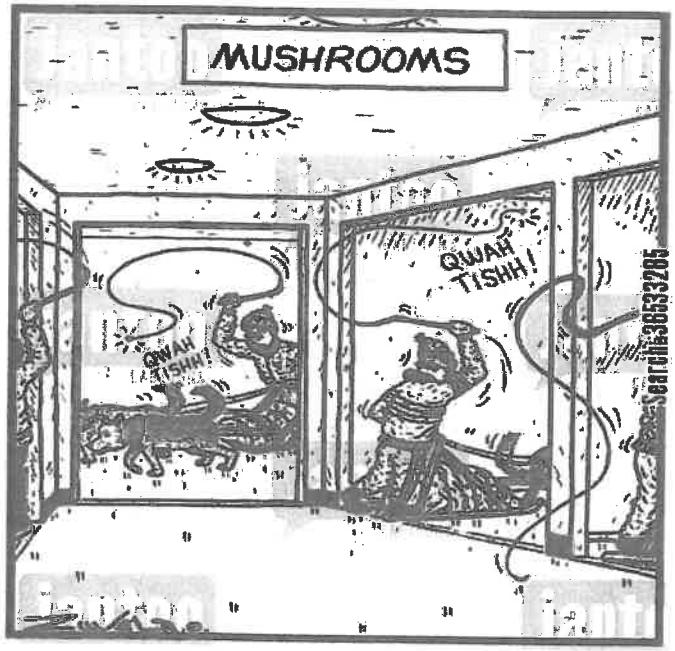
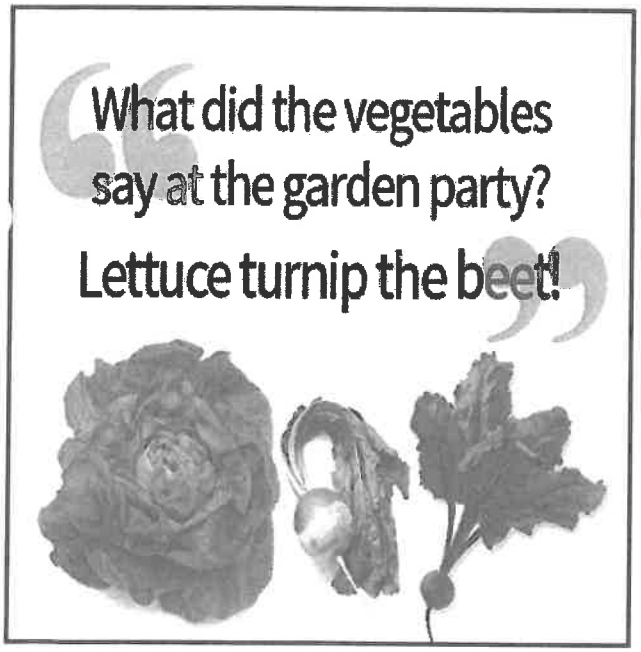
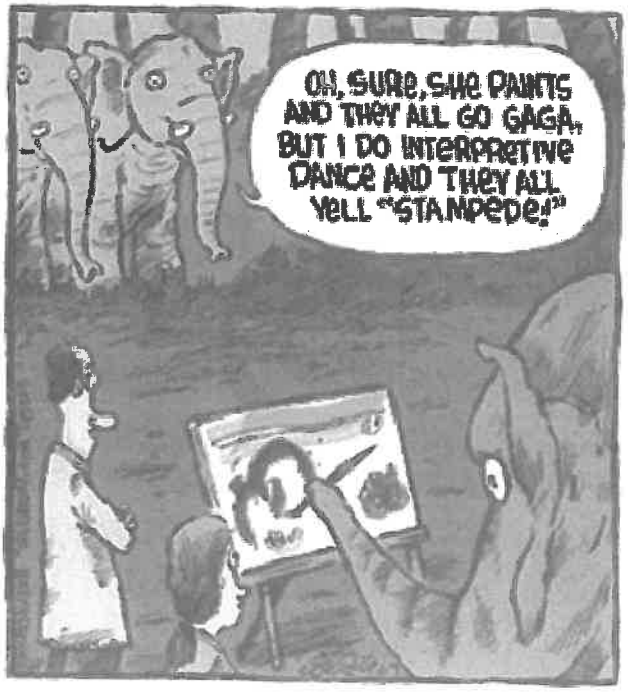
Diversity of Life:

Fungi





Plants



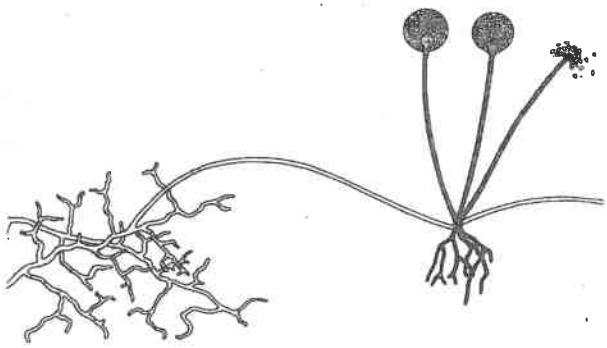
Animals

KINGDOM FUNGI (MYCOPHYTA)

- _____ = the study of fungi
- fossil record dates to 900 million years ago
- at one time classified in the Plantae Kingdom
- Recent molecular evidence suggests that fungi are probably more closely related to animals than either protests or plants!!!

- GENERAL CHARACTERISTICS:
  1) _____
  2) most are _____ and macroscopic
  3) _____, most are terrestrial
  4) have cell walls composed of _____ (a carbohydrate)
  5) lack chlorophyll = _____
  6) require warmth, moisture and oxygen for growth; prefer darkness

- STRUCTURE:
  - made up of thread-like filaments called _____ that can be divided into cells by cross-walls called _____



A) **rhizoids**: descending hyphae
: _____ the fungi and _____ predigested nutrients

B) **mycelium**: branching filaments which make up the _____

C) **stolons**: filaments which grow _____ on the _____ of the substrate

D) **ascending hyphae**: filaments that grow _____ ending in reproductive structures _____

- NUTRITION:

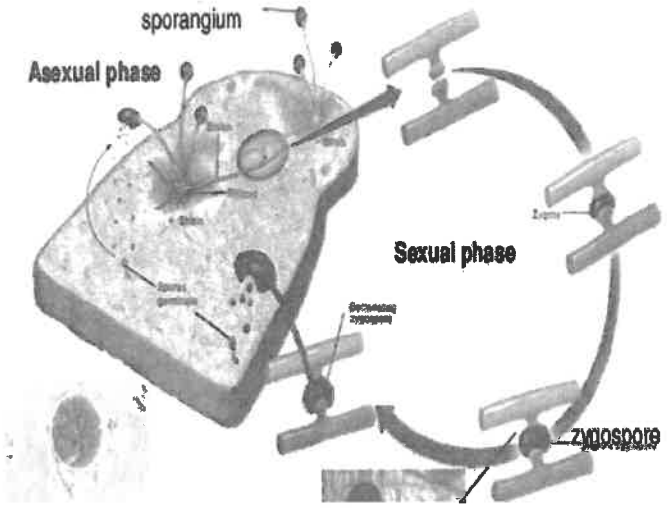
A) <u>Saprophytes</u>
= break down _____ extracellularly with secreted enzymes
: eg) mushrooms, molds

B) <u>Parasites</u>
= pathogens, living off a _____
: eg) athlete's foot, ring worm, Dwarf mistletoe

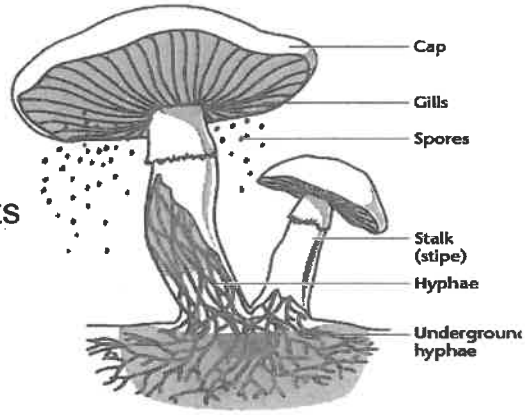
C) <u>Mutualistic</u>
= some fungi live in mutualistic relationships with another organism, such as a plant or an alga where _____ organisms benefit
:eg) Mycorrhizal fungi colonize the plant's root system drawing nutrients & water from the soil that the roots would not be able to access otherwise.

- REPRODUCTION
  - most fungi are capable of reproducing both asexually and sexually
  - Asexual: 1) most fungi producing _____ on ascending hyphae
    2) _____ (breaking) of mycelium
    3) _____ (a miniature organism forms as outgrowth of parent)
  - Sexual: simple _____ of hyphae from 2 different _____(+,-) unite to produce a structure that will develop a _____

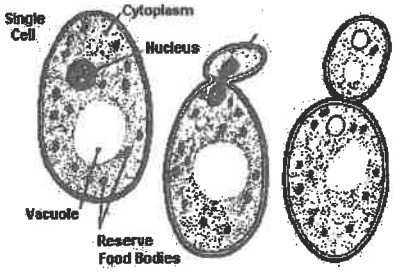
- fungi are divided into 5 phyla based on their spore producing structures



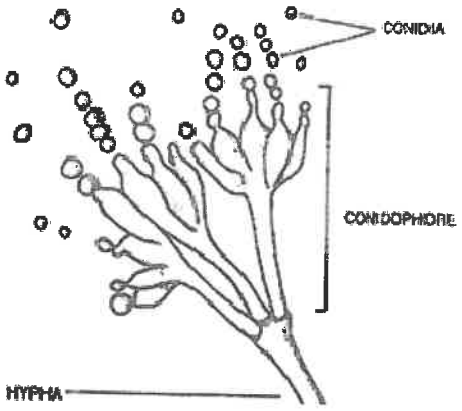
PHYLUM ZYGOMYCETES
- includes Black Bread Mold
- Asexual Reproduction
  : ascending hyphae called _____ produce _____ in _____
- Sexual Reproduction
  : a _____ is produced via meeting of (+,-) hyphae
  : the zygosporangium develops a sporangia which produces spores having _____ of both fungi strains



PHYLUM BASIDIOMYCETES (Club Fungi)
- includes mushrooms, puffballs, bracket fungi rust, smuts
- 4 spores called _____ are produced sexually on the surface of club-like structures called _____
- basidia are located within the _____ of the cap of the mushroom

