

Chapter 33 Comparing Chordates

Observing Vertebrate Skeletons

Introduction

The body plans of all vertebrates are similar in some ways. One characteristic shared by all vertebrates is the presence of a skeleton. The skeleton of a vertebrate is an endoskeleton, or internal skeleton. It is made up, in part, of living cells and thus is able to grow. It is not shed as are many exoskeletons. The endoskeleton provides support, protects the internal organs, and is a site for the attachment of muscles.

Skeletal similarities are evidence that these different animals have evolved from a common ancestor. Structures such as bones that have a common origin but different function are called homologous structures.

In this investigation, you will compare the skeletons of several different vertebrates and look for evidence of homologous structures. You will also classify unknown bone specimens.

Problem

What are the similarities and differences among vertebrate skeletons?
What homologous structures can be identified on these skeletons?

Pre-Lab Discussion

Read the entire investigation. Then, work with a partner to answer the following questions.

1. What will you be comparing in this investigation?

2. What do the animals you will be studying in this investigation all have in common?

3. What evidence will you be looking for to demonstrate that vertebrates share a common ancestor?

4. Based on the investigation title and the other animals you will be studying in this investigation, from what group of animals will the mystery bones come?

5. How will you determine which parts of the skeleton the mystery bones come from?

Materials (*per group*)

set of “mystery” bones

Procedure

1. Carefully examine the labeled human skeleton in Figure 1. The human skeleton contains more than 200 bones. Become familiar with the names and structures of the bones in Figure 1.

