



IN-DEPTH INVESTIGATION

Fossils and Dispersal Patterns of Early Hominids

(adapted with permission from a John Banister-Marx lesson)

Discoveries of fossil hominids around the world have helped scientists determine not only the likely place of origin for the human species, but the path the species took as it spread throughout the world. In this activity, student teams will use representative hominid fossil evidence to determine the possible pattern of dispersal for early hominids.

Objective:

Students use actual data from fossil evidence to determine patterns and to develop/examine hypotheses that explain the data.

Materials:

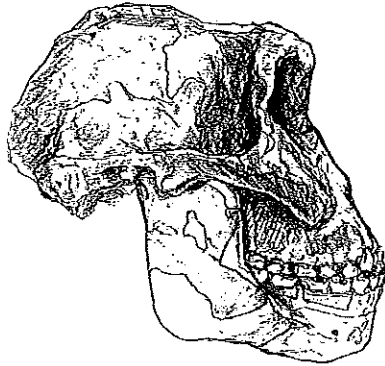
- *Evolution Web* features: "Riddle of the Bones" and "Origins of Humankind"
- Small (8.5" x 11") black and white world maps with numerical latitude and longitude axes (see **TEACHER'S GUIDE WEB RESOURCES**) and large world map (approximately 4 x 6 feet or larger)
- Copies of the "Hominid Fossil Skull Drawings" and the "Hominid Fossil Data" handout (see **TEACHER'S GUIDE WEB RESOURCES**), cut into five sections (so that everyone in team will have a copy of their team's data)
- Copies of the "Hominid Migration Discussion Questions" (see **TEACHER'S GUIDE WEB RESOURCES**)
- Colored pencil sets and colored push pins or $\frac{1}{4}$ " colored adhesive dots (same 4 colors for pencils and pins; box of at least 100 pins)
- Optional: a set of hominid skull casts

Procedures

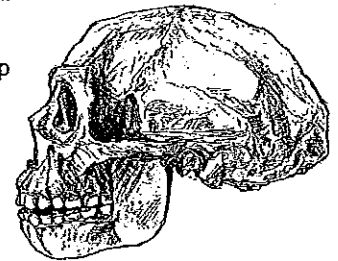
Preparation: Copy and cut the fossil data sheets into five pieces (by taxon), one set of taxa for each team. Students need knowledge of latitude and longitude to plot the locations of the fossils sampled. If time allows, prior to this activity, have students do the related Web features.

1. Group students into five teams: Australopithecine, *Homo erectus*, *Homo neanderthalensis*, and two *Homo sapiens* teams.
2. Introduce the activity by explaining that discoveries of fossil hominids around the world have helped scientists to determine not only a likely origin for the human species, but also a dispersal path throughout the world. The type, dates, and distribution of these representative fossil specimens offer an indication of where humankind's earliest ancestors originated and moved to. Tell students their assignment is to map this distribution.
3. Give each team one part of the fossil evidence from the "Hominid Fossil Data" sheet and colored pencils to match their taxon code (Australopithecines—red, *Homo erectus*—blue, etc.). Point out that the early modern *Homo sapiens* data is divided between two teams because there is more of it. Post the color code key on the board.
4. Tell students that each team will plot its data points by number on a small world map, using its assigned color. Later each team will add their data to the class world map. (Plotting of the 56 points as a class may take 20–30 minutes.) Demonstrate one example of how to plot each coordinate site.
5. Have teams transfer their data to a large world map using colored and/or numbered push pins. Have students check off the fossils on their data sheets as each pin is placed to prevent repeats.
6. Tell students to work in teams to analyze the distribution of fossils on the world map and answer the Hominid Migration Discussion Questions. Have teams discuss their answers.

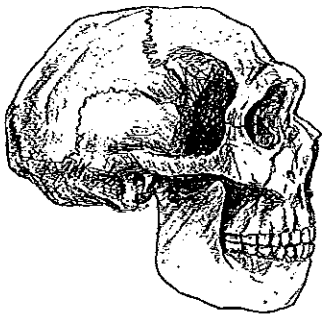
See Assessment Rubric on p. 35.