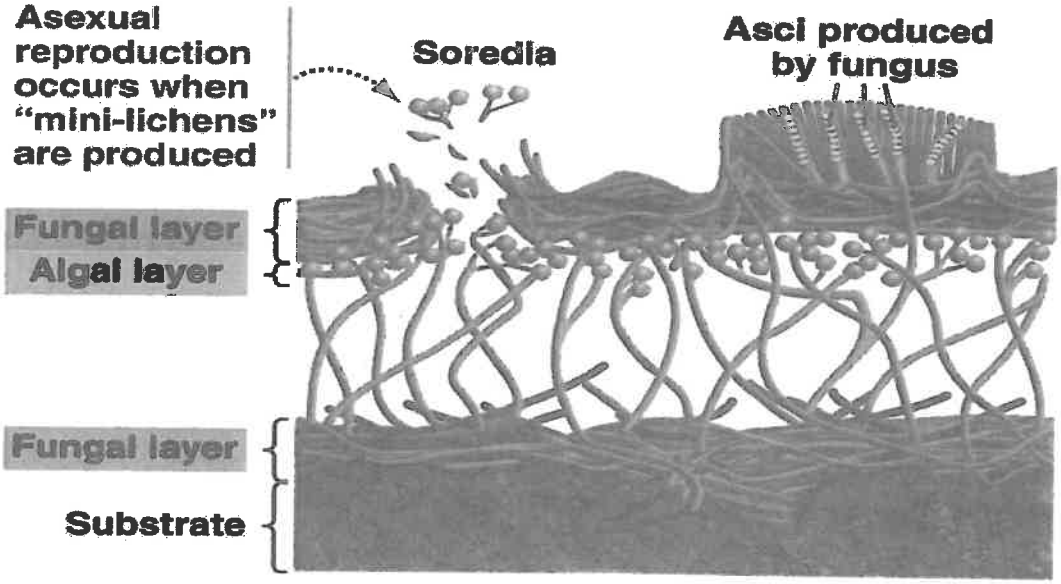


PHYLUM ASCOMYCETES (Sac Fungi)
- includes yeast, morels, mildews, Dutch elm disease
- produce _____ in sac-like structures called _____ through sexual reproduction
- yeast commonly produce spores asexually by _____



PHYLUM DEUTEROMYCETES (Imperfect Fungi)
- includes penicillin, athlete's foot, etc.
- reproduce asexually; no known method of sexual reproduction = _____
  : will be reclassified if / when method of sexual reproduction identified

PHYLUM MYCOPHYCOPHYTA (Lichens)
- includes Reindeer moss
- are really 2 organisms in one (fungi and algae or cyanobacteria) = _____
  : fungal hyphae provides the algae with _____
  : algae provides the fungus with _____ produced through photosynthesis
- tend to reproduce _____ but placed in the Fungi Kingdom because it may produce _____



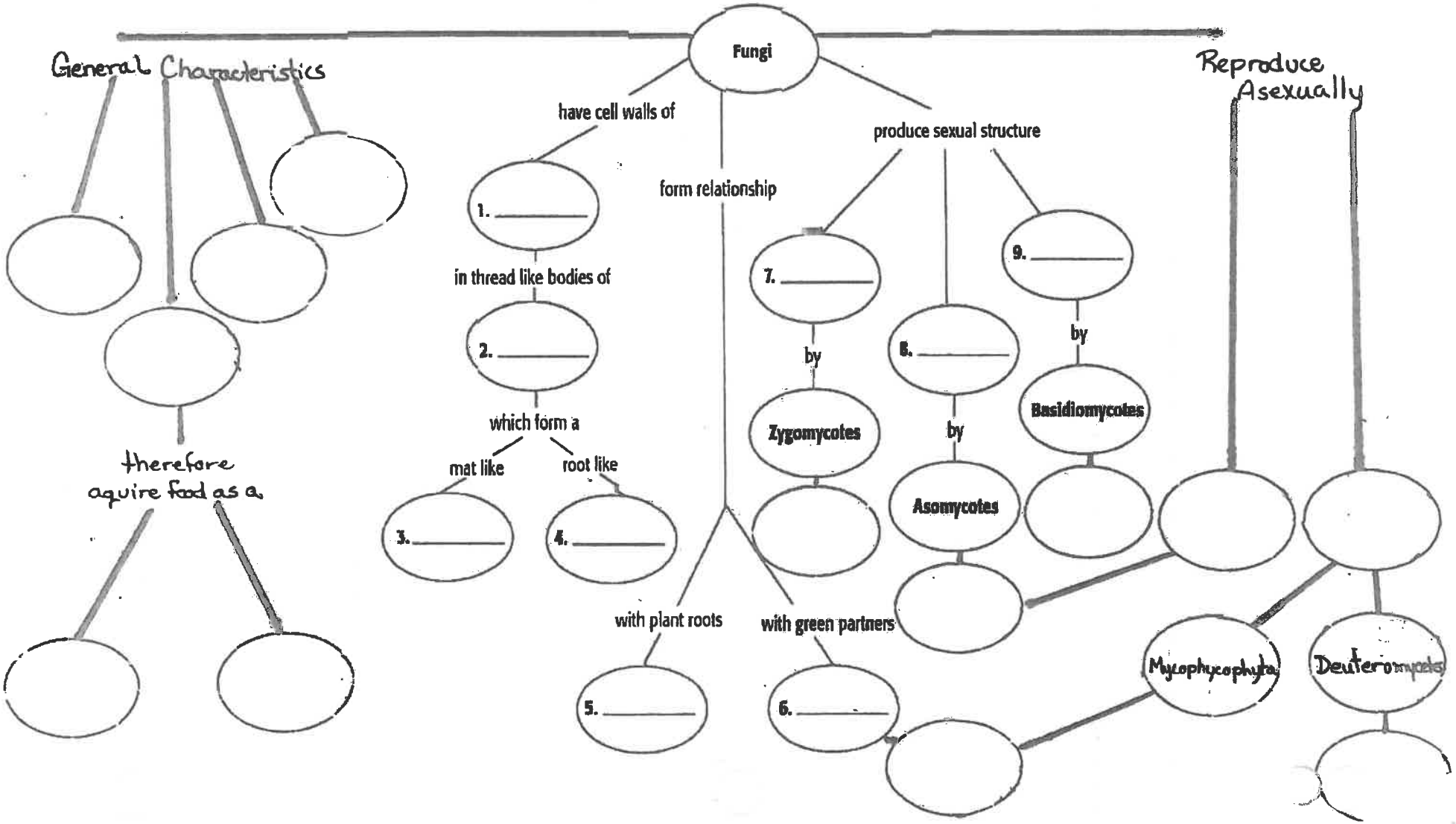
- good things about fungi:
  1) _____
  2) production of _____ (penicillin)
  3) food source; food production _____
  4) production of goods _____
  5) monitor _____ (lichens)

- bad things about fungi:
  1) can cause _____ (athlete's foot, ring worm, rust, Dutch elm disease)
  2) destroy _____
  3) some are _____

Fungi Concept Map

Using the terms provided below, complete the concept map showing the characteristics of fungi.

mildew/yeast	penicillin	ascus	hyphae	mycorrhiza	eukaryotic	Sessile algae
warmth, moisture	saprophyte	basidium	lichen	rhizoid	fragmentation	heterotrophic
parasite	mushroom	chitin	mycelium	zygosporangium	bread mold	budding



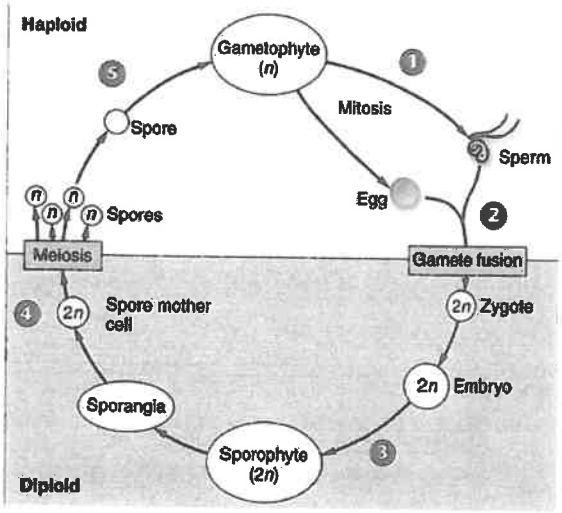
What is a Plant?

Characteristics of Plants

- Multicellular
- Eukaryotic
- Autotrophic _____
- Has cell walls containing _____
- Lacks mobility
- Display "Alternation of Generations" in their life cycle

Plant Life Cycle

- The lives of plants consist of two alternating stages, or generations: a _____ (gamete producing) generation and a _____ (diploid or spore producing) generation.
- One generation is _____ over the other. This means that it is larger and lasts longer.



What Did Plants Evolve From?

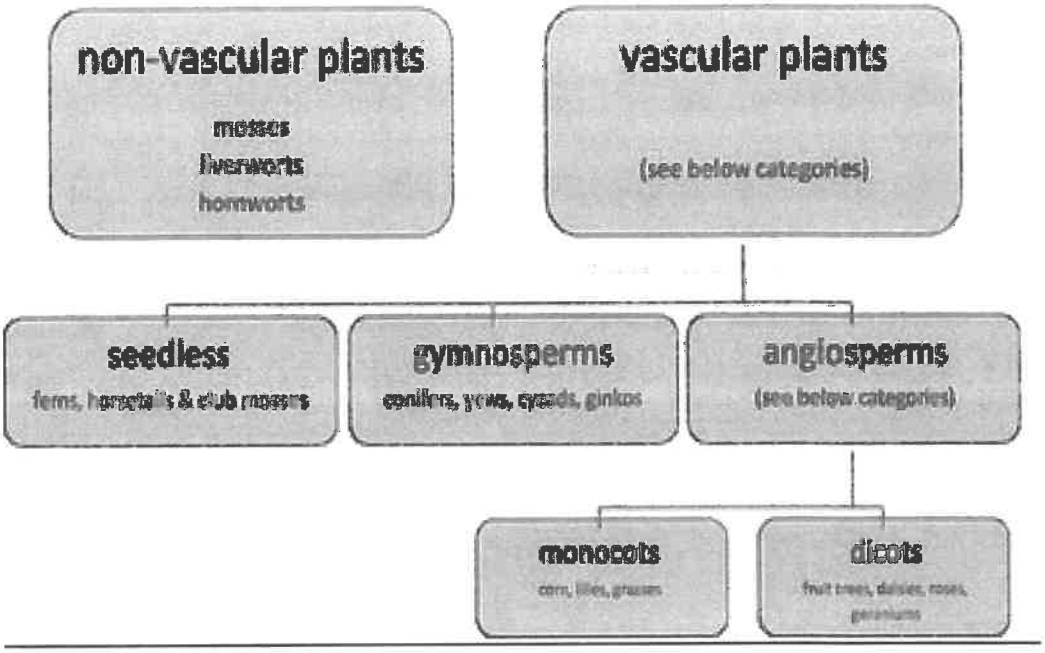
- _____
  - Aquatic protists
- Similarities
  - contain _____
  - have cell walls made of cellulose
  - store energy as _____
- With time, plants adapted to live on _____

