

actionbioscience.org lesson

To accompany the peer-reviewed article by Donald Johanson, Ph.D.:
“Origins of Modern Humans: Multiregional or Out of Africa?” (May 2001)
<http://www.actionbioscience.org/evolution/johanson.html>

Roots: The Ancestry of Modern People (July 2003)

Lesson by **Rebecca Field, Ph.D.**

Ecology professor, Colby-Sawyer College, New London, NH

Educator’s section: p. 1-2 Handout 1: p. 3 Handout 2: p. 4
--

Grades & Levels:

- **Handout 1:** high school (advanced/AP)
- **Handout 2:** undergraduate (year 1-2)

Time Recommendations:

- 1-2 class periods for article review and discussion
- up to 2 weeks for projects in handout 1 or 2

NSES (USA) Content Standards, 9-12:

- NSES 1.1. Unifying Concepts & Processes: Systems, order & organization
- NSES 1.2. Unifying Concepts & Processes: Evidence, models & explanation
- NSES 1.4. Unifying Concepts & Processes: Evolution & equilibrium
- NSES 2.2. Science as Inquiry: Understanding about scientific inquiry
- NSES 4.3. Life Science: Biological evolution
- NSES 8.3. History & Nature of Science: Historical perspective

Learning Objectives: Students will...

- investigate the models currently promoted for the origins of modern humans
- examine ways in which some conditions facilitate speciation and evolution
- learn how evolutionary models are formed and evaluated
- understand classification and nomenclature of hominid species

Key Words Include:

anatomy, archaeology, artifacts, dispersal, DNA, Eurasia, fossil, gene flow, geographic isolation, hominid, *Homo sapiens*, human evolution, human species, migration, mitochondrial DNA, natural selection, neurology, paleoanthropology, prehistoric data, scientific model, speciation, Stone Age

Preparation

Article Discussion:

- Distribute or ask students to download and read the article by Donald Johanson, Ph.D. at <http://www.actionbioscience.org/evolution/johanson.html>.
- Follow the reading with questions about the article, provided on page 2.

Student Handout 1 or 2:

- Activities can be assigned as an individual or group project to be done in class or at home.
- Refer students to the “Useful Links” in the *Educator Resources* section found at the end of the Johanson article. These links help students with their activities or provide a resource for research.

Video Resources:

Check at your video store or library for the video, “Walking with Cavemen” from the BBC. Prepare a list of questions to distribute to students in advance, so that they can take notes while watching the video for discussion after the viewing. Some sample questions are:

- How realistic were the features of the early humans, based on the structural characteristics that you learned about in Johanson’s article?
- What were the behavioral activities of these people that were most different and most similar to people today?
- Which event in the video was the most amazing or unusual in the life and behavior of early humans?

For Educators: Article Discussion

About the article by Donald Johanson, Ph.D.:

“Origins of Modern Humans: Multiregional or Out of Africa?”

<http://www.actionbioscience.org/evolution/johanson.html>

Content Questions:

1. What are the names of the 2 models of the origin of modern humans and the major arguments in those models?
2. What are the scientific names of all of the early ancestors of humans, including the name for modern humans?
3. Define the following terms: gene flow, speciation, taxonomic diversity, genetic drift, occipital region of the skull, molars, cranial vault, Paleolithic era, mtDNA, Neanderthals.
4. How many years ago did all modern humans become anatomically and behaviorally similar?
5. What are the 3 types of evidence that are used to debate the 2 models of human origins?
6. What was the “significant innovation” that occurred in the Upper Paleolithic of Eurasia?
7. When did Neanderthals disappear?
8. Describe the physical characteristics of each of the early ancestors of humans and compare those characteristics to those of modern humans, as described in this article.
9. Summarize Klein’s idea of what brought about the emergence of behaviorally modern humans.
10. What countries are represented in the evidence on the origins of modern humans?
11. Why did earlier forms of humans disappear?
12. How are Peking Man and Java Man different from modern humans?
13. What is “interbreeding” and what role did it play in the development of modern humans, according to the Out of Africa model?

