



SHARK FACTS

THE SHARK TRUST

4 Creykes Court,
5 Craigie Drive,
The Millfields,
Plymouth PL1 3JB

Tel: (+44) (0) 1752 672008/672020
Fax: (+44) (0) 1752 672008

Email: enquiries@sharktrust.org
Website: www.sharktrust.org

Registered charity No.: 1064185
Registered Company No.: 3396164

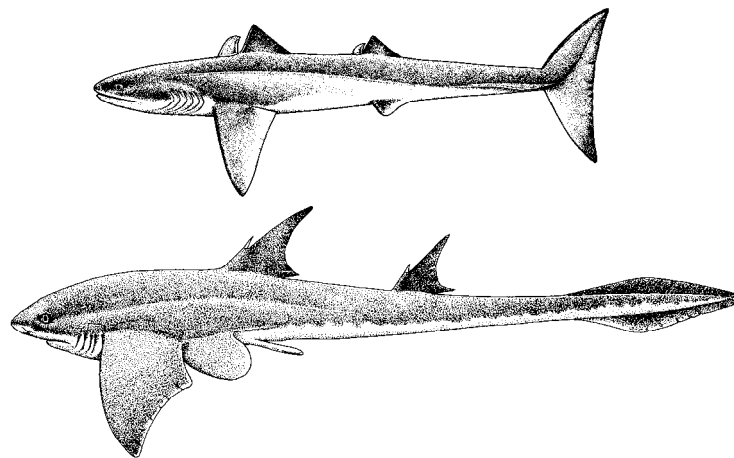
The Shark Trust supports the
European Elasmobranch Association

Old and New

About 450 million years ago (200 million years before the dinosaurs), ancestral fish evolved and diversified into two distinct groups – the bony fish (Osteichthyes) and the cartilaginous fish (Chondrichthyes of which there are two subclasses, all lacking true bones and the external scales normally associated with fish). It is the second group that our sharks, skates, chimaeras and rays all belong to. The cartilaginous skeletons of these fish decompose rapidly and are not prone to fossilise. Despite this, there are over 3000 fossils; the oldest ones being dermal denticles (skin teeth) from about 450 million years ago followed 50 million years later by the first fossilised teeth.

What did early sharks look like?

Ancient sharks share many common features including jaws, replaceable teeth, tooth-like scales, paired fins, internal fertilization, and a cartilaginous skeleton with more modern descendants. However, there are some that vary considerably too. One of the most primitive and ancient sharks *Cladoseleche*, a 1.2 m long species, appeared around 370 million years ago in the late Devonian period. Like most sharks of this



Cladoseleche spp © Marc Dando

period, it had a short snout with the mouth located at the front of the head rather than underneath the snout (as seen in most of our modern sharks today)¹. Its tail was similar to some of our modern fast-swimming sharks like the Mako and the White Shark, giving it agility and great speed to escape the larger armoured fish of the period².

Unlike modern sharks, *Cladoseleche* lacked dermal denticles, a feature that helps modern species to build firmer muscle attachment and also provides protection against injury. It also lacked claspers, the organs used to transfer sperm from males to females. How the species reproduced is still a mystery but the fact that it survived for about 100 million years gives testament to its success¹.

How do we know that sharks evolved so long ago?

About 360 million years ago, sharks diversified and became successful to such an extent that scientists now call it 'the golden age of sharks'. This period lasted for about 60 million years, after which sharks entered a period of evolutionary stasis where little change occurred³. Roughly 245 million years ago, sharks entered a second period of evolutionary proliferation and it wasn't until 213 million years ago that more modern sharks began to make an appearance.

As mentioned previously, sharks do not fossilise readily and the only evidence we have to show that ancient sharks existed is the fossilised remains of teeth and dermal denticles. A 'fossil' is any remains, trace, or impression of ancient life, preserved in rock¹. Shark teeth fossils are the most abundant of all vertebrates and fossilise when phosphates, which preserve the details necessary for identification, replace the protein portion of the teeth. The first truly modern shark teeth have been dated back to 100 million years ago and our oldest White Shark teeth only occurred 60-65 million years ago. The appearance of these fossils coincides with the diversification of marine mammals about 60 million years ago.

