

ScienceNews

Activity Guide for Students: Examining Bias Through Fossils

Directions:

In this activity, you will learn about evidence for human evolution gathered in the 20th century and discuss the effects of bias on the interpretation of fossil features and the development of scientific explanations. You will develop a framework for observing and comparing fossils and then use that framework to make observations of fossils from the Smithsonian National Museum of Natural History. Finally, you will compare your observations about the fossils with a partner and discuss how the same evidence can be interpreted differently by different scientists.

The setup

As homework, read the *Science News* article "[Fossils and ancient DNA paint a vibrant picture of human origins](#)" and answer the following questions.

1. What is the main point of the article?
2. What details does the author provide to support the main point? Identify at least three supporting ideas or details.
3. What significant fossil finds or scientific breakthroughs affected how scientists looked at the evidence or at the explanations of hominin evolution?
4. What role did bias play in historical explanations of hominin evolution?
5. What questions do you have about the fossil evidence for hominin evolution or about explanations of human origins after reading the article?
6. Write a three-paragraph summary of the article's main points for other students in your class.

Class period 1

Paired feedback

Choose a partner and exchange article summaries. Read your partner's article summary and answer the following questions.

1. Read your partner's article summary. How was your partner's article summary similar to yours?
2. How was your partner's summary different from yours?
3. How could you improve your article summary?

Class discussion

Discuss the following questions in class.

1. What is bias?
2. Describe two potential sources of bias in scientific research. Try to give specific examples.
3. List examples from the article of hominin fossils that were described and interpreted by scientists throughout the 20th century. Identify at least one observation made by scientists about each fossil.
4. For each example, describe how the scientist's background or biases might have affected which features of the fossil they focused on.
5. What types or sources of bias influenced the scientists' interpretations of fossil evidence and explanations of human origins?
6. As a class, create a framework that can be used to analyze and compare hominin fossils. This framework could include specific language for describing fossils or a structured template for recording observations. When considering how to describe fossil features, look at the comparison of three fossil skulls in the article under the subhead "*Homo sapiens* arrives, somehow."

Consider the following questions as you develop your framework.

What parts of the body and which features will you look at?

Why are those structures or features important for distinguishing different species?

How will you describe the features you observe?

What will you use to collect your data?

What language or measurements will you use to make comparisons?

How can you structure your framework to account for bias in your observations?

7. As a class, agree on a framework everyone will use to observe and compare hominin fossils. Record the framework and any instructions or rules for conducting observations.

Class period 2

Fossil interpretation

You will use online photographs, 3-D scans and your class framework to make observations about hominin fossils.

1. Choose two fossils from the Smithsonian National Museum of Natural History [online fossil collection](#). Record the exhibit name or number for the fossils you choose and identify the locations or sites where the fossils were found, the fossils' estimated ages and the species names.

2. Following the class framework, list observations about each fossil.

3. Use the framework to describe how the two fossils are similar to and different from each other.

4. What questions, if any, do you still have about the fossils, about the framework or about how fossils are interpreted or compared?

Peer review and discussion

Once you have completed your observations, choose a partner who looked at the same fossils that you did and use the class framework to compare your observations.

1. Find a partner who looked at the same two fossils you observed. If your partner looked at the same species but different specimens, record the exhibit name or number for the fossils your partner observed and identify the location or site where the fossils were found, the fossils' estimated ages and the species name.

2. Compare and contrast your fossil observations with those of your partner.
3. What do you think caused any differences between your observations and those of your partner? Do you see any evidence of biases that may have affected the observations?
4. What do the differences indicate about inferring explanations of evolutionary history from fossil evidence alone?

