

Model skull collection – Maxwell Museum Education Department

## Tracking Traits Through Time

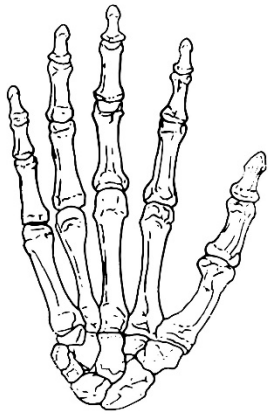
A **trait** is a characteristics that an organism can pass on to its offspring. Scientists study both physical and behavioral traits to understand the human experience. Comparing these traits with our closest living relatives (models for our last common ancestor) and measuring changes seen in hominid fossils and the archaeological record, shows us how these traits evolved.

Walking upright (bipedalism) in our early history allowed us to forage for new food resources. Early on, our teeth were the only things used to process food. They were typically large and robust, and set in heavy jaws. At the same time, walking upright freed up the hands to manipulate and carry things.



42.23.294, [Acheulean hand axe](#) – Maxwell Museum of Anthropology

About 1.8 million years ago, our ancestors started to use tools to forage for and process food. As tools appear in the archaeological record, changes in the size, shape and function of teeth are seen as well. Overtime, jaws and teeth reduced in size and moved directly under the eyes as the braincase (cranium) enlarged. With larger brains came more complex thinking and tool making.



Hands too changed over time. Early on, hands and fingers were long and strong, useful for gripping branches and climbing trees. Later, hands evolved to be relatively small with highly flexible digits and an acute sense of touch. Hands adapted to grasp and grip objects in a variety of ways can make and use tools. The archaeological record shows us, as tools became more and more complex, the thinking brain did as well.

The fossil record, shows how our physical traits changed over time. The archaeological record, shows how our behavioral traits changed over time. Both these traits give us clues about our ability for complex thinking and contributes to our understanding of how we've become the thinkers, writers, artists, etc. that we are today.



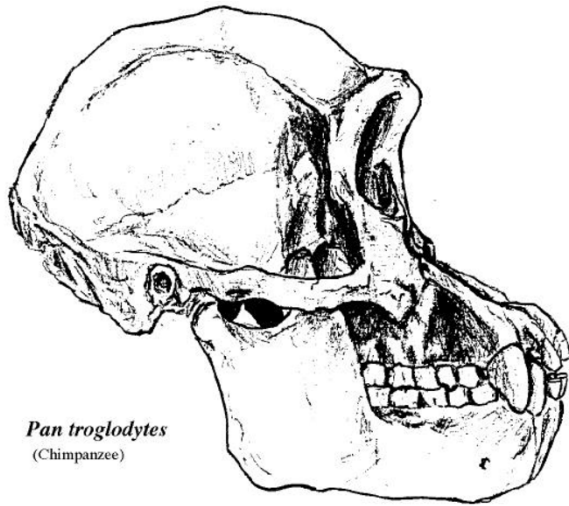
Niaux cave painting replica – Maxwell Museum

## Try the following activities to track traits through time and understand the human experience!

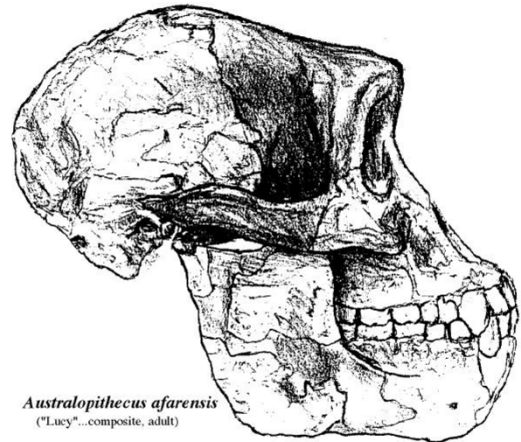
1. Skull comparison – identify changes in physical traits
2. Make a pair of calipers – use tools to measure 3-D objects
3. Opposable thumb challenge – experience life without thumbs!

