

New localities in the geographical distribution of *Diaemus youngii* and *Macrophyllum macrophyllum* in the Mexican Pacific slope

Nuevas localidades en la distribución geográfica de *Diaemus youngii* y *Macrophyllum macrophyllum* en la vertiente del Pacífico Mexicano

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Diaemus youngii and *Macrophyllum macrophyllum* are two species of bats that live in Mexico for which records in collections are scarce. This study aimed to expand the geographical distribution of *D. youngii* for the Mexican Pacific slope in Chiapas and to add records of *M. macrophyllum* in this area. Sampling was carried out in the Municipality of Villa Comaltitlán, Chiapas, in three seven-night periods: December 2020, May 2021, and July 2022. Three mist nets were installed among vegetation near the Papagayo River inside an oil palm plantation. A sampling effort of 6216 net meter-hours yielded 386 records of bats belonging to 12 species, including *D. youngii* and *M. macrophyllum*. One adult male of *D. youngii* and 4 of *M. macrophyllum* were recorded. A fifth record of *M. macrophyllum* was accidentally obtained on the Pijijiapan-Tonalá highway, with a roadkilled individual. The record of *D. youngii* is the first for the Pacific coast of Chiapas. This record is located more than 197 km straight from the nearest capture site, the Montes Azules Biosphere Reserve. The new records of *D. youngii* and *M. macrophyllum* are valuable to advance our knowledge of the distribution of these species.

Key words: Chiapas Coast; Chiroptera; oil palm; Phyllostomid bats.

Diaemus youngii y *Macrophyllum macrophyllum* son dos especies de murciélagos que habitan en México, pero cuentan con pocos registros en colecciones. El objetivo de este estudio es presentar datos que amplían la distribución geográfica de *D. youngii* para la vertiente del Pacífico mexicano en Chiapas y añadir registros de *M. macrophyllum* en esta región. Los muestreos se llevaron a cabo en tres periodos con una duración de siete noches: diciembre de 2020, mayo de 2021 y julio de 2022 en Villa Comaltitlán, Chiapas. Se usaron tres redes de niebla, colocadas dentro de la vegetación cercana al río Papagayo e inmersas en una plantación de palma de aceite. Con un esfuerzo de 6,216 m x hr de muestreo se obtuvieron 386 registros de murciélagos pertenecientes a 12 especies, incluyendo a *D. youngii* y *M. macrophyllum*. Se capturó 1 macho adulto de *D. youngii* y 4 de *M. macrophyllum*. Un quinto registro de *M. macrophyllum* ocurrió de manera fortuita en la carretera Pijijiapan - Tonalá, con un individuo atropellado. El registro de *D. youngii* es el primero para la costa del Pacífico de Chiapas, ya que el registro más cercano se encuentra a 197 km en línea recta del sitio de captura, en la Reserva de la Biosfera Montes Azules. Los registros de *M. macrophyllum* complementan los datos previos en la vertiente del Pacífico. La aportación de los nuevos registros de *D. youngii* y *M. macrophyllum* es valiosa para complementar el conocimiento de su distribución.

Palabras clave: Costa de Chiapas; murciélagos filostómidos; palma de aceite; quirópteros.

The state of Chiapas, in Mexico, has a high richness of bat species, with 108 species ([Lorenzo et al. 2017](#)). There are previous lists of species ([Alvarez-Castañeda and Alvarez 1991](#); [Alvarez-Castañeda 1993](#); [Medellín 1993](#)) and contributions of new records ([Polaco 1987](#); [Medellín 1983](#); [Medellín et al. 1986](#); [Alvarez and Alvarez-Castañeda 1990](#); [Hernández-Mijangos et al. 2008](#)), which have led to the update of the species list in Chiapas ([Retana and Lorenzo, 2002](#); [Lorenzo et al. 2017](#)). However, there are still underexplored regions with gaps in information on species richness, the number of records, and ecological aspects of

the local fauna ([Lorenzo et al. 2017](#); [Retana and Lorenzo 2002](#)). One of these areas is the Pacific coastal plain, which has recorded 47 species of bats ([Alvarez-Castañeda 1993](#)).

