Geophagy in two parrot species in southern Pantanal, Brazil

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Abstract: Geophagy is a habit recorded for parrots, which seek earthy or soil-like substances presumably to help them in digestive functions, whether mechanical or chemical ones. Few studies are devoted to this feeding peculiarity in the Pantanal region. Here are reported two events of geophagy, for the Blue-and-yellow Macaw (*Ara ararauna*) and the Nanday Parakeet (*Aratinga nenday*) in the Pantanal subregions of the Miranda-Abobral and Nhecolândia, Mato Grosso do Sul, respectively.
Keywords: *geophagy, Pantanal, psittacines, parrots, wetland, feeding ecology.*

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Resumo: A geofagia é um hábito conhecido em psitacídeos, que se alimentam de terra ou argila supostamente por ajudar em funções digestivas, sejam mecânicas ou químicas. Poucos estudos são dedicados a essa peculiaridade alimentar na região do Pantanal. É feito aqui o registro de dois eventos de geofagia, para a arara-canindé (*Ara ararauna*) e o periquito-de-cabeça-preta (*Aratinga nenday*) nas sub-regiões pantaneiras da Nhecolândia e Miranda-Abobral, Mato Grosso do Sul, respectivamente.
Palavras-chave: *geofagia, Pantanal, psittacidae, araras, área úmida, ecologia alimentar.*

Introduction

Geophagy, the consumption of earthy or soil-like substances such as clay, silt and sand, is a habit described for several animal taxa, especially herbivorous or strictly herbivorous species (Diamond et al. 1999). Among vertebrates, most studies on geophagy are on primates, as these mammals may ingest soil from anthills, termite mounds and nests of ovenbirds (*Furnarius rufus*) (Bicca-Marques & Callegaro-Marques 1994, Krishnamani & Mahaney 2000, Mahaney & Krishnamani 2003, Sazima 2008).

The knowledge on geophagy among birds is scarce, and intensive studies on this issue are not frequent (Brightsmith 2004). Most of these studies were carried on with birds from the Peruvian Amazon, which use to cluster in flocks in hillsides with fragments of exposed soil, the so called clay licks (Burger & Gochfeld 2003, Brightsmith 2004, Brightsmith & Muñoz-Najar 2004). Geophagy is reported for Anseriformes, Columbiformes, Passeriformes, Casuariiformes, Galliformes and Psittaciformes (review in Brightsmith 2004). Among these orders, the greatest number of records is for the Psittaciformes, various species of macaws, parrots and parakeets (Mee et al. 2005, Symes et al. 2006, Lee et al. 2010).

The use of areas of moist and exposed soil is widespread among South America vertebrates and has been reported in Peru and some regions of Brazil (Vidolin et al. 2009, Tobler et al. 2009), including the Pantanal, where these clay mounds are popularly known as "barreiros". In the northeastern Pantanal, 14 species of vertebrates were recorded ingesting soil from "barreiros" (Coelho 2006). Some birds, including a Hyacinth Macaw (*Anodorhynchus hyacinthynus* (Latham, 1790)) and other parakeets, were also spotted ingesting soil; but not from the "barreiros" (Coelho 2006). This report is on geophagy among psittacines in the Pantanal wetlands, recording this behavior for the Blue-and-yellow Macaw, *Ara ararauna* (Linnaeus, 1758), and the Nanday Parakeet, *Aratinga nenday* (Vieillot, 1823), in two subregions of the Pantanal, Mato Grosso do Sul.

Material and Methods

The Pantanal is one of the largest continuous floodplain in the world; it is located in the Upper Paraguay Basin (16-20° S and 55-58° W). This basin comprises about 496,000 km^2 in which the Pantanal area is about 160.000km^2 distributed among Paraguay, Bolivia and Brazil; being 140,000 km^2 in the Brazilian territory (Junk et al. 2006). Due to edaphic, hydrological and biogeographical variation, its ecosystem can be divided into 10 different sub-regions (Lourival et al 2000). Within these sub-regions, the observations on *A. ararauna* were made at Nhumirim Farm (18° 58' S and 56° 38' W), located in the Nhecolândia sub-region and those on *Aratinga nenday* were made in the Miranda-Abobral sub-region, at the Base de Estudos do Pantanal (19° 34' S and 57° 01' W), property of the Universidade Federal de Mato Grosso do Sul. Both geophagy events were reported trough casual observations.

