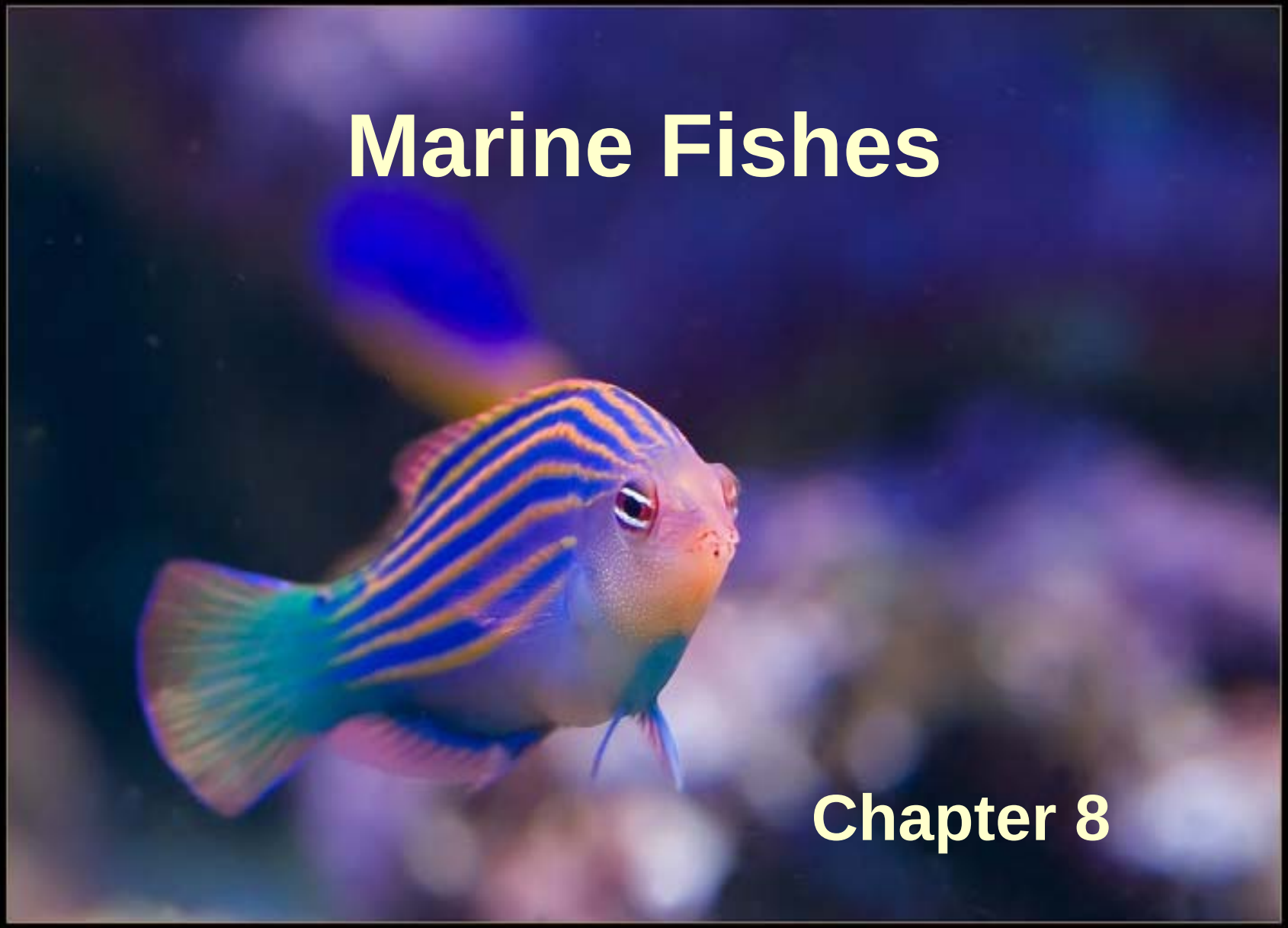
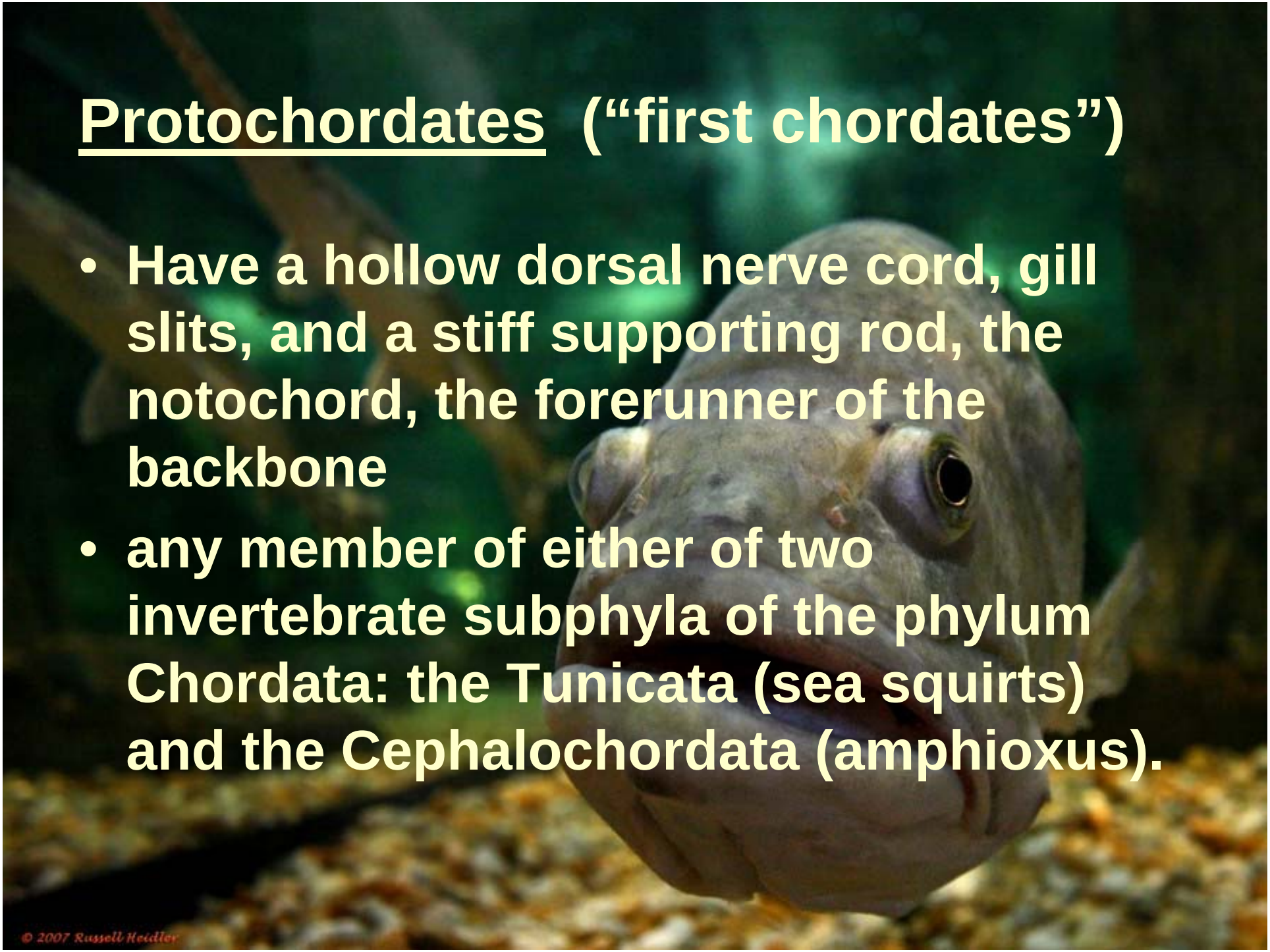
Marine Fishes



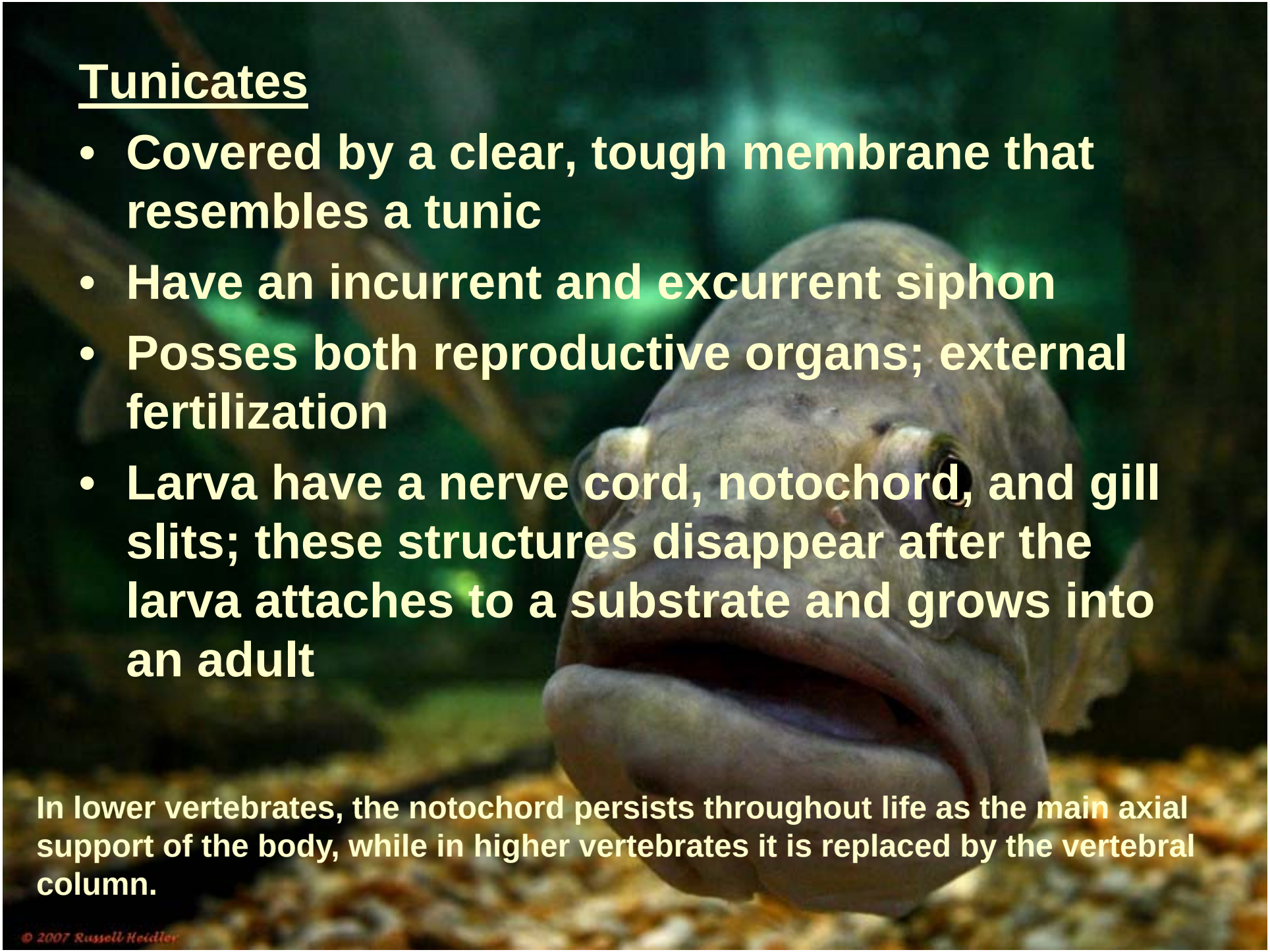
Chapter 8

Neon Fish ~ Kodo34



Protochordates ("first chordates")

- Have a hollow dorsal nerve cord, gill slits, and a stiff supporting rod, the notochord, the forerunner of the backbone
- any member of either of two invertebrate subphyla of the phylum Chordata: the Tunicata (sea squirts) and the Cephalochordata (amphioxus).