Diaemus youngii (white-winged vampire bat) is one of the three species of hematophagous bats present in Mexico. Its coloration is light brown or dark cinnamon, with white wing tips. The body length is between 83 mm and 84 mm, and weighs between 31 g and 38 g. The eyes are relatively larger than those of other bats of similar body size ([Greenhall and Schutt 1996](#)). Additionally, *D. youngii* has a short thumb and a single callosity, contrasting with

Desmodus. The uropatagium is more developed, and its legs are more robust than those of *Desmodus* and *Diphylla* (Scheffer et al. 2015). Another distinctive feature of *D. youngii* is the presence of scent glands inside the mouth (Medellín et al. 1997). Individuals of *D. youngii* rest in caves, tree hollows, and on long leaves of banana plants. Its distribution is discontinuous from Tamaulipas, Mexico, to Argentina, and it mainly inhabits humid and dry tropical forests (Greenhall and Schutt 1996; Barquez et al. 2015). In Chiapas, it has been recorded in the Sierra Lacandona subprovince (Alvarez-Castañeda and Alvarez 1991).

Macrophyllum macrophyllum (Long-legged bat) measures between 41 mm and 53 mm and weighs between 7 g and 10 g. The fur is brown, and the ears are separated and slightly larger than the head. Its limbs are long (Harrison 1975), and the uropatagium has a fringe of hair along the edge (Medellín et al. 1997). This bat inhabits humid and dry tropical forests, mainly in areas associated with water bodies. Its shelters include caves, sewers, and under bridges. It is distributed from southern Mexico to Argentina (Harrison 1975). In Chiapas, it has been recorded in the Sierra Lacandona subprovince (Alvarez-Castañeda and Alvarez 1991) and the La Encrucijada Biosphere Reserve in the Pacific coastal plain (Hernández-Mijangos et al. 2008).

Both species have a marginal distribution in Mexico, being considered rare or uncommon, with incidental captures in few localities (Harrison 1975; Seymour and Dickerman 1982; Greenhall and Schutt 1996) and scarce records in biological collections in Mexico (Kraker et al. 2021; CONABIO 2024). Therefore, the contribution of new localities for both species is valuable to advance our knowledge of their geographical distribution, particularly in areas that are under-explored and with increasing changes in land use, such as the Pacific coastal plain of Chiapas (Lorenzo et al. 2017).

The presence of *D. youngii* and *M. macrophyllum* was documented during the project "Flora and fauna characterization and monitoring in the Maragato and Papagayo oil palm estates, municipality of Villa Comaltitlán, Chiapas," which aimed to sample regional flora and fauna. The objective of the present study was to provide information on these two species, expand the geographical distribution of *D. youngii* to the Mexican Pacific slope in

Chiapas, and add records of *M. macrophyllum* for this area.

The sampling was conducted at the Papagayo plantation, Municipality of Villa Comaltitlán, Chiapas, in December 2020, May 2021, and July 2022. This municipality comprises the following types of vegetation: tular (20 %), high tropical forest (7 %), mangrove forest (5 %), and secondary vegetation and popal in smaller proportions (5 %). The region also includes agricultural areas (32 %) and pastures (31 %; INEGI 2010). The local climate is warm and humid, with abundant summer rainfall. The rainy season spans from May to October and ranges between 1500 mm and 4000 mm annually (INEGI 2010). The study area is located within an oil palm plantation (*Elaeis guineensis*; 15°12'2"N, 92°34'43"W) on the banks of the Papagayo River.

Since the project aimed to prepare an inventory of species, the collection of specimens and their inclusion in biological collections were not considered. It is worth noting that the sampling design (duration and schedule) for bats was adjusted to the sampling of other terrestrial vertebrate species. In particular, bats were sampled in an ecotone between poplar groves and secondary vegetation. To this end, three mist nets measuring 12 m long × 3 m wide were installed for 7 nights per sampling event. The nets were placed at different heights above the ground, from 0.3 m to 3.5 m, separated from each other by 100 m. The nets were active from 20:00 h to 24:00 h and were checked every 30–40 minutes. The sampling effort was quantified as the product of the total net length, in meters, by the total number of installed hours (Medellín 1993).

