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Hold on for your life! Part II Featured scientist: Colin Donihue from Harvard University Written with: Bob Kuhn and Elizabeth Schultheis

In Part I the data showed that, after the hurricanes, anole lizards had on average smaller bodies, shorter legs, and larger toe pads. The patterns were clear and consistent across the two islands, indicating that these traits are adaptations shaped by natural selection from hurricanes. At this point, however, Colin was still not convinced because he was unable to directly observe the lizards during the hurricane.

Research Background:

Colin was unable to stay on Pine Cay and Water Cay during the hurricanes and directly observe the lizards. To be more confident in his explanation, Colin needed to find out how lizards behave in hurricaneforce winds. He thought there were two options for what they might do. First, he thought they might get down from the branch and hide in tree roots and cracks. Alternatively, they might hold onto branches and ride out the storm. If they tried to hold on in high winds, it would make sense that traits like the length of



The leaf blower setup. Lizards were filmed perching on a dowel as wind speeds from the leaf blower were gradually increased until the lizard couldn't hold on any longer and was blown into the soft padding and net.

their limbs or the size of their toepads would be important for their survival. However, if they hid in roots or cracks, these traits might not be adaptations after all.

To see how the lizards behaved, Colin needed to design a safe experiment that would simulate hurricane-force winds. He bought the strongest leaf blower he could find, set it up in his hotel room on Pine Cay, and videotaped 40 lizards as they were hit with high winds. Colin first set up this experiment to observe behavior, but he ended up learning not only that, but a lot about how the traits of the lizards interacted with high winds.

To begin the experiment, Colin placed the anoles on a perch. He slowly ramped up the wind speed on the leaf blower until the lizards climbed down or they were blown, unharmed, into a safety net. He recorded videos of each trial and took pictures.

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<u>Scientific Question</u>: Is there evidence that traits of anoles are adaptations allowing them to survive better in hurricanes?

Scientific Data:



Use the following images and notes from Colin to answer the scientific question:



To Colin's surprise, the vast majority of the lizards chose to hang on during the trials. Even more shocking were the observations of what happened as wind speeds increased. Colin observed that the lizards situated themselves on the perches with their elbows tucked in close to their bodies, but with their back legs sticking out on either side of the branch. As the wind speed increased, their legs, particularly their thighs, caught wind like a sail, eventually resulting in their hindquarters being blown off the perch. Once half their body was aloft, they soon lost grip altogether.

Interpret the data:

Make a claim that answers the scientific question.

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What evidence did you use to write your claim? Reference specific parts of the images.

Consider the data from the two experiments together – the natural island observations and the leaf blower experiment. Use the data from the leaf blower experiment to support or refute your argument from Part 1.

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