Types of marine organisms

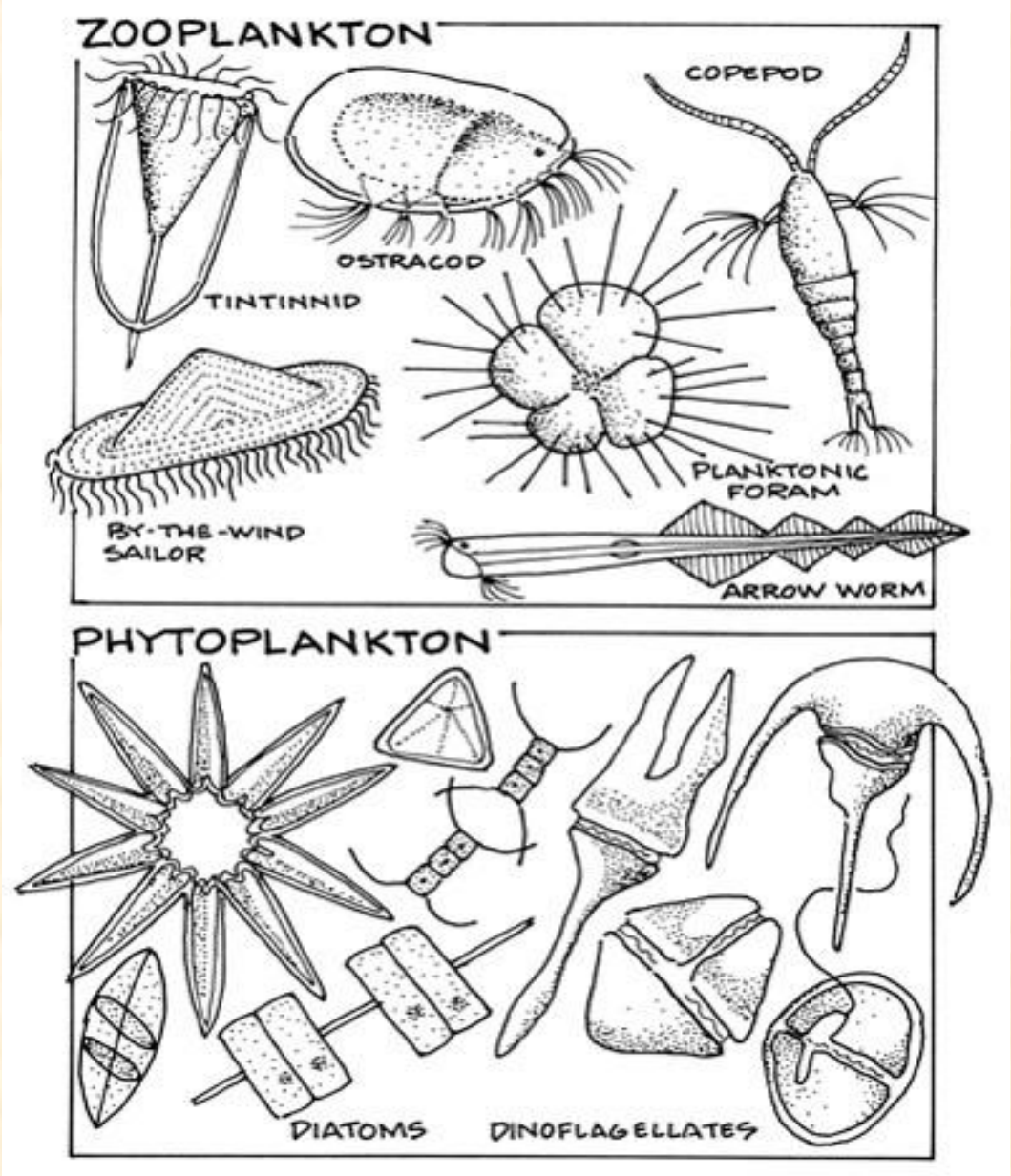
1- Plankton:

Organisms that float or swim freely with water current (have very weak swimming ability).

It includes:

A- **Phytoplankton**: (plants).

B- **Zooplankton**: (animals).



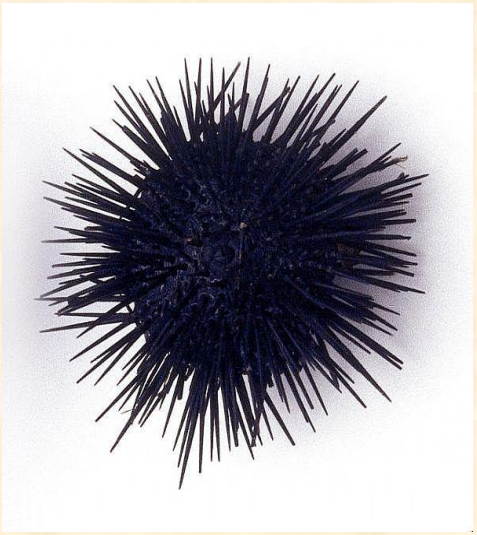
2- <u>Benthos</u>: (Benthic organisms)

Organisms that live on the sea floor and depend on it for food and shelter.

It includes:

A- **<u>Sessile benthos</u>**: e.g. corals.

B- **<u>Vagrant benthos</u>**: e.g. Limpet, Chiton, sea star, sea urchin.



3- Nekton:

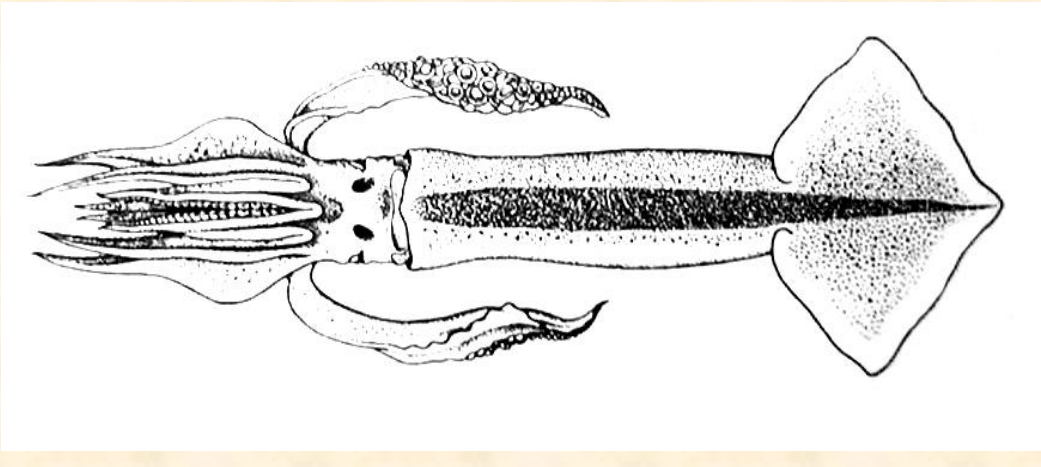
- Organisms that have good ability to swim in water thus called **true swimming organisms**.
- Mainly include members of **Phylum Chordata**: Fish (cartilaginous and bony fish), reptiles (sea snakes and sea turtles) and marine mammals.
- Also some **Mollusca** (squid and octopus) and large **Crustacea** (Shrimp).