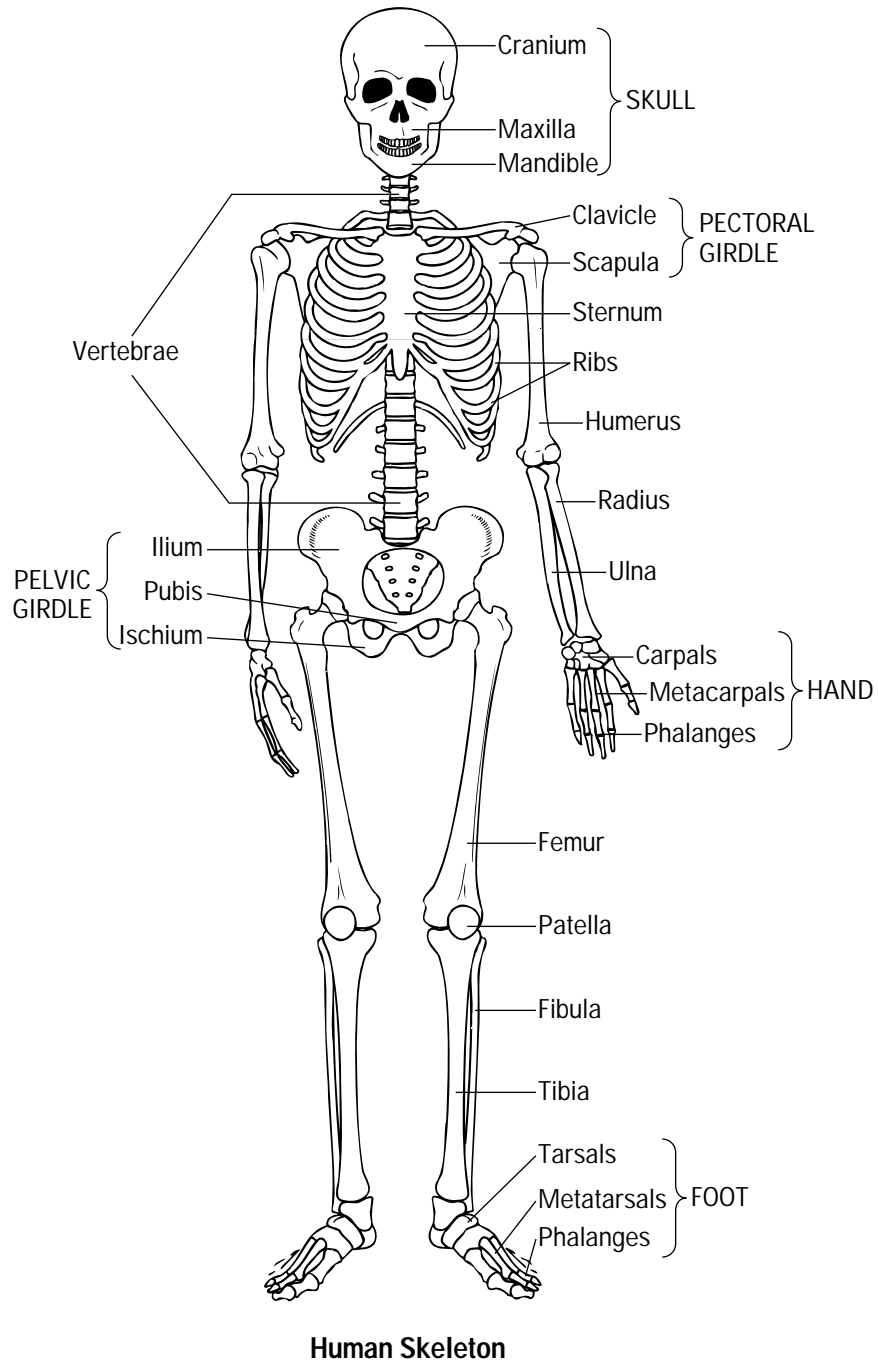
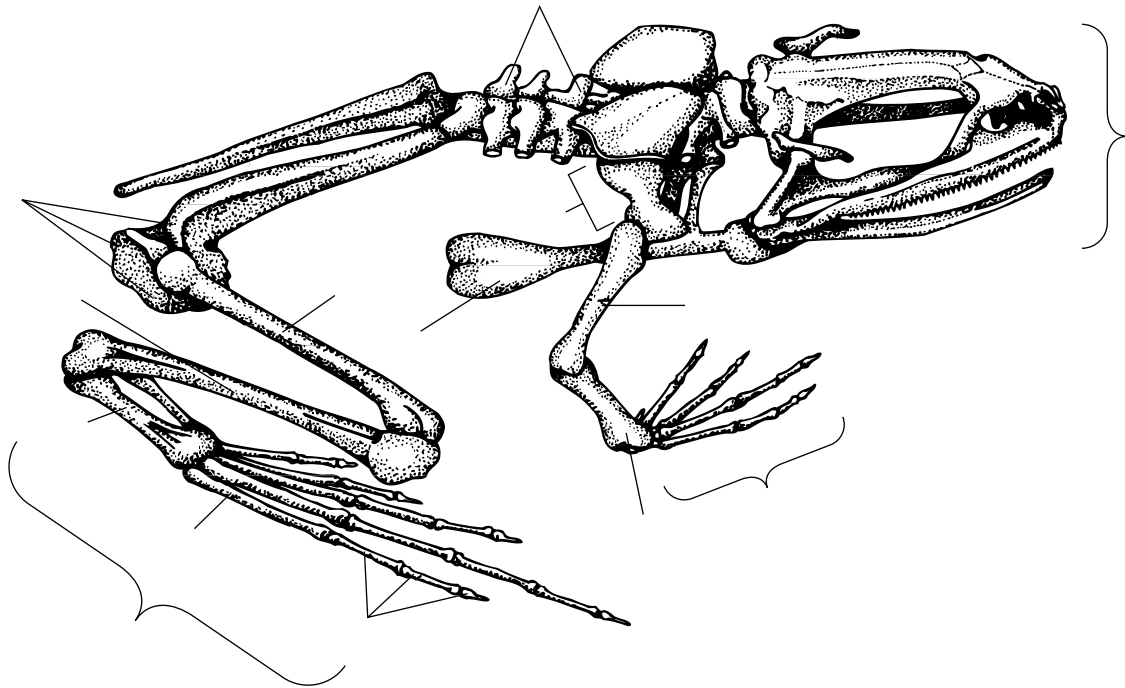


