

Phylum Echinodermata

- all are marine
- adults are radially symmetrical
- larvae are bilaterally symmetrical
- oral and radial nerve cord
- has an **internal limy skeleton**, usually with many projecting spines
- a system of **water-filled tubes**, acting on the suction principle, **catches food and assists in locomotion**
- examples: starfish, brittle stars, sea urchin, sea cucumber, and sand dollar

Starfish











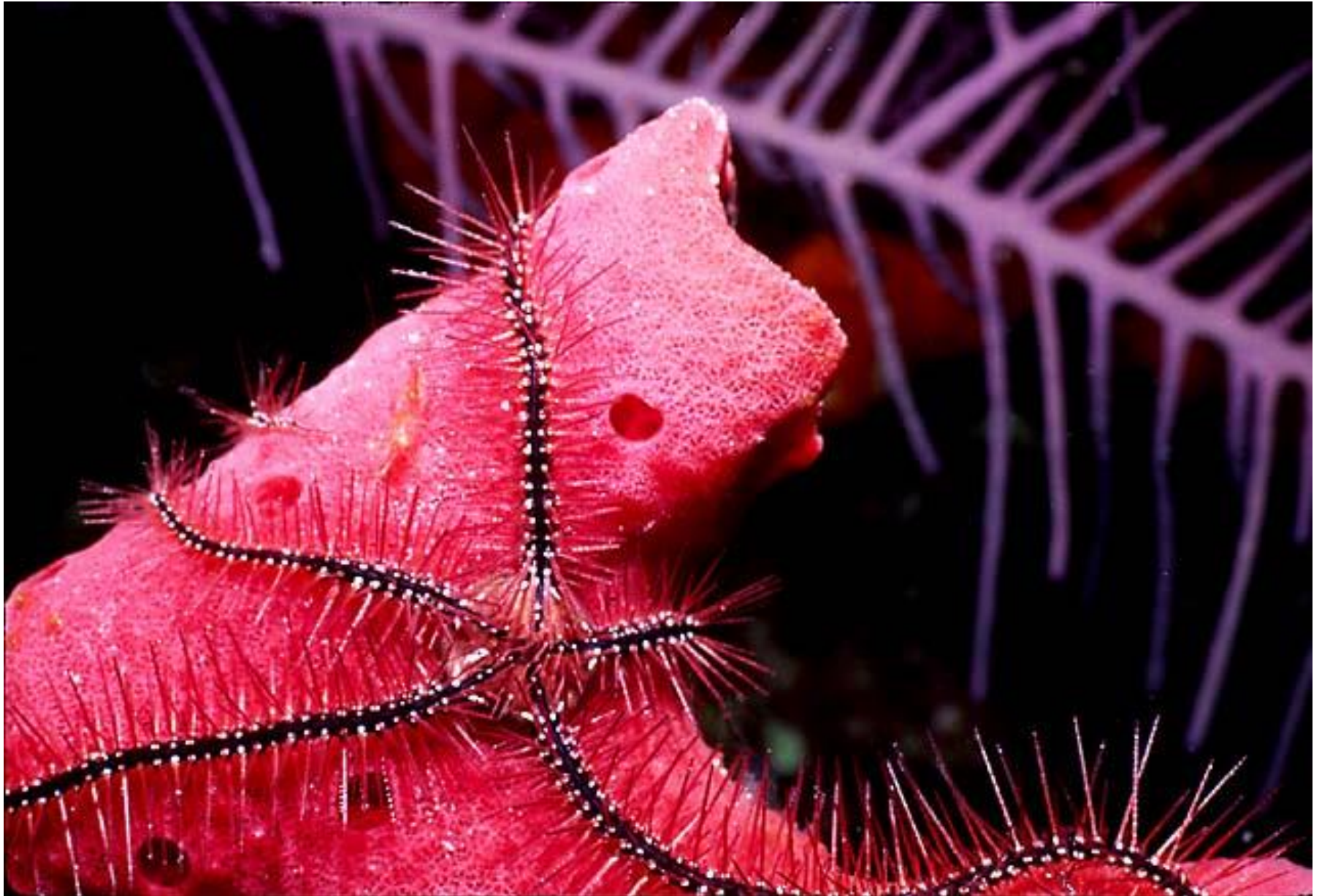
VOTE
PATRICK

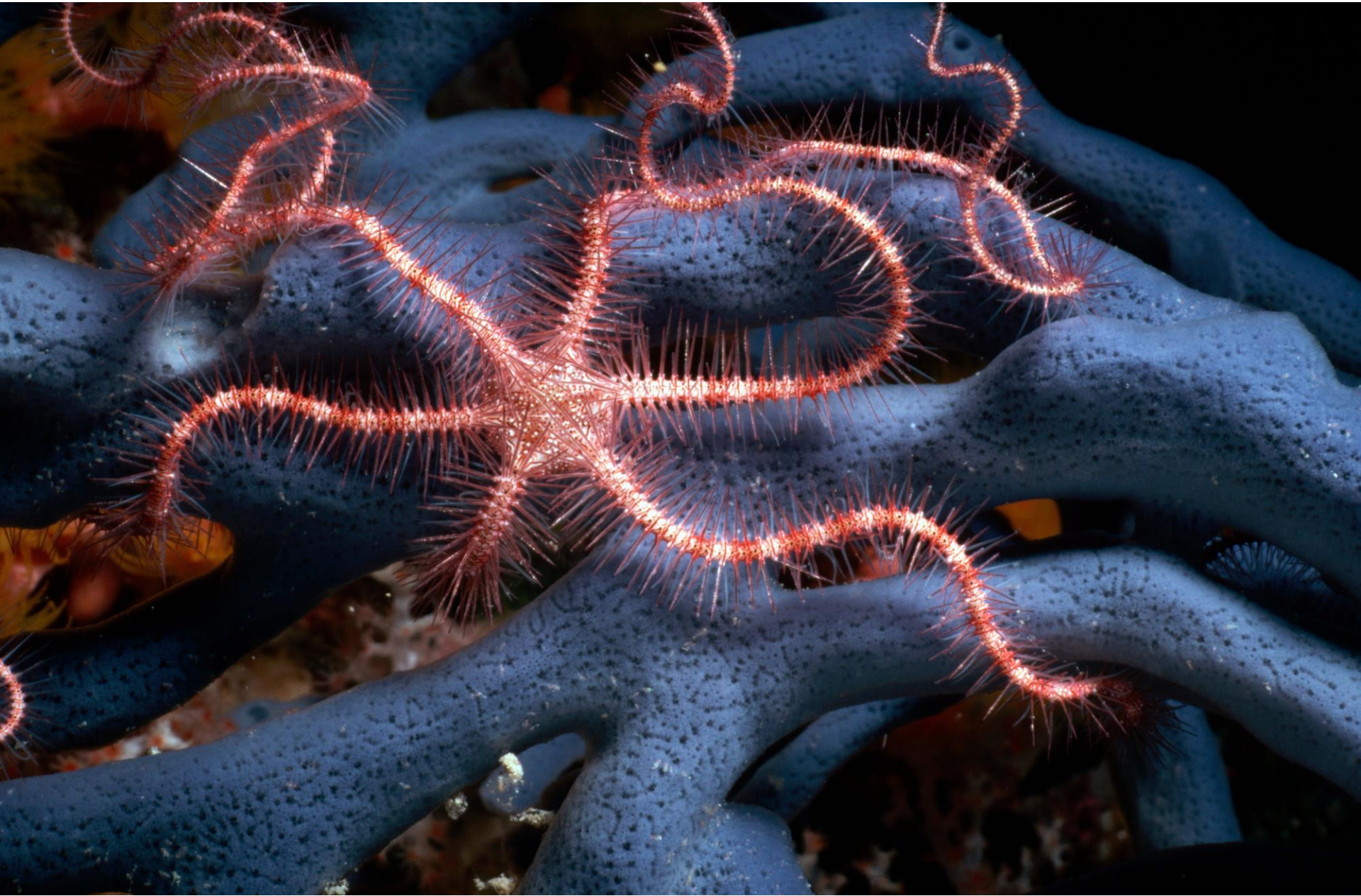
VOTE
PAT

Sea star



Brittle Star





Sea urchin







Sea Urchin Mexico 2011

Sea Cucumber













- Sea Cucumber in action
- http://www.youtube.com/watch?v=wXf_YodWw40

Seas cucumber showing his defence to a class on a field trip

- <http://www.youtube.com/watch?v=lKWSLg5PDiU>

Sand Dollar





Phylum Chordata

- marine, freshwater, or terrestrial
- bilaterally symmetrical
- spinal cord: hollow dorsal nerve tube
- notochord: is a flexible rod beneath spinal cord (which may be lost or replaced during development)
- muscles cover skeleton (endoskeleton)
- several pairs of pharyngeal slits in the throat region
- some segmentation, especially in muscles and nerves

