

# Why do whales swing their tails up and down, but sharks swing their tails to the sides?

Why are they the same sea creatures, but the big whales swim in a way that swings their tail up and down and sharks and many other fish swing their tails sideways horizontally?

Whales, dolphins and sharks are rather large marine animals, when viewed from a distance, they seem quite similar, so how do you know if it is a ferocious white shark or a docile dolphin? To be able to distinguish this, most people rely on their swimming patterns and the shape of their caudal fins, if the tail is vertical, it's a shark, while the horizontal caudal fin is definitely a Dolphin. Similarly, when photographers take pictures from the air, they will distinguish it as a shark if their bodies swim continuously to the side and if waving from top to bottom, it is a dolphin or whale. So why are all marine creatures, they have a different way of swimming?



Although whales and dolphins now have their bodies evolved to suit aquatic life and look very much like other fish, they are essentially mammals, so their column structure is Their life is very different from that of fish.

Their spine mainly moves up and down, while the spine of the fish fluctuates to the sides. The bones in the tails of mammals are in fact the vertebrae of the tail, and are part of the vertebral column, so the direction of the tail's movements should be consistent with that of the entire spine. Therefore, mammals, including whales, mainly swing their tails up and down, while the fish wag their tails to the sides.



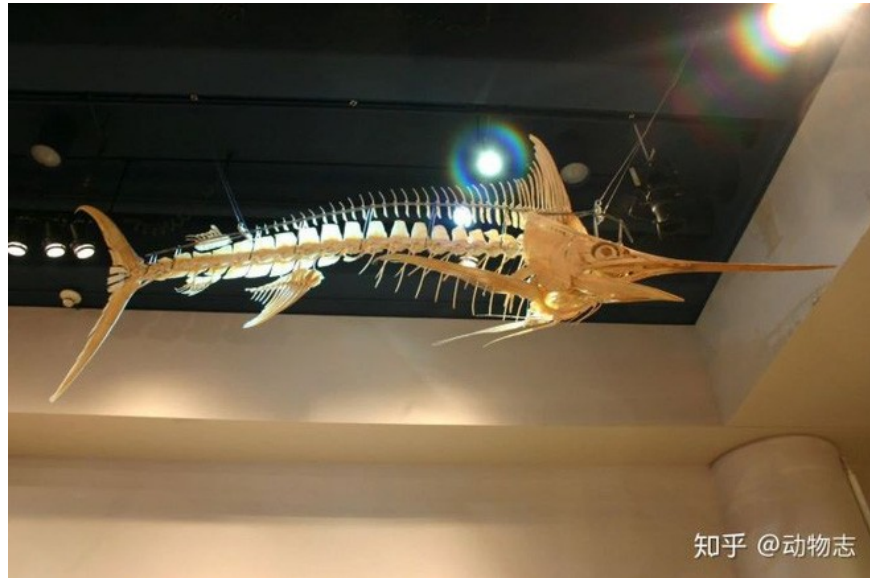
Why is there such a difference? Because terrestrial mammals, although whales are perfectly adapted to aquatic life now, their ancestors were terrestrial mammals. In order to adapt to terrestrial life, the first thing is to be able to move, so most land animals need to have legs. However, if the leg wants to move, it is necessary to have joints to connect the foot to the body and rotate in a certain direction in order to push the body forward.

Mammals have to move forward so their limbs need to move in a straight line. If the spine rotates to the sides, the movement of the spine and the movements of the limbs will not lie on the same plane, the whole body will be very hard, but if it is designed to be able to move upwards down then the limbs will be extremely flexible and can move through many different terrains. Therefore, mammals eventually chose to evolve so that their spine swayed up and down.



As for the fish, they have lived in the water for 500 million years since their appearance and have never lived on land. In the water, they do not need to have legs and bodies to easily swim in a way that moves the spine to the sides, so the spine of the fish does not need to change like mammals.

So when viewed from anatomical perspective, the spine of the fish is very hard when viewed from the side, while the column of mammals has a certain curvature and is much more flexible.



The skeletal structure of the fish.

In the mammalian skeletal structure, the ribs are connected bent to the sides to create compartments of the body and the vertebral spines are changed to open the rotation direction of the spine, supporting the body to develop in the direction of. Move up and down of the spine.

In addition, all mammals evolved from fish (fish ? amphibians ? reptiles ? mammals), but about 50 million years ago, when the ancestors of the whales decided to return. back to the ocean when they left the water 250 million years. Their body structure is highly adapted to terrestrial life and cannot change the texture back to the shape of their ancestors as fish.

As a result, they had to adjust and alter the existing structure, the modified limbs to get a fin like shape, the tail degenerated to become thicker, healthier to be able to support the movement with aquatic life.



The skeletal structure of the whales.

Because of the difference in bone structure, fish move their spine to the sides and whales move up and down their tails. In addition, other marine mammals such as seals and sea lions all swim similarly to whales.



So which spine structure is more effective for survival? If on land, the advantages of up and down movement of the spine are obvious, because in this way, animals move faster and have better maneuverability.

Among the existing terrestrial vertebrates, crocodiles, lizards and snakes are the only species with the direction of the spine moving to the sides and they can only reel their belly to the ground. The vertebral column of higher animals, birds and mammals is mainly up and down.

The first four-legged species on Earth (Tetrapod) originated from fish and their spine initially fluctuated to the sides like crocodiles, but in order to adapt to terrestrial life, they had to change. Back structure of the spine.

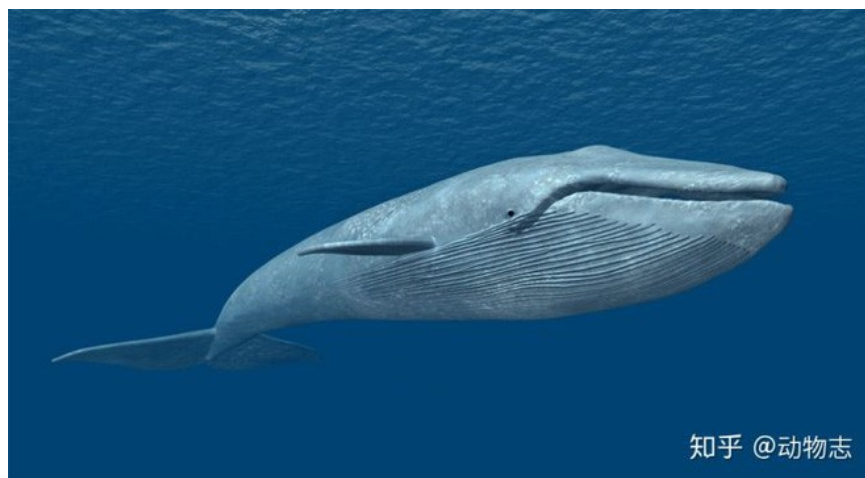
In the more than 200 million years since the arrival of the dinosaurs, the animals that dominated the Earth were all vertebrates that moved up and down. Some argue that the advancement of dinosaurs in the way of movement is one of the advantages for them to become the animals that once dominated our planet for a long time.



However, in the water environment, there is no clear difference in the advantage between the movement of the spine up and down or oscillation to the sides.

Although fish have ruled the ocean for 500 million years and still flourish. Whales have only appeared in the ocean for several tens of millions of years, but they have evolved fully adapted to aquatic life and are ubiquitous, including species that grow into large creatures. largest on the planet.

In addition, the swimming ability of whales is not inferior to that of fish, so it can be shown that the spine movement in up and down direction or to both sides can adapt well to life. aquatic



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