



Smithsonian
National Museum of Natural History

DAVID H. KOCH **HALL OF HUMAN ORIGINS**

EDUCATOR

GRADES 5-12

GUIDE

**This guide will help you plan a successful field trip
to the David H. Koch Hall of Human Origins.**

HumanOrigins.si.edu



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What the Hall Offers

This exhibition is a great place to explore:

- » *some of the milestones in human evolution;*
- » *a variety of early human species that evolved and went extinct over the past 6 million years;*
- » *the relationship between human evolution and the dramatic climate fluctuations that occurred during this time;*
- » *examples of the survival challenges early humans faced—and how they adapted;*
- » *how scientists use evidence such as fossils and DNA to learn about human evolution.*

The exhibit also provides an opportunity to instill a passion for scientific discovery by building on students' natural curiosity about human origins.

What this Guide Offers

This guide contains basic information and a range of strategies for using the exhibit to engage your students in the subject of human evolution. Links direct you to other supportive information on this website, humanorigins.si.edu.

Because human evolution can fit into different areas of the curriculum, we have developed itineraries related to five themes:

1. Milestones in Human Evolution
2. Human Family Tree
3. How Do We Know?
4. Primate Heritage
5. Climate and Survival

You can select those themes and activities that best meet your particular curriculum goals and needs.

Human evolution is a vibrant scientific field, and the origins of our own species is a topic of great personal interest to most people. We hope this guide will help you and your students experience the excitement of scientific discovery.

National Science Standards

All of the following standards are supported by a field trip to the Koch Hall of Human Origins. This guide focuses on those related to Life Science.

Science as Inquiry	Life Science	Earth and Space Science Standards	History and Nature of Science
<ul style="list-style-type: none"> Abilities necessary to do scientific inquiry Understanding about scientific inquiry 	<ul style="list-style-type: none"> Regulation and behavior Populations and ecosystems Diversity and adaptations of organisms 	<ul style="list-style-type: none"> Earth's history 	<ul style="list-style-type: none"> Science as a human endeavor Nature of science

THE HALL OF HUMAN ORIGINS

What does it mean to be human?

There are, of course, many answers to that question—including physical traits, behaviors, values, beliefs, emotions, and spirituality. This exhibit invites you and your students to explore milestones in the evolution of several human traits over the past 6 million years. You can then incorporate this knowledge into your personal understanding of what it means to be human.

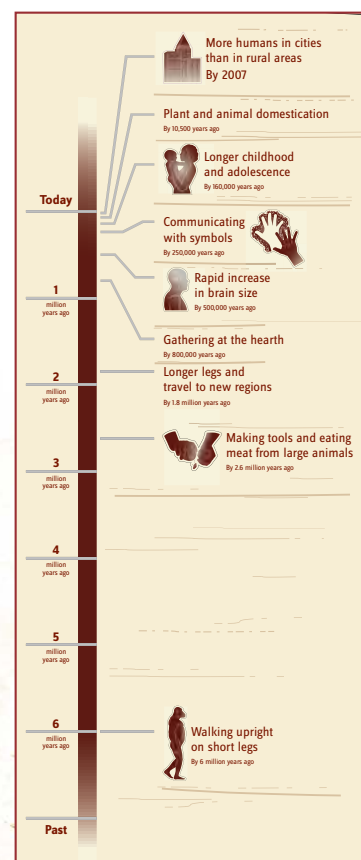
THE BIG IDEAS

Over a long period of time, as early humans adapted to a changing world, they evolved certain traits that help define our species today.

This exhibit focuses on several human traits that evolved over the past 6 million years. As you and your students explore the scientific evidence, you will discover that these traits did not emerge all at once or in any one species. There were important milestones along the way. For example, early humans began walking upright before they began making tools. A rapid increase in brain size occurred before early humans began using symbols to communicate. And all of these traits emerged before humans began domesticating plants and animals.

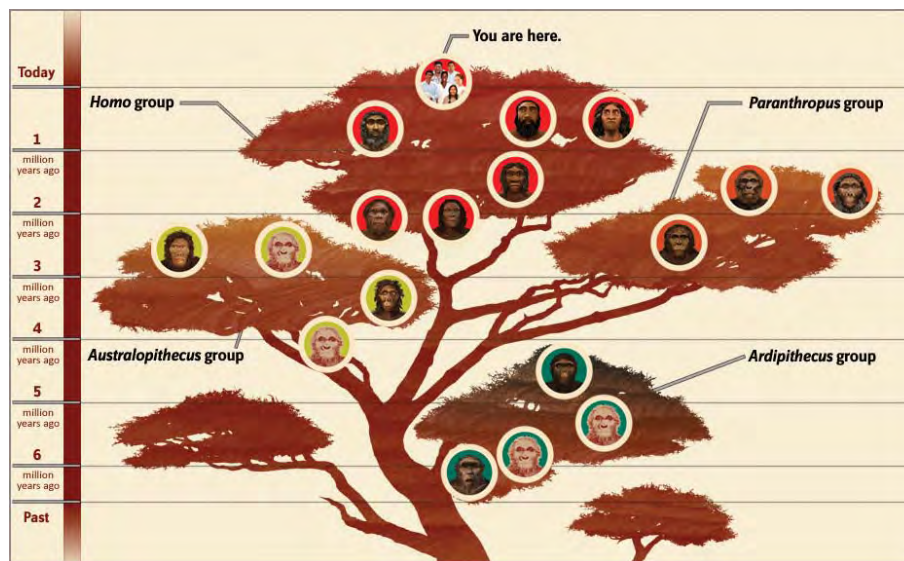
Human beings share many traits with other primates.

DNA evidence confirms that humans are primates and that we belong to the same biological group as great apes. Our closest relatives are chimpanzees and bonobos, with whom we share many physical and behavioral traits. In fact, there is only about a 1.2 percent genetic difference between modern humans and chimpanzees throughout much of their genetic code. In the exhibit students will discover what traits humans share with our closest primate relatives and what traits are unique to humans.



The human family tree is diverse.

For much of the 6 million years of human evolution, more than one early human species lived on Earth at the same time. Researchers have identified fossils of more than twenty early human species so far. Over time, these species became extinct. Our own species, *Homo sapiens*, is the lone survivor. Students will see reproductions of some early human species, learn how they survived, and discover how early and modern humans relate to each other on the human family tree.



Humans evolved during a time of dramatic environmental change.

Earth's climate has always fluctuated between warm and cool, moist and dry. But during the last 6 million years (the period in which humans evolved), these fluctuations became more extreme. The traits that early humans evolved helped them survive. Throughout the exhibit students will encounter examples of how early humans responded to the challenges presented by changing climates—and how this led to the evolution of unique human traits.



Website Links

[Introduction to Human Evolution](#)
[Broader Social Impacts Committee](#)

[Human Characteristics](#)
[Glossary](#)

EXHIBIT FLOOR PLAN

Each major area is described in the following pages.



TIME TUNNEL

As students enter the exhibit, they walk through a short tunnel that takes them back through time from the present to 6 million years ago. They see animations of some of their distant relatives and examples of different environments in which early humans lived.



ORIENTATION (OCEAN HALL SIDE)

The displays in this area are good places to introduce students to the hall's overall themes.

Human Family Tree

- Students explore a large illustration of the human family tree and locate our own species, *Homo sapiens*. We are the lone survivor on the tree today.
- Nearby are reproductions of skulls of five early human species that students touch and compare. They can find each species on the human family tree.