## Skull Comparison

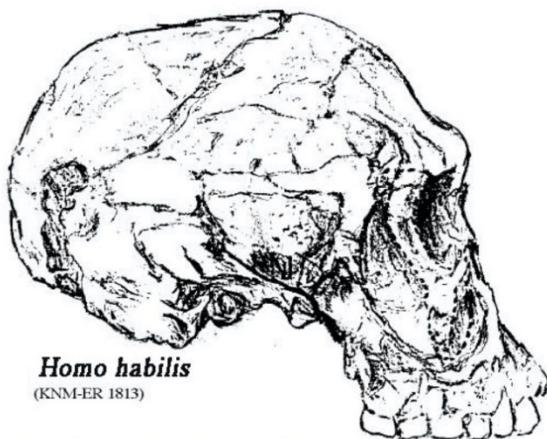
What changes do you notice over time in the skull shape? What happens to the jaw? Teeth? Cranium? Why do you think these changes happened?



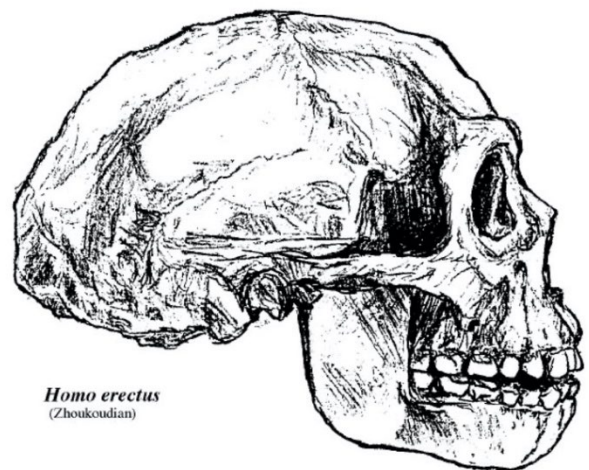
*Pan troglodytes*  
(Chimpanzee)



*Australopithecus afarensis*  
("Lucy"...composite, adult)



*Homo habilis*  
(KNM-ER 1813)



*Homo erectus*  
(Zhoukoudian)



*Homo neanderthalensis*  
(La Chappelle aux Saints)

Feel around your face. What parts of your skull come forward and which don't? What is the widest part of your skull? The narrowest? Looking at the images of our ancestors' skulls, how does your face measure up?

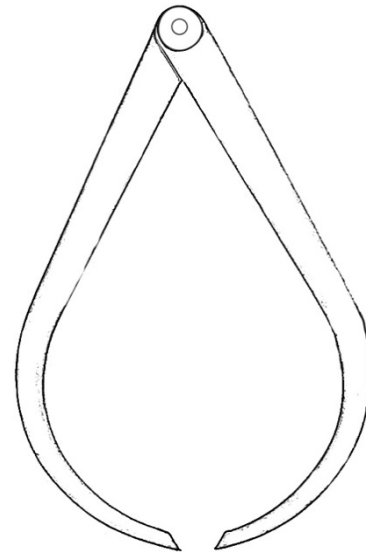
# Make a Pair of Calipers!

As our brain got bigger over time, humans were able to learn new things and became better at making and using tools. Calipers are a tool used by archaeologists to help precisely measure their finds. A ruler can help us measure flat objects, but calipers will help us find the length, width and height of larger, rounded or irregularly shaped objects.

You will need	
<input type="radio"/>	Cardboard or heavy cardstock
<input type="radio"/>	Brad paper fasteners or twist tie
<input type="radio"/>	Caliper printout
<input type="radio"/>	Ruler
<input type="radio"/>	Glue