There are three classes of fish that are separated based on two characteristics:

- 1) What type of jaws they have
 - a) sucker (no jaw)
 - b) jaw
- 2) What their skeleton is made of
 - a) cartilage
 - b) bone

Phylum Chordata

Class Agnatha

- has **no jaws**
- has a **skeleton of cartilage**
- has **no paired fins**
- has a **two-chambered heart**
- examples: hagfish, lamprey

Hagfish





© C. Ortlepp

Lamprey







Brook Lamprey



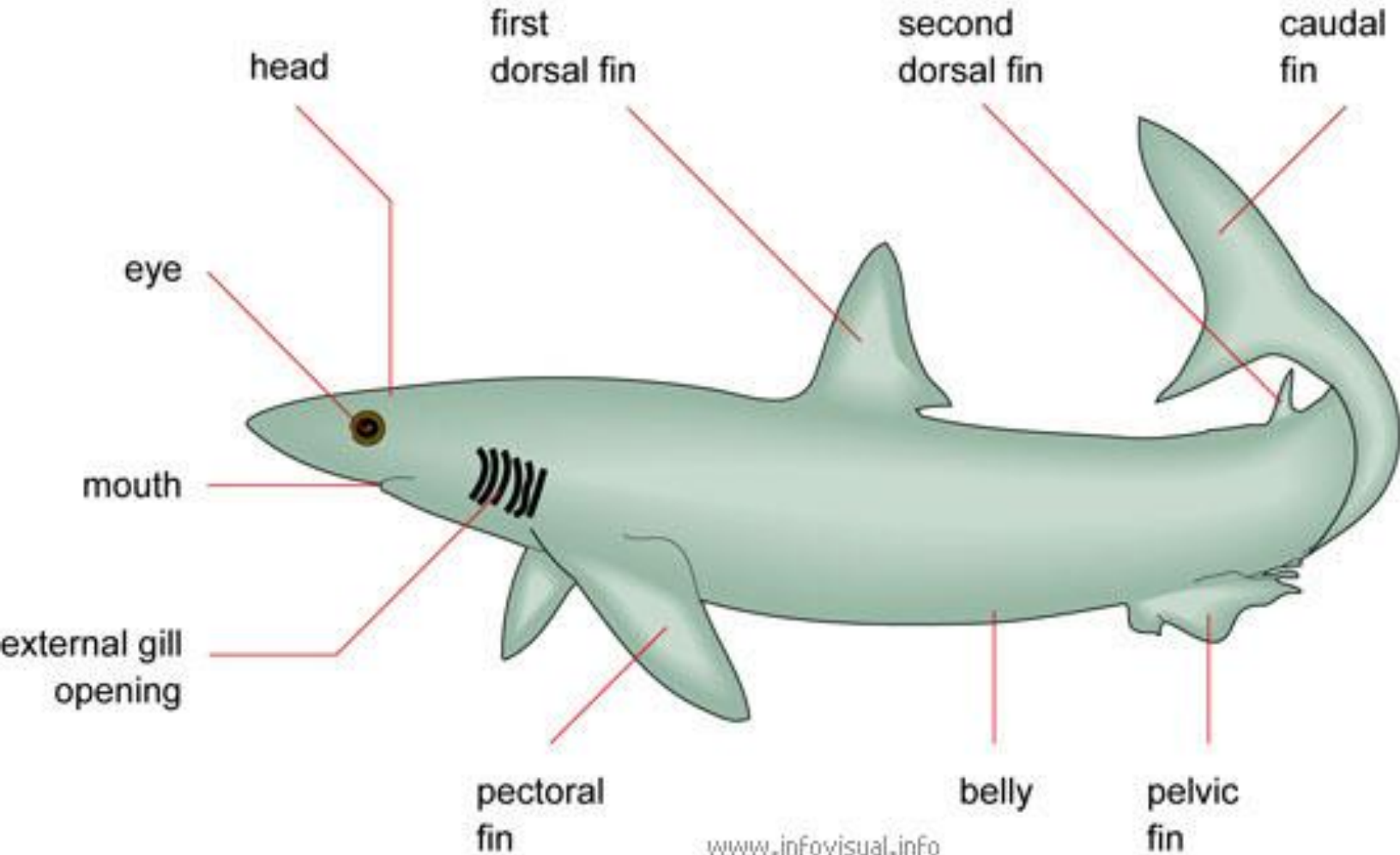
Phylum Chordata

Class Chondrichthyes

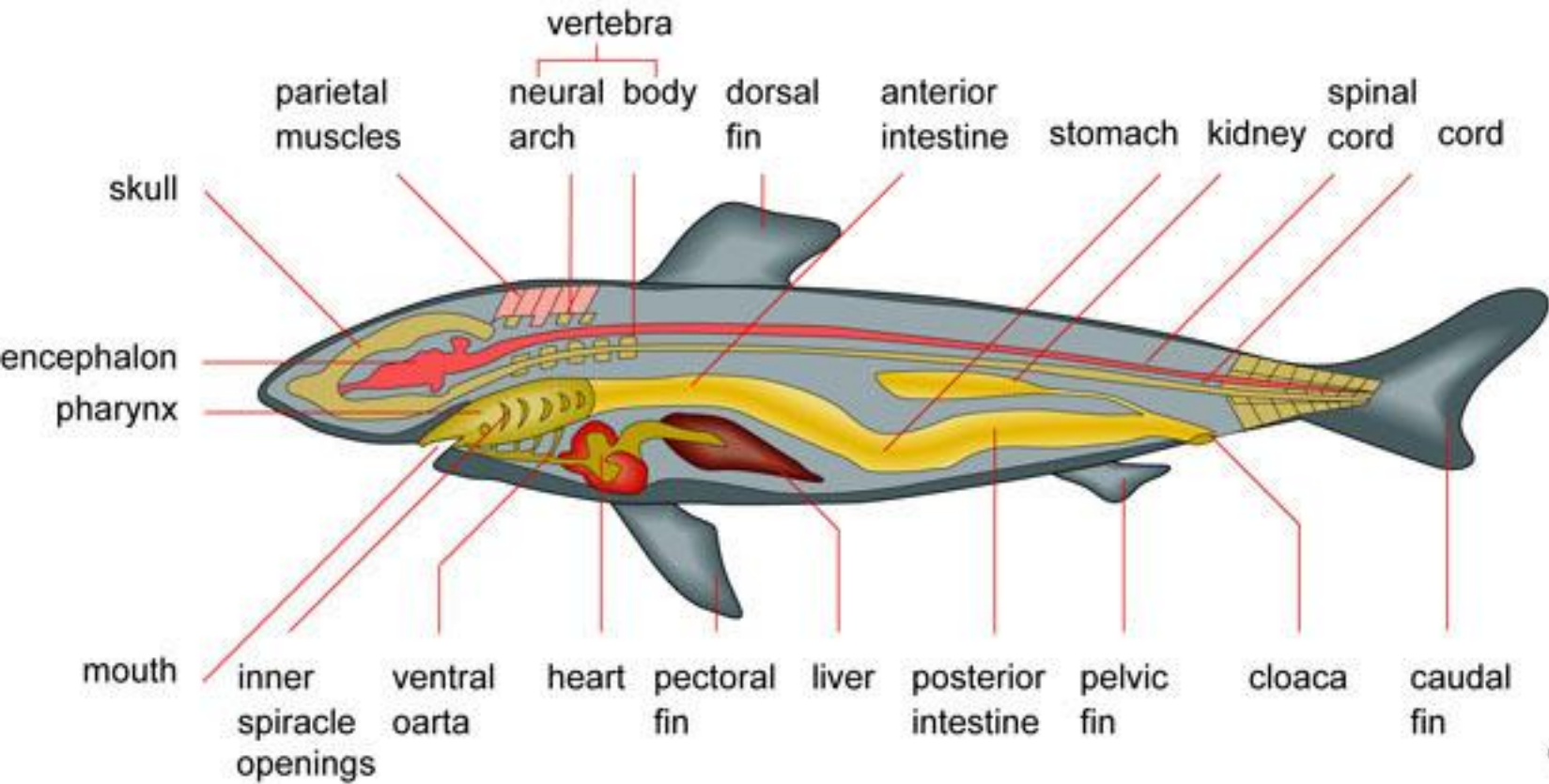
(Cartilaginous Fish)