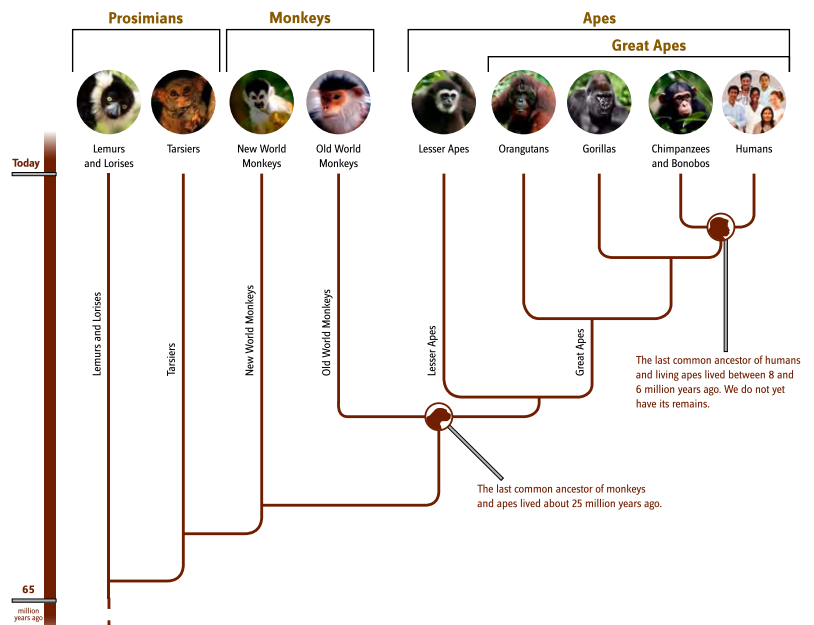
Climate Video

- A 2-minute video shows how Earth's climate has shifted between periods that were warm and cool, and periods that were moist and dry. These shifts became more extreme over time.
- Students see how human traits such as toolmaking and large brains emerged during times of extreme climate shifts.



Primate Family Tree

- This illustration shows how genetically similar modern humans are to chimpanzees (98.8%)—as well as to mice (85%), chickens (75%), and banana trees (60%)!
- A panel nearby explains that DNA confirms humans are primates. Between 8 and 6 million years ago, modern humans branched off from the common ancestor we share with chimpanzees and bonobos.



EVOLUTIONARY MILESTONES

These exhibits provide an opportunity for students to explore some major milestones in human evolution and to examine scientific evidence for each milestone. The milestones are organized in six major sections.

Milestones in Human Evolution Timeline

- This timeline shows when some of the major human traits emerged over the past 6 million years—from walking upright to domesticating plants and animals.
- Students will see similar timelines throughout the exhibit.



Walking Upright

- Fossils show how early humans made a gradual transition from walking on four legs to walking on two legs. Walking upright enabled early humans to move around in a variety of environments and to cope with changing climates.
- Students examine the cast of a 3.2-million-year-old early human skeleton (Lucy) with both apelike and humanlike features. They can also walk a trail of early human footprints made in East Africa 3.6 million years ago.



New Tools, New Foods

- Students compare a variety of early human tools and discover how these tools helped early humans obtain new foods, alter their surroundings, and survive in a variety of environments.
- Students see the oldest-known human tool kit and some tools made by chimpanzees.

Changing Body Sizes and Shapes

- Students compare the body shapes of several early human species and discover how the different shapes emerged in response to changing climates and new diets.
- Students also compare the skeletons of a *Homo erectus* boy who lived in a warm climate and an adult Neanderthal who lived in a cold climate.

Bigger Brains

- A series of brain endocasts (replicas of the insides of braincases) illustrates that brains increased in size as early humans faced new environmental challenges and as their bodies got bigger.
- Students use an interactive to compare their brain with a chimpanzee's.

Social Life

- Students examine evidence that shows how early humans met the challenges of survival by sharing food, caring for infants, creating shelters, using fire, and building social networks.
- They also compare casts of the skeletons of two early human children.

Creating a World of Symbols

- Human artifacts show how symbols such as color, words, and sound changed the way early and modern humans lived and provided new ways to cope with an unpredictable world.
- Students see reproductions of some of the earliest-known human art. They can also compare their hands with handprints left by humans in caves and rock shelters around the world.



SNAPSHOTS OF SURVIVAL

In these interactive media experiences, students use scientific evidence to reconstruct scenes from the past.



1.8 Million Years Ago, Swartkrans, South Africa

- This experience unveils the life and death challenges one early human species (*Paranthropus robustus*) faced in South Africa's wooded grasslands.
- Students examine fossil clues, and then watch an animation of a leopard preying on an early human as his group forages for food.

990,000 Years Ago, Olorgesailie, Kenya

- This media experience shows how a group of *Homo erectus* used tools and cooperated with others to survive during one of East Africa's dry periods.
- Students examine fossil and artifact clues, and then watch an animation showing a group of *Homo erectus* butchering an elephant.

65,000 Years Ago, Shanidar Cave, Iraq

- This media experience re-creates a scene in which a group of Neanderthals bury and mourn a member of their community.
- Students examine fossil and artifact clues, and then watch an animation showing the mourners placing colorful flowers in the burial pit.

SMITHSONIAN RESEARCH STATION

Students discover what Human Origins Program scientists have learned about early humans and past environments in the Rift Valley of East Africa and in northern China.

They can use a computer interactive to explore ancient hippo footprints, an early human fossil skull, and a variety of other important finds at the program's research site in Kenya.

MEET YOUR ANCESTORS

In this area students can compare fossils of different early human species and explore how the species are related to each other.

Six Million Years of Human Evolution

- This display features 76 fossil skulls from 15 species of early humans—including the oldest-known fossil human (*Sahelanthropus tchadensis*) and Cro-Magnon Man.
- Students use a computer interactive to examine some of the skulls more closely, to compare skulls, and to explore relationships among a variety of early human species.

Head Reconstructions

- Students look into the eyes of eight early human species in this display of lifelike reconstructions.
- They can learn what made each species unique and how the species compare with each other.



Morphing Station

- Here students can transform themselves into an early human.
- They select one of eight early human species and watch their own faces morph into the face of that species.

Survival Stories

- These fossils provide clues to the dangers and survival challenges early humans faced.
- Students examine the fossils to see how four individuals died—from an eagle attack, crocodile bite, vitamin overdose, and blow to the head.

Neanderthal Skeleton

- This is a rare opportunity to see the remains of an original fossil Neanderthal skeleton discovered in 1957 in a cave in Iraq.
- Students examine the skeleton to discover how we know the individual's age (40-50 years old), sex (male), and what he ate (plants). They also look for the stab wound that may be evidence of the oldest-known homicide in the fossil record.

CHANGING THE WORLD

This area focuses on how *Homo sapiens* became the sole surviving human species, how modern humans changed the world, and how our human traits help us imagine our future.

Climate and Survival

- Students explore some of the environmental challenges that both Neanderthals and modern humans faced.
- They find out why Neanderthals became extinct—but not us.

Imagine Your Descendents

- This 2.5 minute video describes the impact of modern humans on Earth and introduces the Anthropocene, a geological era named after humans due to the significance of our impact.
- The video ends with a message advising visitors to think about what we want our environmental future to look like.

Keep Your Species Alive

- In this group game, students face a series of imaginary survival challenges and make choices that affect our species' survival.
- Students learn that whether *Homo sapiens* thrives or becomes extinct depends in part on how adaptable we are and how well we cooperate with each other.

