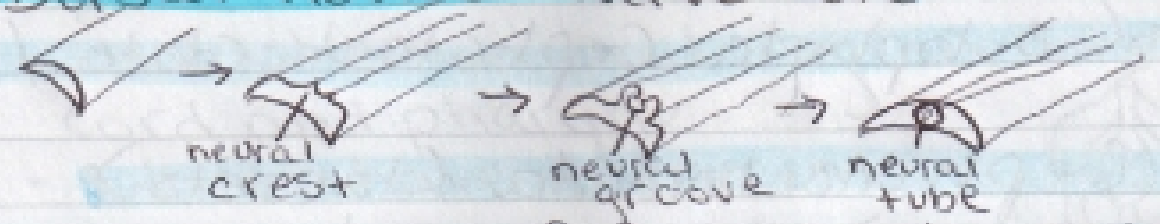
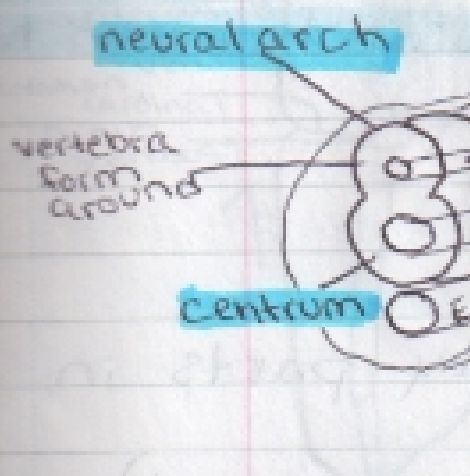
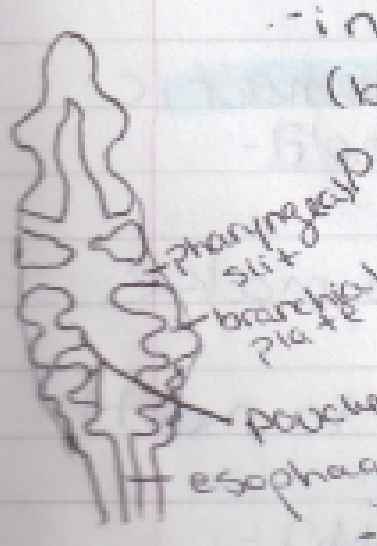
Comparative Vertebrate Anatomy

Phylum Chordata
- Subphylum Vertebrata
- Subphylum Urochordata (tunicates)
- Subphylum Cephalochordata (lanclets)
  - all three share 3 things (at least embryonicall
  - **Notochord**: cartilaginous cylinder situat between the spinal cord and gut at least embryonically
    - Agnathans: Lampreys/ Hagfish
    - have bony projections that aren't quite vertebrae but first atten to protect spinal cord
  - Notochord becomes bone in birds, reptiles, m
  - **Dorsal Hollow Nerve Cord**



  - the process of forming the neural tube is neurul
  - **Paired Pharyngeal Pouches**:
    - invagination of tissue resulting in narrow tissu (branchial plate); eventually disappears and becon pharyngeal slits
    - Agnathans have 15 pairs of pouches;
    - extinct sharks have 7, frogs have 6, only 4 becomes slits but seal back up
    - Birds, Reptiles, Mammals rupture and then seal back before birth
  - **Pharyngeal Arches**: all have 1) skeletal 2) muscle 3) cranial 4) branches from aorta
    - all found in 1st and last arch
    - First and last arch in all after Agnathans give rise to jaw called **mandibular arch**





