

Chapter 12

Fish are the most common and diverse group of vertebrate organisms in the ocean

Their origins date back 500 million years

There are about 32,000 different species of fish worldwide (in both fresh and salt water)

Fish are classified as Chordates meaning they have a backbone and spinal cord.

The study of Protochordates (first chordates)

Sea Squirt like mollusks they have an incurrent and excurrent siphon

Lancelet - a tiny, transparent fishlike animal that lives half buried in the sand with its head sticking out to filter plankton from the water

Acorn worm resembles an invertebrate but has a dorsal nerve cord and gill slits

These organisms and the study of them have helped to show an evolutionary link between invertebrates and vertebrates

Jawless Fish - the first fish to evolve

There are only 2 types still alive today, the sea lamprey and hagfish

They both live as parasites

Sea Lamprey inhabit estuaries from Maine to Florida. They use their sucking disk on its mouth to attach to host fish. It feeds by using its teeth and rasping tongue to make a hole then suck out blood and tissue.

Hagfish use sharp teeth in their round mouth to burrow holes into the bodies of dead or dying fish

Cartilaginous Fish are fish whose entire skeleton is composed of cartilage.

Cartilage - flexible connective tissue composed of cells and proteins.

This ancient class includes sharks, skates, and rays.

There are 700 species of cartilaginous fish.

Cart. fish were the first jawed fish in the ocean.

They have placoid scales which are tiny teeth that are deeply embedded in the skin.

They have visible gill slits for breathing, and also have breathing holes called spiracles located behind the eyes.

The fins of cart. fish are more rigid than bony fish.

Skates and Rays

Their pectoral fins are more highly developed than sharks.

Manta Rays are found in the tropics and can grow to 7 meters (over 21 ft) across.

They open their enormous mouth while swimming to filter feed on plankton.

Stingrays are found, often well hidden in the sand of the Gulf of Mexico and along the Atlantic coast from the Carolinas to Brazil. There is a sharp spine located at the base of the tail and can inflict a painful puncture wound.

Skates - do not have a spine on their tail and are found in temperate waters of the Atlantic and Pacific coasts.

Both skates and stingrays eat crustaceans and mollusks that live in the subtidal zone.

Sharks

Sharks have a full cartilaginous skeleton and a highly streamlined body.

The earliest known sharks were present about 450 million years ago.

- modern sharks have been around for the past 100 million years

There are currently 440 species alive today

- smallest - the dwarf lantern shark 17 cm. or 4.7 in. long

- largest - the white shark, 15 m or 45 ish ft

Shark life-spans vary by species but most live 20 to 30 years. A few live to 100 years.

Shark teeth:

- are embedded in the gums rather than directly affixed to the jaw and are constantly replaced throughout life

- rows of replacement teeth grow on the inside of the jaw and steadily move forward like a "conveyor belt"

- some sharks lose 30,000 or more teeth in their lifetime.

- tooth shape depends on diet:

- if they eat mollusks and crustaceans they have dense flattened teeth for crushing

- those that feed on fish have needle-like teeth for gripping

- those that feed on larger prey have pointed lower teeth for gripping and triangular upper teeth with serrated edges for cutting.

Most sharks are " cold-blooded " which means that their internal body temperature matches that of their ambient environment.

Some sharks, such as the shortfin mako and the great white maintain a higher body temperature than the surrounding water.

- this allows faster bursts of speed and more energy

Most sharks are carnivorous

Some species, including tiger sharks, eat almost anything, but the vast majority seek particular prey, and rarely vary their diet.

Sharks and buoyancy

- Sharks have an enlarged liver that is filled with oil that comprises 30% of their body weight.
- cartilage is about half as dense as bone, which also helps their buoyancy
- Sharks also use dynamic lift, which means swimming will keep them from sinking
- Sharks cannot sleep very long, if at all, without sinking

Shark digestion

- Can take a very long time
- Unwanted items may pass get past the stomach, and instead the shark either vomits or turns its stomach inside out and ejects unwanted items from its mouth

Shark Intelligence

- recent studies have indicated that many species possess powerful problem solving skills, social skills and curiosity.

Range and habitat

- Sharks are found in all seas. They generally do not live in freshwater with a few exceptions such as the bull shark and the river shark.
- Sharks are common down to depths of 2,000 meters (6,000 ft), and some live even deeper

Shark attacks

- The average number of fatalities worldwide per year between 2001 and 2006 from unprovoked shark attacks is 4.3.
- Only a few sharks are dangerous to humans.
- Out of more than 440 species, only 4 have been involved in a significant number of fatal, unprovoked attacks on humans: the great white, oceanic whitetip, tiger, and bull + sharks

Sharks are highly important to the marine ecosystem.

- Some are top predators, hunting and eating smaller and weaker prey which allows only the stronger organisms to survive.
- Others are bottom-feeders and act as garbage men by cleaning up dead and decaying organisms



