BiolOgy

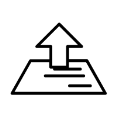
First Name:  
  
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Period:

**U5d5 – Fossils as Evidence for Selection**

**Thu/Fri – Jan 8/9, 2019**

**Do Now**

[1]  Copy down your homework.



Take out your u5d3 HW (Darwin reading passage) and be ready to turn it in.

[2] Select all pieces of evidence that scientists use to determine how to classify a new organism.

□ Habitat

□ Genetics

□ Behavior

□ Morphology

□ Diet

[3] Two species of deer are called *Odocoileus virginianus* and *Odocoileus hemionus*. They have the same…

a) Genus  
b) Species

c) Class  
d) Order

[4] The eight levels of taxonomic classification, from general to specific, are:

a. domain, kingdom, class, order, phylum, family, genus, species.   
b. domain, kingdom, phylum, class, family, order, genus, species.   
c. domain, kingdom, phylum, class, order, family, genus, species.   
d. domain, kingdom, class, phylum, order, family, genus, species.



[5] The picture shows the reconstructed skeleton of *Simosuchus,* an extinct animal that lived in Madagascar about 100 million years ago. Made an educated guess about the closest living relative of *Simosuchus*.

*I think the Simosuchus is closely related to the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ because \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*  
\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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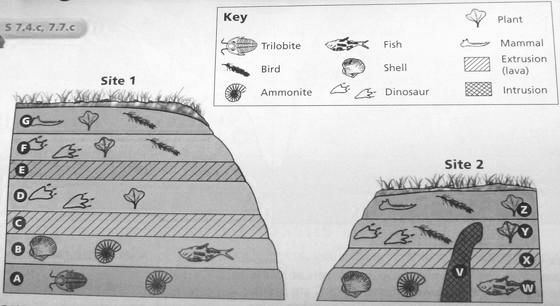
**Today’s Objectives**

* SWBAT explain how fossils are dated.
* SWBAT explain how fossils are used as evidence for evolution through natural selection.

|  |  |
| --- | --- |
| **Homework**: u5d5 HW – Peppered Moths | **Exit Ticket Score:**  \_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_ |

**Practice - Fossils**

**Directions:** *Use the diagram to answer the below questions in complete sentences.*

1. What is the oldest rock layer at each site (Site 1 and Site 2)?

2. What types of fossils are found in the newest rock layer at Site 1? (Use the key)

3. Rock layer Y in site 2 is **most likely** the same age as which rock layer at Site 1? Explain what **evidence** you used to make your decision.

4. Which rock layer contains only dinosaur and plant fossils?\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  
  
5. If you wanted to find the exact age of fossils at a site, what type of technology would you use?

1. Relative dating
2. Radiometric/Carbon dating
3. Both would work equally well
4. You could not figure out how old the fossil is.

**Hominid Skull Morphology**

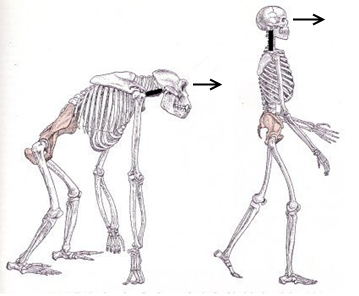
Carefully examine the three hominid skulls. They are labeled with white dots ••• on the back.

[1] **Jaw and teeth.** Examine the jaw and teeth of each species. Predict the probable diet of each species.

|  |  |  |
| --- | --- | --- |
| •, ••, or ••• | **Probably ate…** | **Because…** |
|  | Leaves, insects, bark, and nuts |  |
|  | Raw meat and vegetables |  |
|  | Cooked meat, vegetables, and other soft foods |  |

[2] **Brow ridge.** Examine the brow ridge of each species. Anthropologists[[1]](#footnote-1) believe that a strong brow ridge functions to reinforce the weaker bones of the face and to protect them from breaking while chewing tough materials. Try doing a chewing motion and think about what bones get hit by the force of your jaw.