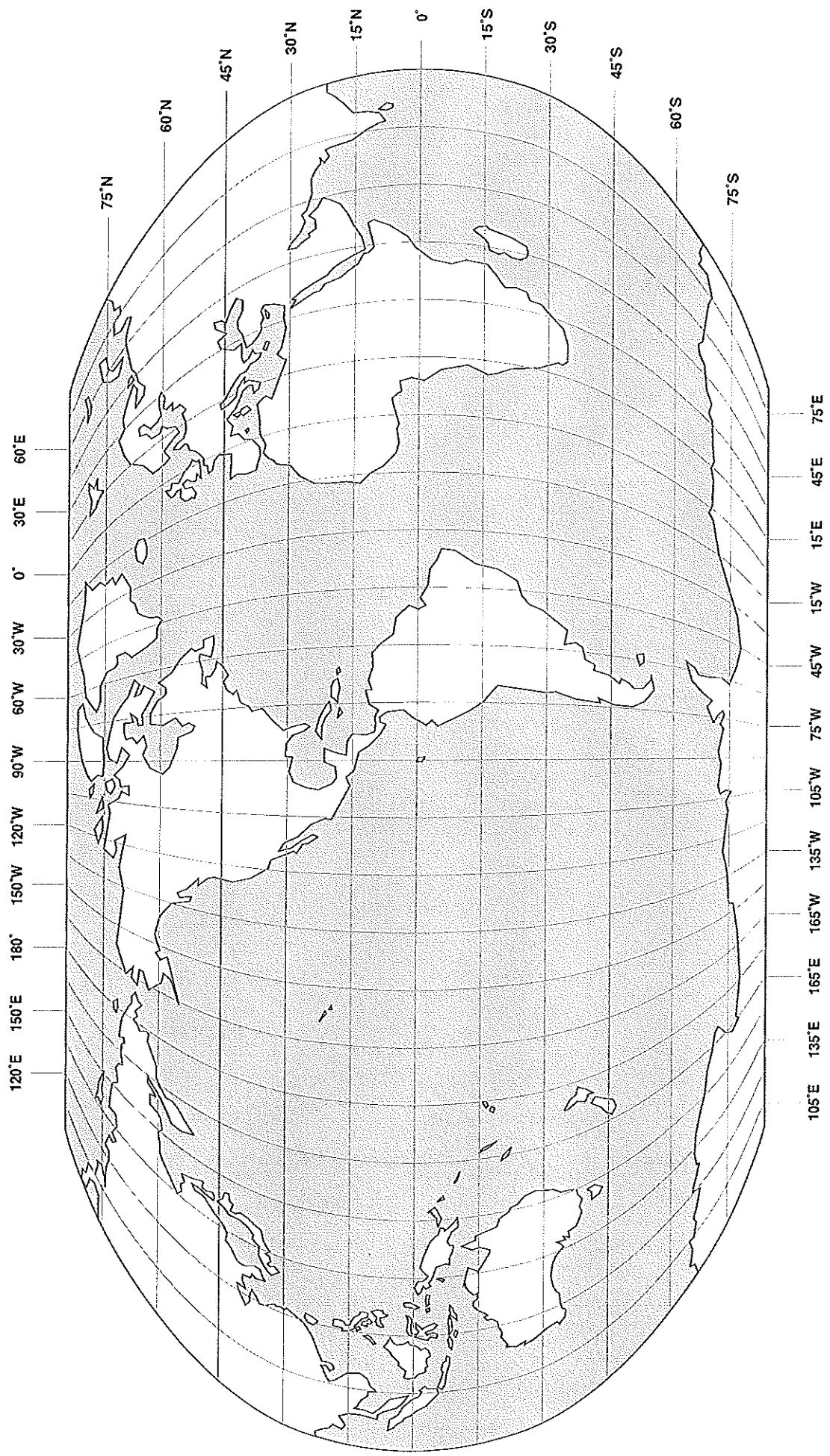
Paranthropus boisei



Homo erectus



Neanderthal



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Hominid Fossil Data

The data below includes four kinds of information:

- *Fossil taxon and its age range in millions of years ago*
- *Location in degrees east or west longitude and north or south latitude, and the name of site where the fossil was found*

Australopithecines (4.4-1.4 mya) Fossils #1–10

(1) 38°E, 1°S Chemeron	(5) 36°E, 5°S Laetoli	(9) 27°E, 27°S Swartkrans
(2) 27°E, 27°S Sterkfontein	(6) 36°E, 7°N Omo	(10) 38°E, 4°N Koobi-Fora
(3) 43°E, 8° N Hadar	(7) 26°E, 26°S Kromdrai	
(4) 37°E, 4°S Olduvai	(8) 28°E, 25°S Magapansgat	

Homo erectus (1.9 -.3 mya) Fossils #11–22

(11) 112°E, 38°N Zhoukoudian	(15) 38°E, 4°N Koobi-Fora	(19) 27°E, 27°S Sterkfontein
(12) 112°E, 8°S Modjokerto	(16) 6°W, 35°N Sale	(20) 43°E, 8°Nhadar
(13) 18°E, 18°N Yayo	(17) 13°E, 47°N Mauer	(21) 37°E, 4°S Olduvai
(14) 7°W, 34°N Rabat	(18) 27°E, 27°S Swartkrans	(22) 36°E, 7°N Omo

Homo neanderthalensis (.13 -.03 mya) Fossils #23–34

(23) 36°E, 33°N Amud	(27) 68°E, 41°N Teshik-Tash	(31) 11°E, 47°N Steinheim
(24) 110°E, 7°S Solo	(28) 5°W, 35°N Gibraltar	(32) 7°E, 52°N Neanderthal
(25) 18°E, 32°S Saldanha	(29) 44°E, 36°N Shanidar	(33) 34°E, 45°N Kiik-Koba
(26) 27°E, 14°S Broken Hill	(30) 2°W, 52°N Swanscombe	(34) 5°W, 32°N Jebel-Irhoud

