



One Year at the Smithsonian Tachinidae collection, and some updates on tachinids that parasite Diptera



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As discussed in a previous *Tachinid Times* issue (Dios 2024), the first author is developing a postdoctoral project aimed at solving systematic and taxonomic problems related to bug-killing flies (Tachinidae, Phasiinae). He is also exploring aspects of their biology and obtaining new host records for the family Tachinidae. Back in 2024, he was awarded a grant from the Brazilian funding agency FAPESP to spend a year as a postdoctoral fellow at the Smithsonian National Museum of Natural History (NMNH) in Washington, DC (USA) under the supervision of Dr. Torsten Dikow. So, in December 2024 he moved to Washington to begin his study of one of the largest Tachinidae collections in the world, and one of the most important for the New World fauna. The collection, which has the acronym USNM (based on the former name United States National Museum) has an enormous number of tachinid flies from all over the world, which was studied and organized throughout the years by staff tachinid experts such as J.M. Aldrich, C.W. Sabrosky and N. Woodley, and curated by many others who have visited and improved the collection (H. Guimarães, D.M. Wood, etc.). It also holds an important Type Collection, including most of Townsend's types, as well as Coquillett's and many others. The first author also took a short visit to the American Museum of Natural History (AMNH) in New York to examine some of Townsend's types that are held there.

During the whole year at NMNH, the first author was able to advance his research in many aspects. One of the goals was to explore and find new molecular markers to understand and define species boundaries for Phasiinae, which sometimes do not perform so well with only CO1 barcodes (Lee et al. 2021, Aurélio et al. submitted, Dios *unpublished data*). With the help of Dr. Allan Cabrero (NMNH), genome sequences of different species of *Gymnoclytia* Brauer & Bergenstamm were obtained through low coverage genomes, and are being processed right now. That data will be discussed in a publication that will integrate different molecular markers and morphology.



Figures 1–3. Pictures from senior author's postdoctoral fellowship at NMNH in 2025. **1.** Looking at many Phasiinae during the fall in a park near Washington, D.C. (on that flower with insert showing a close-up of *Trichopoda pennipes* (Fabricius, 1781)). **2.** Enjoying the cold winter weather in front of the NMNH. **3.** After the presentation at the Entomological Society of Washington, with the president Dr. Talitta Simões, president-elect Dr. Allen Norrbom and program chair Dr. Renan Carrenho.

Concurrently, some other taxonomic works were completed and published (Dios 2025, Dios & Santis 2026), or are being finished to be submitted soon. The curation of the Tachinidae collection has also been greatly improved, as many parts of it were reorganized to follow a more modern classification. Another main aspect of the fellowship was to gather data from tachinid types (photos and notes), to help with a key to the Brazilian Tachinidae genera that is being prepared and will be published in the future. That data will be crucial not only for the key, but for many future taxonomic revisions, especially for the Neotropical fauna. By the end of the fellowship, in December 2025, a presentation was made at the Entomological Society of Washington monthly meeting.

Additionally, new data from host associations are being gathered by the first author. The dataset had already included around 400 records from the Museu de Zoologia collection (MZUSP), and now it has been increased by more than 700 new host records from around the world obtained at the USNM, some with the host identified only to family, but mostly to genus or species. Due to time constraints, only the Exoristinae, Phasiinae and a big part of the Dexiinae were examined for this purpose at the USNM. Many of the records are new, as hosts are unknown for the majority of tachinid flies. Some of these new records will be published individually, with some already submitted and others in preparation. We also plan to organize new host-tachinid associations in catalogues for a few tribes and maybe subfamilies to update the host records of Guimarães (1977).

