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What does hummingbird coloration tell us about competition?

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Abstract

LOWER READING LEVEL

Have you ever wondered why animals look different from each other? Think of a rooster compared to a hen. Usually there's a reason those differences have evolved.

We looked at hummingbirds to learn more about their colors. Some females have a fancy color pattern like the males do. The males are aggressive. Fancy females look like males, so they are left alone to eat. We wanted to know if fancy females just look fancy. Or are they actually better competitors?

We found that fancy females were more like other females. Fancy females are mimicking male color patterns. This is the first time we've seen females mimicking males to get the advantages of a dominant form.

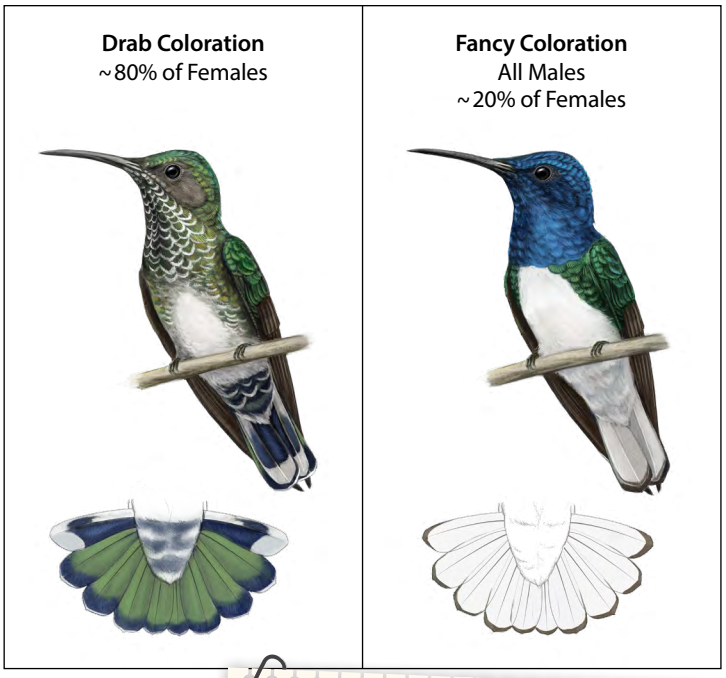
Introduction

Animals look different. They can have different colors or shapes. This might even mean they behave differently. How an animal looks and behaves can help them survive in their environment. Lots of times individuals of the same **species** can look different too. Think about your friends. You might have different eye colors, or maybe you are different genders. But you are all humans. We call this **polymorphism**. Poly- means many and -morph means form.

In the animal kingdom, we know a lot about species where males have many forms. It is common for males to try to use bright colors and flashy displays to attract females.

Females can have many forms too, but we don't know as much about why. You can think of it like a fancy party. Some of the females are wearing sparkly dresses (fancy). But the rest of the females show up to the party in jeans (drab).

Of course, people can change their clothes easily. They can choose whichever fancy clothes they like: a tuxedo, a sparkly dress, or parts of them together. Birds can't change their feathers, which is one reason why these hummingbirds are so interesting.



Female and male white-necked jacobin hummingbirds. **Illustration:** Jillian Ditner

Luckily, there are hummingbirds where females have many forms. In one species (white-necked jacobins), some of the females even look like the males. This means that fancy females are wearing tuxedos instead of sparkly dresses. They are mimicking the males. **Mimicry** is when one animal looks or behaves like another. It gives them some kind of advantage.

We know that fancy hummingbird females get more access to food when they look like males. Male hummingbirds are more **aggressive**. No one likes to fight, so they leave the fancy females alone to eat.

We wanted to know more. Do the fancy females behave like males? Are they better competitors than drab females? Or are they just faking it with their fancy colors?

Methods

We looked at white-necked jacobin hummingbirds in Panama to answer our questions. About 80% of females are a drab dull greenish-brown. But about 20% are fancy and have a blue head with a white neck and tail. The fancy females look almost the same as the males.

We captured hummingbirds and compared males, fancy females, and drab females. We looked at three types of information:

1. **Morphology** – We measured how much the hummingbirds weighed. We also measured the shape of their wings and their colors. We took blood to see if they were male or female.
2. Flying ability – We figured out how much weight the hummingbirds could lift when they fly. Strength helps hummingbirds turn and speed up in the air.
3. Feeding behavior – We recorded when the hummingbirds visited feeders. Then we figured out if their behavior was **territorial** or not.

Results

We couldn't tell the difference between fancy and drab females. They had the same weight and wing shape. They could also lift the same amount of weight (Figure 1). We did see differences between males and females. Males had larger wings than females. They could also lift more weight.

Females (fancy and drab) visited a lot of different feeders. Some males also visited lots of feeders. But some males visited a small number of feeders a lot of times. This is territorial behavior.

