

INVERTEBRATE ANIMALS

Before commencing to study from these notes, refer to Overview of Kingdom Animalia.

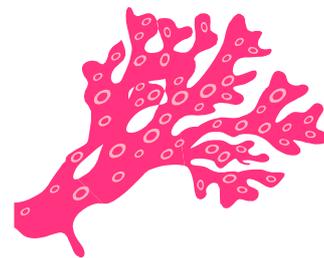
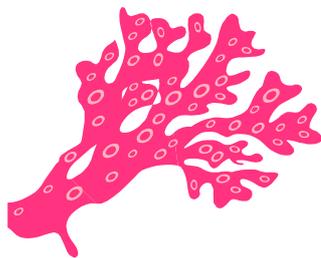
For each of the groups below, refer to your textbook for diagrams to identify the main characteristics.

Please be aware that taxonomists may change the names of some groups.

PHYLUM PORIFERA

- ◆ Examples : sponges
- ◆ Invertebrate
- ◆ Multicellular
- ◆ Mostly marine, some freshwater
- ◆ A sponge consists of an outer layer of covering cells, an inner layer of flagellated cells, and some cells in between. Water moves in through many small pores, and out through one large pore. Nutrients and oxygen are absorbed directly from the water into the cells.
- ◆ No nervous, digestive, circulatory, respiratory, skeletal nor muscular systems
- ◆ Reproduction – either asexual or sexual

Did You Know That...? If a sponge is cut into pieces, each small piece will regrow into a new individual organism. Also, since it has no nervous system, a sponge will feel no pain.



PHYLUM CNIDARIA / PHYLUM COELENTERATA

- ◆ Examples: jellyfish, coral, hydra, sea anemone
- ◆ Invertebrate
- ◆ The name “Cnidaria refers to stinging cells (called cnidocytes) on the tentacles. The name “Coelenterata” refers to the hollow body.
- ◆ Marine
- ◆ Some are fixed (e.g. coral), and some are free-swimming (e.g. jellyfish).
- ◆ Radial symmetry (e.g. Top view of jellyfish)
- ◆ Respond to light and heat
- ◆ Move by contracting muscle fibres
- ◆ A branched central cavity digests nutrients. There is no separate mouth and anus.
- ◆ Absorb oxygen directly from the water into the cells
- ◆ Reproduce asexually and sexually at different times (Alternation of Generations)

PHYLUM PLATYHELMINTHES (FLATWORMS)

- ◆ Examples : tapeworm, liver fluke, planarian
- ◆ Invertebrate
- ◆ Most are parasitic and live inside a host animal. However, planarians are free-living and live in marine, freshwater and moist terrestrial environments.
- ◆ Bilateral symmetry
- ◆ “Head” contains sensory organs for sight and hearing and a simple brain
- ◆ Digestive tract is sac-like with one opening, which has a sucker in most of the parasites
- ◆ No circulatory system
- ◆ Reproduction – Both asexual (binary fission or regeneration) and sexual (Most are hermaphrodites containing both male and female reproductive organs in case one finds a mate.)

PHYLUM NEMATODA (ROUNDWORMS)

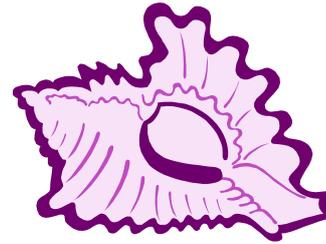
- ◆ Examples : threadworm (Ascaris), hookworm
- ◆ Invertebrate
- ◆ Bilateral symmetry
- ◆ Unsegmented
- ◆ Parasitic
- ◆ Terrestrial, freshwater or marine
- ◆ More advanced than Phyla Platyhelminthes and Nemertea in that nematodes have a simple coelom, an internal protective cavity around the digestive tract
- ◆ Sexual reproduction (some have separate sexes)

PHYLUM NEMERTEA (RIBBON WORMS / PROBOSCIS WORMS)

- ◆ Invertebrate
- ◆ Bilateral symmetry
- ◆ Marine
- ◆ Can be 15 cm or more in length
- ◆ “Head” contains a simple brain, and an extendable proboscis which is used to capture prey (often other worms)
- ◆ Digestive tract has two openings – a mouth and an anus
- ◆ Circulatory system has blood vessels but no heart
- ◆ Sexual reproduction

PHYLUM BRYOZOA (MOSS ANIMALS)

- ◆ Invertebrate
- ◆ Bilateral symmetry
- ◆ Marine, can be mistaken for seaweed
- ◆ Fixed vase-like body with a U – shaped digestive tract with separate mouth and anus at the top
- ◆ Mouth is surrounded by tentacles to trap food
- ◆ Body is enclosed in calcium carbonate material for protection
- ◆ Reproduction – some asexual, some sexual

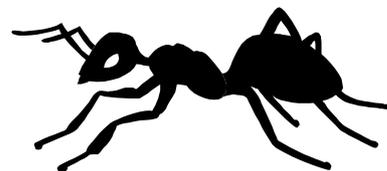
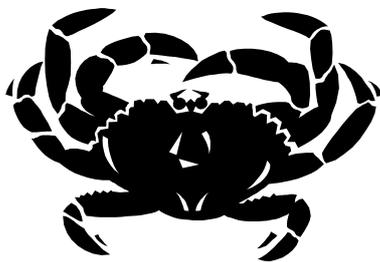


PHYLUM MOLLUSCA

- ◆ Examples : [slug](#), [snail](#), [clam](#), [oyster](#), [chiton](#), [squid](#), [octopus](#)
- ◆ Invertebrate
- ◆ Soft-bodied muscular “foot”, usually enclosed with a hard external shell made of calcium carbonate
- ◆ Breathe with gills
- ◆ Digestive system – Mouth with jaws and a tongue-like radula with teeth on it, also a stomach, intestine and anus
- ◆ Nervous system – Brain and sensory organs that are particularly specialised for sight (squid eyes have lenses and retinas) and smell
- ◆ Circulatory system – Heart and blood vessels
- ◆ Sexual reproduction – Mostly separate sexes, though slow-moving molluscs such as snails are hermaphrodites. Some exhibit courtship behaviour before mating.

