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**Noteworthy Record of *Musonycteris harrisoni* and *Tlacuatzin canescens*  
Pollinating a Columnar Cactus in West-Central Mexico**

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**Abstract:** We report *Musonycteris harrisoni* (Phyllostomidae) and *Tlacuatzin canescens* (Didelphidae) feeding of flowers during the blooming period (March and April 2004) of *Stenocereus queretaroensis*, an endemic cactus showing nocturnal anthesis and chiropterophilic syndrome. Visits were considered legitimate because both mammals made contact with the stigma and anthers, although their visits were highly infrequent compared with the principal pollinator *Leptonycteris curasoae*. These mammals are usually associated with pristine tropical forests, although our study site showed high habitat fragmentation and extensive agriculture. It is likely that both mammals feed regularly on nectar of cacti in pristine tropical forests thus acting actively as pollinators.

**Key words:** *Musonycteris harrisoni*, *Tlacuatzin canescens*, nectarivory, pollination ecology, columnar cactus

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## INTRODUCTION

Pollination mediated by animals has played a relevant role in the evolution and speciation of angiosperms (Stanton *et al.*, 1986). Because of their size and feeding habits, mammals have been considered very effective pollinators, by dispersing higher quantities of pollen to longer distances compared with birds and insects, although mammals demand high food rewards from flowers (Dawson and Hulbert, 1970; Horner *et al.*, 1998). The chiropterophilic syndrome comprises a suit of traits attracting mammals to feed on these flowers (Faegri and Van der Pijl, 1979). This syndrome is characterized solely on the basis of bats visiting flowers, although often other nocturnal mammals may feed on these flowers as well. Bats and opossums are frequent nocturnal mammals visiting flowers, while primates are frequent diurnal plant visitors (Carthew and Goldingay, 1997). More than 590 species of plants are presumably pollinated by bats in the Neotropics (Bestmann *et al.*, 1997) and more than 59 flowering plants are pollinated by marsupials in Australia (Carthew and Goldingay, 1997). Few plants, however, are known to be pollinated by marsupials in the Neotropics and not a formal marsupial syndrome has been recognized (Bawa, 1990). Some studies have documented plants pollinated by marsupials, including *Pseudobombax tomentosum* (Bombacaceae) pollinated by *Caluromys lanatus* (Gribel 1988), *Mabea occidentalis* (Euphorbiaceae) pollinated by *C. derbianus* (Steiner, 1981) and *Quaribea cordata* (Bombacaceae) pollinated by *Caluromyciops irrupta*, *Didelphis marsupialis* and *C. lanatus* (Janson *et al.*, 1981).

Here, we report noteworthy records of two endemic mammals (a marsupial and a bat) feeding on nectar of flowers of the endemic cactus *Stenocereus queretaroensis*; previously, we reported that the bat *Leptonycteris curasoae* (Phyllostomidae) was the principal pollinator of the cactus *S. queretaroensis* (Ibarra-Cerdeña *et al.* 2005).

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## MATERIALS AND METHODS

### Study Site

The present study was conducted in stands of *S. queretaroensis* in the Autlan valley in the State of Jalisco, Mexico (19°42'44" N, 104°14'10" W and 19°53'52" N, 104°25'38" W; elevation is ~900 m a.s.l). The average annual range temperature is 20-28°C and precipitation is 600-1000 mm. Vegetation varies from thorn shrub and tropical deciduous forest in slopes to tequila and corn crops in plane areas. *S. queretaroensis* is an arborescent columnar cactus 10 m height with a short trunk and numerous vertical stems. Flowers are 10-14 cm long and open at night. *S. queretaroensis* is a bat pollinated cactus showing a good match between patterns of rewards offer and feeding habits of *L. curasoae*. Other animals as bees and birds are also attracted to flowers, but their effectiveness as pollinators appears minimal (Ibarra-Cerdeña *et al.*, 2005).

### Data Collection

The diversity, abundance and activity of night visitors were recorded each night for 11 nights in March and April 2004, using a Sony digital Handy cam DCR-TRV740, with a night shot feature and one infrared lamp (IRlights). The camera was positioned in a tripod ~6 m from focal flower. Recording started at 2000 h until 500 h when activity of nocturnal visitors almost ceased.

## RESULTS

The Mexican grey opossum *Tlacuatzin canescens* (Didelphidae) was recorded visiting a flower in 14 April 2004, when two flowers were videotaped from two plants with 26 flowers (Fig. 1b-d).