Tunicates

- Covered by a clear, tough membrane that resembles a tunic
- Have an incurrent and excurrent siphon
- Posses both reproductive organs; external fertilization
- Larva have a nerve cord, notochord, and gill slits; these structures disappear after the larva attaches to a substrate and grows into an adult

In lower vertebrates, the notochord persists throughout life as the main axial support of the body, while in higher vertebrates it is replaced by the vertebral column.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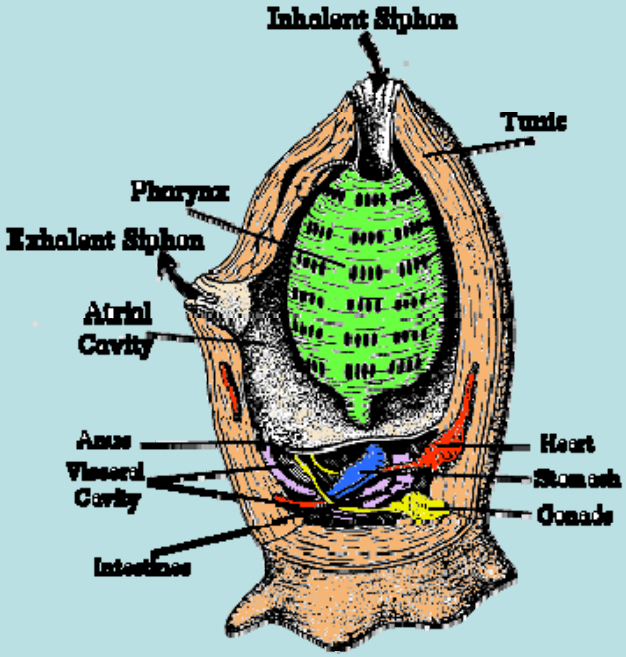
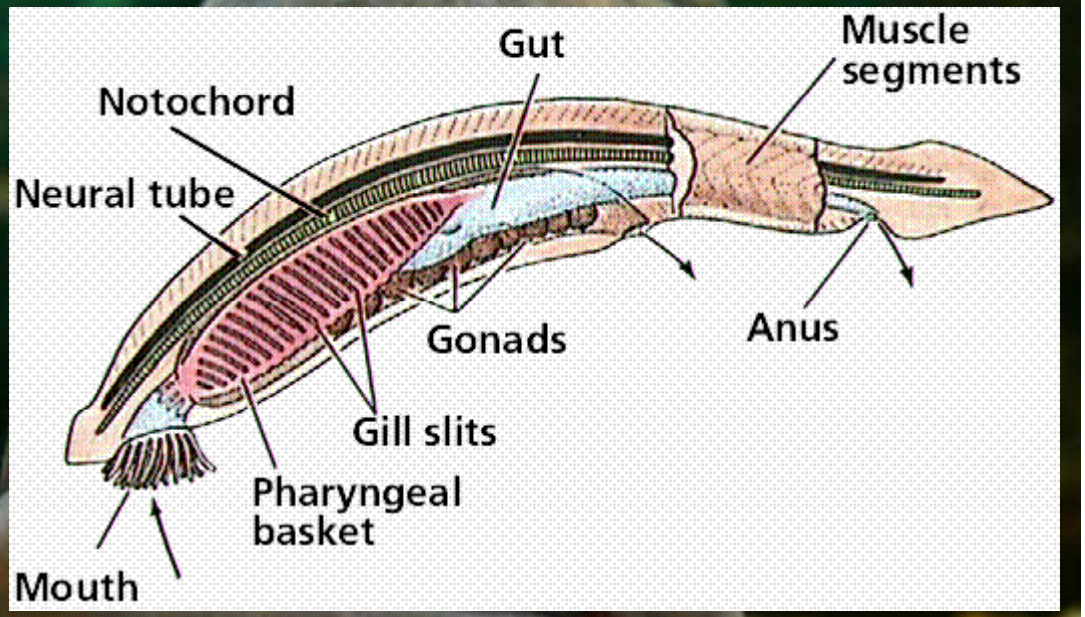
c. Christine R

Sea squirt


Inhalant Siphon
Tunic
Pharynx
Exhalant Siphon
Atrial Cavity
Anus
Heart
Visceral Cavity
Stomach
Gonads
Intestines

Cephalochordates

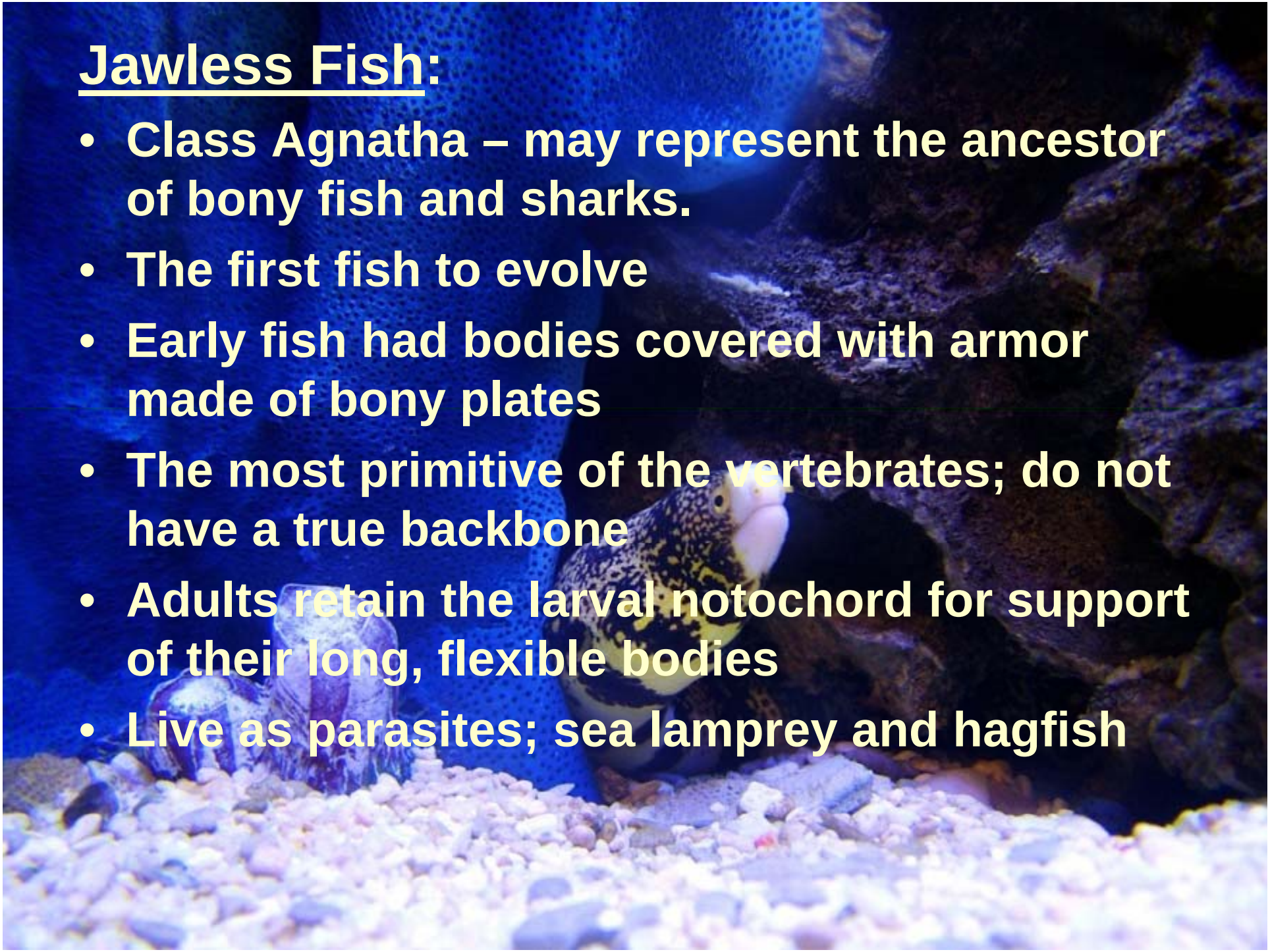
- have a notochord and a nerve cord but no vertebrae; retained in the adult
- Separate sexes; fertilization and development are both external



- Amphioxus - Fishlike animal lives half-buried in the sand, with its head sticking out to filter plankton from the water.

