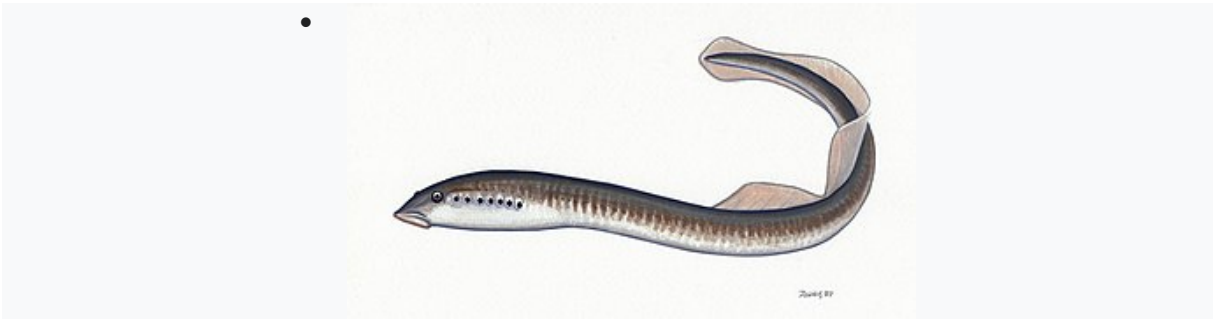
Marine fish

Fish fall into two main groups: fish with bony internal skeletons and fish with cartilaginous internal skeletons. Fish anatomy and physiology generally includes a two-chambered heart, eyes adapted to seeing underwater, and a skin protected by scales and mucous. They typically breathe by extracting oxygen from water through gills. Fish use fins to propel and stabilise themselves in the water. Over 33,000 species of fish have been described as of 2017,[1] of which about 20,000 are marine fish.[2]

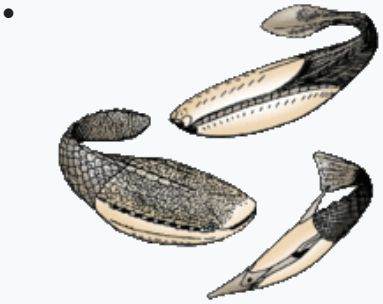
Jawless fish

Hagfish form a class of about 20 species of eel-shaped, slime-producing marine fish. They are the only known living animals that have a skull but no vertebral column. Lampreys form a superclass containing 38 known extant species of jawless fish.[3] The adult lamprey is characterized by a toothed, funnel-like sucking mouth. Although they are well known for boring into the flesh of other fish to suck their blood,[4] only 18 species of lampreys are actually parasitic.[5] Together hagfish and lampreys are the sister group to vertebrates. Living hagfish remain similar to hagfish from around 300 million years ago.[6] The lampreys are a very ancient lineage of vertebrates, though their exact relationship to hagfishes and jawed vertebrates is still a matter of dispute.[7] Molecular analysis since 1992 has suggested that hagfish are most closely related to lampreys,[8] and so also are vertebrates in a monophyletic sense. Others consider them a sister group of vertebrates in the common taxon of craniata.[9]

Hagfish are the only known living animals with a skull but no vertebral column.



Lampreys are often parasitic and have a toothed, funnel-like sucking mouth



The extinct Pteraspidomorphi, ancestral to jawed vertebrates

Pteraspidomorphi is an extinct class of early jawless fish ancestral to jawed vertebrates. The few characteristics they share with the latter are now considered as primitive for all vertebrates.

Cartilaginous fish[edit]

Main article: Cartilaginous fish

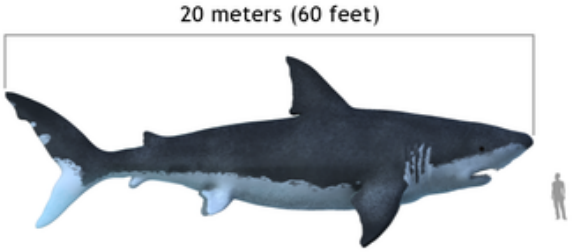
Cartilaginous fish, such as sharks and rays, have jaws and skeletons made of cartilage rather than bone. Megalodon is an extinct species of shark that lived about 28 to 1.5 Ma. It looked much like a stocky version of the great white shark, but was much larger with fossil lengths reaching 20.3 metres (67 ft).[10] Found in all oceans[11] it was one of the largest and most powerful predators in vertebrate history,[10] and probably had a profound impact on marine life.[12] The Greenland shark has the longest known lifespan of all vertebrates, about 400 years.[13]

Cartilaginous fishes may have evolved from spiny sharks

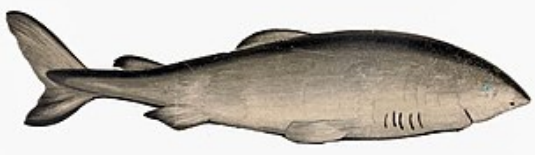
Stingray

The manta ray, largest ray in the world, has been targeted by fisheries and is now vulnerable.[14]

Sawfish are rays with long rostrums resembling a saw. All are now endangered or critically endangered[15]



The extinct megalodon resembled a giant great white shark



The Greenland shark lives longer than any other vertebrate

The largest extant fish, the whale shark, is now a vulnerable species

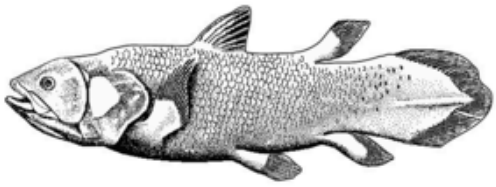
Bony fish[edit]

Main article: Bony fish

Bony fish have jaws and skeletons made of bone rather than cartilage. About 90% of the world's fish species are bony fish. Bony fish also have hard, bony plates called operculum which help them respire and protect their gills, and they often possess a swim bladder which they use for better control of their buoyancy.

Bony fish can be further divided into those with lobe fins and those with ray fins. Lobe fins have the form of fleshy lobes supported by bony stalks which extend from the body.[16] Lobe fins evolved into the legs of the first tetrapod land vertebrates, so by extension an early ancestor of humans was a lobe-finned fish. Apart from the coelacanths and the lungfishes, lobe-finned fishes are now extinct. The rest of the modern fish have ray fins. These are made of webs of skin supported by bony or horny spines (rays) which can be erected to control the fin stiffness.

Ray-finned fish (Prussian carp)

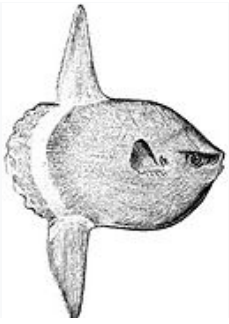


Lobe-finned fish
(coelacanth)

Sailfish

Eel

Sea-
horse



Ocean sunfish

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Anglerfish

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Pufferfish

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Clown triggerfish

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Mandarin dragonet