

Nectar robbing behavior of the Horned Sungem Hummingbird (*Heliactin bilophus*) (Birds: Trochilidae) in two species plant the genus *Amphilophium* Kunth (Bignoniaceae) and *Sinningia* Nees (Gesneriaceae)

Breno Dias Vitorino^{1*}, Angélica Vilas Boas da Frota², Aldes Lamounier Pereira Andrade³

1. Biólogo (Faculdade de Filosofia, Ciências e Letras do Alto São Francisco). Mestrando em Ciências Ambientais (Universidade do Estado de Mato Grosso, Brasil).

2. Bióloga (Universidade de Cuiabá). Mestrando em Ciências Ambientais (Universidade do Estado de Mato Grosso, Brasil).

3. Biólogo (Faculdade de Filosofia, Ciências e Letras do Alto São Francisco).

*Autor para correspondência: vitorinobreno@gmail.com

ABSTRACT. The Horned Sungem Hummingbird (*Heliactin bilophus*) is a typical savannah hummingbird inhabiting opened phytophysiognomies in areas of Cerrado, Caatinga, highlands and plains with low vegetation. There are few studies about its feeding habits and little known about its behavior patterns. Here we report the bird feed behavior on two plant species *Amphilophium elongatum* and *Sinningia* sp. Through illegitimate visits to the floral nectary, *H. bilophus* obtained food acting as a nectar robber. This foraging strategy included new sources of food for the hummingbird and could represent negative effects to the related plant species.

Keywords: bird-flower interactions; food resources; floral visitor

Comportamento pilhador do beija-flor chifre-de-ouro (*Heliactin bilophus*) (Aves: Trochilidae) em duas espécies de plantas dos gêneros *Amphilophium* Kunth (Bignoniaceae) e *Sinningia* Nees (Gesneriaceae)

RESUMO. O beija-flor chifre-de-ouro (*Heliactin bilophus*) é uma espécie tipicamente savânica que habita fitofisionomias abertas em áreas de Cerrado, Caatinga, regiões serranas e chapadas com vegetação baixa. Existem poucos estudos sobre sua alimentação e pouco se sabe sobre seus padrões comportamentais. Aqui relatamos o comportamento alimentar da ave em duas espécies vegetais *Amphilophium elongatum* e *Sinningia* sp. Através de visitas ilegítimas ao nectário floral, *H. bilophus* obteve alimento atuando como pilhador. Esta estratégia de forrageamento inclui novas fontes alimentares para *H. bilophus* e pode representar efeitos negativos para as espécies vegetais relacionadas.

Palavras-chave: interação ave-flor; recurso alimentar; visitante floral.

Foraging strategies by Trochilidae enables the breeding success of plants and can guarantee higher genetic variability besides providing food for the floral visitor (ARAÚJO; OLIVEIRA, 2007; MACHADO, 2009). However, there are cases where the visitors do not act in the pollination, accessing only the nectar of the plant through holes made at the base of the external part of the flower going directly to the floral nectar. This usually happens when the hummingbird size and morphology are not compatible with the flower. This interaction to obtain food is known as nectar robbery (MACHADO; ROCCA, 2010).

Plants that uses hummingbirds for its own pollination often present specific characteristics, as flowers in the shape of tubes and pending, suitable to the capacity of hoover and long and thin bill, making a natural visit. While plants with long corolla prevents that visitors with short bills have accesses to the nectar (MACHADO, 2014), those been more robbed over the ones that presents small flowers (LARA; ORNELAS, 2011).

The species *Amphilophium elongatum* (Vahl) L.G. Lohmann is a plant from the Bignoniaceae family which occurs in *stricto sensu* Cerrado areas, riparian forest, rupestrian field, and secondary growth vegetation *capoeira* from north, west-center and southeast Brazil. It has an aroma strongly sweetish, with a colored cream corolla, internally yellowish and curved pipe down, attracting mainly bees as pollinators (SILVA et al., 2012; MACHADO; ROMERO, 2014).

With neotropical occurrence, the genus *Sinningia* Nees includes about 70 species of shrubs, subshrubs or tuberous herbs. In Brazil, its distribution is concentrated in the

Southeast. The flowers are pollinated by bats, bees and predominantly by birds. Among those pollinated by hummingbirds, the species that stand out are the ones with reddish and odorless flowers. They consist 67% of species of the genus (BARROSO et al., 1991; PERRET et al., 2001).

The Horned Sungem (*Heliactin bilophus*) (TEMMINK, 1820) is a typical savannah species, inhabits open phytophysiognomies in areas of Cerrado, Caatinga, highlands and plains with low vegetation. They occur in the Southeast, Midwest, Northeast and Northern Brazil, Bolivia and Suriname. The species presents sexual dimorphism, male with a crest forming a red-gold horn format and black throat. Female without horn, with brown throat and smaller tail (SICK, 1997).

Research on bird-flower interaction represents a rich field in Ecology, regarding both ecological and evolutionary aspects. The understanding such relationships is becomes indispensable to species conservation (MENDONÇA; ANJOS, 2003). However, few studies addressed the feeding habits of *H. bilophus* and little knows about their behavioral patterns. Therefore, the present work has the aim to report de nectar robbery behavior of *H. bilophus* at *A. elongatum* and *Sinningia* sp..

