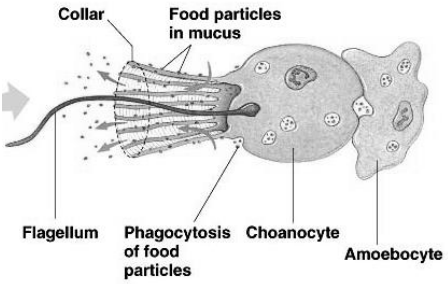
INVERTEBRATES

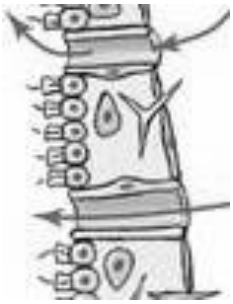
PORIFERA

SESSILE	SEDENTARY	MOTILE
fixed in one place; immobile.	little movement	mobile

Advantages for multicellular organisms: attraction protein on cell

- Division of labour- more complex physical and cognitive tasks
- Longer lifespan- if one cell is damaged, the whole organism does not die





2 cell layers (Epidermal and choanocytes) and 4 cell types:

Epidermal Cells	Choanocytes	Porocytes	Amoebocytes
Outermost cell layer	Flagella are attached to the ends of the cells and they help pump water through the sponge's body. By pumping water, they help bring oxygen and nutrients to the sponge while also removing waste and carbon dioxide.	Make up the pores for influx of water into the spongeocoel cavity	exist between the epidermal and collar cells in an area called the mesohyl. • Production of spicules in mesophyl: skeletal support and defence (silica, Ca CO_3 or sponging) against marine predators. • Digestion and transport of food, waste and oxygen • Reproduction of gametes egg cells and sperms (choanocytes/amoebocytes) for sexual reproduction.

Sequential Hermaphroditism: occurs when the individual changes sex at some point in its life which means that one sex develops at one time and later develops into another.

Reproduction:

(a) Sexual: The 'male' sponge would release sperm into the water, which would travel and then enter through the porocytes of 'female' sponge. It is engulfed by choanocytes and passes into the amoebocyte which carries it to the egg cell in

mesophyll. After fertilization in the sponge, a free swimming larva is released into the water. It floats around for a few days and then sticks to a solid to begin its growth into an adult sponge.

(b) Asexual: Budding

Sessile nature

Advantages	Disadvantages
• A permanent territory occupied • Strongly attached to a solid, predator has difficulty moving them to prey on them • Not carried away to an unfamiliar environment by storm or strong ocean currents • Do not expend large amount of energy searching for food/water.	• Food resources get exhausted due to predator invasion • Large number of sperms are wasted (along with the energy into producing them) in order to find a mate for successful sexual reproduction. • No parental care for young ones • Spicules to avoid predators otherwise vulnerable.

Importance of folded inner cell layer in sponges: SA: Vol ratio > Surface area > number of choanocytes > water movement > food absorption and release of waste > bigger size.

Somatic Embryogenesis: an artificial process in which a plant or embryo is derived from a singlesomatic cell or group of somatic cells.

Totipotency: capability to give rise to any cell type or a complete embryo.

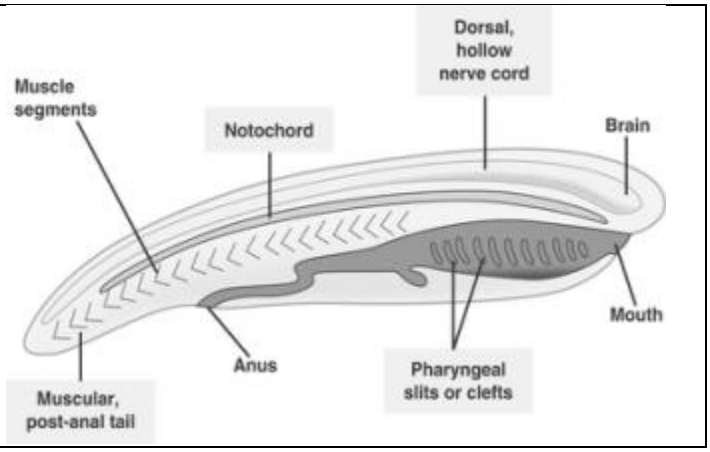
VERTEBRATES

Origin of Vertebrates and Early Vertebrates

Features of CHORDATE

- Notochord
- Dorsal Hollow Tubular Nerve Chord
- Pharyngeal puches and gills
- Post-anal tail