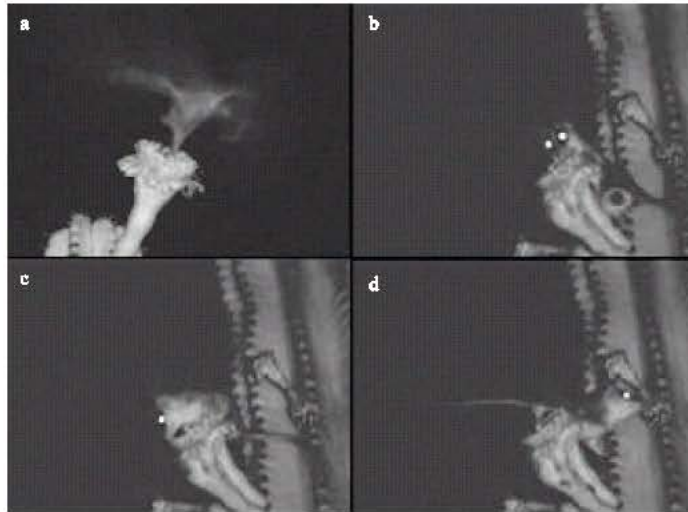


Fig. 1: Photos showing focal flowers of *Stenocereus queretaroensis* and the two mammals visiting flowers. (a) *Musonycteris harrisoni* visiting legitimately a flower. Note the long nose and uropatigium (the membrane between legs), characteristic of this species compared with *Leptonycteris curasoae* (a shorter nose and absence of uropatigium-not shown), *Choeronycteris mexicana* (long nose, but absence of uropatigium-not shown) and *Glossophaga soricina* (presence of uropatigium, but very short nose-not shown). A view of *Tlacuatzin canescens* approaching the flower (b); over the flower, immediately after introducing its head inside (c); leaving the flower (d)

A male visited the flower at 23:24:05 h for 3 sec, approaching from a stem and walking up to the flower, introducing the head completely and touching both anthers and stigma. We believe that the opossum visited the flower for feeding on nectar and insects (beetles and ants). A total of 105 visits by *Leptonycteris curasoae* (84), *Choeronycteris mexicana* (16) and sphingids (15) were recorded that night. All species were easily identified in the videotape (Ibarra-Cerdeña *et al.*, 2005). Likewise, the Colima long nose bat *Musonycteris harrisoni* (Phyllostomidae) (Fig. 1a) was observed visiting legitimately twice the same flower in 17 April 2004, when two flowers were videotaped from two plants, surrounded by 9 cacti containing 30 open flowers in a 25 m radius. The first visit was at 24:09:29 h for 0.6 sec, while an individual was hovering and drinking nectar. A second visit occurred while a male perched at 3:48:01 h for 0.5 sec in the flower. A total of 75 visits by *L. curasoae* (73), *C. mexicana* (1) and *Glossophaga soricina* (1) were recorded that night. During 2003, *L. curasoae* and *G. soricina* were registered visiting flowers of *S. queretaroensis*, but *L. curasoae* was the principal pollinator (Ibarra-Cerdena *et al.*, 2005). During blooming season of 2004, the number of flowers was notably higher than in 2003 and we observed more species of nocturnal visitors (Ibarra-Cerdena *et al.*, unpublished data).

## DISCUSSION

*Tlacuatzin canescens* (Ramirez-Pulido *et al.*, 2005) is endemic to the Neotropics in Mexico (Ceballos and Miranda, 2000) and it has been observed feeding on flowers of *Ceiba grandiflora* (Bombacaceae). Quesada *et al.* (2003) reported that this mammal is affected by habitat fragmentation and showed that the number of visits of pollinators feeding on flowers of trees in fragmented places were significant lower compared with trees in continuous forest. *Musonycteris harrisoni*, is a rare microendemic bat occurring in central Mexico (Koopman, 1976). Few studies report on its feeding habits, observing visits to flowers only in pristine tropical forests (Stoner *et al.*, 2002). We believe that the high number of cacti flowers observed in 2004 attracted both mammals to our habitat fragmented study site. It is likely than in pristine tropical forest both mammals act regularly as active pollinators of plants (Quesada *et al.*, 2003), although their densities appear to be low (Ceballos and Miranda, 2000). The present study documents the first record of *T. canescens* and *M. harrisoni* feeding on flowers of Cactaceae and acting as effective pollinators of *S. queretaroensis*.

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