

DATA *Nugget*

Anole's new niche

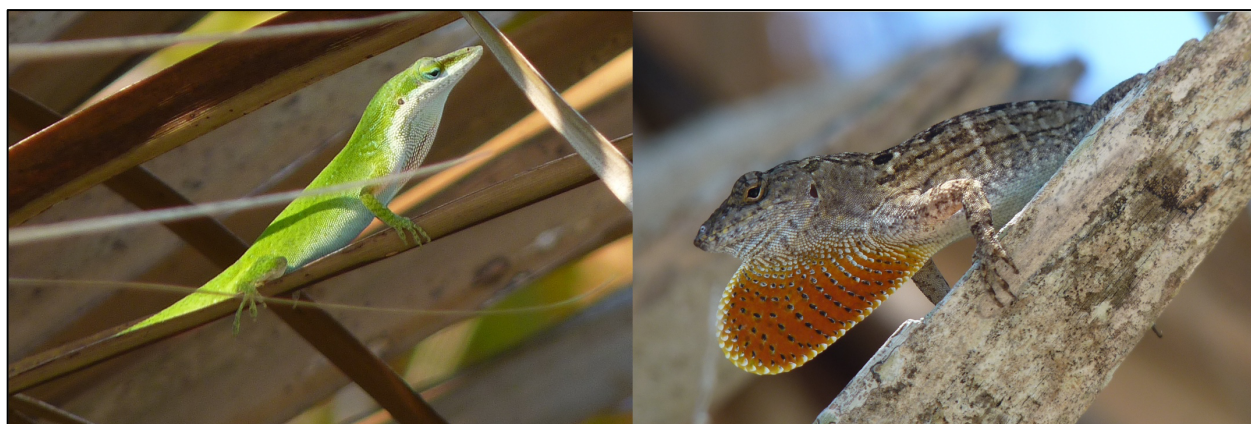
Featured scientist: Yoel Stuart (he/him) from Loyola University Chicago

Research Background:

Throughout our history, humans have been moving species around the world. In your own backyard there are likely multiple species that have come from different countries and mixed into your local ecosystem. Human movement of species has sped up in the last 150 years as we have gotten better at traveling by trains, planes, boats, and cars.

An open question is, what happens to species when they are moved around? Scientists can study both the species that have been moved, called **introduced species**, and the original species that were there before, called **native species**.

One interesting system to study is the anole lizard populations in Florida. In this case, there is both an introduced species that arrived relatively recently, the **brown anole**, and a species that has been there for much longer, the **green anole**.



The Green Anole (*Anolis carolinensis*) and the Brown Anole (*Anolis sagrei*). Photo Credit: Adam Algar

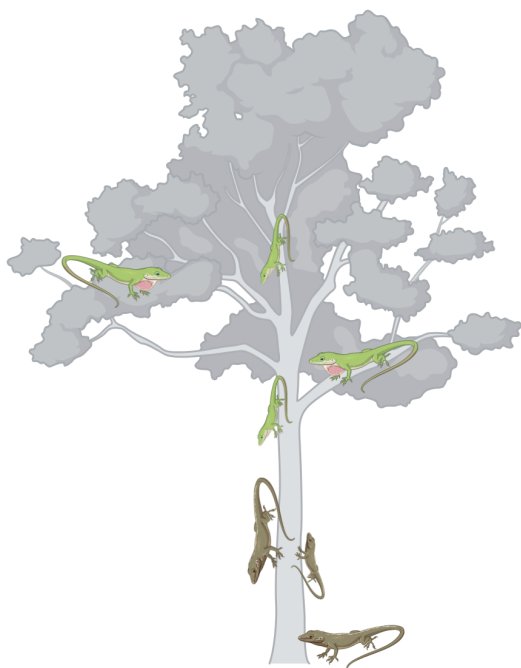
The story of these two anoles and their interactions begins millions of years ago when both the green anole and the brown anole evolved in Cuba. They had different **niches**, or areas of specialization in their ecosystem when they lived there together. The green anole mostly perched high up on tree trunks, moving through branches and leaves as it looked for insects to eat. The brown anole preferred to perch lower down, finding its food on the ground and the lower part of tree trunks.

Then, 2-4 million years ago, the green anole established a new population in Florida. How it did this, we are not sure. But it probably was blown by hurricanes from Cuba to

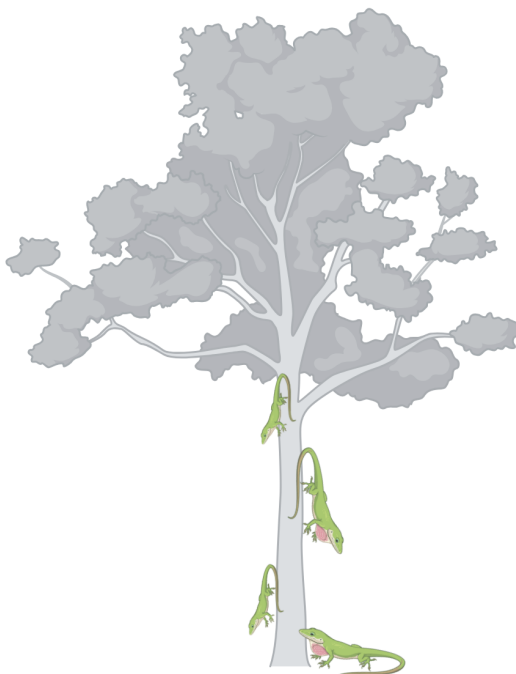
Florida on rafts of trees and other vegetation. Once in Florida, it spread throughout the southeastern United States. As best we can tell, the green anole changed its niche once it was in the United States without the brown anole around. Data from previous research suggest that it started finding insect prey on the ground and perched lower down in the tree trunks.

