Lab 6 Part 2: Anolis Lizards of the Greater Antilles:

Using Phylogeny to Test Hypotheses

In this lab, you will imagine that you have taken a journey to the Greater Antilles, several islands that include Cuba, Hispaniola, Puerto Rico, and Jamica just south of Florida. Your goal is to study and collect Anolis lizards to learn where different species of Anolis lizards live and how they are related. Where they live (called their distribution) and how they are related will help you make hypotheses about how they evolved on the islands. The goals for this activity are to:

1. Observe and describe what each species looks like.
2. Look for patterns in where they live to make hypotheses about how they evolved.
3. Use a phylogenetic tree to test your hypotheses.

Below, instructions are **bolded**and questions you should answer on your answer sheet for this lab are *italicized.*

# Part I. Getting Started

Before you begin your research, learn a bit about the islands and the lizards. **Answer these questions on your answer worksheet for this lab exercise.**

1. *Where are the Greater Antilles? Which Islands make up the Greater Antilles? What is an Anolis (genus) lizard? What are some of their characteristics? How are they related to the Greater Antilles? (do some online research to answer this question.*
2. *What is the goal of this research (see instructions above)?*

At the back of this packet is a simple map of the Greater Antilles that you will use for the exercise. **Tear off this page, and color each of the islands a different color.** For example, color Cuba blue (this is done for you as an example), color Jamaica red, and so on.

# Part II: Looking for Patterns

You travel from island to island observing the lizards that you find. You pay attention to their body shape, their habitat, and the island on which they are found. After several weeks of work you put your data in a data table called “Data Table: Anolis lizards.” You also made drawings of the lizards you identified, and their features. **The data table and your lizard drawings are attached to this exercise; go ahead and tear those out.**

**Answer these questions on your answer worksheet for this lab exercise.**

1. *What type of information does the data table show?*
2. *Describe the six different types of body shapes that the lizards have.*

Your drawings of the lizards are color coded based on body shape. For example, lizards with “slender body, very long tail” are colored orange. **Cut out each lizard drawing using the scissors provided, or your own.**

**Use the data table to place the lizards on the map of islands and in their habitat, using the data table as a key.** Put them in their correct location based on where they live. For example, put the “#1 slender body, very long tail” icon in the bush under the tree in Cuba. Do this for all the lizards.

**Answer these questions on your lab answer worksheet:**

1. *What patterns do you see between the type of body shape a lizard has and the habitat it lives in?*
2. *Does this pattern exist on all islands? Explain.*
3. *Which lizards do you think are more closely related; those that live on the same island but in different habitats, or those that live on different islands but have the same body features and live in the same type of habitat? Explain.*
4. *Write two alternative hypotheses about how these lizards might have speciated/evolved on and between these islands.*
5. *How could you test your hypotheses?*

# Part 3: Testing your hypothesis

You decide to test your hypotheses by using the DNA from each Anolis species to create a phylogenetic tree; attached to this exercise. The phylogenetic tree is a hypothesis of their relationships. The more similar their DNA is, the more closely related they are.

Look closely at the phylogenetic tree. **Color the name of each lizard on the phylogenetic tree the same color as it is in the drawings.** For example, on the phylogenetic tree, color the name of lizard 1 orange (this is done for you as an example).

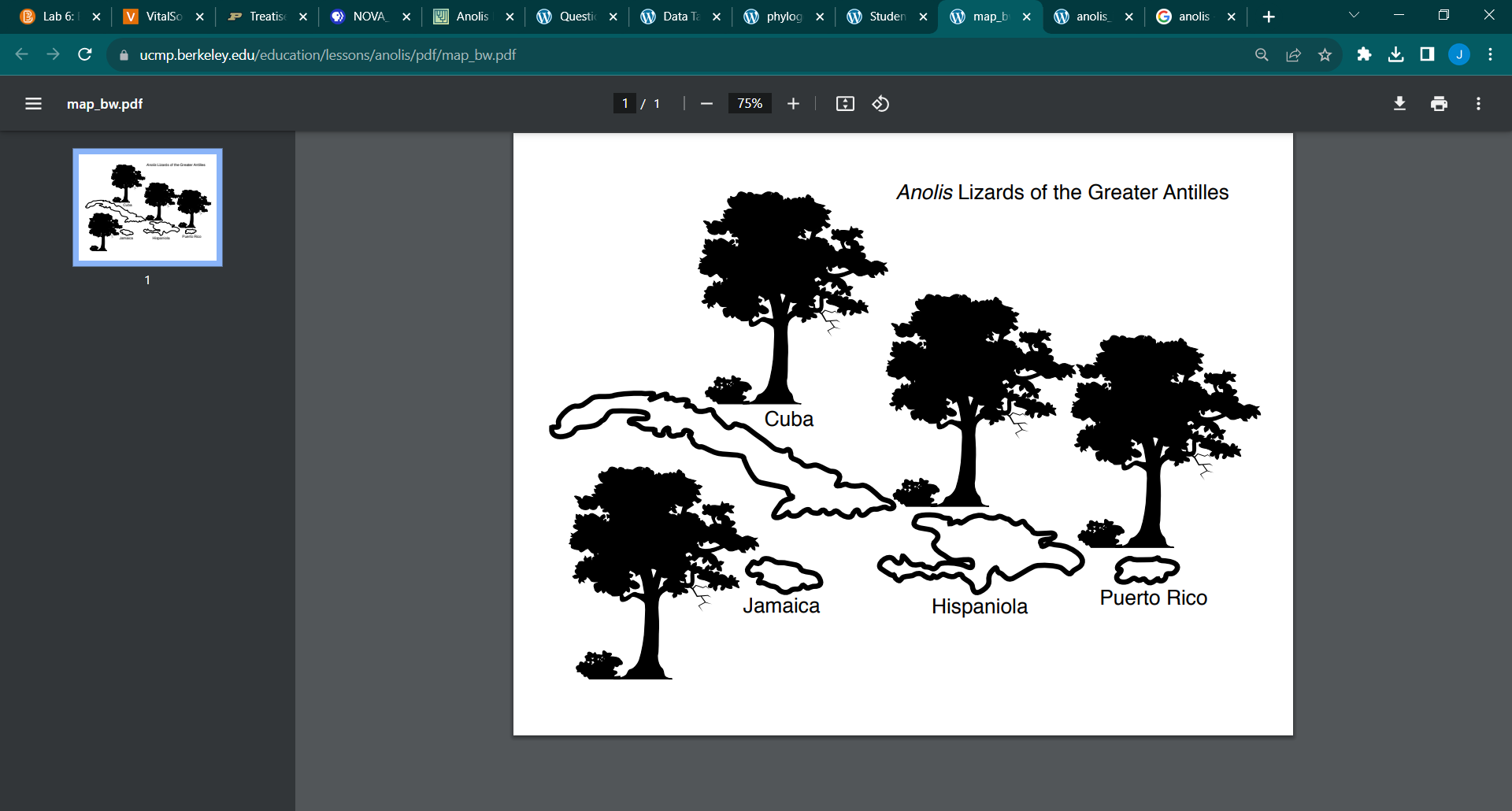
Next, **on the phylogenetic tree, color each branch the same color as the island the lizard is from.**  For example, lizard 1 is from Cuba, so its branch should be colored blue (this is done for you as an example).