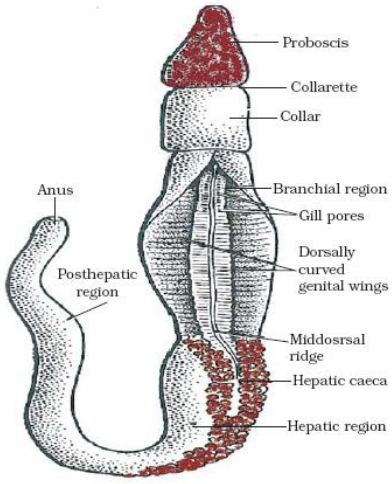
Eg: Amphioxus (Lancet) is a primitive chordate



1.) HEMICHORDATA (Acorn worms):

Show both echinoderm and chordate characteristics

- Echinoderm characteristics displayed in their larval phase
- Chordate characteristics displayed in their adult phase
- Chordate Characteristics:
  - (a) Gill slits
  - (b) Dorsal tubular nerve chord



2.) CHORDATA:

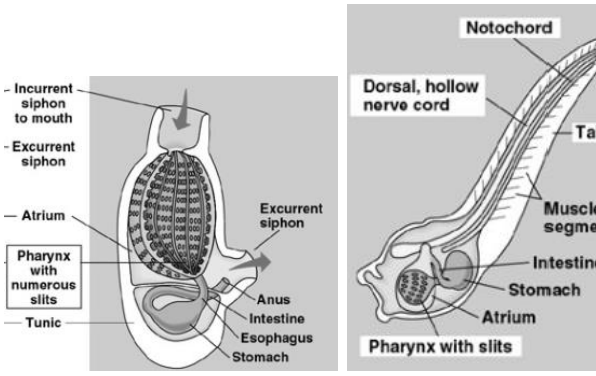
(a) UROCHORDATA (Sea squirts, tunicates)

- Urochordata means "notochord in the tail"
- Covered in a "tunic" made from a type of cellulose (*tunicin*)
- Called "sea squirts" because they squirt water if squeezed
- Only chordates that regularly reproduce both asexually and sexually
- Only chordates that do not have a proper body cavity
- Only chordates that have no excretory organs -- just use diffusion
- Significance:
  - (a) Representative of the earliest true vertebrate.
  - (b) But their vertebrate characteristics are only evident in the larval form

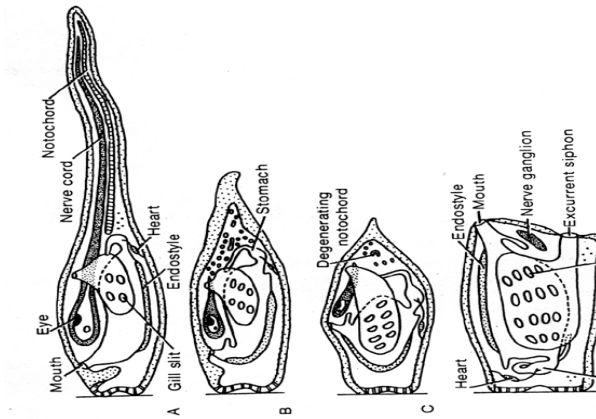
Marine, found from shallow to very deep waters, larva free--swimming, sessile as adults (most), cosmopolitan, filter feeders.

Evolution of Vertebrates From Invertebrates

- Gill slits & dorsal nerve chord evolved first
- Notochord and post-anal tail evolved in the LARVAL stage of sea squirt--like animals
- Larval stage became neotenic (neoteny -- where sexual maturation occurs in the larval form)
- All vertebrates are descended from the larva of a sea squirt!