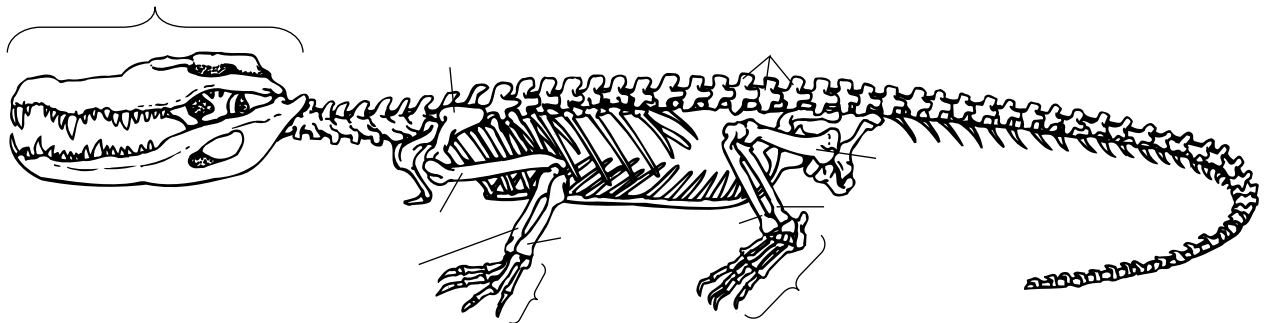
Figure 1

2. Look at the frog skeleton in Figure 2. As you examine the skeleton, compare it to the human skeleton in Figure 1. Label the bones of the frog skeleton using the names from Figure 1.
3. Repeat step 2 with the skeletons of the crocodile, pigeon, and cat in Figures 3, 4, and 5.
4. Obtain a set of “mystery” bones from your teacher. Identify the bones by comparing them to the bones of each skeleton observed in this investigation.