ONE SPECIES, LIVING WORLDWIDE

This 5-minute media presentation explores the origins of modern humans in Africa about 300,000 years ago and celebrates our species' epic journey around the world. Students learn that this shared genetic history is written in every cell of their bodies and that the DNA of all humans living today is 99.9% identical.



ORIENTATION (MAMMALS HALL SIDE)

Ape Heritage

- This display explores the body features that humans share with chimpanzees, gorillas, orangutans, and other apes.
- Students can touch fossil skulls of extinct apes—including two that could be an ancestor of modern humans.

Introductory Video

- This 1-minute video provides a quick introduction or review of milestones in human evolution.
- Students can also examine the family tree representing the common ancestry of every living human.

SPECIES SCULPTURES

Five bronze sculptures of early human species that lived between 2.3 million and 17,000 years ago and that are now extinct

TEACHING ABOUT EVOLUTION

The David H. Koch Hall of Human Origins focuses on what has been learned about human evolution through scientific methods and evidence.

There are, of course, other ways of approaching the topic of human origins, and students bring with them a variety of worldviews and religious beliefs. There need not be a conflict between these religious beliefs and the concept of evolution. For suggestions on how to handle questions about the relationship between science and religion, go to [Broader Social Impacts Committee](#) and [Teaching Evolution through Human Examples](#).

What Is Evolution?

Evolution is the biological process responsible for the magnificent diversity of life on Earth. Through the process of evolution, new species emerge—including our own, *Homo sapiens*.

FACTS ABOUT EVOLUTION

Evolution is a well-established scientific theory.

It is the cornerstone of modern biology, enabling us to understand the history of life on Earth—including that of humans.

Like gravity and plate tectonics, evolution is a scientific theory. Outside of science, a theory implies an untested opinion or even a guess. But in science, a theory is far more than a mere opinion or guess. It is the highest level of scientific knowledge. It is the best explanation for natural processes. It is well-tested and supported by abundant evidence. Scientific theories such as evolution enable scientists to make predictions. They drive investigations and the continued search for evidence.

Evolution is a biological process.

To survive, living things adapt to their surroundings. Occasionally a genetic variation gives one member of a species an edge. That individual passes the beneficial gene on to its descendants. More individuals with the new trait survive and pass it on to their descendants. If many beneficial traits arise over time, a new species—better equipped to meet the challenges of its environment—evolves.

There is ample evidence for evolution.

Scientists have discovered millions of fossils that provide evidence for how one life form evolved into another over time. In the case of human evolution, the evidence includes fossils of more than 6,000 early human individuals representing 6 million years of evolution. Comparisons of DNA, anatomy, and behavior provide other critical evidence that tells us how living organisms are related and how they evolved over time.

In addition, scientists have developed more than a dozen highly reliable methods for determining the age of fossils, human artifacts, and the sediments in which they are found.

MISCONCEPTIONS ABOUT EVOLUTION

Misconception: Evolution involves only random changes—things happening by chance.

Response: Random mutation is the ultimate source of genetic variation. But natural selection (the process by which only some variants survive) is *not* random. For example, streamlined body shapes evolved among some aquatic animals like sharks and dolphins. They could swim faster and therefore better capture prey and escape danger. They were more likely to survive, reproduce, and pass on their traits to the next generation.

Misconception: Evolution is about progress. Organisms are always changing and getting better, with humans as the culmination.

Response: Evolution is not about organisms marching up a ladder of progress. Many organisms—including some mosses, fungi, opossums, and crayfish—have changed little over long periods of time. They are fit enough to survive and reproduce in their environment, which is enough to ensure their existence. Other organisms—such as beetles and finches—changed and diversified greatly as they adapted to changing climates or new competitors. But that doesn't mean they got "better." And humans were definitely *not* the last organism to evolve. Numerous other species have evolved since the onset of human evolution.

Misconception: Evolution is directed toward an intentional goal or need.

Response: The process of biological evolution is not intentional. There is no evidence that evolution responds to what a species "needs." It does, however, shape adaptations that enable organisms to survive and thrive in their environments. If an individual has a particular genetic variation that enables it to survive better than others, it will have more offspring and the population will evolve. Without this process of adaptation, or natural selection, a population may die out. Natural selection is a response to genetic variation and environmental conditions—*not* to an organism's goal.

Misconception: Individuals can evolve during their lifetimes.

Response: Evolution happens to populations and species, *not* to individuals. An individual giraffe's neck will *not* grow longer during its lifetime due to selection pressure to eat from taller trees. But if pressure for long necks exists, then individual giraffes with longer necks will survive and reproduce more often than those with shorter necks. They will produce offspring with longer necks, resulting in a population or species shift to giraffes with longer necks.

Misconception: Gaps in the fossil record disprove evolution.

Response: Science actually predicts gaps in the fossil record. Many species leave no fossils at all, and the environmental conditions for forming good fossils are not common. The chance of any individual organism becoming fossilized is incredibly small. Nevertheless, new fossils are constantly being discovered. These include many transitional fossils—e.g., intermediary fossils between birds and dinosaurs, and between humans and our primate ancestors. Our lack of knowledge about certain parts of the fossil record does not disprove evolution.

Misconception: Humans are no longer evolving, and we can't actually observe evolution in action.

Response: Human evolution usually occurs over so many generations that we can't observe it. But sometimes it happens over a relatively short span. One recent example is the evolution of the ability to digest milk. Most adult mammals, including humans, are lactose-intolerant and cannot digest milk. But nearly 80% of adults of European ancestry have a gene that enables them to digest milk. Researchers think that this genetic change evolved in response to the spread of dairy farming 5,000-10,000 years ago.

Misconception: Humans are too complex to have evolved.

Response: Humans are the product of evolutionary processes that go back more than 3.5 billion years. We evolved new physical traits and behaviors on top of those inherited from earlier primates, mammals, vertebrates, and the very oldest living organisms. Take the human eye, for example. Scientists think that 550 million years ago or more, a light-sensitive spot on the skin of an ancestral creature provided a survival advantage. Random changes over millions of years led to the evolution of a pit with a narrow opening, a retina, and eventually a lens. Eyes corresponding to these stages exist in living species. According to one calculation, only 364,000 years would have been needed for a complex eye like ours to evolve from a light-sensitive patch.

Misconception: If humans evolved from apes, there wouldn't still be apes.

Response: Humans and chimpanzees both evolved from a common ape ancestor that is now extinct. Based on genetic differences between humans and chimpanzees, scientists estimate that this common ancestor lived between 8 and 6 million years ago. Humans evolved a series of differences from this common ancestor; chimpanzees evolved their own unique series of differences. Like many other species that evolved from the same common ancestor, modern humans and modern chimpanzees continue to exist at the same time.

Website Links

[Introduction to Human Evolution](#)

[Fossil Evidence](#)

[Glossary](#)

[How Do We Know?](#)

[Genetics & Primate Family Tree](#)

[Broader Social Impacts Committee](#)

FIELD TRIP STRATEGIES

Customize Your Field Trip

Here are five itineraries based on different themes related to human origins:

1. Milestones in Human Evolution
2. Human Family Tree
3. How Do We Know?
4. Primate Heritage
5. Climate and Survival

You may choose to have all your students focus on one theme or on a combination of several themes. Or, you may assign different groups of students to different itineraries and have them share their findings with other students back in the classroom.