Vertebrates

- Belong to phylum Chordata
- Dorsal nerve cord has developed into a spinal cord protected by vertebrae and a head with brain
- Consist of the most complex, large, fast, and conspicuous organisms



Jawless Fish:

- Class Agnatha – may represent the ancestor of bony fish and sharks.
- The first fish to evolve
- Early fish had bodies covered with armor made of bony plates
- The most primitive of the vertebrates; do not have a true backbone
- Adults retain the larval notochord for support of their long, flexible bodies
- Live as parasites; sea lamprey and hagfish

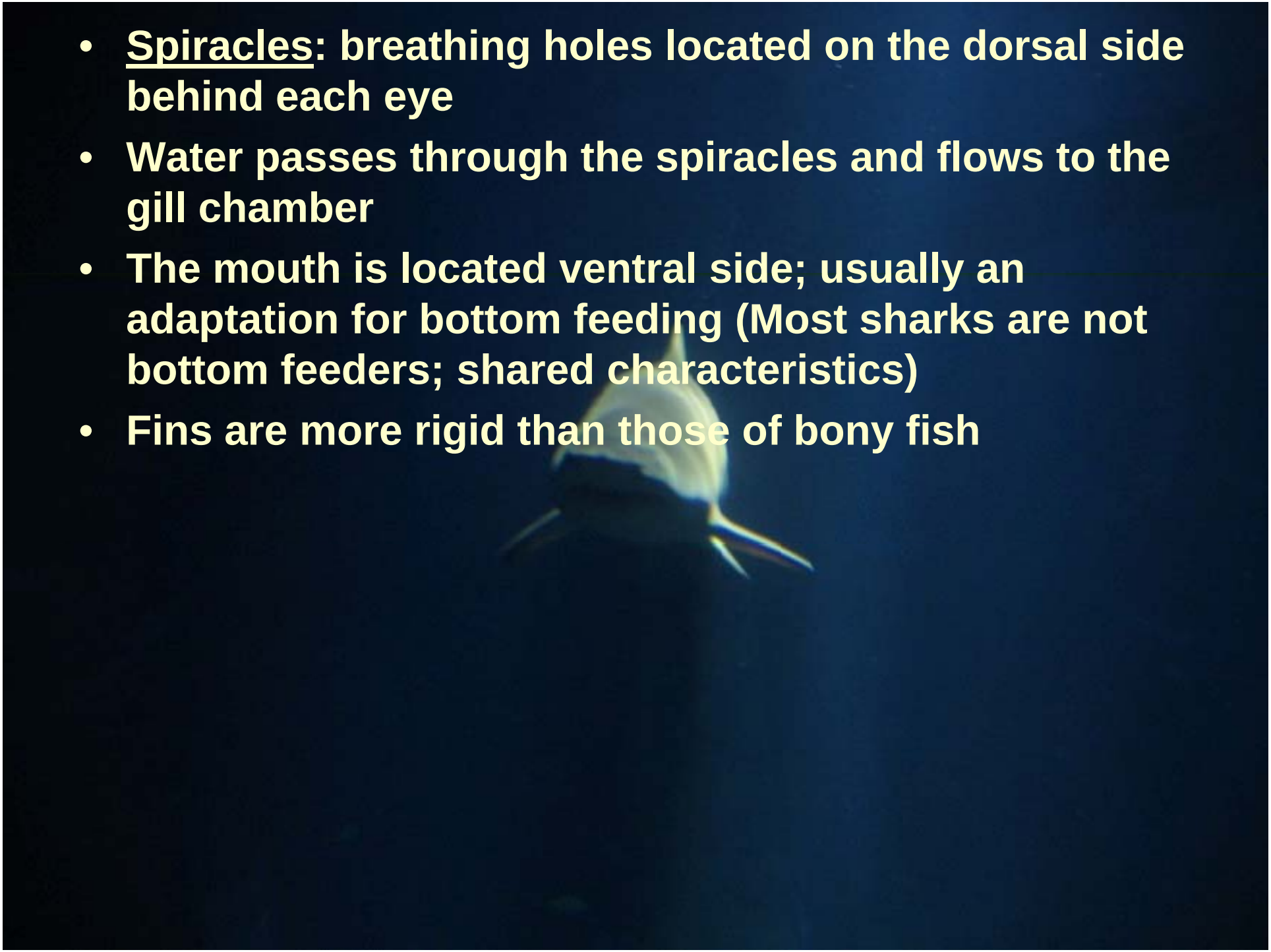
Hagfish

- Use their sharp teeth in their round mouths to burrow into the bodies of dead or dying fish

Cartilaginous Fishes

Cartilage: flexible connective tissue composed of cells and protein.

- **Class Chondrichthyes (cartilage fish)**
- **Includes sharks, skates, and rays**
- **Fewer than 700 species**
- **Have placoid scales – tiny teeth deeply embedded in the skin.**
- **Have visible gill slits for breathing**
- **Gills in rays, skates, and some bottom-dwelling sharks are ventral (underside of the body).**



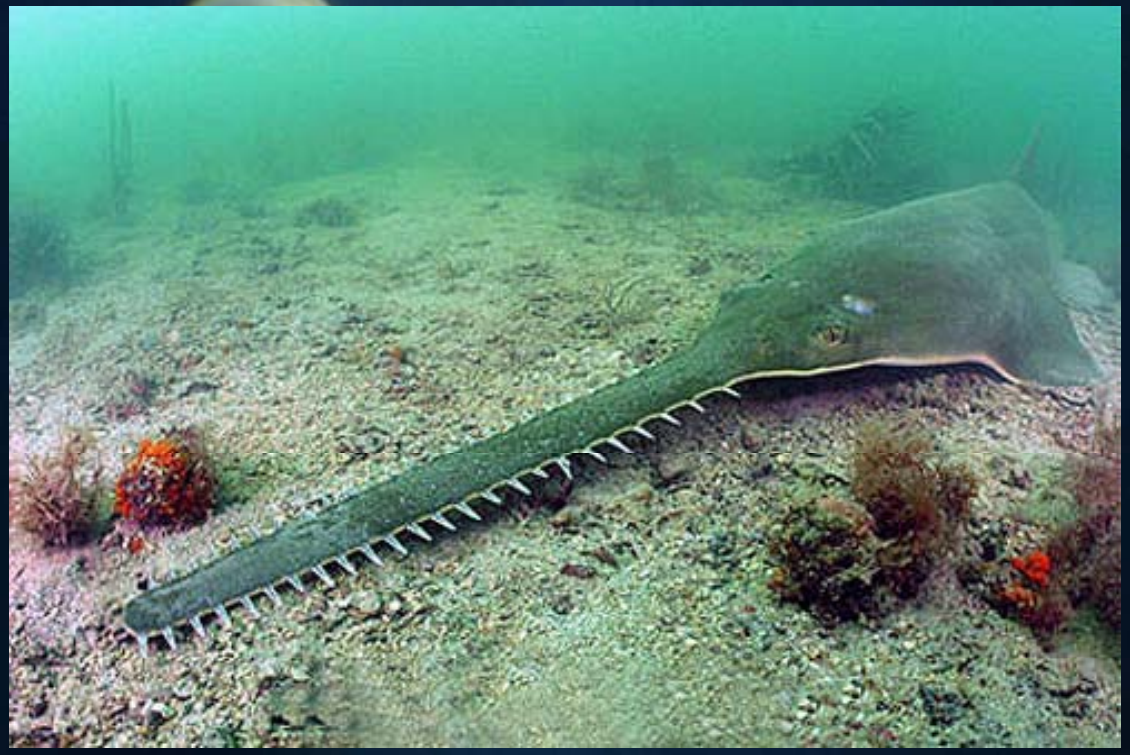
- Spiracles: breathing holes located on the dorsal side behind each eye
- Water passes through the spiracles and flows to the gill chamber
- The mouth is located ventral side; usually an adaptation for bottom feeding (Most sharks are not bottom feeders; shared characteristics)
- Fins are more rigid than those of bony fish

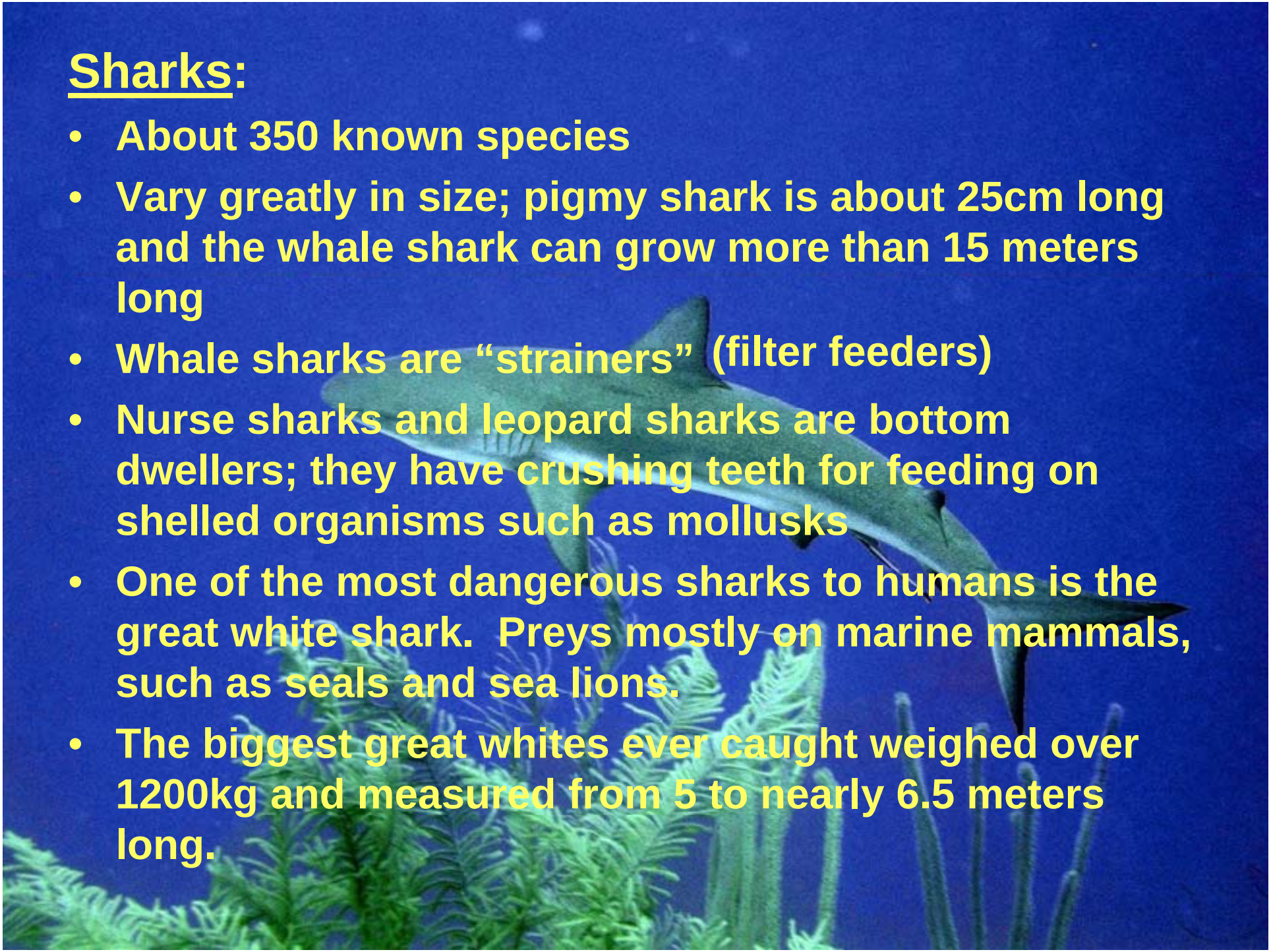
The up-and-down movements of huge pectoral fins of a *manta ray* resembles the wings of a bird in flight. They have a "wingspan" of up to 7 meters and are filter feeders.

The stingray is found in the sand of the Gulf of Mexico and along the Atlantic coast from the Carolinas to Brazil. A sharp spine located near the base of its tail can inflict a very painful stab wound.

The skate does not have a spine on its tail. It is found in temperate waters along the Atlantic and Pacific coasts.