The captured specimens were removed from the nets using leather gloves and placed in cloth bags for identification. We recorded some somatic measurements (total length, tail length, forearm length, and weight), age category, reproductive status, and sex, minimizing the handling and photographing time to reduce stress. Subsequently, each individual was photographed and released in the capture area. Species were taxonomically determined using the field guide by Medellín et al. (1997), and the taxonomic classification followed Ramírez-Pulido et al. (2014). The photographic records are deposited in the image bank of Conservación de la Biodiversidad del Usumacinta A. C. (COBIUS A. C.).

Table 1. Records of *Diaemus youngii* and *Macrophyllum macrophyllum* in Villa Comaltitlán, Chiapas, Mexico. TL = Total length; TI = Tail length; FI = forearm length; EI = Ear length; W = weight. Measurements are expressed in millimeters and the weight is expressed in grams.

Date	Time	Species	Locality	Municipality	Coordinates	Sex	Reproductive status	TL	TI	FI	EI	W
12/13/2020	20:30	<i>D. youngii</i>	Papagayo plantation	Villa Comaltitlán	92°34'44"W 15°12'07"N	Male	Non-reproductive	82	-	51.7	-	34
04/16/2021	20:30	<i>M. macrophyllum</i>	Papagayo plantation	Villa Comaltitlán	92°34'44"W 15°12'07"N	-	-	38	-	34	-	7
07/15/2022	-	<i>M. macrophyllum</i>	Pijijiapan-Tonalá highway	Pijijiapan	93°12'26"W 15°41'45"N	Male	-	32		32		5
07/15/2022	22:20	<i>M. macrophyllum</i>	Papagayo plantation	Villa Comaltitlán	92°34'44"W 15°12'18"N	Female	Lactating	34	38	32	11	6
07/16/2022	21:40	<i>M. macrophyllum</i>	Papagayo plantation	Villa Comaltitlán	92°34'44"W 15°12'02"N	Male	Non-reproductive	34	-	34	14	7
07/17/2022	21:15	<i>M. macrophyllum</i>	Papagayo plantation	Villa Comaltitlán	92°34'53"W 15°12'05"N	Male	Non-reproductive	34	-	32	12	6

