

Introduction: Say Hello to the Junco

Name: _____

Directions: Watch the video clip “Introduction: Say Hello to the Junco” and answer the questions below in the space provided.

1. List at least two different places that *Juncos* live.

2. What is one of the biggest questions in evolutionary biology?

Critical Thinking Question

3. Why do you think the *Junco* would be a good species for studying evolution? What about for studying animal behavior?

4. Why might biologists want to study birds or other animals, in order to learn about human biology?

Rowan and the Junco: Pioneers in Science

Chapter 1

Name: _____

Directions: Watch the video clip “Rowan and the Junco: Pioneers in Science” and answer the questions below in the space provided.

1. Which two biological cues were thought to trigger the migration of birds prior to Rowan’s experiment?

2. What hypothesis did Rowan test to determine the biological cue that triggers bird migration?

3. What was the result of Rowan’s study?

Critical Thinking Questions

4. What challenges did Rowan face when he was conducting his research? What do you think that can teach us about determination and passion?

5. Many animals, such as sea turtles, elk, and fish, migrate. Think of one other hypothesis that may contribute to a different species' migration other than day length and write it below.

6. Under what circumstances could the length of days be a “misleading” cue for animals to use when timing seasonal events like migration or breeding?

Appalachian Spring: Long-term studies at Mountain Lake

Chapter 2

Name: _____

Directions: Watch the video clip “Appalachian Spring” and answer the questions below in the space provided.

1. When is the best time of day to observe the dark-eyed junco in the field?
2. What are at least two reasons why the junco makes a good research species?
3. What allows researchers to identify individual birds and tell one junco from another?
4. How do experimental males (added testosterone) compare to control males in the amount of singing and size of territory they hold?
5. How did testosterone impact the mating behavior of the experimental males (added testosterone) when compared to the control males?
6. How did high testosterone impact male survival and quality of the care to their offspring?

Critical Thinking Questions

7. If the juncos experience particularly difficult conditions during a breeding season (i.e. lack of water/food), make a prediction as to whether the offspring from higher or lower testosterone males will survive best. Support your prediction with data presented in the movie.

8. Based on your thoughts from the above prediction, how do you think that would impact the evolution of the dark-eyed junco? (Hint: think about which offspring will survive and if the offspring will be more likely to have higher or lower amounts of testosterone.)

Diversification I: the Dark-eyed Juncos

Chapter 3

Name: _____

Directions: Watch the video clip “Diversification I: the Dark-eyed Junco” and answer the questions below in the space provided.

1. What physical characteristics distinguish various groups of the Dark-eyed Junco?
2. What characteristics are shared among various breeding habitats?
3. How many distinct groups of juncos were identified by Alden Miller?
4. If different dark-eyed juncos look so different why are they classified as a single species?
5. How do modern scientists determine the degree of relatedness between groups of animals?
6. In the phylogenetic tree provided as an example, which two groups are most closely related? Why?

7. Based on DNA sequence differences, approximately how long ago did the six main groups of Dark-eyed diverge from one another?

Critical Thinking Questions

1. Formulate a hypothesis (a possible explanation) as to why the six different groups of Juncos vary so greatly in plumage color.

2. Provide at least one idea as to how you might test the hypothesis you came up with.

3. Based on the evidence presented, what biological process do you think has contributed towards populations diverging in physical characteristics? Explain why you think that process is responsible for these differences.

4. One million years from now, do you think there will still be 6 distinct groups of Dark-eyed Juncos? More? Fewer? Why or why not?

5. Explain how phylogenetic trees are made. Why do you think biologists construct phylogenetic tree

Diversification II: South of the Border

Chapter 4

Name: _____

Directions: Watch the video clip “Diversification II: South of the Border” and answer the questions below in the space provided.

1. How many distinct groups of clearly distinct yellow-eyed juncos exist?
2. What tasks must scientists complete to collect DNA and data on physical traits?
3. Why do juncos sing?
4. What are endemic groups?
5. Why is it important to determine whether populations are different species?
6. How did the birds in the highlands of Baja, Mexico differ in physical traits when compared to other populations? What about in their behaviors?

7. What did the genetic analysis indicate with regard to amount of genetic differentiation among the three yellow-eyed junco groups?

Critical Thinking Questions

8. How do human culture and lifestyle impact natural habitats?

9. Write at least two hypotheses as to how human culture and lifestyle may influence junco evolution.

10. One million years from now, how many distinct groups of yellow-eyed juncos are likely to exist? More? Fewer? Why or why not?

The Mysterious Juncos of Guadalupe Island

Chapter 5

Name: _____

Directions: Watch the video clip “The Mysterious Juncos of Guadalupe Island” and answer the questions below in the space provided.

1. How long did it take the research team traveling by boat at 30 knots to get to Guadalupe Island?
2. Approximately how old is Guadalupe Island?
3. Approximately how big is the Junco population in the cypress forest?
4. What did the genetic analysis of the juncos on Guadalupe Island reveal?
5. What is Dr. Borja Mila’s hypothesis as to why the Guadalupe Island Juncos have a more “pointy” or more “tweezer-like” beaks?

Evolution in Action: the Campus Juncos at UCSD

Chapter 6

Name: _____

Directions: Watch the video clip “Evolution in Action: the Urban Juncos at UCSD” and answer the questions below in the space provided.

1. What is different about the migration habits of the UCSD population compared to the Mount Laguna population?
2. When was UCSD built?
3. When was the first sighting of Juncos on the UCSD campus?
4. How does the habitat on the UCSD campus differ from that of remote mountain habitats?
5. How does the breeding season differ between the UCSD population and the Mount Laguna population?

10. What is the significance of knowing how long ago the UCSD population stopped migrating for the breeding season?

11. Given enough time, what do you predict will happen with the UCSD population's ability to interbreed with other Dark-eyed Junco populations? Make a prediction as to what will happen to the UCSD population with regard to species status.