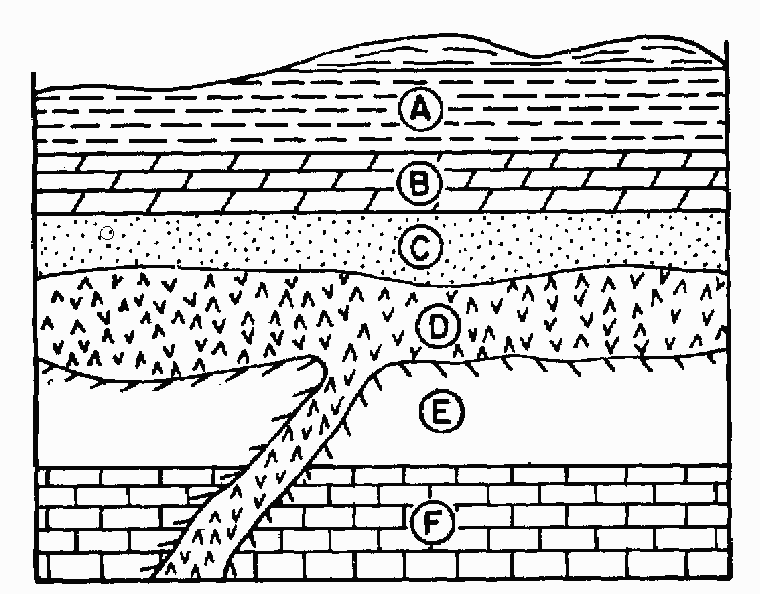
Why did a strong brow ridge count as an **adaptation[[2]](#footnote-2)** for some of the three hominid species?

Which species likely ate a diet similar to modern humans? \_\_\_\_\_\_

[3] **Walk.** Look at the yellow dot on the underside of each skull. The dot marks the *foramen magnum*, a hole in the skull through which the spinal cord passes. We can use this to determine how a species walked while looking forward. Primates can walk quadrupedal ( \_\_\_\_\_\_ legs) or bipedal ( \_\_\_\_ legs). Which skulls are quadrupedal and which ones are bipedal? How do you know?

[4] Using all the evidence you have seen, arrange the skulls from most ancient to most recent.  
  
 \_\_\_\_\_\_\_\_\_ , \_\_\_\_\_\_\_\_\_\_\_ , \_\_\_\_\_\_\_\_\_\_\_\_

[5] Which skull was likely found in the deepest rock layer? \_\_\_\_\_\_\_\_\_\_\_\_

[6] Anthropologists used carbon dating to find the age of • was 200,000 years. Use relative dating to estimate the age of Skull ••. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

[7] In the rock layers shown, Layer E was found to be 1 million years old. What layer would you look in if you wanted to find more of •? \_\_\_\_\_\_\_\_\_\_

[8] These three species are called Hominids because they all belong to the family *Hominidae*. If they all belong to the same family, they also belong to the same… (Select all that apply)

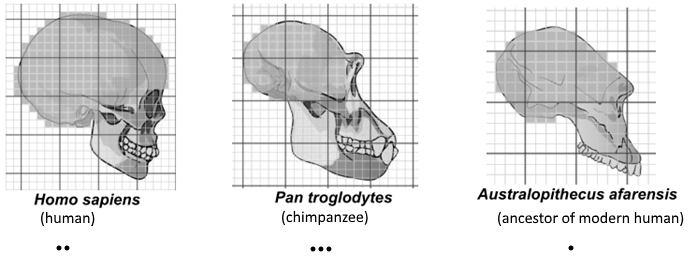
□ Kingdom

□ Phylum

□ Class

□ Order

□ Species



[9] The gridlines above are centimeters. Count the squares to measure the 2-dimensional area of each cranium (skull) in cm2. Then multiply the result by 5 to get an estimate of the 3-dimensional cranial capacity in cm3.

|  |  |  |  |
| --- | --- | --- | --- |
| **Species** | **Specimen age** | **Area of cranium (cm2)** | **Estimated cranial capacity (cm3)** |
| *Pan troglodytes* (chimpanzee) | Present day |  |  |
| *A. afarensis* (“Lucy”, extinct) | 3.2 million years |  |  |
| *Homo sapiens* (human) | Present day |  |  |

Which species probably had the largest brain size? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Which species probably had the smallest brain size? Is this species still alive? How was it able to survive?

**Canine Skull Morphology**

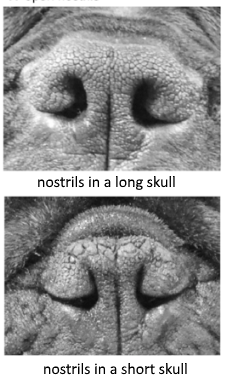
Carefully examine the three canine skulls. They are labeled with white dots ••• on the bottom.

