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Use of Stingless Bee *Trigona hyalinata* (Lepeletier, 1836) as a Food Resource by the Yellow-chevroned Parakeet *Brotogeris chiriri* (Vieillot, 1818) in Southeastern Brazil

Uso da abelha guaxupé Trigona hyalinata *(Lepeletier, 1836) como recurso alimentar pelo periquito-de-encontro-amarelo* Brotogeris chiriri *(Vieillot, 1818) no sudeste do Brasil*

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Abstract

In this study, I report the first record of the use of the stingless bee *Trigona hyalinata* (Meliponini) as a food resource by *Brotogeris chiriri* in Atlantic Forest area in the municipality of Atibaia, São Paulo. The observations were conducted between 2022 and 2025, totaling 2 hours and 35 minutes of observation. The parakeets were observed interacting with the bees mainly in the morning, when nest activity was reduced and the bees were less aggressive. The consumption of bees may represent an alternative source of nutrients, especially proteins and carbohydrates, during periods of fruit and seed scarcity.

Keywords: Psittacines, feeding behavior, stingless bees, diet

Resumo

Nesse estudo relato o primeiro registro do uso de abelhas sem ferrão da espécie T*rigona hyalinata* (Meliponini) como recurso alimentar por *Brotogeris chiriri* em um fragmento da Mata Atlântica no município de Atibaia, São Paulo. As observações foram conduzidas entre os anos de 2022 a 2025, totalizando 2h35min de observação. Os periquitos foram observados interagindo com as abelhas principalmente no período da manhã, quando as atividades no ninho estavam reduzidas, e elas estavam menos agressivas. O consumo de

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abelhas pode representar uma fonte alternativa de nutrientes, especialmente proteínas e carboidratos, em períodos de escassez de frutos e sementes.

Palavras-chave: Psitacídeos, comportamento alimentar, abelhas sem ferrão, dieta

The diet of psittacids is highly diverse, consisting of seeds, fruits, floral parts, nectar, larvae and insects (del Hoyo, 1997; Sick, 1997; Forshaw, 1989; Long, 1984; Sazima, 1989). While searching for food, these birds forage both in the crowns of large trees and on certain fruit-bearing shrubs (Sick, 1997).

Brotogeris chiriri (Vieillot, 1818) (Fig. 1A) measures 20–25 cm and displays green plumage with yellowish underparts and bluish primaries (del Hoyo, 1997). Its geographic range extends from eastern to northern Bolivia, Paraguay and Argentina, and, in Brazil, the species is recorded in several states both in North (Pará), Northeast (Maranhão and Bahia), Center-West (Mato Grosso and Goiás), Southeast (Minas Gerais, Rio de Janeiro and São Paulo) and South (Paraná) regions. (Forshaw, 1989; Sick, 1997). It is widely distributed across Brazilian biomes, including the Cerrado, Caatinga, Atlantic Forest, and Pantanal, as well as in the Chaco and Yungas regions of South America (Ragusa-Netto, 2004; Guilherme, 2018; Paranhos et al., 2007). Its diet is composed mainly of seeds, fruits, infructescences and inflorescences (Forshaw, 1989; Paranhos et al., 2007; Ragusa-Netto, 2004; Sazima, 2008), even including nectar, termites and the soil of arboreal termite mounds (Costa-Pereira et al., 2015; Marques et al., 2018). The species' constant consumption of seeds characterizes this parakeet as a seed predator (Paranhos et al., 2007).

Trigona hyalinata (Lepeletier, 1836), popularly known in Brazil as "guaxupé" (Fig. 1B), is distributed in central South America (Bolivia, Brazil and Paraguay) (Camargo et al. 2023) and forms large colonies of up to 40,000 individuals. (Nieh et al.,2003). In Brazil, it occurs in the states of Bahia, Distrito Federal, Espírito Santo, Goiás, Maranhão, Mato Grosso, Mato Grosso do Sul, Minas Gerais, Paraná, Pará, Piauí, São Paulo and Tocantins (Camargo et al. 2023). In Brazil, T. hyalinata occurs mainly in the Atlantic Forest and Cerrado biomes, including areas of transition between these domains. (Oda et al., 2009; Nogueira-Neto, 1997; Silveira et al., 2002).

In this study, I recorded the use of *T. hyalinata* bees as a food resource by individuals of *B. chiriri*. The observations were as carried out in an Atlantic Forest fragment known as "Espaço Caetê" (23°08'22.2"S, 46°31'45.5"W), adjacent to the slopes of Parque Estadual de Itapetinga (PEI), municipality of Atibaia, São Paulo. Eight observation sessions were conducted at a single nest of *T. hyalinata* between 2022 and 2025. These took place in the winter of 2022 (17 and 30 July, 2 August), in the winter of 2023 (4 August), in the autumn of 2024 (1 and 15 June), and in the autumn of 2025 (1 and 3 May), totaling 2 h 35 min. Of all records, seven occurred in the morning (07:00–10:00) and one in the afternoon (14:00–14:30). I used 10×42 binoculars for the observations, and the images were taken with a photography camera.