Major groups of Nektons

Cephalopods:

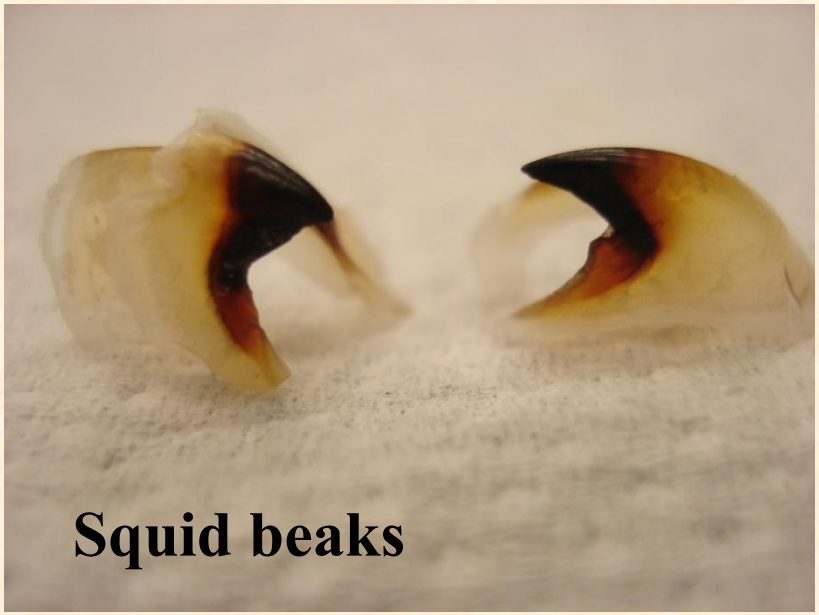
- Belong to phylum **Mollusca**.
- Examples: Squid and octopus.

Squid

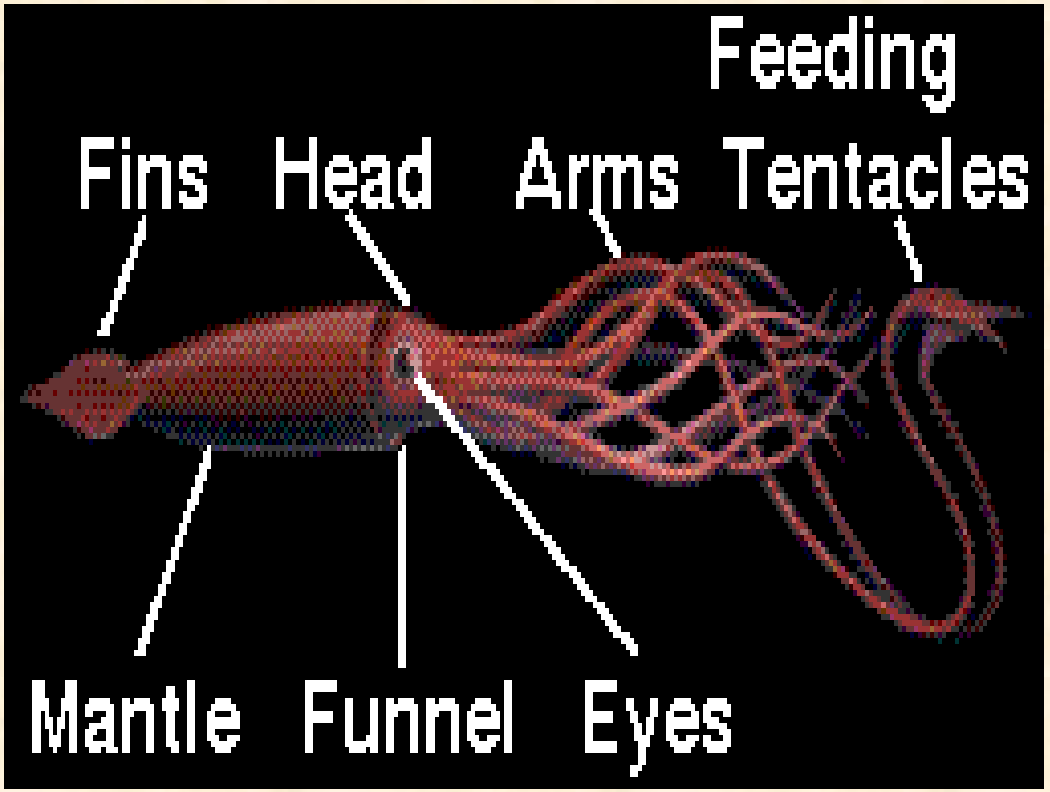


Octopus

- The **mantle** encloses water, which can be expelled by muscular action through a **siphon (funnel)**, this can make sudden rapid movement.
- Squid and octopus have an **ink gland**. Ink can be expelled with water to avoid predators.
- In Squid the mouth is armed with powerful **beaks.**



Squid beaks



Squid

Colossal Squid

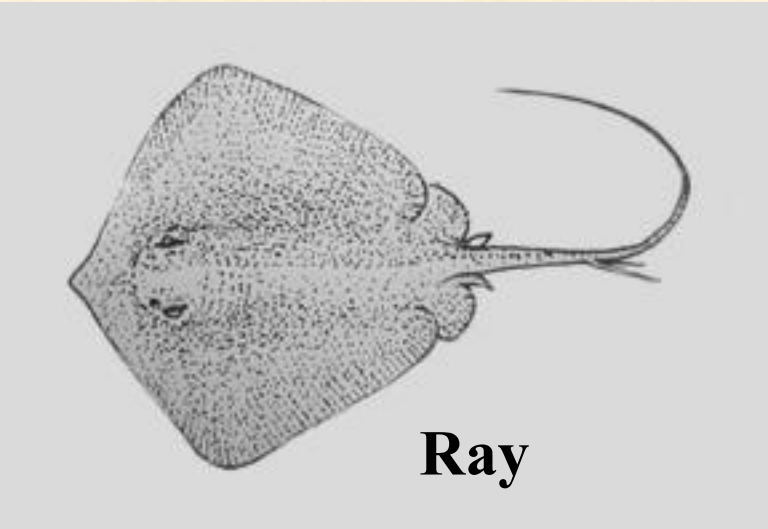
Captured in Newzeland, April 2003.

150 Kg weight – 5 meters long

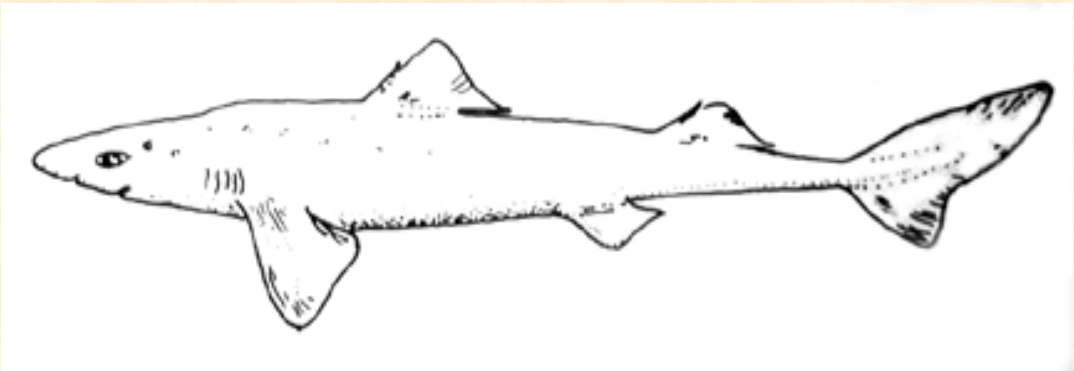
Fish

(1) Chondrichthyes: (cartilaginous fish)

- Have cartilaginous skeleton & replaceable tooth.
- Include sharks and rays.
- Some sharks can grow, use, and lose as many as 1000 teeth.



