NeoBat Interactions: a data set of bat-plant interactions in the Neotropics

Guillermo L. Florez-Montero[1*] Cullen Geiselman[2] Marcelo R. Nogueira[3]
Renata de Lara Muylaert[4] Sharlene E. Santana[5] Richard D. Stevens[6]
Marco Tschapka[7] Francisco A. Rodrigues[8] Marco A. R. Mello[9]

1 Universidade Federal do ABC (UFABC). Centro de Ciências Humanas e Naturais. 09210-580 Santo André, SP, Brazil.

2 Institution. Departament. Postal Code. City, Country

3 Universidade Federal Rural do Rio de Janeiro (UFRRJ). Instituto de Biologia, Laboratório de Mastozoologia. 23890-000 Seropédica, RJ, Brazil.

4 Institution. Departament. Postal Code. City, Country

5 Department of Biology and Burke Museum of Natural History and Culture, University of Washington, Seattle, WA, 98195, USA

6 Institution. Departament. Postal Code. City, Country

7 Institution. Departament. Postal Code. City, Country

8 Universidade de São Paulo. Departamento de Matemática Aplicada e Estatística, Instituto de Ciências Matemáticas e de Computação. 13560-970 São Carlos, SP, Brazil

9 Universidade de São Paulo (USP), Instituto de Biociências, Departamento de Ecologia Geral. 05508-090 São Paulo, SP, Brazil.

*Corresponding author: Guillermo L. Florez-Montero (gflorezmontero@gmail.com)

INTRODUCTION

Open access to primary scientific data is fundamental to assure the social contract that governs scientific publishing (Vision, 2010). Making primary data available improves the transparency, reproducibility, and progress of science by allowing independent verification and reuse of published data. (Costello, 2009). This access has been facilitated in the information age through important frameworks for the production, storage, curation, and sharing of ecological data. Those frameworks which aim to preserve data in the long term, even beyond the life of the initial compilers and curators (Chavan & Ingwersen, 2009).

One of those frameworks are data papers, which optimize efforts in the discovery, organization, and availability of ecological data (Chavan & Penev, 2011). They offer a highly reliable source of data, as they have been subjected to high-quality control measures, such as peer review and editorial control of data and metadata (Costello et al., 2013). This new kind of publication has revolutionized contemporary science by making decades of naturalistic information widely available in highly accessible and comprehensive formats. The revolution has also reached mammalogy. Data papers on mammal communities are growing in numbers. There are, for instance, data papers on the global non-volant mammal communities (Thibault et al., 2011). Another important source is the BioTIME database of biodiversity time series for the Anthropocene (Dornelas et al., 2018). Others have larger scope, such as the global database for metacommunity ecology, integrating species, traits, environment and space (Jeliazkov et al., 2020).

In Brazil, the most famous mammalogical data papers were produced in the ATLANTIC Series, which contains information about the biodiversity of the Atlantic Forest of South America. This series includes data papers on plant-frugivore interactions (Bello et al., 2017), rodents and marsupials: (Bovendorp et al., 2017), bats (Muylaert et al., 2017), primates (Culot et al., 2019), and medium-and large-sized mammals (Souza et al., 2019). Many other data papers were produced by other research groups outside the ATLANTIC Series, focusing on groups such as small mammals (Figueiredo et al., 2017). In addition, only a few covered larger spatial scales, such as Neotropical xenarthrans (Santos et al., 2019). Nevertheless, most of them are based on abundance-incidence species data whereas species interactions received much less attention.

Mutualistic interactions between animals and plants are a cornerstone of terrestrial ecosystems. Almost 94% of plants in neotropical communities are pollinated by animals (Ollerton et al., 2011), while 70 – 94% have their seeds dispersed by vertebrates (Jordano, 2013). Bats are especially important in this context, as they represent the second largest group of seed dispersers in the Neotropics, after birds (Bello et al., 2017). On the other hand, even though insects pollinate most of the flowering plants, bats are also the second group of pollinating vertebrates since they pollinate about 2% of plant genera (Sekercioglu, 2006). Bat-plant interactions also result in ecosystem services, such as the pollination of some economically important plants and the dispersal of seeds from pioneer plants that are key to habitat regeneration (Kunz et al., 2011).