Extension Questions:

1. Why have these models caused such a hot debate in paleoanthropology?
2. What would scientists need to know more about before agreeing on one theory?
3. How might geographic isolation or interbreeding help or hinder speciation in general?
4. What do you think would be the most important factor or skill for the survival of an early hominid species?

Roots: Ancestry of Modern People

Student Handout 1

1. Teach It

You have been invited to a middle school to talk about human origins. Using Dr. Johanson's article as a basis, prepare a talk or lesson on *one* of the following topics:

- a) pre-modern humans and how they differed from people today
- b) the two models of the origins of early humans
- c) the 3 types of data that are used to argue the two models of human origins

2. Illustrate It

Make a poster or other form of illustration on *one* of the following topics that would suit a science fair:

- a) Map of Early Human Movement
Using a world map, illustrate the geographical movements of early humans in the two models of human origins. Label the period and groups that took part in the migrations.
- b) The Human Family Tree
Design a family "tree" of distinct species of modern humans (from earliest to *H. sapiens*). Include the time period for each group's existence and the correct binomial nomenclature, e.g., *Homo sapiens*.
- c) Prehistoric Ages
Create a chart to illustrate different prehistoric ages during which humans have been present. Write notes in the chart on the environmental characteristics (wildlife, climate, etc.) of each of these ages.

3. 1974 News Flash!

Lucy was discovered in 1974. Write a news story as it might have appeared then about the incredible discovery. Include information about the three things that made Lucy different from fossils that had been found previously.

4. 2003 News Flash!

More recently, a breaking news story appeared on June 12, 2003 about additional evidence on the origins of modern humans. Research that story on the Internet. Write a news story that describes the new evidence found. Which of the two opposing models of human origins does this new evidence help to support?

5. Paleoanthropologist

If you were a career counselor for students, how would you encourage a student to consider becoming a paleoanthropologist? Prepare notes about this career. Include information about:

- what a paleoanthropologist does
- the tools a paleoanthropologist uses in the field and in analysis
- the skills needed for the profession
- the college courses a student should take to qualify for this career

Roots: Ancestry of Modern People

Student Handout 2

1. Debate It

Divide into groups of paleoanthropologists with differing viewpoints. As a group, choose **one** of the following topics for debate, providing evidence for your views:

- a) Origin of Modern Humans
Become supporters of the Multiregional model or the Out of Africa model.
- b) *Homo Sapiens*
Agree or disagree that archaic *Homo sapiens* and modern *Homo sapiens* are separate species.
- c) Neanderthals
Side for or against Neanderthals as a distinct species.

2. Illustrate It

You are a science illustrator. A textbook publisher has asked you to provide sample sketches of the fossils that are key in the analysis of early human remains.

- Review Dr. Johanson's article and other Internet sources for information.
- Create a sketchbook of a few sample drawings that you can submit to the publisher.
- Label the sketches to describe the anatomical features, the hominid species represented, and the timeframe the species existed.

3. Chart It

Choose **one** of the following topics for a chart that would suit a science fair:

- a) History of Human Evolution
Design a linear timeline that shows the key events in the origins of modern humans.
- b) Movement of Early Humans
Chart the geographical movements of early humans as described in **one** of the models of human origins.

4. What's in a Name?

You have discovered what you think is a new species of hominid and you would like to give it a name. The formal rules within the scientific world for naming newly-discovered specimens are embodied in the International Code of Zoological Nomenclature (ICZN). Before you can name your hominid:

- Document the description of your hominid.
- Take notes about the series of steps required by ICZN for the naming procedure.
- Investigate the principles of binomial nomenclature and the rights of the describing author (the scientist who found the specimen).

When you understand the rules, propose three names for your hominid (with the describing author name addition). Explain your three choices in class. Ask for a vote for the most popular name.

5. A Day in the Life

As an author, you've chosen to write your next book on the life of an early hominid.

- Choose a lead character that is a Neanderthal, *Homo erectus*, or archaic *Homo sapiens*.
- Write a short summary about your lead character, e.g., physical or behavioral characteristics, social status, age, relationships, etc.
- Create a plot chart for one day in this person's life.

Present your character and story to a group of students for their views on whether you have the makings of a great book or you need to go back to the drawing board.