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BATS IN NATURAL AND URBAN ENVIRONMENTS

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Abstract About 25% of mammal species in Brazil belong to Order Chiroptera. There are 174 described species. Bats present important functions within ecosystems, as pollination, seed dispersal and the population control of insects. The habitat fragmentation process, characterized by the continuing decline of native vegetation areas has led the approximation of bats with man. In the cities these mammals have shelter that meet their requirements of temperature, moisture, light and abundant food. These animals can also transmit rabies and histoplasmosis. To minimize the occurrence of bats in urban shelters, recommend procedures include the monitoring and adjustment of buildings, preventing the establishment of colonies, and implementation of programs for the conservation of these animals, essential for the maintenance of ecosystems.
Key Words Bats, environment, urban areas.

INTRODUCTION

Bats are the only mammals actually able to fly, a key evolutionary step that opened a new strategy for locomotion, about 55 million years ago (Wilson and Reeder, 2005). In Brazil, around 25% of mammal species belong to the Order Chiroptera (Reis et al., 2006), and are distributed into nine families, 64 genera and 172 species; still the group is represented throughout the territory, occurring in Amazon, *'Cerrado'*, Atlantic Forest, *'Pantanal'* and *'Caatinga'* (Reis et al., 2011).

NATURAL HABITATS

The chiropterans play important roles within ecosystems by interacting with other living beings, which provides them a relevant role for the maintenance of several ecological processes, such as pollination (Gardner, 1977), seed dispersal (Van Der Pjil, 1957) and population control of insect (Goodwin and Greenhall, 1961).

Pollination and Seed Dispersal

Regarding pollination process, Gardner (1977) pointed approximately 500 species of Neotropical plants pollinated by bats, which have attractive color and odor to these animals. Furthermore, according to the same author, these bats may present special adaptations, as a long tongue with papillary structures able to gather pollen grains.

In relation to seed dispersal, chiropterans contribute decisively on the maintenance and natural regeneration of forest, as well as of species economically useful to man, both in terms of food and ornamental (Van Der Pjil, 1957). The structure of vegetation may be influenced by bats through the species of consumed fruit (Fleming and Heithaus, 1981).

Pest Control

Goodwin and Greenhall (1961) emphasize that several bat species act in the natural control of insect populations, potential agricultural pests or disease vectors. Certain species could consume quantities corresponding to one and a half times its weight in one night and, according to Reis et al. (2008), insectivorous bats are more numerous due to the food abundance.

Considering the feeding, bats are categorized into: insectivorous, carnivorous, piscivorous, pollinivorous, nectarivorous, frugivorous and hematophagous (Reis et al., 2007) (Figure 1). This wide variety of feeding habits involves particular adaptations, as different shapes of skull, which can reflect the varied ways to get food (Nowak, 1994).

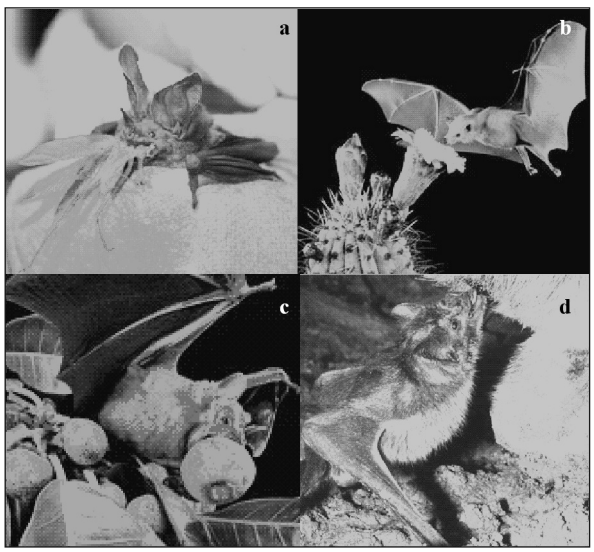

Figure 1. Bats with different feeding habits: a- insectivorous, b- pollinivorous, c- frugivorous and d- hematophagous. *Sources:* a- www.mornigearth.org/graphic-E/Biosphere/Bios-C-PlantPollination.html; b- www.miscience.org/Jason/XV.htm; c- ngm.nationalgeographic.com/2007/06/panama-bats/panama-bats-text; d- www.nytimes.com/2008/10/21/science/21blood.html?_r=1

URBAN HABITATS

The habitat fragmentation process, characterized by the continuing decline of native vegetation areas (Pedro et al., 1995), resulting from the process of urbanization and economic growth through the exploitation of natural resources, has caused damage to biodiversity (Brooks et al., 2002, Pires et al., 2006). Changes generated by increasing urbanization usually result in significant reduction of original diversity, and the approximation of many species to the humans. Analyses related to fauna in urban environments can offer subsidies to estimate the adaptability to profound alterations, and provide suitable measurements to conservation of remaining diversity (Esbérard, 2003).

Synanthropic fauna is made up by wild animals that have adapted, undesirably, to live with the man and differ from domestic animals that man raises and cares for consumption, labor or company (Jardim, 2008). The bats are prominent among synanthropic animals. The main reasons for the increase of bats in urban areas are: the smaller variety of natural predators and the abundance of food, as insects and fruits (Uieda et al., 1995).

According to Uieda et al. (1995), due to deforestation, agriculture and the advancement of cities to rural areas, currently several bat species live in urban environments using resources furnished direct or indirectly by human, as buildings, plants and night light. While forests are giving way for the advance of cities, several bat species have shown ability to resist to anthropogenic pressure, by staying in forest fragments located in urban perimeter, or by the direct establishment in urban environments (Reis et al., 1993), where the animals began to live more intensively with humans (Reis et al., 2000).

Bats look for shelter that meets their requirements of temperature, moisture, light and conditions to raise the offspring; they make use of caves, crevices in rocks, foliage, canopy of trees and palm trees, buildings, roofs, expansion joints of buildings, basements, attics, unfenced ridges; in the cities, these animals find safe shelter and abundant feeding on insects that are attracted by lights (Reis et al., 2002).

Surrounded by myths and legends involving bad omen and vampirism, bats are still considered by many people, as dangerous and unpleasant animals (Jardim, 2008). Much of this fear is associated with the scarce knowledge about the importance of this group into an environmental context (Reis et al., 2002). Beyond the fear that people have of these animals, contributes to the animosity, the fact that they attend domestic orchards in search of food, the accumulation of feces and urine odor in the ceilings of houses, the noise generated by the interaction of colonies and the possibility of transmitting diseases, especially rabies and histoplasmosis (Pedro, 1998).

RECOMMENDATIONS

Recommended actions to assist in solving problems caused by bats in urban areas involve constant monitoring and adaptation of buildings to avoid problems derived from establishment of colonies (Jardim, 2008). Besides the troubles created by bats, the benefits generated by them should be emphasized to population. A well-informed society can and should seek alternatives and subsidies for the execution of a wildlife conservation program without prejudice, which includes not only animals of public satisfaction.

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