Ray



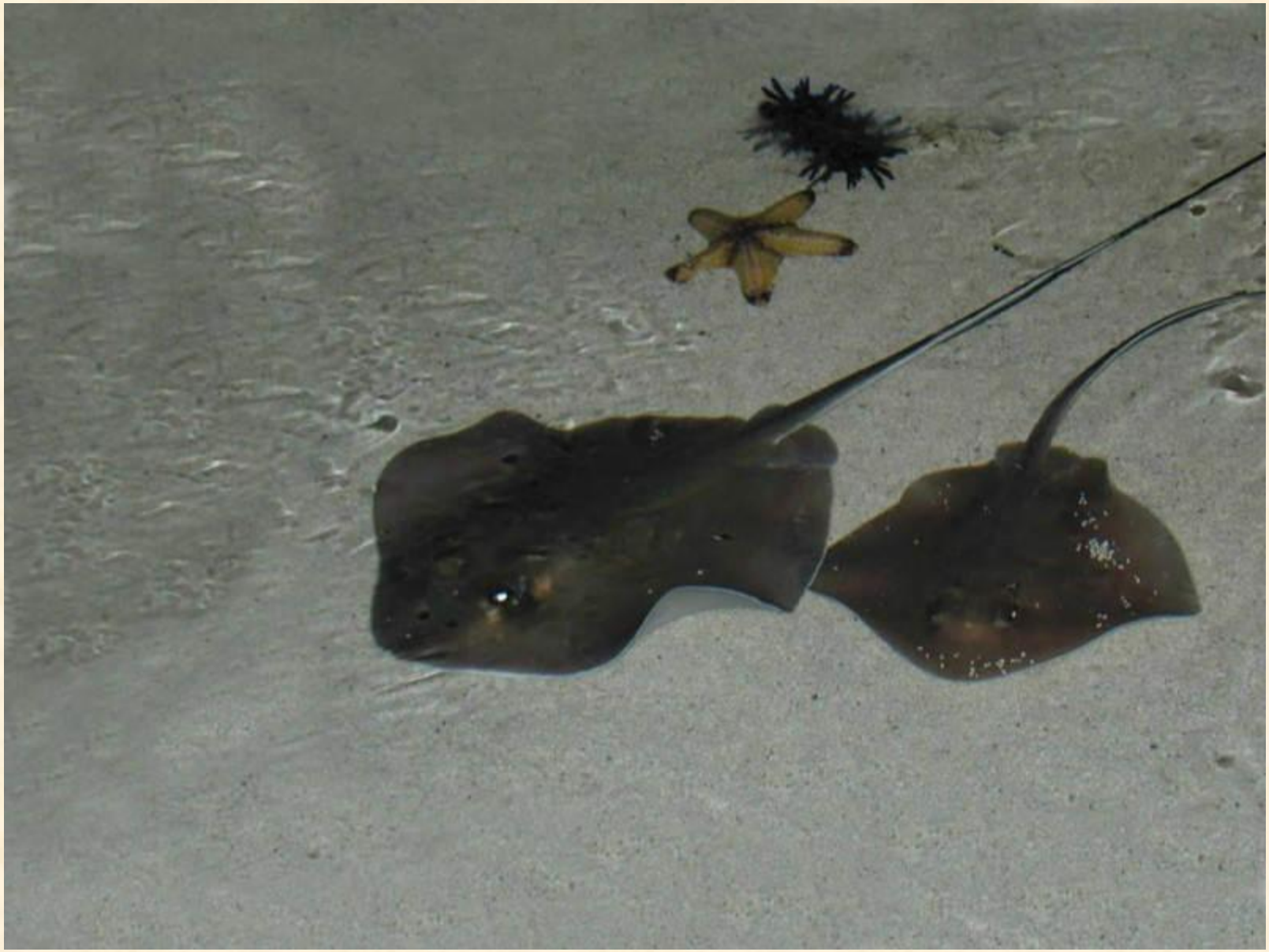
Shark

(2) Osteichthyes: (bony fishes)

- Have true bony skeleton & teeth fixed in jaws.
- Much more diverse than Chondrichthyes.

Shark Jaw

Blue-spotted ribbon-tail ray

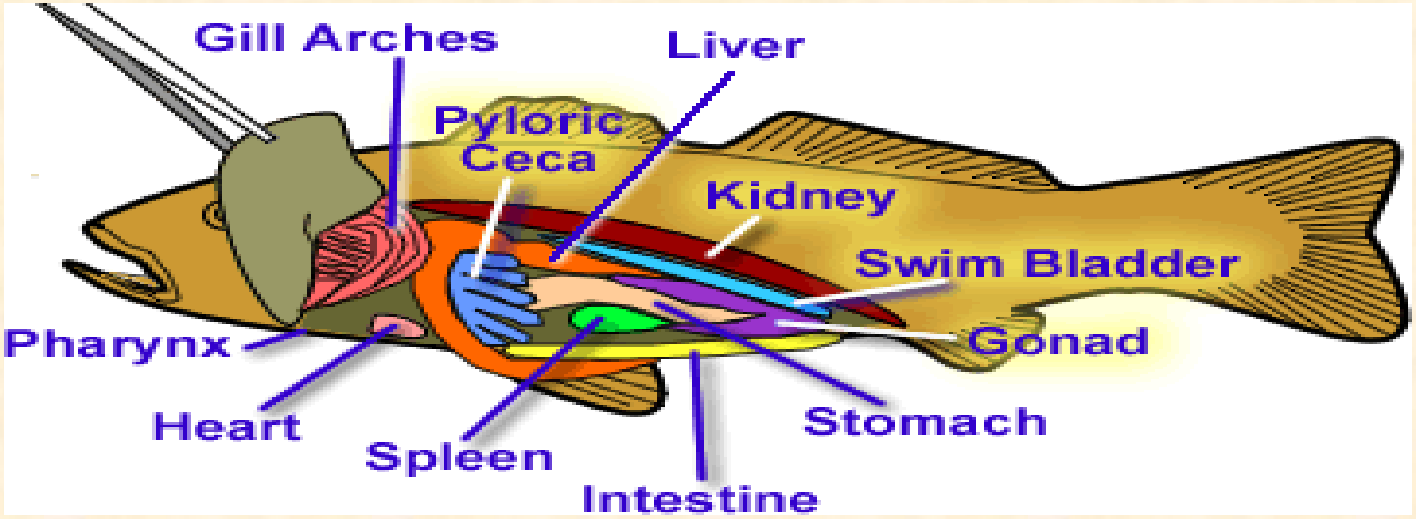


Sting ray

Giant Manta ray

Buoyancy of fish

- The **body chemical composition** of fish affects and regulates buoyancy to keep its vertical position in water column.
- **Cartilaginous fish** have **high lipid content** which reduces its body density.
- **Bony fish** have **lower salt content** than sea water to reduce its body density, also most bony fish have a **swim bladder.**



Bony fish diversity (Coral reef fish)

- Coral reefs are the most species-rich ecosystems known.
- There are 4000-4500 fish species in coral reefs, comprising 25% of the known species of marine fish.
- Here we will present **some common examples of coral reef fish:**

1- **Parrot Fish**:

- Their large front teeth are fused together like a parrot's beak and they use these teeth to feed on algae present in the corals.
- A second pair of teeth is used to grind the coral into little pieces of sand, edible algae, and coral polyps.
- One parrot fish may produce as much as a ton of sand each year (A great source for those beautiful white sand beaches).

2- **Butterfly Fish:**

- May reach length up to 23 cm.
- Most species have a dark spot (which looks like an eye) on its dorsal fin and a thick black band over its eye as a camouflage.
- It feeds on small invertebrates.

3- Angel fish:

- Larger (up to 40-50 cm) and more bright in color than butterfly fish.
- Have large spine in the ventral side of the operculum (not present in butterfly).
- It can live for about 15 years.
- The juvenile angelfish are very dark blue with a concentric pattern of white lines (completely different than adults).

Emperor Angelfish

Juvenile

Adult

4- Wrasse:

- The most numerous inhabitants of all coral reefs.
- Species are so variable in color, size and body shape.
- Some species may be few centimeters long while others may reach 2 meters.

