

# Notes on the Foraging of the Rufous-tailed Hummingbird in an Urban Area of the Colombian Caribbean

Notas sobre la alimentación del *Amazilia colirrufo* en una zona urbana del Caribe colombiano

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## Abstract

Here we present a summary of interaction records between the Rufous-tailed Hummingbird, *Amazilia tzacatl* and a variety of flowering plants in the urban area of Cartagena, Colombia. Observations were conducted using point count methodology. The list includes twelve plant species, most of them native. All recorded flowering plants are newly documented resources for this species and are distributed within its historical range.

**Key words:** flowering plants, hummingbirds, natural history, urban ecology, wildlife records

## Resumen

Presentamos un resumen y análisis de los registros de interacción del *Amazilia colirrufo* (*Amazilia tzacatl*) con diversas plantas con flores en el área urbana de Cartagena, Colombia. Las observaciones se llevaron a cabo mediante la metodología de conteo por puntos. La lista incluye doce especies de plantas, en su mayoría nativas, todas ellas nuevas en la dieta registrada de la especie.

**Palabras clave:** colibríes, ecología urbana, historia natural, plantas con flores, registros de fauna silvestre

Cities can harbor high levels of biodiversity (Alvey 2006). The native vegetation, understory vegetation, and the conservation of large trees can help the management of biodiversity in urban spaces (Threlfall *et al.* 2016). Effective management strategies aim to enhance biodiversity across all components of the urban natural areas, including street trees and parks, which often support a large proportion of species found in natural ecosystems (Alvey 2006). These natural areas in the cities can support not only local but also migratory species (Jokimäki & Suhonen 1998, Carbó-Ramírez & Zuria 2011, Jokimäki *et al.* 2022). Urban ecology studies show that a single species of bird can use up to 27% of the plant species for foraging and feeding in an area of eight hectares (Caicedo-Argüelles & Cruz-Bernate 2014). A single species of flowering plant can interact with more than six species of birds, particularly specialized pollinators—like hummingbirds and non-hummingbirds—which often exhibit strong and significant relationships within urban environments (Baza Mendonça & dos Anjos

2006).

The Rufous-tailed Hummingbird (*Amazilia tzacatl* de la Llave, 1833) is a medium-sized trochilid, measuring approximately ten centimeters in length (Hilty & Brown 2001), that lives in forest borders, secondary forests, gardens, and open areas (Reich 2020). It is characterized by a vibrant green coloration on the crown, back, flanks, and neck, contrasting with a pale gray belly, brown tail, and grayish wings. Its bill is red with a black tip and is nearly straight, adapted for nectar foraging and insect hunting (Hilty & Brown 2001, Reich 2020). In addition to hovering for floral nectar, it actively hunts small arthropods through short aerial flights within foliage, branches, and even spider webs (Hilty & Brown 2001). *A. tzacatl* is distributed from North America to northern South America, with reports that include the southeast part of Mexico, the north of Guatemala, Honduras, Belize, northwest of Venezuela, west of Ecuador and lowlands of the Caribbean coast of Colombia (Reich 2020). The

species generally occurs from sea level to 2,500 m, reaching up to 1,800 m in Colombia (Hilty & Brown 2001, Ridgely & Greenfield 2001).

