Evolution CWA

The Evolution CWA is designed to be a lesson assessment. The overarching question is: Is this species more closely related to modern humans or more closely related to modern-day apes? The following handouts are included:

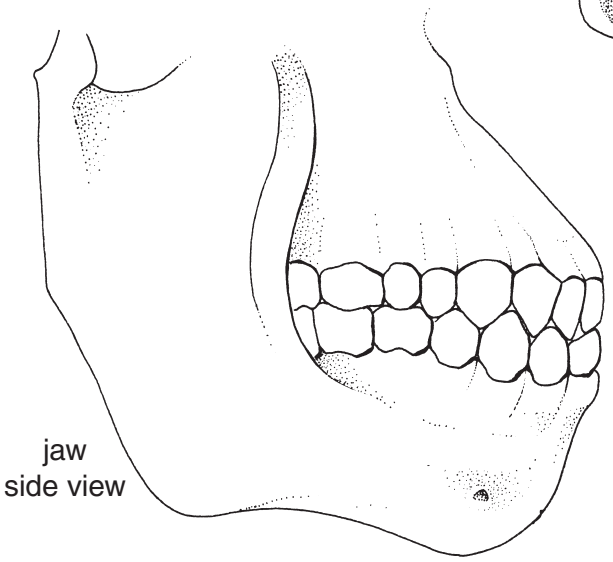
- Evidence for Evolution CERR
- Evolution CERR Written Response-scaffold: This can be read aloud by the teacher (pausing at blanks for students to share the content) as a way to model/scaffold the writing as this is an assignment at the beginning of the year.
- Rubric
- Sample Student Response

Students should be first provided the "Evidence for Evolution CERR" handout. This handout is scaffolded to help them examine the jaw, pelvis, femur, and foot of an unknown species, and compare them to modern humans and modern day apes. After they have evaluated the evidence, then the teacher can model the "Evolution CERR Written Response" handout. This handout is scaffolded to provide general supports around the definition of claim, evidence, and reasoning as well as specific supports in terms of how to build the argument. For the jaw, the evidence and reasoning are heavily scaffolded (include sentence starters and exemplify how the evidence and reasoning should be organized). The students are then expected to use the same procedure to develop evidence and reasoning for the pelvis, femur, and foot. In addition to providing a specific CERR rubric that corresponds to this topic, a sample student response is included.

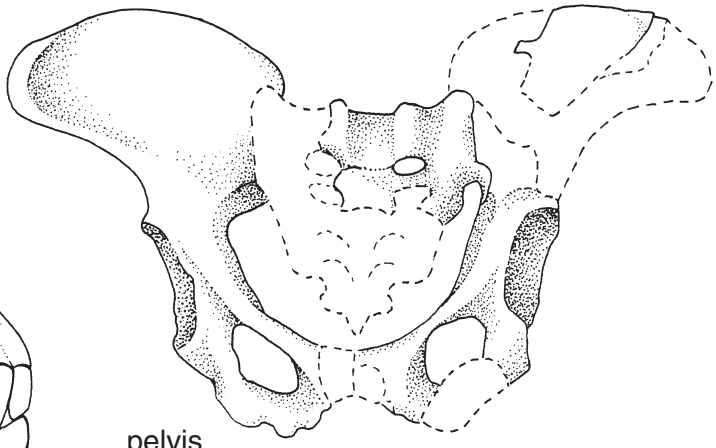
Name_____ Date_____

Chapter 2 Evidence for Evolution CERR

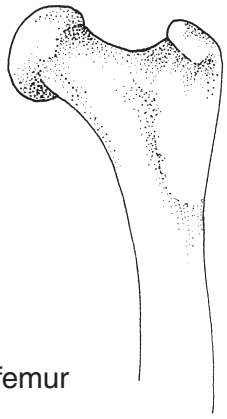
The fossils below were found in a layer of the earth thought to have been at the surface from 3-4 millions years ago, based on index fossils. In addition, after carbon dating the fossils, you find that the fossils formed 3.2 million years ago. Although you have tested many times, you cannot find any samples of DNA in the fossils.