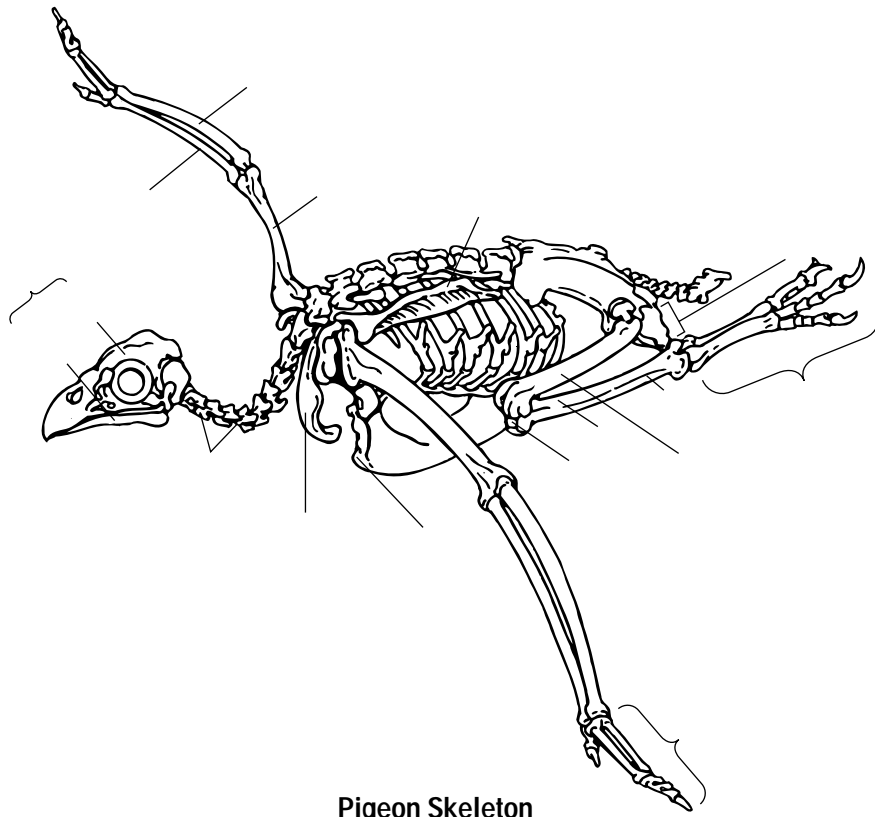
Frog Skeleton

Figure 2



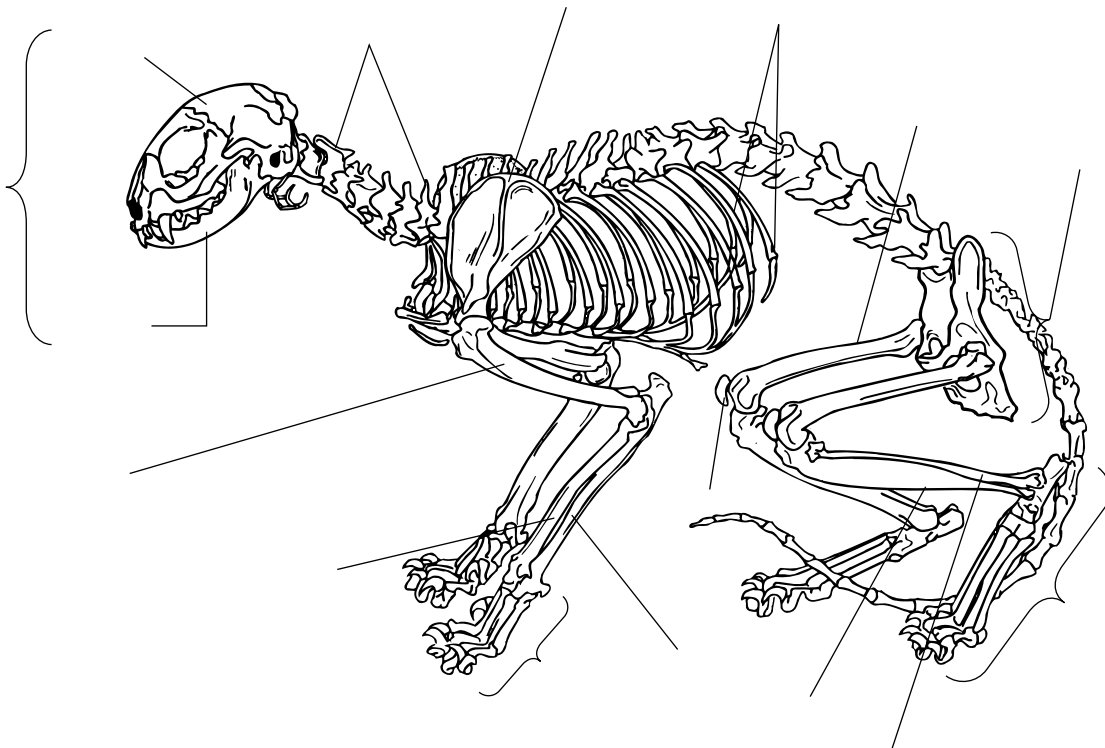
Crocodile Skeleton

Figure 3



Pigeon Skeleton

Figure 4



Cat Skeleton

Figure 5

Analysis and Conclusions

1. Comparing and Contrasting What are three characteristics that all of the skeletons share?

2. Comparing and Contrasting What are three differences that exist among the skeletons?

3. Drawing Conclusions How do the functions of the forelimbs differ among the five vertebrates you have examined?

4. Analyzing Data What type of evidence would indicate that the human hand, pigeon wing, and cat paw are homologous structures?

5. Classifying Which of the skeletons is most closely related to the human skeleton? What evidence supports your answer?

6. Classifying To what type of animal do you think your “mystery” bones belong? On what evidence do you base your conclusion?

7. Drawing Conclusions Are bones that are similar in structure always similar in function? Give an example to defend your answer.

8. Drawing Conclusions What evidence have you obtained in this investigation to support the theory that vertebrates evolved from a common ancestor?

9. Comparing and Contrasting How do the bones in the limbs of the frog differ from those in the other four skeletons?

10. Observing Describe the “mystery” bones in your collection.

11. Drawing Conclusions To what parts of the skeleton do your “mystery” bones belong?

Going Further

Using reference materials, find examples of other vertebrate skeletons. How are these skeletons similar to and different from those you have studied in this investigation? How are the skeletons of these other vertebrates adapted to the environments in which they live?