- has a **jaw**
- **skeleton of cartilage**
- has five or more **pharyngeal slits externally visible**
- has a **ventral mouth and nostrils**
- has a **two chambered heart**
- **no swim bladder**
- **lateral line** (predatory adaptation for detecting vibrations)
- **examples: sharks, skates, rays**

MORPHOLOGY OF A SHARK



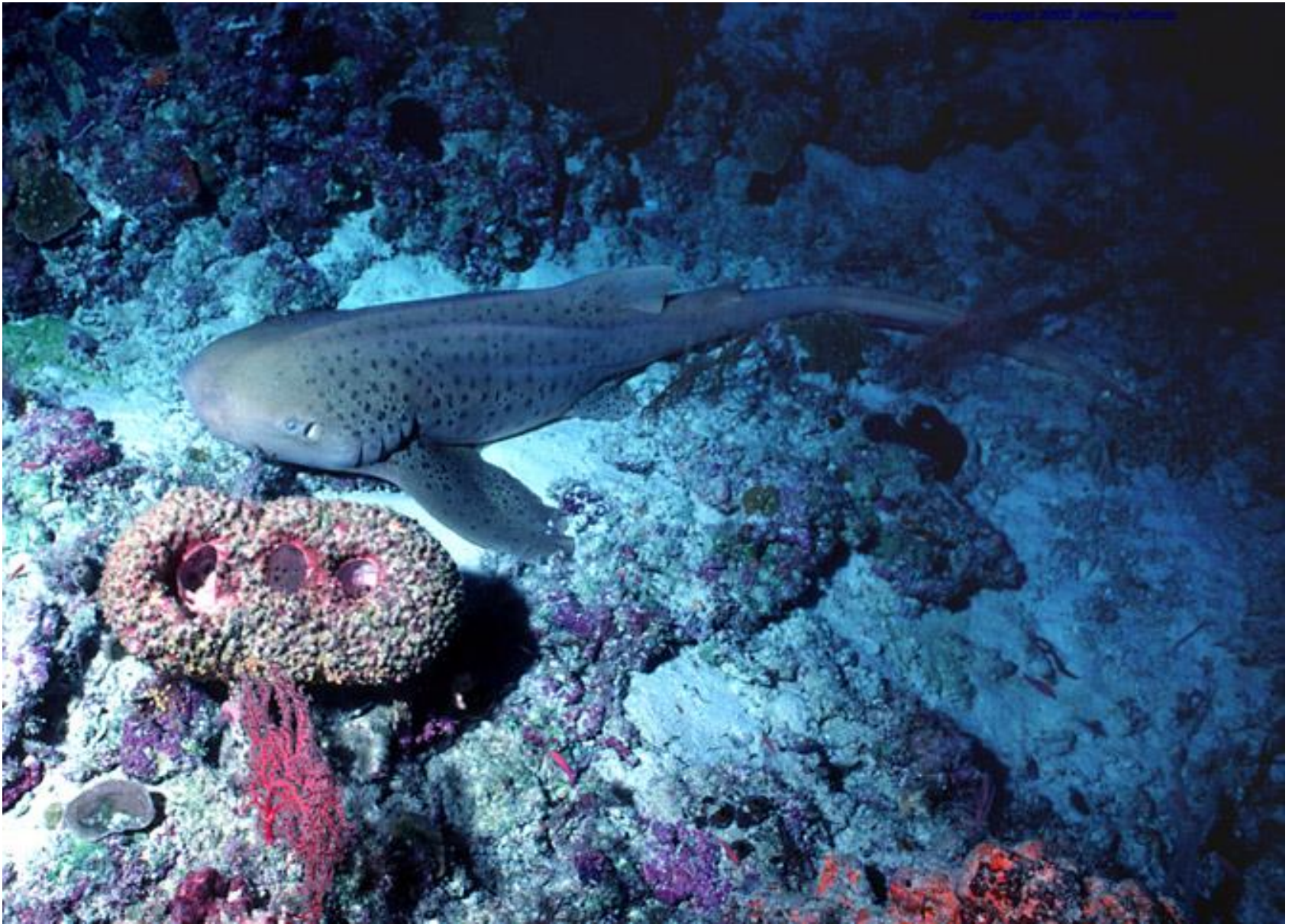
INTERNAL ANATOMY OF A SHARK



Reef Shark



Leopard Shark



Hammerhead Shark



Great White Shark







FINDING
BRUCE

Skates

