



“Tree Tachinidae”: brief notes on bristle flies from the Life on Trees project

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The Life on Trees project is focused on sampling and documenting all of the eukaryotic organisms that are associated with individual trees in the tropical Andes of South America in an attempt to generate baseline knowledge on the diversity of life and species interactions supported by a single tree. This includes epiphytes and vines, mosses and ferns, mushrooms and molds, vertebrates and invertebrates, down to the protozoa living in bromeliad water tanks. The project is a joint initiative of the Royal Belgian Institute of Natural Sciences (RBINS) and the Fonds de Dotation Biotope pour la Nature (FDBPLN), partnering with the Museo de Historia Natural in Peru and the Instituto de Investigación de Recursos Biológicos Alexander von Humboldt in Colombia. It also involves a vast network of collaborating specialists all over the world involved in identifying all of the organisms observed and/or collected.

The project aims not only to comprehensively sample all (eukaryotic) organisms found in the tree but also record exactly where in or on the tree each specimen is collected or observed, from the base of the trunk to the tips of branches (Leponce et al. 2024). This involved a huge array of survey techniques from camera traps and binocular observations of vertebrates to DNA sequencing of leaf samples for fungal endophytes. Survey methods for insects included hand collecting, aerial fogging, flight intercept traps (e.g., Sante-type and SLAM traps), light traps, pan traps, beat sheets, and rearing from galls and dead wood (among other methods; Fig. 1).

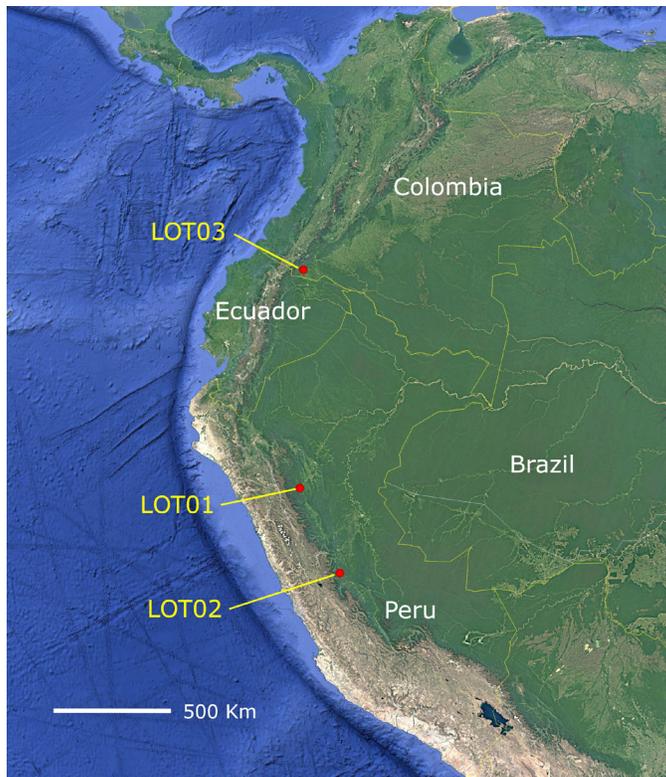


Figure 2. Locations of the three focal trees along the Andes in western South America.

The Life on Trees (LoT) project is focused on three, large, emergent rainforest trees (Figs. 1, 2):

LOT01 – a 50 m-tall *Dussia tessmannii* (Fabaceae) located in Parque Nacional del Río Abiseo, Peru, in the Amazonian Andean foothills at 400 m a.s.l.

LOT02 – a 32 m-tall *Ficus americana* subsp. *andicola* (Moraceae) utilizing a *Beilschmiedia latifolia* (Lauraceae) for support, located in Parque Nacional Yanachaga-Chemillén, Peru, in Andean montane forest at 2500 m a.s.l.

LOT03 – a 40 m-tall *Brosimum cf. utile* (Moraceae) located in the Natural Reserve La Isla Escondida, Colombia, in the Andes-Amazon transition zone at 850 m a.s.l. [Some samples were obtained at ground level in the vicinity of the LOT03 tree, and these are coded as LOT00.]

Trees were sampled over a limited amount of time, with each type of sampling (pan traps, fogging) employed over a 7–10 day period. Canopy traps were operated for 3 days per month for a year. Details of sampling periods and methods can be found in Leponce et al. (2024) and at the Life on Trees website (<https://www.lifeontrees.org/home/>).

Dr. Marc Pollet of the Institute for Nature and Forest (INBO, Brussels), a dolichopodid expert, did much of the flying insect sampling and has been coordinating identification of fly samples from the LoT project. He contacted me and asked if I was interested in working with the Tachinidae sampled from the project, sorting them to species and morphospecies and reporting this back to the LoT consortium. I am generally interested in the diversity of Neotropical Tachinidae, especially in the Andes (e.g., Stireman et al. 2017, Stireman 2024) and thus, I volunteered to examine the tachinid specimens. Here, I provide a brief overview of my initial findings. I plan to examine and analyze the reported data more thoroughly in a subsequent manuscript.

