

Evolution of the Whale

An Interactive Timeline - From Land to Sea

PAKICETUS ABOUT 50 MILLION YEARS AGO

- **Habitat:** Lived on land near rivers and lakes, but was semi-aquatic.
- **Anatomy & Adaptation:**
 - Resembled a wolf with a long, slender body.
 - Had four functional legs, adapted for walking on land but also capable of swimming.
 - Skull shows traits linking it to modern whales, such as the shape of the inner ear bones, which indicate early adaptations for underwater hearing.
- **Homology:** The limbs of Pakicetus provide evidence of the transition from land mammals, with a skeletal structure that hints at the eventual evolution into flippers.



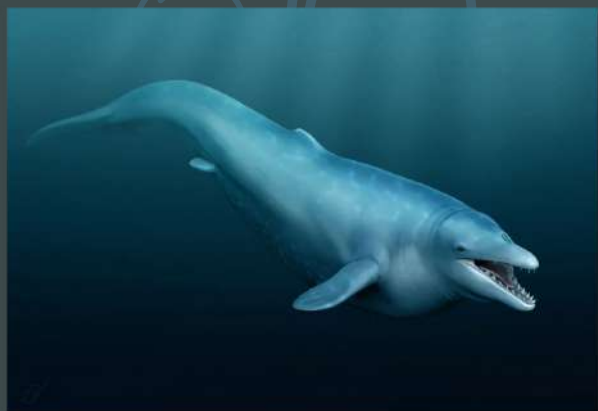
AMBULOCETUS ABOUT 48 MILLION YEARS AGO

- **Habitat:** Fully aquatic, lived in the oceans.
- **Anatomy & Adaptation:**
 - Long, serpentine body (up to 60 feet) with small, reduced hind limbs that were no longer functional for walking but still visible.
 - Fully developed flippers and a powerful tail used for propulsion.
 - Vestigial hind limbs: These small, useless limbs were no longer necessary for movement but are evidence of its terrestrial ancestors.
- **Homology:** The vestigial hind limbs are a key marker of common ancestry, showing that whales evolved from land animals with functional legs.



RODHOCETUS ABOUT 47 MILLION YEARS AGO

- **Habitat:** Shallow seas
- **Key Traits:**
 - **More aquatic:** Rodhocetus spent most of its time in water, with shorter limbs adapted for swimming.
 - Hind limbs became smaller but were still present, showing it was transitioning further away from life on land.
 - **Tail:** Development of a stronger tail for propulsion in water.
- **Significance:** Rodhocetus represents a shift toward a fully aquatic lifestyle. Its limbs were evolving into flippers, and it relied more on its tail for swimming. However, the presence of hind legs shows its connection to land mammals.



DORUDON ABOUT 37 MILLION YEARS AGO

- **Habitat:** Open ocean
- **Key Traits:**
 - **Fully aquatic:** No longer capable of moving on land.
 - Flippers instead of legs: Forelimbs became fully adapted for swimming, while hind limbs were nearly vestigial (small and non-functional).
 - **Tail fluke:** Developed a large tail fluke for efficient swimming.
- **Significance:** Dorudon looked much more like modern whales. Its body was streamlined for life in the open ocean, and its flippers and tail were well-suited for fast swimming. The small vestigial hind limbs remain an important clue to its terrestrial ancestry.



BASILOSAURUS ABOUT 35 MILLION YEARS AGO

- **Habitat:** Open ocean
- **Key Traits:**
 - Elongated body (up to 60 feet in length).
 - Vestigial hind limbs: Still present but too small for walking or swimming.
 - No dorsal fin: Unlike modern whales, Basilosaurus lacked the dorsal fin seen in some species today.
- **Significance:** Basilosaurus marks a late stage in whale evolution. It was fully aquatic and had very small, non-functional hind limbs. These vestigial limbs, although no longer useful, are important evidence of the species' land-dwelling ancestors.

MODERN WHALES (TODAY) PRESENT



- **Key Traits:**
 - **Fully aquatic:** Modern whales (e.g., baleen and toothed whales) are entirely adapted to life in the ocean.
 - **Flippers:** Their forelimbs have evolved into flippers, helping with navigation.
 - **Vestigial hip bones:** Though whales have no hind limbs, they retain small vestigial hip bones, a remnant of their land-dwelling ancestors.
- **Blowhole:** Evolution of nostrils into a blowhole on the top of the head for breathing at the water's surface.
- **Significance:** Modern whales showcase the final step in the journey from land to sea. Their streamlined bodies, powerful tails, and specialized breathing systems reflect millions of years of adaptation to aquatic life. However, the presence of vestigial structures like hip bones links them to **their land-dwelling ancestors**.

• Evolutionary Takeaways:

- **Homologies** like the whale's flippers (modified limbs) and vestigial hip bones are key evidence of common ancestry, showing how whales evolved from four-legged land mammals to fully aquatic animals.
- **Over millions of years, natural selection** led to adaptations like the development of flippers, tail flukes, and the blowhole, while structures no longer needed for land life, like hind limbs, became vestigial.