We present a list of records of interactions between the Rufous-tailed Hummingbird and the flowering plants of an urban area of the Colombian Caribbean in June, July, and September 2017. The study was conducted in the District of Cartagena de Indias, capital city of the Bolívar Department, localized on the Caribbean coast, northern Colombia (10° 26' N, 75° 33' W). The city has an average altitude of two meters above sea level and has a mean annual temperature of 32 °C with a mosaic of ecosystems characteristic of the Colombian Caribbean lowlands, such as tropical dry—*e.g.* Cerro de la Popa, Cerro de Albornoz, Loma de Marion (Martelo Tirado, 2016)— and mangrove forest—*e.g.* Parque Espiritu del Manglar—, thorn scrub, marshes, and coastal environments including sandy beaches and rocky shores (Programa de las Naciones Unidas para el Medio Ambiente (PNUMA) 2009). It covers 60,900 hectares, with 7,590 ha classified as urban land and 53,310 ha as rural land (Programa de las Naciones Unidas para el Medio Ambiente (PNUMA) 2009). The sampling was conducted in the green areas also known as greenspaces (Taylor & Hochuli 2017), defined for this study as vegetated spaces like parks, gardens, sports fields, pedestrian corridors, and urban wastelands. Records were taken by a single observer in the mornings and afternoons, using point-counts (Ralph *et al.* 1996). Each point lasted five minutes was sampled twice. The number of points per site was proportional to its size (area > 7,000 m<sup>2</sup> included multiple point), for a total of 82 points. Every point had a vegetation plot with a radius of 25m, where the interactions of hummingbird-flowering plants were recorded. After the record, a part of every plant species was collected or photographed for their taxonomic identification.

Overall, we recorded 21 Rufous-tailed Hummingbird visiting 12 species of flowering plants, mainly from trees and small trees (Table 1; Fig. 1), eight of the total species of plants were native, while the remaining four were exotic. Seven interactions were recorded in September, six in July, and four in June. These interactions were recorded in 14 vegetation plots of 25



**Figure 1.** Four of the twelve species recorded for the Rufous-tailed hummingbird (A) *Cascabela thevetia* (L.) Lippold 1980 (B) *Samanea saman* (Jacq.) Merr. 1916 (C) *Morisonia odoratissima* (Jacq.) Christenh. & Byng (2018) (D) *Pachystachys lutea* Nees 1847. Photographs: Hayder D. Ramos-Guerra.

m radius —equals to 0,0275 km<sup>2</sup>—, in a total area sampled of 35.8 ha (3,58 km<sup>2</sup>) approximately, 70% of the city's green areas, a total of 51,1 ha (5,11 km<sup>2</sup>) of green areas by the time of the sampling.

The natural history of the Rufous-tailed Hummingbird has been described by several authors who have documented its interactions with a wide range of floral resources —32 species of plants have been recorded (Table 2)— and ecosystems throughout its distribution. Most studies have focused on these interactions in natural ecosystems, open habitats, and agricultural landscapes.

The records of the species in urban environments and their interactions with ornamental or spontaneous flowering plants remain limited. Skutch (1931) documented visits to *Hibiscus sinensis* (updated name *Hibiscus rosa-sinensis*), *Thunbergia* sp., and *Clitoria* sp. in gardens, hedgerows, yards, and town plazas in Panama and Honduras. Similarly, Borrero (1965) reported visits to *Thunbergia grandiflora* and species of the genus *Allamanda* in urban areas of Medellín, Colombia. The plant species documented in Cartagena are represent novel additions to the known

**Table 1.** Records of the Rufous-tailed Hummingbird in the study area. Type: 1-Tree, 2-Small tree, 3- Shrub, 4- herbaceous shrub, 5- Liana. Distribution: 6- Native, 7-Species of the Tropical Dry Forest, 8-Exotic/Introduced. All species are categorized as Least Concern (LC).

