



HUMAN EVOLUTION



TEACHING VERSION

This version of the lesson can be taught in a classroom. While the content is identical to the student workbook above, this version is adapted for explicit instructor guidance.

DURATION

This lesson should take around 50 minutes to complete!

NGS STANDARDS

MS-LS4-1 Biological Evolution: Unity and Diversity

Analyze and interpret data for patterns in the fossil record that document the existence, diversity, extinction, and change of life forms throughout the history of life on Earth under the assumption that natural laws operate today as in the past



Apply scientific ideas to construct an explanation for the anatomical similarities and differences among modern organisms and between modern and fossil organisms to infer evolutionary relationships

MS-LS4-2: Biological Evolution: Anatomical Evidence of Evolutionary Relationships

MATERIALS

- 11 primate casts, if physical casts are unavailable, please cut and laminate the photos on the “Primate Cast Photos” page below, which is also separately linked at the right
- Appropriate quantity of “Primate Morphological Characteristic Identification Worksheet,” found below and on the right
- Online presentation of primate environments, found on the right

LEARNING GOALS

- 1) Identify morphological characteristics of five primate species.
- 2) Recognize the changes in morphological characteristics amongst these primates are due to evolutionary processes.
- 3) Become familiar with the climatic environments of each primate.



Primate Cast Photos



Primate Morphological Identification Worksheet



Environment Presentation



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PROCEDURE AND TIMELINE

- **5 minutes:** gauge prior student understanding of the human evolution. Ask the students what organism they believe is the closest living relative of humans
- **3 minutes:** hand out “**Primate Morphological Characteristic Identification Worksheet**” and introduce the activity
- **3 minutes:** split the class into five small groups and direct each group to observe one primate’s cast(s). Inform each group of which specific primate cast(s) they were provided. If physical primate casts are not available, instruct students to view the cut-out and laminated photos of the casts, which will be shared amongst the small group
- **15 minutes:** students should devote approximately three minutes on each primate identifying two morphological features. After each group is finished identifying the morphological features, each group will receive a new primate’s cast(s). This process will continue until every group has viewed all five primates’ casts.
- **2 minutes:** regroup the class and collect all primate casts
- **10 minutes:** present the presentation about primate climatic environments, which is linked above. During the discussion of each climatic environment, inquire the students about which primate called said environment its home. Have the students match the climatic environment to the appropriate primate on their worksheet
- **10 minutes:** throughout the presentation ask the students to answer the related assessment question(s) about each primate

PRE AND POST ASSESSMENT

To gauge prior student understanding of human evolution and knowledge imparted in the lesson, consider conducting a pre and post assessment.

Pre-assessment

What organism do you think is the closest relative to humans?



Post-assessment:

Challenge: draw a phylogeny of hominins and mark two morphological changes!