In the present data paper,we compiled a georeferenced database of 2,574 interaction records of frugivory and nectarivory between 95 bat species and 526 plant species. The data came from 168 studies covering 200 locations in 16 countries all over the Neotropical region. (Fig. 1). The database compiled by (Geiselman and Younger (2002)) was used as a starting point and was filtered and updated. NeoBat Interactions is so far the most extensive bat-plant interaction database both in geographic and taxonomic terms. Most sampling sites are georeferenced with high coordinate accuracy. All records came from primary sources and were taxonomically verified and updated. Additionally, our database includes ecological information, such as a life form and successional stage of plants, and trophic guild of bats. The data are organized and standardized at different levels of ecological complexity and temporal and geographic scales, which allows using them in a variety of studies with different scopes.

METADATA

CLASS I. DATA SET DESCRIPTORS

A. Data set identity

Title: NeoBat Interactions: a data set of bat-plant interactions in the Neotropics

B. Data set identification code

Suggested data set identity codes:

NeoBat_Interactions_References.csv

NeoBat_Interactions_Sites.csv

NeoBat_Interactions_Records.csv

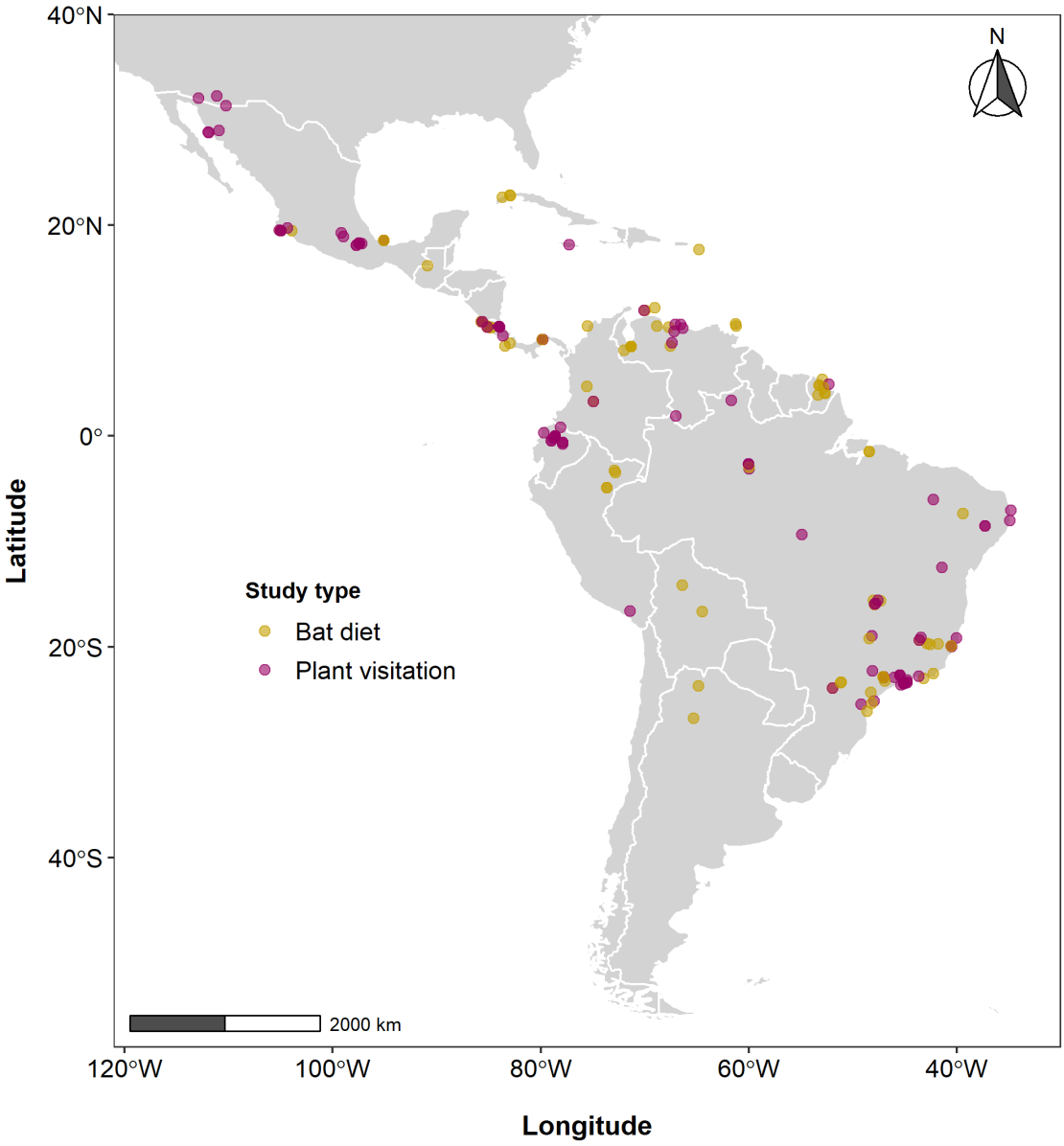

Figure 1: Distribution of sampling sites covered in NeoBat Interactions. Purple dots show the location of original studies reporting bat-plant interactions. White lines show country borders. We included only studies with records of bat-plant interactions that were confirmed either by indirect or direct observation.

C. Data set description

Principal Investigator(s):

1. Guillermo L. Florez-Montero. Universidade Federal do ABC. Centro de Ciências Humanas e Naturais. 09210-580 Santo André, SP, Brazil.
2. Marco A. R. Mello. Universidade de São Paulo, Instituto de Biociências, Departamento de Ecologia Geral. 05508-090 São Paulo, SP, Brazil.

Abstract:

Data papers and open databases revolutionized contemporary science, as they provide the long-needed incentive to collaborate in large international teams and make naturalistic information widely available. Nevertheless, most of them focus on occurrence or abundance, while species interactions received less attention. To help fill this gap, we compiled a georeferenced data set of interactions between 89 bat species of the family Phyllostomidae (Chiroptera) and 413 plant species of 68 families. Data were obtained from 169 studies published from 1957 to 2007 in the entire Neotropical Region, with most records coming from Brazil (34.5% of all study sites), Costa Rica (16%), and Mexico (14%). Our data set includes 2571 records of frugivory (75.1% of all records) and nectarivory (24.9%). The best represented bat genera are *Artibeus* (28% of all records), *Carollia* (24%), *Sturnira* (10.1%), and *Glossophaga* (8.8%). *Carollia perspicillata* (187), *Artibeus lituratus* (125), *Artibeus jamaicensis* (94), *Glossophaga soricina* (86), and *Artibeus planirostris* (74) are the bat species with the broadest diets recorded in number of plant species. Among plants, the best represented families are Moraceae (17%), Piperaceae (15.4%), Urticaceae (9.2%), and Solanaceae (9%). Plants of the genera *Cecropia* (46), *Ficus* (42), *Piper* (40), *Solanum* (31), and *Vismia* (27) hold the largest number of interactions. These data are stored as arrays (records, sites, and studies) organized by logical keys and rich metadata, which helps compile the information at different ecological and geographic scales, as required by different studies. Our data set on bat-plant interactions is so far the most extensive both in geographic and taxonomic terms, and also includes some ecological information of plants and bats. It has already helped us develop several studies and we hope it will stimulate novel analyses and syntheses, in addition to pointing out to important gaps in knowledge for future research.

D. Key words

Species interactions, mutualism, nectarivory, frugivory, pollination, seed dispersal, databases, networks.

E. Description

This data base, includes information from 16 countries of the Neotropics, sice

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