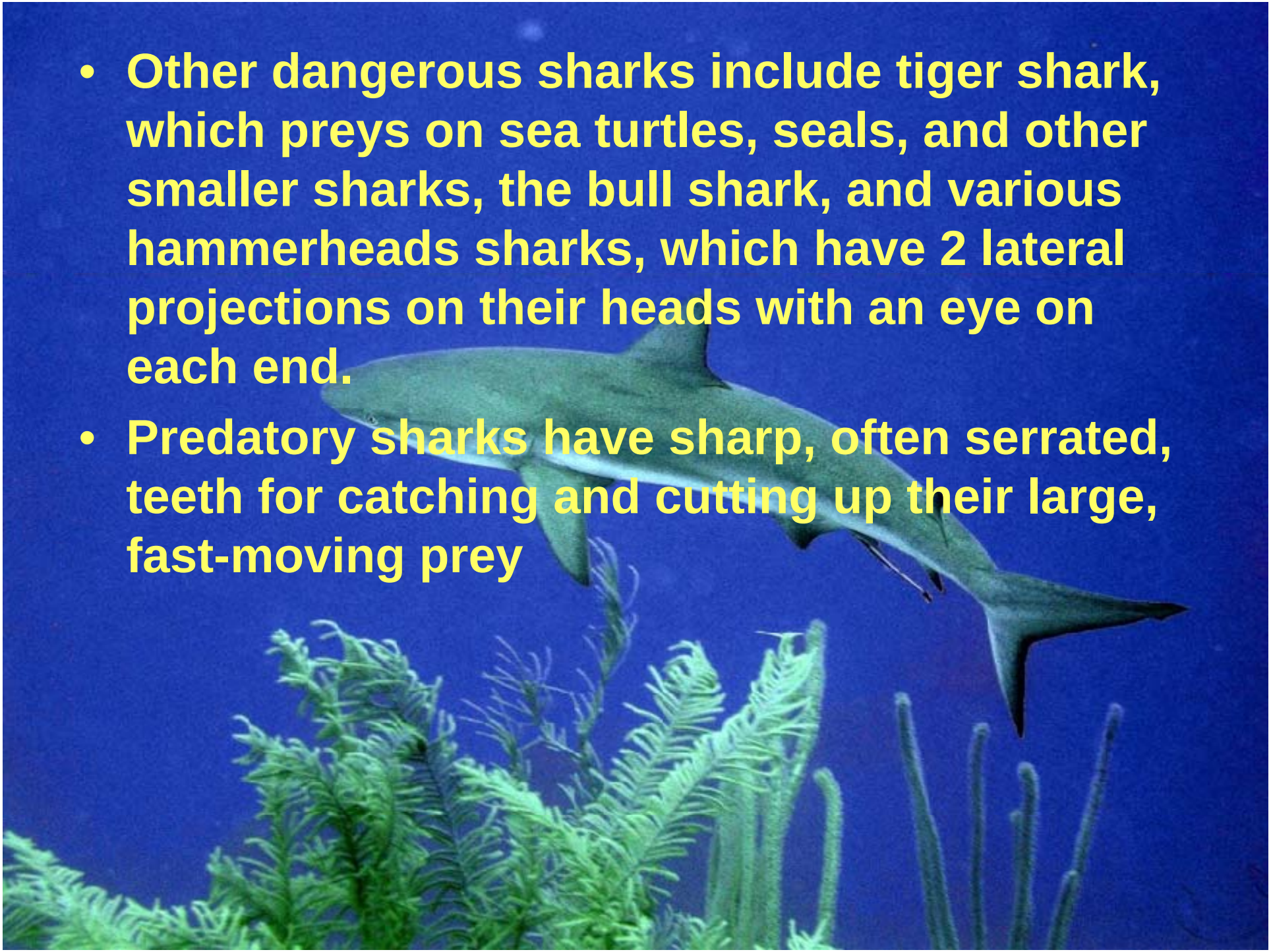
Sawfish inhabits coastal waters from Virginia to Brazil and in the Gulf of Mexico. It has a long, bladelike snout which contains 24 or more teeth that stick out on each side. It uses its snout as a weapon.





Sharks:

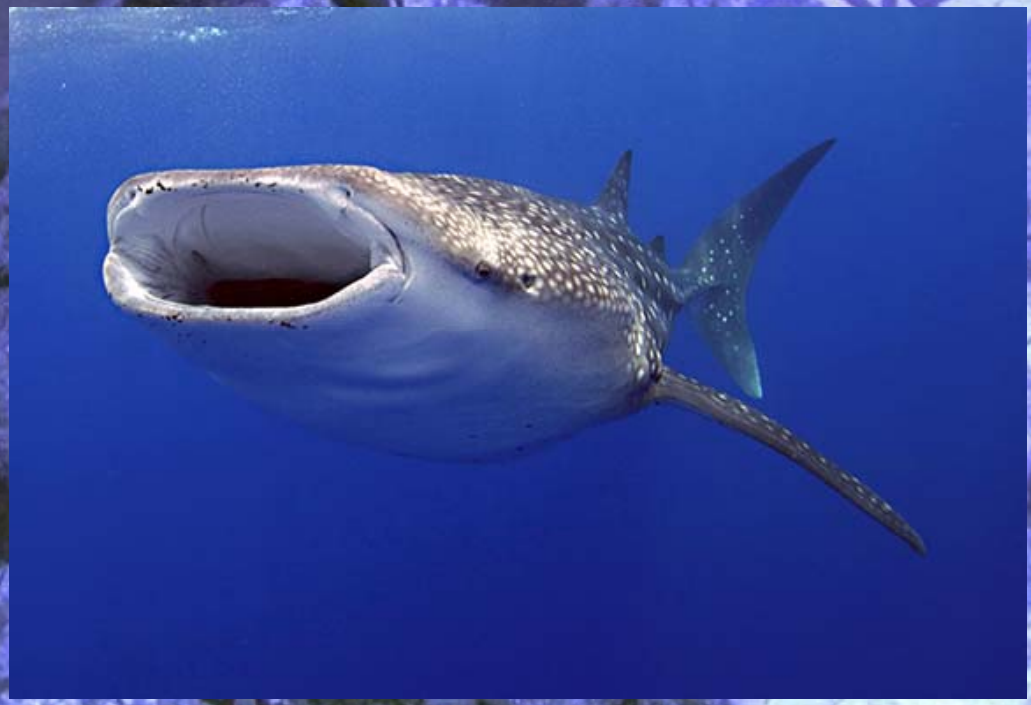
- About 350 known species
- Vary greatly in size; pigmy shark is about 25cm long and the whale shark can grow more than 15 meters long
- Whale sharks are "strainers" (filter feeders)
- Nurse sharks and leopard sharks are bottom dwellers; they have crushing teeth for feeding on shelled organisms such as mollusks
- One of the most dangerous sharks to humans is the great white shark. Preys mostly on marine mammals, such as seals and sea lions.
- The biggest great whites ever caught weighed over 1200kg and measured from 5 to nearly 6.5 meters long.



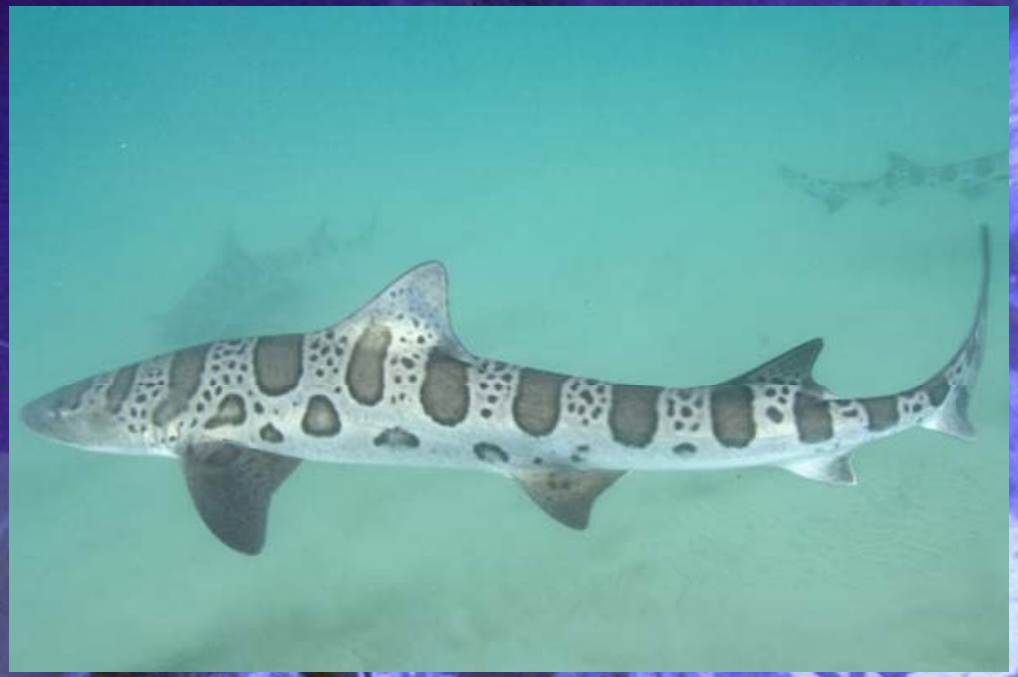
- Other dangerous sharks include tiger shark, which preys on sea turtles, seals, and other smaller sharks, the bull shark, and various hammerheads sharks, which have 2 lateral projections on their heads with an eye on each end.
- Predatory sharks have sharp, often serrated, teeth for catching and cutting up their large, fast-moving prey