Primate common ancestor

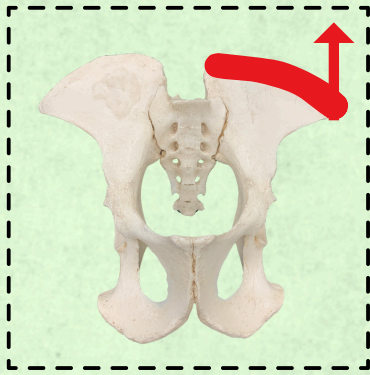


HUMAN EVOLUTION

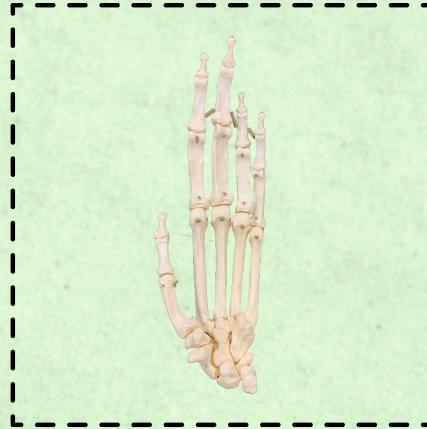


PRIMATE CAST PHOTOS

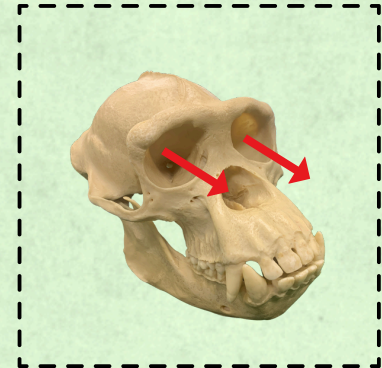
Note: not scale



Chimpanzee pelvis



Chimpanzee hand



Chimpanzee skull



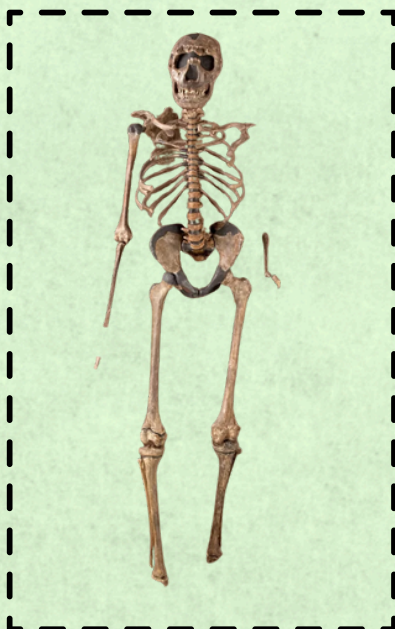
Australopithecus africanus pelvis



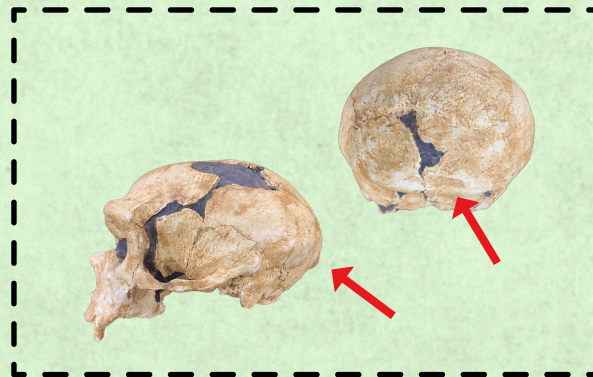
Australopithecus africanus skull



Homo erectus skull



Homo erectus body



Neanderthal skull



Neanderthal skull



and then laminate!



HUMAN EVOLUTION



PRIMATE CAST PHOTOS

Note: not scale



Human
skull



Human
pelvis



and then laminate!



PRIMATE MORPHOLOGICAL IDENTIFICATION WORKSHEET



Chimpanzee (*Pan troglodytes*)

Evolved 7 million years ago, currently living

1. *Identify*: Large, forward-facing orbital sockets (eyes)
2. *Identify*: Long, prehensile (grasping) fingers

Environment: _____

ASSESS

What is a colored object in a forest that chimpanzees might be looking for?

?

Australopithecus africanus

Evolved 3.3 million years ago, extinct

1. *Identify*: Slightly curved pelvis
2. *Identify*: Small brain

Environment: _____

ASSESS

Can you think of selective pressures for walking on two legs?

?

ASSESS

If *Australopithecus africanus* lived in both tree and grassland environments, how do you think they moved?

?



PRIMATE MORPHOLOGICAL IDENTIFICATION WORKSHEET



ASSESS

Homo erectus

Evolved 2 million years ago, extinct

1. Identify: Modern human-like body proportions and limbs

2. Identify: Medium-sized brain

Environment: _____

Homo erectus was the first hominin (human ancestor) to leave Africa. What traits helped them to do so?

?

Neanderthals (*Homo neanderthalensis*)

Evolved 500,000 years ago, extinct

1. Identify: Bump at the back of the skull (occipital bun)

2. Identify: Thick brow ridge

Environment: _____

ASSESS

If humans and Neanderthals were so similar, why do you think humans are the only species that lives today?

?



PRIMATE MORPHOLOGICAL IDENTIFICATION WORKSHEET



Humans (*Homo sapiens*)

Evolved 300,000 years ago, living

1. Identify: Large brain
2. Identify: Curved and broad pelvis

Environment: _____

ASSESS

What other environmental adaptations do humans have?

?

ASSESS

What is the advantage of language?

?



CITATIONS AND ACKNOWLEDGEMENTS



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Created by Gabriella Snyder

Photo Citations:

Chimpanzee hands, Tambako The Jaguar, 2012, Flickr.

Mother and Baby Chimpanzee, wildlife shot, Gombe National Park, Tanzania, guenterguni, 2018, Getty Images.

Australopithecus. Maurice Wilson, National Museum of History.

KNM-WT 15000 (Turkana Boy), Chip Clark, Smithsonian Museum of Natural History.

Homo erectus, Acheulian man, The Natural History Museum, Alamy Stock Photo.

Cordate shaped hand axe (replica), José-Manuel Benito Álvarez, 2007, Wikimedia Commons.

Red scalariform sign, panel 78 in hall XI of La Pasiega gallery C., Hoffman et al., 2018, Science.

Family of Neanderthals, NASA-JPL-Caltech.

The lion man from the Stadel cave in the Hohlenstein, Lonetal (Bade-Wurtemberg), Dagmar Hollman, 2013, Wikimedia Commons.

Gas Field Workers in Baluchistan, Albert Moldvay, National Geographic.

Next generation reindeer herder on the tundra in northern Russia, Thomas Nilsen, Barents Observer.

All other graphics were sourced from CanvaPro.



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Educational Content:

The educational content in the lesson was sourced from the University of Iowa's ANTH:1301 Human Origins lectures by Dr. Robert Franciscus. His lectures are based off of the book *Introduction to Physical Anthropology* (15th Edition), Jurmain R., Kilgore L., Trevathan W., Ciochon R.L., Bartelink E., Wadsworth & Cengage Learning.

Thank you to Dr. Robert Franciscus for also providing immensely helpful feedback on the human evolution lesson plan.