

**Patterns in the foraging time of Eastern Caribbean
Hummingbirds as a function of sucrose concentration**

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Abstract

Three species of hummingbirds persist around the Springfield station area on the island of Dominica. I selected two separate locations around the Springfield station area to place hummingbird feeders with two different concentrations of sucrose. Through several observations, foraging times and preference were determined. As a result, only two of the three species demonstrated a statistically significant relation between concentration and foraging time, although all three species most frequently visited the higher concentration feeders.

Introduction

Throughout the Archbold research center located at Springfield Station, Dominica, W.I.; three species of hummingbirds occur: Green-throated Carib (*Sericotes holosericeus*), Purple-throated Carib (*Eulampis jugularis*) and the Antillean Crested hummingbird (*Orthorhyncus cristatus*). Due to their high metabolic rate and small size (between 3-8 in.), these three species of hummingbirds must utilize every opportunity to get the most nutrients out of every foraging event. By providing two different concentrations of sucrose, each at two distinct locations, I will attempt to statistically determine if these species forage at the higher concentration solution. I hypothesize that both the Purple and Green-throated hummingbirds will forage more frequently at the higher sucrose concentration due to their large size and higher energy demands, compared to the Antillean Crested hummingbird.

Materials and Methods

Materials:	(2) 32 oz. Containers	Stopwatch
	Measuring Cup	Binoculars
	Sugar	Note-taking material
	Water	Masking tape

Methods:

I prepared two sucrose solutions, one containing 1 cup of sugar and the other containing ½ a cup of sugar. Each was poured into a 32-oz. bottle and mixed with 4 cups of water. Two of the four bird feeders were labeled “1/2 cup” with masking tape, while the other feeders were labeled “1 cup”. Each solution was poured into its labeled bird feeder. At the fieldstation in Springfield, one feeder of each concentration was placed on a tree branch 1 foot apart. The other two feeders were positioned underneath the cover of a tree at the Springfield Station Streamhouse; both feeders were also positioned one foot apart. Four, 2-hour observations and six, 1½-hour observations were conducted between June 9th and June 14th, with five observations taking place in the morning and five taking place in the afternoon. The observation distance at the fieldstation was 36 ft. and 18 ft. at the Streamhouse location. The following data were recorded for each feeding event: Time/Date, Concentration, Species, Duration and Other/Comments.

Results

In presenting my results, I will first present the data on percent observations at each concentration for all three species. They are as follows:

Green-throated Carib	.05 avg.=17.2 %	1.0 avg.=82.8%
Purple-throated Carib	.05 avg.=19.4%	1.0 avg.=80.6%
Antillean Crested H.bird	.05 avg.=8.3%	1.0 avg.=91.7%

Next, **Table 2** lists the summary of averages for foraging times at each of the two concentrations.

Table 2. Foraging times in seconds for the three species of hummingbirds on the full sucrose concentration and the half concentration. Number of observations in parenthesis.

<u>Species</u>	<u>.05</u>	<u>1.0</u>
Crested Male	2.0(1)	9.2(33)
Crested Female	2.7(3)	5.6(11)
All Crested	2.5(4)	8.3(44)
Green-throated	4.8(5)	16.3(24)
Purple-throated	5.0(6)	10.2(25)

Data were analyzed separately for each of the species. A linear regression was run for each species the StatView analysis program. The regression will determine if there is a significant linear increase in time spent foraging as a function of sucrose concentration. Chart 1 lists the results for Antillean Crested hummingbirds, Chart 2 list the results for Green-throated Caribs and Chart 3 list the result for Purple-throated Caribs.

Discussion

As a result of my observations and findings, my hypothesis is negated only for Purple-throated Caribs due to the .1661 p-Value for the regression results. It seems apparent that at a 91.7% 1.0 solution preference, the Antillean Crested hummingbird excels as the species that forages more frequently at higher concentrations. The data clearly shows that all species visit the higher concentration more frequently. The data also shows that all species average more time at the higher concentration. Overall, the results show that for two of the three species, there is a significant relation between concentration and time. Although topics in behavioral ecology might shed some light on my findings, time constraints made it unable for me to scientifically provide a legitimate explanation. One probable explanation might be hierarchy among bird species. The support behind this alternative explanation comes from one of my observations. On the afternoon of June 9th, a purple-throated carib approached the 1-cup feeder located at the Springfield Streamhouse. After feeding for two seconds, a Bananaquit (*Coerba flaveola*) approached. After both flew around the feeder in an obvious aggressive behavior, the Bananaquit flew away and the purple-throated carib continued feeding for three more seconds. From that observation, the understanding that the Bananaquit is superior due to its larger size, is certainly questionable.

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