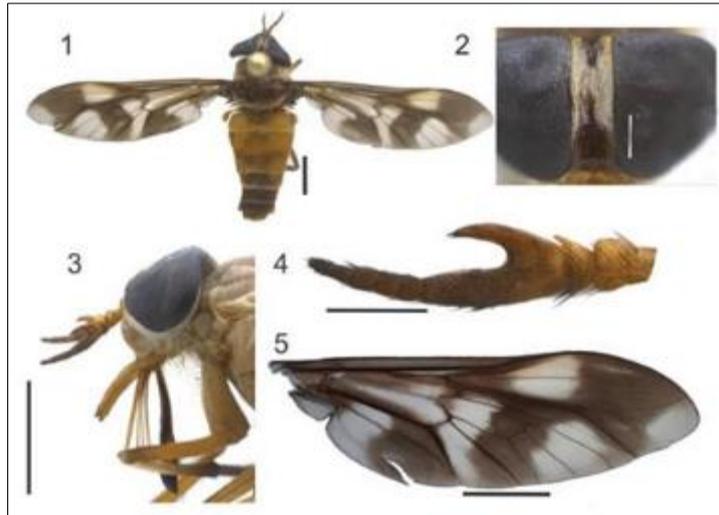


Source: [https://www.researchgate.net/figure/Body-parts-of-female-Philoliche-Philoliche-longirostris-Hardwicke-1823-A-Head\\_fig5\\_316739907](https://www.researchgate.net/figure/Body-parts-of-female-Philoliche-Philoliche-longirostris-Hardwicke-1823-A-Head_fig5_316739907)

**Figure 2** Body parts of female *Philoliche (Philoliche) longirostris* (Hardwicke, 1823); A: Head and antennae; B: Abdomen; C: Wing

### 1.1. Descriptions

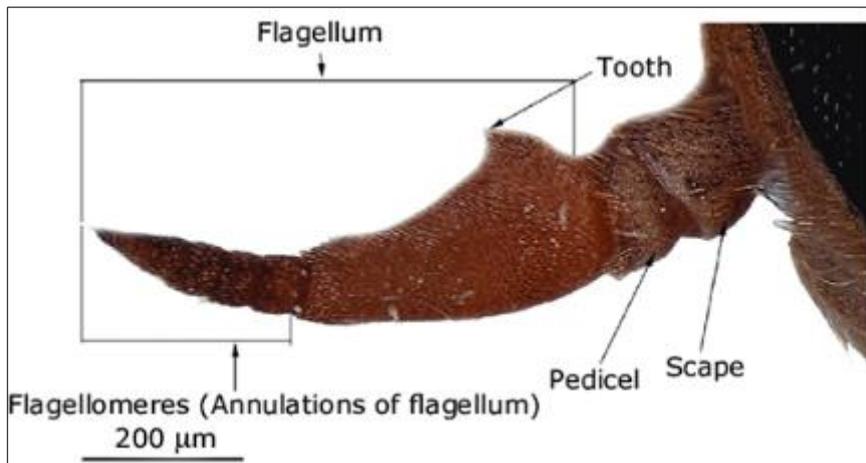
The integument is usually covered with a down but does not have developed bristles. Liveries are generally understated, with colors ranging from black to gray, and brown to yellowish. As with most Tabanomorpha, they are characterized by sexual dimorphism that is evident mainly in the conformation of the eyes. Another element of differentiation in the morphology of the sexes, recurrent but not exclusive to this family, is the conformation of the oral apparatus, adapted to hematophagy in females. They are the largest hematophagous dipterans, with species measuring up to 6.5 cm in wingspan. Their wings always have the 'Y' shaped veins at the tip. Usually, there are dense short hairs on their body (Figure 3)



Source: <https://www.scielo.br/j/isz/a/GKwyMkmBKXdpWBcgD5dqpJK/?lang=en#ModalFig1> and <https://doi.org/10.1590/1678-476620151052242244>

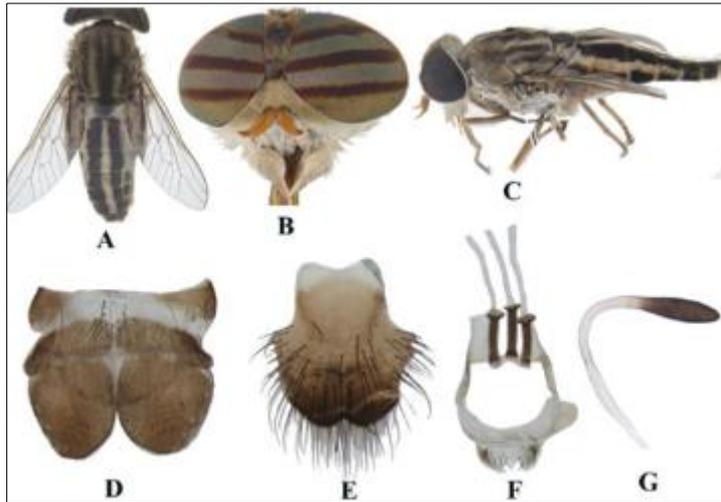
**Figure 3** *Dichelacera matogrossensis* sp. nov., holotype female: 1, habitus, dorsal view; 2, fronts, frontal view; 3, head, side view; 4, antenna, side view; 5, wing, dorsal view