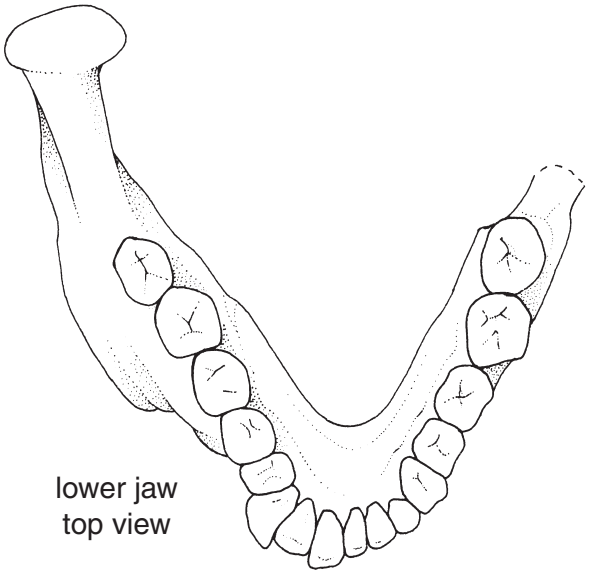
jaw
side view



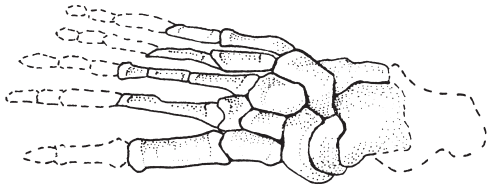
pelvis



femur



lower jaw
top view



foot

Write a paper that answers the question: ***Is this species more closely related to modern humans or more closely related to modern-day apes?*** Use evidence to support your claim and explain your reasoning. Be sure to address and refute a possible counter-claim as well.

Don't Forget to...

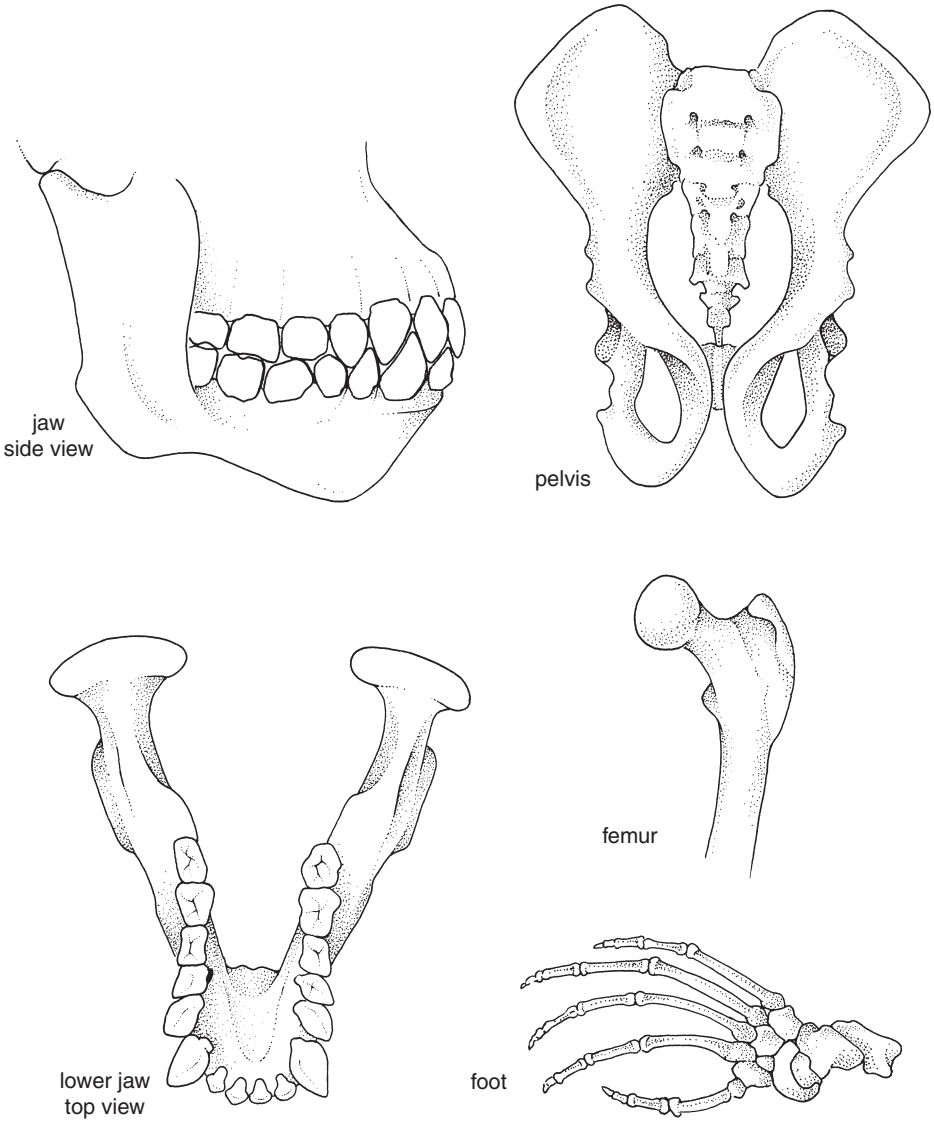
Plan your writing using an outline, web or graphic organizer. As you write each draft of your assignment, it's important to use what you know as a writer to communicate your ideas effectively.