Adaptations for Land

- Structures for retaining moisture
  - Cuticle = _____ on the outer surface of a plant
  - Stomata = _____in the outer layer of leaves & some stems which regulate water loss and allow gas exchange for photosynthesis
- Transport System
  - _____ to move nutrients & water throughout the plant
  - Also provides _____ for the plant
- Reproductive Strategies
  - adaptations that allow gametes to meet without _____

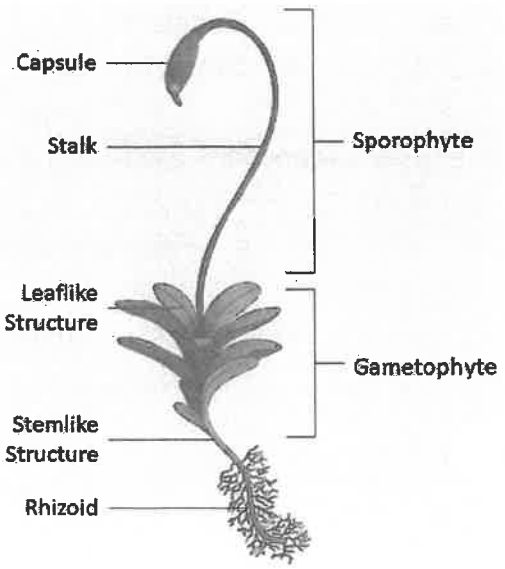
How are Plants Classified?

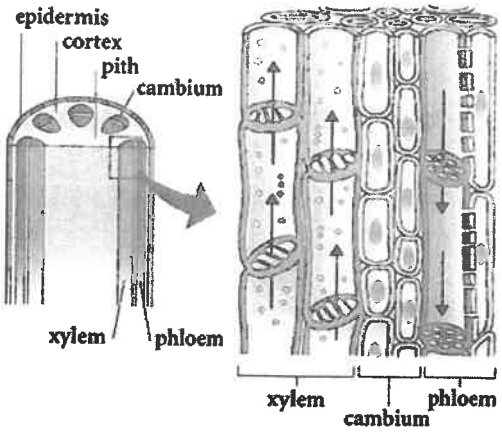
No phyla, rather plants are organized into 1-2 _____.



Non-Vascular Plants

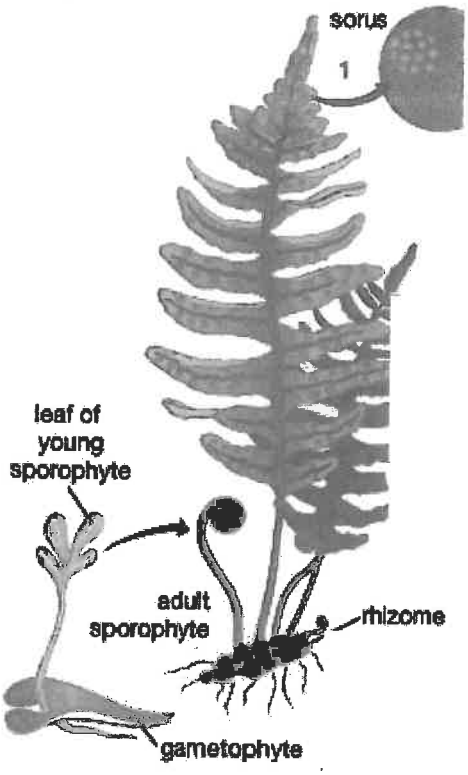
- Are known as Bryophytes
- Include mosses, liverworts, & hornworts
- No transport system
  - no vascular "tubes" to transport water & nutrients so must live in _____
- Small size
  - no _____ from vascular tissues
- Do not have true roots, stems and leaves
  - Have root-like _____ which _____ the plant and _____
  - Absorb water through cell walls of leaf-like structures; water moves via _____.
- Depend on water for reproduction
  - water is needed for _____
- Mosses display Alternation of Generations with the _____stage being dominant & the sporophyte stage being dependent on it





Vascular Plants

- Are known as Tracheophytes
- Are true _____ plants
- Contain vascular tissue
  - _____ transports water
  - _____transports food and nutrients
  - run continuously through out the plant body
- Larger size.
  - vascular tissues provide _____ against gravity
- Cuticle
  = reduces _____



1. Sporophyta (Seedless Plants)

- Belong to the Class Filicineae
- Includes _____ and _____
- Have vascular tissue, but have a _____ underground instead of a stem and leafy _____
- Are the most primitive Tracheophytes because they are still dependent on _____ for reproduction
- Ferns display Alternation of Generations with the _____ stage being dominant
  * Water is still necessary for _____

2. Spermatophyta (Seed Plants)

- Include Gymnosperms and Angiosperms
- Have specialized organs = _____
- Do not depend on _____ for reproduction
- Produce _____
  - a seed is a plant _____

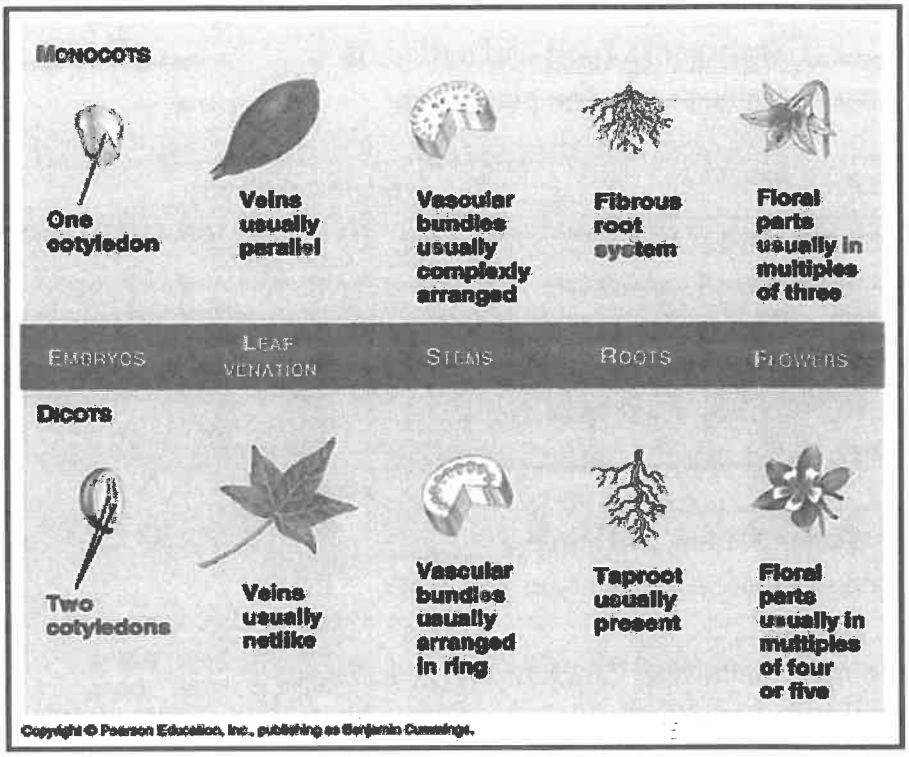
A. Gymnosperms

- They include the evergreens, junipers, cedars
- Gymnosperms have "_____" seeds usually protected by _____.
- Adaptations of Gymnosperms
  1. Thin, needle-like leaves = retains _____
  2. No water needed for reproduction
     = allows diversity of _____
- Gymnosperm Reproduction

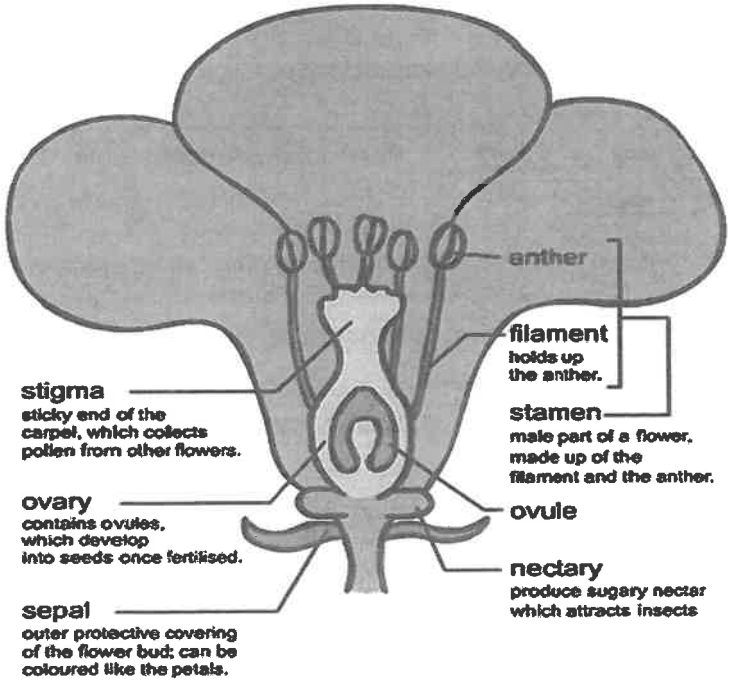
- Gymnosperms display Alternation of Generations with the _____stage being dominant

B. Angiosperms

- Include members such as lilies, oak, roses, grasses, etc
- Angiosperms are _____ plants
- Further divided into _____ and _____.