There is evident sexual dimorphism in the eyes (iridescent colour), like some other families, females are almost always dichoptic, and males are almost always holoptic. They are usually grey to brown in color, a few are colorful in the resting position, and all mouth appendages are housed in the lower lip shower, with the exception of the upper palps, positioned anteriorly in relation to the proboscis. Males have non-functional jaws and are therefore unable to bite (Figures 4-5) [1-4].



Source: [https://www.researchgate.net/figure/Showing-typical-morphology-of-antenna-of-adult-Tabanidae\\_fig2\\_316739907](https://www.researchgate.net/figure/Showing-typical-morphology-of-antenna-of-adult-Tabanidae_fig2_316739907)

**Figure 4** Typical morphology of antenna of adult Tabanidae



Sources: <https://www.semanticscholar.org/paper/Taxonomic-notes-on-Tabanidae-from-south-India-with-Metri-Puttalakshamma/4f03fa8eb1834c270305f82660138268479153c3/figure/4> and <https://api.semanticscholar.org/CorpusID:226428596>

**Figure 5** *Tabanus dorsilinea* Wiedemann, 1824. A–habitus (dorsal view); B–head (front view); C– habitus (lateral view); D–tergite IX, X, cerci and hypoproct (dorsal view); E– Hypogynium + hypogynial valve (dorsal view); F– genital fork, (dorsal view); G– spermatheca capsule

### 1.2. Biology, Ecology and Distribution

Aquatic species are generally found buried in the substrate. They can be large, reaching 6 cm. They have an elongated appearance and with two fusiform ends, a very small head. Thick and rigid cuticle, with a clearly segmented appearance, like short aligned cylinders. Varied coloration, and may have a zebra pattern. The larvae are also voracious predators, they feed on worms, mollusks, and insects, and may have cannibalistic behavior. They can inflict a painful sting on humans, often reported in rice fields. Pupation occurs out of water, in marginal lands [1-6].

Tabanidae are generally associated with rural or forested environments and avoid enclosed spaces. The highest concentration of hematophagous flies is found in locations that host high population densities of potential guests. The events that lead to the mechanical transmission of pathogens occur due to the fact that the insect starts feeding on an infected host and, when it is interrupted, due to the pain felt, the insect is displaced and moves to another host, transporting the agent inside the body or in the part that comes into contact with the host, passing the agent through a wound (Figure 6) [1-7].



Sources: Photograph by Jerry Butler, University of Florida and [https://entnemdept.ufl.edu/creatures/livestock/deer\\_fly.htm](https://entnemdept.ufl.edu/creatures/livestock/deer_fly.htm)

**Figure 6** Deer fly, *Chrysops* sp., egg mass after darkening

A cosmopolitan family, its range also includes the most remote islands of all zoo-geographical regions on Earth, with the exception of Antarctica. The greatest concentration of species occurs in tropical regions. Occur in temperate, subtropical, and tropical locations, but hematopoiesis is absent from Australia and South America (Figure 7) [1-8].