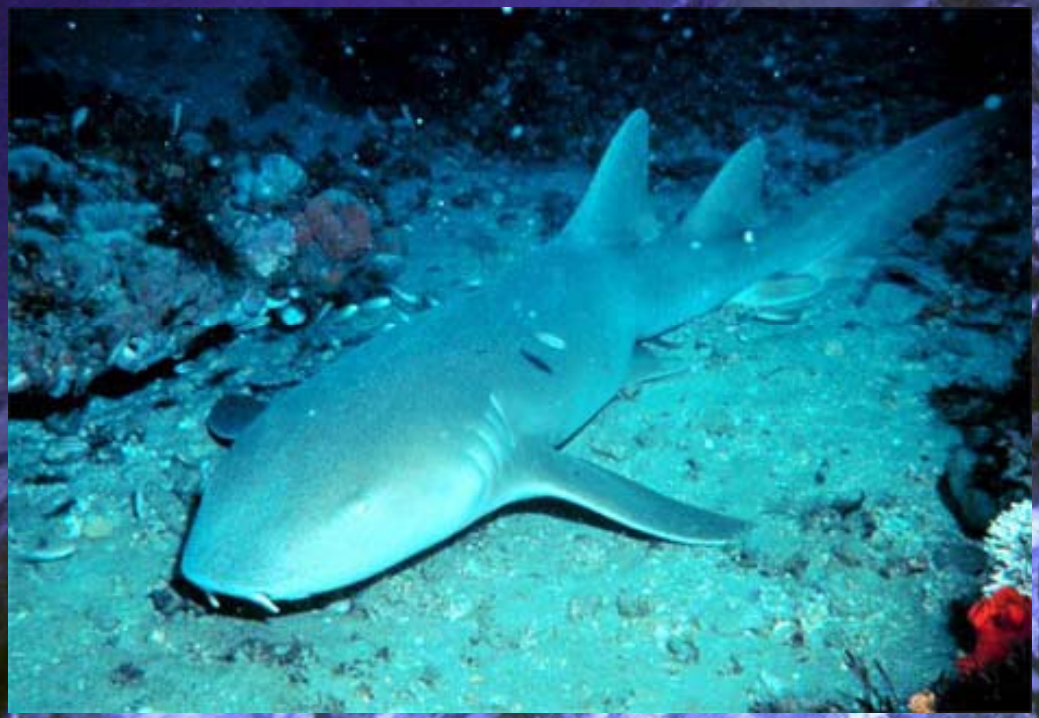
Pygmy shark

Whale shark



Leopard shark





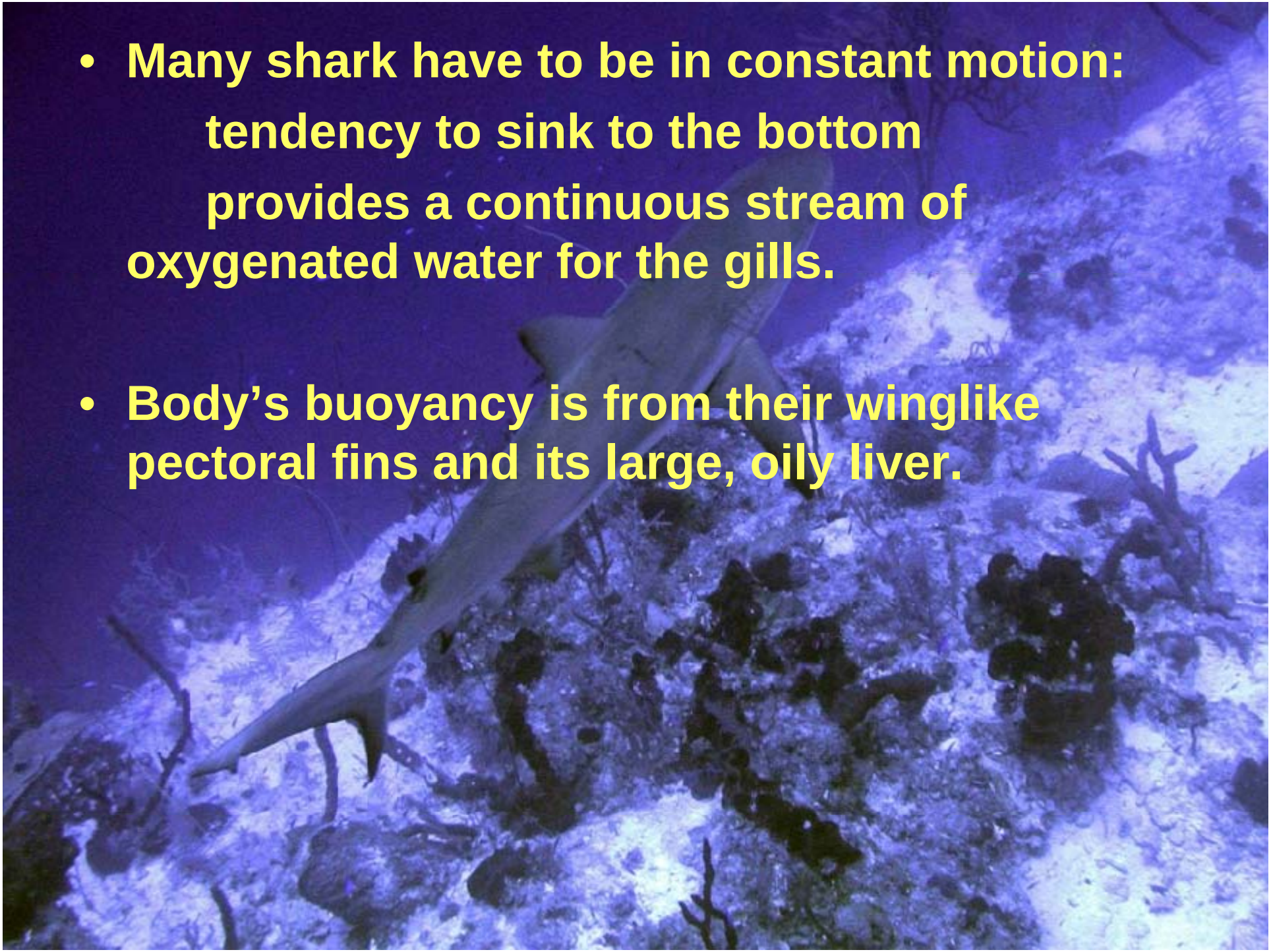
Nurse shark


STEVE BLOOM IMAGES


Hammerhead shark

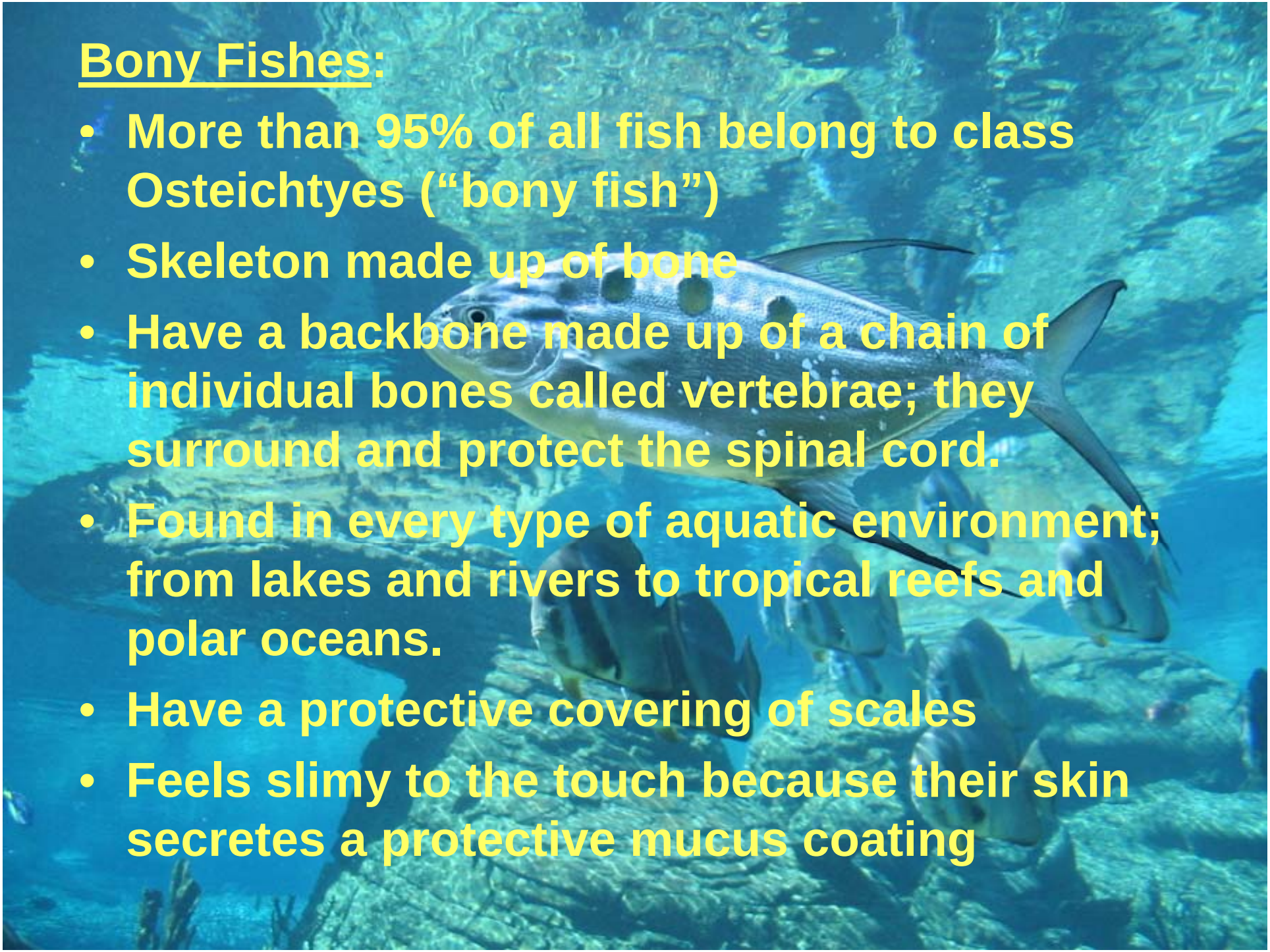
Structure and Behavior:

- Have survived more than 300 million years
- Often called living fossils
- Lateral line organ: faint line on the shark's body that can pick up faint sound vibrations over great distances.
- Shark's sense of smell is so acute that it can detect a small amount of blood nearly half a kilometer away. Two-thirds of its brain is devoted to smell
- Ampullae of Lorenzini: nerve receptors found in the tiny pores of the shark's snout. Senses electric fields generated by the muscles of fish and other potential prey.
- Streamlined body enables them to swim quickly through the water.