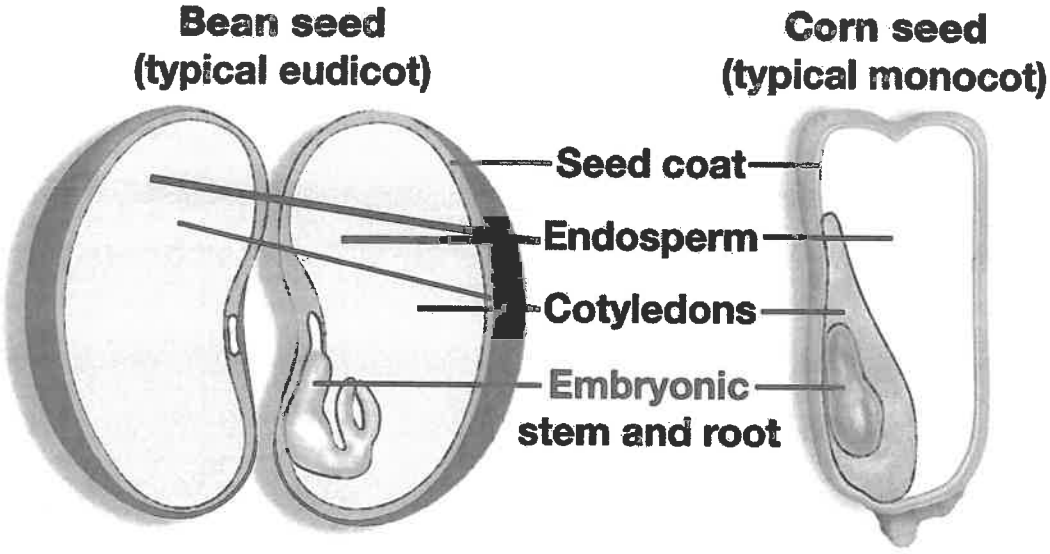


- Angiosperm Reproduction
  - A flower is the_____ reproductive structure of a plant



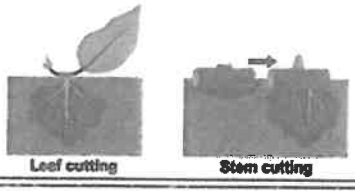
- Seeds are produced within the _____ which develops into a _____.

- Fruits are not always edible, anything with a seed inside can be considered a fruit (_____)
- Fruits are dispersed in a variety of ways _____
- Each seed is composed of the plant embryo and a food source called the_____

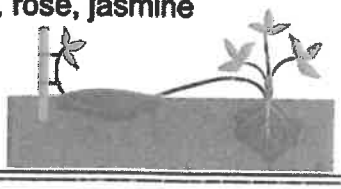


- Many plants can clone themselves, a process called _____
  = use organs of the sporophyte stage (roots, stems, leaves) to produce a new plant
  - result in plants that are genetically identical to the parent plant = _____

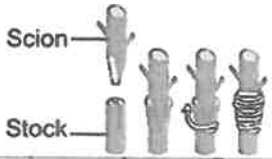
Cutting – A part of stem is cut and the cut end grows into new plant when placed in moist soil
e.g. mango, guava, litchi, lemon, rose



Layering – The stem of a plant is bent down until it touches the soil. The stem is then cut once it develops roots and grows into a new plant e.g. lemon, rose, jasmine



Grafting – The stem of a plant is cut and then fitted on another strong plant and covered with grafting wax.
e.g. apples, oranges, water melon, ornamental plants



Tissue culture - A collection of techniques used to maintain or grow plant cells, tissues or organs under sterile conditions on a nutrient culture medium of known composition

- Angiosperms display Alternation of Generations with the _____stage being dominant

Land Plant Comparison Chart

	Bryophyta (Mosses)	Tracheophyta-Class Filicinae (Ferns)	Tracheophyta-Class Gymnosperm (Conifers)	Tracheophyta-Class Angiosperms (Monocots / Dicots)
Habitat Moist or Dry				
Plant Organs (ie. Roots, Stems and Leaves)				
Vascular tissue?				
Gametophyte or sporophyte dominant?				
Description of Sporophyte				
Description of Gametophyte				
Is water required for fertilization?				
Sperm or Pollen?				
Spores, Seeds, Fruit?				
Adaptations for Land				

PLANT STRUCTURES AND FUNCTION pages *600-616.*

I. PLANT TISSUES

- plant tissues are made up of 3 basic cell types: _____, _____ or _____
- plant tissues are specialized cells that work _____ to do a specific job such as: absorption, transport, photosynthesis, reproduction and storage

Types of Plant Tissues

1. Dermal

: outer layer of cells
: provides _____ and _____
:may be involved in _____& growth of _____structures (ie. root hairs)

2. Ground

: middle layer
: provides protection, structure and _____
: classified as one of 3 types

a) Meristematic
: area of cell division or _____ (very small cells)
: found in growing regions where cell division is _____
: found in _____ (tips of stems & roots) and lateral meristems (_____ & _____)

b) *Cork*
: inner layer of dead cells
: _____ function

c) *Cortex*
: ground tissue with a _____ function

3. Vascular Tissue

: _____ or transport tissue
: may provide support (structure)
: two types --
a. _____ : conducts water and dissolved minerals
b._____: conducts nutrients

- all 3 tissues are found in _____

II. PLANT STRUCTURES

- plant organs are structures specialized to perform specific functions
- the 3 main plant organs are: **Roots** – _____ the plant & _____ water, minerals
  Leaves –_____ to produce nutrients
  Stems – _____ leaves & flowers, _____ materials between different plant organs

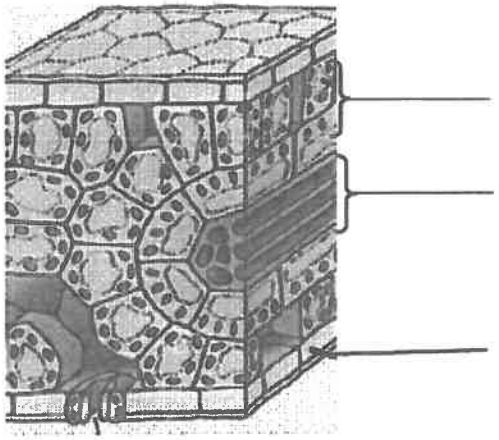
Plant Tissues and Structures

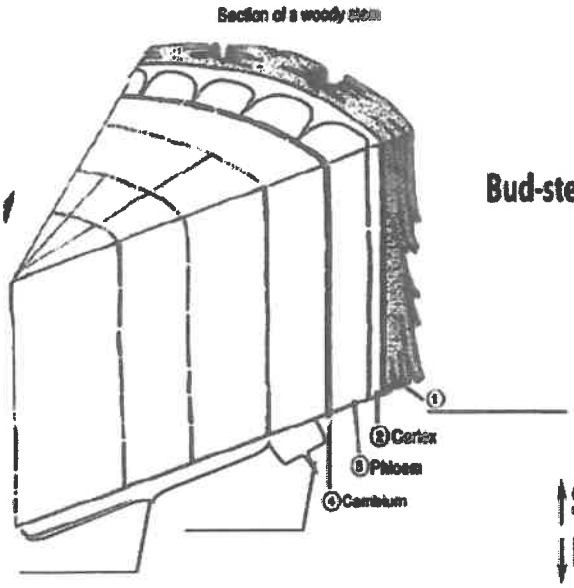
Below is a picture of a plant with cross sections through its root, stem and leaf.

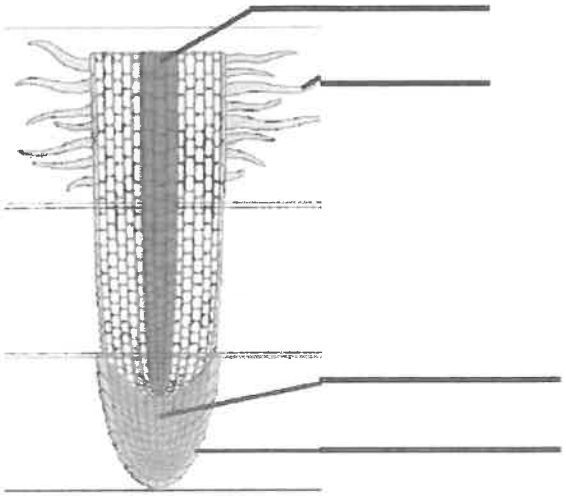
a) Label the diagrams

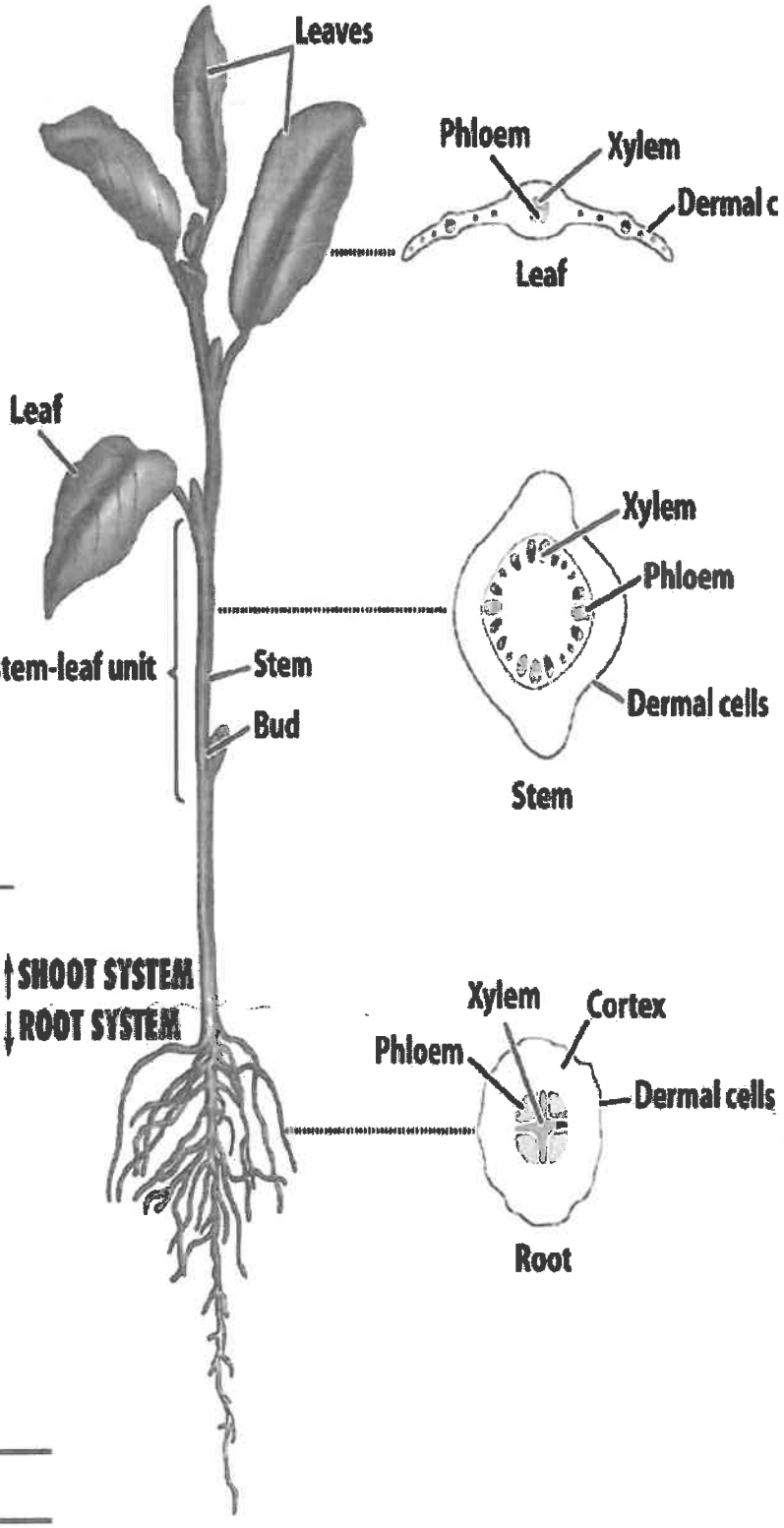
b) Use the following guide to identify and color the plant tissues in each cross section:

Dermal Tissue = Green
Ground Tissue = Red
Vascular Tissue = Blue







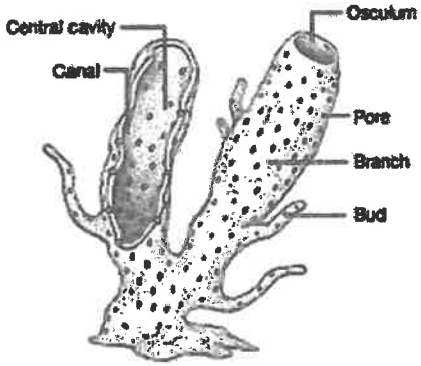


KINGDOM ANIMALIA

The Kingdom Animalia is the largest of the 5 Kingdoms in Domain Eukarya. Although the members of this kingdom are very diverse, all are _____ & _____. They are further characterized by having _____ & _____ for particular functions. All animals reproduce _____ with simpler members being capable of asexual reproduction as well. This kingdom is subdivided into 2 groups: Invertebrates and Vertebrates.

INVERTEBRATES - Animals Without Backbones

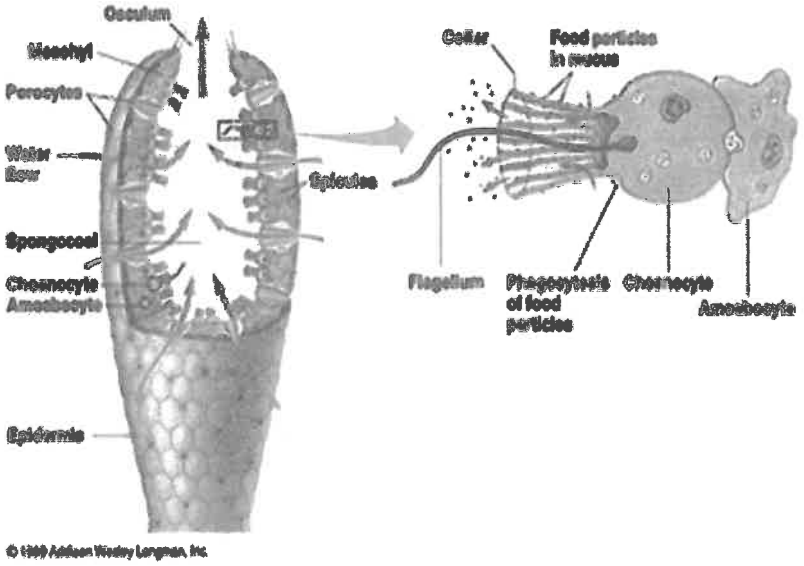
Animals that lack a backbone are called_____. It is estimated that 97% of all species of animals are invertebrates. With the exception of insects, most invertebrates are marine.



Phylum PORIFERA Example: SPONGES

Sponges are called porifera or "pore bearers" because of the _____on the sides. They are among the simplest multicellular animals. They do not have any tissues or organs. They are animals that are a _____ _____. Nearly all sponges are marine & all are _____, which means they live on the ocean bottom or attached to something and come in many shapes and sizes so are described as _____

The outer surface is covered with flat pore cells which allow water to enter. Water is pumped into a larger canal lined with _____ (choanocytes) The cells have flagellum that creates currents and a thin collar that traps food that is later ingested and passed to specialized cells (_____) for distribution. Water then leaves the through _____, a large opening at the top of the sponge. Since the sponge actively filters food out of the water to eat, they are known as _____. As sponges grow larger they need support. _____ are supporting structures.

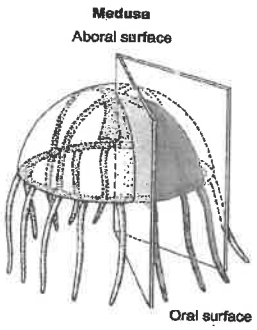


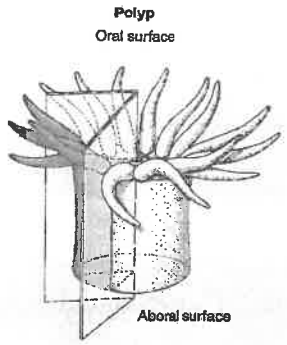
Sponges can reproduce _____ when branches or _____ break off and grow into larger sponges. Sponges can also reproduce _____ by producing egg or sperm. The sperm enters the sponge and fertilizes the egg. The gametes are released directly into the water.

Sponge Feeding https://www.youtube.com/watch?v=pTZ211cIjX8&vl=en (2 min)

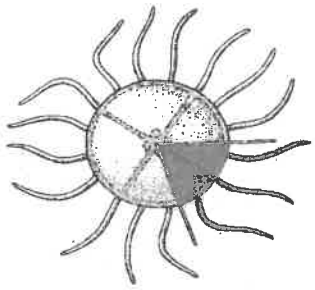
Phylum CNIDARIA or COLENTRATES **Example: Jelly Fish, Sea Anemone, Coral**

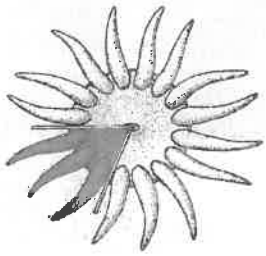
Sometimes called Coelenterates this phylum contains organisms that are mainly **marine**. Cnidarians are more complex than sponges. They have _____ specialized to perform specific functions. Unlike Sponges which have no symmetry, Cnidarians are radially symmetrical. _____ means body parts are repeated around the central part of the body.





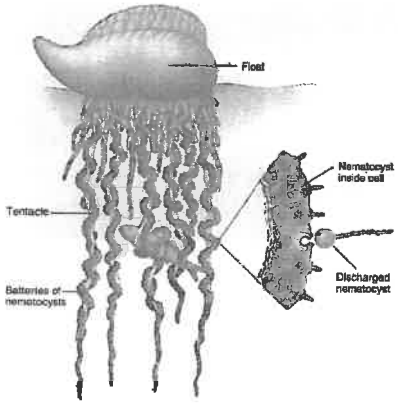
Cnidarians have 2 body forms:_____- a sessile, cylindrical, sac-like body or a motile bell like _____ form . Both have a centrally located mouth surrounded by tentacles.





Almost all Cnidarians are _____. They usually use _____ (stinging structures) located on their tentacles sting and paralyze their prey. Food is pulled into the mouth which opens into a _____ (sac-like cavity) where is digested. Due to their _____ (single opening) body plan wastes must leave through the mouth.

Swimming Anemone https://www.youtube.com/watch?v=ysOmq71fcMk (1:30)

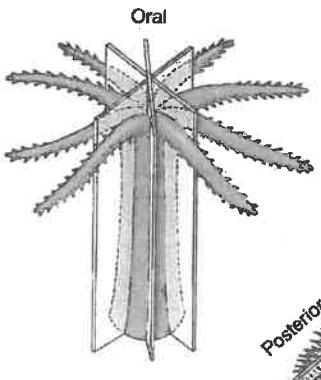


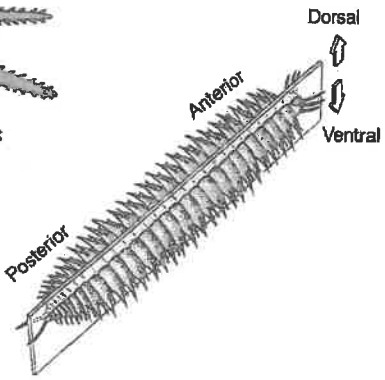
Like sponges Cnidarians are capable of both _____ & _____ reproduction with many medusae members beginning life as a polyp becoming free swimming as an adult

Jellyfish 101: https://www.youtube.com/watch?v=9z8ujpPgUjI (3:50)

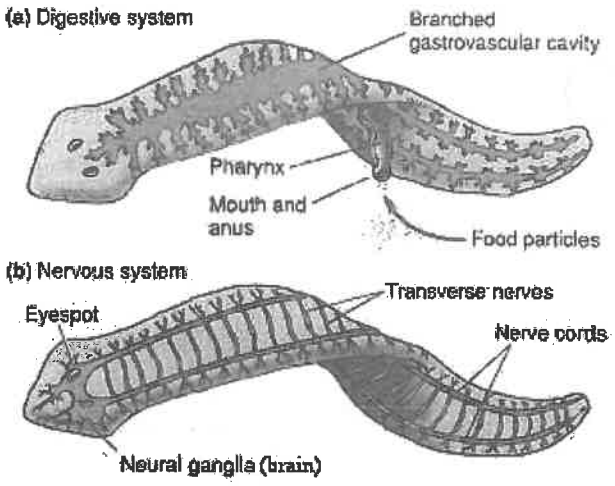
Phylum PLATYHELMINTHES, Phylum NEMATODA, Phylum ANNELIDA

Members of these 3 Phyla are commonly called worms. These organisms are all _____ _____ meaning only symmetrical in one direction with a front (_____) end and a back (_____) end. They also have a back (_____) surface and a belly (_____) surface. All have evolved organs to perform life functions.