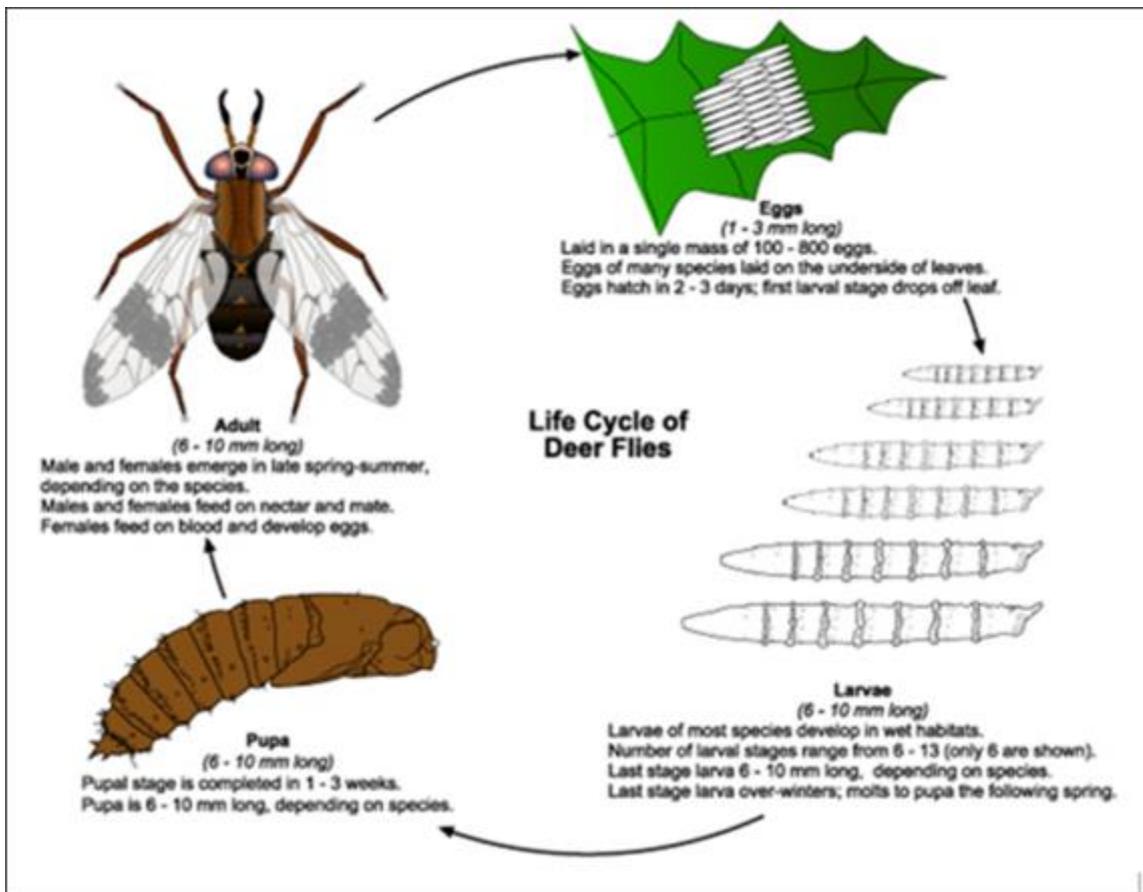


Sources: Photograph by Jerry Butler and [https://entnemdept.ufl.edu/creatures/livestock/deer\\_fly.htm](https://entnemdept.ufl.edu/creatures/livestock/deer_fly.htm)

**Figure 7** Deer fly, *Chrysops* sp., egg mass after darkening

### 1.2.1. Life Cycle:

After oviposition, the egg takes 3 to 4 days for embryogenesis can last up to 21 days. The female can lay 100 to 800 eggs in a single mass and her eggs measure 1 to 3 mm in length. Horseflies often oviposit on leaves or stems of emerging vegetation on the banks of lakes and streams. Some species lay their eggs on tree bark hanging underwater, above the water line on rocks, and also on dry soil and leaf litter (Figure 8) [1-11].



Sources: Illustration by: Scott Charlesworth, Purdue University based in part on Pechuman, L.L. and H.J. Teskey, 1981, IN: Manual of Nearctic Diptera, Volume 1 and <https://extension.entm.purdue.edu/publichealth/insects/tabaniid.html>

**Figure 8** Summarized life cycle of horse flies

Tabanidae larvae are fusiform and measure, in the last instar, from 15 to 60 mm They are generally whitish in color, although there are some with shades of brown. it's green. The larvae are carnivorous, preying on insects and snails, and

cannibalistic. They can be found in a wide variety of habitats that include mud, vegetation saturated with water, swamps, near lakes, streams, under rocks along streams, stumps of rotten trees, and forest litter (Figures 9-10) [1-12].



Sources: Photograph by Jason M. Squitier, University of Florida and [https://entnemdept.ufl.edu/creatures/livestock/deer\\_fly.htm](https://entnemdept.ufl.edu/creatures/livestock/deer_fly.htm)

**Figure 9** Typical larva of a *Tabanidae* species



Source: Photograph by Jason M. Squitier, University of Florida and [https://entnemdept.ufl.edu/creatures/livestock/deer\\_fly.htm](https://entnemdept.ufl.edu/creatures/livestock/deer_fly.htm)

**Figure 10** Typical *Tabanidae* pupa

### 1.3. Medical-Veterinary and economic importance

The Tabanidae family is made up of Diptera of medical-veterinary and economic importance, due to the hematophagy carried out by the female, which causes blood spoliation and transmission of agents pathogens. The wound opened by the bite allows bacterial invasion and the emergence of myiasis. The economic importance is related to the stripping and irritating action that Tabanidae cause mainly in horses and cattle. They interfere with the animal's feeding and rest, causing loss of milk production and weight and due to myiasis, leather depreciation [1-13].

The harmfulness of hematophagous Tabanidae manifests itself in three aspects: Economic damage caused to the livestock sector, discomfort and discomfort caused to people and pets, and transmission of pathogens. The economic damage is due to the reduction in zootechnical production, due to the stress caused by domestic animals systematically attacked by flies. Persistent persistence in parts of the body that cannot be reached causes stress, reduced appetite, weakening due to blood collection, and transmission of more or less serious infections. They are a nuisance to livestock and humans due to the insertion of the frontal style into the skin's epidermis [1-14].