Plant Species	Type	N. of Ind.	Date	Latitud	Longitud	Area
<i>Amazilia tzacatl de la Llave, 1833</i>						
<i>Samanea saman</i> (Jacq.) Merr. (1916)	1, 6, 7	1	30/06/2017	10°22'55.57"N	75°29'46.52"O	Campestre
<i>Samanea saman</i> (Jacq.) Merr. (1916)	1, 6, 7	1	22/09/2017	10°25'21.29"N	75°32'50.07"O	Centro Historico
<i>Morisonia odoratissima</i> (Jacq.) Christenh. & Byng (2018)	2, 6, 7	2	30/06/2017	10°22'51.60"N	75°30'1.07"O	Campestre
<i>Morisonia odoratissima</i> (Jacq.) Christenh. & Byng (2018)	2, 6, 7	3	10/07/2017	10°24'16.71"N	75°31'6.66"O	Bruselas
<i>Pachystachys lutea</i> Nees (1847)	3, 6, 7	1	4/07/2017	10°23'17.90"N	75°29'44.61"O	Admirante Colón
<i>Fridericia</i> sp. Mart.	5, 6, 7	1	11/07/2017	10°26'15.73"N	75°31'16.56"O	Daniel Lemaitre
<i>Cascabela thevetia</i> (L.) Lippold (1980)	2, 6, 7	1	11/07/2017	10°26'15.73"N	75°31'16.56"O	Daniel Lemaitre
<i>Crescentia cujete</i> L. (1753)	1, 6, 7	1	26/09/2017	10°25'50.22"N	75°32'2.58"O	Torices
<i>Heliconia psittacorum</i> L.f. (1782)	4, 6	1	26/09/2017	10°25'41.20"N	75°32'31.47"O	Espirito del Manglar
<i>Crescentia cujete</i> L. (1753)	1, 6, 7	1	27/09/2017	10°23'36.41"N	75°29'26.52"O	Tacarena
<i>Delonix regia</i> (Bojer ex Hook.) Raf., (1837)	1, 8	1	29/06/2017	10°23'10.07"N	75°28'38.09"O	El Socorro
<i>Ixora coccinea</i> L. (1753)	3, 8	2	30/06/2017	10°22'56.28"N	75°30'15.81"O	Santa Clara
<i>Morinda citrifolia</i> L. (1753)	2, 8	1	1/07/2017	10°25'13.42"N	75°33'7.80"O	Centro Historico
<i>Morinda citrifolia</i> L. (1753)	2, 8	1	2/07/2017	10°26'33.73"N	75°31'28.80"O	Crespo
<i>Moringa oleifera</i> Lam. (1785)	3, 8	1	21/09/2017	10°23'20.52"N	75°28'26.86"O	La Concepción
<i>Moringa oleifera</i> Lam. (1785)	3, 8	1	30/09/2017	10°23'35.26"N	75°29'49.44"O	Los Calamares
<i>Cordia sebestena</i> L. (1753). 2, 6		1	30/09/2017	10°23'37.16"N	75°29'41.90"O	Country

floral resources used by Rufous-tailed Hummingbird, not only in urban environments, but also in its natural habitats. The native species listed (Table 1), are typical of the critically threatened tropical dry forest biome, (Gentry *et al.* 2009, Pizano & García 2014, Bernal *et al.* 2017), while four others are classified as introduced (Torres-Morales *et al.* 2022).

The presence of native species within urban green areas may act as ecological bridges connecting the flora of the city to nearby forest remnants, especially in an endangered ecosystem (Londoño-Lemos *et al.* 2022). Such connectivity may support not only avian diversity, but also the genetic flow among native plants by increasing the chance of pollination, potentially aiding the conservation of endangered flora (Ives *et al.* 2016). Although a flower visit does not compromise effective pollination (Ne'eman *et al.* 2009).

González-Lagos & Quesada (2017) introduced the urban dweller and urban explorer concepts, building upon the framework of urban ecology proposed by Blair (1996). This concept emphasizes that certain species, including ecological specialists —*e.g.*,

bananaquits—, can only persist in urban environments when sufficient and suitable vegetation is present. However, to apply this concept, the availability of specific floral resources is valuable for maintaining viable populations (MacGregor-Fors & Schondube 2011); as well as the daily range, often used in mammal and camera trap studies. This emphasizes the movement and activity of species within a specific area, measures the species' space requirements, which are influenced by resources and food availability —*e.g.*, nectar—, and it describes how, where, and the distance a species moves (Garland 1983, Carbone *et al.* 2005, Rowcliffe *et al.* 2016). In this sense, urban green areas should either reflect the structure and composition of nearby natural ecosystems or harbor a high diversity of flowering plants to support specialist species. On top of that, in the case of endangered plants, the presence of specialized pollinators, hummingbirds, can favor their persistence within city landscapes. However, to ensure long-term conservation, it is essential to maintain ecological connectivity between urban populations and those in surrounding natural habitats, thus preserving genetic diversity through ongoing gene flow. Some studies have shown that feeders can facilitate the movement