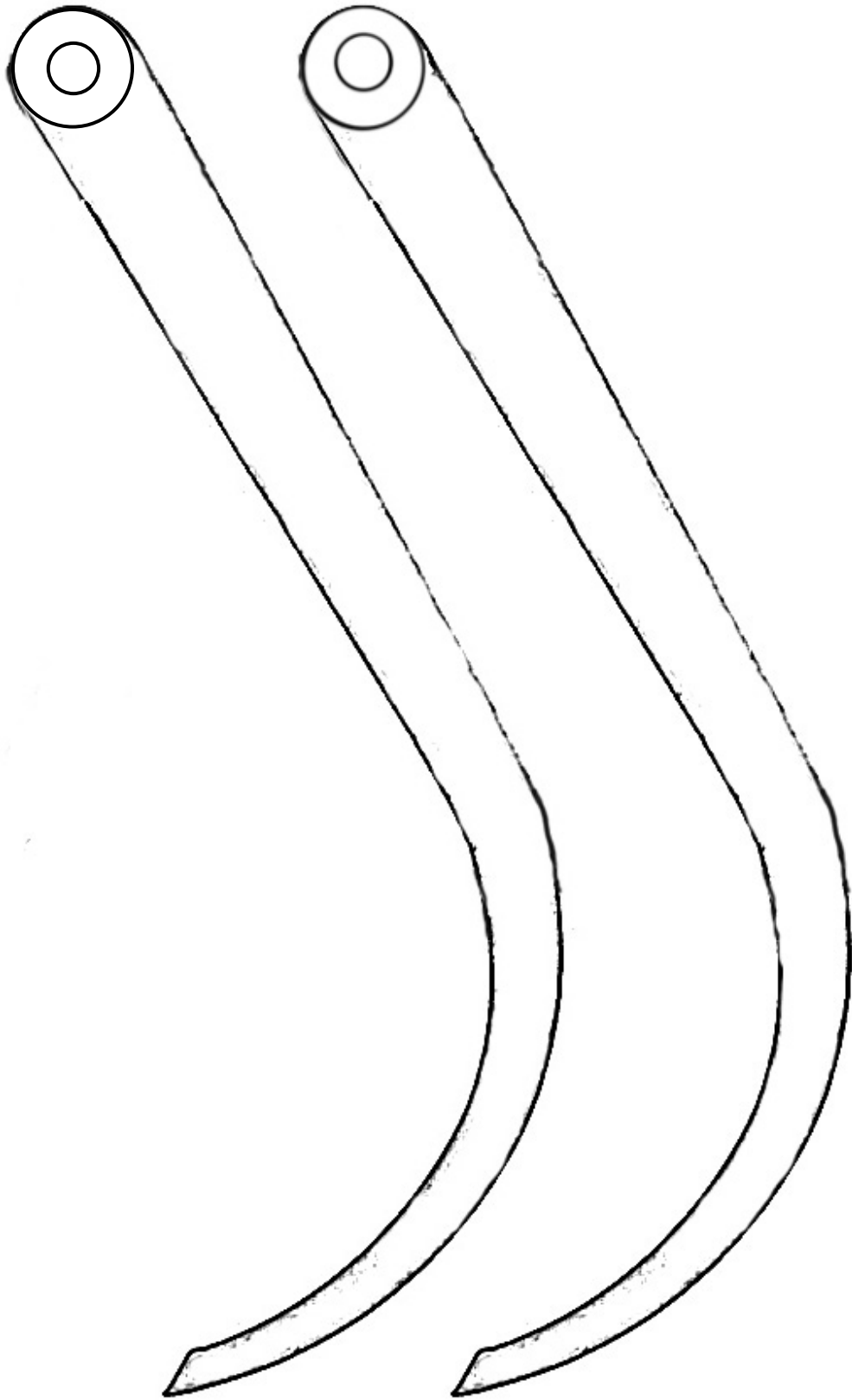
## Instructions

1. Print out the image below and glue it to some thick cardstock or cardboard. Then cut out each half.
2. Have someone help you use a sharp point to cut a small hole in the center of the circle on both prongs.
3. Run a brad paper fastener through the hole you made and flatten both edges, so you get a hinge. Don't have a paper fastener, thread a twist tie through both prongs and make a loop with the wire.
4. Use the calipers by placing the pointed ends on either side of what you are measuring. Then carefully holding them in place, measure the span between the points with your ruler.
5. Measure 3-D objects you find around your house with your own pair of calipers.



Write down your observations in the table below

Object	Length	Width	Height



## Opposable Thumb Challenge

Our brains weren't the only thing which helped us make more advanced tools. A large part of what makes us human is our hand anatomy that includes opposable thumbs. This means that our thumbs can touch all of our other fingers. This movements allows us to grip and pinch things with more power.

If we didn't have opposable thumbs, the simplest tasks become difficult. Try these simple tasks without using your thumbs.

Tape your thumb to the middle of your palm and:

- Zip a zipper
- Pick up a coin
- Tie your shoe
- Write your name
- Open a water bottle



Try the activities again, taping down your pinky finger instead this time. What changed?