Cleaner Wrasse

Napoleon Fish

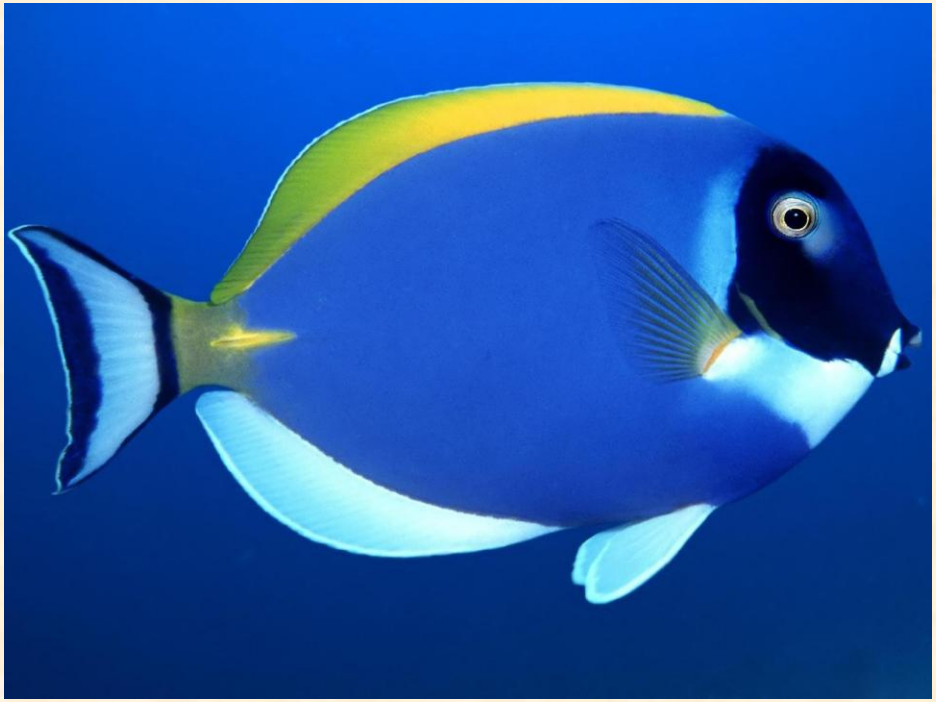
5- Trigger Fish:

- Feed on hard-shelled benthic invertebrates like molluscs and echinoderms.
- Some species feed mainly on sea urchins and the long snout of this fish helps to protect the eyes from the urchin's spines.

Picasso trigger fish

6- Surgeon Fish:

- Have single fixed spine on each side of the caudal peduncle used for defense or fighting.
- The pectoral fins have large, sharp and venomous spines.
- Its sting is very painful and can be healed by applying heat (exposing the wound to very hot water to destroy the venom).
- Feed on algae or zooplanktons.



7- Damsel Fish:

- A very large family with about 300 species.
- Live mainly in reefs which have protected cover and rarely move over open substrates.
- Found always close to its food source.
- **Examples** of damsel fish:

Clown fish
(Anemone fish)

Sergeant Major

8- Porcupine Fish:

When it is frightened, the porcupine fish quickly inflates itself into a large balloon shape with sharp spines.

9- Puffer Fish:

Can do the same defense mechanism but it does not have sharp spines on the skin.

10- Stone Fish:

- It is the most poisonous fish in the world as the whole body is covered with needle-sharp, venom-filled spines.
- Its body colors help it to hide in sea floor.

Stone Fish

11- Lion Fish:

- Both stone fish and lion fish belong to the same family called scorpion fish.
- Have very long spines on dorsal and pectoral fins.
- All species have venomous spines.
- Its sting is very painful and can be healed by applying heat (exposing the wound to very hot water or air to destroy the protein-based venom).

12- Moray eel:

- Snake like body with sharp long teeth.
- By day, the moray eel stays in its shelter in rocks or coral cave, waiting for a fish prey. At night, it swims along the reefs, using its sharp sense of smell to find fish. It is a nocturnal predator.

What is symbiosis?

General definition: “the act of living together”.

Which means:

- Two organisms living together.
- Temporarily or for a long time.
- At least one of the organisms benefits from this relationship.

Types of Symbiosis

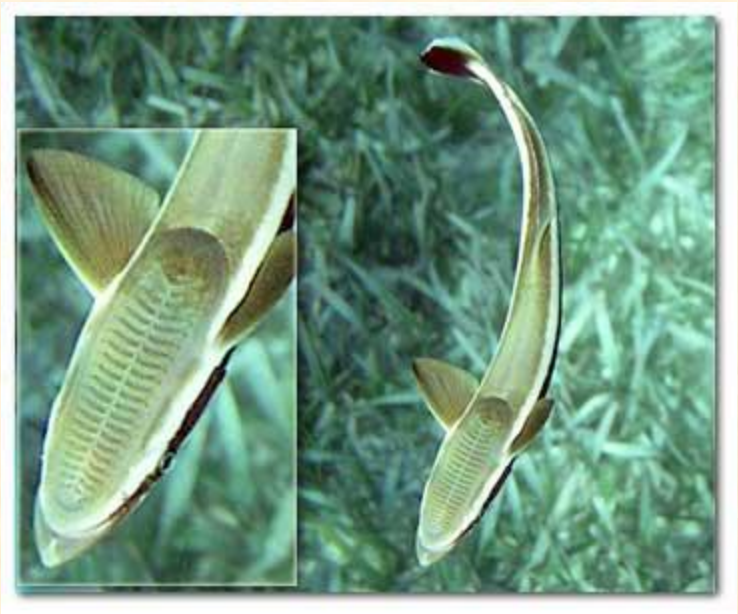
Commensalism: A relationship in which one organism benefits and the other is not harmed nor helped.

Mutualism: A relationship in which both organisms benefit.

Parasitism: A relationship in which one organism benefits and the other is harmed.

Remora & Shark: (Commensalism)

The Remora attach itself to the shark's body and saves energy since it doesn't have to swim, and it feeds on the remaining food from the shark. The shark doesn't get benefit.



Clown fish & sea anemone: (Mutualism)

- The anemone has poisonous tentacles that kill other fish but not the clown fish.
- The clown fish helps to clean the anemone and scare away the anemone's predators it may also feed on dead tentacles of the anemone.
- The clown fish gets protection.

Cleaner Wrasse & fish: (Mutualism)

- Cleaner wrasse feeds on the parasites on the skin or gills of other fish.
- It feeds also on food remaining inside the mouth of other fish.
- Both fish benefit as the cleaner wrasse gets food and the other fish is cleaned.

False Cleaner blenny & fish: (Parasitism)

- This fish has very close body shape and color to the cleaner wrasse but it feeds on fish meat and not on external fish parasites.
- When a fish comes to this false cleaning station, the blenny will feed on healthy tissues of the fish.

Cleaner wrasse & Moray eel

False cleaner Blenny

Continue:

Major Groups of Nektons

Mammals

Whales and Dolphins

- All belong to **Order: Cetacea**
- **Suborder: Odontoceti** (Toothed whales)

  e.g.: sperm whale, killer whale and dolphins.
- **Suborder: Mysticeti** (Baleen whales)

  feed by means of baleen, which traps zooplankton.

  e.g.: blue whale, humpback whale and right whale.