It should take about one hour for students to complete each of the above structured itineraries. Be sure to leave some additional free time for students to explore displays other than those on the itineraries.

Find the Best Place to Start

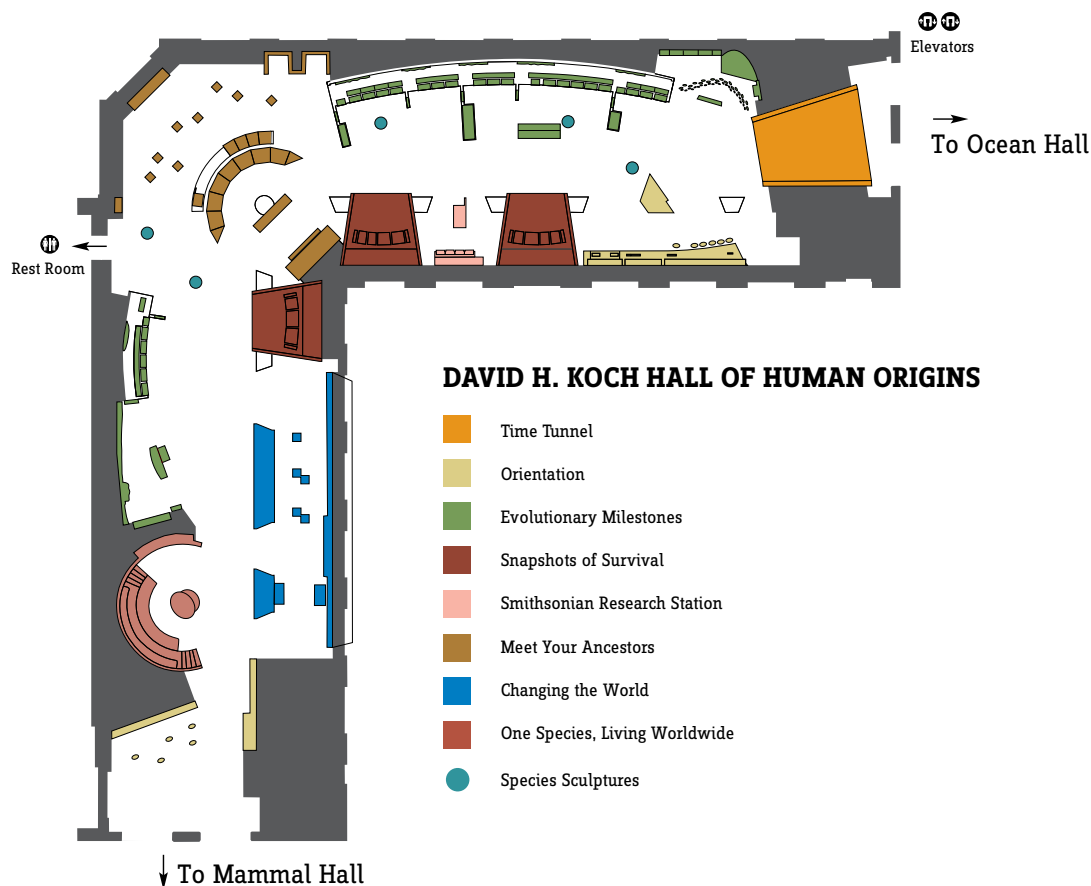
The hall is located on the First Floor of the National Museum of Natural History. There are two entrances—one through the Ocean Hall, and one from the Mammals Hall.

We strongly recommend that you enter through the Ocean Hall.

Chronologically and conceptually, the displays are easiest to follow from this direction. In addition, this entrance enables your students to start off with the dramatic experience of walking through a Time Tunnel and coming face to face with a variety of early humans.

- » *As you walk through the Ocean Hall, point out that the same biological processes that produced such amazing diversity in the sea also led to the evolution of our own species on land.*
- » *As you exit through the Hall of Mammals, remind students that humans are part of this major group of vertebrates. You might stop at the primate display to see some of our closest relatives.*

DAVID H. KOCH HALL OF HUMAN ORIGINS EDUCATOR GUIDE



Before the Field Trip

Spend some time in the classroom orienting students to the exhibit and to the mission of the field trip. Research shows that the more familiar students are with the physical space of an exhibit and what they will be doing there, the better they can focus once they enter the exhibit's novel and stimulating setting.

- » *Explain why students will be visiting the exhibit, what they will be doing there, and how it relates to what they are studying.*
- » *Use the photos, exhibit map, and interactive floorplan available on this website to orient students to the space and how it is organized, including where they will enter and where they will leave.*
- » *Point to each of the major areas on the map and give examples of different things students can do in each area.*
- » *Encourage students to think about what they might look for in the exhibit, and what interests them most.*
- » *Answer any questions.*

Website Links:

[Exhibit Interactive Floorplan](#)

FIELD TRIP ITINERARIES

Theme #1: Milestones in Human Evolution

A. PREPARING FOR THE FIELD TRIP

Ask students to name some of the traits that make us human. Write the traits on the board, grouping them in categories—*e.g., physical traits, mental abilities, behaviors, emotions, spirituality, etc.* Emphasize that all of students' responses are valid.

Explain that in the exhibit, students will be exploring several human traits that emerged and changed at different times.

The traits are organized in six sections:

Walking Upright

New Tools and Foods

Body Size and Shape

Bigger Brains

Social Life

Language and Symbols

Each section presents a series of milestones in the evolution of human traits. It took millions of years for all the traits that define our species to accumulate.

Their mission is to explore at least one human trait. They should find out when that trait emerged, how it changed, and what scientific evidence there is for those changes (or milestones). Students should also think about how the trait helped early humans adapt to different environments and how it expanded their capabilities.

B. AT THE MUSEUM

Before you enter the Time Tunnel, remind students of the field trip's theme and their mission. Divide the class into groups, and encourage students to work together and to discuss their questions and discoveries with each other.

Give each student an exhibit map and a copy of the handout for this theme. Make sure students understand what displays on the map will help them complete their mission.

C. BACK IN THE CLASSROOM

Have each group of students report on what they discovered about the milestones that occurred in the evolution of human traits—and about the evidence for those milestones.

1. What was one of the human traits that emerged first? How do we know?
2. What was one of the last traits to emerge? How do we know?
3. How long did it take for all the traits to emerge?
4. Does it surprise students that it took so long?

Then discuss how traits such as walking upright on two legs, large brains, and complex social lives helped early humans adapt to their environments and survive.

5. How do modern humans use these same traits?
6. What can students themselves do as a result of their uniquely human traits?

If time allows, have students produce a large timeline (perhaps illustrated with students' drawings or photos of scientific evidence) that presents major milestones in human evolution.

Website Links:

[Human Characteristics](#)

[Interactive on "What Does It Mean to Be Human?"](#)

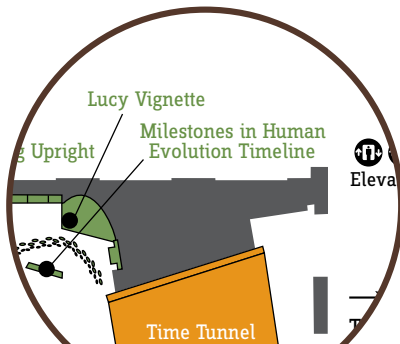
[Video on fossil evidence of human evolution](#)



MILESTONES IN HUMAN EVOLUTION

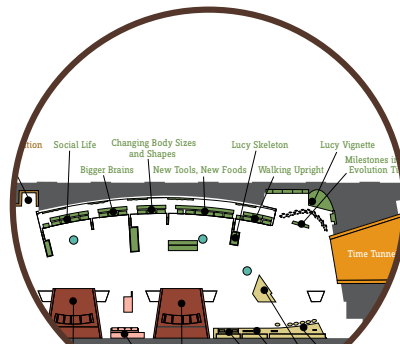
These displays will help you complete your mission.