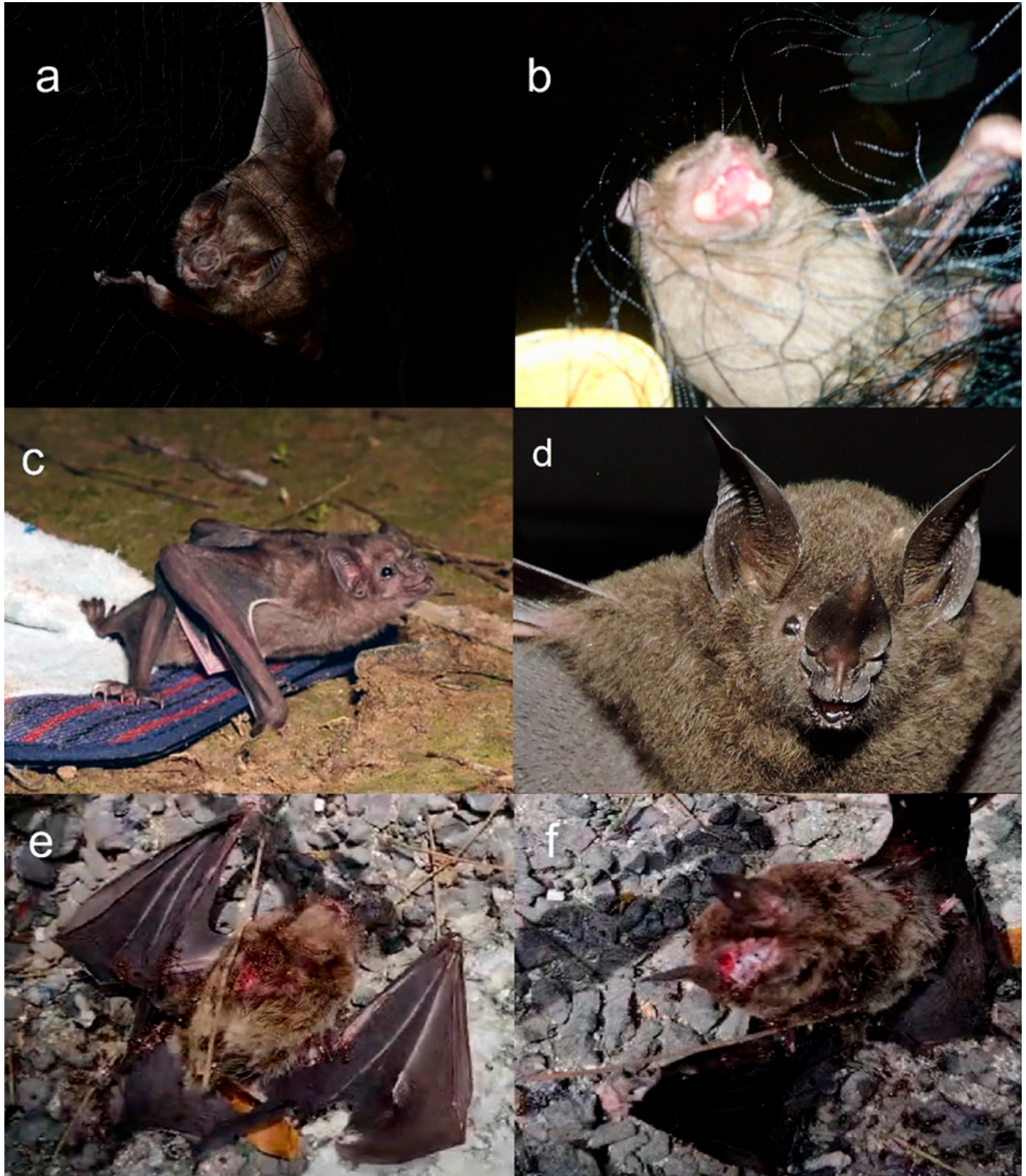


Figure 1. Photographic records of *Diaemus youngii* (a, b, and c) and *Macrophyllum macrophyllum* (d, e, and f) documented in Villa Comaltitlán, Chiapas, Mexico. *D. youngii*, shows the scent glands inside the mouth and the white wing edges. Photos: Image Bank of COBIUS A.C. - Arturo Candelaria Peña.

