



Nota Científica
(Short Communication)

A DUNG BEETLE IN MEXICO CITY: THE CASE OF *CERATOTRUPES FRONTICORNIS* (ERICHSON) (COLEOPTERA: GEOTRUPIDAE)

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RESUMEN. *Ceratotrupes fronticornis* (Erichson) es un escarabajo estercolero de tamaño mediano, perteneciente a la subfamilia Geotrupinae (Coleoptera: Scarabaeoidea: Geotrupidae). Es endémico de México, distribuyéndose en la zona montañosa alta del Sistema Volcánico Transversal. En esta nota señalamos la presencia de esta especie en dos áreas urbanas (Cuajimalpa y Magdalena Contreras) de la Ciudad de México. Adicionalmente, recalamos la plasticidad ecológica de *C. fronticornis* en ambientes urbanos, al utilizar una fuente de alimento alternativa y abundante como es el excremento de perro doméstico.

Urbanization is one of the main threats to biodiversity (Czech *et al.* 2000). Nowadays more than half of human population lives in cities, and in Latin American countries, more than 70% of human population lives in urban areas (UN 2014). Thus, urbanization represents a major challenge for the biodiversity that lives in or near urban areas (Vitousek *et al.* 1997). The study of biodiversity and its response to urbanization has gained importance (McKinney 2008, McIntyre 2000), but there is still a lack of information for many species and biological groups (McIntyre 2000).

Among biological indicator groups, dung beetles have been widely studied (Favila & Halffter 1997, Spector 2006) mainly in productive and wild environments such as ranching, farming and in nature reserves (Davis *et al.* 2001, Halffter & Arellano 2002). However, few publications address the study of dung beetles in urban environments (Ramírez-Restrepo & Halffter 2016). Urbanization has led to the local extinction of several dung beetles. In Rome five dung beetle species that used to be common in the urban area are now extinct (Fattorini 2011). Therefore, it is very important to know what species inhabit urban environments in order to detect losses and/or gains of species due to urbanization over time.

The main objective of this note is to report the presence and the possible shift of food source of the Geotrupinae dung beetle *Ceratotrupes fronticornis* in private gardens of Mexico City (Mexico).

Observations of dung beetles arriving to dog dung were made in two private gardens at peripheral colonies in Mexico City between 2010 and 2012. Both gardens are located on the slopes of Sierra de Las Cruces Mountains belonging to the Transverse Volcano Belt. Both gardens are partially covered with grass and sparse trees such as pines and oaks. In both properties, dogs were nourished with industrial dry dog food.

Garden A: Emilio Carranza 105. Magdalena Contreras colony (19°18'9.7"N and 99°14'38"W). 2500 m asl.

Garden B: Bosque de la Reforma 1415. Bosque de Las Lomas colony. Cuajimalpa (19°24'18" N and 99° 13' 46"W). 2600 m asl.

Ceratotrupes fronticornis (Erichson), a middle-sized Geotrupinae dung beetle species, endemic to Mexico was present in the gardens. It was remarkable the frequent appearance of several individuals of *C. fronticornis* that were feeding, and also burying dog-dung for nesting purposes. Additionally, individuals of this species were observed to be attracted to artificial lights. During the rainy seasons, the quantity of individuals observed increased.

Ceratotrupes fronticornis is a Mexican endemic species, characteristic of the highlands of the Mexican Transverse Volcanic Belt. *Ceratotrupes fronticornis* is usually established in altitudes between 2200-2800 m asl, usually attracted to equine excrements (Halffter & Martínez 1962). Our findings show that *C. fronticornis* is not restricted to mixed forest of *Quercus* and *Pinus* (Halffter & Martínez 1962), this species is also present and abundant in certain urban areas of Mexico City. Moreover, *C. fronticornis* is using an alternative food source showing the ecological plasticity of this species in certain peripheral areas of Mexico City. Similar observations have been made for other dung beetles. Cave (2005) found 16 species feeding on dog-dung in Austin, Texas (USA). In addition,

in a green urban area in Rome, Italy, the assemblage of dung beetles shifted from sheep to dog dung as the main source of food between 1986 and 1999 (Carpaneto *et al.* 2005).

As most urban areas hold an increasing quantity of dogs (Beck 1975) the daily production of dog excrement is high (Beaver 1975, Saitoh & Itagaki 1990). Urban dung beetles fulfill an important role by eating and scavenging excrements in the cities (Cave 2005, Nichols *et al.* 2008, Nichols & Gomez 2014). There are still many questions to answer about the presence and natural history of *C. fronticornis* in urban areas. Is dog dung its main food source? Where are the limits of the distribution of *C. fronticornis* in Mexico City? What are the special conditions that allow this species to live in urban areas? The number of individuals of *C. fronticornis* in Mexico City has augmented or decreased in the last decades? What is the main ecological function of this species in urban areas? And what other dung beetle species are living in Mexico City?

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