PHYLUM CHORDATA (5% Of Animal Kingdom)

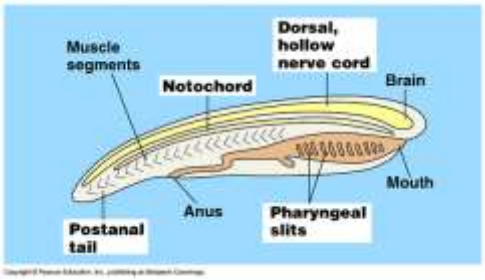
Crash Course Chordates http://www.youtube.com/watch?v=kgZRZmEc9j4&list=TLXbDnnfuh8FRktl3xZSraD3DS6LLBCow4

Characteristics of Chordates:

- **Notochord** = supportive, but flexible rod on dorsal side
- **dorsal** nerve chord
- bilateral symmetry
- coelomates
- **pharyngeal (gill) slits** at some point in lifetime
- **post- anal** tail

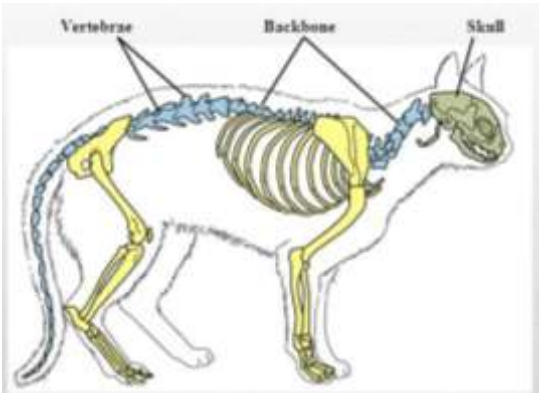
Chordates can be divided into 2 subphyla:

- **Invertebrate Chordates** = flexible notochord
  = transition between invertebrates and vertebrates



- **Vertebrate Chordates** = notochord made of **bones** called **vertebra**

8 Characteristics of Vertebrates:



- a backbone of vertebrae (bone and cartilage) containing the dorsal nerve chord
- endoskeleton = **living**
- advanced nervous system (brain, nerve chord, ganglia, neurons)
- large brain (enlarged anterior end of nerve chord) which is protected by a **skull**
- epidermis specialized for their **environment & habitat**
- paired appendages specialized for **movement**
- a large coelom containing vital organs
- complex **heart** and **closed** circulatory system of varying complexity

Circulatory Systems in Vertebrates https://www.youtube.com/watch?v=5XqEQr-KsW8

Class Agnatha (lamprey, hagfish)

= jawless fish

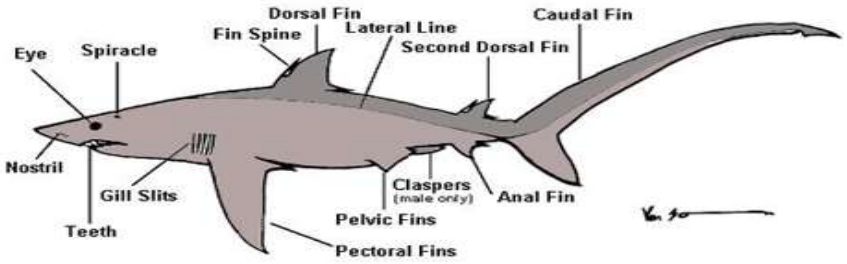
- primitive skeleton composed of **cartilage**
- slimy skin = no **scales**
- no paired fins
- **uncovered** gill slits = must be moving for respiration to occur
- **2-chambered** heart (1 atrium and 1 ventricle, so circulation is **unidirectional**)
- **ectothermic** = cold-blooded (body temperature varies with the environment)
- **external** fertilization and hatching of eggs

Lampreys of this class have caused damage to commercial fisheries because they are parasitic, feeding on the blood and body fluids of other fish like white fish, eventually killing the fish.