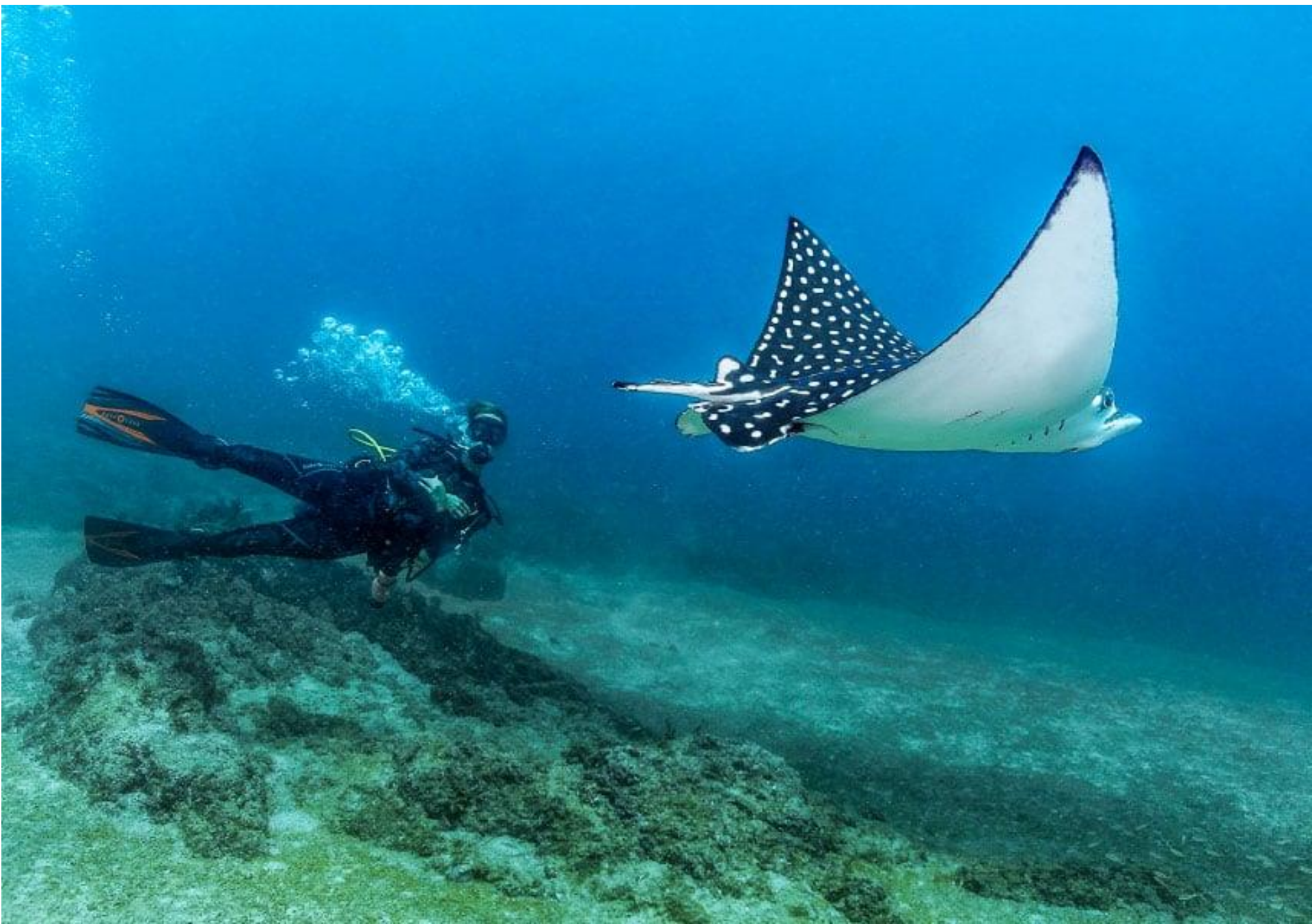




Manta Ray









Stingrays





Spotted Stingray



Fresh Water Stingray

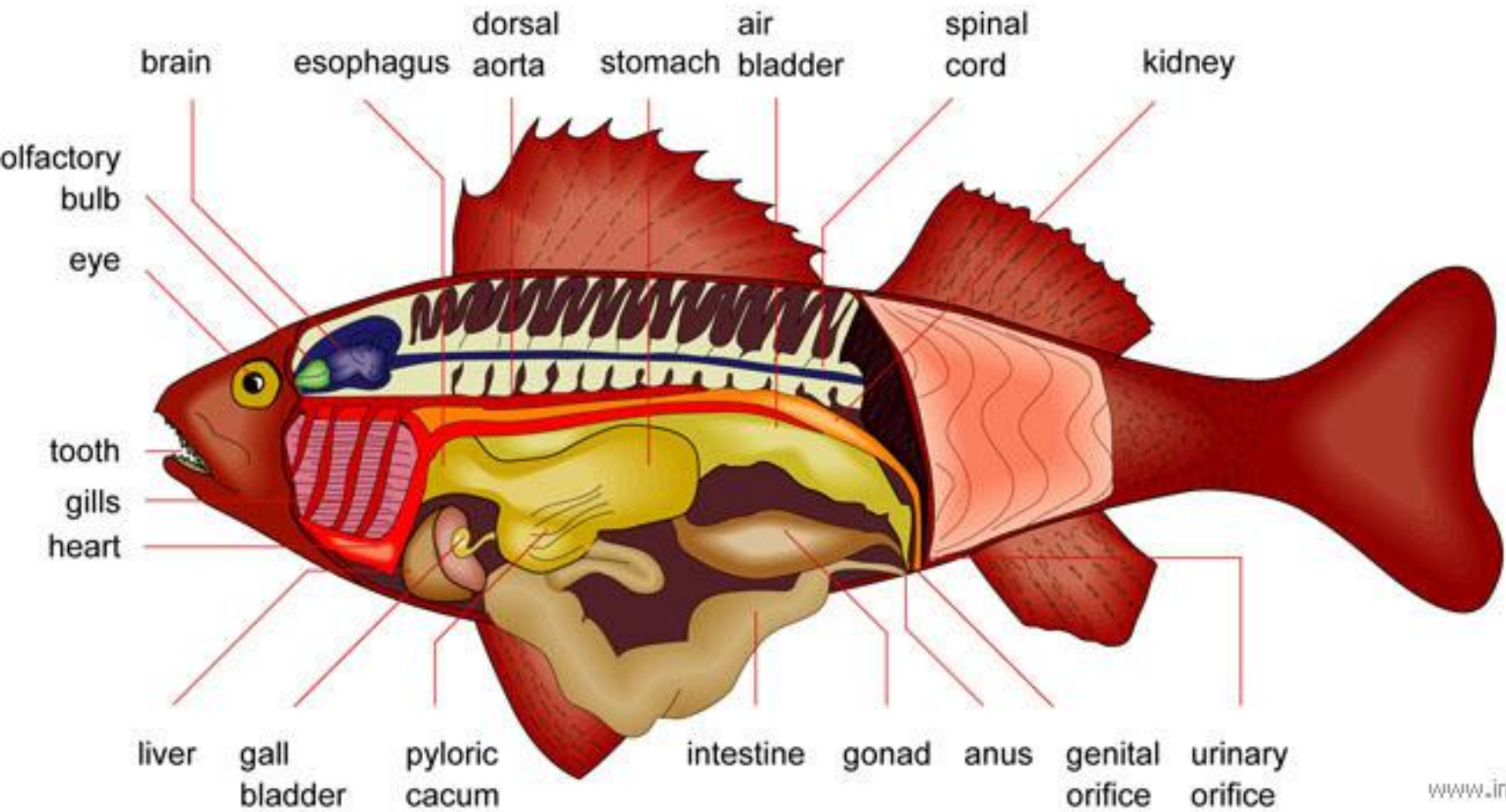


Phylum Chordata

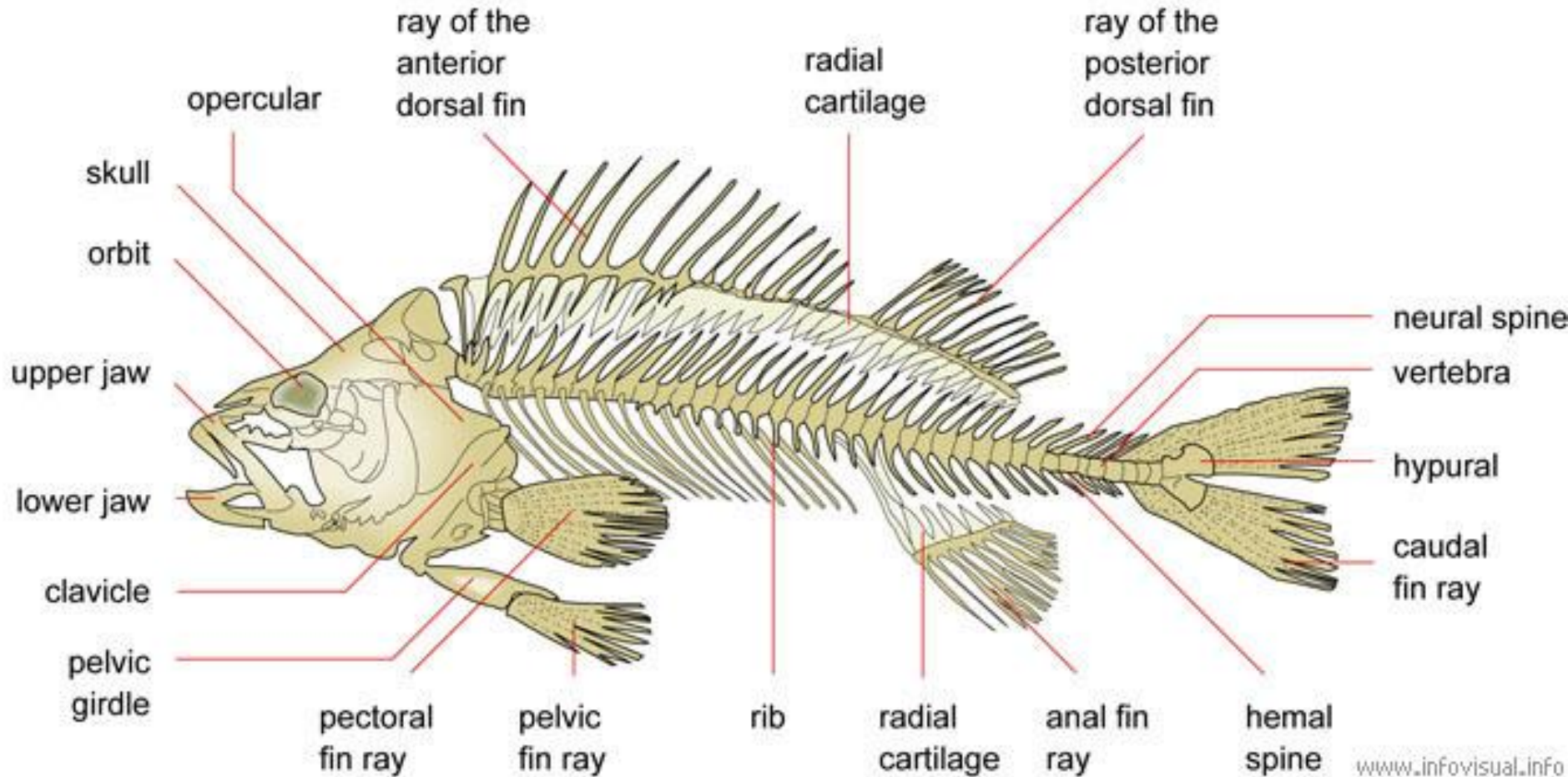
Class Osteichthyes (Bony Fish)

- has a **jaw**
- **skeleton of bone**
- the **pharyngeal slits are covered** and are not externally visible
- has a **two-chambered heart**
- have a **swim bladder**
- **lateral line** (predatory adaptation for detecting vibrations)
- examples: salmon, trout, cod, perch

