CH 6 – Sarcopterygii – monophyletic
Sarcopterygian bony fish classified as osteolepiformes are sister group to all terrestrial vertebrates (tetrapoda)
*Tetrapod ancestor was some type of osteolepiform fish
Early devonion - present
Fish & non verts (tetrapods)

1. complex coating enamel surrounding oral teeth
2. pectoral & pelvic fins lobate – single basal bone

Actinistia

1. 2 dorsal fins
2. diphycercal caudal fin
3. soft anatomy – Rostral organ – senses electrical currents @ snout top
4. Coelacanth – known mid Devonian, thought extinct until 1938
    a. Latimeridae – 2 kinds – Chalumnae & menadoensis
    b. Aonly 2 living reps of actinistia

Dipnoi

1. Diphycercal caudal fin
2. Upper jaw fused to cranium – autostylic jaw suspension (holocephalans)
3. Large well developed lung - singular

One Order: Ceratodontformes
-Ceratodontidae (Australia lungfish)
-Lepidosirenidae (south America)
-protopteridae
Tetrapoda

1. pectoral girdle separated from shell
2. presence of zygaphyses on vertebrae
3. limbs w/ carpels tarsals & digits (phalanges)
4. pelvic girdle attached to vertebral column

Zygopophyses (tetrapods) – allow vertebrae to interlock & allow twist & bend
-reinforce vert column to support weight
-prezygapophyses (anterior) & post
Lateral Line System – sense movement in water around them

- main cell of system – Hair Cell
- Hair cells excited by mechanical stimuli which pass over their surface & stimulate tiny hairs
- Largest of these hairs are kinocilia

Secondary Lamellae
-where O2 exchange takes place in gill filaments

- Collapse in air & no exchange
- Solution:
    - Gas filled bladder – extension of anterior gut (lungfishes)
    - Gills to lungs req. change to circulatory system
        - Include a double circuit to include a pulmonary loop
    - Higher blood pressure - req to prevent blood from pooling @ low points b/c of weight of blood in air
    - Gill arches adapted to make cartilage to support larynx & thyroid gland

Sacral Rib – connect the acial skeleton to the pelvic girdle allowing weight to be transmitted to hind limb

**** OSTEOLEPIFORMES DIDN'T HAVE

Panderichthys & tiktaalik – Derived Elpistostegids

- Lacked dorsal & anal fin, reduced caudal
- Still had developed gills
- Pectoral girdle still attach to cranium but prob allowed partial rotation
- Pectoral fin
- Pelvic girdle unknown
- Eyes on top of head like croc

Tiktaalik – skull w/ eyes on top

-pectoral fin w/ lepidotrichia

-MAJOR DIFFERENCE – pectoral girdle completely separate from cranium

Panderichthyidae: some of these appear truly intermediate between osteolepiforms and tetrapods

• Dorsolaterally flattened body with long snout, eyes on top of head

• Vertebrae: Large ribs project laterally and ventrally

Early Osteolepiform fish

Eusthenopteron (another Osteolepiform known from a fossil) is a cylindrical osteolepiform that was a good candidate to be the sister to tetrapods for a while.

• Cylindrical body

• 4 unpaired fins (2 dorsal, caudal, and anal fin)

• Vertebrae: neural arches do not articulate, short ribs

• Skull: Area anterior to parietals on skull is mosaic of small bones

Order – Panderichthyes>tiktaalik>acanthostega

Two earliest stem group tetrapods

Acanthostega - *most basal ********FIRST VERTEBRATE WITH A NECK****!!!!!***

-couldn't support body out of water

- Weak zygaphyses & connection b/w pelv girdle & vert column
- More complex pectoral girdle now separate from head
- Paired limbs lacking in lepidotrichia & had up to 8 digits
- Prob still aquatic

Icthyostega – BEST CANDIDATE FOR 1ST TERRESTRIAL VERTEBRATE

- Vert columns w/ strong zygapophyses like extant tetrapods
- Good connection w/ pelvic girdle for support of weight
- Well developed ribs, overlapped forming cage around viscera
    - Adaptation prob protected viscera from being crushed under weight of body on land
- Lacked gills – dunno if semi aquatic or full terrestrial – prob like crocodile – terrestrial traits

Chonae –
How did the Choanae evolve?

- Posterior nostril migrated from its external to internal position over evolutionary time
    - Critics – This would involve migrating across a field of teeth in the upper jaw & is unlikely – no fossil intermediates found for support of hypothesis
- Nasal ways dif in tetrapods – Have noses that open to world through a singe pair of external nostrils
    - Open to throat through a pair of Internal NostriLS called **CHONAE** (choana sing.

Ch 7
KenIchThys – 395 myo Osteolepiform fish (china)

I. **Vomeronasal Organ/ Jacobsons organ**
    a. In anterior roof of mouth
    b. Well developed in snakes & in some mammals
        i. Flehman Behavior in ungulates (where the head is lifted high & the upper lip is curled) – likely a way of inhaling pheromones into the vomeronasal organ

-Olfactory receptors associated w/ mouth & throat – pass air over olfactory epithelium every breath
-receptors can be very sensitive
------amongst extant mammlas have most sensitive
---**due partly to presence of thin scrolls of bones called TURBINATES**
-Turbinates highly developed in mammals – significantly increase the surface area available for olfactory epithelium

Lepospondyli – 1 of 2 major tetrapod lineages

Lepospondyli

1. Diverse tetrapods – semi-aqua & terrestrial forms
2. Many body forms some similar to extant - suggest similar ecologies & life hisotries
3. Relation to other tetrapods unclear