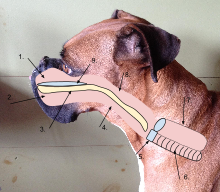
[1] **Maxilla and mandible.** Match the maxilla (upper jaw) of each canine with the corresponding mandible (lower jaw). Why is it important that the two parts of the jaw fit well together?

Which skull has the worst fit between its maxilla and mandible? \_\_\_\_\_\_\_\_\_\_

[2] **Diet**. Observe the shape of the teeth and jaws. Pay special attention to the “canine teeth”  .Predict the probable diet of each species.

|  |  |  |
| --- | --- | --- |
| •, ••, or ••• | **Probably ate…** | **Because…** |
|  | Raw meat, bones, and hooves |  |
|  | Canned soft food or dry kibble |  |



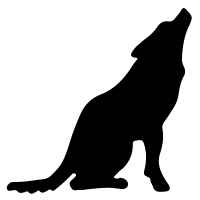
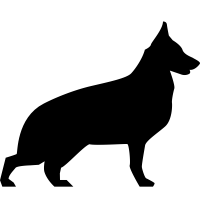
[3] **Skull length.** Turn the skulls to the side and observe the length from front to back. The skull length affects the ability of an animal to breathe through its airway. When the airway is shorter, it also becomes more compressed (squished) and air must to travel through a smaller opening.

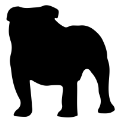
Which canine(s) would have the strongest breathing while running at high speeds? Why?

[4] **Orbitals**. Observe the orbitals (eye sockets) of each canine. Do the eyes point forward, or to the sides?   
Are canine species usually predator, or prey? Explain.

[5] Using all the evidence you have seen, arrange the skulls from most wild to most domesticated.  
  
 \_\_\_\_\_\_\_\_\_ , \_\_\_\_\_\_\_\_\_\_\_ , \_\_\_\_\_\_\_\_\_\_\_\_

[6] These three species are called canines because they all belong to the family *Canidae*. Which taxonomic groups are small than a Family? (Select all that apply)

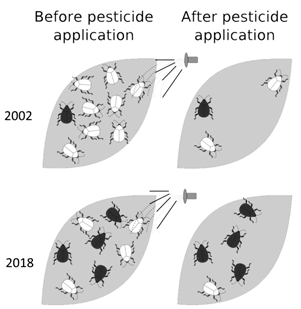
□ Kingdom □ Order

□ Phylum □ Species

□ Class

[7] Skull •• is a bulldog, ••• is a wolf, and • is a German shepherd. Would the bulldog be able to survive and reproduce in nature? Give evidence from your skulls to support your claim.

[8] Bulldogs, although cute, are unhealthy in a variety of ways including breathing problems, skin infections, underbites, and hip bone disorders. If bulldogs have so many health issues, then why do they still exist?



[9] Bulldogs were created by artificial selection. (Hopefully you said that in question 8.) Using the diagram, explain how artificial selection can also to create insects that are resistant[[3]](#footnote-3) to pesticides. Use the words *variation, mutation,* and *many generations.*

# u5d5 Notes - Fossils

|  |  |
| --- | --- |
| **Fossils** | * The remains of a past organism that has been preserved in \_\_\_\_\_\_\_\_\_\_\_\_\_ or \_\_\_\_\_\_\_\_\_\_\_\_ * Are used as evidence for natural selection and \_\_\_\_\_\_\_\_\_\_\_ * Fossil show how species have changed across \_\_\_\_\_\_\_\_\_\_\_ periods of time |
| **Dating Techniques** | * Rule: \_\_\_\_\_\_\_\_\_\_\_\_\_\_ fossils are deeper * \_\_\_\_\_\_\_\_\_\_\_\_\_\_ **dating** is when we estimate the age of a fossil based on its layer * **Carbon dating (aka** \_\_\_\_\_\_\_\_\_\_\_\_\_\_ **dating)** gives the \_\_\_\_\_\_\_\_\_\_\_\_\_ age of a fossil using a half-life calculation   + \_\_\_\_\_\_\_\_\_\_\_is the time it takes for half of a rock sample to decay (\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_).   + E.g. The half-life of carbon is \_\_\_\_\_\_\_ years.  |  |  | | --- | --- | | Year | Amount of carbon left | | 0 | 100% | | 100 |  | |  |  | |  |  | |