[Look for them on the full exhibit floor plan.](#)



Milestones in Human Evolution Timeline

Notice which milestones emerged before others.



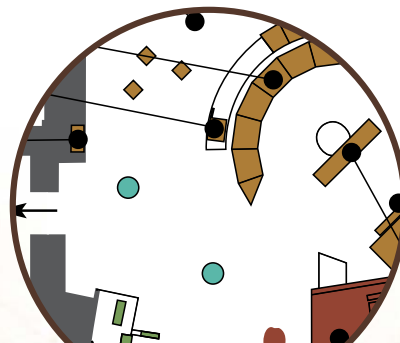
Evolutionary Milestones Displays

Visit at least one of these displays to look for milestones in the evolution of human traits. Use the worksheet to record your findings.



Changing the World Displays

Find out when humans became a turning point in the history of life on Earth—and why.



Species Sculptures

Can you tell what human traits each early human species had—and what traits each species did not have?

NAME

DATE

DATA COLLECTION GUIDE

Name of human trait: _____

PART 1:

What was the first milestone to occur as early humans evolved this trait?

When did that milestone occur?

Describe at least one piece of scientific evidence for that milestone. *(You can also draw or take a photo of the evidence.)*

PART 2:

What was the next milestone?

When did that milestone occur?

Describe at least one piece of scientific evidence for that milestone. *(You can also draw or take a photo of the evidence.)*

PART 3:

What was another milestone?

When did that milestone occur?

Describe at least one piece of scientific evidence for that milestone. *(You can also draw or take a photo of the evidence.)*

PART 4:

How did this trait help early humans adapt to their environment and survive?

Other notes or questions:

Theme #2: Human Family Tree

A. PREPARING FOR THE FIELD TRIP

Ask students if they've seen or heard of family trees that represent the genealogy, or history, of particular human families. Discuss how these trees show how all members of a family are related, and how living members descended from their ancestors. The human family tree is very similar, but it shows relationships among species rather than individuals. It also covers a much longer time period—about 6 million years.

Make sure students understand that all humans living today belong to one species: *Homo sapiens*. The exhibit refers to our species as “modern humans.” There are many other species on the human family tree that are now extinct. The exhibit refers to these species as “early humans.”

- » *Ask students if they've heard of any specific early human species.*
- » *Which species have they heard of?*
- » *What impressions do they have about what these early humans were like?*

Use the descriptions of early human species on this website humanorigins.si.edu/evidence/human-fossils/species to introduce some of the species featured in the exhibit and to begin to explore some of the ways the species differ from each other. Explain that students will learn a lot more about these species in the exhibit.

Their mission is to find out all they can about at least one early human species, including how it was like—and unlike—our own species. Students will use their findings to produce a human family tree.

B. AT THE MUSEUM

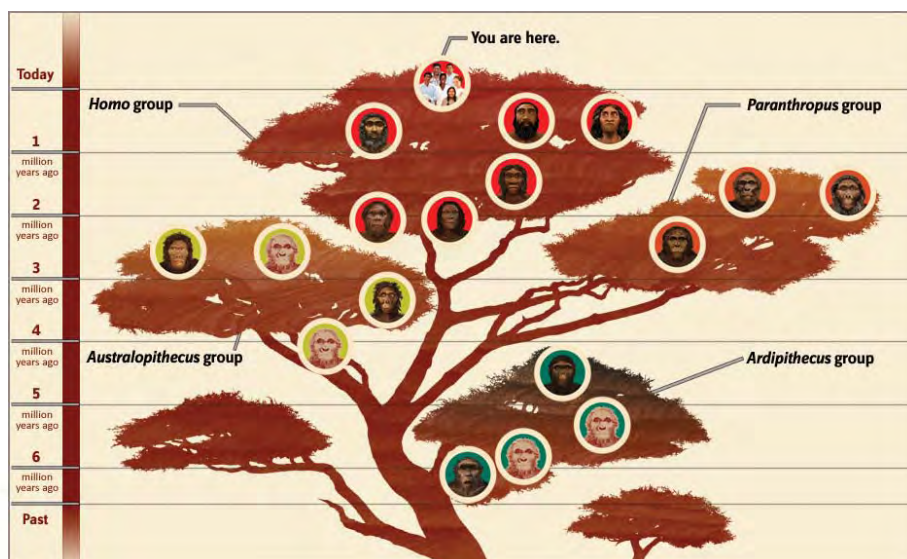
Before you enter the Time Tunnel, remind students of the field trip's theme and their mission. Divide the class into groups, and encourage students to work together and to discuss their questions and discoveries with each other.

Give each student an exhibit map and a copy of the handout for this theme. Make sure students understand what displays on the map will help them complete their mission.

C. BACK IN THE CLASSROOM

Create a classroom display using the photos students had taken of themselves as early human species (at the Morphing Station). Then have students report on the early human species they researched. Discuss the similarities and differences between these early humans and modern humans.

1. What did students find most interesting about the species they researched?
2. What was most surprising?
3. Have their impressions of early humans changed at all?
4. Did they realize that the human family tree had so many members and groups?



If time allows, have students construct a human family tree featuring the early human species they researched in the exhibit. Have them place each species in the appropriate group on a family tree and describe some traits the species shares with other members of that group.

Website Links:

[Fossil Evidence Family Tree](#)

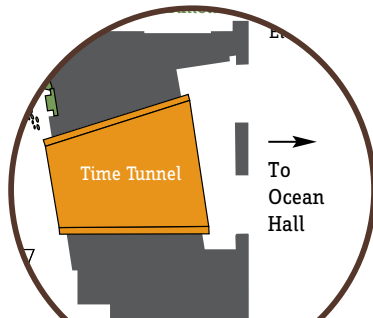
[Early Human Species](#)

[One Species Worldwide Video](#)

HUMAN FAMILY TREE

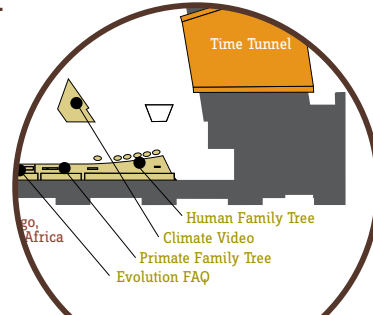
These displays will help you complete your mission.

Look for them on the full exhibit floor plan.



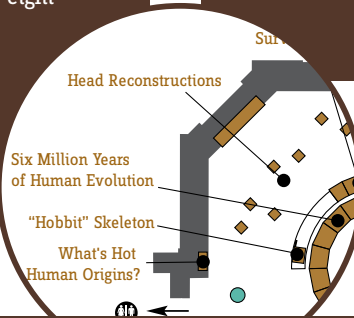
Time Tunnel

As you travel back in time, watch for eight early human species. Notice that more than one species existed at different times in the past. Pay attention to what the species are doing.