The main species of pathogenic bacteria mechanically transmitted by Tabanidae in animals are *Anaplasma marginale* (Anaplasmataceae) (carbuncle and malignant pustule), *Bacillus anthracis* (Bacillales) (carbuncle and malignant pustule), *Pasteurella multocida* (Gammaproteobacteria), *Francisella tularensis* (Francisella), *Clostridium chauvoei* (Bacillaceae), *Brucella* sp., *Listeria monocytogenes* (Bacillales), and *Erysipelothrix rhusiopathiae* (Erysipelothrix), although only some of them have been demonstrated experimentally. In addition to the ability to transmit bacteria, and viruses (viruses equine infectious anemia, bovine leukemia, and swine cholera) some species of Tabanidae are proven biological transmitters of other etiological agents, such as the protozoan *Trypanosoma vivax*, a parasite of cattle in South America [1-17].

#### 1.4. Hosts

Horseflies feed on various vertebrate hosts, including domestic and wild animals, such as cattle, camels, pigs, horses, rodents, reptiles, and birds. Tabanids prefer donkeys, followed by cows, horses, and finally humans. The search for the host involves olfactory attraction (CO<sub>2</sub>), the color of the animal also interferes with attractiveness, for example, tabanids are more attracted to dark horses than to light horses. Some hypotheses suggest that this preference occurs due to the dark coat [1-18]

Human blood does not have exclusive characteristics that attract females. In fact, there are a number of factors that contribute to a person being more attractive to mosquitoes. "In general, CO<sub>2</sub> from breathing, smell, perspiration, and temperature are chemical and physical signals that attract females to feed [1-19].

#### 1.5. Etiology

The reason lies in the etiology of flies and the transmission mechanism. The bite of flies is very painful and therefore immediately attracts the attention of the victim, whose reaction can interrupt the insect's feeding and force it to move to another point or to another guest [1-20].

To complete a meal, a fly must generally practice more bites, and often on different hosts, at a short distance. This behavior facilitates the accidental and mechanical transmission of pathogens with a mechanism similar to the transmission of viruses transmitted by stylets by aphids on plants: the pathogen does not establish any biological relationship with the carrier, it is taken over by accidental contact of the mouthparts with the blood of an infected host and transmitted immediately afterward with a puncture into a healthy host [1-21].

#### 1.6. Prevention and Control

There are native beneficial insects that target tabanids. Eggs are parasitized by such Hymenoptera families as Trichogrammatidae, Scelionidae, and Chalcididae. Diapriidae and Pteromalidae (Hymenoptera) and Bombyliidae and Tachinidae (Diptera) parasitize the larvae and pupa. Tabanid adults are used as provisions for nest-building wasps. Cattle egrets and killdeer are also tabanid feeders.

Preventive protection of the body with repellent products, available on the market, is completely useless since flies are not attracted by smell, but by heat. In fact, many governments have shown that the only effective tool for fighting these flies is the trap. In the case of bites, specific products are used to treat insect bites, such as antihistamines, and, in the case of more severe and prolonged inflammation, the use of corticosteroids combined with antibiotics [22-30].

#### 1.7. Management

Currently, there are no adequate means for managing populations. Traps are sometimes effective in small areas such as yards, camping sites, and swimming pools. Trapping of nuisance flies has reduced their numbers on the Atlantic Coast of the United States. Traps have been effective when used around cattle that are confined to manageable areas.

#### *Objective*

The objective of the article is to verify the medical-veterinary and economic importance of the Tabanidae family.

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## 2. Methods

The methodological basis of the present work consists of bibliographical research of scientific articles published in national and international academic journals classified by the Coordination for the Improvement of Higher Education Personnel (CAPES). Document analysis was used as a data collection method to gather information from theoretical books, banks, university dissertations, scientific journals, documents, and digital platforms: The search criterion for articles was to prioritize articles that dealt with the topic. Document analysis was used as a data collection method to gather information on theoretical books, these banks, university dissertations, scientific journals, documents, and websites

(<https://goo.gl/gLTTTs>), HAL (<https://hal.archives-ouvertes.fr/submit/index>), SSRN (<https://hq.ssrn.com/login/pubsiginjoin.cfm>) and Research Gate (<https://www.researchgate.net/signup.SignUp.html>) HAL SSRN.

### 3. Selected Studies

#### 3.1. Study 1

Tabanidae species collected by Nzi, Malaise, and equine bait traps in the central region of Rondônia in the municipality of Monte Negro, State of Rondônia, Brazil, from June 2019 to May 2020.