I received samples already sorted by other collaborating taxonomists, consisting of primarily tachinid flies (along with a few Mesembrinellidae, Sarcophagidae, and Rhinophoridae). They were all preserved in alcohol, which necessitated chemical drying (1–2 days submerged in ethyl acetate and then air-dried) and mounted for identification and morphospecies separation. Many of the specimens were in very poor condition. Most were missing at least some legs and some specimens were completely disarticulated. The very poorest specimens were not mounted, but were examined in ethanol after I had examined and sorted all of the pinned samples. As a first pass, genera were identified largely using the key in Wood & Zumbado (2010) and with reference to specimens in my research collection at Wright State University (JOSC). Many of these identifications are provisional and I still need to go back through the specimens to refine these identifications further. All but a few badly damaged specimens could be assigned to a morphospecies.

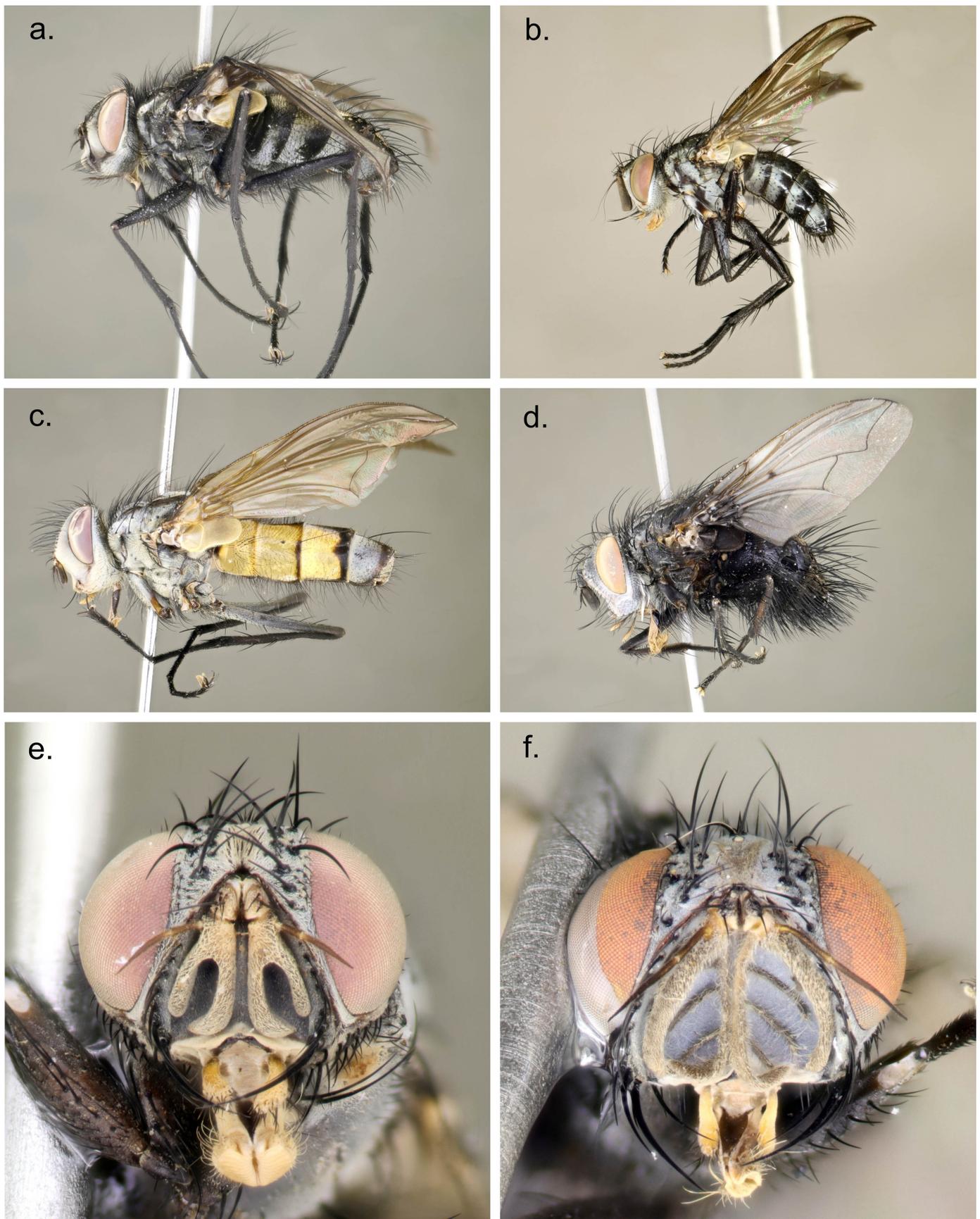


Figure 3. A few of the bristle flies sampled by the LoT project. **a.** Genus nr. *Ptilodexia/Dolichocodia* sp. (Dexiini) – the most abundant tachinid collected. **b.** *Calolydella* sp. (Blondeliini), a member of the most diverse tribe collected. **c.** *Zelia* sp. (Dexiini), one of several *Zelia* species collected, illustrating the typical lack of legs of many specimens. **d.** *Gaediopsis* sp. (Goniini). **e, f.** Close-ups of two *Phytomyptera* species with highly modified antennae (unfortunately the latter was poorly mounted and glue covers part of the eye).