**Table 2.** Historical records of the plant species used by the Rufous-tailed Hummingbird.

Author	Species, Type of Habitat and Country
Skutch (1931)	<i>Hibiscus sinensis</i> Mill. (1768); <i>Thunbergia</i> sp. Retz. (1780); <i>Clitoria</i> sp. L. (1753); <i>Musa</i> × <i>paradisiaca</i> L. (1753). Gardens, hedges, yards, towns plazas and banana crops, Panama and Honduras.
Borrero (1965)	<i>Thunbergia grandiflora</i> Roxb. (1820); <i>Allamanda</i> sp. L. (1771), urban area of Medellín, Colombia.
Wolf (1970)	<i>Genipa americana</i> L. (1759); <i>Bromelia pinguin</i> L. (1753), tropical dry forest, Costa Rica.
Primack & Howe (1975)	<i>Stachytarpheta jamaicensis</i> (L.) Vahl (1804), premontane Wet Forests, Costa Rica.
Snow & Snow (1980)	<i>Musa</i> × <i>paradisiaca</i> L. (1753); <i>Canna indica</i> L. (1753); <i>Psammisia penduliflora</i> (Dunal) Klotzsch (1851); <i>Cavendishia pubescens</i> Britton (1893); <i>Hamelia patens</i> Jacq. (1760); <i>Calliandra purdiei</i> Benth. (1846); <i>Eugenia jambos</i> L. (1753), montane cloud forests, Colombia.
Dearborn (1998)	<i>Hamelia patens</i> Jacq. (1760), grassy clearing of the Atlantic lowlands, Costa Rica.
Arias-Campos & Umaña-Céspedes (2016)	<i>Souroubea sympetala</i> Gilg (1898), riparian forest, Costa Rica.
Izquierdo-Palma <i>et al.</i> (2021)	<i>Aechmea bracteata</i> (Sw.) Griseb. (1864); <i>A. tillandsioides</i> (Mart. ex Schult. & Schult.f.) Baker (1879); <i>Catopsis berteroniana</i> (Schult. & Schult.f.) Mez (1896); <i>Heliconia latispatha</i> Benth. (1846); <i>H. librata</i> Griggs (1903); <i>Psychotria poeppigiana</i> Müll.Arg. (1881); <i>Androlepis skinneri</i> (K.Koch) Brongn. ex Houliet (1870), evergreen tropical rainforest, Mexico.
Hernández-Barbosa (2021)	<i>Tillandsia heliconioides</i> Kunth (1816); <i>Centropogon granulatus</i> C.Presl (1836); <i>Guzmania donnellsmithii</i> Mez ex Donn.Sm. (1903); <i>Palicourea padifolia</i> (Willd. ex Schult.) C.M.Taylor & Lorence (1985); <i>Bomarea hirsuta</i> (Kunth) Herb. (1837); <i>Hoffmannia dotae</i> Standl. (1928); <i>Passiflora vitifolia</i> Kunth (1817); <i>Salvia carnea</i> Kunth (1818); <i>Diastema racemiferum</i> Benth. (1845); <i>Calathea crotalifera</i> S.Watson (1889), premontane wet forests, Costa Rica.

of species between forest remnants, enhancing pollination and enabling connectivity across distances of up to 500 meters (Kormann *et al.* 2016), facilitating species colonization to new sites even under higher housing density (Brooks & Gillen 2006, Greig *et al.* 2017). Moreover, the occurrence of more flowering plants inside the cities could benefit the presence of the species of hummingbirds. In this sense, the native or ornamental vegetation (Wood & Esaian 2020), cultivated and maintained in urban natural landscapes, can increase the hummingbird species movement and possible pollination, favoring ecosystem services and urban sustainability.

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