



Classes Found In The Phylum- Chordata

All chordates have a number of structures in common:

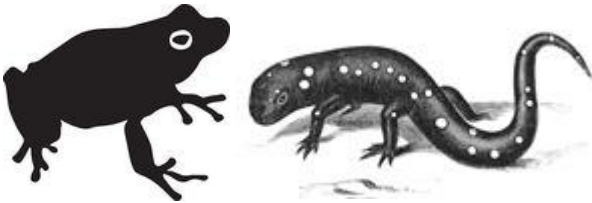
A **notochord** (**noto** = the back; **chord** = string) is present in all embryos, and may be present or absent/reduced in adults. This is the structure for which the phylum was named. The notochord is a rod-like structure that forms the supporting axis of the embryo and gives birth to the vertebral column in vertebrates.

Chordates are sometimes referred to as “**vertebrates**” because most possess a backbone with vertebrae. Most also possess the following characteristics; four limbs, aerobic respiration, get rid of waste via kidneys, reproduce sexually.

1-Class Agnatha (**a-** = not, without; **gnatho** = jaw) which is the lampreys. They **do not have jaws**, are eel-shaped, prey on fish, and have larval forms which are different from the adults.



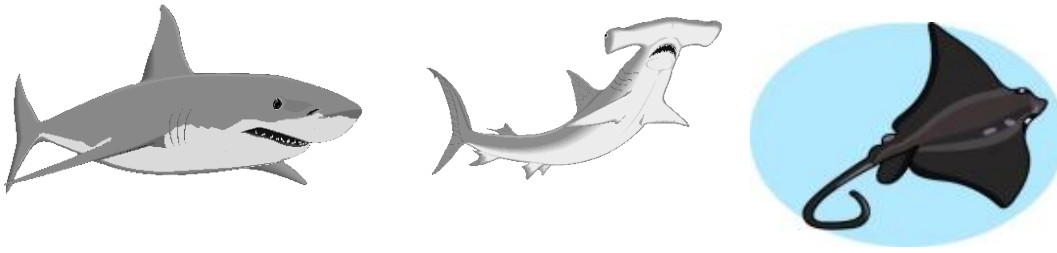
2-Class Amphibia (**amphi** = on both sides, double; **bios** = life) is frogs, newts, and salamanders. They were the first land vertebrates. Frogs, especially, go through **metamorphosis**. Their eggs have no egg shells, so the sperm can swim through the water to the eggs, and the embryos must develop in water. Amphibians are **exothermic** (**exo** = out, outside), that is they maintain their body temperature through external means such as the sun or the water.



3-Class Aves (**avi** = a bird) is the birds. It is thought that birds are descended from dinosaurs, as evidenced, in part, by the scales on their feet. Also, feathers are modified scales: a key characteristic of birds is that they have feathers. Birds’ bones are light weight for flight. Birds are **endothermic** (**endo** = within, inner), that is, they control their body temperature from within (they’re “warm-blooded”). Birds’ vision is the best of all vertebrates: soaring hawks can spot small mice scrambling through the grass in a field far below them. Birds have shelled eggs and so must have internal fertilization — the egg must be fertilized before the hen’s reproductive tract secretes an eggshell. Generally, mating is accompanied by an elaborate courtship ritual. Eggs and often young birds are more exothermic (are not able to control their body temperatures from within) and so must be brooded/incubated by parents.



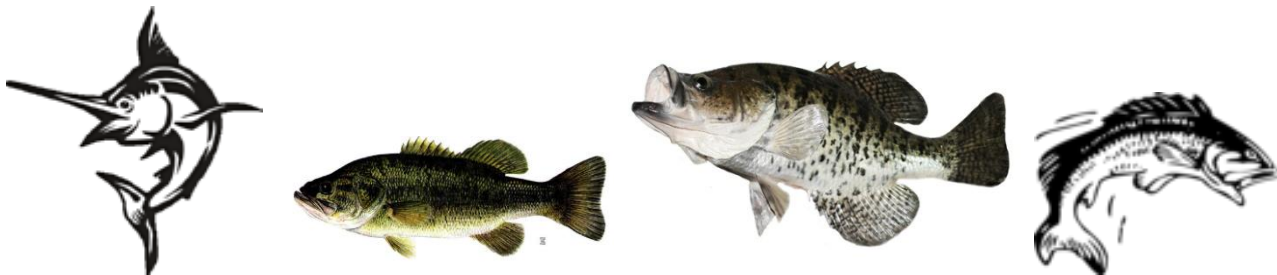
4-Class Chondrichthyes (**chondro** = cartilage; **ichthys** = fish) which includes sharks and rays. They have a **cartilage skeleton, not bone**. They are not buoyant like other fish so they must swim or sink. Like other fish they have a **lateral line** system which detects differences in water pressure, the equivalent of our hearing.



