

# Geneticist: Homosapiens vs. Neanderthals

## Adventure Description:

In this adventure, students will think like geneticists and create a Youtube channel about how DNA can be used to make a claim about similarities and differences between Homo sapiens and Neanderthals.

## Activity

- Teacher Note: Students will need access to very cold isopropyl alcohol for this activity. We recommend putting a bottle of isopropyl alcohol in the freezer for at least an hour before beginning the activity.

### Step 1: Background Information on Geneticists and Species of Humans (5-10 minutes)

- Show [Video: Homo Sapiens versus Neanderthals](#).
- As a class, discuss how geneticists research DNA. Show [Handout: Importance of DNA](#).
- Next, ask students why geneticists study the DNA of early humans. Discuss the following:
  - Because artifacts can be difficult to find, studying DNA can offer clues about where and how early people lived. For example, the discovery of a jawbone on a high mountaintop in China allowed scientists to pull DNA from the bone. It showed that an early people known as the Denisovans were able to live in high, cold places.
  - Studying DNA of early humans can lead to completely new discoveries. In 2016, scientists discovered a completely new group of people, that were not related to any of the other early human groups such as Neanderthals or Denisovans. Scientist believe that this group lived in the Middle East, did not have contact with other groups, and later died out.
  - In 2013, a group identified as “African Neanderthals” was discovered in a cave. Like the Middle Eastern group, the “African Neanderthals,” appeared to be isolated from other early groups. It is believed that this group may have been part of larger group of Neanderthals, but split off and settled in Africa. But because there is so little DNA evidence, there are more questions than answers around how this group fits in with the overall family tree of early humans.

### Step 2: Activity Set Up (5 minutes)

- Explain to students that geneticists share their findings with the public. For example, scientists share their work through scientific papers, lectures, conferences, social media, or Youtube.
- Explain to students that they will imagine they are geneticists who are creating a Youtube episode about how DNA is used to analyze differences between early and modern humans. Provide students with [Handout: Steps to Create a Youtube Episode](#). As a class, read through the steps.

### Step 3: Extract DNA (25 minutes)

- Students will now complete Step 1 of the handout. Explain to students that in the first part of their video, they will show viewers what DNA looks like. In order to do this, students will do an experiment to extract DNA from strawberry cells. Then, they will show viewers what DNA looks like!
- Provide students with the following materials:
  - 100 mL graduated cylinder

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- Small cup or container
- 90 mL of water
- 10 mL of liquid dish soap
- Measuring spoon (1/4 teaspoon)
- 1/4 teaspoon of salt
- Spoon
- Plastic zipper top bag
- Strawberry
- 5 mL cold isopropyl alcohol
- Strainer
- Small bowl or other container (for use with strainer)
- Tweezers
- Optional: Clear dish or plate
- Have students complete step 1 on the handout.

## Step 4: Creating a Claim (20 minutes)

- Students will now complete Step 2 of the handout. Explain to students that in the second part of their Youtube episode, they will talk about how geneticists make claims about what they have learned from examining DNA. To make a claim, students will look at sources and collect information about the similarities or differences between early and modern humans. Then, they will choose what information they would like to present to their viewers.
- Teacher Note: Students will choose to either present similarities OR differences, not both.
- Provide students with [Handout: Sources to Use](#).
- Once students have read through the sources, instruct them to choose whether they would like to focus on the similarities or differences between early and modern humans.
- Once students have decided which side to present to their viewers, they should write their claim, or main message to deliver to their audience.

## Step 5: Creating a Script for a Youtube Video (20+ minutes)

- Students will now complete Step 3 and 4 on the handout. Explain to students that they will now write a script to use while recording their video.
- While students are working, discuss the following:
  - How does the study of DNA help scientists and historians understand the history of Neanderthals? (e.g. studying DNA from Neanderthal peoples, scientists and historians can learn about the genetic makeup of the Neanderthals, such as hair color, physical appearance and health, and how those traits may or may not be present in today's humans).
  - What challenges do geneticists face in working with DNA that is found from Neanderthal peoples? (e.g., there may be little genetic material available, or the material has been degraded in some way).
  - How does locating DNA from Neanderthal people in different places help historians understand their history?(e.g., historians can better understand where people lived and draw conclusions about how they lived).
- After students finish their scripts, have them use a tablet or phone to record their episode. Have students complete step 4 on the handout.
- Teacher tip: Create a private Youtube channel so that other students or parents can access to view their student's videos at home.

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## Step 6: Discussion (5+ minutes)

- Have students show their videos to the class.
- Have a concluding discussion about whether students had different claims in their videos. Discuss the following:
  - How can having different claims help people to understand different ways of learning about Neanderthal people? (e.g. different claims can help highlight more than one approach to learning about Neanderthals and Homo Sapiens)
  - Does having different claims make one more right than another claim? (e.g. does the fact that Neanderthals could stand cold better than Homo Sapiens make Homo Sapiens weaker? or just different?)
  - How can different claims help create other opportunities to study Neanderthals and Homo Sapiens? (e.g. studying the DNA of Neanderthals and comparing it to Homo Sapiens has opened up the possibility that the two groups have more in common than originally thought)
- Extra time? Allow students to debate whether early and modern humans have more similarities or differences overall. Ask students to back up their argument with evidence.

## Materials List

### Provided online:

- Video: Homo Sapiens versus Neanderthals
- Handout: Importance of DNA
- Handout: Steps to Create a Youtube Episode
- Handout: Sources to Use
- Handout: Steps to Create a Youtube Episode

### Not Provided Online:

- 100 mL graduated cylinder
- Small cup or container
- 90 mL of water
- 10 mL of liquid dish soap
- Measuring spoon (1/4 teaspoon)
- 1/4 teaspoon of salt
- Spoon
- Plastic zipper top bag
- Strawberry
- 5 mL cold isopropyl alcohol
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