Skeletal System:

- osteocytes: just chillin; the following two are when these are being active
- osteoblasts:divide and become bone cells
- osteoclasts: bone repair
- hydroxyapatite crystals are concentrated and cemented together by osteoblasts
- all bone cells are within a reasonable distance of blood vessels which they connect to through microscopic canals called canaliculi
- hollowed area of bone is Lacunae

Replacement Bone

- most bone starts out embryologically as hyaline cartilage, removed and replaced by bone= endochondral ossification
- long bone growth in ectotherms is continuous throughout life

-in mammals and birds it ends after sexual maturity

Membrane Bone = Intramembranous Ossification
- no cartilaginous model; instead developed from membranous blastemas: osteoblasts starts to replicate

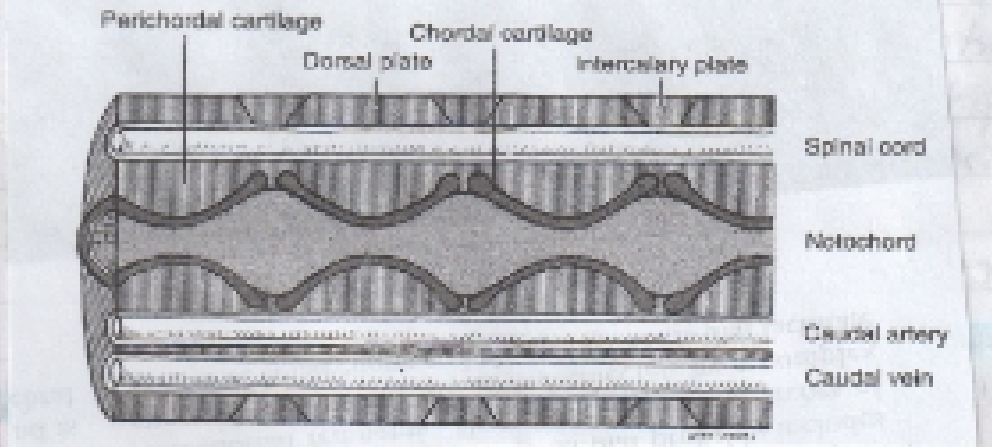
Axial Skeleton: bones around axis of skeleton ribs, sternum, visceral skeleton (gills), vert., skull

Appendicular Skeleton: appendages and girdles

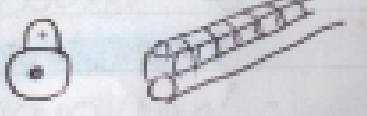
-Vertebral Colum
- protects spinal cord and place to attach muscle, lever for movement
  - fish vert column = side to side flexibility
  - we have dorsal/ventral flexibility

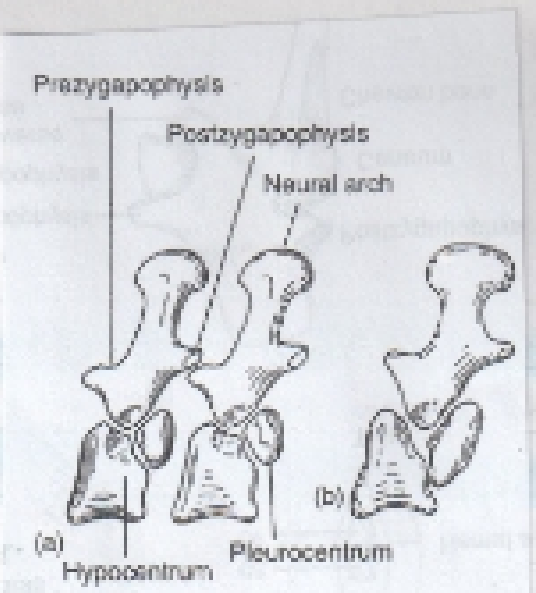
2. Basic Components of Vertebra
- centrum
- neural arch

Chondrichthyes: consists of paired dorsal plates the constitute a neural arch, paired dorsal intercalary plates.



Agnathans: have n
centrum, just a l
bit of support

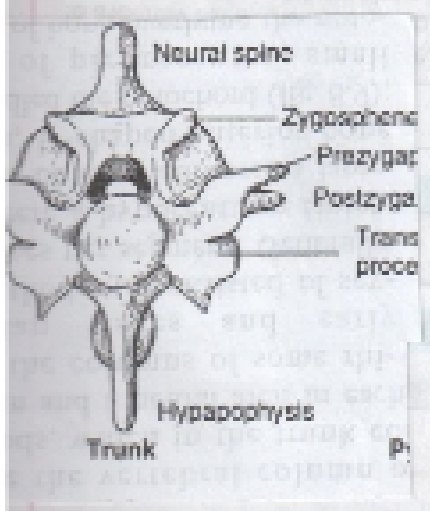


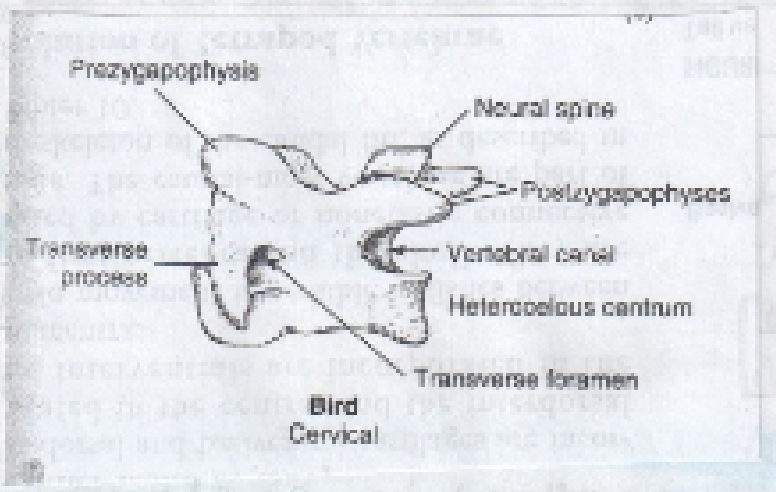


Rachitomous

Cont'd

- Later Tetrapods
  - Diapophyses: transverse processes that articulate with ribs, separating epaxial and hypaxial musculature
  - zygapophyses: paired processes at the cephalic end of trunk vertebra (prezygapophyses) and at their caudal end (postzygapophyses) in tetrapods
  - Parapophyses: prominent midventral projections from the centra of a few tetrapods





Specializations of Tetrapods

- sacral vertebrae Frogs: 1, Reptiles: 2, Cats: 3, Us: 5
  - sacrum starts with amphibians
  - evolut. tendency to decrease # ribs
  - fish have ribs on every vertebra = for muscles
- Amphibians: 1st cervical vertebra is atlas and lost 1st rib; * odontoid process / Dens: part of centrum of atlas
- Reptiles: have 8 cervical vert
- Mammals have 7 (most)
- Birds variable (12-25)

- Birds, Reptiles, Mammals limited to area around lu
  thoracic vertebra main function in respiration ar
  to protect lungs
- Amphibians don't use thoracic ribs, just for musc
- Pygostyle: fused vertebrae of the visible part of the tail in living birds
- Coccyx: fused caudal vertebrae of humans
- Urostyle: fused postsacral vertebrae of frogs; bony sheath enclosing the notochord in the homocercal caudal fin of teleosts
- Autotomy: cutting ones self, as when a lizard breaks off the end of its tail
  - cleavage/fracture plane
  - Bones were osteocytes, when broken chan
    to osteoblasts which lay down new bon
    make new blastemas
- Synsacrum: sacrum united w/ other vertebrae: lumbare, one thoracic, several caudal