Could you tell if two people were related just by looking at them? What kinds of evidence would help you determine their relationship? In this lab, you will observe parts of various animals and look for evidence that these animals are related to one another.

**OBJECTIVES**

Observe and describe the limb structures of different organisms.

Identify relationships between the structures of different organisms.

**MATERIALS**

- pen or pencil

**Procedure**

1. Observe the forelimbs of the animals shown in Figure 1. Count the approximate number of bones in each of the upper and lower limbs. Record this data in Table 1. Then record the function of each limb.

**FIGURE 1  LIMBS OF DIFFERENT ANIMALS**
## Analysis and Conclusions

1. **Examining Data** Observe the arrangement of bones of each animal. Compare these observations with the approximate number of the bones of each animal. How are the limbs of the frog, whale, dog, human, bat, bird, and alligator similar?

How do the limbs differ?

2. **Classifying** Look again at the data you collected. Classify the animals according to the functions of their limbs.

3. **Drawing Conclusions** Which is the better indicator of the relationship between two organisms—structure or function? Explain your reasoning.
Comparing Limb Structure and Function

Teacher Notes
TIME REQUIRED  20 minutes

SKILLS ACQUIRED
Classifying
Identifying patterns
Inferring
Interpreting
Organizing and analyzing data

RATINGS
Teacher Prep–1
Student Setup–1
Concept Level–1
Cleanup–1

THE SCIENTIFIC METHOD

Make Observations  Students observe the bones in the limbs of various animals and look for evidence that the animals are related to one another.

Analyze the Results  Students analyze their data in Analysis and Conclusions questions 1 and 2.

Draw Conclusions  Analysis and Conclusions question 3 asks student to draw conclusions from their data.

MATERIALS
Skeletons of vertebrate limbs would enhance this lab.

TIPS AND TRICKS
This lab works best in groups of two but can be done individually.
Stress that biologists often must rely on observations made from the drawings of others, at least during the initial stages of an investigation. Explain that in this lab, students must make the best use of the drawings of appendages.
Show students the key in Figure 1, which distinguishes upper bones from lower bones. Make sure students are able to compare the humerus (upper bone) and radius and ulna (lower bones) among the animals in the diagrams.
Allow students to consult other sources for more detailed diagrams of the upper and lower limbs of animals.
The bone counts will be approximations based on what students can see and count in the drawings in Figure 1. The data in Table 1 also are based on the drawings, not necessarily the actual number of bones in those vertebrates.
Could you tell if two people were related just by looking at them? What kinds of evidence would help you determine their relationship? In this lab, you will observe parts of various animals and look for evidence that these animals are related to one another.

**OBJECTIVES**

*Observe* and *describe* the limb structures of different organisms.
*Identify* relationships between the structures of different organisms.

**MATERIALS**

- pen or pencil

**Procedure**

1. Observe the forelimbs of the animals shown in **Figure 1**. Count the approximate number of bones in each of the upper and lower limbs. Record this data in **Table 1**. Then record the function of each limb.

**FIGURE 1  LIMBS OF DIFFERENT ANIMALS**
TABLE 1 COMPARING ANIMAL LIMBS

<table>
<thead>
<tr>
<th>Animal</th>
<th>Approximate number of bones in upper limb</th>
<th>Approximate number of bones in lower limb</th>
<th>Function of limb</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frog</td>
<td>1</td>
<td>15</td>
<td>locomotion on land</td>
</tr>
<tr>
<td>Whale</td>
<td>1</td>
<td>31</td>
<td>swimming</td>
</tr>
<tr>
<td>Dog</td>
<td>1</td>
<td>23</td>
<td>locomotion on land</td>
</tr>
<tr>
<td>Penguin</td>
<td>1</td>
<td>9</td>
<td>swimming</td>
</tr>
<tr>
<td>Human</td>
<td>1</td>
<td>28</td>
<td>grasping and manipulating</td>
</tr>
<tr>
<td>Bat</td>
<td>1</td>
<td>26</td>
<td>flight</td>
</tr>
<tr>
<td>Bird</td>
<td>1</td>
<td>9</td>
<td>flight</td>
</tr>
<tr>
<td>Alligator</td>
<td>1</td>
<td>28</td>
<td>locomotion on land</td>
</tr>
</tbody>
</table>

Analysis and Conclusions

1. Examining Data  Observe the arrangement of bones of each animal. Compare these observations with the approximate number of the bones of each animal. How are the limbs of the frog, whale, dog, human, bat, bird, and alligator similar?

   Answers may vary but should indicate that the number and arrangement of bones in the upper and lower limbs of the animals are similar.

   How do the limbs differ?

   The shape and function of the limbs may differ.

2. Classifying  Look again at the data you collected. Classify the animals according to the functions of their limbs.

   Appendages of the bird and bat are used for flight. The human limb is used for grasping and manipulating, the whale’s and penguin’s limbs are used in swimming, and the frog’s, dog’s, and alligator’s limbs are used in locomotion on land.

3. Drawing Conclusions  Which is the better indicator of the relationship between two organisms—structure or function? Explain your reasoning.

   Answers may vary but should suggest that structure is a better indicator of relationship than is function.