Then, in the 1950s, the brown anole came to southern Florida through human movement on boats. This probably happened because humans were moving agricultural products (like sugar cane) from Cuba to the United States.

A - Cuba



B - Florida



Where green and brown anoles perched in Cuba a long time ago (A). Where green anoles perched in Florida before the arrival of brown anoles (B).

Yoel is a scientist studying anoles, and he wanted to know how green anoles respond to the recent presence of the brown anole. Now that they are together in Florida, the two anole species interact a lot.

They both have a large population, they eat similar insects, and likely compete for food and space. Yoel thought the green anoles might respond by changing their behavior and habitat use. Yoel predicted that the green anoles would return to the treetops once the brown anole arrived, living like their ancestors did with the brown anole in Cuba. He also thought that the brown anole would keep low on the tree trunks, because that is where it has always perched while it coexisted with the green anoles in Cuba.

To test his hypothesis, Yoel's team worked on eleven islands that were approximately the size of football-fields in Mosquito Lagoon, Florida. All eleven islands had green anole populations on them. Six of the eleven islands also had brown anole populations present on them. This meant that five islands only had one species, the green anole.

This created an ideal "natural experiment" to collect data on how green anoles use the habitat when they are alone, compared with when they are living on islands with the brown anole. To do this, Yoel collected data on perch height. He and his team did this by walking through the island habitats slowly until they spotted a lizard. Then, they measured the height of the spot where the lizards were sitting in the trees.



Yoel looking for lizards on a spoil island.
Photo Credit: Adam Algar



Looking south at Spoil Islands along the Intracoastal Waterway shipping channel in Mosquito Lagoon.
Photo credit: Todd Campbell

Scientific Question: How does the introduction of brown anoles to Florida islands affect the way that green anoles use their habitat? Does the green anole niche change?

What is the hypothesis? Find the hypothesis in the Research Background and underline it. A hypothesis is a proposed explanation for an observation, which can then be tested with experimentation or other types of studies.

Scientific Data:

Use the data below to answer the scientific question:

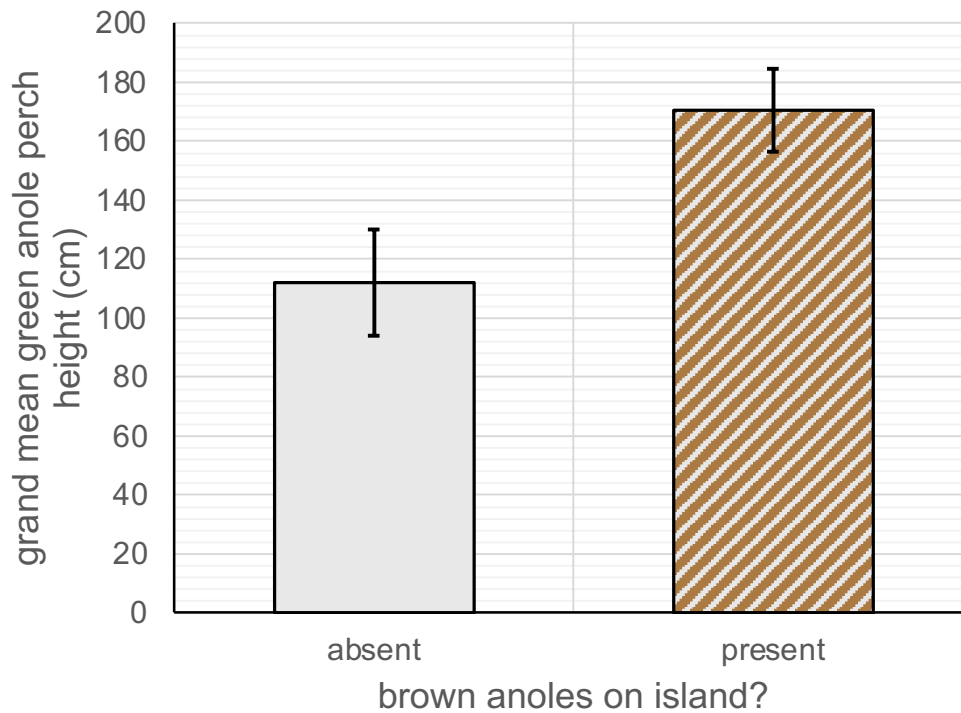
Island Name	Brown anoles on island?	Number of green anoles (n)	Mean green anole perch height (cm)
Crescent	absent	62	123
Hornet	absent	87	89
Osprey	absent	67	97
Pine	absent	57	130
South Twin	absent	98	121
Channel	present	66	193
Hook	present	75	180
Lizard	present	110	166
North Twin	present	70	169
Yang	present	71	155
Yin	present	60	160
		Grand Mean (cm)	Standard Deviation
Green anole perch height with brown anoles are absent			17.9
Green anole perch height with brown anoles are present			13.9

What data will you graph to answer the question?

Independent variable(s): _____

Dependent variable(s): _____

Below is a graph of the data: Identify any changes, trends, or differences you see in your graph. Draw arrows pointing out what you see and write one sentence describing what you see next to each arrow.



Interpret the data:

Make a claim that answers the scientific question.

What evidence was used to write your claim? Reference specific parts of the table or graph.

Name_____

Explain your reasoning and why the evidence supports your claim. Connect the data back to what you learned about niches and how species introductions can cause changes in behavior.

Did the data support Yoel's hypothesis? Use evidence to explain why or why not. If you feel the data are inconclusive, explain why.

Your next steps as a scientist: Science is an ongoing process. What new question(s) should be investigated to build on Yoel's research? How do your questions build on the research that has already been done?