Table 1. Abundance and species richness of Tachinidae from the LoT sampling.

Tree	Individuals	Species
LOT01	83	60
LOT02	149	60
LOT03	20	18
“LOT00”	43	20

A total of 293 bristle fly specimens was collected including representatives of an estimated 153 species (Table 1). Exactly the same number of species were collected from the middle (LOT01) and high (LOT02) elevation trees (60), whereas only 18 species were recorded from the lowland tree (400 m) in Colombia (with another 20 species obtained from the vicinity of this tree). I am not certain why this last tree had so many fewer species; maybe sampling intensity varied among trees, but the findings are consistent with observations that the mid-elevation Andes Mountains are exceptionally rich in Tachinidae. A few examples of the species collected are illustrated in Fig. 3. Very few of the species were found in more than one of the three trees. These are impressive numbers of species given the focus on just three individual trees and the somewhat limited sampling, but nearly three-quarters of these species are represented by just a single individual (Fig. 4a)! This indicates that the sampling is woefully incomplete, which is also evident from the high slopes of the (rarefied) species accumulation curves for each tree (Fig. 4b).

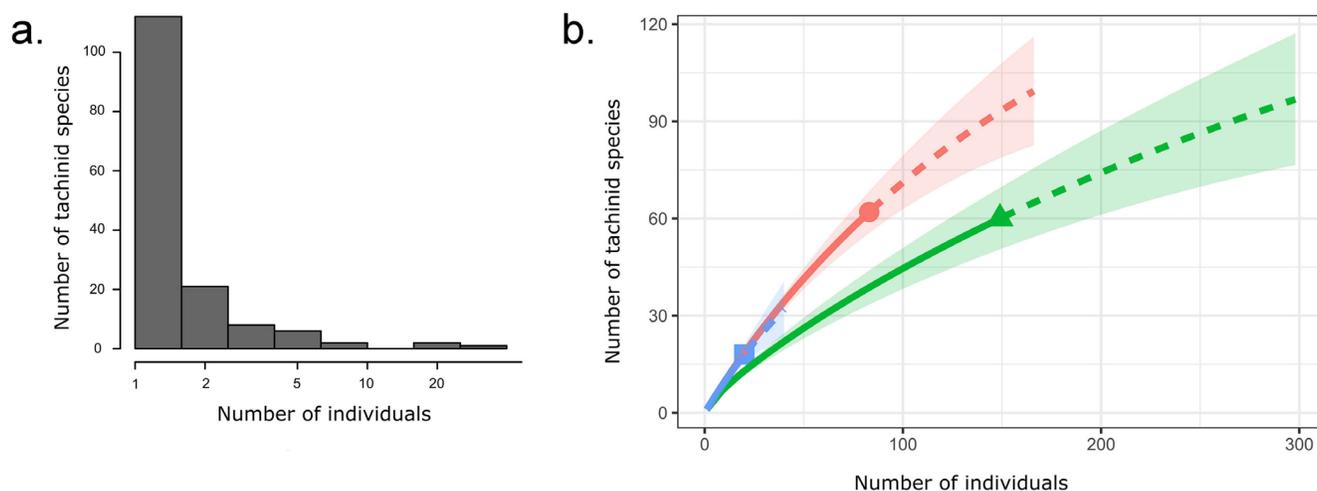


Figure 4. **a.** A histogram of the number of individuals tachinid per species recovered (note the number of individuals is on a \log_{10} scale). **b.** Species rarefaction curves of tachinid richness on each focal tree. Dotted lines are extrapolated species richnesses 95% confidence intervals (shading). LOT01 = red (circle), LOT02 = green (triangle), and LOT03 = blue (square).

It is clear from these high numbers of singletons and high slopes of rarefaction curves that much more sampling would be needed to accurately characterize the diversity and community composition of bristle flies associated with these three individual trees. In the future, I plan to refine my identifications to some extent with reference to C.H.T. Townsend's keys and descriptions of South American taxa (e.g., Townsend 1927), assess the taxonomic composition of taxa, compare collecting methods, and examine the locations on the trees where the specimens were collected (e.g., trunk, major branches, canopy). I also look forward to seeing broader publications by the Life on Trees consortium examining diversity and turnover of all the insects, other animals, plants, and fungi associated with these trees.

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