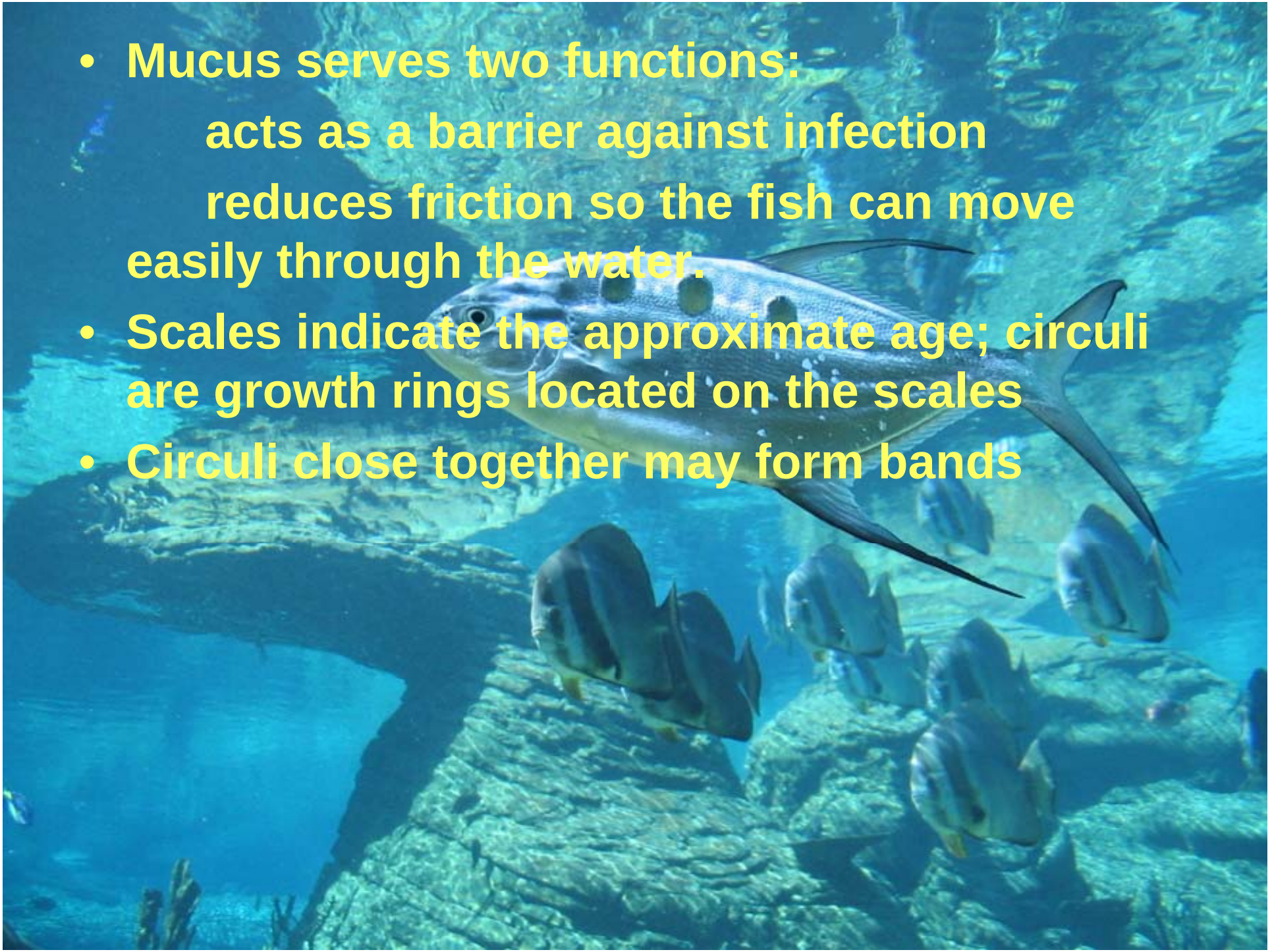
- **Many shark have to be in constant motion:**
  tendency to sink to the bottom
  provides a continuous stream of oxygenated water for the gills.

- **Body's buoyancy is from their winglike pectoral fins and its large, oily liver.**



Bony Fishes:

- More than 95% of all fish belong to class Osteichtyes (“bony fish”)
- Skeleton made up of bone
- Have a backbone made up of a chain of individual bones called vertebrae; they surround and protect the spinal cord.
- Found in every type of aquatic environment; from lakes and rivers to tropical reefs and polar oceans.
- Have a protective covering of scales
- Feels slimy to the touch because their skin secretes a protective mucus coating



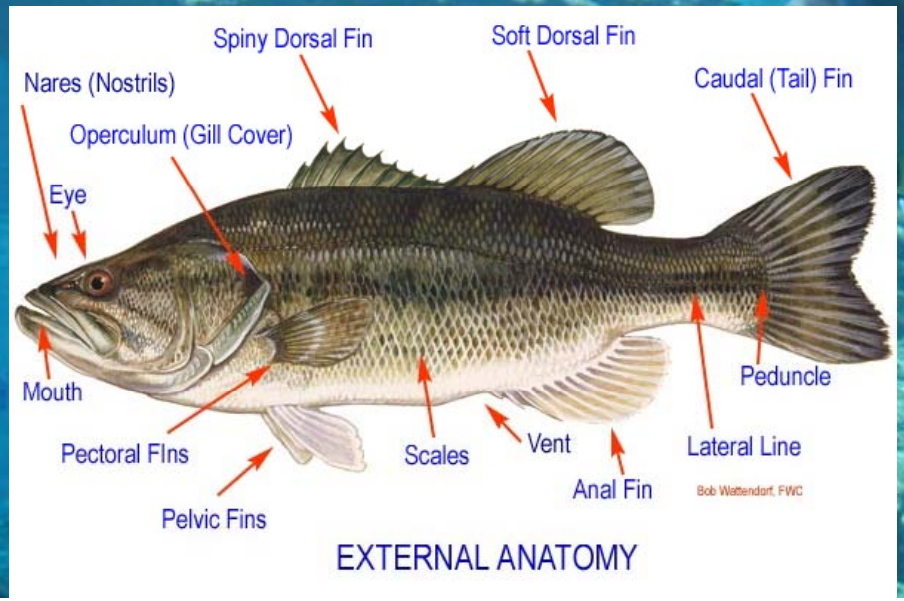
- Mucus serves two functions:
  - acts as a barrier against infection
  - reduces friction so the fish can move easily through the water.
- Scales indicate the approximate age; circuli are growth rings located on the scales
- Circuli close together may form bands

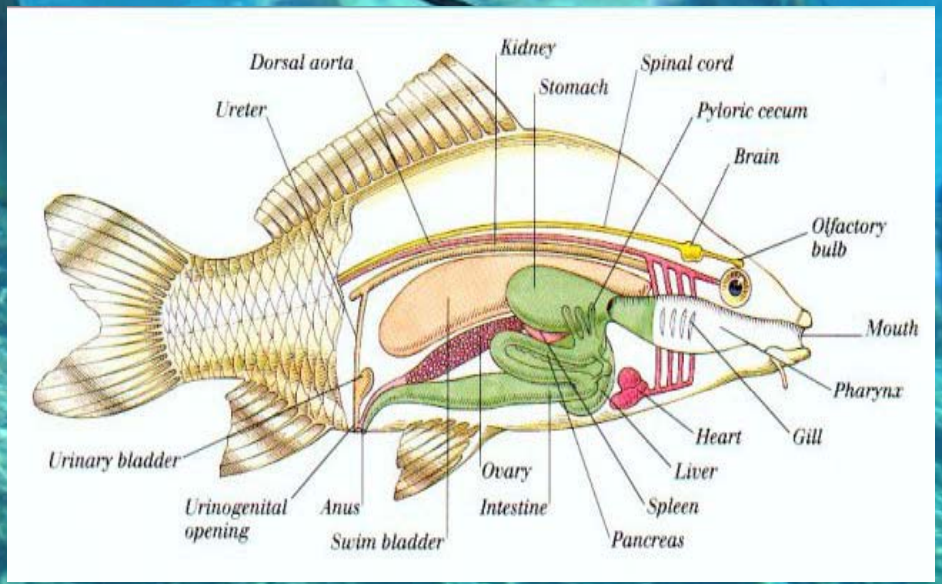
Breathing:

- **Gills are covered by a flap of tissue called the *operculum*; opens and closes every time a fish breathes**
- **Gill arches have gill rakers; channel incoming food particles into the esophagus**

Locomotion in Fish:

- Fins are mainly used for swimming
- Are nekton (ability to swim)
- Pectoral and pelvic fins are paired (pectoral fins correspond to the forelimbs of other animals, pelvic fins correspond to hind limbs)
- Single dorsal fin and anal fin work to stabilize the fish; sometimes there is a second dorsal fin
- Some fish have venomous spines in their dorsal fins

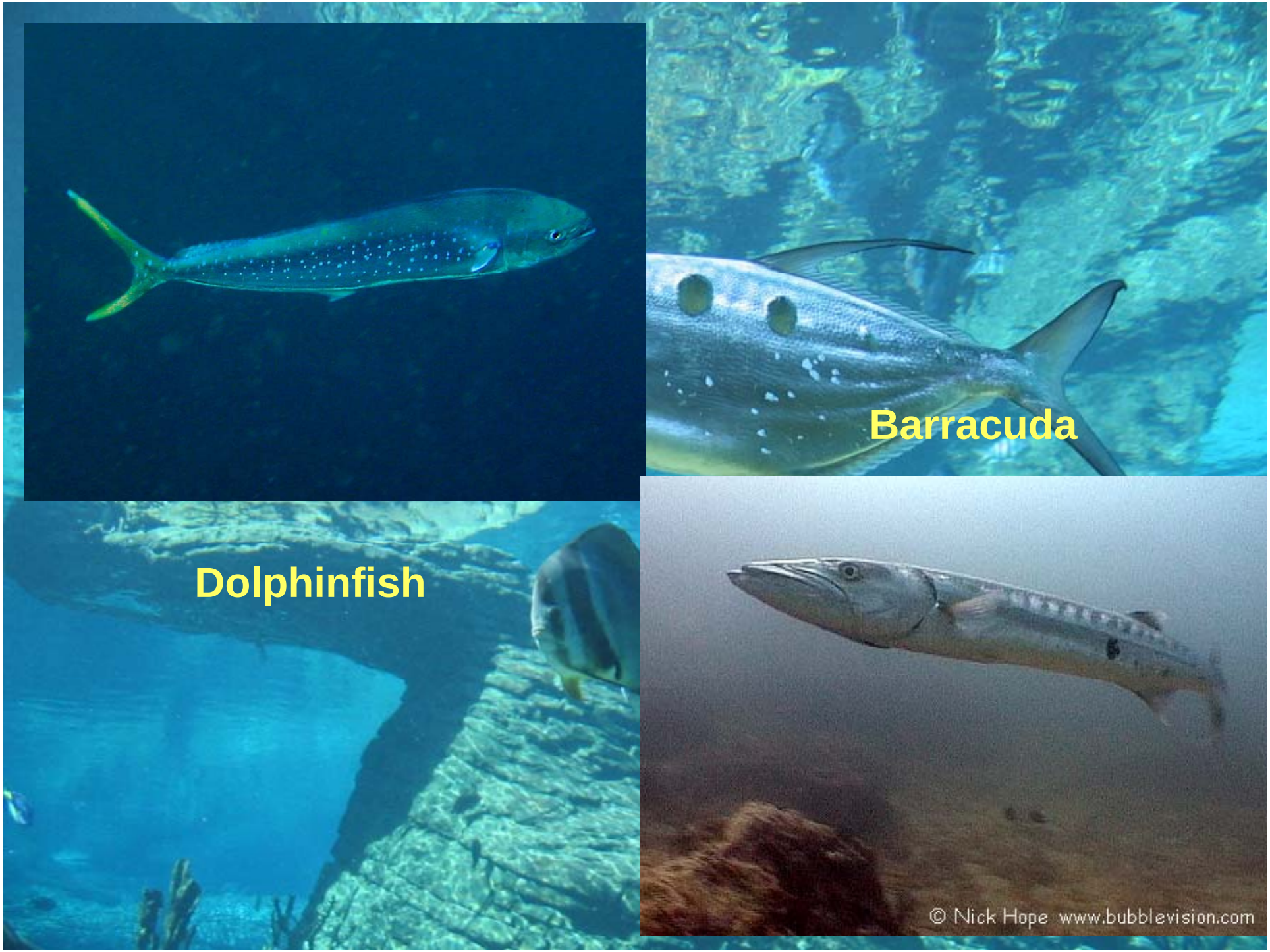




Which is the fastest fish in the ocean?