- ✓ Write in complete sentences.
- ✓ Provide a clear claim that answers the question.
- ✓ Include evidence using data from class activities, experiments and other resources.
- ✓ Include reasoning to show how your evidence supports your claim.
- ✓ Include a rebuttal to address a counter-argument.
- ✓ Use vocabulary that you have learned in science class.
- ✓ Correct grammar, punctuation, and spelling errors.

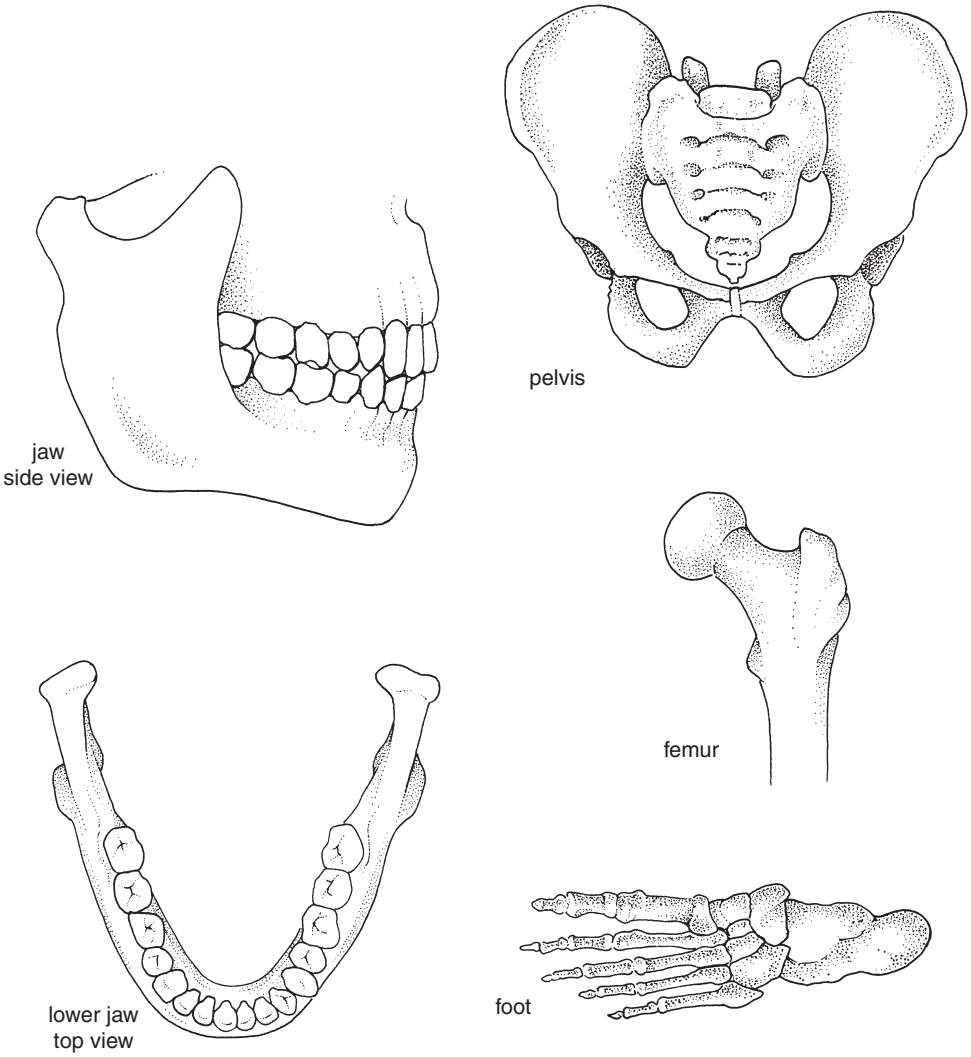
Use the table below to organize data before beginning your paper. Pictures of the same human and chimpanzee bones are included in another handout.

