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Scientific Note

Unexpected passenger: new record and key to *Anastrepha* Schiner, 1868 (Diptera, Tephritidae) from Mato Grosso, Brazil

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Abstract. The economic importance of some species of *Anastrepha* Schiner, 1868 (Diptera, Tephritidae) has contributed to expanding knowledge of fruit fly diversity in Brazil, due to the numerous surveys conducted in the country since the late 1970s. However, a new record of *Anastrepha* may sometimes be revealed by an entomologist traveling through a bucolic landscape. In this case, a fly entered through the window of a vehicle traveling along a dirt road in the municipality of Cáceres, in the state of Mato Grosso (MT), and landed on the windshield. The yellow coloration of the accidental passenger caught the attention of the traveling entomologist, who collected it in a small plastic vial and later took it to the Laboratory of Insect Taxonomy (LTI) of "Luiz de Queiroz" College of Agriculture (ESALQ/USP), Piracicaba, state of São Paulo, for identification. This unusual collection represents the first record of *Anastrepha flavipennis* Greene, 1934 in MT. Although *A. flavipennis* has been recorded in eight Brazilian states, including now MT, few specimens have generally been collected in surveys, and only a single host is known. In addition to the morphological characters used to identify *A. flavipennis*, an identification key to the 27 *Anastrepha* species known from MT was prepared.

Keywords: Accidental collection, *Anastrepha flavipennis*, Distribution, Fruit fly, Trypetinae.

The state of Mato Grosso (MT), located in the Central-West region of Brazil, is part of the Legal Amazon. It is the third largest state in the country (903,357.908 km²), with 141 municipalities distributed across three biomes (Amazon, Cerrado, and Pantanal) (Faria 2014).

Records of fruit flies in MT are still incipient. The first records, based on occasional collections, revealed the occurrence of nine species in the state (Uchôa & Zucchi 2000). Subsequently, surveys using McPhail-type traps were conducted (Uchôa & Pontes 2011; Silva et al. 2017; Barreto et al. 2022). The first records of *Anastrepha montei* Lima, 1934 and *Anastrepha tumida* Stone, 1942 in MT have not yet been formally published; however, they were presented by Nobre & Uchôa in the proceedings of the XXVII Brazilian Congress of Entomology, Gramado, RS, in 2018 (Barreto et al. 2023). In several of these surveys, new records of *Anastrepha* species for MT were reported, in addition to the discovery of a new species — *Anastrepha matogrossensis* Norrbom & Uchôa, 2011 — which is, to date, known only from this state (Norrbom & Uchôa 2011).

The first host records in MT were obtained only in the late 2010s (Silva et al. 2019; Barreto et al. 2022). Of the 26 *Anastrepha* species occurring in the state, hosts are known for only 10 species (38%) (Barreto et al. 2023). Based on data such as the state's large territorial extent, diverse geography, and limited sampling effort, it is evident that the diversity of fruit flies and their hosts remains poorly known. Information on *Anastrepha* species and their hosts in MT is available online (Zucchi & Moraes 2026).

Knowledge of fruit fly species diversity in a given environment depends on sampling through passive collections (traps) or active methods (fruit sampling) (Savaris & Lampert 2023). However, collections may sometimes occur in an unusual manner, as in the case that resulted in the first record of *Anastrepha flavipennis* Greene, 1934 in MT.

During a technical trip to assess damage caused by the burrowing bug *Scaptocoris carvalhoi* Becker, 1967 (Hemiptera, Heteroptera, Cydnidae) in pasture, a fruit fly entered through the window of a vehicle traveling along a dirt road in the municipality of Cáceres (MT) and landed on the windshield. The yellowish coloration of the fruit fly caught the attention of one of the passengers (an entomologist), who recognized it as a female of *Anastrepha*. The vehicle windows were quickly closed, and the specimen was collected in a plastic vial that Prof. Sinval Silveira Neto, a cautious entomologist, always carries with him. The fly, preserved in ethanol, was taken to the Laboratory of Insect Taxonomy (LTI), Department of Entomology and Acarology, "Luiz de Queiroz" College of Agriculture (ESALQ/USP), Piracicaba, São Paulo (SP), Brazil.