One thousand five hundred and seventy-two (1,572) specimens were captured, belonging to 17 genera and 55 species. Females corresponded to 99.05% of the tabanids captured, that is, only 15 males were collected during sampling. The main genera were: *Tabanus* Linnaeus, 1758 with 814 individuals and 25 species, followed by *Dichelacera* Macquart, 1838, with 216 individuals and distributed in 2 species, and *Stypommisa* Enderlein, 1923, with 164 specimens belonging to 4 species.

As the most abundant species, respectively, *Tabanus antarcticus*, 1758 (24.68%), *Dichelacera tetradelta* Henriques, 1993, (13.61%), *Stypommisa aripuana* Fairchild & Wilkerson, 1986 (8.78%), *Tabanus mucronatus* Fairchild, 1961 (5.85%), *Leucotabanus albovarius* (Walker, 1854) (4.83%), *Tabanus occidentalis* Linnaeus, 1758 (4.71%), *Tabanus western* var. *modest* Kröber 1931 (4.26%), *Pityocera cervus* (Wiedemann, 1928) (3.50%), *T. occidentalis* (3.44%), *Cataclorops difficilis* (Kröber, 1931) (2.74%), *Stenotabanus incipient* (Walker, 1860) (2.29%) and *Tabanus redis* Macquart, 1838 (2.29%). The other species corresponded to approximately 2.73% total sample

*Acanthocera fairchildi* Henriques & Rafael, 1992, *Cataclorops halteratus* Kröber, 1931, *Diacloro curvipes* (Fabricius, 1805), *Diachlorus fuscistigma* Lutz, 1913, *Dichelacera cervicornis* (Fabricius, 1805), *Esenbeckia osornoi* Fairchild, 1942, *Lepiselaga crassipes* (Fabricius, 1805), *Leucotabanus pauculus* Fairchild, 1951, *Phaeotabanus cajennensis* (Fabricius, 1787), *Philipotabanus pictus* Gorayeb & Rafael, 1984, *Philipotabanus estigmatalis* (Kröber, 1931).

*Phorcotabanus cinereus* (Wiedemann, 1921), *Stypommisa captiroptera* (Kröber, 1930), *Stypommisa modica* (Hine, 1920), *Tabanus crassicornis* Wiedemann, 1821, *Tabanus discifer* Walker, 1850, *Tabanus discus* Wiedemann 1828, *Tabanus dorsorufus* Carmo & Henriques, 2019, *Tabanus humboldt* Fairchild, 1984, *Tabanus importunus* Wiedemann, 1828, *Tabanus mucronatus* Fairchild, 1961, *Tabanus nebulosus* DeGeer, 1776, *Tabanus piciveventris* Rondani, 1848, *Tabanus sannio* Fairchild, 1956, *Tabanus sextriangulus* Gorayeb & Rafael, 1984, and *Tabanus sorbillans* Wiedemann, 1828 [36-39].

#### 3.2. Study 2

This work aimed to analyze some ecological aspects and behavioral notes of *Tabanus nematocallus* Fairchild, 1984, and other tabanids, which were collected during the decomposition process of swine models.

During the three stages of the experiment, there was a difference in the composition and abundance of tabanids. In the stage referring to the intermediate period, the greatest abundance is noticeable, with eight of the collected specimens belonging to the species *Leucotabanus exaestuans* Linnaeus, 1758, one being from the species *Fidena* sp., and *Tabanus trivittatus* Fabricius, 1805.

In the dry season, only one specimen was collected, belonging to the species *L. exaestuans*, and in the rainy season experiment four specimens were collected, all belonging to the species *L. exaestuans*. This greater abundance in the intermediate period is related to the beginning of the ebb of the rivers, which is the period when adults emerge to take a blood meal and reproduce.

The most abundant decomposition phase was the fresh phase, possibly because it still provides conditions for the females of these insects to be able to carry out the hematophagy necessary for the maturation of their eggs. Once this is no longer possible, the carcass is apparently not more attractive to tabanids and the number of visitors from this family decreases until they are no longer found associated with it [40-41].

#### 3.3. Study 4

In addition, an updated list of tabanids from the Jaú National Park (PNJ) is presented and data from three expeditions are discussed.

The Jaú National Park: (Rio)=Jaú river, CA=arbustiva campina, Pab=open campinarana, CP=campinarana, FD=terra firma forest (canopy), FS=terra firma forest (soil), RioP=Papagaio river, IgV=igarapé do Veado). Ten traps were used in

each expedition to capture insects: two large Malaise-type flight interception traps, four small Malaise-type traps, and four hanging traps. When more than one trap of the same type was installed in the same type of environment.

Eight thousand three hundred and forty-nine (8,349) individuals of 54 species and one variety were captured. Previously, 70 species of tabanids were known to the PNJ, captured on nine expeditions. With these last three collections came three new records of species and one of a variety. Therefore, the Park has 73 species and one registered variety. The most abundant species were: *Stenotabanus bequaerti* Rafael, Fairchild & Goarayeb, 1982 (4,490 individuals - 53.8% of the total), *Tabanus trivittatus* Fabricius, 1805 (1,099 - 13.1%), *Tabanus occidentalis* Linnaeus, 1758 (767 - 9.2%), and *Diachlorus pechumani* Fairchild, 1972 (387 - 4.6%).