Class Chondrichthyes (sharks, rays, skates)

= cartilaginous fish

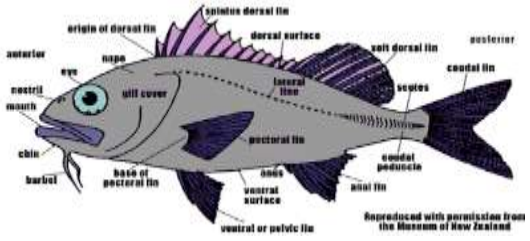
- in addition to the characteristics seen in Jawless fish, members of this class have
  - : a skeleton & scales made of **cartilage**
  - : a **biting** jaw
  - : **paired** fins
  - : a **lateral line** allowing it to sense pressure changes of water currents



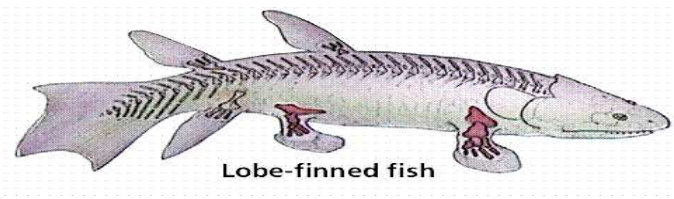
Class Osteichthyes (trout, northern pike)

= bony fish

- unlike other classes of fish, bony fish have:
  - : a **skeleton** and scales composed of **cartilage and bone**
  - : **operculum** (covered gills) = can remain stationary in water
  - : a gas-filled **swim bladder** for buoyancy
- 2 major groups
  - : ray finned
    - = have **flat** fins
    - majority of fish



  - : lobe finned
    - = **fleshy** fins that move in an **alternating** manner

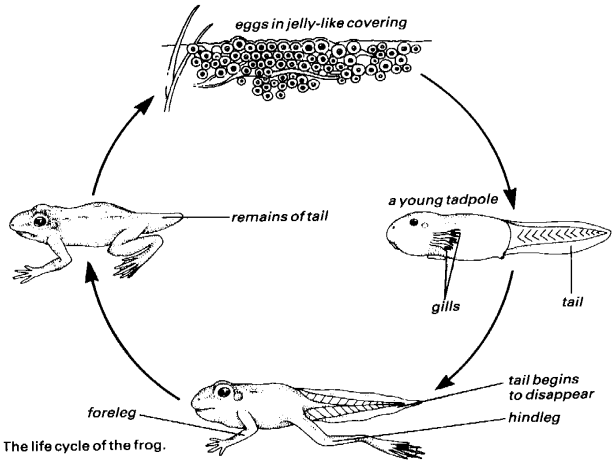


Lobe finned fish are believed to be the evolutionary link to amphibians and therefore all terrestrial vertebrates.

Class Amphibia (salamander, frog)

= live double lives

- **external** fertilization and hatching of eggs in **water**
- the larvae undergoes **metamorphosis**
- have **gills** as aquatic larvae; **lungs** as adult
- have 2 pair of limbs suitable for land (adult)
- slimy, moist skin aids in **respiration** on land
- **3-chambered** heart (2 atria and 1 ventricle)
- ectothermic

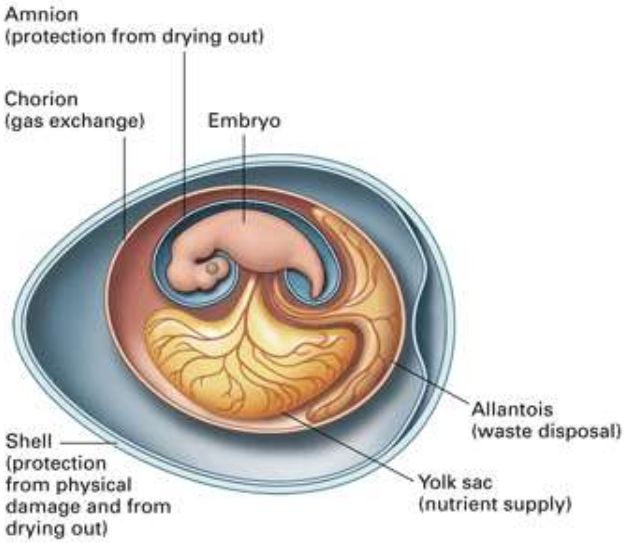


The life cycle of the frog.