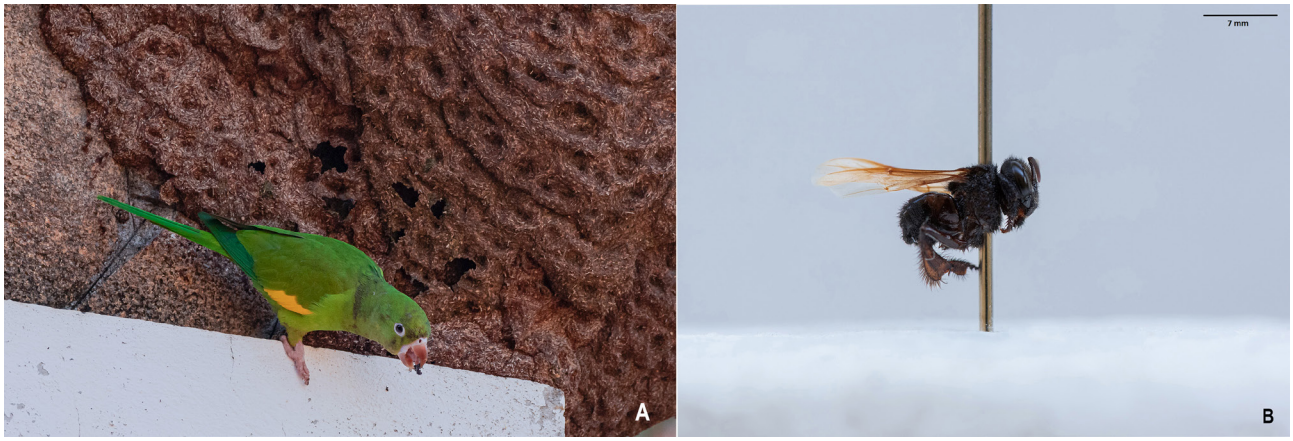

Figure 1. A) *Brotogeris chiriri* registered at the study site. B) *Trigona hyalinata* collected at the study site.

The number of *B. chiriri* individuals can vary greatly when foraging at a particular food source; Paranhos et al. (2007) recorded from one to 45 individuals at a feeding site. During my observations, only two *B. chiriri* individuals were seen interacting with the bee nest, probably a couple (Fig. 2A). The interval that *B. chiriri* spent predating on bees' nest was 19 min 35 s.

All bee species are influenced by environmental factors, particularly temperature (Roubik, 1989). Most parakeet visits to the nest occurred in the morning, when temperatures were still low and bee activity and aggressiveness were reduced. In contrast, during the afternoon observation, higher temperatures led to increased bee activity, making it more difficult for parakeets to remain at the nest. One behavior recorded was the perforation of the nest's outer wall at specific points with the bill, which facilitated bee capture (Fig. 2B). Similar behavior has been reported in termite nests by Marques et al. (2018). During feeding, none of the parakeets swallowed the bees whole; after capturing them they simply macerated them with the bill, ingesting their internal contents and discarding the exoskeleton beneath the nest. The behaviour of capturing bees at their nest may be related to the fact that sometimes nests in arboreal termite mounds and occasionally feeds on termites (Costa-Pereira et al., 2015; Marques et al., 2018; Sick, 1997).

Insects and their larvae are important foods for some psittaciform species, providing an extra supplement during periods of fruit and seed shortage (Barnett et al., 2018; Díaz & Peris, 2011; Taylor & Perrin, 2006). Insectivory can be generalized in African parrots, providing a protein supplement during periods of reduced fruit and seed availability (Symes & Perrin, 2003). The availability of food resources for parrots in Brazil shows strong seasonality, primarily reflected in plant fruiting. In different biomes, fruits and seeds tend to be more abundant during the wet season, while in the dry season a significant reduction of these resources is observed, leading parrots to diversify their diet and exploit alternative items such as flowers, shoots, and insects (Francisco & Galetti; 2002; Ragusa-Netto, 2006; Matuzak et al., 2008). Thus, insect consumption can be interpreted as an adaptive response to the seasonal shortage of plant resources.

Regarding the nutritional benefits acquired by the parakeets from this type of feeding, future studies incorporating a more detailed nutritional analysis would be of interest. Despite the numerous studies on the feeding ecology of psittacids, no reports of bee consumption by this bird family were found in the literature. This study provides the first record of *B. chiriri* feeding on stingless bees. The observed behavior highlights the remarkable dietary plasticity exhibited by some Psittacidae species.

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Figure 2. A Two individuals Parakeets, probably a couple, foraging in the studied *Trigona hyalinata* nest. Arrows show the holes made in the outer wall of the nest of *Trigona hyalinata* by the parakeets.

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Conflicts of interest

The author declares that there is no conflict of interest in the content of this publication.

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