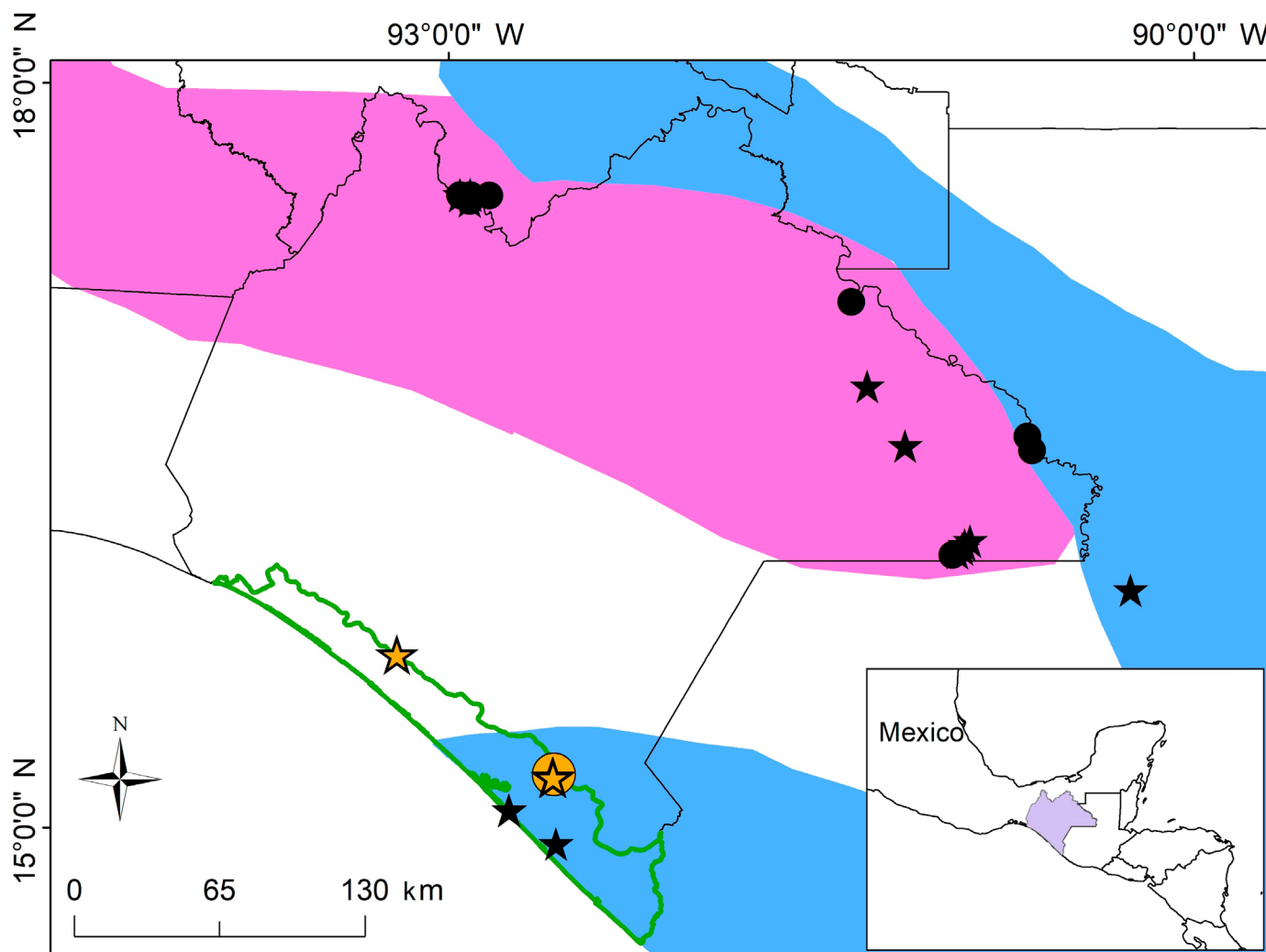


Figure 2. Historical records (black symbols) and new records (orange symbols) of *Diaemus youngii* (circles) and *Macrophyllum macrophyllum* (stars) in the coastal plain of Chiapas, Mexico (green line polygon), and nearby areas. The blue area is the current distribution range of *M. macrophyllum* and the pink area is the distribution range of *D. youngii*, both according to the IUCN.

The sampling effort was 6216 net-hours, which yielded 386 bats belonging to 12 species. *Artibeus jamaicensis* ($n = 139$), *Sturnira parvidens* ($n = 126$), and *A. lituratus* ($n = 37$) were the species with the greatest number of captured specimens.

On December 13, 2020, *D. youngii* was recorded in an ecotone near the Papagayo River surrounded by an oil palm plantation (Table 1, Figure 1a, b, and c). The individual exhibited the scent glands inside the mouth and the white wing edges, which are distinctive traits of the species (Figure 1b and c).

Four individuals of *M. macrophyllum* were recorded in the study area in 2021 and 2022 (Table 1). The fur coloration and the tail extending to the edge of the uropatagium of the captured organisms match the description in the identification guide (Figure 1d), and the measurements are consistent with those reported for the species (Medellín 2005; Hernández-Mijangos et al. 2008). An additional record was obtained incidentally on July 15, 2022, outside the sampling period, on the Pijijiapan-Tonalá road in the peri-

urban area of Pijijiapan, 86 km from the previous record in Villa Comaltitlán. One roadkilled specimen was observed; it was decomposing, so some somatic measurements were not recorded (Table 1, Figures 1e and f).