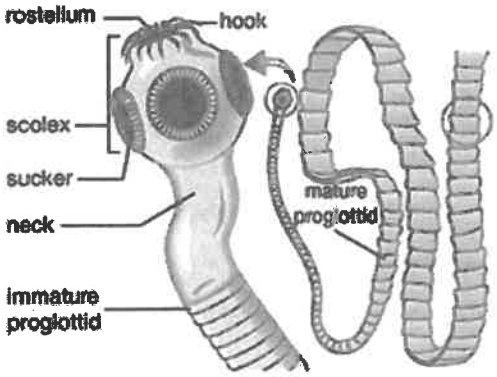
Platyhelminthes – Example: Planaria, Tapeworm



"Flatworms" are the simplest invertebrates that have organs and _____. They have a simple brain and nervous system that coordinates the movement of the muscular system. This concentration of nerves in the anterior end is called _____.

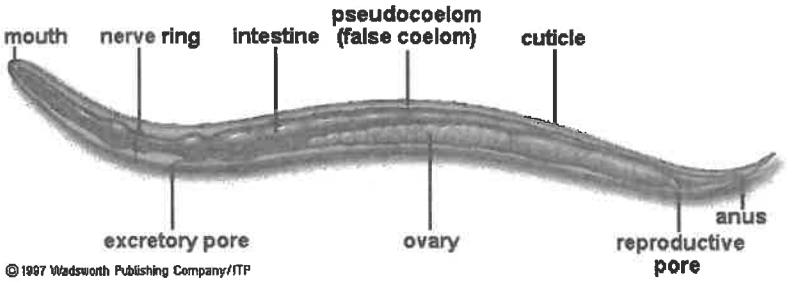
Planaria are free-living carnivores. They have a _____ they extend to take in food and digest it. Waste goes out the pharynx as well. They have _____ to detect light. This is the first time we see some type of nervous system.

Planaria Regeneration https://www.youtube.com/watch?v=w0QzSYQGsnA (0:30)



Tapeworms attach themselves inside the intestines and absorb the nutrients the host takes in. Some can grow up to 50 feet in length. Tapeworms do not have a _____ because they are **parasitic** and the organism they live in has already digested the food so they don't need one. This allows room for a well-developed reproductive system in the form of _____. Each c contains both _____ and _____ reproductive structures.

Nematoda – Example: Ascaris, Hookworm



"Roundworms" have a _____ _____ running through the body with a separate mouth and anus. They get their cylindrical shape from a fluid-filled body cavity _____ between the digestive tract and the body wall which acts as a _____. Most members are parasitic, covered with a tough _____.

Nematodes reproduce sexually with separate sexes. Hook worms https://www.youtube.com/watch?v=44aq2A6NkUw (2:07)

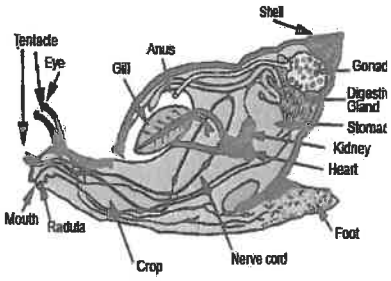
Annelida – Example: Earthworm, Leach

Annelids are known as the "Segmented Worms" and as such are the first invertebrates to show true segmentation & a covering on the digestive tract _____. The space _____ created by the peritoneum allows for the development of organs. Segmentation allows for specialization of body regions (development of_____) & more efficient movement. You will learn more about annelids in the Earthworm Dissection.

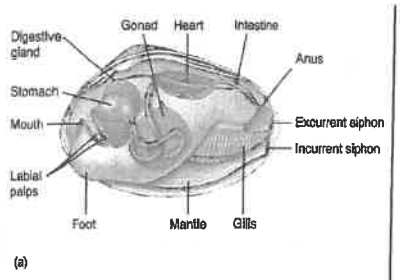
Medicinal Leeches https://www.youtube.com/watch?v=O-0SFWPLaII (3:40)

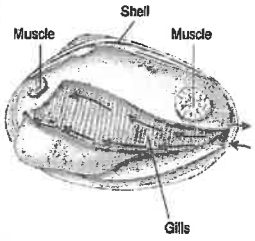
Phylum MOLLUSCA Example: Snails, Clams and Octopuses

The name Mollusc comes from the Latin word "mollis," which means **"soft."** Molluscs have a soft body protected by a calcium carbonate _____. Some molluscs have an internal shell called a _____ (squid). A thin layer of tissue called the _____ covers the unsegmented body and produces the shell. The body is usually _____ with a ventral, _____ used for locomotion. Most Molluscs have a head that includes eyes and an _____ (the heart pumps blood through tubes which _____organs). Three common Classes of Molluscs are gastropods (snails), bivalves (clams, oysters) & cephalopods (squid, octopus).



Gastropods are typically a coiled body mass tucked into a shell. Some molluscs use a file-like tongue or _____ to scrape algae off of rocks. Other molluscs are soft bottom feeders or even carnivores.

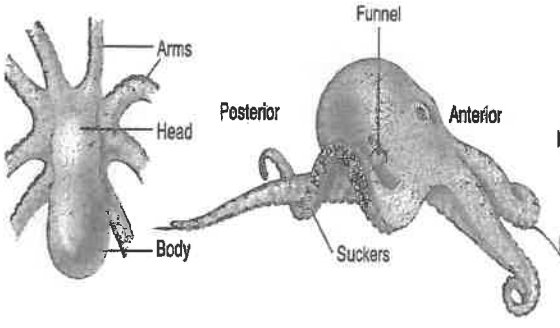


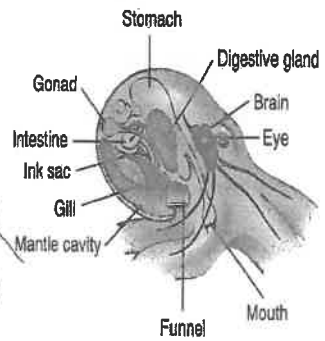


Bivalves are clams, mussels and oysters and other similar molluscs. They retain the body plan and are compressed in a two-valved shell. The inner part of the shell is lined with the mantle. There is no head or radula. _____ pull water over the gills for _____ as well as _____ small food particles. If a foreign particle becomes caught between the mantle and the body, the mantle will secrete calcium carbonate over top of it resulting in a _____. Strong muscles are used to keep the shell closed. Clams will use their shovel shaped _____ to move and to bury themselves in the bottom sediment.

Cephalopods include squid and octopus. They are agile swimming carnivores and have their foot divided into _____ equipped with _____to capture prey. They have a well developed brain & excellent vision. Cephalopods use _____ to move. The water enters through the open end of the mantle cavity and is forced out through a muscular tube called the _____.

Octopuses have 8 long arms & lack a shell. They are efficient hunters & bite with a pair of _____ jaws. If threatened, they can emit a dark ink produced by the _____, to distract predators.

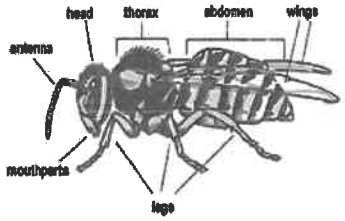


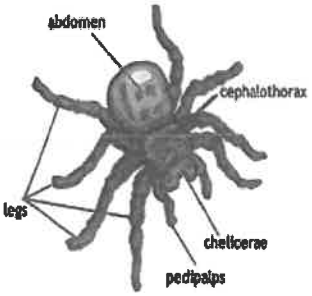


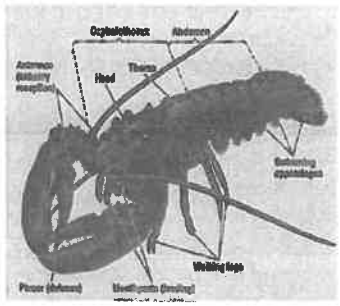
Octopus Opens a Jar https://www.youtube.com/watch?v=9kuAiuXezIU (2:50)

Phylum ARTHROPODA Example: Lobster, Spider, Dragonfly

Arthropods make up the largest phylum of animals with over 1 million species occupying all habitats on Earth. The arthropod body is bilaterally symmetrical, segmented & covered by a tough nonliving chitinous _____. The exoskeleton provides protection for well-developed body systems but must be shed (_____) thus limiting their size. Muscles are attached to _____ like legs & mouth parts which are _____ for a particular lifestyle allowing for walking, flying or swimming.

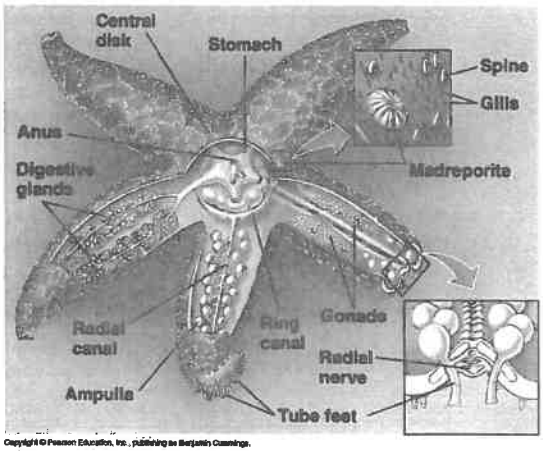






Arthropods have an _____ circulatory system & _____ (a concentration of sensory organs in the head region) Most arthropod species have separate sexes. Many species have larvae that look nothing like the adult & go through _____. This contributes to the success of the Phyla as the young do not compete with adults for food. Familiar Classes of Arthropods are _____(Bee), _____ (spiders) & _____ (lobster). Arthropod Adaptations https://www.youtube.com/watch?v=bz4ODmqbnQA (3:40)