Results and Discussion

The geophagic behaviour of *A. ararauna* was observed on 10 September 2010, at 8:30 AM The macaw was alone on the ground, at the edge of a "salina", term used for the characteristic ponds of the Nhecolândia sub-region. These ponds remain isolated from other ponds during the flood and thus have sandy soil and high concentrations of sodium and potassium (Sakamoto et al. 1996). The bird scraped the ground with the beak (Figure 1) and lifted the head, as it does while swallowing, doing this repeatedly. However, as I approached to take a photograph, about100 m far from the bird, it flew. The wariness of parrots on the ground and their vulnerability to predators during geophagy are discussed by Burger & Gochfeld (2003).

Figure 1. Blue-and-yellow Macaw (*Ara ararauna*) scraping earth (geophagy) at the edge of a "salina", a typical pond in the subregion of Nhecolândia, Mato Grosso do Sul, Brazil, in September 2010. Note mammal droppings (dark objects around the edge).

Figura 1. Arara-canindé (*Ara ararauna*) raspando terra (geofagia), na margem de uma salina, uma lagoa típica da sub-região da Nhecolândia, Mato Grosso do Sul, Brasil, em setembro de 2010. Note excrementos de mamíferos (objetos escuros ao redor da margem).

Other vertebrates, such as tapirs (*Tapirus terrestris*) and peccaries (*Pecari tajacu*, *Tayassu pecari* and *Sus scrofa*) also visit the site to lick the soil. Faeces of these and other animals that visit the same spot are visible on Figure 1. Geophagy by Hyacinth macaws and parakeets was previously observed at this site (M. Tomas pers. comm.). Additionally, *Ara ararauna* was observed feeding of cattle feces (M. Tomas pers. comm.). Other bird species also found in the "salinas" in search of the "barreiros", include the Blue-throated Piping-Guan [*Aburria cumanensis* (Jacquin, 1784)], Bare-faced Curassow (*Crax fasciolata* Spix, 1825), Yellow-collared Macaw [*Primolius auricollis* (Cassin, 1853)], Blue-crowned Parakeet [*Aratinga acuticaudata* (Vieillot, 1818)] and the Monk Parakeet [*Myiopsitta monachus* (Boddaert, 1783)] (A.P. Nunes pers. comm.).

Aratinga nenday was observed scraping earth on 20 September 2010, at 5:30 PM Except for the work of Ragusa-Netto (2005), little is known on the biology of this species on Pantanal. The parakeet was alone on the ground, in a circle of naked soil (around 12 m^2), repeatedly making movements of scraping and swallowing similar to those described above for *A. ararauna* (Figure 2). Nanday Parakeets are frequently found alone or in couple at this site, about 50 m far from the Miranda River, where there are some tree species used as perches (*Mangifera indica*, *Cecropia pachystachya*) or food (fruits of *Attalea phalerata* and flowers of *Cocos nucifera*) by these birds.

Several hypotheses are postulated to explain geophagy in birds. As a mechanical function, earthy grains would be responsible for crushing the food in the gizzard (Best & Gionfriddo 1991). Biochemically, it is suggested that the ingested soil would help in the digestive processes buffering the gastric acids and providing mineral supplements. Other studies emphasize the importance of geophagy as a mean of adsorption for toxins and secondary compounds derived from the herbivorous diet and protection of gastrointestinal cells from these compounds (Gilardi et al. 1999). Diamond et al. (1999) argue that the diversity of parrots found in the western Amazon basin would be a reflection of geophagy, which allows these birds to consume a wider range of plants resources.

Figure 2. Nanday Parakeet (*Aratinga nenday*) scraping earth (geophagy) on a site of naked soil at the subregion in Pantanal known as Miranda-Abobral, in September 2010.

Figura 2. Periquito-de-cabeça-preta (*Aratinga nenday*) raspando terra (geofagia) em um local de solo nu na sub-região do Pantanal conhecido como Miranda-Abobral, em setembro de 2010.

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