

Individually, answer these questions on page 3.

1. Answer these questions individually:

A. Which is true of adult bumblebees? Circle the best answer.

B. Which is true of adult Junco birds found in central New Jersey? Circle the best answer.

# Understanding Evolution

- The first step in understanding evolution is learning to recognize:

## **VARIATION**

- “Variation” means “differences.” For example, if we say, “There is variation in human feet,” we mean that different people have different feet (different shapes, colors, and so on).
- While we can see some of these differences (for example, foot colour), sometimes there are differences that are not so obvious (for example, small variations in toe size, the strength of the bones inside, the thickness of the skin).

# Understanding Variation

## Acquired versus inherited variation

1. Some variation is acquired – it is the result of what happens to an organism during its life. An example is blue hair color from a person dying her hair blue.
2. Some variation is inherited – it is the result of the genes that the organism inherits from its parents. An example is black hair color from a person having naturally black hair from birth.

# Understanding Variation

- In the images below, identify both acquired and inherited variation:



Individually, answer Question 2 on page 4.  
Here are color photos of the adult finches.

<http://www.yourparrotcage.com/photos/GouldianFinch.jpg>



# Understanding Variation

- To start thinking about variation, we'll consider the variation in human feet.
- Do this activity on page 4:

4. In groups, look at your feet and list 5 types of variation that you see in your feet.

A. \_\_\_\_\_

B. \_\_\_\_\_

C. \_\_\_\_\_

D. \_\_\_\_\_

E. \_\_\_\_\_

# Understanding Evolution

- The next two slides show variation in human feet. The first slide shows small differences, the second slide shows some very large differences.





# Answer Question 5 6

Now do this on Page 5:

In groups, look at the following pictures and read about the case of the Doma people. Then list 5 more types of variations you notice on this page.

# Pictures for Question 5



# Understanding Evolution

- Some variation is easy to see.
- Some variation is more difficult.
- The next slide shows lots of variation that is easy to see.



# Understanding Evolution

- The next slide shows pictures of one breed of dog--German shepherds. Even in this one breed, there is lots of variation between individual dogs.
- Can you see some of the variation?
- What variation is there that you cannot see?



# Understanding Evolution

- Although you might not be able to see the variation in the organisms in the next slide, scientists have shown that sheep can recognize each other even when humans cannot see any differences between their faces.
- There is lots of variation in these faces that sheep can notice.



# Understanding Evolution

- Even more amazing, wasps can tell the differences among wasp faces, too!
- There is variation in wasp faces that other wasps can see and notice.
- Can you see the variation?



# Understanding Evolution

- In the next slides, try and find variation between each of the organisms.
- Identify:
  - Variation that is easy to see
  - Variation that is harder to see
  - Variation that cannot be seen at all
- There are many kinds of inherited variation. You may also see some acquired variation.











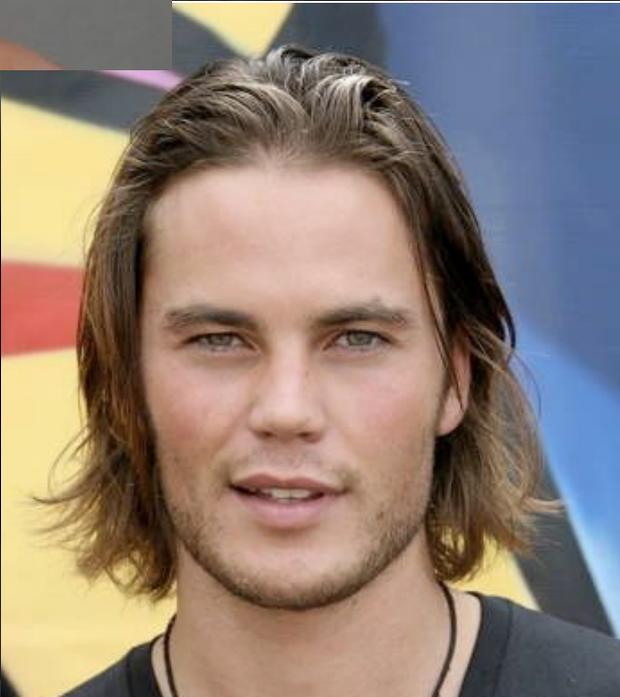












# Understanding Evolution

- Some variation you cannot see or it is not very noticeable but they can be very important!
- A 1mm variation in the size of a finch beak could determine what the bird can and cannot eat.



Individually, answer Question 6 on page 6.  
Here are color photos of the adult parrots.



Individually, answer these questions on page 7.

7. Answer these questions individually. Use new ideas you have learned when you answer.

A. Which is true of adult bumblebees? Circle the best answer.

B. Which is true of adult Junco birds found in central New Jersey? Circle the best answer.