Here we present some new records for tachinids that parasitize other Diptera that we found in the miscellaneous collections of MZUSP and USNM. Specific tachinid lineages have adapted to exploit dipteran hosts, attacking

mainly larvae of Limoniidae, Stratiomyidae, Tabanidae, and Tipulidae (Gudin et al. 2022). Currently, at least 17 species of Tachinidae are recorded as parasitoids of Diptera worldwide; see the comprehensive review in Gudin et al. (2022), and the catalogues of Guimarães (1977), Arnaud (1978) and Tschorsnig (2017), comprising the Nearctic, Neotropical, and Palaearctic regions. To our knowledge, there are no published records from the Afrotropical or Oriental regions; historical records in the Australasian Region in larval Calliphoridae, Muscidae, and Tabanidae are pending revisions due to inaccurate identifications of the tachinid species (Spratt & Wolf 1972, Smith 1974, Ferrar 1977, Gudin et al. 2022). In the Nearctic Region, Tabanidae larvae are attacked by the following Dexiini (Dexiinae): *Ateloglossa novaeangliae* (West), *A. isolata* (West), and *Phasiops flavus* Coquillett. Regarding Tipulidae, species of *Admontia* Brauer & Bergenstamm (Exoristinae: Blondeliini) and *Siphona* Meigen (Tachininae: Siphonini) are frequently recorded in the Nearctic and Palaearctic regions, alongside a few isolated records of *Allophorocera arator* (Aldrich), *A. ferruginea* (Meigen) (Exoristinae: Goniini), and *Phyllomyia limata* (Coquillett) (Dexiinae: Voriini). Two species of the Blondeliini genus *Lixophaga* Townsend were recorded in Limoniidae, specifically *L. limoniina* Richter in Russia (Richter 1995), and in Stratiomyidae, namely *L. stratiophaga* Gudin, in Brazil (Gudin et al. 2022), with the latter being the sole record in the Neotropical Region until now. The new records of Tachinidae in dipteran hosts are presented below.

New dipteran host records of Tachinidae

NEARCTIC REGION

Admontia ?pergandei Coquillett, 1895. Many specimens: USA, California, Sacramento/ Sloughouse, 1922 (USNM).

Host: *Tipula quaylii* Doane, 1909 (Tipulidae).

Admontia near *degeerioides* (Coquillett, 1895). Seven specimens: USA, Alaska, 1945 (USNM).

Host: Tipulidae (identified only to family).

Remarks: Both *Admontia* species were identified by Dr. Monty Wood, formerly of the Canadian National Collection of Insects, Ottawa. The genus is taxonomically complex, and even a Blondeliini expert such as Dr. Wood had doubts about the species identity.

NEOTROPICAL REGION

Lixophaga aberrans (Townsend, 1929). One male. Brazil, Rio de Janeiro, Seropédica, Horto Florestal, vi.1984, Carlos D. Freitas col. (MZUSP) (Fig. 6).

Host: *Ptecticus testaceus* (Stratiomyidae) (e.g., Figs. 8, 9).

Lixophaga famelica (Wiedemann, 1830). Two females, 2 males. Brazil, Rio de Janeiro, Seropédica, Horto Florestal, vi.1984, Carlos D. Freitas col. (MZUSP) (Figs. 4, 5).

Host: *Ptecticus testaceus* (Fabricius, 1905) (Stratiomyidae) (e.g., Figs. 8, 9).



Figures 4–9. 4. *Lixophaga famelica* (Wiedemann, 1830), male (MZUSP). 5. *L. famelica*, female (MZUSP). 6. *Lixophaga aberrans* (Townsend, 1929), male (MZUSP). 7. Holotype male of *Ptilolydella aberrans* Townsend, 1929 [now as *Lixophaga aberrans*], with labels (USNM). 8. *Lixophaga puparium* inside a *Ptecticus* pupa. 9. *Ptecticus testaceus* (Fabricius, 1905) adult and pupa, lateral view (MZUSP).

Remarks

The stratiomyid larvae of *Ptecticus testaceus* (F.) on both records were collected in fruit of the host plant *Couroupita guianensis* Aubl. (Ericales, Lecythidaceae), popularly known as “abricó-de-macaco”. Two specimens of *P. testaceus* are pinned together as a voucher in the collection (Fig. 9), and the tachinid puparium is inside the stratiomyid pupa shell (Fig. 8). Previously, only *L. stratiophaga* was known as a parasitoid of *P. testaceus* in the Brazilian Amazon rainforest (Gudin et al. 2022), and now we also register here the first records for the Atlantic Forest (i.e., Seropédica).

