



FIRST REPORT OF NECTAR ROBBING BY SWORD-BILLED HUMMINGBIRDS *ENSIFERA*

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Abstract · A growing number of hummingbird species are known to practice nectar robbing. Hummingbirds that rob nectar tend to have short bills and to rob flowers with tubular corollas that are so long they prevent the birds from accessing nectar through the floral openings. Here, we document that Sword-billed Hummingbirds *Ensifera ensifera*, which have the longest bills of any hummingbird species, are secondary nectar robbers on flowers of the red angel's trumpet *Brugmansia sanguinea*, which have long tubular corollas and are regularly pollinated by Sword-billed Hummingbirds. When obtaining nectar through the floral opening of *B. sanguinea*, Sword-billed Hummingbirds sometimes probe so far into the corolla that their heads are completely enveloped by the flower, which would severely limit their vision. Sword-billed Hummingbirds that feed on *B. sanguinea* flowers might be at a lower risk of predation when they rob nectar than when they insert their heads into the floral opening. Thus, nectar robbing in this species might function to reduce predation risk, although we have no data to support this speculation.

Resumen · Primer reporte de robo de néctar por el colibrí pico espada *Ensifera ensifera*

Se sabe que un número creciente de especies de colibríes practican el robo de néctar. Los colibríes que roban néctar tienden a tener picos cortos y a robar flores con corolas tubulares tan largas que impiden que las aves accedan al néctar a través de las aberturas florales. Aquí, documentamos que los colibríes pico de espada *Ensifera ensifera*, que tienen los picos más largos de todas las especies de colibríes, son ladrones de néctar secundarios en las flores de la trompeta del ángel rojo *Brugmansia sanguinea*, las cuales tienen corolas tubulares largas y son polinizadas regularmente por colibríes pico de espada. Cuando obtienen el néctar a través de la abertura floral de *B. sanguinea*, los colibríes pico espada a veces hurgan tanto en la corola que sus cabezas quedan completamente envueltas por la flor, lo que limitaría severamente su visión. Los colibríes pico espada que se alimentan de las flores de *B. sanguinea* pueden correr un menor riesgo de depredación cuando roban el néctar que cuando insertan la cabeza en la abertura floral. Por lo tanto, el robo de néctar en esta especie podría funcionar para reducir el riesgo de depredación, aunque no tenemos datos que respalden esta especulación.

Key words: *Black Flowerpiercer* · *Brugmansia sanguinea* · Ecuador · Predation risk.

INTRODUCTION

More than 30 species of hummingbirds have been reported to be secondary robbers that steal nectar through holes in flowers made by primary robbers such as flowerpiercers *Diglossa* spp. and bees (Marks et al. 2023). Hummingbirds that rob nectar tend to have short bills and to rob flowers with corollas that are too long for the birds to obtain nectar through the floral opening (Lara & Ornelas 2001, Igić et al. 2020, Marks 2021). Not surprisingly, nectar robbing has not been reported in hummingbird species with especially long bills (Irwin et al. 2010, Marks et al. 2023).

The Sword-billed Hummingbird *Ensifera ensifera* is a large trochilid (10–12 g; King 1991, Echeverry-Galvis et al. 2005) with an extraordinarily long bill (90–110 mm; Züchner & Kirwan 2020). It occurs in humid and semi-humid montane forest and edge habitats from 1,700–3,600 m a.s.l. in the Andes from western Venezuela south through Colombia, Ecuador, and Peru to north-central Bolivia (Schulenberg et al. 2010, Züchner & Kirwan 2020). With such a long bill, this species would not be expected to rob nectar, and several studies of its foraging behavior reported that it was a “legitimate” visitor that fed solely through the floral openings of the flowers it frequented (e.g., Snow & Snow 1980, Lindberg & Olesen 2001, Pelayo et al. 2011, Soteras et al. 2018). Moreover, the Sword-billed Hummingbird has coevolved with a host of plants (e.g., *Passiflora* spp., *Aetanthus* spp., *Tacsonia* spp., and *Brug-*

Table 1. Documented cases of Sword-billed Hummingbirds robbing nectar from flowers of red angel's trumpet *Brugmansia sanguinea*.

Date	Observer	Location	Elevation (m)	Primary robber
1 Sep 1998	Martin Reid	Napo Prov., Ecuador	3,300	Black Flowerpiercer
24 Oct 2017	Mélanie Raymond	Napo Prov., Ecuador	3,340	Not reported
17 Mar 2018	Randy Vickers	Napo Prov., Ecuador	3,230	Black Flowerpiercer

mansia spp.) whose flowers have tubular corollas that are so long, no other hummingbirds can feed through the floral openings and pollinate the flowers (Lindberg & Olesen 2001, Abrahamczyk et al. 2014, Soteras et al. 2018). The specialized coevolutionary relationships between *E. ensifera* and the flowers it pollinates very likely would not be maintained if the hummingbirds robbed nectar from these flowers at a high rate. Here, we provide the first documentation of nectar robbing by Sword-billed Hummingbirds and suggest that the behavior functions, in part, to reduce predation risk during foraging bouts. Nectar robbing by *Ensifera* apparently is quite rare and almost surely does not weaken coevolutionary relationships with the plants it pollinates.

