



First record of four bat species for the state of Morelos and new bat records for the Sierra de Huautla Biosphere Reserve, Mexico

Primer registro de cuatro especies de murciélagos para el estado de Morelos y nuevos registros para la Reserva de la Biosfera Sierra de Huautla, México

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Abstract. Four bat species are reported for the first time in Morelos: *Centurio senex*, *Lasiurus intermedius*, *Myotis fortidens* and *Nyctinomops macrotis*, which were captured at the Tropical Dry Forest (TDF) of the Sierra de Huautla Biosphere Reserve (SHBR). Furthermore, 9 additional bat species that were previously unconfirmed in the SHBR are recorded. External morphometric data of the captured individuals is provided, as well as details regarding the sampling dates and sites and, when possible, information about echolocation sequences. The list of bat species in the SHBR has increased to 41 species (71% of the bat fauna in Morelos), which highlights the value of this area for protecting the biodiversity of Morelos.

Key words: tropical dry forest conservation, Chiroptera, Balsas River Basin.

Resumen. Se registra por primera vez la presencia de 4 especies de murciélagos para el estado de Morelos *Centurio senex*, *Lasiurus intermedius*, *Myotis fortidens* y *Nyctinomops macrotis*, capturados en la selva baja caducifolia de la Reserva de la Biosfera Sierra de Huautla (REBIOSH). Adicionalmente, se han documentado para esta misma región 9 especies de murciélagos sin confirmación previa de su presencia. Se proporcionan medidas morfológicas externas de los ejemplares capturados, detalles sobre las fechas y sitios de captura y para algunas especies información sobre sus pulsos y secuencias de ecolocación. Con estos registros, la riqueza de murciélagos de la REBIOSH aumenta a 41 especies (71% de la quiroptero fauna del estado de Morelos) lo que resalta el valor de esta área para la protección de la biodiversidad del estado.

Palabras clave: conservación selva baja caducifolia, Chiroptera, cuenca del río Balsas.

Introduction

The bat fauna for Morelos and for the Sierra de Huautla Biosphere Reserve (SHBR) has been extensively described, based on confirmed records, mostly on 3 previous publications (Álvarez-Castañeda and López-Formet, 1995; Sánchez-Hernández and Romero-Almaraz, 1995; Álvarez-Castañeda, 1996). However it is important to note that although these publications presented comprehensive information about bat richness in the state, it is clear that still there is a need for more studies as has been shown by recent records of some species for the state (e.g. Orozco-Lugo et al., 2008 that reported for the first

time for Morelos the bat *Enchistenes hartii*).

Although Morelos it is one of the smallest states in México, it presents a steep altitudinal gradient and hence a great variety of climatological zones which in combination with the topographic features and the fragmentation of the native vegetation cause the state to present a high environmental heterogeneity and a great variety of micro habitats.

In particular, the tropical dry forest (TDF), that was the dominant vegetation type in the state, may have a high relevance for the bat fauna of Morelos. However TDF in Morelos has suffered an intense pressure and nearly 60% of the original vegetation has been lost, and only 19% remains and is restricted to areas with steep slopes (Trejo and Dirzo, 2000).

The TDF is a vegetation type with high biodiversity and a high number of endemic species; however, these forests are also among the most threatened tropical environments, and they are insufficiently represented in natural protected areas in Mexico (Janzen, 1988; Ceballos and García, 1995; Ceballos and Valenzuela, 2012).

Forests are a key habitat for microchiropteran bats all over the world. The highest diversity of bats at a generic level is in the Neotropics and it is likely that TDF play an important role in maintaining this diversity. The intense deforestation pressure on these forests, is a major concern for bat conservation (Hutson et al., 2001; Mickleburgh et al., 2002). TDF in México have been considered of high relevance for the conservation of some bat groups, such as the Glossophagine bats (Arita and Santos-del Prado, 1999), but the bat fauna of these of forests has been understudied. It is an urgent task to obtain better knowledge of the bat fauna and the biodiversity in general of TDFs, considering that they present deforestation rates as high as 1.4% by year for some regions in the country (Trejo and Dirzo, 2000).