Mystery Bone	More chimpanzee-like or human-like?	Evidence for Decision
Side View Jaw		(Angle of chin? Do teeth stick out from chin? Width of jawbone?)
Lower Jaw		(Is it U-shaped or V-shaped? Shape of canines?)
Pelvis		(Is it wide or narrow? Elongated or short?)
Femur		
Foot		

Copymaster 2.10 *Primate Comparisons—Chimpanzee*



Copymaster 2.9 *Primate Comparisons—Human*



Evolution CERR Written Response

The first step of writing a CER-R is stating your claim. The claim is your answer to the question. You make your claim after analyzing your evidence. Then you use your evidence to back up your claim. Then in your reasoning explain why your evidence supports your claim using biological concepts.

Claim: The bones from the mystery species are more closely related to _____.

Evidence:

A. The first piece of evidence is found in the shape of the jaw features.

1. The shape of the mystery bones species' jaw is like the letter _____, which is similar to the bones of the modern-day _____.
2. The canine teeth of the mystery bones are _____. This is more like the modern day _____. The
3. The side view of the jaw shows that the shape of the chin is _____ _____. This is similar to the bones of the modern day _____.
4. The width of the jawbone is _____, which also more closely resembles _____.

Reasoning

A. Based on the structure of these jawbones, the mystery species most likely would have / would not have used tools to eat. These structures appear to be analogous/homologous/vestigial because _____ _____ _____ _____. Given this way of eating and that the mystery bones have more in common with modern _____, the mystery species is more closely related to _____.

Evidence: Use the structure laid out in Evidence A to write bout the following bones. You can do this here or on white-lined paper. Introductory sentences have been given to you.

B. The second piece of evidence is found in the shape of the pelvis.

C. The third piece of evidence is found in the shape of the femur.

D. The fourth piece of evidence is found in the foot.

Reasoning B-D: *Combine the evidence for the pelvis, femur and foot. Use the structure laid out in Reasoning A. Instead of talking about how the species ate, make inferences about how it moved around (mostly bipedal or mostly quadripedal), given its body structures.*

Evidence:

E. The final piece of evidence is that the mystery fossils have been dated at _____ _____.

Reasoning:

E. These fossils seem similar to _____, which has also been dated to the same time period. Therefore, the mystery species could be from the same species, which is a closer relative of _____. If scientists had DNA from the fossils, they could confirm this claim by _____

Rebuttal:

Given the shape of _____, another scientist might claim that this mystery species is more closely related to _____. However, given _____ _____ _____, it is more reasonable to infer that the animal is more closely related to _____.