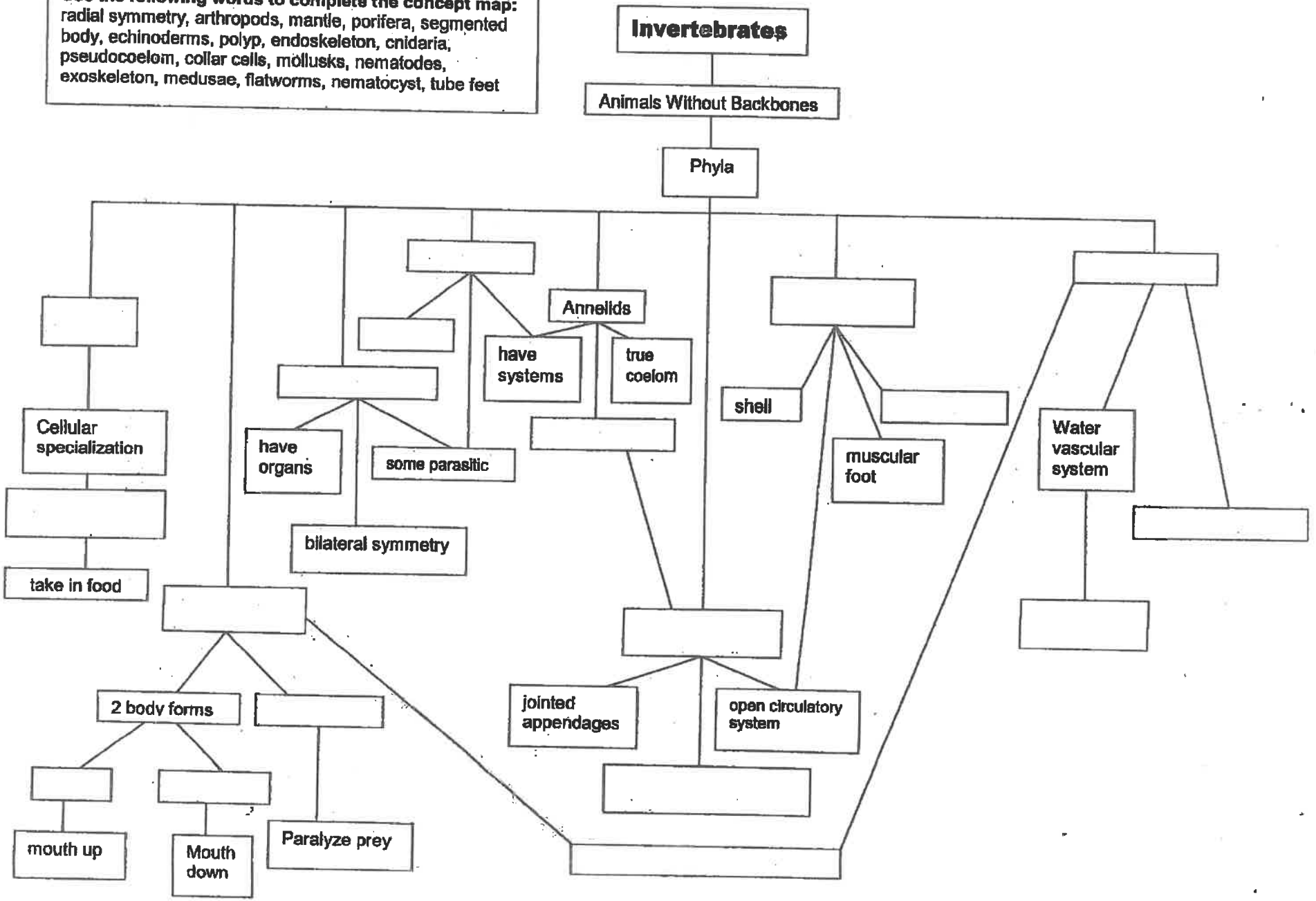
Phylum ECHINODERMS Example: starfish, sea urchins & sand dollars



Echinodermata means "spiny-skinned". Although sometimes the spikes look external they are part of an _____ (internal) & are really covered with a thin layer of ciliated tissue. Not all echinoderms have spines (ie. Sand dollars). Adults are _____ symmetrical while larvae are _____ making them our closest invertebrate relative. Their radial symmetry is based on five repeating pieces as they lack a _____(anterior) region. The two sides of an echinoderm are the _____ (containing the mouth) & the _____ (with the anus). Echinoderms have an _____ so feed by extending the stomach outward secreting digestive enzymes to begin digestion externally. Nutrients are then absorbed & the stomach is pulled back into the body. Echinoderms have a _____ of canals attached to muscular _____. These water-filled channels create hydrostatic pressure within the tube feet for movement and adhesion. The nervous system is a simple _____that coordinates the movement of the tube feet & spines w the absence of a brain. The sexes are separate in most echinoderms. Asexual reproduction is through _____. An arm can produce a new organism if a piece of the central disk is intact or present.

INVERTEBRATE CONCEPT MAP

Use the following words to complete the concept map:
radial symmetry, arthropods, mantle, porifera, segmented body, echinoderms, polyp, endoskeleton, cnidaria, pseudocoelom, collar cells, mollusks, nematodes, exoskeleton, medusae, flatworms, nematocyst, tube feet



Name: _____

Virtual Earthworm Dissection

Introduction: This is used as a make-up lab or a supplemental lab to the earthworm dissection. Students will access a website where they can read about the structures found in an earthworm dissection and label diagrams.

Website: http://glencoe.mheducation.com/sites/dl/free/0078802849/383950/BL_14.html

A. Initial Question & Introduction

1. What is the purpose of studying an dissecting an earthworm?
2. To what phylum do earthworms belong? _____ What is their species name? _____
3. What is a coelom? _____
4. What is a hermaphrodite? _____
5. What do earthworms eat? _____

B. Click the Lab Manual to read about the external anatomy of the earthworm.

1. How can you tell the dorsal side from the vental side?

_____

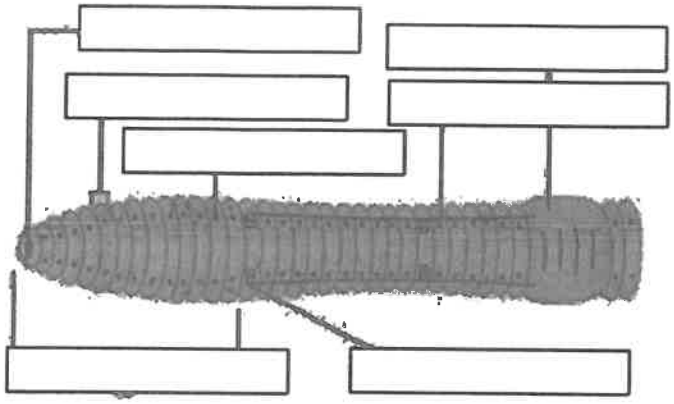
2. What are the setae used for? _____
3. Where is the clitellum located and what is it used for?

_____

4. What is the purpose of the excretory openings?

_____

C. Close the Lab Manual and go to the main page. Drag and drop the labels to the picture. Label the picture below.



D. Click on the "Internal Anatomy" Button and open the lab manual to read about the internal structures.

1. The mouth leads to what structure: _____
2. Why is the esophagus hidden in the drawing (and on the real earthworm)?

_____

3. After the esophagus, food passes through what three structures:

_____

4. Undigested particles are eliminated through the _____
5. The ventral nerve cord consists of a chain of _____ and three pairs of _____ in each segment.
6. What is the purpose of the nephridium? _____

.....Where are they located? _____

7. What is the purpose of the seminal vesicles?

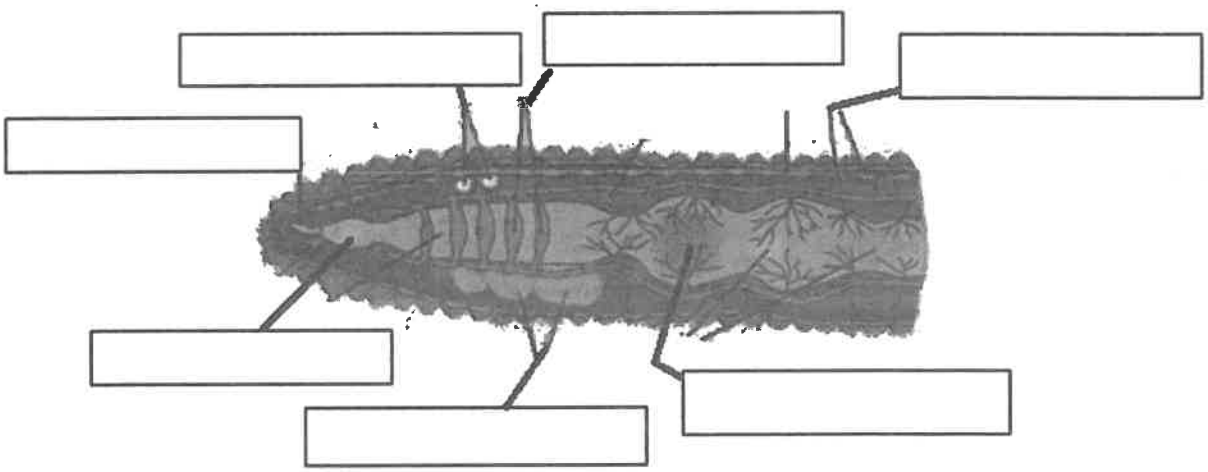
_____

.....Where are they located? _____

8. Where are the seminal receptacles located?

_____

E.. Close the Lab Manual and go to the main page to view the internal anatomy picture. Drag and drop the labels to the picture. Label the picture below. Note that not all of the structures are indicated on this picture.



F. Click on the "Journal" button. You will be given a series of questions to answer. Answer them on this sheet instead. You can reference the lab manual and text book to help you answer the questions.