Once you’ve colored everything, look carefully at the phylogenetic tree for patterns. These represent evolutionary pathways.  **Answer these questions on your lab answer worksheet:**

1. *Explain the different patterns that you see in the phylogenetic tree. Look at their body shape, habitat, and the island on which they are found. Write down as many observations as you can.*
2. *Based on the phylogenetic tree, which lizards do you think are more closely related: those that live on the same island but in different habitats, or those that live on different islands but have the same body shape and live in the same type of habitat? Explain using specific examples.*
3. *Look back at your original hypotheses (question 8). Explain how these new data support or do not support your hypotheses about how these lizards might have speciated/evolved.*
4. *How could you further test your hypotheses? What type of information would you want to have?*
5. *How could fossil evidence help you test your hypotheses?*
6. *How do you think the lizards could have gotten from one island to another?*

**When you are finished, gather up all your materials from this lab and keep, or recycle them and this worksheet. Be sure your answers are recorded on the answer sheet that you turn in to your TA.**

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| ***Anolis* Lizards of the Greater Antilles:** | | | | |
| **DATA TABLE** | | | | |
|  | | | | |
| **ID #** | **Name** | **Island** | **Habitat** | **Body Shape** |
| 1 | *Anolis alutaceus* | Cuba | grass, bushes | slender body, very long tail |
| 2 | *A. angusticeps* | Cuba | Twig | Short body, slender legs and tails |
| 3 | *A. chlorocyanus* | Hispaniola | Upper trunk, canopy | Large toe pads, can change color |
| 4 | *A. cuvieri* | Puerto Rico | Tree crown | Large body, large toe pads |
| 5 | *A. cybotes* | Hispaniola | Lower trunk, ground | Stocky body, long hind limbs |
| 6 | *A. distichus* | Hispaniola | Midtrunk | Long fore limbs, flattened body |
| 7 | *A. equestris* | Cuba | Tree crown | Large body, large toe pads |
| 8 | *A. evermanni* | Puerto Rico | Upper trunk, canopy | Large toe pads, can change color |
| 9 | *A. garmani* | Jamaica | Tree crown | Large body, large toe pads |
| 10 | *A. grahami* | Jamaica | Upper trunk, canopy | Large toe pads, can change color |
| 11 | *A. gundlachi* | Puerto Rico | Lower trunk, ground | Stocky body, long hind limbs |
| 12 | *A. insolitus* | Hispaniola | Twig | Short body, slender legs and tail |
| 13 | *A. lineatopus* | Jamaica | Lower trunk, ground | Stocky body, long hind limbs |
| 14 | *A. loysiana* | Cuba | Midtrunk | Long fore limbs, flattened body |
| 15 | *A. occultus* | Puerto Rico | Twig | Short body, slender legs and tail |
| 16 | *A. olssoni* | Hispaniola | Grass, bush | Slender body, very long tail |
| 17 | *A. porcatus* | Cuba | Upper trunk, canopy | Large toe pads, can change color |
| 18 | *A. pulchellus* | Puerto Rico | Grass, bush | Slender body, very long tail |
| 19 | *A. ricordii* | Hispaniola | Tree crown | Large body, large toe pads |
| 20 | *A. sagrei* | Cuba | Lower trunk, ground | Stocky body, long hind limbs |
| 21 | *A. valencienni* | Jamaica | Twig | Short body, slender legs and tail |



A diagram of different colored lizards

Description automatically generated

A black and white chart

Description automatically generated