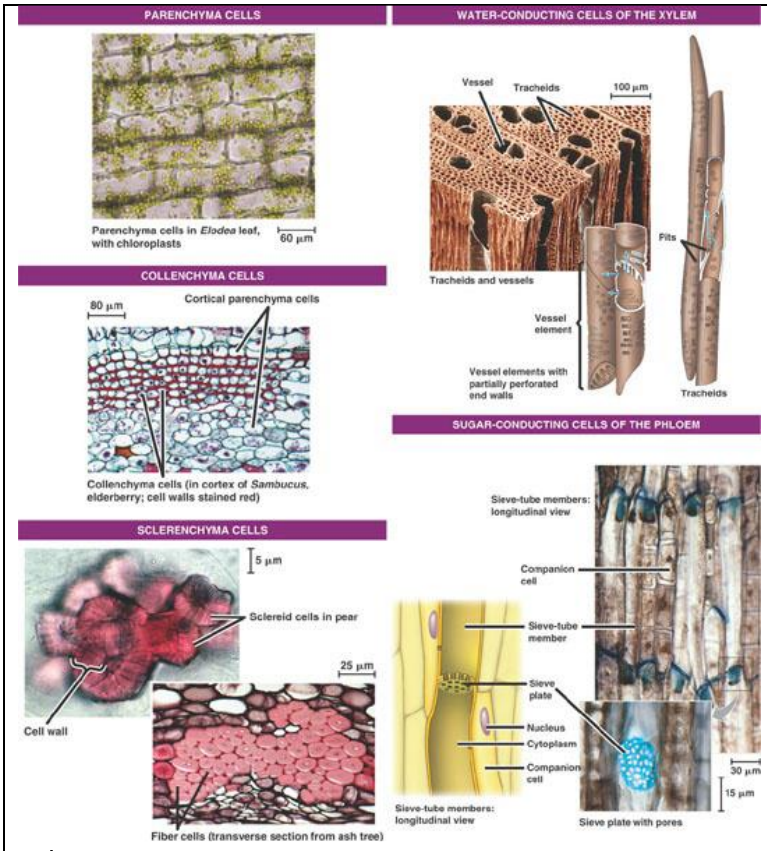
- In the different looking free--swiming larval stage, the sea squirt has
- a notochord
- dorsal tubular nerve chord
- pharyngeal pouches and gill slits
- postanal tail



Sea Squirt Development -the notochord and ta are lost after metamorphosis.

PLANTA

1.) Be able to name the main cell types in plants, describe their function and give examples



Xylem

- Thick secondary cell walls, often deposited unevenly in a coil-like pattern so that they may stretch
- Dead at functionally maturity.
- Involved in conduct of water and ions in the plant
- Two types - tracheids and vessels
  - Tracheids - long, slender cells connected to each other by pits. Found in all vascular plants.
  - Vessels - shorter, larger diameter cells with completely perforated cell wall ends. Found only in Angiosperms

Parenchyma cells

- Least specialized plant cells
- Thin and somewhat flexible cell walls
- Living at maturity
- plant's metabolic functions (C fixation)
- Generally have a large centra vacuole
- the ability to differentiate int other cell types under specia conditions (During repair and replacement of organs after injury)

Collenchyma Cells

- Thicker primary cells walls (usually with uneven thickness)
- Living at maturity

Role in support of herbaceous plants

  - *Example* - the "strings" of celery

Schlerenchyma Cells

- Thick secondary cell walls
- Dead at functional maturity
- Cannot increase in length - occur in parts of the plant which have quit growing in length
- Two types - fibers and schlerids
  - Fibers - long, slender cells with a more or less regular secondary cell wall
    - *Example* - hemp fibers for making rope

	○ Schlerids - shorter cells with an irregular shape ▪ *Example* - stone cells in pears and hard nut and seed shells