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reserved **Part 1: Fossils #35-45**

(35) 38°E, 50°N <i>Sungir</i>	(39) 36°E, 35°N <i>Tabun</i>	(43) 112°E, 38°N <i>Zhoukoudian</i>
(36) 3°E, 43°N <i>Lascaux</i>	(40) 30°S, 24°E <i>Florisbad</i>	(44) 137°E, 38°N
(37) 18°E, 48°N <i>Predmost</i>	(41) 138°E, 34°S <i>Lake Mungo</i>	(45) 99°W, 19°N <i>Tepexpan</i>
(38) 70°E, 62°N	(42) 115°E, 1°N <i>Niah</i>	

Early modern *Homo sapiens* (.1 – .02 mya)

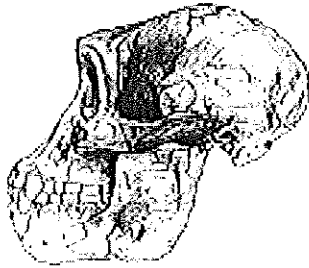
Part 2: Fossils #46-56

(46) 75°W, 2°N <i>Punin</i>	(50) 108°E, 27°N	(54) 88°W, 32°N <i>Natchez</i>
(47) 120°W, 44°N <i>Marmes</i>	(51) 32°E, 27°S <i>Border Cave</i>	(55) 102°W, 32°N <i>Midland</i> <i>Cave</i>
(48) 100°E, 54°N	(52) 35°E, 32°N <i>Jebel Qafzeh</i>	(56) 81°W, 27°N <i>Vero Beach</i>
(49) 70°E, 23°N	(53) 44°W, 18°S <i>Lagoa Santo</i>	

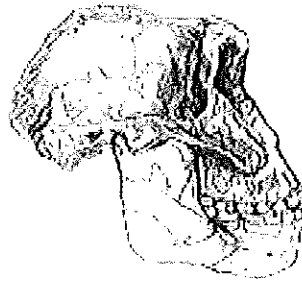
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Hominid Fossil Skull Drawings

(Original drawings by Ryan Scott McCullar in support of laboratory activities designed by Dr. Martin Nickels, Professor of Anthropology and Biology, Illinois State University, and used with Dr. Nickels' permission)



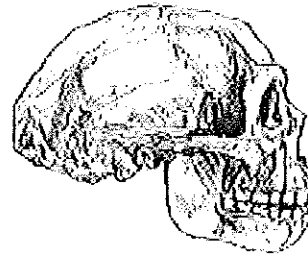
Drawing 1: *Australopithecus afarensis* ("Lucy") composite reconstruction, c 3.0 mya*



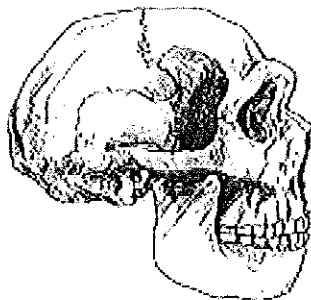
Drawing 2: *Paranthropus boisei* ("Zinjanthropus") [robust australopithecine], c 1.8mya



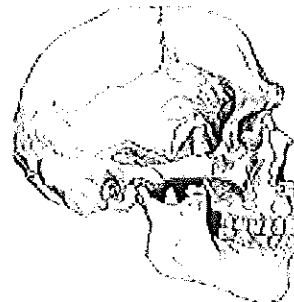
Drawing 3: *Homo habilis* (KNM-ER 1813), c. 2.0 mya



Drawing 4: *Homo erectus* ("Sinanthropus"), c. 450,000 years ago



Drawing 5: Neanderthal (La Ferrassie), c. 60,000 years ago



Drawing 6: prehistoric modern *Homo sapiens* (Predmost), c. 25,000 years ago

*millions of years ago

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Hominid Migration Discussion Questions

1. How many thousands of years ago is .3 million years? Or .02 million years?
2. Why have scientists concluded that Africa is the "birthplace" of humanity?
3. Find a fossil and write its type (taxon) and map coordinates for each of the following locations below:

a. China	d. Australia	g. Germany
b. United States	e. Brazil	h. Ethiopia
c. Mexico	f. Java	i. Iraq
		j. South Africa

4. Which fossil taxon seems to have the earliest wide distribution throughout much of the Old World? How did they get to these places? Pick two sites that are widely separated and infer the relative age of each specimen. (Which one is older than the other? Explain your reasoning.)
5. In which area of the Old World does Neanderthal seem to be most prominent?
6. Early modern *Homo sapiens* were the first hominids to enter into which continent(s)? Choose one and infer a possible path of migration.
7. Where is the greatest coexistence between Neanderthals and early modern *Homo sapiens* likely to have occurred? Explain how this may have contributed to the extinction of Neanderthals.
8. Describe the overall migration pattern of humans and prehuman ancestors based on the data that you plotted on the map.