INTERNAL ANATOMY OF A BONY FISH



SKELETON OF A FISH



Sockeye Salmon



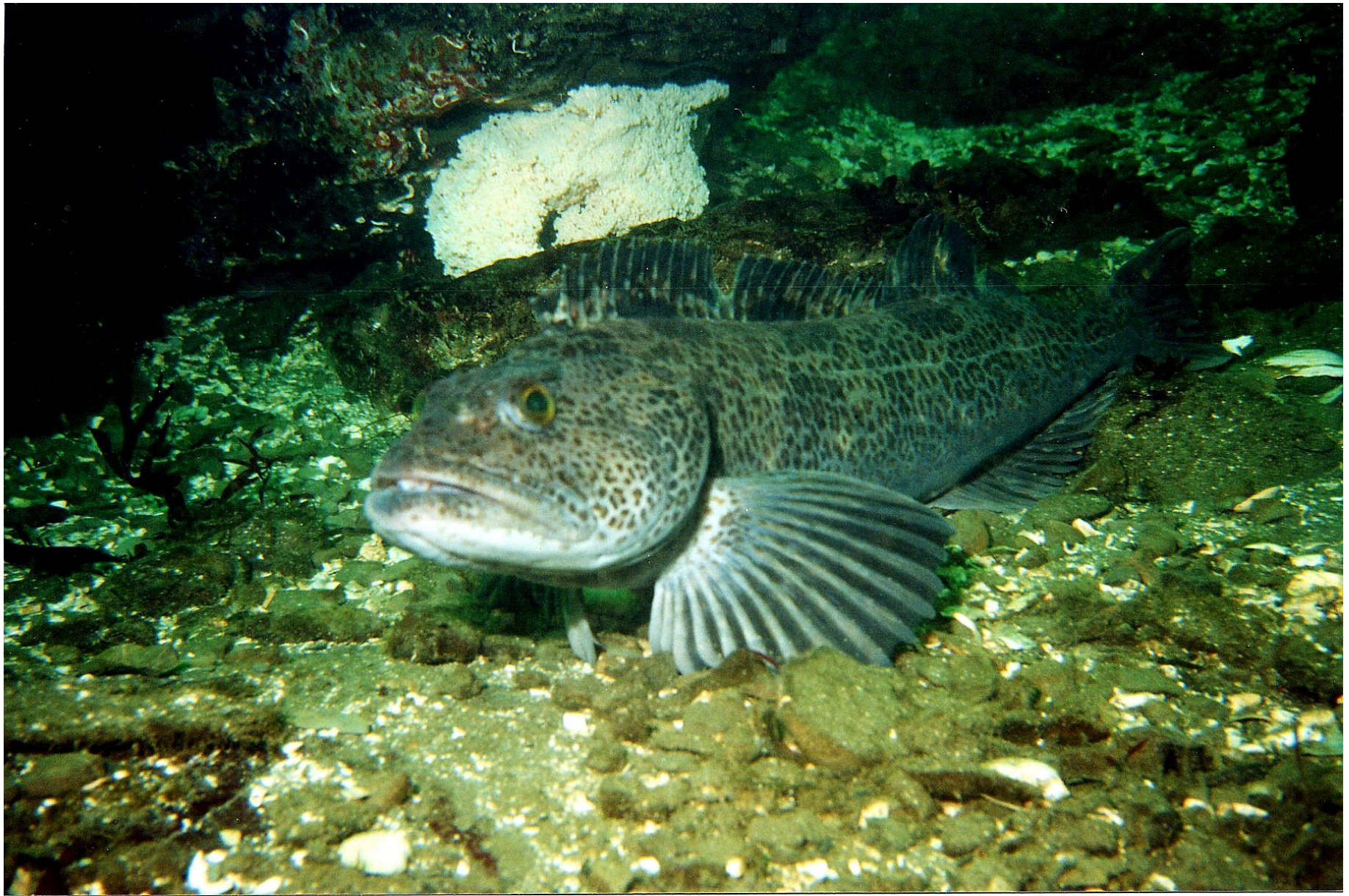
Coho Salmon



Trout



Ling Cod



Yellow Perch



Northern Pike





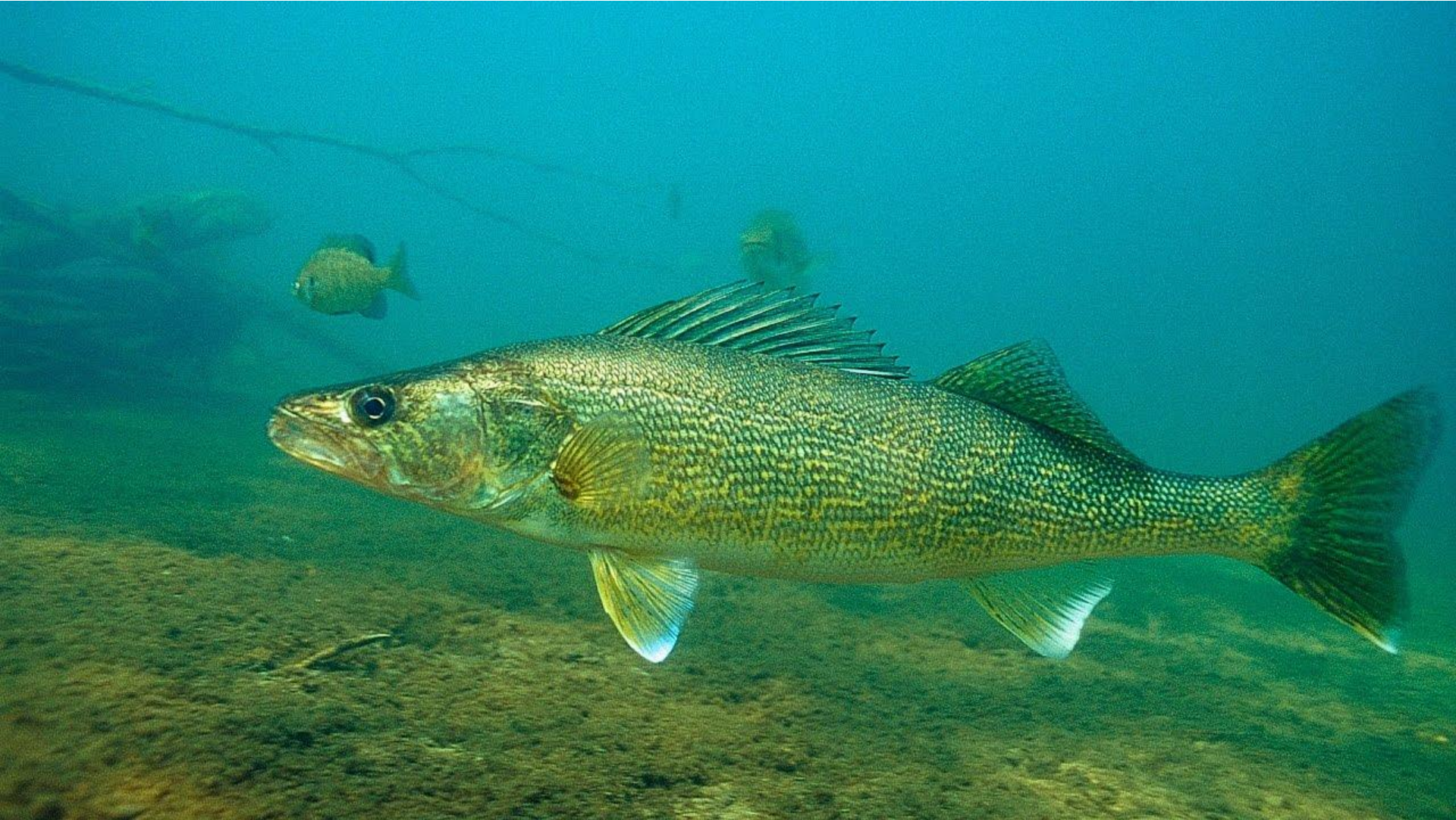


350 lb 9 foot Sturgeon caught in
B.C. in 2007 by a friend of a friend.
I caught one 45 lbs in 2006 - 2 hours and 8 minutes
to reel in with an 8 lb test line!



Walleye





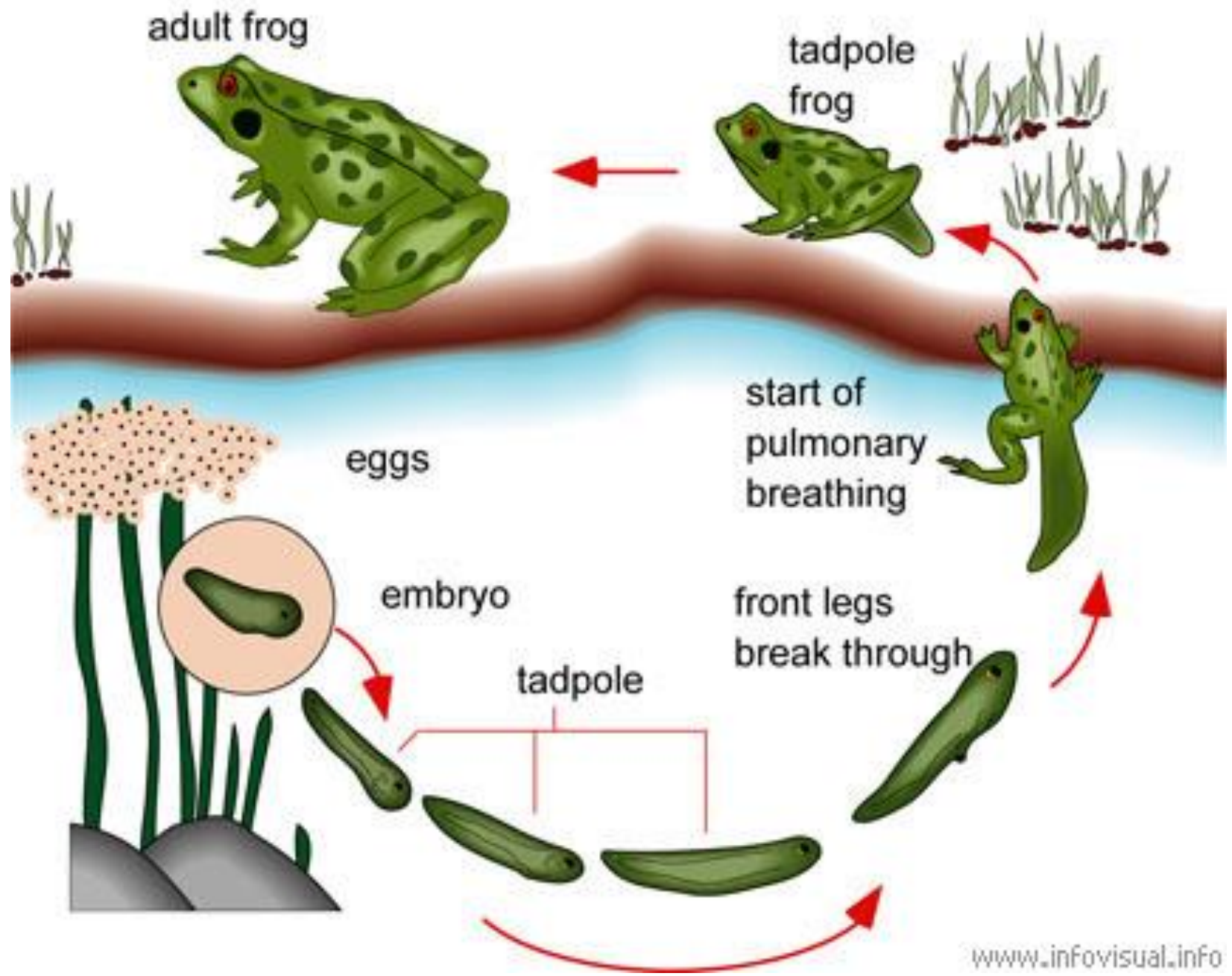


Phylum Chordata

Class Amphibia

- have a **three-chambered heart**
- **lack claws on their toes**
- **seldom have scales**
- **the eggs have no shells and must be laid in water**
- **most have lungs (adult) - may also breathe through moist skin**
- **are cold-blooded**
- **examples: frog, toad, salamander**

LIFE CYCLE OF A FROG



Gray Frog



Poison Dart Frog







Baw Baw Frog



Tomato Frog





Eats flies.
Dates a pig.
Hollywood
star.