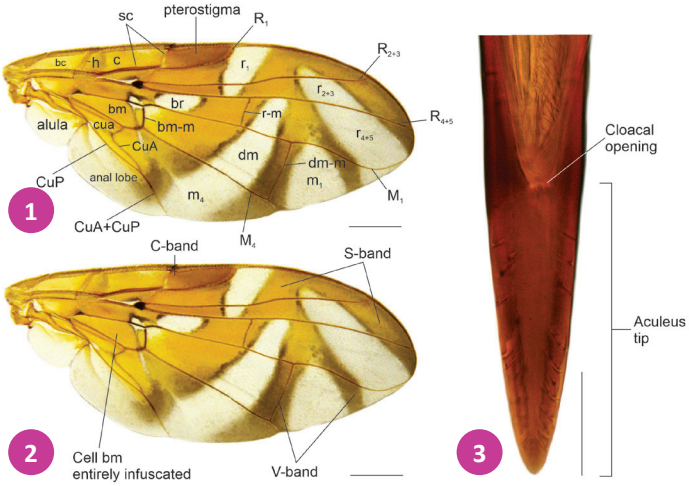
The fruit fly preserved in ethanol was mounted on entomological pin. For the study of the female terminalia, the abdomen was removed and placed in a sodium hydroxide (NaOH) solution, heated for 3–5 min, and washed in distilled water. The abdomen and terminalia were transferred to a microtube containing glycerin, which was attached to the pin of the labeled specimen.

Morphological terminology followed Norrbom et al. (1999). Measurements of the mesonotum and aculeus followed Norrbom et al. (2012). Definitions and illustrations of the morphological characters, as well as species descriptions and the most comprehensive interactive key for *Anastrepha*, are available in Norrbom et al. (2012). Photographs were taken with a Leica DFC 450 camera attached to a Leica M205C stereomicroscope. The aculeus tip was photographed using a Zeiss Axio Imager 2 microscope. Adjustments to brightness, exposure, contrast, and removal of debris from the images were performed using CorelDRAW Graphics Suite 14 (2020). The specimen, identified as *A. flavipennis*, was deposited in the Museu de Entomologia "Luiz de Queiroz" (MELQ), Piracicaba, SP, Brazil.

Anastrepha flavipennis Greene, 1934

Recognition. Mesonotum 2.00–3.75 mm long (specimen from MT: 3.53 mm), yellowish; scutum with only two pale postsutural vittae, without brown spots; scutellum yellow or with dark marks at the extreme base of the disc; subscutellum and mediotergite entirely

yellowish. Wing 6.50–7.80 mm long (specimen from MT: 7.50 mm); C- and S-bands narrowly to broadly connected; proximal arm of the V-band broadly connected to the S-band along vein R_{4+5} (Figs. 1-2); proximal and distal arms of the V-band connected (Figs. 1-2). Aculeus 1.65–2.00 mm long (specimen from MT: 1.88 mm); aculeus tip 0.21–0.31 mm long (specimen from MT: 0.29 mm), nonserrate (Fig. 3) (Norrbom et al. 2012). *Anastrepha flavipennis* and *Anastrepha mitaraka* Norrbom, 2021 share a similar wing pattern (C-, S-, and V-bands connected) and a tapered, nonserrate aculeus tip (Norrbom et al. 2025); however, they differ in the coloration of cell bm, which is entirely infuscated in *A. flavipennis* (Fig. 2) and hyaline in *A. mitaraka* (see Norrbom et al. 2021). These two species are the only members of the *flavipennis* group, recently proposed by Norrbom et al. (2025).



Figures 1–3. *Anastrepha flavipennis* Greene, 1934 (Diptera, Tephritidae). 1-2. Wings; 3. Aculeus tip (ventral view). Scale bars: wings = 1.0 mm; aculeus tip = 0.1 mm.

New record. BRAZIL: 1 (female), Mato Grosso, Cáceres, Sepotuba River Farm (15°52' 1.01" S, 57°37'40.11" W, 127 m a.s.l.), 2 Jun 2025, manual collection, S. Silveira Neto, leg. (MELQ ESALQENT0002316).

Distribution in Brazil (Fig. 4). Amapá (Trindade & Uchôa 2011), Amazonas (Corrêa et al. 2011), Maranhão (Oliveira et al. 2000), Mato Grosso (**this study**), Minas Gerais (Canal et al. 1998), Pará (Greene 1934), Piauí (Santos & Pádua 2004), and Roraima (Marsaro Júnior et al. 2012).