Odontoceti

Single blowhole

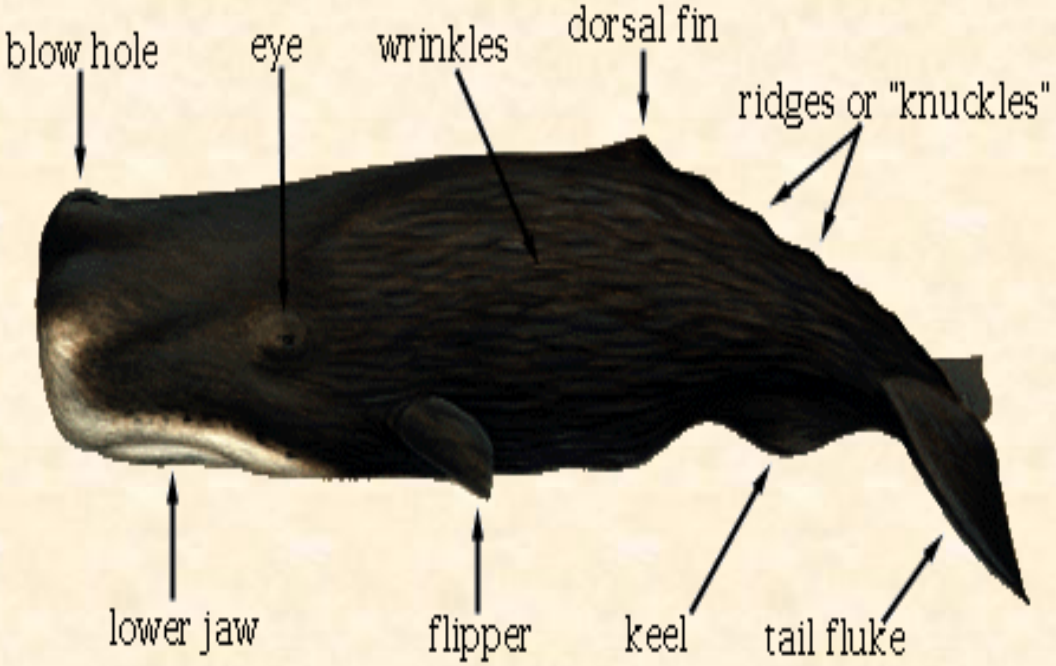
Mysticeti

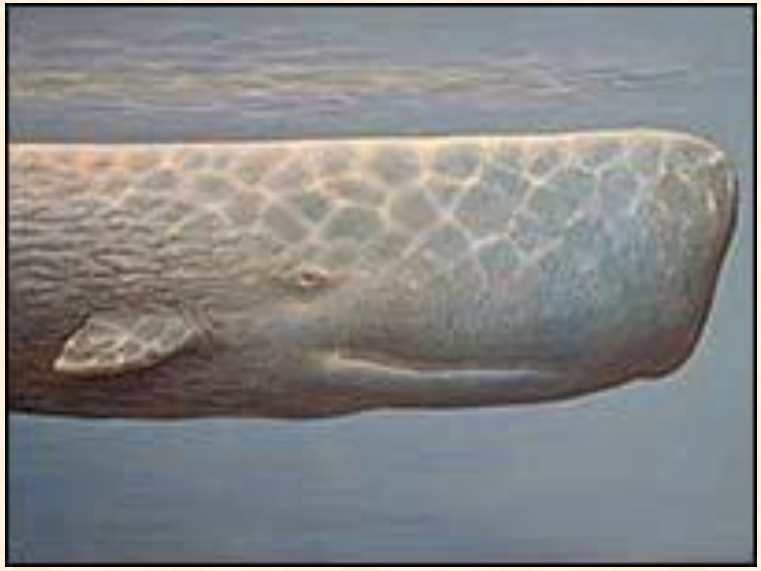
2 blowholes

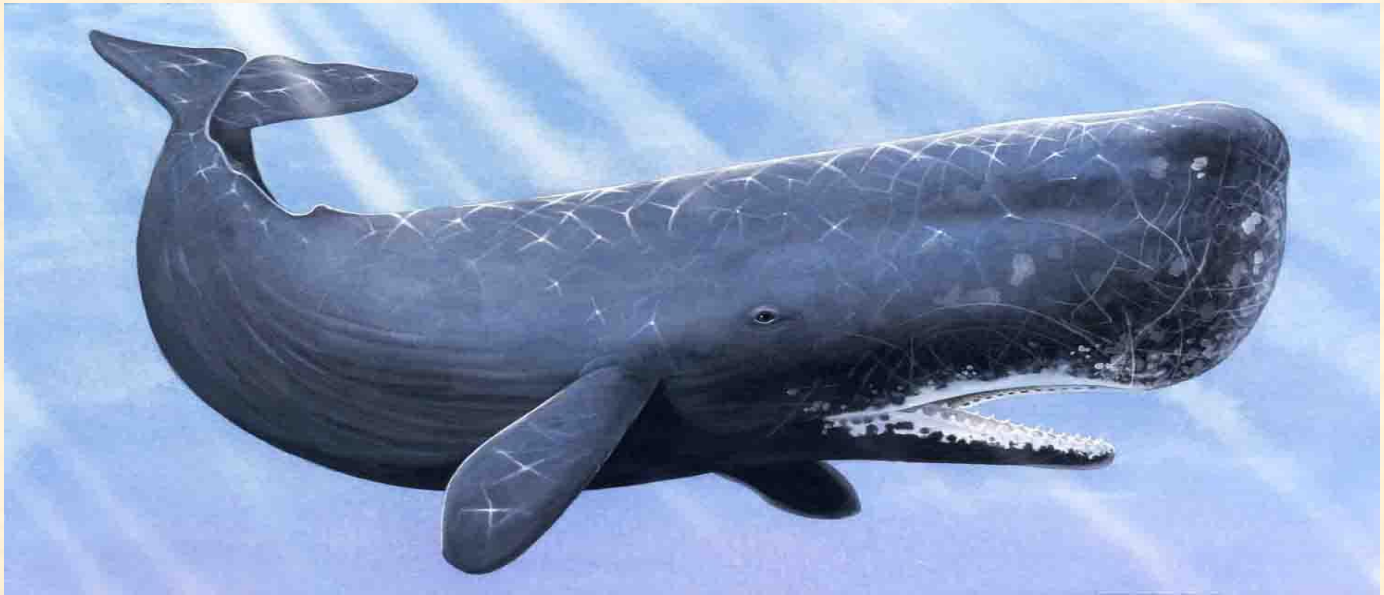
Odontoceti (Toothed Whales)

- Have teeth, usually good hunters, feed on squid, fish or even small mammals.
- Have single blowhole.
- Oral communication is common among individuals.
- Many species have bulbous melon, filled with oil which is used for sound reception and echolocation.
- Usually have social behavior, killer whales live in groups dominated by old females (maternally dominated).