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Toad



American Toad





Spotted Salamander



Grotto Salamander



Cave Salamander



Phylum Chordata

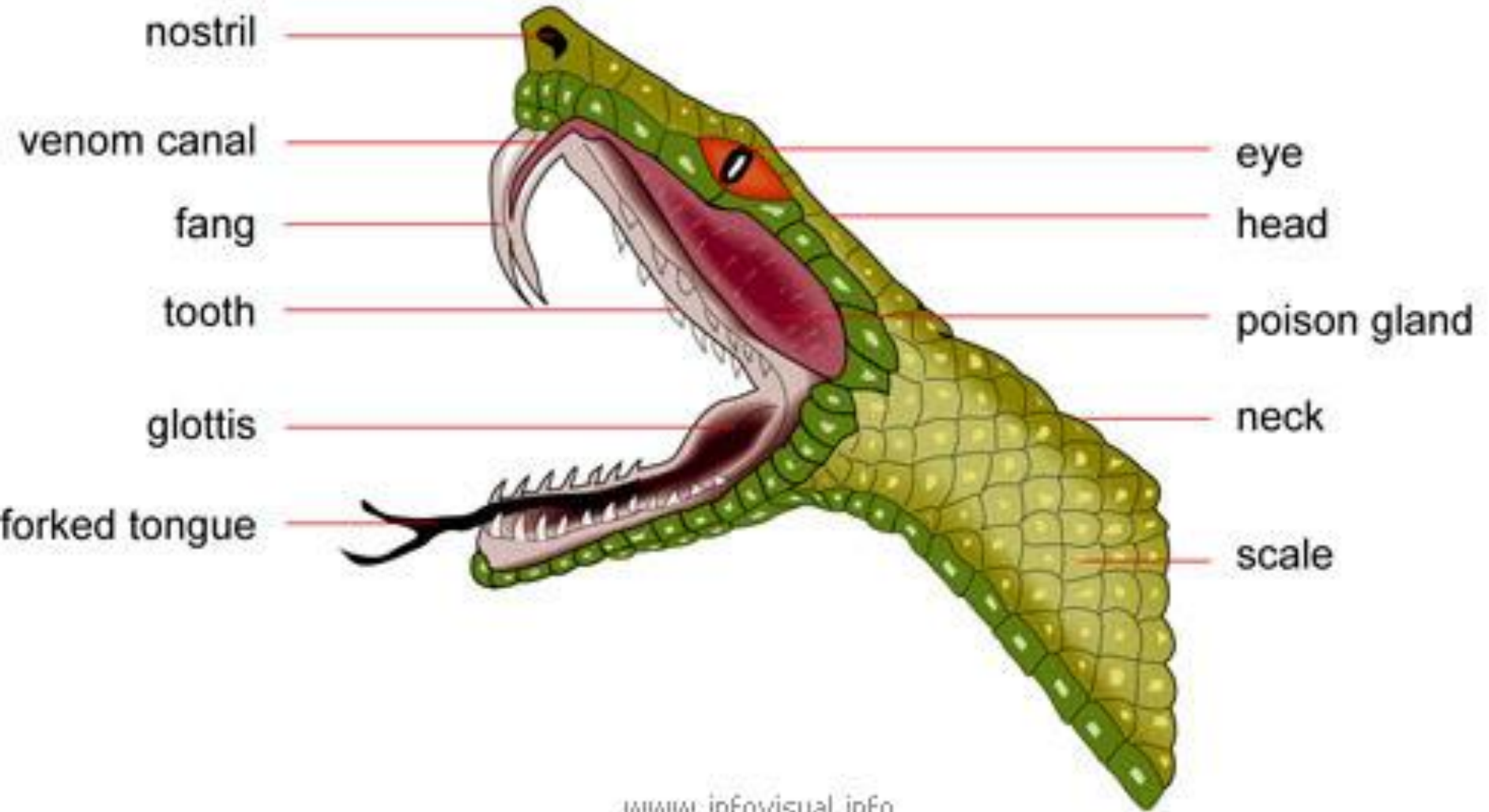
Class Reptilia

- have **scales on skin**
- **breathe by lungs**
- are **cold blooded**
- have **three-chambered heart** (except crocs have 4)
- have **two pairs of appendages with claws** (small and lacking in some)
- **egg - leathery shell**
- examples: snake, lizard, turtle

Diamondback Rattlesnake



MORPHOLOGY OF A VENOMOUS SNAKE



Spitting Cobra

Spitting cobra spit venom from their mouth when defending themselves against predators which can cause permanent blindness if introduced to the eye. Some species can "spit" their venom a distance as great as two meters. While spitting is typically their primary form of defense, all spitting cobras are capable of delivering venom through a bite as well.



Bull Snake



Red-tailed Boa (our snake)



Jon
Triffo

Python



Python





Earless Lizard



Spiny Lizard



Chuckwalla



Box Turtle



Snapping Turtle



Giant Tortoise

They can weigh as much as 300 kg (660 lbs) and can grow to be 1.3 m (4 ft) long. They are one of the world's longest-living animals, with an average lifespan of 100 years or more.

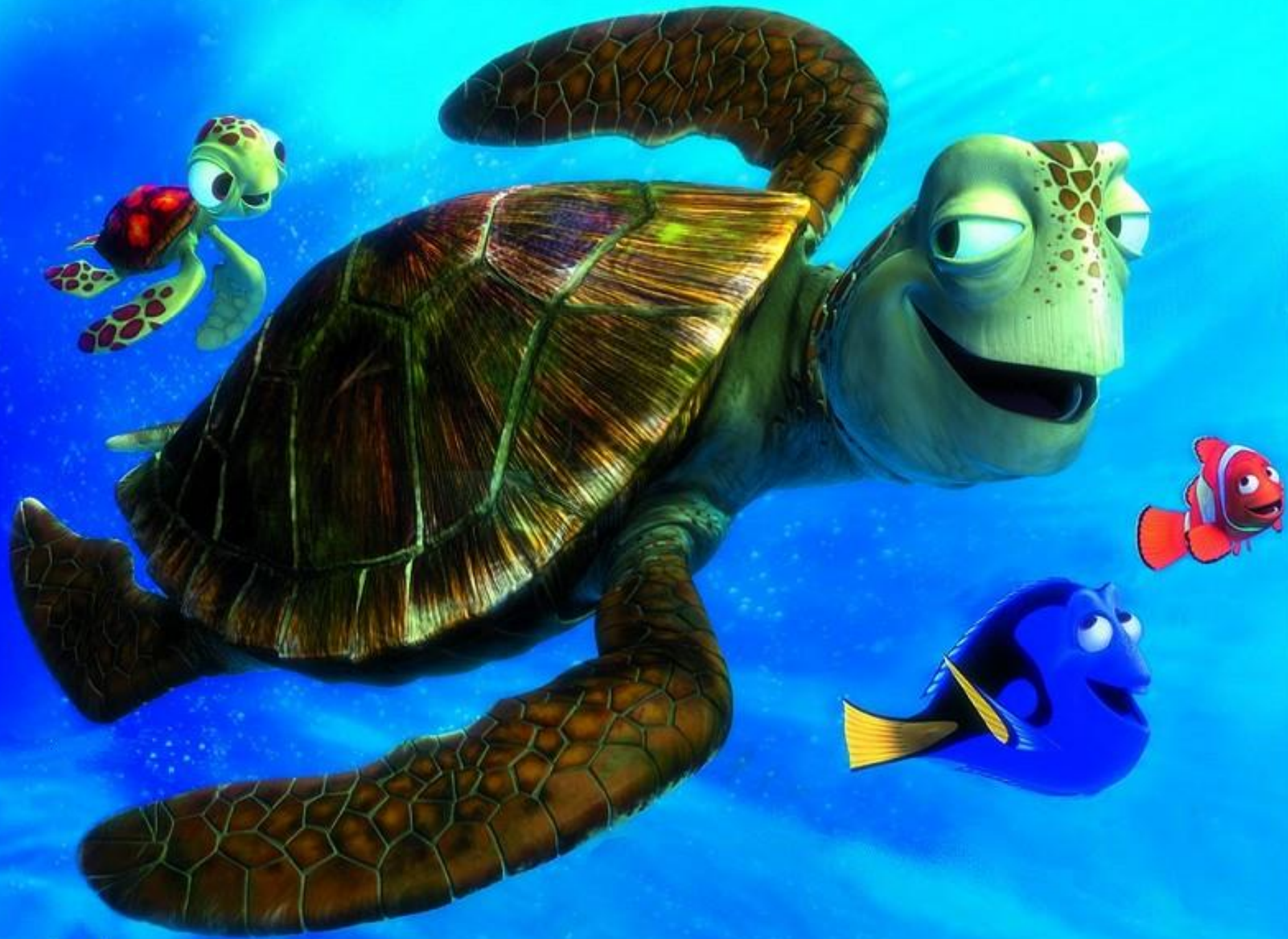


Sea Turtle



Green Sea Turtle





Komodo Dragon





Crocodile

Can reach 70 years, 15 feet, 2000 lbs





The zookeeper shot this crocodile with an antibiotic rather than a tranquilizer dart and then went in to work on him. He won't make that mistake again....