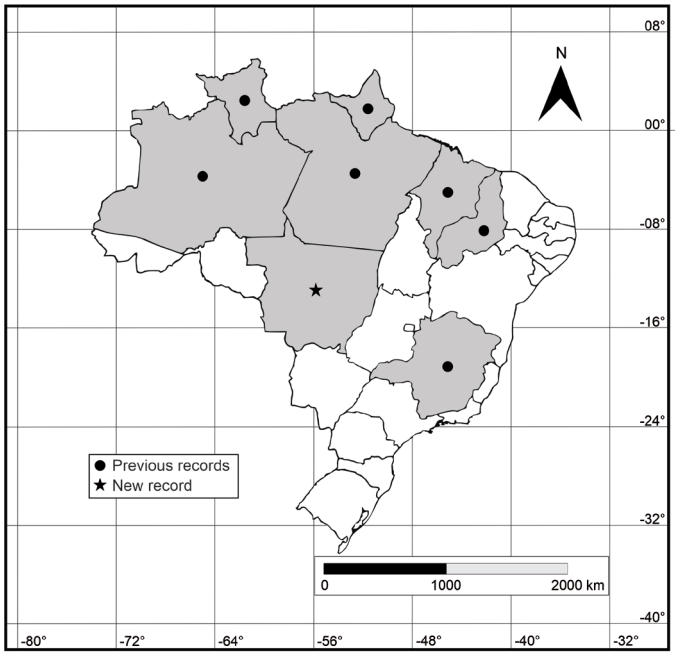


Figure 4. Distribution map of *Anastrepha flavipennis* Greene, 1934 (Diptera, Tephritidae) in Brazil.

Host plant in Brazil. *Pouteria glomerata* (Miq.) Radlk. (Sapotaceae) (Corrêa et al. 2011).

This female of *A. flavipennis* represents the first record of the species in MT. Thus, a completely unplanned collection, prompted by the curiosity of an attentive entomologist, contributed to expanding knowledge of fruit fly diversity in the state. This record of *A. flavipennis* increases the number of *Anastrepha* species in MT to 27, for which hosts remain unknown for more than half of the species (n = 17; 62%). The distribution of *A. flavipennis* is now updated to eight states across four regions of Brazil. However, there are no records of the species in the southern region of the country. Sampling in the natural habitat of *P. glomerata* (*igapó*, *várzea*, *terra firme*, and gallery forests) is therefore needed to confirm the occurrence of *A. flavipennis* in that area, as well as in other regions of Brazil, in order to better understand the relationship between this fruit fly and its host.

The vegetation surrounding the area where *A. flavipennis* was collected in Cáceres (MT), near the border with Bolivia, is part of the Pantanal ecosystem. Although the Pantanal biome predominates, there is also a transitional zone influenced by the Cerrado. Based on the records of *A. flavipennis* in Brazil, it can be inferred that this is a specialist species adapted to riparian and seasonally flooded forests within the Pantanal and Cerrado biomes, which comprise the ecosystems where *P. glomerata*, the only known host of *A. flavipennis* in Brazil, occurs (Côrrea et al. 2011; Zucchi & Moraes 2026).

Surveys using traps and fruit sampling of cultivated and native plants are needed to expand knowledge of *Anastrepha* species across the different phytophysiognomies of the Amazon, Cerrado, and Pantanal biomes present in MT. Such information is also important for understanding fruit fly population dynamics, with a view toward managing pest species. Conversely, knowledge of native hosts is equally relevant, as it allows the identification of plants that may serve as alternative or reservoir hosts for economically important fruit fly species. Recognizing host plants, particularly native ones, supports the development of monitoring and management strategies for pest fruit fly species in MT.

As a result of this new record, the most recent identification key for the *Anastrepha* species of MT (Barreto et al. 2023) was updated and amended. The key was based on selected, commonly used morphological characters to facilitate its use by agricultural entomologists. Definitions and illustrations of the morphological characters, as well as species descriptions and the most comprehensive interactive key for *Anastrepha*, are available in Norrbom et al. (2012). Nevertheless, the identification obtained should be confirmed by a taxonomist or checked against the original species description, especially if the species is being associated for the first time with a new host or represents a new distribution record. An incorrect association between a species and its host may lead to quarantine problems (Zucchi 2023). It is also recommended that voucher specimens be deposited in a public collection to allow subsequent validation of published identifications (Packer et al. 2018).

Key to the *Anastrepha* species (female) from Mato Grosso, Brazil

1 C-band continuous to wing apex 2

1'C-band extending at most to the apex of vein R_1 3

2(1) Abdome yellowish or orange; aculeus 5.27–6.18 mm long; tip not serrate ..... *Anastrepha grandis* (Macquart, 1846)

2'Abdome red brown; aculeus 1.79–2.20 mm long; tip finely serrate apically..... *Anastrepha daciformis* Bezzi, 1909

3(1') Scutum posteriorly with a pair of brown spots; aculeus less than 2 mm long ..... *Anastrepha punctata* Hendel, 1914

3' Scutum posteriorly without a pair of brown spots 4

4(3') Mesonotum and abdomen dark with yellow stripes; aculeus tip serrate ..... *Anastrepha serpentina* (Wiedemann, 1830)

