

Invertebrates

Do not have a backbone

1. Porifera - Sponges
 - Filter feeders
 - sessile
 - asymmetrical
 - Sexual or asexual
2. Cnidarians - jellyfish, coral
 - stinging cells
 - radial
 - endoderm
 - ectoderm
3. Platyhelminthes - Flatworms
 - tapeworms
 - many are parasitic
 - bilateral
4. Nematoda - roundworms
 - all parasitic
 - 2 body openings
 - hookworms, pinworms
5. Annelida - segmented worms
 - earthworms, leeches
 - decomposers
 - bilobed (true body cavity)
6. Mollusca - have a muscular foot
 - snails (gastropods)
 - clams, oysters (bivalves)
 - squid, octopus (cephalopods)
 - bilateral
7. Arthropoda - "jointed feet"
 - exoskeleton (molt to grow)
 - largest invertebrate phylum
 - insects, lobsters
 - bilateral
8. Echinodermata - "spiny skin"
 - Starfish
 - Sea urchins
 - radial symmetry

Animals (Kingdom Animalia)

- eukaryotic - cells have a nucleus
- multicellular - many cells
- heterotrophic - consumes food for energy
- no cell wall

Basic Vocabulary

Symmetry

- asymmetrical - cannot be \div into 2 equal parts
- bilateral - 2 equal sides (right & left)
- radial - can be divided along multiple planes + always get 2 equal halves
- invertebrates - no backbone; 95% of all animals
- vertebrates - do have backbone

- sessile - cannot move
- motile - can move

- endoderm - inner tissue layer
- ectoderm - outer tissue layer
- mesoderm - middle tissue layer

- endoskeleton - inner skeleton
- exoskeleton - outer skeleton

- internal fertilization - eggs fertilized inside mother
- external fertilization - eggs fertilized outside mother

- endothermic - internal temperature regulation
- ectothermic - external temperature regulation

Vertebrates

Have a backbone

Phylum Chordata

Subphylum Vertebrata

1. Class Agnatha
 - jawless fish
 - sucker round mouth
2. Class Chondrichthyes
 - sharks, rays
 - endoskeleton of cartilage
3. Class Osteichthyes
 - trout, salmon, clownfish
 - endoskeleton of bone
 - swim bladder
4. Class Amphibia
 - frog, salamander
 - double life - live on land but reproduce in water
 - damp, slimy skin
5. Class Reptilia
 - turtles, snakes, alligators
 - protected shelled eggs
 - scales, claws
 - internal fertilization
6. Class Aves
 - birds
 - hollow bones
 - endothermic
 - feathers
7. Class Mammalia
 - elephant, kangaroo, dolphin
 - nourish young with milk (mammary glands)
 - hair/fur
 - internal fertilization
 - endothermic

Key

Kingdom Animalia

Eukaryotic Multicellular Heterotrophs
Lack Cell Walls
Must do to survive: Feed, Respiration, Circulation, Excretion, Response, Movement, Reproduction

Types of Symmetry - Body Plans

- 1. Asymmetrical - no shape; irregular
- 2. Radial - gives 2 halves when cut along any plane
- 3. Bilateral - when cut down center gives a distinct right and left side

Invertebrates - No Backbone (95% of Animals)

- Phylum Porifera Ex. sponges
- Simplest Invertebrates
- Symmetry: asymmetrical
- Filter Feeders (Pores)
- Sessile (Anchored to a surface) - do not move
- No organs, but have specialized cells
- Reproduction
 - Asexual - budding
 - Hermaphrodites - Both male and female reproductive structures
 - Sexual - shed egg and sperm in water - fertilize externally

Phylum Cnidaria Ex. jellyfish, man o' wars, hydra

- Radial Symmetry
- Stinging Cells
- Tissues - 2 tissue layers
- Endoderm - Inner most germ layer (becomes lining of the digestive tract and much of respiratory)
- Ectoderm - Outer most germ layer (becomes sense organs, nerves, and outer layer of skin)
- Single Body Opening
- Reproduction - External Fertilization, Hermaphrodites