Amphibians represent the transition from water to land because they have 2 lives
= are adapted for both aquatic and terrestrial life.

Class Reptilia (snake, turtle, crocodile)

- have adaptations to be completely terrestrial:
  - : dry, scaly skin to prevent **water loss**
  - : limbs **beneath** body & **claws** to enhance land movement
  - : the 3-chambered heart has a **septum** allowing more efficient circulation
  - : amniotic egg (encased in hard shell)
    - developed from **internal** fertilization & laid on **land**
    - protects the embryo from **drying out** while providing **nutrients** and **oxygen**

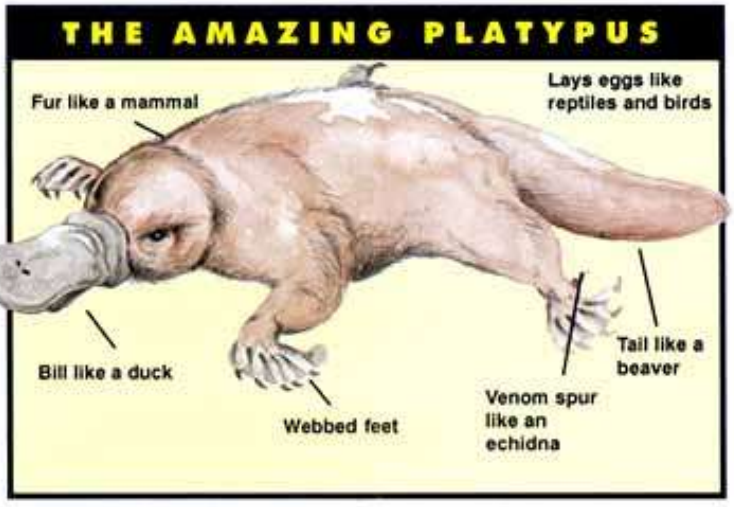


Class Aves (chicken, robin, goose)

- have retained the following reptilian characteristics
  - : thick bones
  - : teeth and claws
  - : long bony tail
  - : scales (most modified to feathers)
  - : amniote egg
  - : lungs
- adaptations which have allowed birds to fly:
  - : **feathers** = insulation, protection and flight
  - : modified forelimb = **wings** for flight
  - : porous bones & reduction of internal organs = **lighter**
  - : enlarged sternum **(breastbone)** = muscle attachment
  - : complete **4-chambered** heart = quicker circulation
  - : **air sacs** attached to lungs = continuous oxygen supply
  - : **endothermic** (warm-blooded) = constant body temperature

Class Mammalia (dog, elephant, human)

- characterized by the evolution of:
  - : skin covered in **hair or fur**
  - : **internal** fertilization and embryo development
  - : **mammary** glands (produce milk for feeding young)
  - : **sweat glands** to regulate body temperature (endotherms)
  - : 2 pair of appendages adapted to **habitat** (walking, climbing, flying, swimming)
  - : well developed brain with capacity to **learn**
- Mammals are placed in 3 groups:
  - a) **Monotremes** (platypus)
    - : external hatching of amniote egg



b) **Marsupials** (kangaroo, koala)

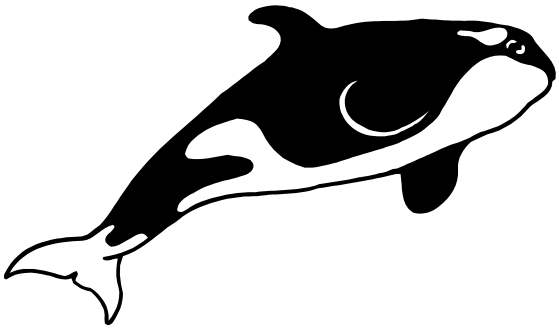
: bear partially developed young which require further development

: the offspring develops in the mother's pouch

c) **Placentals** (bat, dog, human)

: produce a placenta connecting the mother to the unborn embryo

: the placenta provides nutrients and oxygen while removing wastes until the embryo develops into a miniature adult in a placental sac (uterus)



****NOTE:** No monotremes or marsupials are native to Saskatchewan