Natural Selection: The Evolution Of Sharks

Natural selection is the process in which the organisms in a population that are better suited and adapted to their environment increase in numbers compared to species that have gotten less adapted to their environment over several generations. However, natural selection does come with a consequence, which is that through time, species typically develop characteristics that make them better adaptive to their environments, ultimately resulting in a world full of different animal forms and species.

Sharks have been majorly influenced by natural selection through a number of ways. A trait that most sharks have developed through natural selection is the colour of their skin. Their skin color helps these sea creatures camouflage using a particular method known as counter-shadowing. For example, on the top of a Great White Sharks body they have a dark gray colouring and a white bottom, hence the name Great White Shark. This pigment disrupts their outline in the water making them harder to see which gives them an advantage as they blend in with the dark see the floor when they are viewed from above. Another advantage of this trait is that sharks can also blend in with lighter surfaces when viewed form below.

Another trait they have developed through natural selection is their upper jaw. Their upper jaw is not attached to their skull but kept in place by flexible, connective muscles which let them lengthen outward from their head, allowing them to extend their bite and reach range. This can be especially helpful when hunting prey. The ancestor of the Great White Shark is actually believed not to have swum as much. This is evident by the shape and size of their fin.

Adaptations

Sharks have been roaming our earth for over 450 million years and no matter their size or difference from evolution over centuries, these magnificent creatures' all have similar anatomy. Over time, they have evolved new and different adaptations that have helped them for survival and reproduction. Some of these include: heightening in all 6 senses, teeth becoming sharper and more predator-like, adapting of body shape and size of fins and skeletons.

Size and body:

An important adaptation that sharks have had over the years, is the shape of their fins and body. Sharks are significantly different compared to other fish as their skeletons are not made of bones but rather made from a thin, flexible material called cartilage. Cartilage has got a much lighter weight and density compared to bones which allows the sharks to move more quickly throughout the water. It is highly crucial that sharks have this adaptation as they need to be able to swim very easily so they can breathe. When sharks travel through water, there gills absorb oxygen which is how they breathe. Their cartilage also allows sharks to stay floating in the water for longer periods of time and makes it easier to swim long distances without getting tired and using less energy.

Teeth

Their teeth were also very different compared to our current sharks. Instead of being incredibly sharp and long, they were smaller and rounder. However, early ancestors also contained rows of teeth that replaced the missing ones that current sharks have today. These types of teeth might also indicate that early sharks ate only plants and insects due to the structure of their teeth, instead of being notorious carnivores as some are today. These pointy sharp teeth that sharks own in our present-day also help them to survive and reproduce as it is easier for them to hunt as they mostly feed off meat; such as fish or other sea creatures.

The Evolution Of Sharks

Possible Consequences

Sharks have largely remained unaffected for many years, not due to them being embryonic, but their development in evolution has become so successful, and there isn't much room for consequences in the near future. However, considering all the advantages of sharks with cartilage skeletons, the cartilage itself has also evolved to adapt to the needs of sharks. For example, near the backbone and jawline, the cartilage is very weak, too weak to entirely support this large mammal. In these particular areas, sharks have evolved with calcified cartilage. This type of cartilage has been hardened by calcium and is more similar to the bone as it is quite hard, but still very flexible and durable so it helps support the areas in the shark where bone would have been more beneficial. Furthermore, if you take in to consideration that some parts of shark's cartilage aren't exactly the strongest type, it could be assumed that in the future, consequences such as slow growth or vulnerability from not being able to fight or protect themselves could lead to a decrease in the population of these animals.

Shark Skeleton: cartilage benefits include weight reduction, buoyancy, flexibility, tough skin, extendable jaws and bite force.

450 million years ago, the first known ancestor of the modern shark was a type of fish called the Acanthodian. Also known as "Spiny sharks" (Michael Rogers, June 10th, 2016), these sharks developed the same characteristics that all sharks still have today which are the cartilaginous skeletal structures. 140 million years later, the Megalodon shark was evolved. They were the largest ocean predator to ever exist, weighing over 30 tons and being a massive 65ft in length. These sharks are very similar to our great white sharks in features but not so much in size. The size gradually dropped as the sharks began to enter the Modern Cenozoic Era which is where today's sharks lie on the timeline and are currently holding 440 species.

Throughout the late Devonian Era, the first modern shark was called the Cladoselache. This shark differed from its early eel ancestors, as its body appeared more like today's shark. It was 6ft long, with a long-structured body, dorsal fins, and 5-7 gill slits. The main differences between this shark and today's shark is the lack of claspers, its jaw, and round rose.

This era began around 200 million years ago. During this time, around 12 new relations of sharks emerged. Sharks started to evolve mouths under their snout, and supple jaws so they could attack and catch prey and fins that allowed them to swim faster and more efficiently.

Shark teeth 450, 000 years ago (left) shark teeth in our present-day.

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