The Shark Trust

Unit 4, Creykes Court, The Millfields, Stonehouse, Plymouth, PL1 3LD, UK

www.sharktrust.org


What do modern sharks look like?

There are about 1100 known living species of Elasmobranchs (sharks and rays), 500 of which refer solely to sharks. Elasmobranchs are characterised by five to seven paired gill openings on the side of the head and pectoral fins that are not attached to the head above the gill openings.

What are orders?


Taxonomy is the method by which all organisms are classified in a ranked hierarchy (e.g. see White Shark classification in the table). Each organism falls into a specific order, sharing similarities with the other species in that category. Below are the eight orders that sharks are broken down into with an illustration of each.

SQUATINIFORMES (Angelsharks)
 Single family with 15 species. Characterised by large pectoral fins extending forward over the gills (but not attached to head) and five gill slits. Bare live young from eggs inside the body. Often found half-buried on sandy/muddy bottoms during the daytime.



Angel Shark © Simon Rogerson

SQUALIFORMES (Dogfish Sharks)
 Three families with more than 94 species, some with spines. All species have cylindrical bodies and a long snout. Generally found in all oceans up to a depth of 6,000m. Young hatch from eggs inside body.




Spiny Dogfish © Andy Murch

HEXANCHIFORMES (Sixgill, Sevengill and Fritled Sharks)
 Two families of at least 5 species. Fritled sharks have slender, eel-like body while Sixgill and Sevengill sharks are more heavy-bodied with high fins – 2 of the species in this family have six pairs of gill openings and the other two have seven pairs. Young hatch from eggs within the body



Sevengill Shark © Rob Allen

HETERODONTIFORMES (Bullhead Sharks)
 Single family with 8 described species. Have big, thick heads with a broad crest over each eye, short piglike snout's and nearly transverse mouths as well as grooves connecting the mouth to nostrils and teeth for holding and crushing. They lay eggs in conical eggcases with screwlike flanges.




Port Jackson Shark © Paul Martin

LAMNIFORMES (Mackerel Sharks)
 Seven families with at least 16 species, including the White Shark and the Megamouth Shark (very rare) as well as the Basking Shark. Characterised by long snouts and mouths that stretch behind the eyes in most species. They lack nictating eyelids but exhibit *intrauterine cannibalism* in reproduction.




White Shark © Jeremy Stafford-Deitsch

CARCHARHINIFORMES (Ground Sharks)
 Eight families with over 200 described species. Have an elongated snout, long mouth reaching behind the eyes and teeth ranging from small cuspidate to large and bladelike. Also have a third eyelid. Include primitive catsharks to hammerheads and requiem sharks and the Blue, Silky and Oceanic Whitetip Sharks are most numerous pelagic sharks.



Blue Shark © Jeremy Stafford-Deitsch

ORECTOLOBIFORMES (Carpet Sharks)
 Seven families with 33 species including Wobbegongs, Blindsharks and the Whaleshark. Generally have piglike snout's and short mouth that in most species connect by grooves to nostrils as well as unique barbels on inside edges.



Tasselled Wobbegong © Jeremy Stafford-Deitsch.

PRISTIOPHORIFORMES (Sawsharks)
 Single family with five species. Characterised by long, flat, bladelike snout edged with slender sharp teeth and a pair of long barbels in front of the nostrils. They also have small cuspidate holding teeth in both jaws and are a minor group of harmless bottom dwelling sharks that resemble miniature sawfishes.

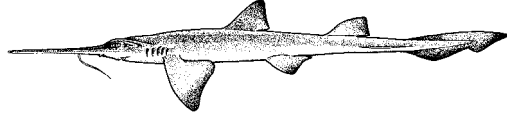


Illustration of Sawsharks © Mark Dando

Kingdom	Animalia	Order	Lamniformes
Phylum	Chordata	Family	Lamnidae
Sub-Phylum	Vertebrata	Genus	<i>Carcharodon</i>
Class	Chondrichthyes	Species	<i>C. carcharias</i>
Sub-Class	Elasmobranchii		