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 structures.

- Open x-ray images 01 through 10.
  You may have to close one or two images to open the next one.
- Briefly examine each image.

These x-rays show the hands of the following animals:

- beluga whale
- human
- hyena
- lion
- macaque monkey
- owl
- panda
- sea lion
- sun bear
- zebra

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 structures. Based on the shape of each hand, figure out its main function and determine its owner.

- Enhance the features of the animal hands. You may want to use some of the following techniques. Refer to the Look-Up Tables and Density Slicing IPTechnique Sheets for more details.

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. This sun bear has a deformed front paw.
- You may want to look at a picture of each of these animals.

1. 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 bones?
2. In your table, state the function of each hand.
3. 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 usually 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.

4. Which of the animals in this activity do you think is most closely related to the mystery animal? Justify your answer.

**Further Exploration**

- On the sea lion, zebra, and human images, use the **A** tool to label the characteristics that helped you identify the hand’s function. What are the main differences between the three hands? What do they all have in common?
- Based on your observations, describe how you would expect an x-ray of a bat’s wing to appear.
- Research the behavior of one or more of these animals to find out what other functions their hands serve.
- Examine the images in the **Zoo Animals** folder.

Functions can include: flying, swimming, grasping/manipulating, walking/running.