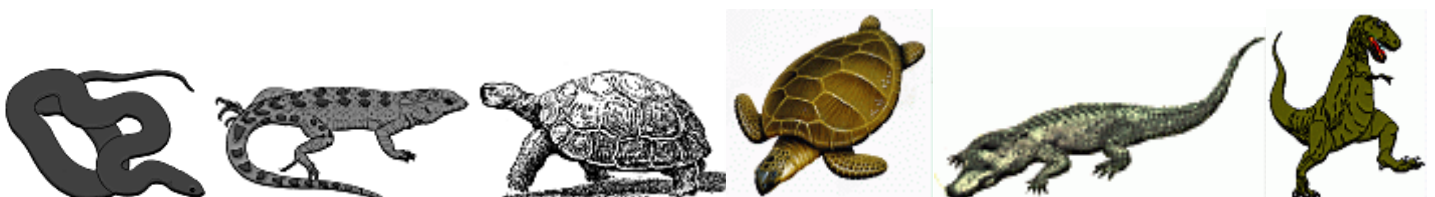
5-Class Mammalia (**mamma, mammil** = teat, nipple) is the mammals. Key characteristics of mammals are the presence of fur/hair and mammary glands, derived from modified sweat glands, which produce milk for the young. Mammals have a diaphragm to aid in respiration. They are **endothermic**. Most mammals bear live young



6-Class Osteichthyes (**osteo** = bone) is the bony fish. This is the most numerous of all vertebrate classes. In fish, O₂ is exchanged via the gills, which are covered by an **operculum** which helps to draw water across/through the gills. Their swim bladder is an air sac used to control buoyancy, thus unlike the sharks, bony fish can hold still at any depth and not sink. Most fish we eat are in this class (salmon, cod, tuna etc)



7-Class Reptilia (**reptili** = creeping) , snakes, turtles, crocodiles, and lizards. Reptiles have scales and are dry to the touch. Their eggs have leathery shells. Reptiles are **exothermic** (**exo** = out, outside), that is they maintain their body temperature through external means such as sunning on a rock or seeking shade. Reptiles need less food/energy to live and live longer than a comparable-sized mammal. There is a debate whether DINOSAURS were like modern day reptiles. ***NOTE-TURTLES AND TORTOISES ARE REPTILES, NOT AMPHIBIANS!!!!!!!!!!!!!!!!!!!!!!**



Phylum Chordata

Class	Main Characteristics	Examples	Approximate # of species
Agnatha	<ul style="list-style-type: none"> • lack jaws and paired fins • cartilaginous skeleton 	Lamprey, hag fish	10 species
Chondrichthyes	<ul style="list-style-type: none"> • have jaws • cartilaginous skeleton • paired fins 	Sharks, skates, rays, sawfish	600 species
Osteichthyes	<ul style="list-style-type: none"> • have jaws • bony skeleton • paired fins 	Most familiar fish ie perch, tuna, catfish	20,000 species
Amphibia	<ul style="list-style-type: none"> • moist, glandular skin • lack scales and claws • larvae are aquatic • eggs without shells 	frogs, toads, salamanders	2,000 species
Reptilia	<ul style="list-style-type: none"> • dry, scaly skin • breathe by lungs • leathery shelled eggs 	snakes, turtles, lizards, crocodiles	5,000 species
Aves	<ul style="list-style-type: none"> • feathers • wings • warm blooded • hard shelled eggs 	birds	9,000 species
Mammalia	<ul style="list-style-type: none"> • hair on part or all of body • warm-blooded • mammary glands to produce milk 	humans, rodents, whales, bats	4,500 species

From an evolutionary perspective, there are a number of trends or changes that can be seen in the vertebrates from class agnatha to class mammalia. Some of these trends are:

1. A switch from a cartilage to a bone skeleton.
2. A move from water to land.
3. An increase in brain size and complexity.
4. An increase in size, number of chambers and complexity of the heart.
5. A change from cold to warm blooded.
6. The evolution of learned behaviors
7. A reduction in the number of offspring (clutch sizes).
8. An increase in parental care.

Phylum Chordata Questions

1. What is a “chordate”? What do these creatures possess? _____ What is another name for a chordate? _____
2. List the 7 major classes found in the Phylum Chordata _____

3. List 3 characteristics that a rat and a whale should share since they are both classified as mammals _____

4. Which classes are endothermic? Which are exothermic? What do these terms mean? _____

5. What is the biggest difference between class Chondrichthyes & Osteichthyes? If you went to a restaurant and ordered trout, what class do you think this fish would be classified under? _____

6. Which class is thought to have been descended from dinosaurs? What characteristic does this class share with dinosaurs? _____

7. Look at the **root** word of each Class name. List what each root word means and how it relates to the organisms in each Class (you should have 7 answers, one for each Class in the Phylum)



8. A Whale Shark (above) is one of the largest creatures in the oceans. It has no fur, but does reproduce using fertilized eggs and gives birth to live young that are not connected by a placenta but instead stay in a pouch inside the mothers body. They do not have mammary glands and need to swim constantly or they sink. In what Class should this creature be classified under? Explain your answer _____

9. There is a modern theory that Aves evolved from Reptilia. By comparing the characteristics of both classes, give two facts that would support this theory and two facts that would discard this theory. _____

10. Circle which of these characteristics in Phylum Chordata probably evolved ***last***
Endothermic/ exothermic
Water environment/ land environment
Bone/ cartilage
Large clutch sizes/ small clutch sizes
Large brain size/ small brain size
2 chambered heart/ 4 chambered heart
11. Which Class has the most species? _____ Looking at these organisms habitats, does this number of species make sense? Explain your answer? _____