**Resources:**

Great Transitions Interactive: Human Origins – Howard Hughes Medical Institute

<https://media.hhmi.org/biointeractive/click/human-origins/>

Meet the Relatives Interactive – American Museum of Natural History

<https://www.amnh.org/exhibitions/permanent/human-origins/meet-the-relatives>

Bigger Brains: Complex Brains for a Complex World – Smithsonian National Museum of Natural History

<https://humanorigins.si.edu/human-characteristics/brains>

Human Characteristics: Tools and Food – Smithsonian National Museum of Natural History

<https://humanorigins.si.edu/human-characteristics/tools-food>

Becoming Human Interactive Documentary – BecomingHuman.org

<http://www.becominghuman.org/node/interactive-documentary>

**Photo credit:**

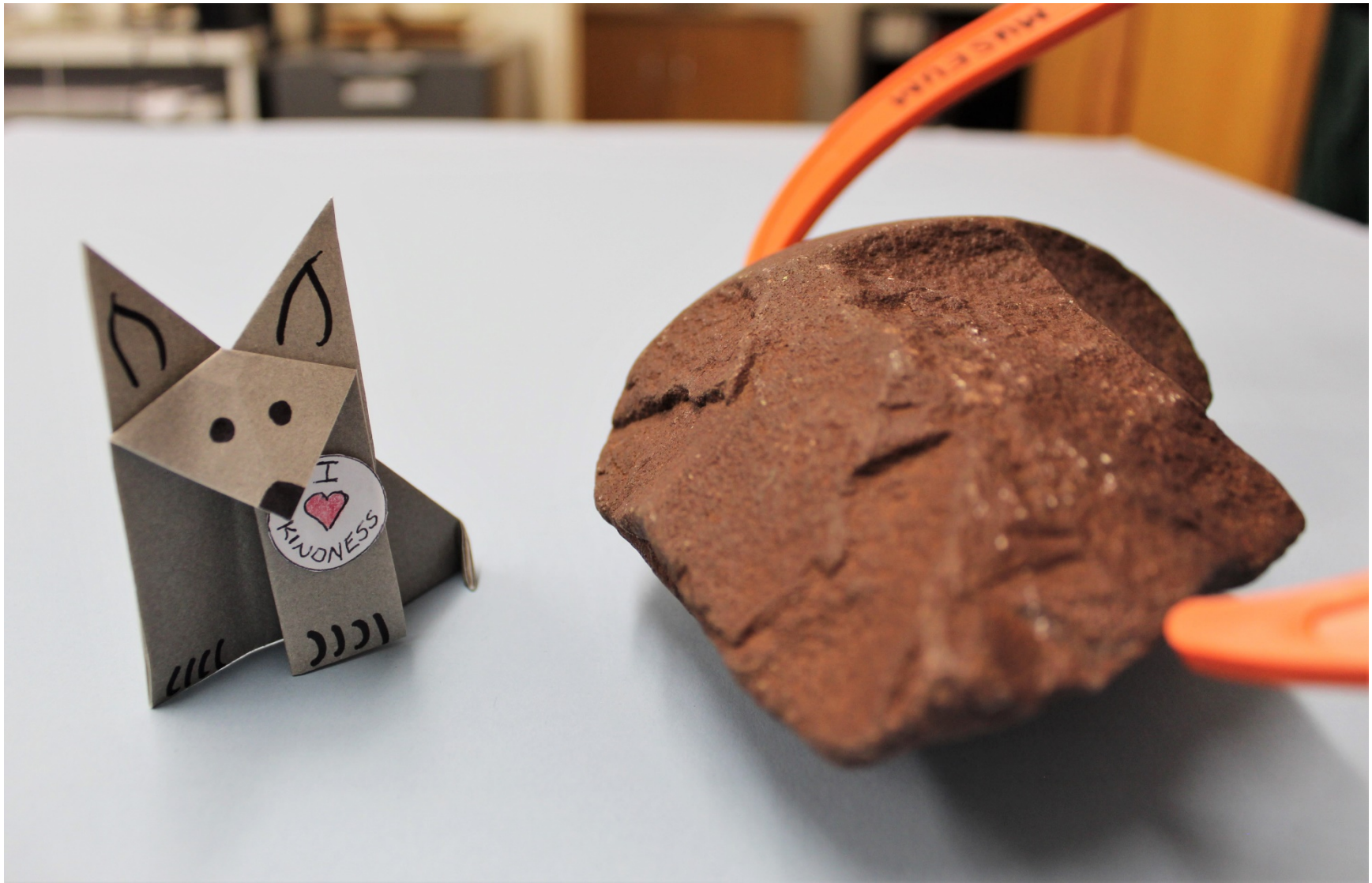
42.23.294, Acheulean hand axe, flint or chert

1.65 million to 100,000 years ago

Old World (country of origin unknown)

Frank Carney collection

Photograph by B. Bernard



Lulu assisting with measuring a stone tool