Which hummingbirds were more similar in their lifting ability?

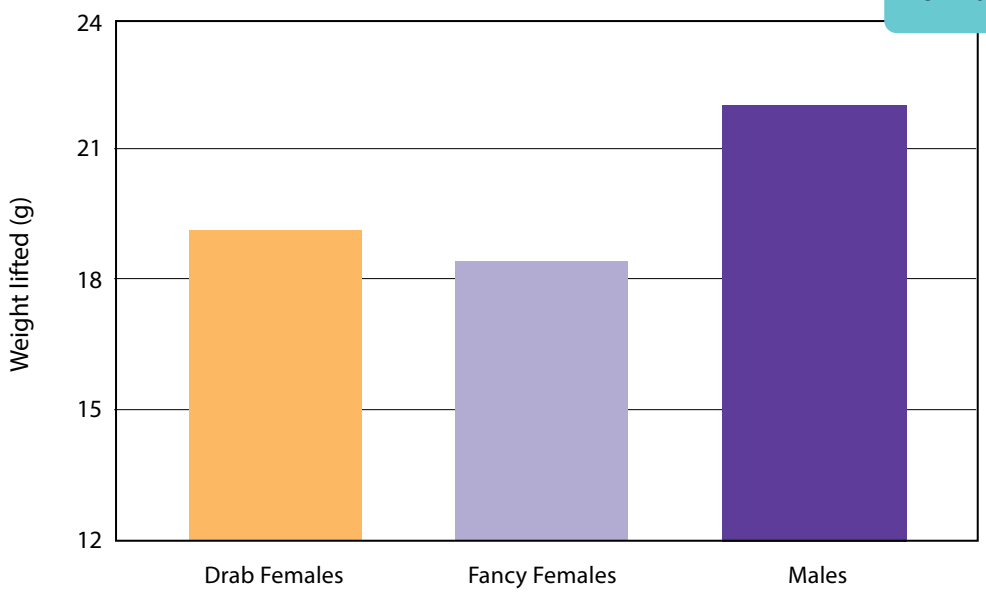


Figure 1: Weight lifted by hummingbirds with different color patterns. The amount of weight a bird can lift is related to its flying ability.

Discussion

Our results show that fancy females are just mimicking male colors. They don't have the same wing shape, strength or behavior as males. They are more like drab females.

Some male hummingbirds were territorial. This means that some males are aggressive toward other birds. They chase other birds from feeders. Fancy females get chased away less because they look like males. This means they get to eat more food. Hummingbirds use up food more quickly than other animals. So it is really important for them to eat enough. Fancy females don't have to have bigger muscles or be stronger to get more food. They just have to look like males!

There may be differences between drab and fancy females that we can't see or measure. In the future, we'd like to study the **DNA** of these hummingbirds. This could help us understand how these different forms of hummingbirds evolved.

Conclusion

Hummingbirds are amazing birds. They can be found as far north as Alaska and as far south as Chile. If you live in the Americas, you can set out your own feeders to watch the hummingbirds in your neighborhood. If not, you can still set out bird feeders and keep track of any behaviors you notice. Do you see different species of bird visiting your feeders? Do you notice any aggressive behaviors? Are there any birds that seem to be territorial? Also, make sure to have fun and enjoy your bird watching!

Glossary of Key Terms

Aggressive - describes an organism that will attack or challenge another organism. This behavior can happen when protecting resources like food, shelter, or mates.

DNA - the chemical structure that carries instructions for how an organism functions and looks.

Mimicry - the evolution of organisms looking like each other. This can happen between two species or within the same species.

Morphology - the form of an animal. This can include colors, shapes, and textures. It can also include things like bones and organs.

Polymorphism - two or more different forms within a species.

Species - a group of organisms that can mate with each other and produce offspring. They also live in the same area.

Territorial - behaviors that help an organism protect a specific area from others. Behaviors include making sounds, acting aggressively, leaving scents or marks, or chasing other individuals away.

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Check your understanding

1. What is polymorphism? What are some examples of polymorphism that you can think of?

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2. What three broad categories of things did we collect data about? Which hummingbirds did we compare using this data?

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3. We had two hypotheses we tried to test with our data. 1) Fancy females look like males and they have the same morphology and behaviors as males, AND 2) Fancy females look like males, but they do NOT have the same morphology and behaviors as males. Which of these hypotheses is supported with our data? Which specific pieces of data support the hypothesis?

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4. Go outside and see if you can find any birds. Observe those birds for 5 to 10 minutes. What kinds of behaviors did you observe? Were there multiple birds? Did they interact? Did they look like different species? What kinds of behaviors would you likely see if the birds were aggressive? What if they were territorial?

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