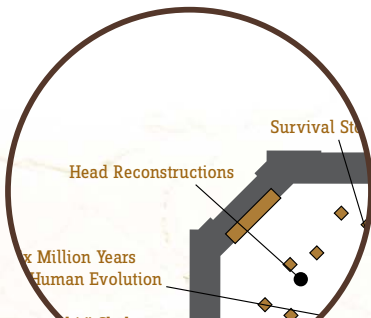
Human Family Tree

Notice the four major groups on the tree. Find our species: *Homo sapiens*. Which group do we belong to? What early human species existed at the same time as us? Touch and compare the five skulls of early humans displayed nearby. Then find them on the tree.



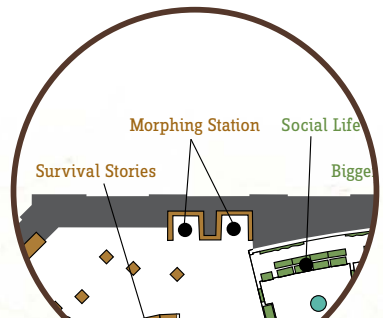
Six Million Years of Human Evolution

The 76 fossil skulls in this display come from 15 early human species as well as our own species, *Homo sapiens*. They are arranged chronologically. Look for the oldest skull, one from our own species, and one from the sculpture or head reconstruction species that interested you most. What differences do you see between earlier and later skulls?



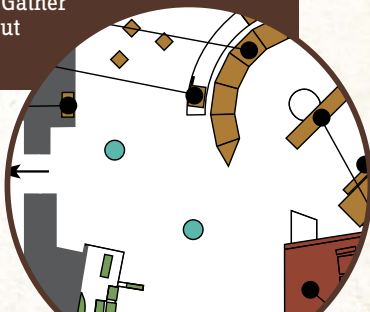
Head Reconstructions

Take a close-up look at eight early human species. Gather more information about one of the species.



Morphing Station

Have your face transformed into the face of an early human, and have the depiction emailed to your home or school.



Species Sculptures

Visit all five sculptures. Then gather information about the early human species that interests you most.



One Species, Living Worldwide

Watch this 5-minute video to follow the worldwide journey of our own species and to find out how scientists know all humans living today belong to the same species.

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Visit the early human sculptures and head reconstructions, then select the species that interests you most.

Why does this species interest you?

What is the name of the species?

When did the species live?

Where did it live?

How tall was this species?

What did it eat?

What is one physical feature you notice?

In what ways does this early human seem like us?

In what ways does this early human seem different from us?

What can you conclude about this species' lifestyle?

Draw or take a photo of your species.



Theme #3: How Do We Know?

A. PREPARING FOR THE FIELD TRIP

Tell students to imagine that they are detectives who have been hired to find a missing person. How would they go about tracking down that person and solving the mystery? Students will probably mention the need to look for clues. Discuss how scientists who study human origins are a lot like detectives. They must look for clues and figure out how all the pieces fit together. In the exhibit students will have a chance to examine a variety of kinds of scientific evidence.

Their mission is to find at least three different kinds of clues that scientists use to reconstruct the story of human evolution, to think about the questions those clues help answer, and to come up with questions of their own and a plan for answering them.

B. AT THE MUSEUM

Before you enter the Time Tunnel, remind students of the field trip's theme and their mission. Divide the class into groups, and encourage students to work together and to discuss their questions and discoveries with each other.

Give each student an exhibit map and a copy of the handout for this theme. Make sure students understand what displays on the map will help them complete their mission.

C. BACK IN THE CLASSROOM

On the board, list the clues students found, grouping them into appropriate categories such as: fossil clues, genetic clues, behavioral clues, geological clues, archaeological clues, etc. Discuss what questions the different kinds of clues help answer.

1. What questions intrigued students the most?
2. What other kinds of clues might help answer the same questions?

Then ask students to share some of their own questions about human evolution.

3. What kinds of evidence could help answer these questions?
4. Do students see how questions drive scientific research and discovery?
5. Are students surprised by how much evidence there is for human evolution?

Finally, show students the short video narrated by Dr. Matt Tocheri, Human Origins Program scientist, illustrating some of the modern technologies that help scientists find answers to questions about human evolution. Students can research the Smithsonian's Human Origins Program to meet some other scientists and find out what they are discovering about human evolution. What questions are they trying to answer?



Website Links:

[How Do We Know](#)

[Video on fossil evidence of human evolution](#)

[Video on latest technologies meet human evolution](#)

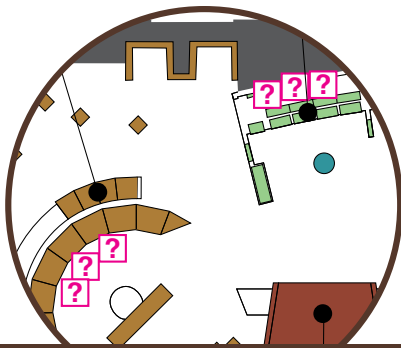
[Human Evolution Research](#)

[Video on personal stories](#)

HOW DO WE KNOW?

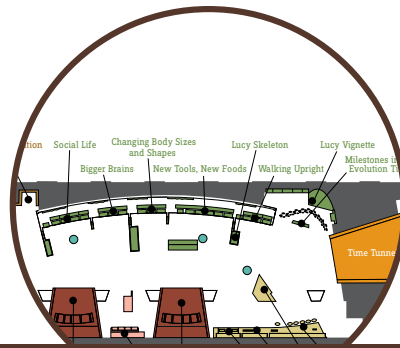
These displays will help you complete your mission.

[Look for them on the full exhibit floor plan.](#)



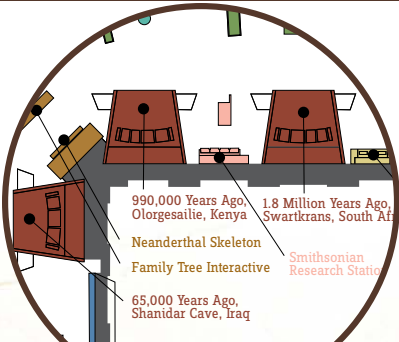
How Do We Know? Labels

There are 17 of these labels spread throughout the exhibit. Use them to explore questions that scientists ask and scientific evidence that answers these questions.



Evolutionary Milestones Displays

Visit at least one of the six sections. What different kinds of scientific evidence do you see for the milestones in human evolution?



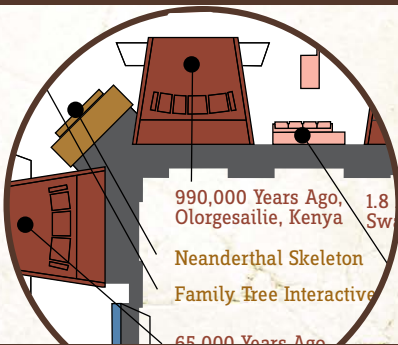
Snapshots of Survival Displays

Visit at least one of these three interactive stations. Use the fossil clues to reconstruct what happened in the past.



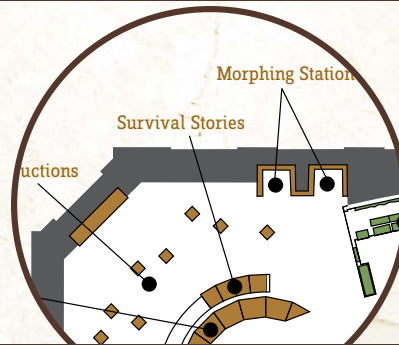
Smithsonian Research Station

Discover what clues helped Human Origins Program scientists figure out how environments have changed in Africa's Rift Valley. Explore the scientists' research site on the computer interactive.