Swordfish

Tuna


Barracuda
Dolphinfish
© Nick Hope www.bubblevision.com

Factors affecting speed:

- Open water – these fish tend to be faster than the bottom dwellers
- Body shape – fusiform shape (tapered at both ends)
  flattened shape

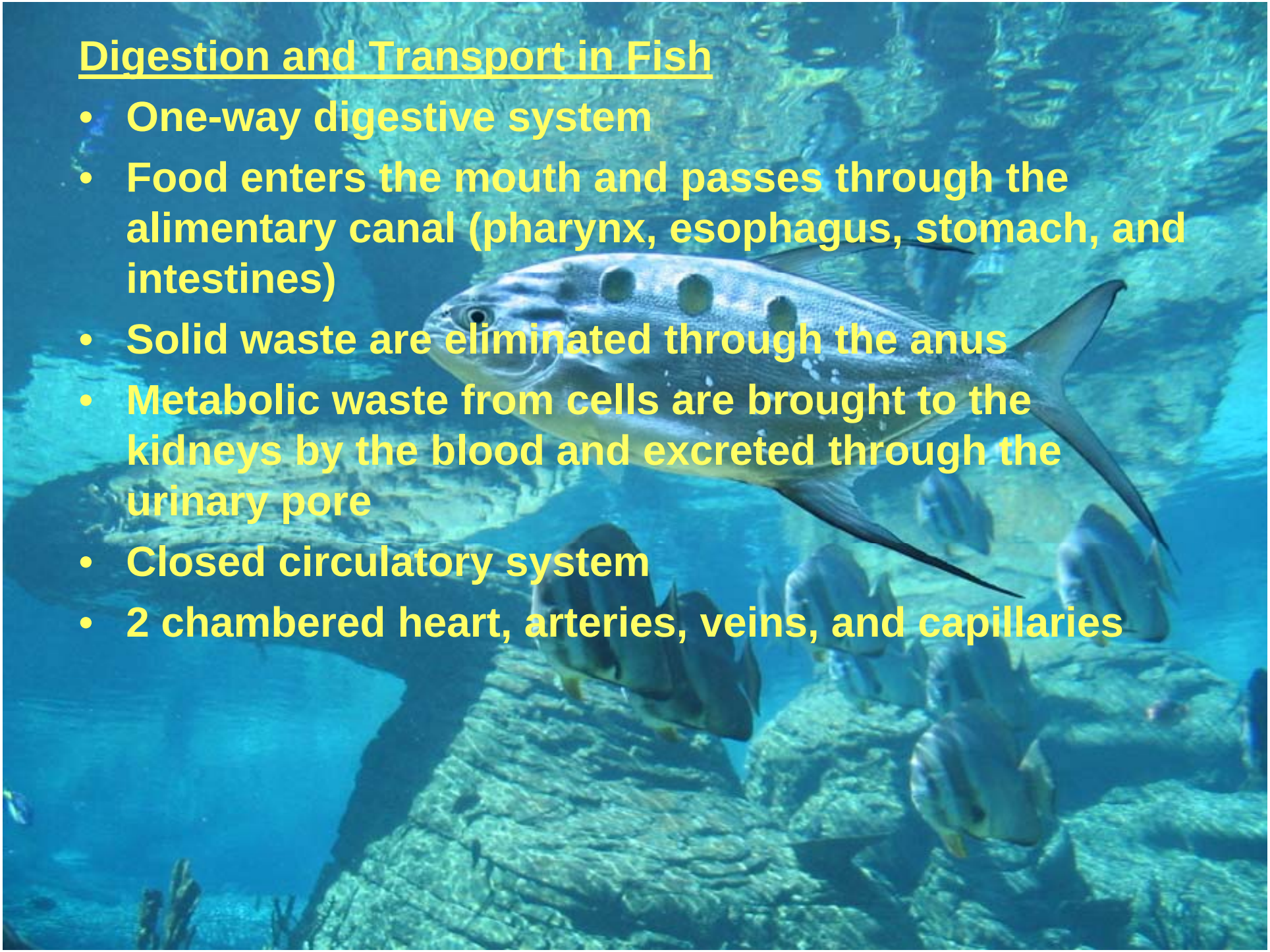
- Caudal fin – shape and height affect speed

Buoyancy in Fish:

- **Buoyancy – the ability to float or rise in a liquid.**
- **Swim bladder – an internal gas-filled organ found in bony fish**

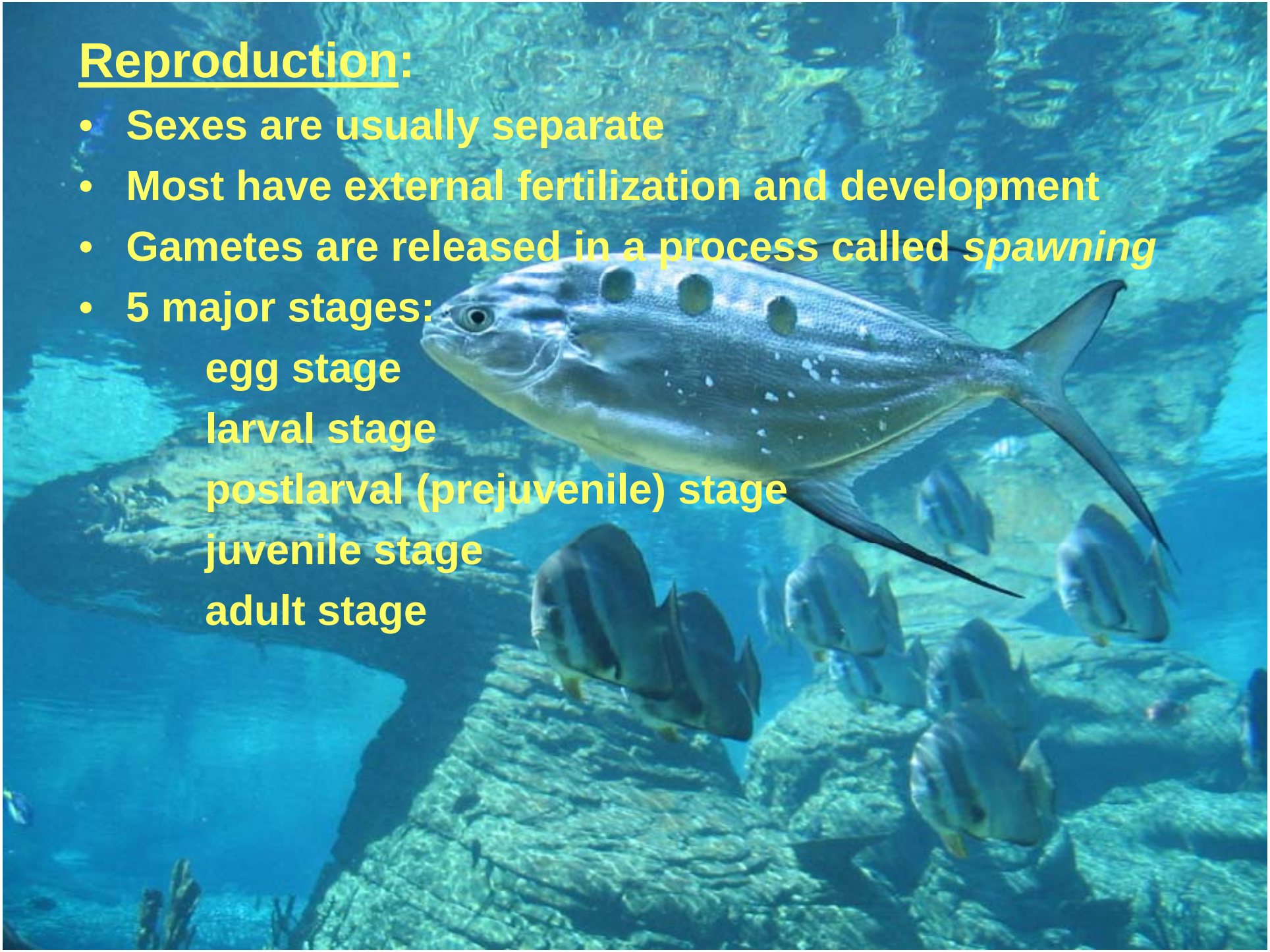
When the body muscles around the swim bladder contract, the fish sinks. When the muscles relax, the swim bladder enlarges and the fish rises.

- **Neutral buoyancy – ability to maintain a steady position at any depth**



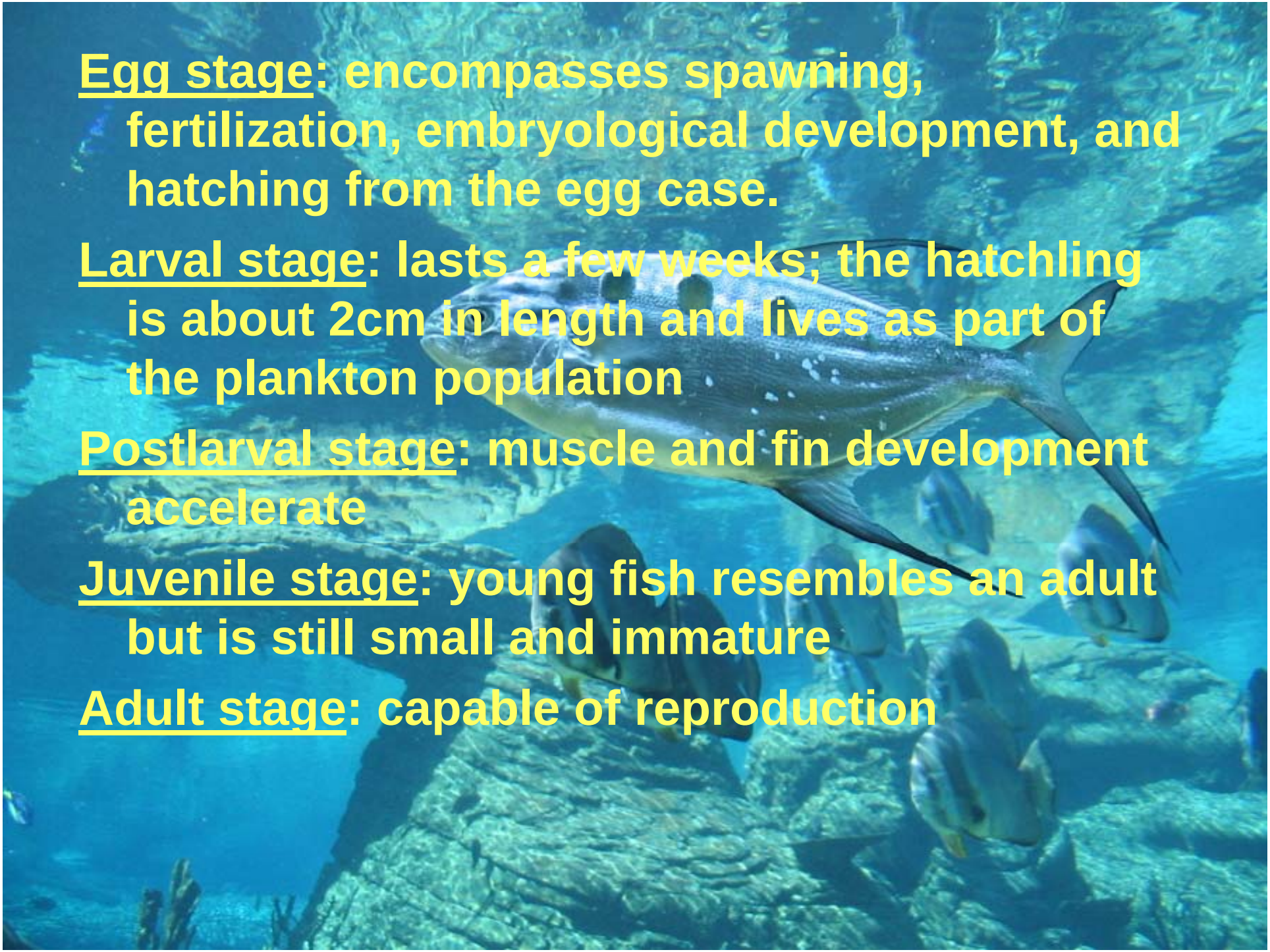
Digestion and Transport in Fish

- One-way digestive system
- Food enters the mouth and passes through the alimentary canal (pharynx, esophagus, stomach, and intestines)
- Solid waste are eliminated through the anus
- Metabolic waste from cells are brought to the kidneys by the blood and excreted through the urinary pore
- Closed circulatory system
- 2 chambered heart, arteries, veins, and capillaries