RESULTS AND DISCUSSION

JSM examined photographs in databases of the Macaulay Library (2023; N = 3,360) and iNaturalist (2023; N = 511) for evidence of nectar robbing by Sword-billed Hummingbirds. He found three instances of nectar robbing (see Figures 1A, 1B) and contacted each of the photographers. Two of them, MR and RV, confirmed that the hummingbirds were robbing nectar through holes made by a Black Flowerpiercer *Diglossa*

humeralis; the third, Mélanie Raymond, did not see any primary nectar robbers in the area. Each event occurred in Napo Province, Ecuador, at elevations that ranged from 3,200–3,350 m a.s.l. (Table 1). Also in each case, the plant species whose flowers were robbed was red angel's trumpet *Brugmansia sanguinea*, which has long red-and-yellow flowers (mean corolla length = 172.6 mm) and is pollinated exclusively by Sword-billed Hummingbirds (Soteras et al. 2018). When not robbing nectar, Sword-billed Hummingbirds sometimes feed so far into the opening of a *B. sanguinea* flower that their heads are completely enveloped by the corolla (Figures 2A, 2B). In these cases, the birds' vision is completely obstructed while they feed.

Ours is the first report of nectar robbing by Sword-billed Hummingbirds and brings the number of hummingbird species known to be secondary nectar robbers to 35 (Marks et al. 2023). Nectar robbing by Sword-billed Hummingbirds appears to be rare and thus far is known only when birds feed on *B. sanguinea*, whose tubular flowers are among the longest of any plant on which Sword-billed Hummingbirds feed (Soteras et al. 2018: Figure 1).

In nearly all reports of nectar robbing by hummingbirds,



Figure 1. Sword-billed Hummingbirds robbing nectar from flowers of red angel's trumpet *Brugmansia sanguinea* in Napo Province, Ecuador, on 24 October 2017 (A) and 17 March 2018 (B). Photos by Mélanie Raymond (A) and Randy Vickers (B).

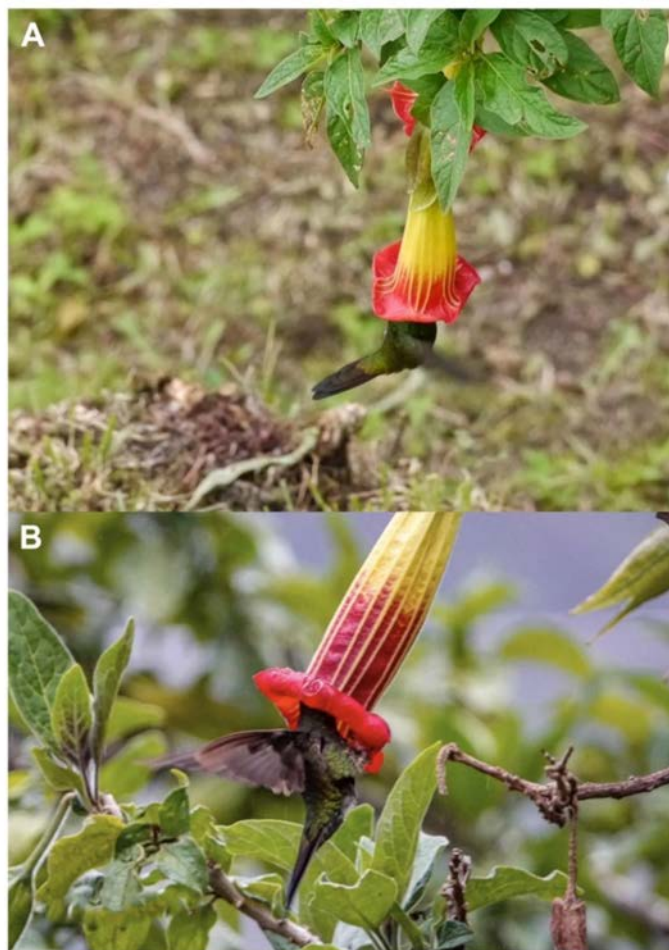


Figure 2. Sword-billed Hummingbirds feeding legitimately through the floral opening of *Brugmansia sanguinea* flowers in Departamento de Cundinamarca, Colombia, on 10 October 2016 (A) and in Napo Province, Ecuador, on 17 March 2018 (B). Photos by Juan Carlos Pachón (A) and Randy Vickers (B).

robbing is restricted to flowers whose corollas are too long for the birds to access nectar through the floral opening. Occasionally, hummingbirds have been reported to rob nectar from the same species of flower on which they also feed through the floral opening (McDade & Kinsman 1980, Lara & Ornelas 2001), but in all such reports, the hummingbirds appeared to be primary versus secondary nectar robbers. Why would Sword-billed Hummingbirds feed legitimately and rob nectar from the same species of flower? One possibility is that the birds are at a lower risk of predation when they rob nectar than when they feed so far into the floral opening that their vision is obstructed by the corolla. Another possibility is that Sword-billed Hummingbirds extract nectar more efficiently when robbing *B. sanguinea* flowers than when feeding through the floral opening.

Our results call into question the conventional wisdom that nectar robbing by hummingbirds is restricted to short-billed species, and we suspect that the number of hummingbird species that rob nectar is much larger than that reported by Marks et al. (2023). We found no information about predation on Sword-billed Hummingbirds or on how their maneuverability—and thus vulnerability to predators—might be compromised by their long bill. We also found no data on the efficiency of nectar extraction when hummingbirds feed legitimately through the floral opening versus when they rob nectar. Some bees have been reported to obtain nectar more efficiently when robbing than when feeding through the floral

opening (Free 1968, Dedej & Delaplane 2005), but we are not aware of similar reports for avian nectar robbers. In the absence of data on predation of foraging Sword-billed Hummingbirds, our suggestion that nectar robbing functions to reduce their risk of predation is speculative but worthy of attention. Additional observations of foraging Sword-billed Hummingbirds may reveal that they rob plant species other than *B. sanguinea*, which could shed light on additional reasons for nectar robbing.

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