Skeletons Reveal Human and Chimpanzee Evolution

hhmi | BioInteractive

Student Worksheet
Click & Learn

INTRODUCTION

This worksheet complements the Click & Learn *Skeletons Reveal Human and Chimpanzee Evolution* developed in conjunction with the 2011 Holiday Lecture Series *Bones, Stones, and Genes: The Origin of Modern Humans*.

PROCEDURE

Follow the instructions below and answer the questions as you read through the Click & Learn. Click the arrow in the bottom-right corner of the screen to advance the slides.

Read Slide 2.

1. What is a phylogenetic tree used to illustrate?
   To show the revolutionary relationships

Read Slide 3. Click on the video of Dr. White to listen to his description of the human branch of the tree of life.

2. Based on genetic evidence, humans are most closely related to which two species?
   Chimpanzees and bonobos

3. Are humans more closely related to gorillas or orangutans? State the evidence.
   Gorillas we have the close genomes the humans seem to be more developed than gorillas.

Read Slide 4. Click on the video of Dr. White to listen to his explanation of human evolution.

4. Charles Darwin proposed that modern humans directly descended from chimpanzees. Support or refute this statement with evidence from the video clip.
   Darwin did not support the statement but appreciated common ancestry from chimpanzees not descent from them.

Read Slide 5. Click on the video of Dr. White to listen to his description of the human branch of the tree of life.

5. What is a hominid (or hominin)?
   Refers to humans, chimpanzees, gorillas, orangutans and bonobos

6. *Australopithecus* is an early hominid that is now extinct. Why does Dr. White contend that *Australopithecus* is not completely gone?
   He believes that its genes in altered form are in humans.

Read Slide 6.

7. Identify at least **two** sources of data that scientists can compare to determine the evolutionary relationships between two or more species.

   DNA sequencesAnatomy and physiology

Read Slides 7 through 12.

8. Bones are one anatomical feature that can provide a wealth of information. List **seven** things scientists can learn about an organism by examining its bones.

1.	Pelvis and spine tell if one walked upright or on all fours
2.	Pelvis size tells about how the animal reproduces
3.	Teeth tell about diet and social behavior.
4.	Position of eyes indicate whether one was prey or predator
5.	Ridge on the skull tells the size of muscles that control the lower jaw.
6.	Bone composition reveals the age
7.	Bones reveal the animal size and shape

Read Slide 13. Click on the video of Dr. White to listen to his description of the discovery of *Ardipithecus ramidus*, or Ardi.

9. Once the finger bones of Ardi were discovered, why did the crew begin to excavate and sieve the surrounding area?
   To find whether there are other parts of the animal

10. What was the point of marking the excavation site with small yellow flags?
    To show the base and horizon of where the fossils were found.

11. Why did the excavation site for Ardi need to remain wet?
    To avoid the clay from expanding and getting sticky which may shutter the bones.

Read Slide 14. Click each of the anatomical structures to compare Ardi's teeth, pelvis, and feet with those of chimpanzees and humans.

12. List the key features of each structure in the table below.

Anatomical Structure		**Chimpanzee**	***Ardipithecus***	**Humans**
Teeth		Largest and sharpest	Less pointed canines compared to chimpanzees	Stubby canines
Pelvis	Ilium	Lies flat on the back	Horizontal and vertical short similar to humans.	Flares outward and wraps around the body
	Ischium	Longer than the one of human	Similar to chimpanzee	
Feet		Divergent big toe	Divergent big toe	No divergent toes

13. State which conclusions can be drawn from each set of information.

Conclusions from teeth comparisons	Aridis teeth are blunter than chimpanzee's showing they were less violent than the male chimpanzees
Conclusions from pelvis comparisons	Combination of human like ilium and chimpanzee ischium show adaptation for bipedalism and tree climbing
Conclusions from feet comparisons	Aridis feet show the mix of both walking upright and climbing

Click on "Continue to Summary" to go to Slide 15.

Read Slides 15 through 20. On Slide 18, click on the video of Dr. White discussing Ardi's unique features.

14. Where does Ardi belong on the tree of life? State the evidence.
    It is the beginning of the chimpanzee evolution. This is evident from the distinct features such as bipedalism.

15. Based on your answer above, is Ardi the common ancestor of humans and chimpanzees? State the evidence.

    Yes, from the different features that are common such biapedalism which inherited by humans and the divergent big toe by the chimpanzees