Neanderthal Skeleton

Examine a fossil skeleton of a Neanderthal for clues to the age and sex of the individual, what his life was like, what he ate, and how he died.



Survival Stories

Look for clues that tell us how four early humans died.

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1. What questions do scientists ask about human evolution?

Find three questions that interest you, and list at least one piece of evidence that answers each question.

Scientist's Question

Evidence

1.	
2.	
3.	

2. What questions do you have about human evolution?

List your questions and what evidence you could look for to answer them.

My Question

Possible Evidence

1.	
2.	
3.	

Theme #4: Primate Heritage (*older students*)

A. PREPARING FOR THE FIELD TRIP

Remind students that humans are primates, and that we belong to the same group as great apes. Ask students if they can name some of the great apes (e.g., chimpanzees, gorillas, and orangutans). Which one is our closest relative? (It's the modern chimpanzee.) Make sure students understand that being closely related does *not* mean we evolved from a chimpanzee, or another kind of ape, or a monkey. It means that sometime in the past—more than 6 million years ago—we shared a common ancestor.

Use the primate images to introduce some of our primate relatives.

- » *How do students think we are similar to other primates?*
- » *How are we different?*

Explain that in the exhibit, students can learn more about how we are related to other primates, and how we are like and unlike our close primate relatives.

Their mission is to find at least one piece of evidence for how we know humans are primates, and to describe at least two ways humans are similar to other primates—and two ways we are different.

B. AT THE MUSEUM

Before you enter the Time Tunnel, remind students of the field trip's theme and their mission. Divide the class into groups, and encourage students to work together and to discuss their questions and discoveries with each other.

Give each student an exhibit map and a copy of the handout for this theme. Make sure students understand what displays on the map will help them complete their mission.

After you leave this exhibit, stop at the primate section of the Mammals Hall to observe some of the basic features of primates. You can also see a model of the now-extinct species scientists believe is the common ancestor of all mammals: *Morganucodon oehleri*.

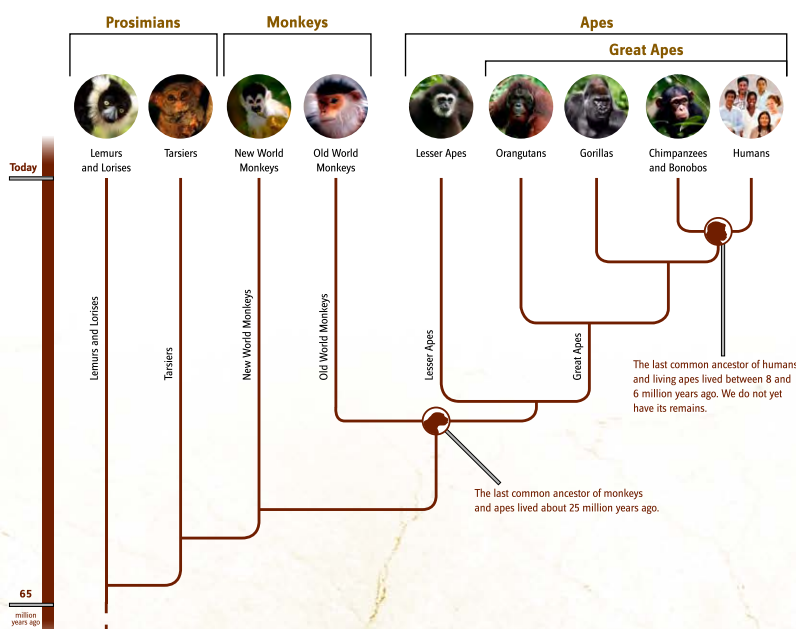
C. BACK IN THE CLASSROOM

Discuss what evidence students found for how we know humans are primates (e.g., physical similarities, genetics, behavior).

Then discuss some of the ways we are similar to our primate relatives (chimpanzees in particular), and what makes us different. Refer to some of the traits covered in the Evolutionary Milestone Display sections: Walking Upright, New Tools and Foods, Body Size and Shape, Bigger Brains, Social Life, and Language and Symbols.

1. If chimpanzees occasionally walk upright, what makes humans different?
2. How are human tools different from the tools chimpanzees make?
3. How does your brain compare with a chimpanzee's?

Students might even demonstrate some of the differences—e.g., walking or using tools like a chimpanzee and a human. If time allows, have students do more research on the features of primates and discuss how humans reflect those features.



Website Links:

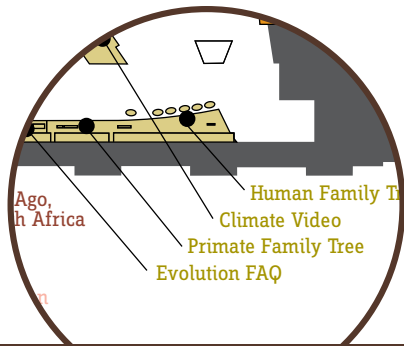
[Primate Videos](#)

[Genetics & Primate Family Tree](#)

PRIMATE HERITAGE

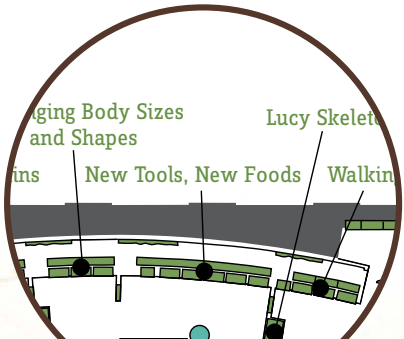
These displays will help you complete your mission.

[Look for them on the full exhibit floor plan.](#)



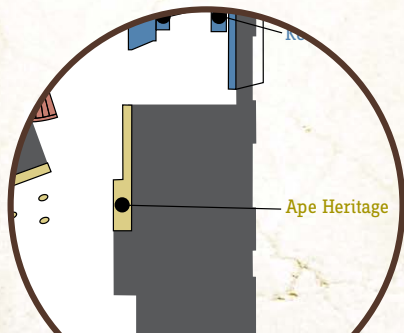
Primate Family Tree

Find humans on the primate family tree, and discover how scientists know humans are primates. Look for your closest primate relative, and learn how genetically similar you are to a chimpanzee, mouse, and banana tree.



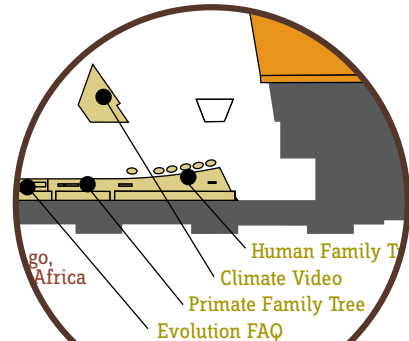
New Tools, New Foods

Look for the chimpanzee tools, and compare them with the stone tools made by early humans and with the more specialized human tools that came later.



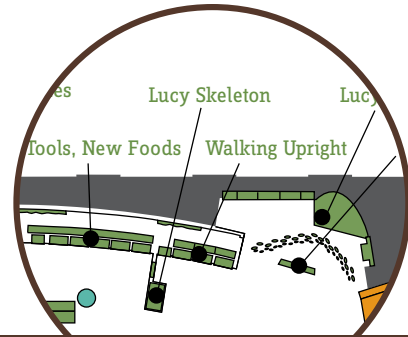
Ape Heritage

Explore the adaptations we share with other apes. Touch casts of fossil skulls from extinct apes—including some who could be an ancestor of humans.