Reproduction:

- Sexes are usually separate
- Most have external fertilization and development
- Gametes are released in a process called *spawning*
- 5 major stages:
  - egg stage
  - larval stage
  - postlarval (prejuvenile) stage
  - juvenile stage
  - adult stage



Egg stage: encompasses spawning, fertilization, embryological development, and hatching from the egg case.

Larval stage: lasts a few weeks; the hatchling is about 2cm in length and lives as part of the plankton population

Postlarval stage: muscle and fin development accelerate

Juvenile stage: young fish resembles an adult but is still small and immature

Adult stage: capable of reproduction

Unusual Adaptations in Fish

- **Ability to inflate its entire body; some have sharp spines**

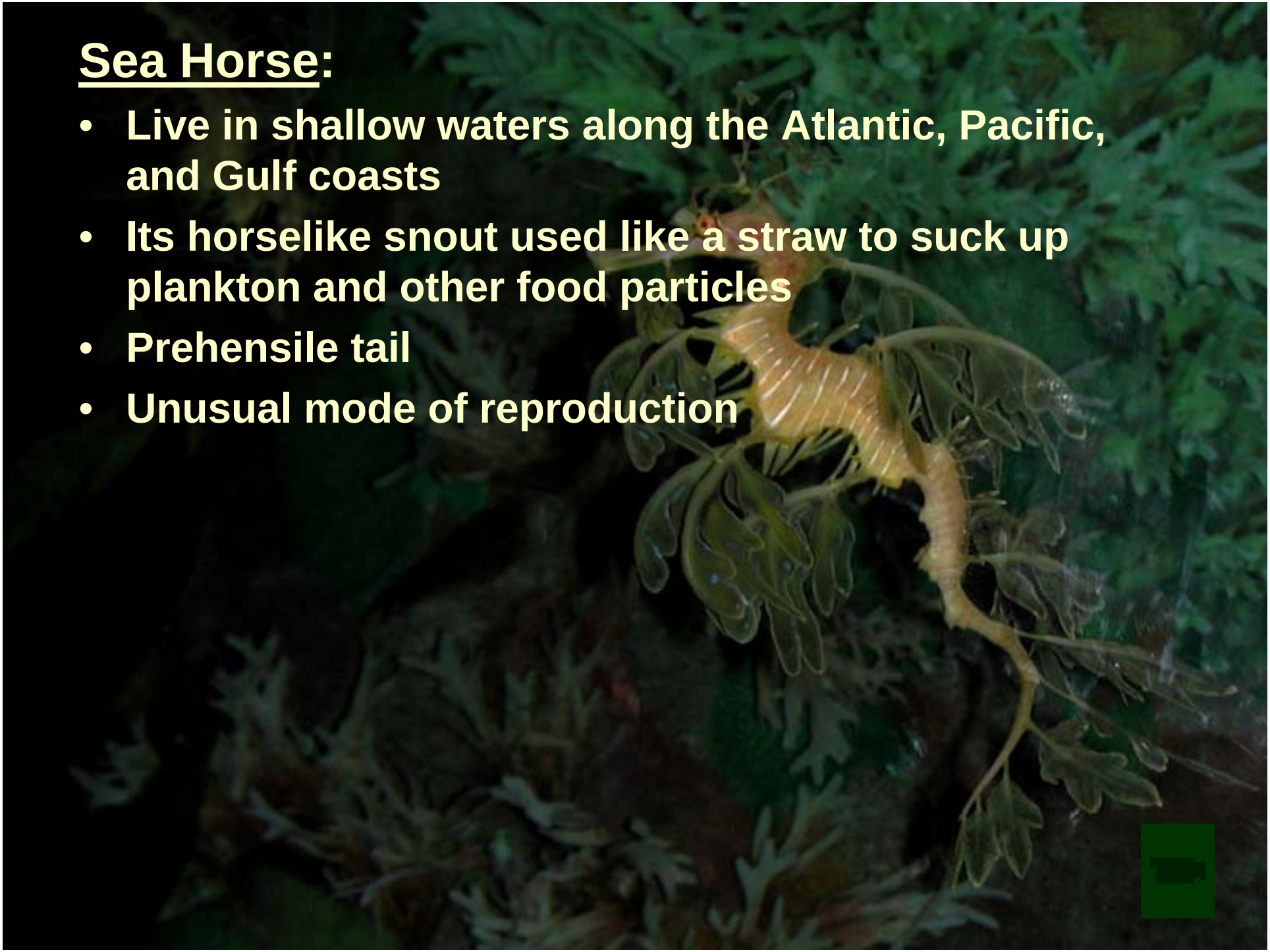
porcupine fish **puffer fish**

- **Can protect themselves by changing colors**

flounder

Its 2 eyes are on the side of its body that faces up. It is born with an eye on each side of its head because as a young fish it swims through water. Before the young settle on the bottom, one eye migrates to join the other eye.

- **Sargassum fish resembles the shape, color, and texture of the sargassum seaweed.**



Sea Horse:

- Live in shallow waters along the Atlantic, Pacific, and Gulf coasts
- Its horselike snout used like a straw to suck up plankton and other food particles
- Prehensile tail
- Unusual mode of reproduction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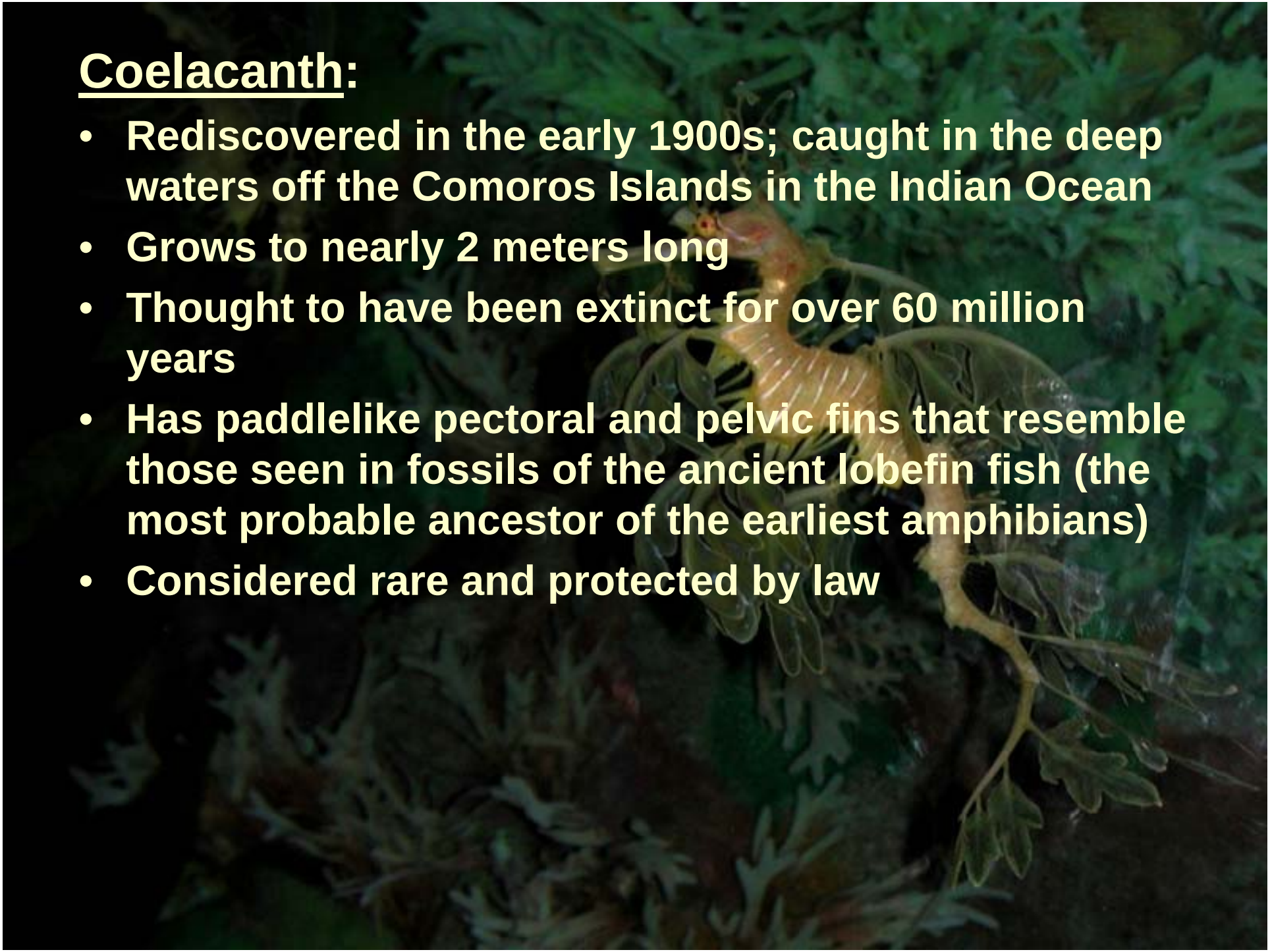

Coelacanth:

- Rediscovered in the early 1900s; caught in the deep waters off the Comoros Islands in the Indian Ocean
- Grows to nearly 2 meters long
- Thought to have been extinct for over 60 million years
- Has paddlelike pectoral and pelvic fins that resemble those seen in fossils of the ancient lobefin fish (the most probable ancestor of the earliest amphibians)
- Considered rare and protected by law