

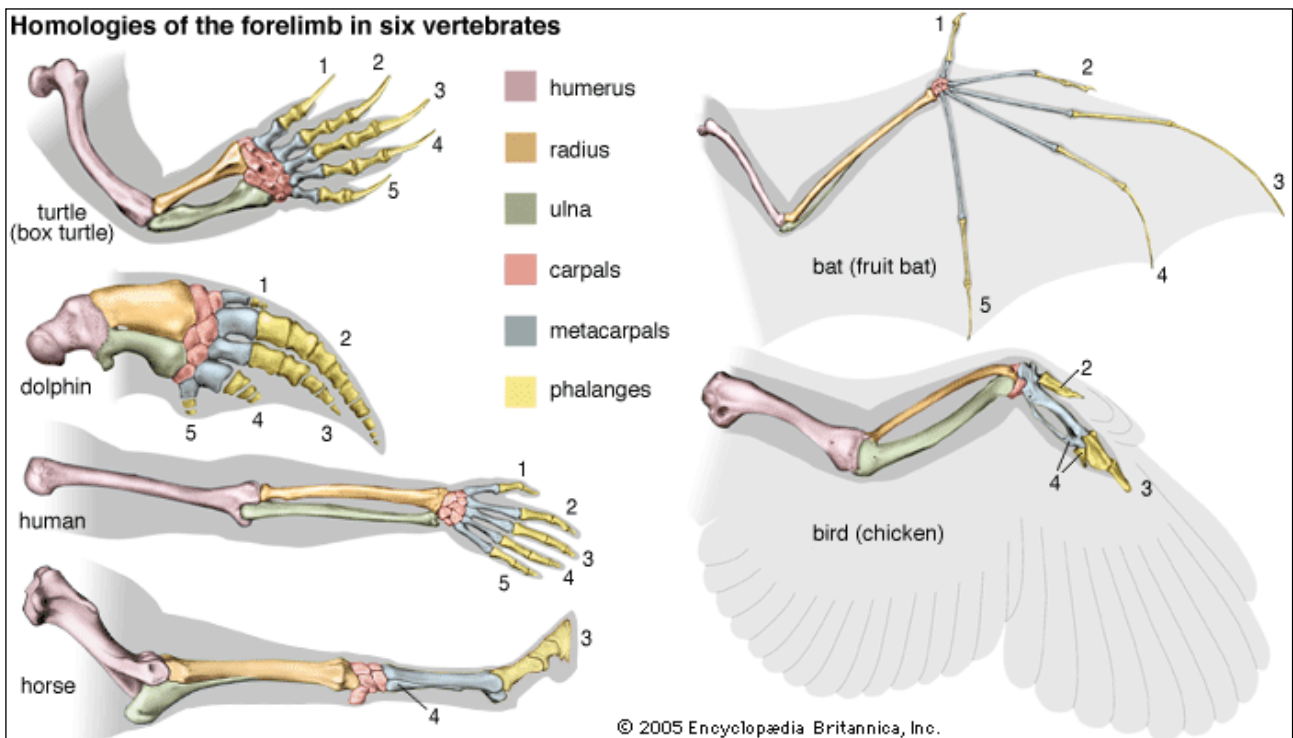
VERTEBRATE FORELIMBS

INTRODUCTION

When we compare the anatomy of different animals we find that many of them possess organs that are similar in structure, although used in different ways. Such similar structures are said to be homologous. An example of this can be seen when we examine the forelimbs of a number of vertebrates. The limbs of many vertebrates, including humans, are based on an arrangement of bones called the pentadactyl limb (penta meaning five, dactyl meaning finger). The fact that such a structure is present strongly suggests that these vertebrates share a common ancestor whose descendants later evolved in different ways. We call this divergent evolution (see p. 106).

PURPOSE

To gather information from secondary sources to observe, analyse and compare the structure of a



range of vertebrate forelimbs.

PROCEDURE

1. Examine each of the vertebrate specimens in turn. Using Figure 2.16 as a guide, locate and identify the bones making up the pentadactyl structure.
2. Make a labelled sketch in your workbook of the forelimbs of two specimens.
3. Describe the differences you see in the two sketches. Make reference to size, shape and arrangement of bones.
4. Collect a copy of the student worksheet. It shows a number of vertebrate forelimbs.
5. Complete the missing labels from the lizard skeleton. Using coloured pencils, shade each type of bone for each animal. Use one colour for each bone type—for example, shade in all the ulna bones in the same colour. Include an appropriate key.

DISCUSSION

1. Compare the bird and the bat. Both animals use their forelimbs for flight, yet they are quite different in their structure. Describe and account for any differences you see. The structures of birds and bats are homologous in that they are both modifications of the forelimb bone structure of early reptiles. But birds' wings differ from those of bats in the number of digits and in having feathers for flight while bats have none. Bat wings are a leathery substance and have elongated digits. And most importantly, the power of flight arose independently in these two

different classes of vertebrates; in birds while they were evolving from early reptiles, and in bats after their mammalian ancestors had already completely changed from reptiles.

2. Using information from your worksheet, explain how the forelimb structure of each animal is well suited to the organism's role in the ecosystem.

Organism	Function of limb
Frog	Support, cleaning
Lizard	Movement, support, attack
Bird	Walk, fly
Cat	Movement, support, attack
Bat	Fly, protection, support
Whale	Swim
Human	Movement, attack, eat, clean

3. Are the wings of an insect and the wings of a bird homologous structures? No, they are Analogous structures, the wings of birds and of insects and the structures are used for flight in both types of organisms, but they have no common ancestral origin at the beginning of their evolutionary development.

CONCLUSION

This Investigation explored Comparative Anatomy, which is when the body structures of different organisms are compared, it is often obvious that they share common features, even though those body parts might be used in different ways. This investigation comes to a conclusion that all these animals evolved from a common ancestor which supports evolution.