The visits records to the species *A. elongatum* made on 5th February 2014, in a *stricto sensu* Cerrado area, at the municipality of Rondonópolis, Southeast of Mato Grosso state. A *H. bilophus* female was observed visiting the flower three times (Figure 1). On each one of the visits the bird invested sequentially from three to four times at a hole located just after the receptacle, accessing the plants nectar (Figure 2).



Figure 1. Female of *Heliactin bilophus* nectar robbing of *Amphilophium elongatum*, municipality of Rondonópolis, Mato Grosso state, Brazil (Photo: B.D.V., 2014). / **Figura 1.** Fêmea de *Heliactin bilophus* pilhando *Amphilophium elongatum*, município de Rondonópolis, estado de Mato Grosso, Brasil (Foto: B.D.V., 2014).



Figure 2. Hole used by *Heliactin bilophus* during foraging tactic to obtain nectar in *Amphilophium elongatum*, (indicated by the red circle), municipality of Rondonópolis, Mato Grosso state, Brazil (Photo: B.D.V., 2014). / **Figura 2.** Orifício utilizado por *Heliactin bilophus* durante tática de forrageamento para obtenção de néctar em *Amphilophium elongatum* (indicado pelo círculo vermelho), município de Rondonópolis, estado de Mato Grosso, Brasil (Foto: B.D.V., 2014).

The visit at *Sinningia* sp. was record on the 22nd January 2015 in a *stricto sensu* Cerrado area with pasture influence, at the municipality of Paracatu, Northwest of Minas Gerais. On the occasion, was observed a male of *H. bilophus* accessing the nectar trough a role next to the sepals of three plants flowers (Figure 3).



Figure 3. Male of *Heliactin bilophus* nectar robbing a species of the genus *Sinningia* sp., municipality of Paracatu, Minas Gerais state, Brazil (Photo: A.L.P.A., 2015). / **Figura 3.** Macho de *Heliactin bilophus* pilhando espécie do gênero *Sinningia* sp., município de Paracatu, estado de Minas Gerais, Brasil (Foto: A.L.P.A., 2015).

On both cases reported, it was not possible watch if the bird was responsible for the opening of the holes, that could have been made by the hummingbird, as well as another bird or even some insect such as *Trigona spinipes* (LÍRIO et al., 2001; CARVALHO et al., 2007; COSTA; MORAIS, 2008; PARRINI; RAPOUSO, 2010). Similar tactic as the one adopted by *H. bilophus* was reported for other Trochilidae, where birds with short bill in relation to the morphology of some flowers were frequently observed obtaining nectar by perforation of the base of the corollas (MENDONÇA; ANJOS, 2005).

At certain environments, the hummingbird community may present a flexibility on their strategies of behavior or expected seasonal patterns, and also for being able to explore non-ornithophilous resources. Thus, the availability of nectar associated with the species *Amphilophium elongatum* and *Sinningia* sp. may serve as an important food supply for *H. bilophus* in a period of scarcity of floral resources (MACHADO, 2014).

Some studies mentioned *H. bilophus* consuming floral resources from several species, such as: *Palicourea rigida* (Rubiaceae), *Bauhinia tenella* (Caesalpinoideae), *Cuphea linarioides* (Lythraceae) (GHIRINGHELLO; TUBELIS, 2009), *Zeyheria Montana* (Bignoniaceae), *Calliandra sincorana* (Nephrolepidaceae), some of them exclusively visited by the hummingbird in a small Cerrado area in Northeast Brazil: *Dyckia dissitiflora* (Bromeliaceae), *Sida angustissima* (Malvaceae) and *Lippia* cf. *gracilis* (Verbenaceae) (MACHADO, 2014). All these are legitimate visits.

Data involving the illegitimate visits of *H. bilophus* and its interaction with the species *A. elongatum* and *Sinningia* sp. were not documented until now. Both in *A. elongatum* and in *Sinningia* sp., the bird accessed floral nectaries without entering in contact with the reproductive system of the flowers, therefore characterizing as robbery.

The process of robbing at elevated frequency and intensity could decrease significantly the availability of nectar, and alter in a negative manner the visit rate of pollinators (MALOOF; INOUE, 2000; CASTRO et al., 2008). Visits at low frequency do not change directly in the production of seeds. However, the presence of the robbing hummingbirds suggests competition with the legitimate groups of visitors, as observed in *Passiflora speciosa* (Passifloraceae) (LONGO; FISCHER, 2008). Besides those factors, González-Gomes and Valdivia (2005) point out that the robber could also damage the floral nectary, so preventing the replenishment of nectar by the vegetal species.

It is noteworthy that if it were not for the process of robbing, *H. bilophus* possibly would not be able to access the nectar of those plants, due to incompatibility of the species with the morphology of flowers. This strategy of foraging includes new feeding sources for the bird besides to be able to represent negative effects for the referred vegetal species.

Acknowledgment

Thanks to the Cia Ambiental for the logistic support, and to Marcus Canuto for helping on the translation of this manuscript.

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