Four new records for the PNJ area: *Eutabanus pictus* Kröber, 1930, *Tabanus discifer* Walker, 1850, *Tabanus fortis* Fairchild, 1961 and *T. occidentalis*. The four new records for the PNJ area were: *E. pictus*, *Tabanus discifer* Walker, 1850, *Tabanus fortis* Fairchild, 1961 and *Tabanus dorsovittatus* Macquart, 1855, and *E. pictus*.

In Janela Seringalzinho, in April (rainy season), 939 individuals of 27 species and one variety were captured, three of which were new records for the PNJ. At Janela Floresta, in June (the beginning of the drought and ebb of the rivers), 1,677 were captured individuals of 25 species, 12 of which had not been captured on the first expedition. In Janela Seringalzinho, in August (dry season), 5,733 individuals of 36 species were captured, which is a new record for the Park, and 14 more had not been captured in the two previous expeditions [42-43].

### 3.4. Study 5

#### 3.4.1. Bacteria carried on horseflies

Insect collections were carried out in peri-urban and forested areas, using Malaise traps and horses as bait. After identifying the tabanids, the specimens were dissected and subjected to bacteriological study, on the body's entire body surface, mouthparts, and intestine. After the bacteria were isolated on blood agar, MacConkey Agar, and Chapman media, they were biochemically identified.

Around 400 tabanids were collected. To carry out the tests, 130 specimens were selected. All specimens were recorded and grouped according to their respective species and groups for bacteriological testing.

*Serratia marcescens* is the most important member of its genus and is generally associated with a variety of human infections, in particular pneumonia and septicemia in immunocompromised patients. It is worth noting that in the present study, this bacterium was isolated from five species of horsefly, especially from the mouthparts (three), followed by the intestine and the surface of the body.

The clinical spectrum of *Salmonella arizonae* (Enterobacteriaceae) infections ranges from benign gastroenteritis to enteric fever and septicemia with localized infection.

*Klebsiella pneumoniae* (Enterobacteriales) can cause a classic form of primary pneumonia; This colonization may be the source of lung infections that often occur in patients with debilitating conditions.

*Escherichia coli* (Enterobacteriales) is one of the microorganisms commonly involved in septicemia due to Gram-negative bacteria in endotoxin-induced shock; Certain serogroups can cause enteritis gastroenteritis and urinary infections.

*Enterobacter cloacae* (Enterobacteriaceae) is found widely distributed in water, sewage, soil, and vegetables; it is part of the commensal enteric microbiota and is believed to not cause diarrhea; It is also associated with a variety of opportunistic infections that affect the urinary tract and respiratory tract, potentially causing skin lesions and septicemia.

*Staphylococcus aureus* (Staphylococcaceae) can cause diverse infectious processes, ranging from relatively benign chronic cutaneous infections to potentially fatal systemic infections; which are confirmed as the biggest cause of contamination in food [42-43].

### 3.5. Study 6

#### 3.5.1. *Tabanus bovinus* L., 1758.

Fly that attacks cattle - Length: 2 to 2.5 cm. Amphibian larvae.

The horsefly's jaws are like a pair of sharp swords, with projections on the sides like saws, and which cross each other like the blades of scissors; Its jaws are like small spears with a sharp tip, capable of entering and exiting a hole as if they were a pneumatic drill. But that is not all. This strange surgeon, as if he were in an operating room, sucks the blood from his victim, using his sucking device.

Finally, use an anticoagulant so that the blood does not clot. The horsefly bite itself is not harmful, although it is painful; however, it can transmit diseases: sleeping sickness to humans in Africa and to horses in India. There are four species in Europe: The two largest ones that attack horses are known pests, which buzz around people's heads and bite their faces.

Horsefly larvae are shaped like elongated cones. They have two hooks on their heads and a padded abdomen. This allows them to crawl on damp ground over aquatic plants. The larvae of insects from the Tabanidae family are carnivorous – they feed on small freshwater invertebrates [43-44].

### 3.6. Study 7

Contribute to expanding knowledge of Tocantins tabanids, through the identification of specimens collected at the Canguçu Research Center.

The collections were carried out by the Laboratory team of Entomology, using four types of trap: Malaise model Gressitt & Gressitt, Malaise model Townes, NZI, and illuminated sheet, some were collected. manually.

