

EXPLORE YOUR INNER ANIMALS

ABOUT THIS WORKSHEET

This worksheet complements the Click and Learn “Explore Your Inner Animals” (www.hhmi.org/biointeractive/explore-your-inner-animals).



PROCEDURE

Proceed through the Click & Learn and answer the questions assigned by your instructor in the spaces provided. The *Extend* questions were designed for class discussion.

Section 1—Eyes

Click on the glowing hot spot for EYES. Watch the video clip and then click through the “NEXT” buttons or use the animal silhouettes to access additional materials while answering the following questions.

1. How do we know that Kramer cannot see the same way most humans can?

2. What are opsins and what do they do?

3. Both humans and monkeys like Kramer have opsins, but monkeys like Kramer cannot see the same range of colors that most humans can. Why not?

4. Describe what the “clues” scientists found in our DNA suggest about how humans might have evolved enhanced color vision.

5. *Extend.* Dr. Shubin says that once our ancestors evolved a broader range of color vision, they could more easily find ripe fruits and young leaves. Why would this have been an advantage?

Section 2—Legs

Click on the glowing hot spot for LEGS. Watch the video clip and then click the “NEXT” button or use the animal silhouette to access additional materials to help you answer the following questions.

1. Based on the age of the rock in which the fossil was found, how long ago did Ardi live?



2. Why was finding a hominid of this age significant?

3. Describe the anatomical features of Ardi's upper and lower pelvis and what they indicate about how Ardi may have moved.

4. What does Dr. Shubin mean when he describes Ardi as a "creature in transition"?

5. Does Ardi's foot structure support or refute the idea that Ardi was a creature in transition? Explain your answer.

6. Dr. White and his team came to a surprising conclusion about the type of environment Ardi lived in. What type of environment was it, and what evidence led the team to this conclusion?

7. *Extend.* Discuss how the way Ardi moved could have provided an advantage in her environment.

Section 3—Ears

Use the slider below the body to rotate the human body until it is facing left. Click on the glowing hot spot for EARS. Watch the video clip to help you answer the following questions.

1. What are three bones are found in the middle ears of all mammals, including humans?

2. How do these three bones work together to produce sound?

3. Explain why mammalian ears are more sensitive to sound than those of reptiles.



4. Describe two pieces of evidence that the three ear bones of mammals like the opossum evolved from reptiles.

Section 4—Hands

Click on the glowing hot spot for HANDS. Watch the video clip and then click through the “NEXT” buttons or use the animal silhouettes to access additional clips and materials to help you answer the following questions.

1. Describe what features the modern human hand shares with the hand of the 50 million year-old primate, *Notharctus*.

2. Dr. Shubin explains that the earliest primate ancestors could access the “fine branch niche.” What is special about this niche, and how did their hand structure enable them to access it?

3. What characteristics of the modern human hand enable our “precision grip”?

4. What is the earliest human ancestor thought to be capable of making and using tools, and how long ago did this ancestor live?

5. Describe the basic pattern of the bones in the limbs of humans and other four-limbed vertebrates (tetrapods) that Richard Owen first documented.

6. How did Darwin explain common patterns like these among vertebrates?

7. What is *Tiktaalik*? Why was the discovery of *Tiktaalik* so exciting to Dr. Shubin and his team?

8. According to the last slide, what do a human hand, chicken wing, and fish fin have in common?



Section 5—Brain

Use the slider below the body to rotate the human body until you are looking at its back. Watch the video clip and then click through the “NEXT” buttons or use the animal silhouettes to access an additional clip and materials to help you answer the following questions.

1. Dr. Shubin says that’s it is very hard for him to see any similarities between the human brain and amphioxus. Where does Dr. Holland tell us that the similarities are?

2. How many million years ago did the “first roots” of our modern human brain arise?

3. Describe how our human brain is similar to the brains of other primates.

4. According to the last slide, what feature of the human brain most likely accounts for the exceptional capability of humans compared to other primates?

5. *Extend.* “Studying the DNA of ancient organisms is a window into our distant past,” according to Dr. Shubin. Discuss how what you have learned about amphioxus supports this statement.

Section 6—Back

Click on the glowing hot spot for BACK. Watch the video clip and then click the “NEXT” button or use the animal silhouette to access an additional clip to help you answer the following questions.

1. What is another word for *coccyx*?

2. Why can falling on our coccyx hurt so much?

3. What is one of the easiest ways to distinguish an ape from a monkey?

4. Discuss how the shape of the sacral vertebrae of the fossil ape *Proconsul* provides evidence that it may have been one of the first tailless apes.

5. Explain how going from walking on all fours to walking on just two feet affects balance.

6. *Extend.* Organisms have traits that reflect “trade-offs”—the evolution of one feature that provides an advantage may result in another feature or characteristic that is a disadvantage. Use the example of the human spine to illustrate this concept.

Section 7—Teeth

Use the slider below the body to rotate the human body until it is facing right. Watch the video clip and then click through the “NEXT” buttons or use the animal silhouettes to access an additional clip and materials to help you answer the following questions.



1. Describe the teeth of a typical reptile.

2. How do the teeth of *Gorgonopsid* differ from those of reptiles? What can paleontologists infer from these teeth about how *Gorgonopsid* ate?

3. What is an advantage of chewing food over swallowing it whole?

4. Why are teeth so important to paleontologists?

5. What is *EDA* and why is it important that it is found in both humans and fish?

6. Humans have both molars with flat surfaces and pointed canines. What does this suggest about the diet of human ancestors?

AUTHOR

Written by Mark Eberhard, St. Clair High School

Edited by Stephanie Keeps, consultant, and Laura Bonetta, PhD, HHMI