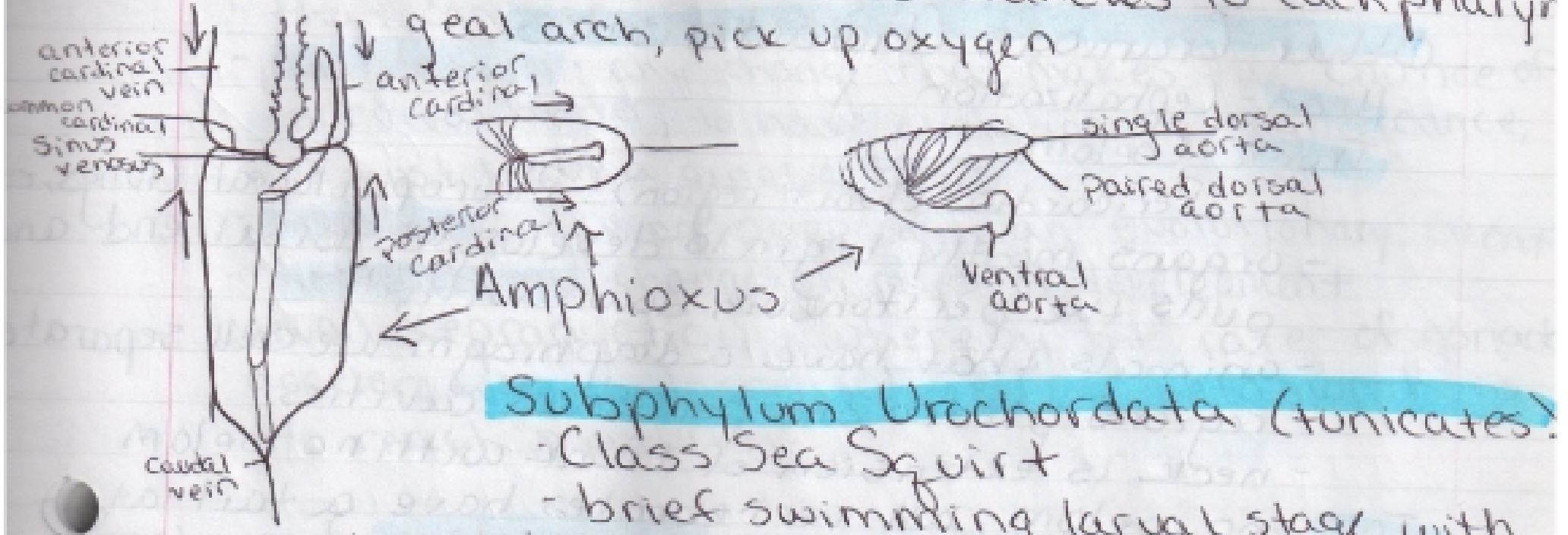
- 2nd arch in tetrapods becomes hyoid bone called hyoid arch
- rest of arches in fish become gills and are #ed; collectively called branchial arches
- bones of branchial arches called visceral skeleton
- muscles of branchial arches called branchiomeric mus

- Characteristics of Vertebrata
  - bone around notochord (vertebrae)
  - bilateral symmetry
  - metamerism: serial repetition of body parts in longitudinal axis (nerves of spine)
  - tendency toward regionalization (head, trunk, tail)

Protochordates: Subphyla Cephalochordata / Urochordata

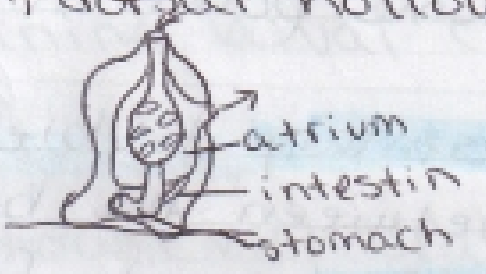
Subphylum Cephalochordata (lancets)
- Amphioxus (y/nus) lives in sand
  - head sticks out of sand / filter feed
  - supported by notochord
  - myomere muscle bundles are metameric
  - chemoreceptors at oral / buccal hood
  - ocelli light sensing organs
  - pharyngeal gill slits w/ cilia to make waving motion / current
  - vestibule w/ vellum to direct food to mouth
  - vellum opens into pharynx
  - buccal cili help guide food to mouth
  - muscular midgut ring pushes food back into hepatic diverticulum where it is mostly digested
  - pharyngeal gill slits open to atrium; water leaves atrium released into atrium once

- evolutionary tendency in arches is a reduction in #; vert ≈ 7, lancets 60+
- Circulatory: one chamber to heart = sinus venosu
  - ventral aorta sends branches to each pharyn



Subphylum Urochordata (tunicates)

- Class Sea Squirt
  - brief swimming larval stage with notochord in tail region, dorsal hollow nerve cord and pharynx
  - Adults have incurrent and excurrent siphon
  - filter feeders



Hemichordata

- Class Enteropneusta (acorn worm)
  - exist in tidal flats
    - live beneath sand and filter feed
    - little resemblence to chordates: no d.h.n.c/not.
    - have pharyngeal gill slits, larvae have cilia
    - look like Echinoderms!
- Class Pterobranchs
  - not filter feeders; most don't have gill slits; related to Enteropneustans