Primate Heritage Videos

Watch these four 1-minute videos to find out some ways humans are like and unlike chimpanzees and other primates. Try walking and communicating like a chimpanzee!



Lucy Skeleton

Visit the 3.2-million-year-old skeleton of Lucy, an early human with both apelike and humanlike features. Then look for the nearby Lucy Vignette that shows Lucy at home both in the trees and on the ground. Walk in the trail of footprints made by other members of Lucy's species. How do the footprints compare with yours?



Head Reconstructions

Look closely at these reconstructions of eight early human species, and compare the earlier and later species. Notice how the earlier species have flatter noses, larger faces, and smaller braincases—features that are more apelike. The later species have larger braincases, smaller faces, and more prominent noses. How does the angle of the face change over time?

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How do we know humans are primates?

Describe at least two sources of scientific evidence.

How were early humans like other primates?

Describe at least three similarities. You can also draw or take photos of the similarities.

How are modern humans like other primates?

Describe at least three similarities. You can also draw or take photos of the similarities.

How are modern humans different from other primates?

Describe at least three differences. You can also draw or take photos of the differences.

Theme #5: Climate & Survival (*older students*)

A. PREPARING FOR THE FIELD TRIP

Ask students to list some of the survival challenges modern humans face. They may suggest problems such as disease, accidents, or warfare. Then have students imagine some of the survival challenges early humans might have faced—e.g., finding food and water, staying warm, and avoiding predators.

- » *What kinds of conditions would have made it hard for early humans to find food, water, and shelter?*
- » *What if the climate kept changing? How would that have affected early humans?*

Explain that scientists in the Smithsonian's Human Origins Program are investigating the relationship between climate change and human evolution.

- » *Did climate change have an impact on human evolution?*

Their mission will be to look for evidence in the exhibit to answer that question, to find out more about the survival challenges early humans faced, and to think about the survival challenges modern humans face.

B. AT THE MUSEUM

Before you enter the Time Tunnel, remind students of the field trip's theme and their mission. Divide the class into groups, and encourage students to work together and to discuss their questions and discoveries with each other.

Give each student an exhibit map and a copy of the handout for this theme. Make sure students understand what displays on the map will help them complete their mission.

C. BACK IN THE CLASSROOM

Discuss what students learned about climate change over the past 6 million years—the period in which humans evolved.

1. How did the Earth's climate change during that time?
2. Did it have an impact on human evolution? If so, what was it?
3. What is the evidence?

Show students the short video on environmental change and human evolution (see link below), narrated by Rick Potts, director of the Human Origins program. Discuss how Dr. Potts used research and scientific evidence to test the hypothesis that climate change was an important factor in human evolution.

Finally, discuss climate change today, how it is different from climate change in the past, and whether or not it still affects us.

4. Is the climate still changing?
5. What effect does climate have on students' lives and on the lives of other humans worldwide?
6. How are modern humans affecting the climate in ways early humans did not?
7. Could climate change affect the future survival of humans?



Website Links:

[Video on environmental change and human evolution](#)

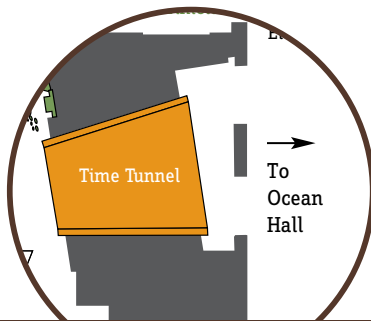
[Climate Change](#)

[Humans Change the World](#)

CLIMATE & SURVIVAL

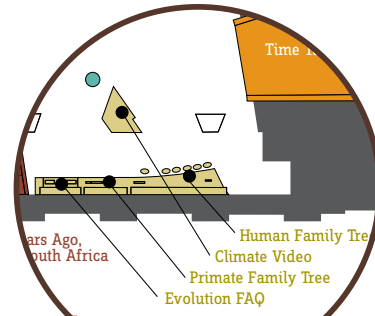
These displays will help you complete your mission.

Look for them on the full exhibit floor plan.



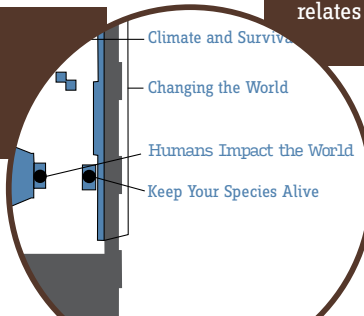
Time Tunnel

As you walk through the tunnel, notice some different environments and climates early humans encountered.



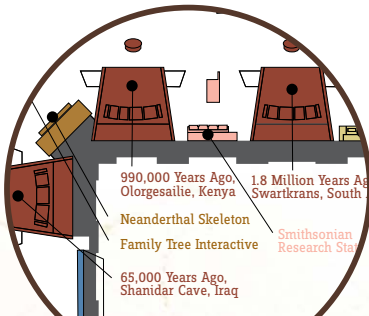
Climate Video

Don't miss this brief presentation. It shows how Earth's climate has shifted over time. It also relates some periods of dramatic climate change to milestones in human evolution.



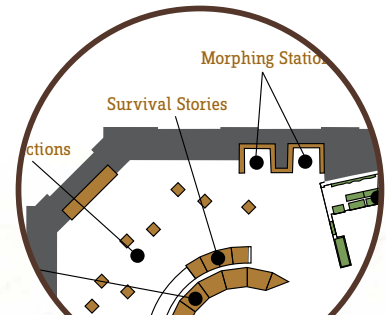
Keep Your Species Alive

Today our species is the only one remaining on the human family tree. But will we continue to survive? Work with your classmates to try to prevent our species from going extinct.



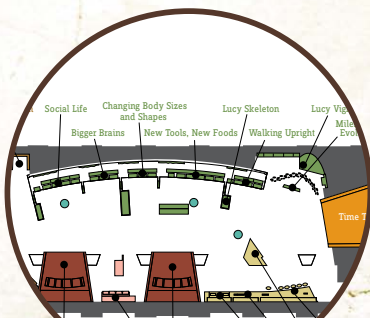
Snapshots of Survival Displays

Visit either the Swartkrans or Olorgesailie interactive display. What challenges did those early humans face? How did they respond to the challenges?



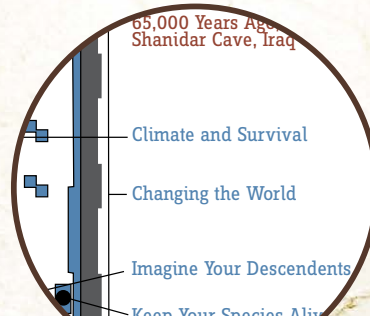
Survival Stories

What survival challenges did these four early human individuals face? How do we know?



Evolutionary Milestones Displays

Visit at least one of these displays. Can you find evidence for how a particular trait helped early humans survive?



Life and Death in a Changing World

Explore some of the environmental challenges that Neanderthals and modern humans both faced. Why did Neanderthals become extinct—but not us?

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Did climate change have an effect on human evolution?

Your conclusion: ☐ No ☐ Yes

Describe the evidence for your conclusion. *You can also draw or take photos of the evidence.*

Describe at least three survival challenges that early humans faced.

What traits helped them survive?

What are some of the survival challenges that modern humans face?

What traits will help us survive?