Sperm whales







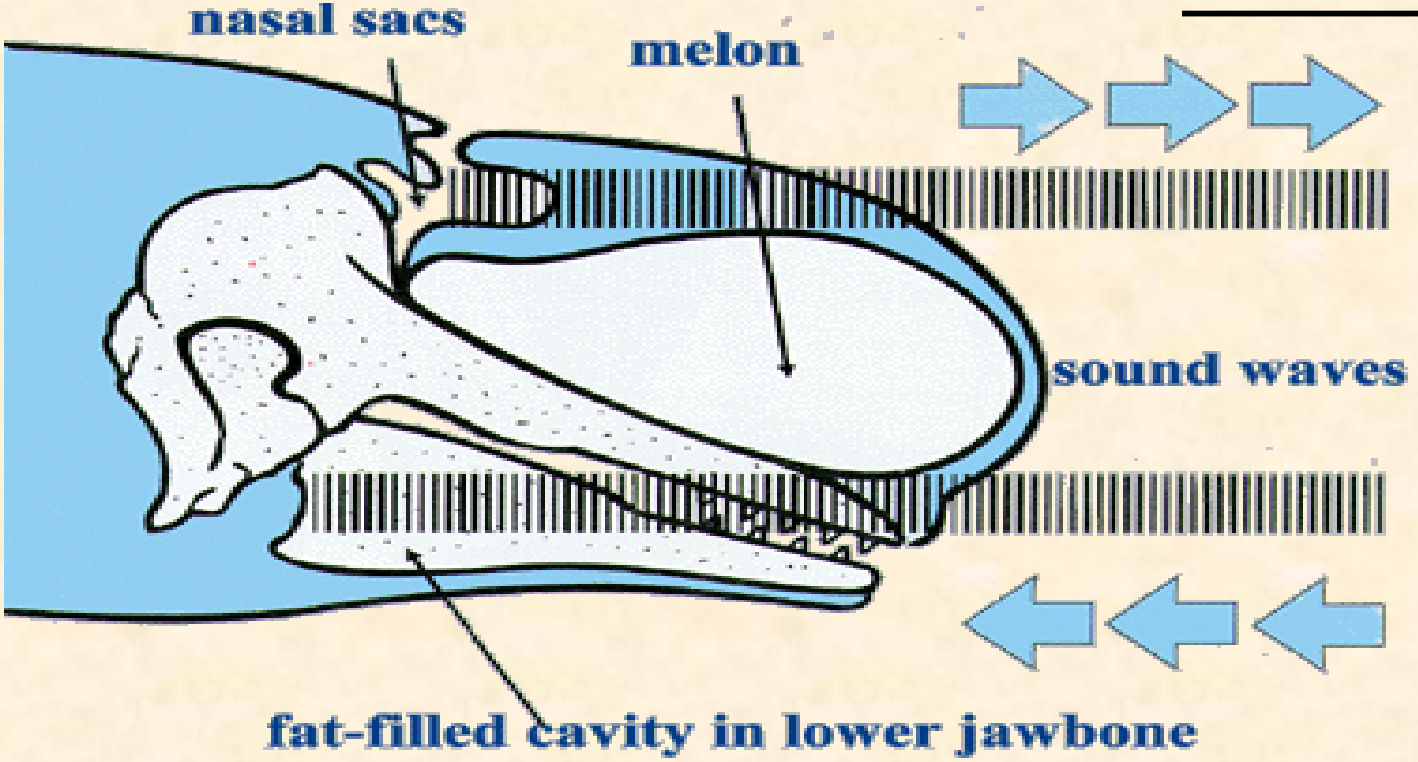

WHALE WORLD
SPERM WHALE
one of the last whales to be taken in 1978. the sperm whale is the only large toothed whale and can dive very deep for its food. (giant squid)
Length 37 feet (11m)

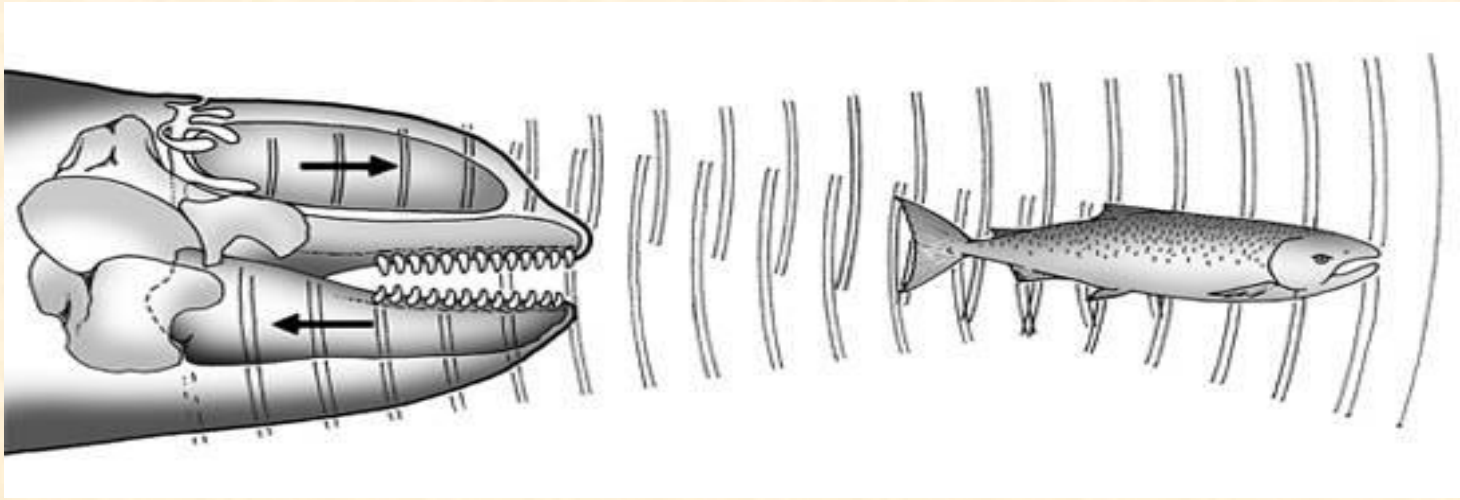
Dolphins

Bottle-nose Dolphin

Killer whale, *Orcinus orca*

Echolocation

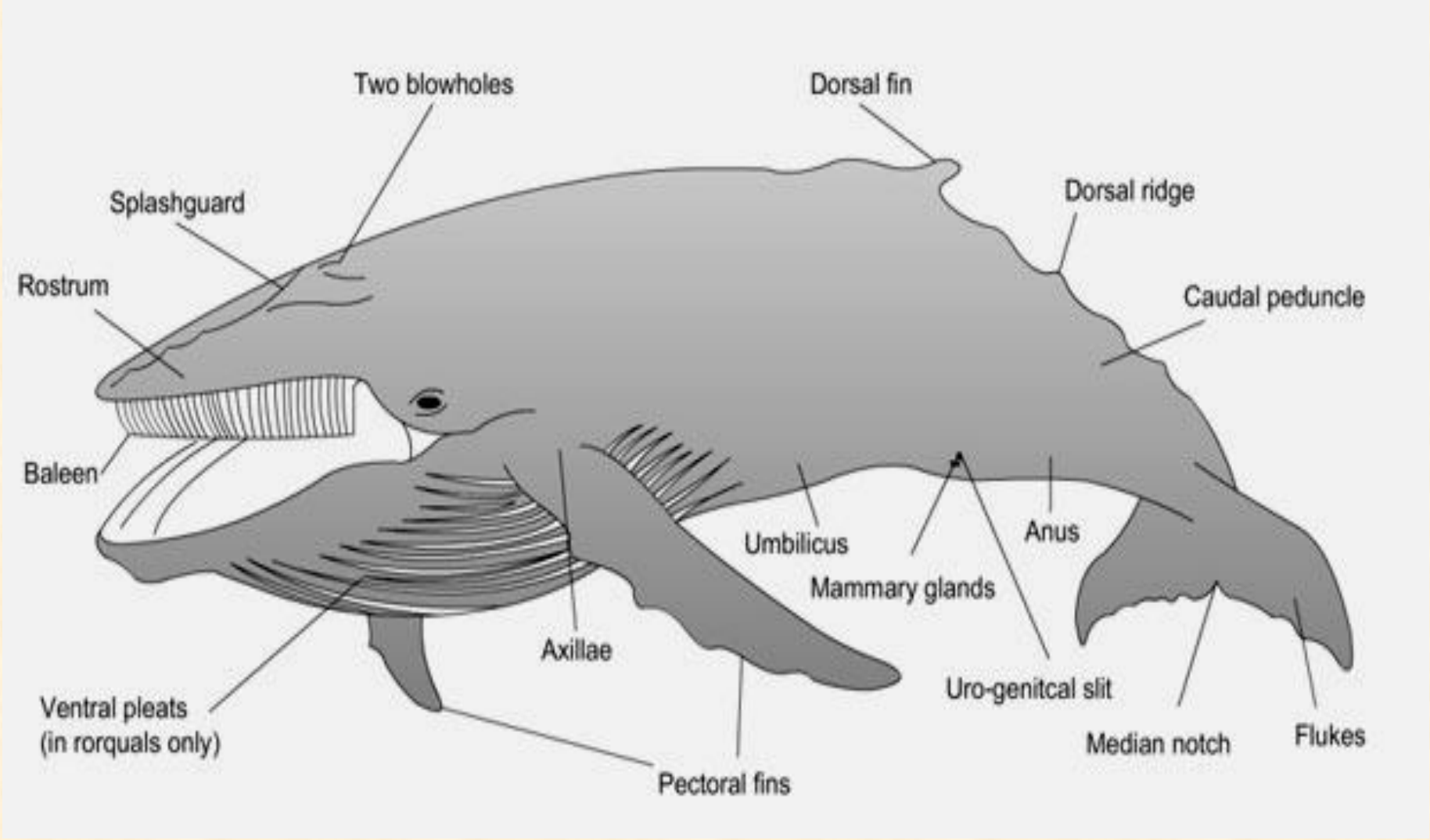




Mysticeti (Baleen whales)

- Baleen whales are larger than toothed whales.
- All are filter feeders that use baleen to sieve food from water.
- Have horny baleen plates, which trap zooplankton (feed mainly on zooplankton).
- Have 2 blowholes.