# u5d5 Notes - Fossils

|  |  |
| --- | --- |
| **Fossils** | * The remains of a past organism that has been preserved in earth or rock * Are used as evidence for natural selection and evolution * Fossil show how species have changed across long periods of time |
| **Dating Techniques** | * Rule: older fossils are deeper * **Relative dating** is when we estimate the age of a fossil based on its layer * **Carbon dating (aka radiometric dating)** gives the exact age of a fossil using a half-life calculation   + **Half-life** is the time it takes for half of a rock sample to decay (break down into a different chemical).   + E.g. The half-life of carbon is 100 years.  |  |  | | --- | --- | | Year | Amount of carbon left | | 0 | 100% | | 100 | 50% | | 200 | 25% | | 300 | 12.5% | |

# BiolOgy HW

First Name:  
  
Last Name:  
  
Period:

**U5d5 HW   
Thu/Fri – May 14/15, 2019** [**slong@striveprep.org**](mailto:slong@striveprep.org) **– (303) 807-9131**

Peppered Moths

*What do you think this reading is about?\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*

*What do you think you will learn from this reading?\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*



A famous example of natural selection due to environmental change happened to a species called the Peppered Moth. Before the 19th century, nearly all of England's peppered moths were silver-colored (see picture to right). This coloring was a form of camouflage (blending in). The silver peppered moths could hide from predators by blending in with silver moss that grew on the trees. Through variation, however, a black-colored peppered moth arose as well (see below).



*Which color moth is more likely to survive in a forest of trees with silver bark, the silver moth or black moth?*

*The \_\_\_\_\_\_\_\_\_\_\_\_\_\_ moth is more likely to survive because \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*

At first, the black gene variation was harmful to the moths that inherited it. Predator birds saw the black moths more easily than the silver moths, so the number of black moths was low. During the 19th century, however, the moth’s environment changed. Pollution from factories blackened the bark of the trees. Suddenly, the variation that had been harmful for the black moth was now an advantage. The silver moths now stuck out on the blackened trees and birds found and ate them—the black moths blended in. More black moths now survived and reproduced, and there were more black moths than silver moths in the population.

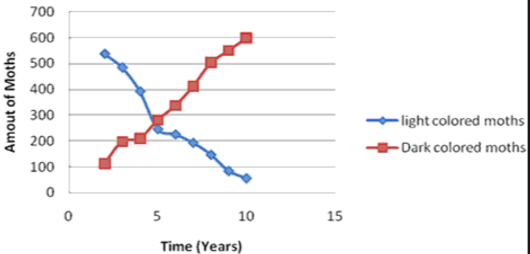
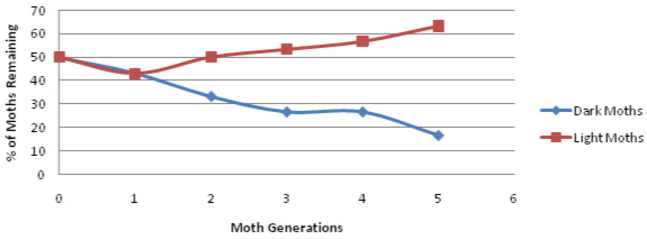