Three hundred and two (302) specimens were recorded, distributed in three subfamilies (Pangoniinae, Chrysopsinae, and Tabaninae), four tribes (Scionini, Chrysopsini, Diachlorini, and Tabanini), 12 genera, 29 species, and two varieties. The most abundant species was *Chlorotabanus inanis* (Fabricius, 1787), with 48 specimens. Of the 29 species collected, 21 these are new records for Tocantins. Only eight species, *C. inanis*; *Diachlorus bicinctus* (Fabricius, 1805); *Leucotabanus exaestuans* (Linnaeus, 1758); *Tabanus cicur* Fairchild, 1942; *Tabanus importunus* Widemann, 1828; *Tabanus mucronatus* Fairchild, 1961; *Tabanus occidentalis* Linnaeus, 1758; *Tabanus palpalis* Brèthes, 1910.

### 3.7. Checklist of CPC Tabanidae species

#### 3.7.1. Subfamily Pangoniinae

Scionini Tribe

*Fidena mattogrossensis* (Lutz, 1912);

**Distribution:** Brazil (Rondônia, Amazonas, Mato Grosso and Tocantins) Guyana and Suriname.

#### 3.7.2. Subfamily Chrysopsinae

Chrysopsini Tribe

*Chrysops formosus* Kröber, 1926

**Distribution:** Brazil (Acre, Rondônia, Amazonas, Roraima, Pará, Amapá, Maranhão, Bahia and Tocantins), Trinidad, French and Guiana.

*Chrysops formosus* Kröber, 1926

**Distribution:** Brazil (Acre, Rondônia, Amazonas, Roraima, Pará, Amapá, Maranhão Bahia and Tocantins), Trinidad, and French Guiana.

*Chrysops variegatus* (De Geer, 1776)

**Distribution:** Brazil (Amapá, Roraima, Amazonas, Rondônia, Mato Grosso, Maranhão, Pará, Acre, Paraná and Tocantins), West Indies, from southern Mexico to Argentina (Misiones).

### 3.7.3. Subfamily Tabaninae

Diachlorini Tribe

*Chlorotabanus inanis* (Fabricius, 1787)

**Distribution:** Brazil (São Paulo, Paraná, Amazonas, Amapá, Maranhão, Rondônia, Mato Grosso, Pará, Acre, Rio Grande do Sul, Roraima, Tocantins, Goiás, Minas Gerais, Espírito Santo, Rio de Janeiro and Santa Catarina), Mexico, Peru, Belize, Guatemala, Costa Rica, Panama, Colombia, Venezuela, Trinidad Tobago, French Guiana, Ecuador and Bolivia.

*Chlorotabanus leucochlorus* Fairchild, 1961

**Distribution:** Brazil (Amapá, Amazonas, Pará, Maranhão, Rondônia, Roraima and Tocantins), Venezuela, French Guiana, Suriname, Peru, Colombia and Guyana.

*Cryptotylus unicolor* (Wiedemann, 1828)

**Distribution:** Panama to Brazil (Mato Grosso, Amazonas, Amapá, Roraima, Maranhão, Pará, Espírito Santo, Acre, Rondônia and Tocantins), Paraguay and Argentina (Chaco).

*Diachlorus bicinctus* (Fabricius, 1805)

**Distribution:** Brazil (Acre, Rondônia, Amazonas, Roraima, Pará, Amapá, Maranhão, Mato Grosso, Paraíba, Bahia and Tocantins), Venezuela, Suriname, Trinidad, Peru and Bolivia.

*Diachlorus bimaculatus* (Wiedemann, 1828)

**Distribution:** Brazil (Rondônia, Mato Grosso, Paraíba, Minas Gerais, São Paulo, Mato Grosso do Sul, Acre and Tocantins), Ecuador, Peru, Bolivia, Paraguay and Argentina.

*Diachlorus curvipes* (Fabricius, 1805)

**Distribution:** Brazil (Roraima, Pará, Amapá, Rondônia, Mato Grosso, Amazonas, Maranhão, Paraíba, Bahia, Acre and Tocantins), Costa Rica, Panama to Suriname, French Guiana, Peru, Bolivia and Trinidad.

*Diachlorus falsifuscistigma* Henriques & Rafael, 1999

**Distribution:** Brazil (Amazonas, Pará and Tocantins).

*Diachlorus fuscistigma* Lutz, 1913

**Distribution:** Brazil (Acre, Rondônia, Amazonas, Roraima, Pará, Amapá, Bahia, Maranhão, Mato Grosso do Sul and Tocantins), Colombia, Suriname, Ecuador, Peru (Loreto) and Bolivia.

*Diachlorus immaculatus* (Wiedemann, 1828)

**Distribution:** Brazil (Mato Grosso, Minas Gerais, São Paulo, Mato Grosso do Sul and Tocantins) and Paraguay.

*Dichelacera fuscinervis* (Barretto, 1950)

**Distribution:** Brazil (Mato Grosso, Goiás, Rio Grande do Sul and Tocantins).

*Eutabanus pictus* Kröber, 1930

**Distribution:** Brazil (Amapá, Pará, Amazonas and Tocantins), Ecuador, and Peru.

*Lepiselaga crassipes* (Fabricius, 1805)

**Distribution:** Brazil (Paraíba, Mato Grosso do Sul, Amazonas, Amapá, Maranhão, Pará, Acre, Roraima, Rondônia and Tocantins), Mexico and Argentina (Formosa, Chaco, Salta, Tucumán, Santa Fé, Buenos Aires), Cuba, Jamaica, Hispaniola and Puerto Rico.