1. What part of the digestive system would you see in a cross-section anterior to the gizzard?

2. What structure in the earthworm has a similar function as the human heart? Explain your answer.

3. What do two earthworms exchange during mating? Explain your answer.

4. Describe the difference between a closed and an open circulatory system.

5. Do earthworms have a front and a back end? Explain your answer.

6. What characteristics distinguish an annelid from other worms?

PHYLUM CHORDATA (5% Of Animal Kingdom)

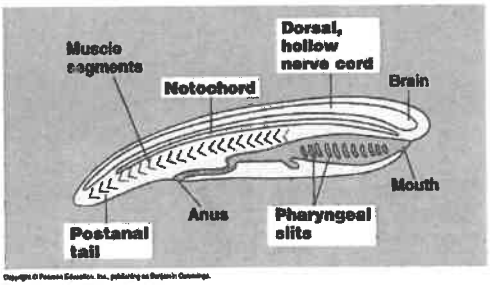
Crash Course Chordates http://www.youtube.com/watch?v=kgZRZmEc9j4&list=TLXbDnnfuh8FRktl3xZSraD3DS6LLBCow4

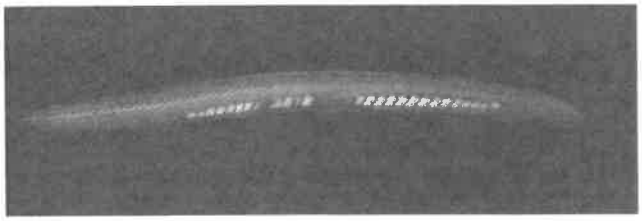
Characteristics of Chordates:

- _____ = supportive, but flexible rod on dorsal side
- _____ nerve chord
- bilateral symmetry
- coelomates
- _____ at some point in lifetime
- _____ tail
- _____ circulatory system of varying complexity

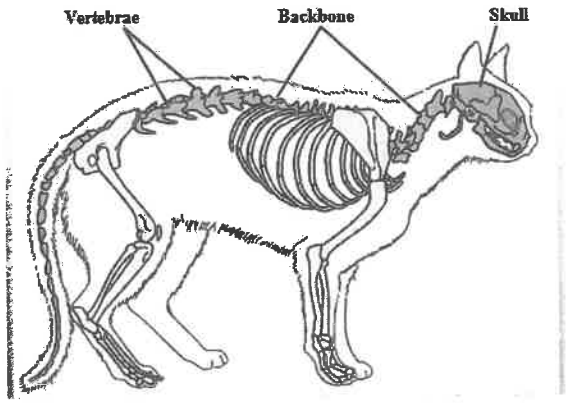
Chordates can be divided into 2 subphyla

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





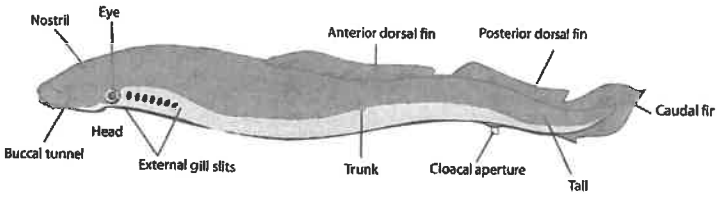
- **Vertebrate Chordates** = notochord made of _____ called _____



8 Characteristics of Vertebrates:

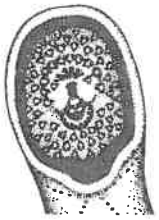
- a backbone of vertebrae (bone and cartilage) containing the dorsal nerve chord
- endoskeleton = _____
- advanced nervous system (brain, nerve chord, ganglia, neurons)
- large brain (enlarged anterior end of nerve chord) which is protected by a _____
- complex _____ and _____ circulatory system
- epidermis specialized for their _____
- paired appendages specialized for _____
- a large coelom containing vital organs

Class Agnatha (lamprey, hagfish)



= jawless fish

- primitive skeleton composed of _____
- slimy skin = no _____
- no paired fins
- _____ gill slits = must be moving for respiration to occur
- _____ heart (1 atrium and 1 ventricle, so circulation is _____)
- _____= cold-blooded (body temperature varies with the environment)
- _____ 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

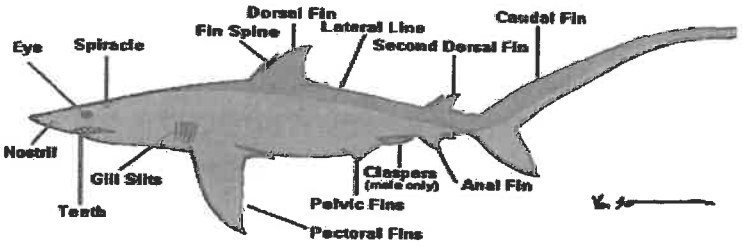
- in addition to the characteristics seen in Jawless fish, members of this class have:

: skeleton & scales made of _____

: a _____ jaw

: _____ fins

: a _____ 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 _____ and scales composed of _____

: _____ (covered gills) = can remain stationary in water

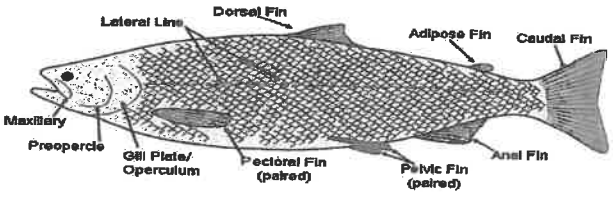
: a gas-filled _____ for buoyancy

- 2 major groups

: ray finned

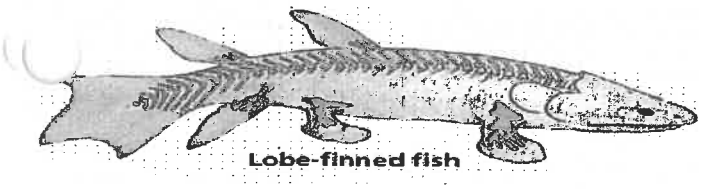
= have _____ fins

- majority of fish



: lobe finned

= _____ fins that move in an _____ manner

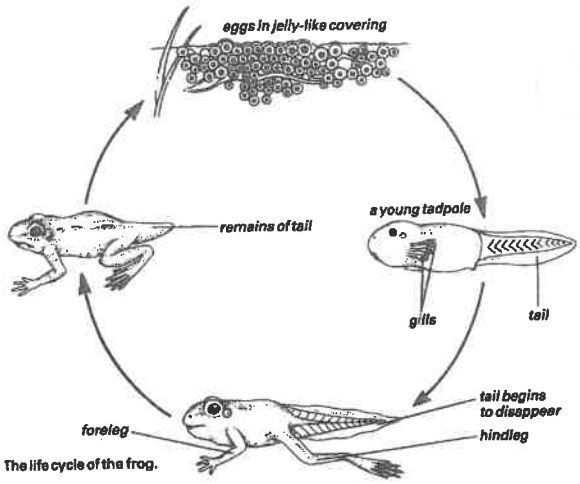


Lobe finned fish are believed to be the evolutionary link to amphibians and therefore all terrestrial vertebrates.

Class Amphibia (salamander, frog)

= live double lives

- _____fertilization and hatching of eggs in _____
- the larvae undergoes _____
- have ____ as aquatic larvae; _____ as adult
- have 2 pair of limbs suitable for land (adult)
- slimy, moist skin aids in _____ on land
- _____ heart (2 atria and 1 ventricle)
- ectothermic



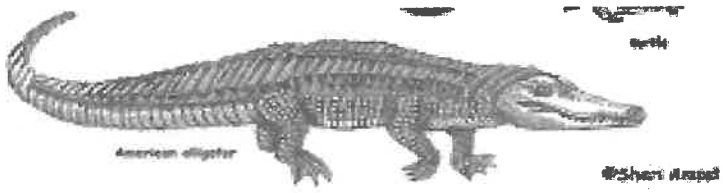
The life cycle of the frog.

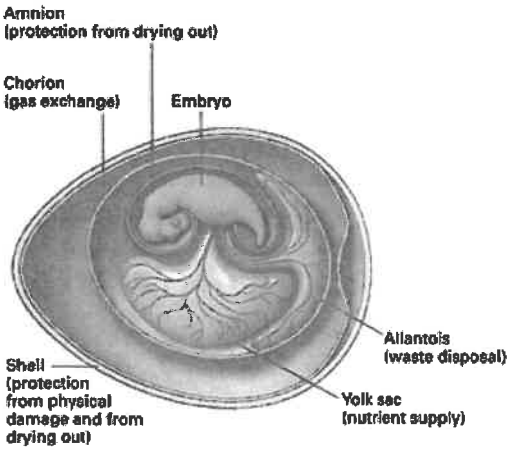
Amphibians represent the transition from water to land because they have 2 lives

= are adapted for both aquatic and terrestrial life.

Class Reptilia (snake, turtle, crocodile)

- have adaptations to be completely terrestrial:
  - : dry, scaly skin to prevent _____
  - : limbs _____ body & _____ to enhance land movement
  - : the 3-chambered heart has a _____ allowing more efficient circulation
  - : amniotic egg (encased in hard shell)
    - developed from _____ fertilization & laid on _____
    - protects the embryo from _____ while providing _____ and _____





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

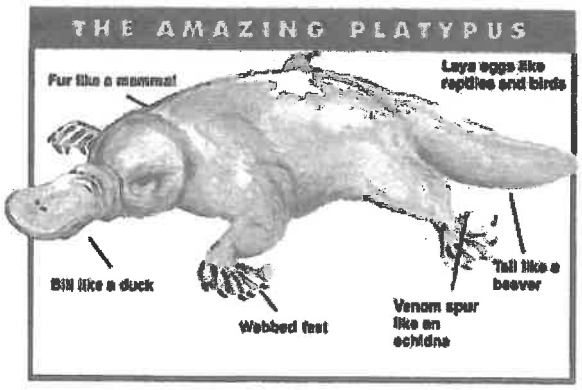
- adaptations which have allowed birds to fly:
  - : _____ = insulation, protection and flight
  - : modified forelimb = _____ for flight
  - : porous bones & reduction of internal organs = _____
  - : enlarged sternum _____ = muscle attachment
  - : complete _____ heart = quicker circulation
  - : _____ attached to lungs = continuous oxygen supply
  - : _____ (warm-blooded) = constant body temperature

Class Mammalia (dog, elephant, human)

- characterized by the evolution of:
  - : skin covered in _____
  - : _____ fertilization and embryo development
  - : _____ glands (produce milk for feeding young)
  - : _____ to regulate body temperature (endotherms)
  - : 2 pair of appendages adapted to _____ (walking, climbing, flying, swimming)
  - : well developed brain with capacity to _____
- Mammals are placed in 3 groups:

a) _____ (platypus)

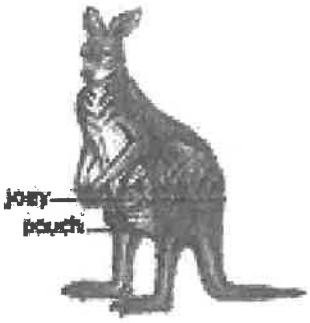
: external hatching of amniote egg



b) _____ (kangaroo, koala)

: bear partially developed young which require further development

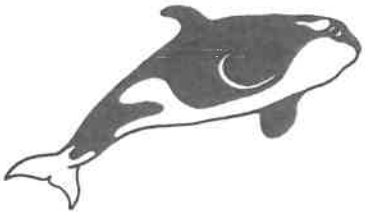
: the offspring develops in the mother's pouch



c) _____ (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

Bozeman Science: Animal Behaviour

Complete the following chart:

Term	Definition	Examples (2)
Instinct		
Fixed Action Plan		
Imprinting		
Associative Learning		
Trial and Error		
Habituation		
Observational Learning		
Insight		