On some *Lixophaga* species identifications

It was remarkable to us that the two *Lixophaga* species, *L. aberrans* and *L. famelica*, were found parasitizing the same host species in the same place at the same time. Although unusual, a similar case of co-occurrence was recorded for *L. punctata* (Townsend, 1927) and *Ophirion lenkoi* Gudin, 2023 (Blondeliini) in a nest of the eusocial wasp *Polybia (Myrapetra) scutellaris* (White, 1841) (Hymenoptera: Vespidae) (Gudin 2023). Regarding the records in *Ptecticus* larvae, both *Lixophaga* species are easily distinguished by the color of the pruinosity on the head, thorax and abdomen: golden in males and females of *L. famelica*, and silver in the male of *L. aberrans* (female unknown).

Lixophaga famelica is very similar to *L. stratiophaga* and *L. puscolulo* Carrejo & Woodley (recorded from *Neoleucinodes elegantalis* (Guenée) (Lepidoptera: Crambidae) from *Solanum quitoense* Lam. (Solanales, Solanaceae) in Colombia, Carrejo et al. 2013). The three species have a deep golden pruinosity on the entire body and similar chaetotaxy; however, the main differences are found in the male terminalia, mainly in the shape of the cerci and surstyli in lateral view: slightly curved towards posterior region in *L. puscolulo* (Carrejo et al. 2013, Fig. 9), slightly curved towards anterior region in *L. stratiophaga* (Gudin et al. 2022, Fig. 3), and straight in *L. famelica*, visible in the exposed terminalia of the males recorded here. Aldrich (1927) examined and redescribed the holotype male of *Tachina famelica* Wiedemann, deposited in the Naturhistorisches Museum Wien (NHMW), in Vienna, Austria, although without any notes on the male terminalia. According to Papavero (1971), most of the Brazilian material described by Wiedemann had been collected by Friedrich Sellow in the Atlantic Forest. Our colleague Marcelo Santis, while on a postdoc in Vienna (see his article in this issue of *Tachinid Times*) kindly examined the holotype of *T. famelica* for us, which is damaged. However, due to the correspondence in body color, chaetotaxy, and biome, we are confident that the specimens recorded in *P. testaceus* belong to this species.

For determining the single male of *L. aberrans* we had to check the type specimens of a few other *Lixophaga* species, all of them deposited in the USNM. Besides *L. aberrans* (as *Ptilolydella aberrans*), we examined *Lixophaga opsiangusta* Nihei & Dios 2016 (a new name for *Cataphorinia angusta* Townsend, 1927) and *L. brasiliana* (Townsend, 1927), these species all originally described by Townsend and collected from the same place (Itaquaquecetuba, São Paulo, Brazil). The holotypes of both *L. aberrans* and *C. angusta* are males, but differ slightly in general body color, with the first having a darker background, black to dark brown, and black legs, and the latter having a slightly lighter background, brown to reddish colored, and brown legs. The holotype of *L. brasiliana* is a dark female. Superficially, examining only the photos, there is not much external morphological difference. The MZUSP specimen fits the external characters of *L. aberrans*, but the male terminalia are not

exposed, preventing the examination of other potential diagnostic characters now. There is a possibility that some or all these three species could be conspecific; however, a more detailed study is necessary. The examination of more specimens, terminalia morphology and even molecular data, will help us understand if there is variation in body color within this complex.

In this short communication, we present new records of dipteran hosts, expanding our knowledge regarding the diversity and distribution of these tachinids. A broader discussion on the subject, including details on oviposition strategies, can be read in Gudin et al. (2022). With more studies, mainly in the Neotropical Region, we can expect the discovery of much more tachinids that are parasitoids of their fellow dipterans.

Acknowledgements

We thank MZUSP and NMNH and their employees for providing access to the material examined, space and equipment. Special thanks to Dr. Torsten Dikow (NMNH) for hosting RVPD during the year of 2025. We also thank Dr. Diego Fachin for the identification of the Stratiomyidae fly, and Dr. Marcelo Santis for examining the holotype of *T. famelica* in NHMW. Financial support from the São Paulo Research Foundation (FAPESP) grant 2022/14482-6 and FAPESP BEPE grant 2024/06165-6 to RVPD, and 2024/08327-3 to FMG are gratefully acknowledged.

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