


Animal Hands

Different functions of homologous structures

Many animals share similar body structures. For instance, your nose, a pig’s snout, and an elephant’s trunk can all be called *noses*. Though these noses have different functions and appearances, all have a similar location and structure. Such similar features are called homologous. Such similar features are called homologous* structures.

 Open [X-ray images 01](#) through 11.

 Briefly examine each image


Beluga Whale	Human
Macaque Monkey	Owl
Sun Bear	Zebra
Hyena	Lion
Panda	Sea Lion
baboon	

The x-rays show the *hands* of the following animals:

A structure’s shape is often related to its function. A hand used for swimming (a fin) is shaped differently than one used for supporting an animal’s weight as it walks. Likewise, a hand used for flying (a wing) is shaped differently than one used to manipulate objects and use tools.

Examine these [x-ray images of animal](#) hands in more detail and compare their structure. Based on the *morphology* (shape) of each hand, **figure out its main function and determine its owner**.

1. Use the animal hands [data table](#) to record your observations of the eleven hand x-rays.

 Enhance the features of the animal’s hands. You may want to use some of the following techniques.

<i>To use this Technique...</i>	<i>...do this</i>
Adjust brightness and contrast	Under Process menu use Adjust <i>brightness/contrast</i>
Density comparison	Draw a line across the areas you want to compare Analyze/Plot Profile
Invert Image	Edit/Invert
Enhance image with filters	use Process menu items
Switch color tables	Image/Look Up Tables

If the image looks worse after enhancing...

Edit/Undo to undo the last thing you did, or

File/Revert to Saved to return to the original image.

2. Briefly describe the main features of each hand. Here are some clues:

- Does the hand appear to have individual fingers?
- Does the hand show fingernails or claws?
- Are the bones thick compared to their length?
- How many joints does each “finger” have?
- Can you tell the shape of the flesh covering the bone?

3. In your table, state the function* of each hand

4. Based on the structure and function of each hand, identify the animal shown in each x-ray

Mystery Animal

 Open **Mystery Animal**

Animals that are closely related have very similar structures. For example, all species of birds have wings, even

flightless birds. Because of these similarities, you can figure out what kind of animal a hand belongs to even if you don't know the exact species.

5. Answer the Data Analysis questions on the data table.
6. Examine the images in the **Zoo Animals** folder. Pick one X-ray to describe.

Helpful information

***Homologous** = “agreeing” in Greek

*Functions can include flying, swimming, grasping/manipulating, and walking/running

HINTS

- The size of each x-ray is not related to the size of the animal
- The heavier an animal is, the thicker its bones are. This is a sign that the bones support weight.
- Macaques and humans are both primates, but macaque hands have more padding for swinging on tree branches.
- Bird bones are difficult to see in x-rays because they are very thin and light.
- Pandas appear to have five fingers plus a thumb. This false thumb is an extension of one of their wrist bones. Pandas use it to strip leaves from bamboo, their main food source.
- Sun bears are small bears. The sun bear has a deformed front paw.
- You may want to look at a picture of each of these

Name(s) _____ Date _____ Period _____

Animal Hands Data Sheet



Hand functions include:

Flying grasping/manipulating

Swimming walking/running

Animals shown include:

Beluga Whale human hyena lion macaque monkey

Sun bear owl baboon panda sea lion zebra

X-ray #	Description	Function	Animal
01			
02			
03			
04			
05			
06			
07			
08			

09			
10			
11 Mystery			

Animal Hands Data Analysis

1. What features of the “animal hands” were helpful in determining which X-ray belonged to each species?
2. Did you find evidence for homologous structure (same structure serving different functions) between the bones of the species we studied? Explain.
3. How does this information relate to the topic of evolution and common ancestry? Did you see evidence to support or discredit these ideas?
4. Examine the images in the **Zoo Animals** folder. Pick one X-ray to describe.