**Directions:** Complete the below table using the words: *increased, decreased, silver, black*

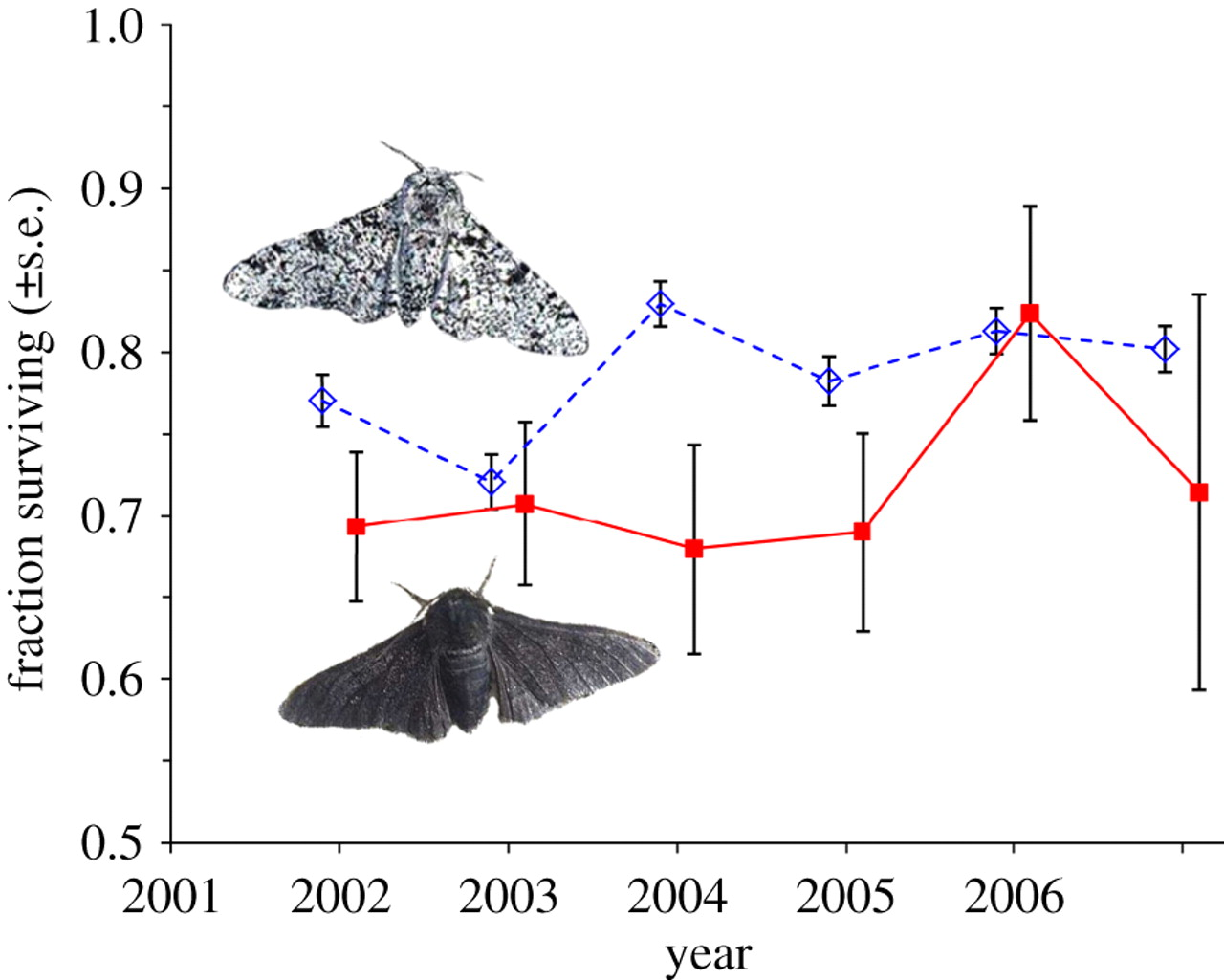
|  |  |  |  |
| --- | --- | --- | --- |
| ***Event:*** | ***What happened to the silver moth population?*** | ***What happened to the dark moth population?*** | ***Which trait was most likely to help you survive?*** |
| ***Before*** *the Pollution:* |  |  |  |
| ***After*** *the Pollution:* |  |  |  |

Did the moths change due to natural selection, or artificial selection? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. In the box below each graph, write if the graph shows the populations before the pollution, or after the pollution

|  |  |
| --- | --- |
|  |  |

2.

* 1. Write a title for the graph to the left:
  2. What is the independent variable? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  3. What is the dependent variable? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  4. What is the difference fraction surviving between the two moths in 2004?

3. In the past century, England has enforced clean air laws that regulate the amount of pollution produced by factories. What effects do you predict that these laws would have on the tree bark and **each** of the moth populations and why? Answer in at least 3 complete sentences.

1. Anthropologists are scientists who study humans from past and present [↑](#footnote-ref-1)
2. An adaptation is any trait that helps an organism to survive and/or reproduce. [↑](#footnote-ref-2)
3. Resistant means the insect is not affected by pesticides that are supposed to kill it. [↑](#footnote-ref-3)