PHYLUM ANNELIDA (SEGMENTED WORMS)

- ◆ Examples: [bristle worm](#), [earthworm](#), [leech](#)
- ◆ Invertebrate
- ◆ Bilateral symmetry
- ◆ More advanced than the other worm phyla because of a coelem , which is an internal fluid-filled body cavity
- ◆ Digestive tract is straight, with separate mouth and anus
- ◆ Head has simple brain, and may have simple eyes, feelers or tentacles
- ◆ Usually no appendages
- ◆ Sexual reproduction, and Earthworms and Leeches are hermaphroditic but do not self-fertilise.



PHYLUM ARTHROPODA

- ◆ Largest phylum in the animal kingdom
- ◆ Invertebrate
- ◆ External skeleton (Exoskeleton)
- ◆ Segmented body
- ◆ Jointed appendages
- ◆ Ventral nerve cord

CLASS CRUSTACEA

- ◆ Examples: crab, lobster (crayfish), shrimp (prawn) barnacle, water flea, slater
- ◆ Invertebrate, ventral nerve cord
- ◆ Mostly aquatic
- ◆ Body segments are cephalothorax and abdomen
- ◆ Each body segment has a pair of jointed limbs that may be used for swimming, crawling or feeding.
- ◆ Bilateral symmetry
- ◆ 2 pairs of antennae
- ◆ 1 pair of jaws
- ◆ Heart and blood vessels
- ◆ Gills
- ◆ Straight digestive tract with separate mouth and anus
- ◆ Simple brain and sensory organs
- ◆ Sexual reproduction, usually with separate sexes

CLASS MYRIAPODA

- ◆ Examples : centipede, millipede
- ◆ Invertebrate, ventral nerve cord
- ◆ Bilateral symmetry
- ◆ 1 pair of antennae
- ◆ Brain and sensory organs of eyes, feelers and skin
- ◆ Air tubes called tracheae for breathing
- ◆ Heart and blood vessels
- ◆ Straight digestive tract with separate mouth and anus
- ◆ Sexual reproduction, with separate sexes
- ◆ This group is sometimes divided into two classes – Class Chilopoda (Centipedes) and Class Diplopoda (Millipedes).

Did You Know That...? Centipedes do not have 100 legs, nor do millipedes have 1000 legs. In fact, a centipede has 1 pair of legs per body segment, and a millipede has 2 pairs of legs per body segment. Another difference is that centipedes are carnivorous and can be poisonous, and millipedes are herbivorous.

CLASS ARACHNIDA / CLASS CHELICERATA

- ◆ Examples : spider, scorpion, tick, mite
- ◆ Invertebrate, ventral nerve cord
- ◆ Usually terrestrial
- ◆ Bilateral symmetry
- ◆ 2 body segments – Prosoma (with sense organs, mouthparts and limbs, but no antennae) and abdomen
- ◆ Usually 4 pairs of appendages
- ◆ Poison fangs are called chelicerae
- ◆ Usually carnivorous
- ◆ Breathes with book lungs (similar to gills)
- ◆ Sexual reproduction

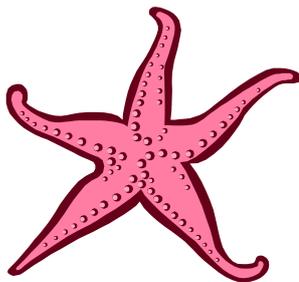
Did You Know That...? Spiders don't get caught in their own webs because they produce two types of web threads - non-sticky threads which provide structure for the web and on which the spider crawls, and sticky threads to catch the prey.

CLASS INSECTA

- ◆ Examples: beetle, weevil, fly, mosquito, midge, cicada, aphid, bee, ant, termite, butterfly, praying mantis, dragonfly, grasshopper, locust, cricket, flea, silverfish, cockroach
- ◆ Invertebrate, ventral nerve cord
- ◆ Largest class in the animal kingdom
- ◆ Bilateral symmetry
- ◆ 3 body parts – head (with 1 pair of antennae, 1 pair of jaws and eyes), thorax (with 3 pairs of appendages) and abdomen
- ◆ Breathe by tracheae
- ◆ Heart and blood vessels
- ◆ Straight digestive tract with separate mouth and anus
- ◆ Brain and specialised sensory organs
- ◆ Sexual reproduction – Some insects such as bees produce offspring by parthenogenesis also. Many insects produce chemicals called pheromones to attract mates.
- ◆ Many insects, e.g. bees, ants and termites, live in organised social groups.

Did You Know That...?

- ◆ Only female mosquitoes suck blood.
- ◆ Male mosquitoes have a deeper hum than the shriller female hum. They make the humming sound by vibrating their wings.



PHYLUM ECHINODERMATA

- ◆ Examples : starfish, sea cucumber, sea urchin, sand dollar
- ◆ Invertebrate
- ◆ Radial symmetry
- ◆ Marine
- ◆ “Spiny skin”
- ◆ Mouth surrounded by 5 arms with tube feet that move by a hydraulic system
- ◆ Internal structure made of calcium carbonate
- ◆ Well-developed digestive system
- ◆ Simple nervous and circulatory systems
- ◆ Sexual or asexual reproduction

- ◆ Echinoderms are thought to be the invertebrate group that most closely resembles the chordate group because there are similarities between the larval stage of the echinoderms and some of the simpler chordates called the acorn worms.