Elementary School | Grades 3–5

UNCOVERING OUR AFRICAN PAST THROUGH TRACKS AND BONES

ESSENTIAL QUESTION

Where did we all come from and how are we all the same?

OBJECTIVES

Students will:

- → Learn about key scientific discoveries advancing our understanding of human origin.
- → Explore the key evidence of early hominid existence in Africa.
- → Investigate the ways in which humans migrated and populated the Earth.
- → Understand the shared genetics of all humans and that humanity emerged in Africa.
- → Explain why racial categories based on skin color are false and not based in science.

LEARNING STANDARDS

See the standards alignment chart to learn how this lesson supports New Jersey State Standards.

TIME NEEDED

70 minutes

MATERIALS

- → AV equipment to show a video
- → *Lucy Bingo* handout (one per student)
- → *Animated Life: Mary Leakey* handout (one per student)
- → *Mapping "Footsteps of My Ancestors"* handout (one per pair or small group)
- → Yarn and glue (optional)

VOCABULARY

ancestor
Australopithecus afarensis
bipedal
DNA
evolution
extinct
fossil
genes/genetics
hominids
Homo sapiens
migrate
paleontologist
species

Procedures

PART I
Useful Doodle (20 mins)

1 Project Google's 'Lucy Doodle' [0:38] commemorating the 41st anniversary of the discovery of the skeletal remains of the early hominid named Lucy in 1974, in what is today Ethiopia: https://www.google.com/doodles/41st-anniversary-of-the-discovery-of-lucy.

2 Ask students: "What do you think is the message of this Google Doodle?" Likely responses should address the evolutionary history of humans. Show students photos of Lucy, such as those on the National Geographic website.

3 Have students play bingo using the *Lucy Bingo* handout, in order to find out more about what scientists have learned from the discovery. In pairs, students place an 'O' on statements they think are true and an 'X' on those they believe to be false. When they finish, review the answers as a class and discuss their significance. Teams that get four correct responses in a row (true or false) earn a bingo!

a O	**b** O	**c** O	**d** X
e O	**f** O	**g** X	**h** X
i O	**j** X	**k** O	**l** O
m X	**n** O	**o** O	**p** O

NOTE

All three figures in the Doodle—the primate, Lucy and the human—are members of the zoological family Hominidae (the "great apes"), which includes humans, chimpanzees, gorillas and orangutans.

NOTE

Items d, g, h, j and m are false; all others are true. Here are the explanations for the false items: (d) Lucy's species was *Australopithecus afarensis*; (g) Lucy was bipedal; (h) Lucy lived to about 11 or 12 years of age; (j) Lucy's species could climb trees; (m) Lucy's brain was smaller than ours; it was about the size of a chimpanzee's.

PART II
Flinging Dung—Discovering Bipedal Hominids in Africa (20 minutes)

4 Share the following fact: Two years after Lucy's fossils were discovered and we learned that her species walked upright, another important discovery was made in Africa. Ancient footprints were discovered that showed the manner in which early hominids walked.

5 Show students the video "Animated Life: Mary Leakey" [7:51]: https://www.biointeractive.org/classroom-resources/animated-life-mary-leakey. Individually or in pairs, have them take notes on the *Animated Life: Mary Leakey* graphic organizer as they watch, using the questions below as a guide. Pause at strategic intervals to allow students to capture ideas and to discuss important concepts.

- **Who** uncovered the Laetoli footprints?
- **What** do the footprints teach us about early humans and evolution?
- **Where** were the footprints found?
- **When** were the footprints originally formed?
- **Why** was this discovery important?

6 Review the following information with students:

- Scientists know humans migrated from Africa to populate the rest of the world over thousands of years.
- Genetics are the traits we inherit from our parents and all of our ancestors.
- Scientists know people, worldwide, share the same genetics from common ancestors who lived in Africa at least 100,000-200,000 years ago.

7 Point out that in the Mary Leakey video, the narrator shares that before the discoveries of Lucy's fossils and the Laetoli footprints, most paleontologists in the Americas and Europe did not believe that humans evolved in Africa. Ask the class: "Before the physical evidence was found in the 1970s, why do you think scientists resisted that Africa was the origin of all humans?" Encourage students to consider how perspectives on race and culture might have influenced their beliefs.

PART III
Everyone on Earth is Related (30 minutes)

NOTE

This activity can be done as a whole class or in small groups if students have access to laptops or tablets.