4' Mesonotum and abdomen mostly yellowish 5

5(4') Mesonotum with longitudinal dark stripes..... ..... *Anastrepha striata* Schiner, 1868

5' Mesonotum without longitudinal dark stripes..... 6

6(5') Aculeus less than 0.07 mm wide; tip not serrated..... ..... *Anastrepha montei* Lima, 1934

6' Aculeus more than 0.07 mm wide..... 7

7(6') Aculeus tip with lateral protuberance..... ..... *Anastrepha tumida* Stone, 1942

7' Aculeus tip without lateral protuberance..... 8

8(7') S- and V-band connected 9

8' S- and V-band separated..... 12

9(8) S-band and V-band connected only to V-band; aculeus tip abruptly narrowed.....*Anastrepha undosa* Stone, 1942

9' S-band connected to C-band and V-band; aculeus tip gradually tapered and nonserrate..... 10

10(9') Cell bm entirely infuscated; aculeus tip not serrated..... .....*Anastrepha flavipennis* Greene, 1934

10' Cell bm hyaline; aculeus tip serrated..... 11

11(10') Aculeus tip with distinct constriction; serrated part 0.65–0.75 times length of tip ..... *Anastrepha matertela* Zucchi, 1979

11' Aculeus tip with slightly constriction; serrated part 0.40–0.50 times length of tip..... *Anastrepha coronilli* Carrejo & González, 1993

12(8') C- and S-band separated 13

12' C- and S-band connected..... 16

13(12) Aculeus tip not serrated.... *Anastrepha mucronota* Stone, 1942

13' Aculeus tip serrated..... 14

14(13') Aculeus tip with fine serrations along the entire length of the apex..... *Anastrepha matogrossensis* Norrbom & Uchôa, 2011

14' Aculeus tip with serrations over less than apical half..... 15

15(14') V-band arms not connected..... .....*Anastrepha leptozona* Hendel, 1914

15' V-band arms connected.....*Anastrepha chiclayae* Greene, 1934

16(12') Aculeus 4.25 mm long; aculeus tip with minute serration over more than apical half ..... *Anastrepha mixta* Zucchi, 1979

16' Aculeus less than 4.00 mm long..... 17

17(16') Aculeus tip without serrations, abruptly narrowed ....*Anastrepha fractura* Stone, 1942

17' Aculeus tip with serrations..... 18

18(17') Serrated part beyond the cloacal opening..... ..... *Anastrepha pickeli* Lima, 1934

18' Serrated part at most up to the cloacal opening..... 19

19(18') Aculeus tip with a distinct constriction before serrated part. 20

19' Aculeus tip with a slight constriction or without constriction before serrated part 21

20(19) Aculeus tip ratio (length/base width) about 1.9 .... *Anastrepha fraterculus* (Wiedemman, 1830)

20'Aculeus tip ratio (length/base width) about 1.4..... .....*Anastrepha sororcula* Zucchi, 1979

21(19') Aculeus tip with a slight constriction before serrated part 22

21' Aculeus tip without constriction before serrated part 23

22(21) Aculeus tip with acute serrations over more than apical half..... .....*Anastrepha obliqua* (Macquart, 1835)

22' Aculeus tip with blunt serrations over less than apical half .... *Anastrepha amita* Zucchi, 1979

23(21') Aculeus tip with serrations over more than apical half..... .....*Anastrepha pseudoparallela* (Loew, 1873)

23' Aculeus tip with serrations at most up over than apical half 24

24(23') Serrated part over less than apical half..... 25

24' Serrated part at least over apical half..... 26

25(24) Aculeus less than 2.00 mm long..... ..... *Anastrepha bahiensis* Lima, 1937

25' Aculeus more than 2.00 mm long .... *Anastrepha distincta* Greene, 1934

26(24') V-band arms not connected. *Anastrepha turpiniae* Stone, 1942

26' V-band arms connected..... *Anastrepha zenildae* Zucchi, 1979

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Authors' Contributions

MS: Conceptualization, Formal Analysis, Methodology, Writing - review and editing; ASA: Investigation, Visualization, Writing - review and editing; NSS: Investigation, Writing – review & editing; SSN: Methodology, Writing - review and editing; RAZ: Formal Analysis, Methodology, Writing – original draft, review and editing.

Conflict of Interest Statement

The authors declare no competing interests.

Ethical Approval

Not applicable.

Data Availability

The datasets generated during this study are available from the corresponding author upon reasonable request.

Generative AI Statement

The authors declare that no generative artificial intelligence tools were used in the preparation of this manuscript.

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