

Morphological Variation in *Anolis oculatus* Between Dominican  
Habitats

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# Morphological Variation in *Anolis oculatus* Between Dominican Habitats

## **Abstract:**

Lizards in the genus *Anolis*, commonly called anoles, are small arboreal reptiles that have radiated in a number of species in the Caribbean islands. Of the many species throughout the islands, only one is found on Dominica: *Anolis oculatus*. Considering Dominica's extreme degrees of habitat diversity, one would assume that variation in morphology is displayed in the anoles of Dominica as well. After a two-week research project, it was found that the differences are not so extreme, but there are suggested patterns of distinguishable morphological features between habitats.

## **Introduction:**

On the island of Dominica, the habitats experience extreme degrees of variation in climate, average rainfall, and average temperature. With so many differences between habitats, one should concur that the fauna should reflect such diversity, too. Three different habitats, a primary forest, a secondary forest, and a dry forest were randomly sampled for anoles on three different days, and several morphological measurements were taken and compared to test this hypothesis.

A primary rainforest is a habitat that has never been disturbed, and is therefore very old. They experience an annual rainfall of 175 to 300 inches per year and occur at elevations between 1,000 to 2,500 feet. Tree heights average greater than 100

feet. Three primary rainforest sites were chosen for collection: Middleham Falls, Syndicate Trail, and Emerald Pool. The average temperature on collection days was 25.3 degrees Centigrade.

Secondary rainforest habitats occur where original vegetation has previously been cut for agricultural purposes, and then a new rain forest grew. Because of this they are usually significantly younger than primary rainforests. Secondary forests experience an annual rainfall of 175 to 300 inches per year, and the elevation is between 1,000 to 2,500 feet. Mount Joy was chosen for the secondary rainforest habitat collection. The average temperature on collection days was 25.7 degrees Centigrade.

Dry scrub woodland is a forest that experiences an average rainfall of 60 to 70 inches per year. They occur at elevations from 0 to 1,000 feet. Trees average 30 feet in height. Cabrits National Park was chosen as the site for dry woodland habitat. The average temperature on collection days was 30.1 degrees Centigrade.

## **Materials:**

Caliper

100-gram scale

Brown cloth bags

## **Methods:**

Each anole was caught by hand, and measurements were taken with a caliper and a 100-gram scale, each measuring to the one-tenth degree. Eight different measurements were taken for the anoles: weight, front leg length, back leg length, tail length, body

length, head length, head width, and jaw length. Color, general patterns, and location found were also noted. Each leg was measured from the beginning of the attachment to the body to the end of the longest toe. Tail length was measured from the anterior end of the cochlea to the tip of tail, and the amount of re-grown tail or state of tail was noted. Body length was taken from the tip of the snout to the anterior end of the cochlea. Head length was measured from the ear to the tip of the snout. Jaw length was measured from just under the eye to the tip of the snout. Head width was measured across the head at the position of the ear. Each was measured to the nearest one-tenth millimeter. Weight was found by placing each anole in a brown cloth bag and weighing it with a scale. The data was recorded and then inserted into a Microsoft Excel Spreadsheet. The spreadsheet was then transferred to a StatView program, in which the principal components (PC) were calculated for dimension reduction to facilitate comparisons among habitats.

## **Results:**

StatView (Figure 1) constructed two principal components, which together contain 78% of the total variance (Figure 2). Figure 3 provides the loadings for the two principal components, the first one generally representing size, and the second representing shape. Under Factor 1, all the numbers are positive, suggesting that as Principal Component 1 increases, size increases. Since individuals from all three habitats are evenly distributed along the first principal components, it appears that they have similar size distributions (Figure 4). However, Factor 2 shows a large degree of increase in tail size with an increase in principal component 2 (Figure 3). In contrast, head length, head width, and jaw length all decrease as location on principal component 2

increases. Another interesting fact is front legs decrease as body length increases (Figure 3).

Using these facts and applying them to figure 4, one can see size is evenly dispersed throughout each habitat. However, primary rainforest anoles tend to have larger tails. Furthermore, secondary rainforest anoles tend to have larger heads (measured by three variables) and larger front legs. Dry forest lizards show the least variance in shape.

Figure 1:

**Factor Analysis Summary**

|                        |         |
|------------------------|---------|
| Number of Variables    | 8       |
| Est. Number of Factors | 4       |
| Number of Factors      | 2       |
| Number of Cases        | 53      |
| Number Missing         | 2       |
| Degrees of Freedom     | 35      |
| Bartlett's Chi Square  | 365.243 |
| P-Value                | <.0001  |

Factor Extraction Method: Principal Components

Extraction Rule: Method Default

Transformation Method: None

Figure 2:

**Eigenvalues**

|         | Magnitude | Variance Prop. |
|---------|-----------|----------------|
| Value 1 | 5.437     | .680           |
| Value 2 | .816      | .102           |
| Value 3 | .569      | .071           |
| Value 4 | .400      | .050           |

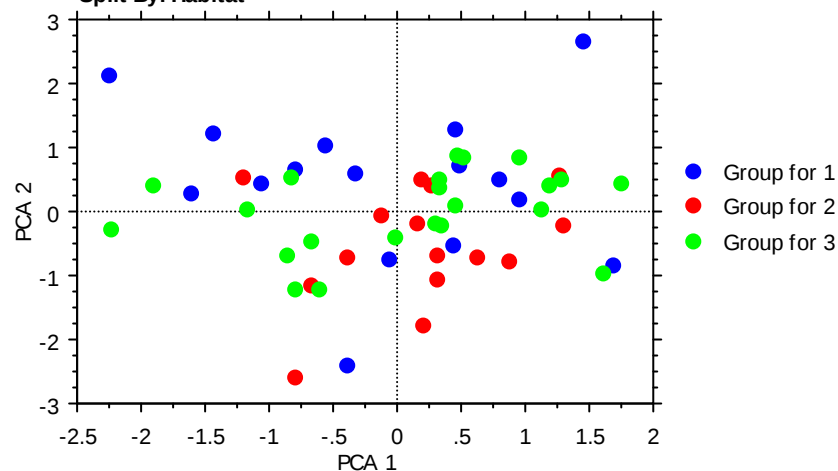
Figure 3:

**Unrotated Factors**

|             | Factor 1 | Factor 2 |
|-------------|----------|----------|
| Weight      | .849     | .161     |
| Front Leg   | .872     | -.117    |
| Back Leg    | .736     | .026     |
| Tail Length | .579     | .775     |
| Body Length | .929     | .105     |
| Head Length | .859     | -.197    |
| Head Width  | .847     | -.235    |
| Jaw Length  | .872     | -.266    |

## Primary Component Variations Between Anoles in Different Habitats

Figure 4:  
**Bivariate Scattergram**  
Split By: Habitat



## **Discussions:**

The data, in support of the hypothesis, suggests a few distinct characteristics between anoles of different habitats, although not as extreme as predicted. It is speculated that because primary rainforests experience a significantly smaller amount of disturbance than the secondary rainforests, the tails are able to grow longer without being dropped due to human interaction or predators. Longer tails also most often parallel with an increase in more arboreal behavior, but the data here disagrees in that most of the primary rain forest anoles were caught in ground debris while most of the dry forest, shorter tailed anoles were captured in trees. The significance of larger back legs is unclear, considering that most of the lizards in the primary forest with large back legs were found in ground debris, while most of the lizards in the dry forest with large back legs were found high on trees. It is also unclear to what degree head shape and size is important.

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