Materials and methods

The Sierra de Huautla Biosphere Reserve (SHBR; recognized by the MAB-UNESCO program and included in the world net of biosphere reserves) in Morelos is the largest natural protected area (ca. 60 000 ha) devoted to the conservation of TDF in Central Mexico. Its mammalian fauna has been intensively studied since 2001, and it has been found that the bat fauna is highly diverse.

A monitoring protocol for bat species at the SHBR, including mist nets and ultrasound detectors, started in 2001 when the project entitled “Mastofauna de la Reserva de la Biosfera Sierra de Huautla, Morelos: Diversidad, Patrones Espacio-Temporales y Conservación” (Project J3490-V Conacyt, under the supervision of the second author) began. Since 2004, the bat fauna has been monitored twice a year (1 sampling event at the end of the dry season and another in the middle of the rainy season) at 4 sampling sites in the central region of the SHBR (Table 1). The dominant vegetation in this area is TDF with common tree or shrub species including: guayacán (*Conzattia multiflora*), tepehuaje (*Lysiloma divaricata*), cuachalalate (*Amphipterygium adstringens*), rosál (*Pseudobombax ellipticum*), pochote (*Ceiba parvifolia*), venenillo (*Sapium macrocarpum*), cacahuananche (*Licania arborea*), cuayotomate (*Vitex mollis*), amate blanco (*Ficus insipida*), texcalamate (*Ficus cotinifolia*), copal (*Bursera aloexylon* y *B. grandifolia*), cardón (*Pachycereus grandis*), bonete (*Jacaratia mexicana*), chichilillo (*Stemmadenia bella*), San Pablito (*Hamelia patens*), mata rata (*Gliricidia sepium*),

cubata (*Acacia cochliacantha*) and guachocote (*Malpighia mexicana*).

Additionally, in 2004, 4 sites in the northeastern region and 4 sites in the southwestern region of the SHBR (mostly dominated by dry oak forest; Table 1) were also sampled, as part of another project entitled “Mamíferos y hormigas cómo bioindicadores en la Reserva de la Biosfera Sierra de Huautla” (part of the research project Semarnat-2002-C01-0790). In 2004, each site was sampled twice during each climatic season.

A total sampling effort of 184 hrs of ultrasound recording time and more than 24 561 m/hr on 92 sampling nights, has been accumulated so far, on which more than 1 631 individuals of 33 different bat species have been captured and the ultrasound sequences of 11 aerial insectivorous bat species has been recorded and identified (Orozco-Lugo et al., 2007; Orozco-Lugo et al., 2013). Specific identification of the captured bat species was aided by the use of field guides (Medellín et al., 1997, 2008; Reid, 1997, 2009) and also by the collection of specimens along with the use of a key for the identification of species via the morphological features of their skulls (Álvarez et al., 1994).

All specimens were collected under permits extended by Semarnat to the second author (FAUT-0251) and a special license to collect-SGPA/DVGS/02131, SGPA/DGVS/002296/11 and SGPA/DGVS/02581/12-linked to the research projects “Mastofauna de la Reserva de la Biosfera Sierra de Huautla, Morelos: diversidad, patrones espacio-temporales y conservación” and “Mamíferos y hormigas cómo bioindicadores en la Reserva de la Biosfera Sierra de Huautla”, or licenses extended to the third author (FAUT-0145) or to C. Martínez (SGPA/DGVS/07803, linked to her research project “Restauración de la diversidad biológica en áreas degradadas de la Reserva de la Biosfera Sierra de Huautla”). All collected specimens were deposited in the mammals collection (MOR-MAM-177-075; CMC) at the Centro de Investigación en Biodiversidad y Conservación, Universidad Autónoma del Estado de Morelos or at the Colección de Vertebrados del Instituto de Ecología A. C., Xalapa, Veracruz, México (IEX).

Results

Here, 4 bat species are reported for the first time in Morelos: *Centurio senex*, *Lasiurus intermedius*, *Myotis fortidens* and *Nyctinomops macrotis*. These species were captured at the TDF of the SHBR, additionally 9 bat species, previously reported in Morelos but not previously confirmed within the SHBR, were also recorded: *Eumops underwoodi*, *Lasiurus cinereus*, *Macrotus waterhousii*, *Molossus sinaloae*, *Myotis yumanensis*, *Natalus mexicanus*, *Parastrellus hesperus*, *Pteronotus personatus*

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