

Comparison of Mammalian Skulls

Activity

Scientific Investigation

The comparison of fossils is one way to investigate common ancestry among species. In this investigation, you will compare illustrations of a prehistoric mammalian skull to two present-day mammalian skulls. Then you will use this data to evaluate possible relationships among these organisms.



Pre-Activity Questions:

Answer the following questions before starting your investigation.

1. What is the question that you are trying to answer in this investigation, and why is it important?

2. What is the independent variable (also known as the manipulated variable)?

3. What is the dependent variable (also known as the responding variable)?

4. Is there a control? If so, what is it?

5. How will the dependent variable change when the independent variable changes?

6. What is your hypothesis?

7. What materials will you need to conduct this investigation?

8. Are there any safety considerations? If so, what are they?

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Procedure

- Using the Skull Reference Sheet, measure the boxes' length and width to calculate the face area and cranial area (mm^2).
- Is the cranial area larger than the face area? Answer YES or NO.
- Indicate whether a brow ridge is present or absent.
- Indicate whether a sagittal crest is present or absent.
- Are enlarged canine teeth present or absent?
- Using the Skull Reference Sheet, measure the jaw angle that is represented by the bold lines.
- Using the Skull Reference Sheet, measure the cranial span represented by bold square dots. Multiply this number by the cranial area to determine the cranial capacity (mm^3).
- Use this information to fill in the data table below.

Characteristic	Gorilla	<i>Australopithecus africanus</i>	<i>Homo sapiens</i>
Face Area			
Cranial Area			
Cranial Area (Larger Than Face Area)			
Brow Ridge			
Sagittal Crest			
Enlarged Canine Teeth			
Cranial Capacity			
Jaw Angle			



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Data Analysis

9. What are the similarities between the gorilla skull and *Australopithecus africanus* skull?

10. What are the similarities between the *Australopithecus africanus* skull and *Homo sapiens* skull?

Conclusion and Scientific Explanation

Using the data that you collected, write a scientific explanation regarding how the skull fossils illustrate common ancestry between these species. In your explanation, make sure to include which species you think share a more closely related common ancestor, which species share a more distantly related common ancestor, and why you came to those conclusions. Use a separate piece of paper if necessary.

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Rubric for writing a scientific explanation

Points Awarded	2	1	0
Claim	Not applicable.	Answers the question and is accurate based on data.	No claim or does not answer the question.
Evidence	Cites data and patterns within the data. Uses labels accurately.	Cites data from the data source, but not within the context of the prompt.	No evidence or cites changes, but does not use data from data source.
Reasoning	Cites the scientifically accurate reason using correct vocabulary, and connects this to the claim. Shows accurate understanding of the concept.	Cites a reason, but is inaccurate or does not support the claim. Reasoning does not use scientific terminology or uses it inaccurately.	No reasoning or restates the claim, but offers no reasoning.
Rebuttal	Rebuttal provides reasons for different data or outliers in the data. Can also provide relevance to the real world or other uses for the findings.	Rebuttal is not connected to the data or is not accurate.	Does not offer a rebuttal.