8 Introduce students to the "Footsteps of My Ancestors Photo Gallery": https://www.nationalgeographic.com/traveler/photos/genographic0510/genographic_gallery2.html. Explain that the Genographic Project, created by the National Geographic Society and IBM, uses DNA samples to map how humans populated the Earth. Share that journalist Donovan Webster, who was aware of his Scottish heritage, learned after a DNA analysis that he also shares genetic markers with the peoples of Tanzania, Lebanon, Uzbekistan and Spain. He spent a summer visiting the descendants of his ancestors and documenting his journey.

9 Show students the photos in the gallery one at a time, reading together the captions for each image. In pairs or small groups, have students map Donovan's "genetic route" on the *Mapping "Footsteps of My Ancestors"* handout by attaching yarn or drawing lines from one country to the next. Then discuss the following questions:

- What was surprising to you about Donovan's discovery and his genetic makeup?
- What did you learn about how humans have populated the Earth?
- In what way is everyone on Earth related?
- What do you know about your own genetic route? What more would you like to find out?

10 Project or share the following quote from Dr. Spencer Wells, lead scientist of the Genographic Project:

You and I, in fact everyone all over the world, we're literally African under the skin; brothers and sisters separated by a mere two thousand generations. Old-fashioned concepts of race are not only socially divisive, but scientifically wrong.

Have students journal in response to the quote, discussing what they think it means, how it is we're all related ("African under the skin") and why some of society's ideas about race are incorrect. Allow time for students to share and discuss their writing in pairs or as a whole class.

Discussion Questions

1. What evidence points to Africa as the place where all of humanity originated?
2. Why is it important for us to know that our earliest ancestors came from Africa?
3. What conditions, can you imagine, motivated early Africans to migrate to other parts of the world?
4. What physical adaptations or changes were necessary for early humans to migrate?
5. How are all human beings connected genetically?
6. Why do you think categories of race based on skin color developed? How are such categories disproved by science?

Lesson Extensions

- Show students the video "Walking with Lucy" [1:58]: https://www.calacademy.org/educators/walking-with-lucy. This computer animation demonstrates the evolution of hominids by highlighting the anatomical similarities and differences among chimpanzees, *A. afarensis* (Lucy) and modern humans.
- Show students the video "Becoming a Fossil" [2:34], which explores how skeletal remains, such as Lucy's, might have become fossilized: https://ny.pbslearningmedia.org/resource/tdc02.sci.life.evo.becfossil/becoming-a-fossil. Then, have students create their own fossils by pressing natural materials (e.g., leaves, twigs, etc.) into a pan of wet plaster of Paris. After they have dried, students can observe one another's fossils and record salient facts, such as which parts of the object made the clearest impressions and which are harder to identify.
- Encourage students to look for tracks in their school's environment, including in dirt and on sidewalks. Following the precedent of Mary Leakey and her team, challenge the students to observe the tracks and make observations about who created them. Students can also create their own tracks on butcher paper by wetting their bare feet, dipping them in flour or powder, and walking or tiptoeing across the paper. Hairspray can be used to preserve the tracks so they can be displayed in the classroom.
- Read *All the Colors We Are/Todos los Colores de Nuestra Piel*, by Katie Kissinger, to students. This bilingual book offers a scientific description of the reasons human beings have different skin colors, including geographical and environmental factors. It also celebrates human diversity and raises awareness about the negative impact of stereotypes based on skin color.

ADDITIONAL RESOURCES

- Becker, J.R. *Annabelle & Aiden: SAPIENS: Our Human Evolution*. Imaginarium Press, 2019.
- Cummings, Judy Dodge. *Human Migration—Investigate the Global Journey of Humankind*. White River Junction, Vermont: Nomad Press, 2016.
- Gray, Richard. "The real reasons why we walk on two legs, not four." *BBC*, December 12, 2016. http://www.bbc.com/earth/story/20161209-the-real-reasons-why-we-walk-on-two-legs-and-not-four.
- Hogenboom, Melissa. "The Lucy Fossil Rewrote the Story of Humanity." *BBC*, November 27, 2014. http://www.bbc.com/earth/story/20141127-lucy-fossil-revealed-our-origins.
- Wow in the World—Where Did We Come From? *NPR*. Podcast audio. August 31, 2017. https://www.npr.org/2017/10/17/547337520/where-did-we-come-from.