Phylum Platyhelminthes Ex. flatworms (Flukes, tapeworms, planaria)

- Bilateral Symmetry
- Tissues - Endoderm, ectoderm, and mesoderm (middle layer) - 3 layers
- Reproduction - Sexual, regeneration (asexual)
- Most species are both male and female (hermaphrodites)
- # body openings - 1

Phylum Nematoda Ex. roundworms (pinworms, hookworms, all parasitic)

- Symmetry: bilateral
- Most numerous worms
- 2 body openings - mouth & anus
- More specialized digestion system

Phylum Annelida Ex. segmented worms (earthworms, leeches)

- Segmented Worms, Most complex worms
- Bilateral Symmetry
- Closed circulatory system and complete digestive system
- First group to have a Coelom - body cavity containing organs (separate sexes)
- Sexual reprod.

Phylum Mollusca (Mollusks) Ex. Squid, clams, oysters, scallops, snails

- Bilateral Symmetry
- External, Internal, or No Shell
- Most Developed Head (Except Clams) - Sexual reproduction
- Tentacles

Phylum Arthropoda (Jointed Legs) Ex. Insects, spiders, lobsters, crabs.

- Insects - Most successful group on earth
- Largest phylum
- Bilateral Symmetry
- Exoskeleton - outer skeleton of chitin
- Must molt - shed shell periodically
- Body segmented into distinct body parts
- Better Developed senses
- Most have internal fertilization

Phylum Echinodermata (Spiny Skin) Ex. starfish, sea urchin, sand dollars

- Radial Symmetry
- Marine Invertebrates
- Water Vascular System (Digestive)
- Endoskeleton - Inner skeleton
- Regenerate lost parts (asexual)
- ↳ can do sexual reproduction

Vertebrates - Have a Backbone (5% of Animals)

Phylum Chordata

- > Notochord - Dorsal Rod of Cartilage
- > Dorsal Nerve Cord
- > Gill Slits

Tail of some point in development

- > Sub Phylum Vertebrata
- > Backbone - Vertebrae - Body Segments
- > Highly Evolved Nervous System

Class Agnatha (Jawless Fish) Ex. lampreys, hag fish

- o no jaws
- o Sexual rep, but external fertilization
- o Have Sucker Heads
- o ectothermic
- o 2 chambered heart

Class Chondrichthyes (Cartilaginous Fish) Ex. sharks, rays, skates

- o Skeleton Made of cartilage
- o jaws
- o Sex used rep. with internal fert.
- o gills
- o ectothermic
- o 2 chambered heart

Class Osteichthyes (Bony Fish) Ex. perch, bass, trout

- o jaws
- o Sexual rep. w/ internal fert.
- o gills
- o ectothermic
- o 2 chambered heart
- o Swim bladder - keeps them from sinking when they swim

Class Amphibia Ex. frogs, toads, salamanders

- o Live a Double Life - live on land but reproduce in water
- o Live on Land but Reproduce in water
- o No Skin Covering, Moist, No Claws
- o Lay eggs
- o Ectothermic (Cold Blooded)
- o external fert.
- o 3 chambered heart
- o Gills then lungs

Class Reptilia Ex. turtle, lizard, snake, alligator

- o Produce First Land Egg - amniotic egg
- o Allows For Reproduction on Land
- o Ectothermic
- o internal fertilization & mother lays eggs
- o 3 chambered heart
- o lungs

Class Aves (Birds) Ex. robin, eagle, pelican

- o Endothermic - body temperature maintained by homeostasis
- o Maintain Constant Body Temperature
- o Even When External Conditions Change
- o Feathers - Believed to Be Modified Scales
- o hollow bones for flight
- o Amniotic Eggs
- o 4 chambered heart
- o lungs

Class Mammalia Ex. bear, whale, kangaroo, humans

- o About 70 Million Years Old
- o Mammary Glands - Nurse Young
- o Internal Development of Young
- o Insulation - hair/fur on Body
- o internal fertilization
- o Legs Under Body
- o Complex Nervous System
- o 4 chambered heart
- o endothermic