Body parts of baleen whales



Baleen plates

Do Not Forget:

Whales are mammals

Young whale feeding on mother's milk

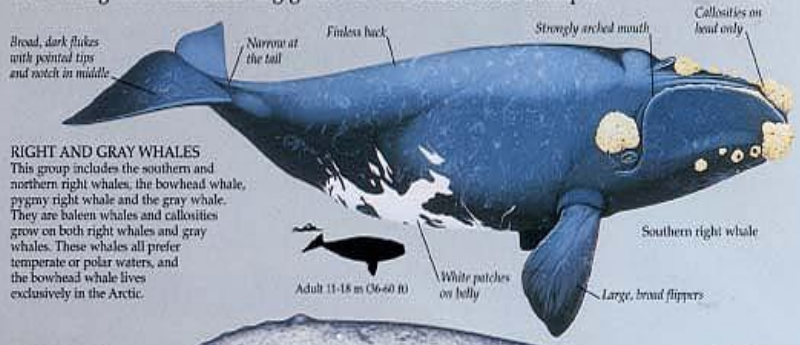
Marine mammals (Whales) are adapted for life underwater

- Mammals do not have gills and can not breath underwater; however, they **can hold their breath** for long periods of time. Some whales can hold their breath for over an hour!
- Their blood hemoglobin have **high oxygen affinity**.
- Most marine mammals have either tails or webbed feet and their "arms" are modified into **flippers**.
- Mammals are warm-blooded and need insulation to keep warm body temperature. They have either a thick layer of **blubber** (fat) or very thick **fur**.

Whales have thick Blubber (fat) as body heat insulator

Who's who?

WHILE SOME CETACEANS ARE VERY DISTINCTIVE, others are much more difficult to identify. Below is an outline of the characteristics of each of the main groups with illustrations showing clearly the features that set them apart. This should help you to begin to work out the species you are looking at. A scale drawing gives the true size of each example.



RIGHT AND GRAY WHALES

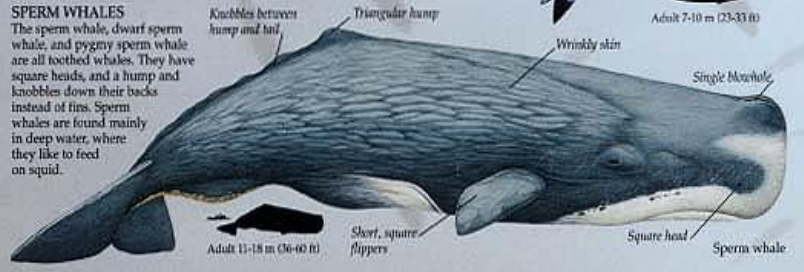
This group includes the southern and northern right whales, the bowhead whale, pygmy right whale and the gray whale. They are baleen whales and callosities grow on both right whales and gray whales. These whales all prefer temperate or polar waters, and the bowhead whale lives exclusively in the Arctic.

RORQUAL WHALES

The term rorqual comes from the Norwegian word for furrow "rothval". This refers to the throat grooves common to this group of baleen whales, which includes the long, slim blue whale, minke whale, sei whale, fin whale and the stockier humpback whale.

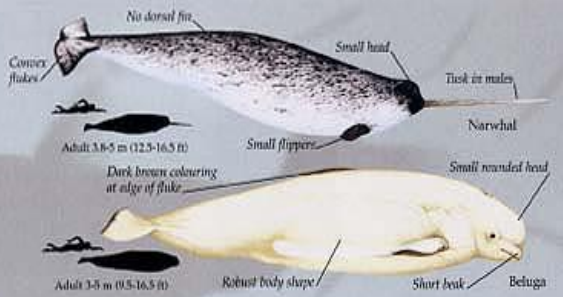
SPERM WHALES

The sperm whale, dwarf sperm whale, and pygmy sperm whale are all toothed whales. They have square heads, and a hump and knobbles down their backs instead of fins. Sperm whales are found mainly in deep water, where they like to feed on squid.



NARWHAL AND BELUGA

Although the narwhal and beluga are related, they each have very distinctive and unusual appearances. Both species live in the cold, remote waters of the Arctic and subarctic, where they are common. Both the narwhal and the beluga are similar in size, are toothed and have thick blubber to protect them from the cold. Unlike other whales, they are both able to change their facial expression. Beluga calves are born dark brown and turn white as they mature.



BEAKED WHALES

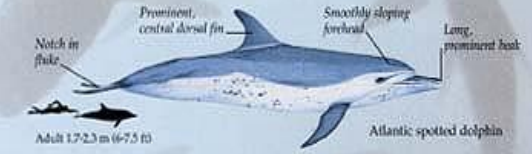
Beaked whales are rarely seen because they live in deep water far from land. They can range in size from 4 m (13 ft) to nearly 13 m (43 ft). Most males have very distinctive teeth, with just two or four teeth in the lower jaw and none in the upper jaw. The teeth can usually be seen when the jaws are closed and are sometimes very large. Most females have no teeth at all.

BLACKFISH

This family of smaller toothed whales, which includes the killer whale and the long- and short-finned pilot whales, is more closely related to dolphins than whales. But blackfish do not look like dolphins and most prefer deep water. These are mostly very gregarious whales that live together in strong groups.

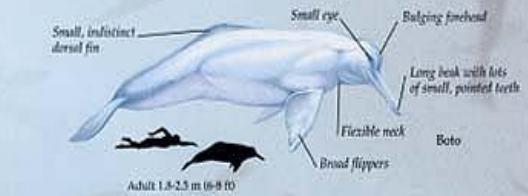
OCEANIC DOLPHINS

Oceanic dolphins can be divided into two main groups: those with prominent beaks and those that have short rounded beaks. There is a wide variety of colouring, patterns and body shapes between the species. While some have a very streamlined body, others are more robust in shape.



RIVER DOLPHINS

River dolphins can be found in the largest rivers of Asia and South America: the Boto in the Orinoco and the Amazon of South America, the Baiji in the Yangtze in China, plus species found in the Indus and the Ganges of Asia. The different species are not related but they are similar. They are all small, slow swimmers with long, narrow beaks and are almost blind.