*Leucotabanus albovarius* (Walker, 1854)

Distributions: Brazil (Acre, Rondônia, Amazonas, Roraima, Pará, Amapá, and Tocantins), Guyana, Suriname, French Guiana, Ecuador (Napó, and Orellana), Peru, Bolivia, Colombia, and Venezuela.

*Leucotabanus exaestuans* (Linnaeus, 1758)

**Distribution:** Brazil (Roraima, Bahia, Amazonas, Maranhão, Amapá, Mato Grosso, Tocantins, Rondônia, Pará, Acre, and Parana), Mexico to Bolivia (Chapare), Argentina (Salta, Chaco, Misiones), Trinidad, Venezuela, Suriname and Peru.

*Phaeotabanus cajennensis* (Fabricius, 1787)

**Distribution:** Brazil (São Paulo, Paraná, Amazonas, Roraima, Amapá, Mato Grosso, Distrito Federal, Pará, Paraíba, Rondônia and Tocantins), Trinidad, Colombia, French Guiana and Bolivia.

*Phaeotabanus fervens* (Linnaeus, 1758)

**Distribution:** Brazil (Roraima, Amazonas, Rondônia, Mato Grosso, Mato Grosso do Sul, Pará, and Tocantins), Trinidad, Venezuela, and Argentina (Chaco).

*Phorcotabanus cinereus* (Wiedemann, 1821)

**Distribution:** Brasil (Tocantins), México a Argentina and Trinidad.

*Tabanus cicur* Fairchild, 1942

**Distribution:** Brasil (Pará and Tocantins), Colômbia, Equador, Guiana and Bolívia.

*Tabanus crassicornis* Wiedemann, 1821

**Distribution:** Brasil (Acre, Rondônia, Amazonas, Roraima, Pará, Amapá, Mato Grosso and Tocantins), Colômbia, Venezuela, Suriname, Guiana Francesa, and Peru.

*Tabanus importunus* Wiedemann, 1828

**Distribution:** Brazil (Rio Grande do Sul, Mato Grosso do Sul, Maranhão, Tocantins, Distrito Federal, Roraima, Amapá, Pará, Rio Grande do Norte, Mato Grosso, Rondônia, and Amazonas), Panamá, Guiana, Trinidad, Peru, Bolívia and Paraguay.

*Tabanus mucronatus* Fairchild, 1961

**Distribution:** Brazil (Pará, Goiás, Mato Grosso, Tocantins, Maranhão and Rondônia),

*Tabanus nebulosus* De Geer, 1776

**Distribution:** Barbados to Brazil (Mato Grosso, Roraima, Maranhão, Rondônia, Amapá, Pará, Acre, and Tocantins), Belize, Trinidad, and Argentina (Tucumán, Formosa, Corrientes, Santa Fé and Chaco).

*Tabanus occidentalis* Linnaeus, 1758

**Distribution:** Brazil (Federal District, Mato Grosso, Bahia, Tocantins, Amapá, Paraíba, Maranhão, Amazonas, Rondônia, Pará, Acre, Paraná, Mato Grosso do Sul, Roraima and Tocantins), Mexico and Argentina (Entre Ríos, Buenos Aires and Trinidad).

*Tabanus occidentalis* var. *dorsovittatus* Macquart, 1855

**Distribution:** Brazil (Tocantins), Mexico to Argentina, and Trinidad.

*Tabanus occidentalis* var. *modestus* Wiedemann, 1828

**Distribution:** Honduras to Brazil (Mato Grosso and Tocantins).

*Tabanus palpalis* Brèthes, 1910

**Distribution:** Brazil (Mato Grosso, Goiás, Tocantins, Distrito Federal, and Pará), Paraguay and Argentina (Salta, Catamarca, and Misiones), and Bolivia.

*Tabanus pseudonebulosus* Gorayeb & Barros, 2006

**Distribution:** Brazil (Pará, Amazonas, Mato Grosso do Sul and Tocantins) and Venezuela.

*Tabanus pungens* Wiedemann, 1828 [44-45].

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#### 4. Conclusion

The Tabanidae family is made up of Diptera of medical-veterinary and economic importance, due to the hematophagy carried out by the female, which causes blood spoliation and transmission of agents pathogens. The wound opened by the bite allows bacterial invasion and the emergence of myiasis. The economic importance is related to the stripping and irritating action that Tabanidae cause mainly in horses and cattle.

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