Diaemus youngii and *M. macrophyllum* have been listed in bats of Chiapas for several decades (Alvarez-Castañeda and Alvarez 1991; Lorenzo et al. 2017; Retana and Lorenzo 2002; Muñoz-Alonso and March-Mifsut 2003). The record of *D. youngii* in this study is the first for the Pacific coast of the state of Chiapas. There are previous records of *D. youngii* in the ejido Benemérito de las Américas (Alvarez-Castañeda and Alvarez 1991), in areas near the Usumacinta River in the Lacandon tropical forest (CONABIO 2024), and in the vicinity of the Montes Azules Biosphere Reserve (GBIF 2024), all corresponding to the Sierra Lacandona subprovince (Alvarez-Castañeda 1993; Lorenzo et al. 2017; Kraker et al. 2021). In nearby areas outside of Chiapas, it has been recorded in Teapa, Tabasco (CONABIO 2024, Figure 2).

The new record of *D. youngii* is located more than 197 km straight from the nearest capture site near the



Figure 3. Vegetation in the study area on the banks of the Papagayo River (a, b, c) and the surrounding plantations in Villa Comaltitlán, Chiapas, Mexico.

Montes Azules Biosphere Reserve and outside the species distribution polygon described in the International Union for Conservation of Nature, IUCN (Figure 2; Barquez et al. 2015). This new record was obtained in an ecotone of popal and secondary vegetation 60 m from the Papagayo River (Figure 3). *D. youngii* thrives in several types of vegetation, such as low tropical forest, high tropical forest, grasslands, as well as ecotones, secondary vegetation, forest edges, and human settlements (Greenhall and Schutt 1996; Costa et al. 2008; Pedroso et al. 2018), so the new record matches the observed habitat. Additionally, the present study recorded *D. youngii* in the rainy season, consistent with previous reports (Greenhall and Schutt 1996). However, it is unknown whether the periodicity of precipitation influences the detection of this species (Scheffer et al. 2015). The recent record of the species in the study area is probably a consequence of the scarce studies on biodiversity in the coastal plain, a fact that has hindered its previous detection. Additionally, changes in land use, expanding human settlements, and the presence of domestic livestock in the area favor the presence of *D. youngii* due to its preference to

feed on the blood of domestic animals, particularly poultry (Scheffer et al. 2015).

The records of *M. macrophyllum* supplement previous data for the Pacific slope of Chiapas (Hernández-Mijangos et al. 2008; iNaturalistMX 2022). In Chiapas, this species has also been documented in Arroyo San Pablo, Chajul, and Arroyo José, in the Montes Azules Biosphere Reserve (Alvarez-Castañeda and Alvarez 1991); outside of Chiapas, it has been recorded in Teapa, Tabasco (CONABIO 2024).

Four of the five new records reported in the present study were located 60 m from the Papagayo River, which offers favorable conditions for various species of aquatic insects, the main food source for *M. macrophyllum* (Figure 3; Harrison 1975; Weinbeer et al. 2013). This bat species is found in caves or logs near the coast, streams, or rivers that run through various vegetation types, including humid and dry tropical forests (Seymour and Dickerman 1982; Weinbeer et al. 2013).

Although the records obtained during the fauna sampling in the study area were not deposited in a Mexican scientific collection, the information is valuable and can be

verified through photographic records (Figure 1). In other similar cases, the information provided from citizen science data has proven its value in expanding our knowledge of wild species, supplementing geographical, biological, ecological, and risk information, particularly for poorly sampled areas (Díaz-Segura et al. 2021; Castro-Bastidas and Serrano-Serrano 2022).

Although both species are listed as Least Concern in the IUCN Red List (Barquez et al. 2015; Rodríguez and Pineda 2015), *D. youngii* is in the Special Protection category and *M. macrophyllum* is in the Threatened Category in the Mexican Official Standard 059 (SEMARNAT 2010). Both species have their northernmost distribution limit in Mexico, probably with small populations (Scheffer et al. 2015; Hernández-Mijangos et al. 2008). Therefore, anthropogenic impacts on their habitats (e.g., pollution of water bodies, introduction of domestic species, changes in land use) could lead to local changes in their populations and distribution (Scheffer et al. 2015).

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