EVOLUTION OF WHALES

3. **Evolution**

Objective: Students compare whales and their land-mammal ancestors.

Level: 4-7

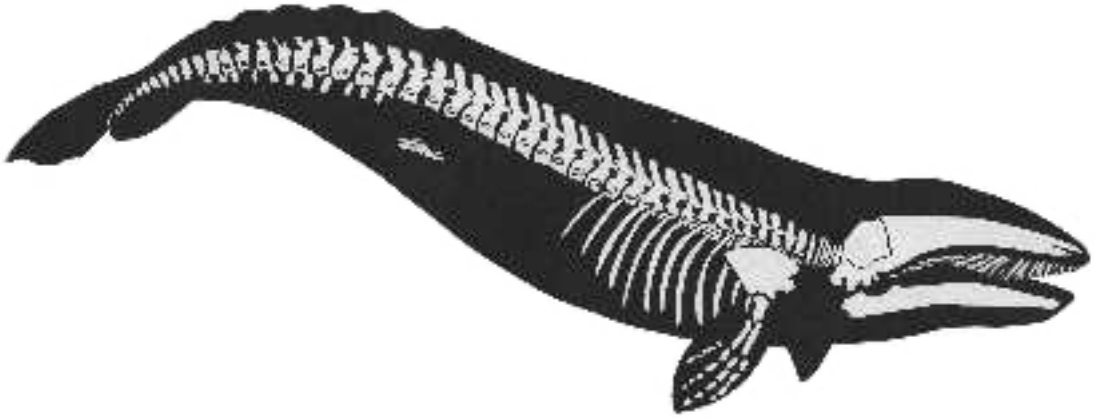
Background: No one is certain how whales came to exist, but there is fascinating evidence for the evolutionary link between whales and other mammals. Fossils of early whales possess some clear, whale-like characteristics: elongated bodies, reduced hind legs, long snouts and a trend to the placement of nostrils on the upper rear part of the snout. Scientists now believe that whales evolved from carnivorous land mammals called mesonychids. The huge, furred, wolf-like Andrewsarchus was a mesonychid that lived from 42 to 40 million years ago in the Eocene epoch. At a length of 3.7 metres Andrewsarchus was the largest carnivorous land mammal that ever lived. Although Andrewsarchus appeared too late to be an ancestor to whales, the best available evidence suggests that one of its small relatives gave rise to the whales about 50 million years ago. The form and number (44) of Andrewsarchus's teeth are very similar to those characteristics of the earliest whales. The body form of whale ancestors clearly underwent a major alteration during the transition to aquatic life. Front limbs became flippers, hind limbs eventually disappeared, the hair was all but lost, and the body took on a streamlined shape.

One of the early whales, Basilosaurus, flourished about 40 million years ago. Perhaps this best-known species of the early whales was an intermediate form between land mammals and the modern whales. It had small but functional hind limbs, its nostrils were situated on the top of the snout and its ears had adapted only partially to hearing in the aquatic environment. Other early whales show the intermediate or transitional features that one would expect to find. Today, whales have a non-functional and totally isolated pelvic structure as the only skeletal trace of hind limbs. The forelimbs have evolved into flippers but the bones inside the flipper are like those in a human hand and arm. Most contain five fingerlike bone arrangements (although some have only four) and the limb bones of cetaceans connect to the shoulder blade, as ours do.

Materials: pictures of animals, paper, felt pens.

Procedure:

1) Examine *Andrewsarchus* and *Basilosaurus* and compare their characteristics to those of modern-day whales. Make a list of similarities and differences.
2) Discuss what characteristics the whale had to develop in order to survive in an aquatic environment.



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