Evolution CERR Rubric

	4 – Exemplary	3 – Proficient	2 – Needs Improvement	1 – Critical Area
Claim:	□ Directly states that the mystery bones are more human-like, using precise language □ Written in complete, easy to understand sentence(s)	□ States that the mystery fossil is more human-like, using language that generally corresponds to the question □ Written in complete, easy to understand sentence(s)	□ Accurately states that the mystery fossil is more human-like, but uses vague or unclear language, or □ States fossils are more chimpanzee-like, and/or □ Not written in complete, easy to understand sentence(s)	□ Does not make a claim, or makes a completely inaccurate claim.
Evidence:	□ Describes each fossil bone (shape, size, etc.) with comparisons to human and chimpanzee □ States evidence about age of fossil	□ Describes each fossil bone (shape, size, etc.) with comparisons to human and chimpanzee □ Includes inappropriate evidence	□ Describes some, but not all, of the fossil bones. □ Descriptions of bones are incomplete or unclear. □ Include some inappropriate evidence	□ Does not describe any fossil bones or information about fossils, or only provides inappropriate evidence (evidence that does not support claim)
Reasoning:	Correctly and clearly… □ explains how each bone supports the claim that the animal was more human-like and why the bones that are chimpanzee-like do not counter claim □ Includes reasoning from paleobiologist – discusses how age of bones, along with their features, dates them to same time period as *Australopiths* and connects to claim □ Uses content vocabulary □ Uses students' own words	Correctly and adequately… □ Includes reasoning from physical anthropology - Correctly and clearly explains how each bone supports the claim that the animal was more human-like and why the bones that are chimpanzee-like to do not counter claim □ Uses mostly students' own wording	□ Correctly connects the physiological anthropological evidence to the claim, but leaves out important bones or provides incomplete reasons, □ Uses wording directly from notes, the textbook, or an outside source, that does not demonstrate clear understanding of the meaning, or □ Restates the evidence without connecting it to the claim	□ Does not provide reasoning, or only provides reasoning that does not connect evidence to the claim, and/or □ Provides an incomplete generalization, or does not apply any of science specialties
Rebuttal:	□ Correctly identifies that counter-argument is, "The mystery bones are more chimpanzee-like." □ Explains, in your own words, why your claim is a better claim than the counter-argument, using evidence and reasoning.	□ Correctly identifies that counter-argument is, "The mystery bones are more chimpanzee-like." □ Explains, mostly in your own words, why your claim is a better claim than the counter-argument using some evidence and incomplete reasoning	□ Identifies the counter-argument that the mystery bones are more chimpanzee-like, but includes evidence but not reasoning or reasoning but not evidence to show why your claim is better than the counter-argument	□ Does not identify appropriate counter arguments, and/or □ Does not provide sufficient evidence to address counter arguments, or provides more support for the counter-argument then the original claim
Writing:	□ Writing contains no grammatical or spelling errors □ Writing is clear, concise, and persuasive	□ Writing contains very few grammatical or spelling errors □ Writing is clear, mostly concise, and well developed	□ Writing is fairly clear, with some grammatical or spelling errors □ Writing could be more concise	□ Writing is difficult to follow, with many grammatical errors and no clear structure □ Writing is either too wordy or too incomplete

Evolution CERR Sample Student Response

Claim:

The bones from the mystery species are more closely related to Human Beings.

Evidence 1:

The first piece of evidence is found in the shape of the jaw features. The shape of the mystery bones species' jaw is like the letter "U", which is similar to the bones of the modern day Human Beings. The canine teeth of the mystery bones are not very sharp or pointy. This is like the modern day human canine. The side view of the jaw shows that the shape of the chin is curved which is also similar to the modern day Human Being. The width of the jawbone is somewhat wide, which also more closely resembles human jaw.

Reasoning 1:

Based on the structure of these jawbones, the mystery species most likely would have used tools to eat. These structures appear to be homologous because they have similar bone structures which means they must have evolved from the same common ancestor. Given this way of eating and that the mystery bones have more in common with the modern day human, the mystery species is more closely related to Human Beings.

Evidence 2:

The second piece of evidence is found in the shape of the pelvis. The pelvis is very wide which forms to the shape of the human's body structure. However, chimpanzees do not have a wide pelvis, they have a quite narrow pelvis. The third piece of evidence is found in the shape of the femur. The hip joint on the femur looks as though it can fit snug into the pelvis that seems to be of a Human Being. The fourth piece of evidence is found in the foot. The bones to the toes are very straight and the entire foot is also flat.

Reasoning 2:

According to my observations of the femur, pelvis and the foot, the mystery species was

most likely bipedal. By the pelvis being quite wide, shows that it can support two legs, such as Human legs. The femur also fits into the pelvis which gives the pelvis partial support for the legs. Also, by the foot being flat and its toes being very straight, proves that the mystery species was capable of walking on foot. All of these reasons supports the hypothesis of bipedalism. This has a strong connection to Human Beings because they are also bipedal.

Evidence 3:

The final piece of evidence is that the mystery fossils have been dated at 3.2 million years ago.

Reasoning 3:

This fossil seems similar to Lucy, which has also been dated to the same time period. Therefore, the mystery species could be from the same species, which is a closer relative of the Human Being. If scientists had DNA from the fossils, they could confirm this claim by comparing the genetic code across the living organisms, which would tell the exact percentage as to how closely related they are.

Rebuttal:

In contrary, given the shape of the lower jaw, another scientist might claim that this mystery species is more closely related to a chimpanzee. However, given the look of both canines, one could see that they aren't sharp as the chimpanzee's canines would be. It is more reasonable to infer that the animal is more closely related to a Human Being.