

Anole Density and Biomass in Dominica

TAMU Study Abroad

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Abstract

The genus *Anolis*, commonly known as Anoles, are small lizards largely restricted to the Neotropics. Scientific surveys conducted by our team have suggested trends in population density and biomass. It appears from this research that larger populations of anoles occur in dryer habitats, while moist habitats displayed smaller populations.

Introduction

Anolis occulatus is an endemic species on Dominica. Throughout the island of Dominica, the anole population varies with differing habitats. The focus of this study is to assess anole biomass and population density as a function of habitat. Anoles were collected between May 31 and June 12, 2002 in three different habitats: dry forest, primary rainforest, and secondary rain forest. Data on temperature and relative humidity were collected in conjunction with each survey. The hypothesis is that population density would be higher in dryer habitats.

Materials

Kestrel 3000 weather meter
Tape measure
Scale
Click counter

Methods

Data were collected by the transect method. Each transect was 457.2 meters in length and 3 meters wide. A standard of .6 meters per pace was used and verified by walking three preliminary transects of known length and averaging the number of paces. Nine transects were walked on three trails, with two members on the left and two members on the right focused on their respective trail edges. A fifth group member tailed the team and counted paces and anoles spotted. Transects were all performed in the afternoon to early evening. The sites chosen for these transects were Mt. Joy (secondary rainforest), Middleham Falls (primary forest), and Cabrits National Park (dry forest).

Mt. Joy is a secondary rainforest habitat located near the Archbold Tropical Research Center. Secondary rainforest occurs where original vegetation has previously been cut for agricultural purposes, and the annual rainfall is 4445-7620 millimeters (mm) per year. The three transects performed at Mt. Joy were done on the same portion of the

trail at an elevation of 700 m. They were performed on three different dates: May 31 at 2:00 p.m., June 4 at 1:30 p.m., and June 9 at 4:15 p.m.

Middleham Falls is a primary rainforest habitat located in Mornes Trois Pitons National Park east of the Archbold Tropical Research Center. The annual rainfall is 4445-7620 mm per year. The primary rainforest has many ferns, woody vines, and epiphytes. Tree heights can be greater than 30 m. The three transects were walked at an elevation of 690 m on the same day at 2:30 p.m., 3:00 p.m., and at 3:30 p.m. along different portions of the trail.

Cabrits is a dry scrub woodland forest located on the northwest Caribbean coast. The annual rainfall is 1524-1778 mm per year, and the vegetation consists of small leathery leafed plants, many plants with thorns, and trees averaging less than 9 m in height. Three transects were walked along separate trails at Cabrits at an elevation of 185 m. On the 3rd of June the West Cabrits trail was walked at 1:30 p.m. On the 7th of June the East Cabrits trail was walked at 4:00 p.m. and the East Battery trail was walked at 5:00 p.m.

For measurement of biomass in different areas, random samples of anoles were hand captured and their weights were cataloged with respect to their habitats. Weights of anoles may be biased towards slower moving anoles, which were easier to catch. Midway through each transect numerous weather measurements were recorded with the aid of a Kestrel instrument, including temperature, heat index, humidity, wind velocity, and wind chill.

After all of the data was collected, density was calculated by multiplying the length of the transect by the width of the transect. This gave us the area of the transect: 1393.5 square meters. This was divided into 10,000 square meters, or one hectare, and multiplied by number of anoles seen to give anoles per hectare.

Results

Table 1 – Anoles Collected by Habitat

HABITAT	DATE	TIME	ANOLES	DENSITY (anoles per hectare)
Mt. Joy	5/31/02	2:00-3:15	5	35.9
	6/04/02	1:30-2:05	3	21.5
	6/09/02	4:15-4:45	6	43.1
Cabrits	6/03/02	1:30-2:15	127	911.3
	6/07/02	4:00-4:30	118	846.8
	6/07/02	5:00-5:50	109	752.2
Middleham	6/05/02	2:33-3:00	6	43.1
	6/05/02	3:00-3:30	5	35.9
	6/05/02	3:30-4:00	3	21.5

Table 2 - Mass (g) of Anoles captured at different habitats:

Middleham	Mt. Joy	Cabrits
1	2	2
2.5	2	2
3	2	2
3	2.5	2.5
3.5	2.5	2.5
4	3	3
4	3	3
4	4	3
4	4	4
4	4	4
4.5	4	4
4.5	4	4.5
5	5	5
5	5	5
5.5	6	5
7		6
8		6
10		6
13		6.5
		7
		9
		10
		13
Average:		
5.0	3.5	5
Biomass:		
168.3	118.3	4233.8

Table 3 – Density and Biomass by Habitat

HABITAT	DENSITY (anoles per hectare)	BIOMASS (grams per hectare)
Mt. Joy	33.5	118.3
Cabrits	846.8	4232.8
Middleham	33.5	168.3

Table 4 – Average Mass as a Function of Humidity

HABITAT	Mass (g)	Relative Humidity (%)
Mt. Joy	3.5	74.5
Cabrits	5	62
Middleham	5	77.7

Discussion

The data collected suggests that anole population density is in fact greater in dryer woodland areas than in rainforest (Table 3) as we predicted. Anoles may flourish in the drier habitat due to the necessity of thermoregulation. Bullock and Evans' (1990) density estimate of *Anolis oculatus* showed 2148 anoles per hectare on the island of Dominica. While this number is significantly higher than the data collected in this study, the differences in duration and intensity of the two studies might account for some of the difference.

Biomass throughout the three habitats was not necessarily a function of humidity, as suggested by the data collected (Table 4). Average anole body weights were nearly identical in the dry forest area and primary rainforest area despite a significant difference in humidity. The average body weights of anoles captured in secondary rainforest at Mt. Joy, however, were lower than in the other two habitats (Table 3), but the average humidity is relatively close to the primary rain forest area. This result suggests that biomass is a function not of humidity, but of an undetermined factor.

In an ANOVA comparing sample means of anole weights among the three habitats with 2 and 54 degrees of freedom, $F=1.97$ and $p=.15$, there was no significant difference in the average weight of individual anoles. Pairwise tests between the three showed marginally non-significant differences between primary and dry forest, but a marked trend towards smaller body masses in secondary rain forest habitat. Given the high variability of body mass measurements, a larger sample size would probably yield a significant difference in mean body weights for secondary rain forest habitat.

Works Cited

Bullock, D. J. and P.G.H. Evans. 1990. The distribution, density and biomass of terrestrial reptiles in Dominica, West Indies. *Journal of Zoology* 222:421-443

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