Phylum Chordata

Class Aves

- have **feathers**
- they **lay eggs with a hard calcium shell**
- they have **wings**
- have a **four-chambered heart**
- are **warm-blooded**
- examples: sparrow, chicken, ostrich



Peregrine Falcon

Fastest animal on the planet in its hunting dive, the stoop, which involves soaring to a great height and then diving steeply at speeds of over 322 km/h (200 mph) hitting one wing of its prey, so as not to harm itself on impact. Has body length of 34–50 cm (13–20 in) and a wingspan of around 80–120 cm (31–47 in)

Video - Peregrine Falcon

[http://www.youtube.com/watch?
v=legzXQlFNjs](http://www.youtube.com/watch?v=legzXQlFNjs)

Bald Eagle



Video - Eagle vs. Hare

http://www.youtube.com/watch?v=8I7xhTcYJO8&list=UUwmZiChSryoWQCZMIQezgTg&index=49&feature=plpp_video



Ostrich

Can run at speeds of about 65 km/h (40 mph). Male ostriches weight up to 155 kg (340 lb). Male ostriches can be 2.7 m (9 ft) in height. At one year of age, ostriches weigh around 45 kg (100 lb). An Ostrich can live up to 75 years.

Video – How fast does an Ostrich run

[http://www.youtube.com/watch?
v=1r-b8uY7C9E](http://www.youtube.com/watch?v=1r-b8uY7C9E)

Mallard Duck



Canadian Goose





Peacock





Emperor Penguin

Adults average about 1.1 m (3 ft 7 in) tall and weigh 35 kg (75 lb). Diving penguins reach velocities of 27 km/h (17 mph), reach a depth of 565 m (1,870 ft) and stay submerged for up to 22 minutes.



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Phylum Chordata

Class Mammalia

- **have hair**
- **mammary glands** (modified sweat glands) of female secrete milk
- **give birth to live young**
- are **warm-blooded**
- have a **four chambered heart**
- the teeth are usually of four well-defined types: **incisors, canines, premolars & molars**
- examples: primates, cats, bats, whales, etc.

Male Lion - Can exceed 250 kg (550 lb) in weight.



Lionesses hunt in groups and stalk their chosen prey. They can reach speeds of 59 km/h (40 mph) for short bursts and must sneak up to the victim until they reach a distance of approximately 30 m (98 ft).



A very relaxed squirrel!



Ever been kissed by giraffe?



Brown Bat



Humpback Whale

Adults range in length from 12–16 metres (40–50 ft) and weigh approximately 36,000 kilograms (79,000 lbs)



Killer Whale



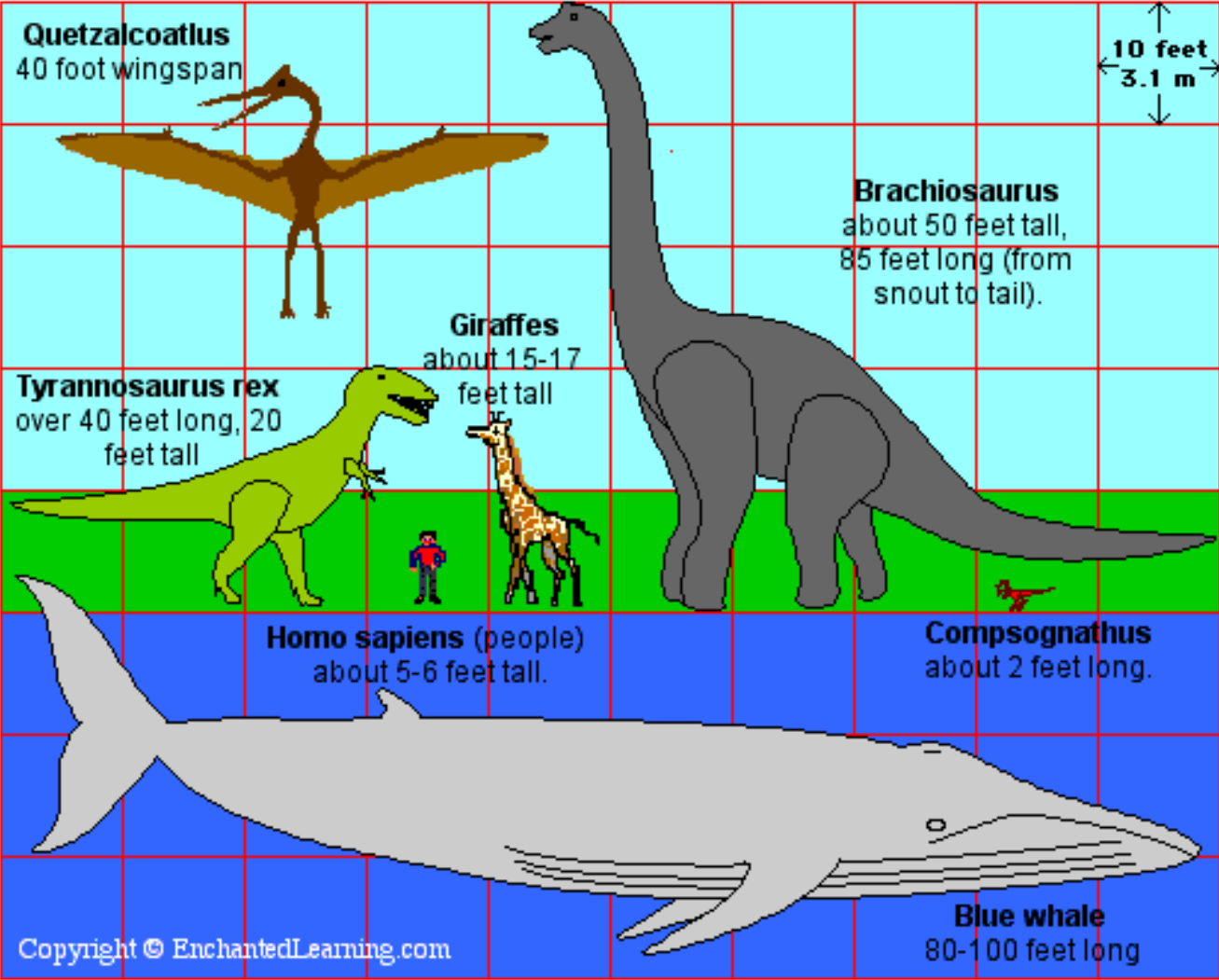
© Rolf Hicker



Blue Whale - up to 33 metres (110 ft) in length and 181 metric tonnes, it is believed to be the largest animal ever to have existed.



A Blue Whale's tongue weighs around 2.7 tonnes and the mouth is large enough to hold up to 90 tonnes. Its aorta is about 23 cm (9 in) in diameter. A calf drinks approximately 400 litres of milk every day and weighs up to 2,700 kg (6,000 lbs) – the same as a fully-grown hippo.



Beached Blue Whale



Star-Nosed Mole

The mole's most distinctive feature is a circle of 22 mobile, pink, fleshy tentacles at the end of the snout. These are used to identify food by touch, such as worms, insects and crustaceans.



Duck Billed Platypus

They are the only mammals that lay eggs rather than giving birth to live young. The male Platypus has a spur on the hind foot that delivers a venom capable of causing severe pain to humans



Perry the Platypus