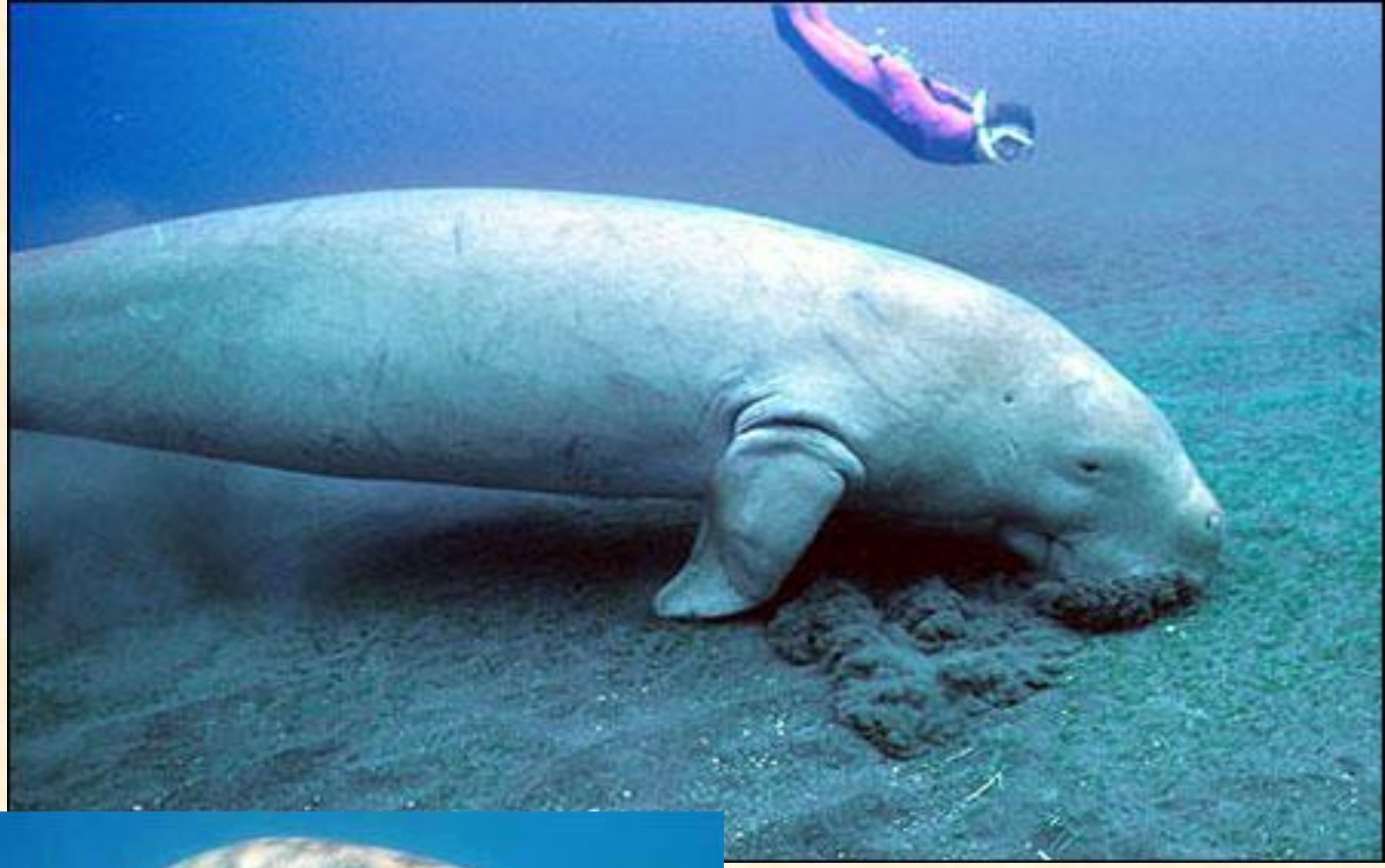
PORPOISES

Porpoises live mainly along the coast but can also be found in rivers and out in open sea. Their numbers are on the decline because they often get entangled in fishing nets. They are some of the smallest cetaceans and, unlike dolphins, are quite shy. Most species tend to avoid people. They are difficult to identify because little of their body is usually seen above the surface of the water.

Order: Sirenia

- Includes manatee and dugong (Sea Cows).
- Live in warm or tropical waters and feed on sea grass (herbivorous).
- They eat 40-70 kg of plants per day.
- These are the slowest marine mammal.
- They weigh up to 1,600 kg and reach 4 m in length.
- They have a mermaid-like tail.
- They have no defense system except for fleeing, and do not fight for food or territory. They have few natural enemies, except man.


Manatee



Dugong

Major Groups

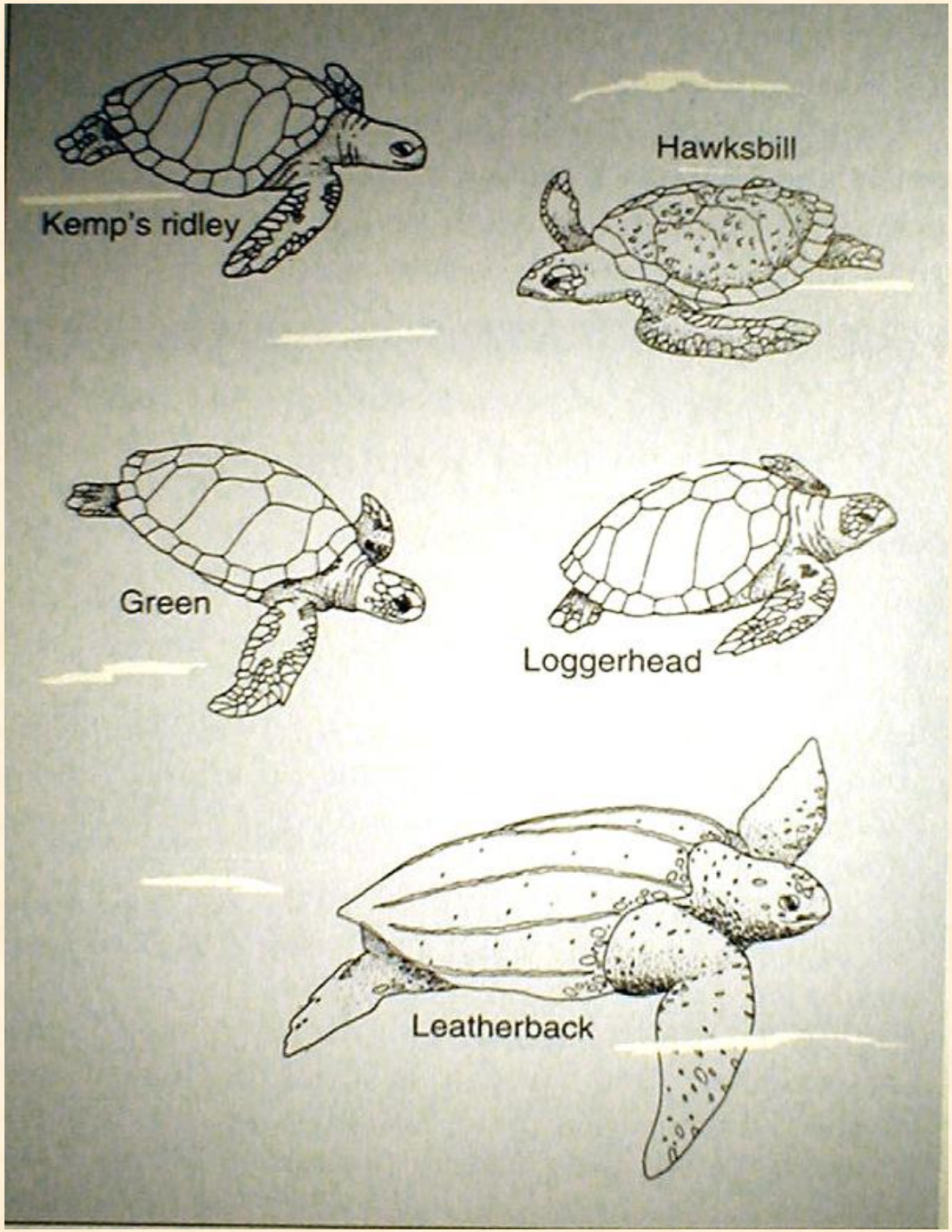
Sea turtles
(Reptiles)

Sea Turtles

- Five species in American waters only 2 species in red sea (Egypt).
- Green turtle is herbivorous, others are carnivorous.

e.g., Kemp's Ridley turtle feeds on benthic invertebrates, Leatherback turtle feeds on jellyfish.

- Turtles nest on sandy beaches but feed in other areas, often 1000s of kilometers away.
- All turtle species are endangered owing to fishing, drowning in fish nets and development of nesting grounds.


Kemp's ridley
Hawksbill
Green
Loggerhead
Leatherback

Green Turtle
Chelonia mydas

Hawksbill turtle

Eretmochelys imbricata