

LECTURE 6

*****MEMORIZE PHYLOGENETIC TREE OF VERTEBRATA*****

TERMS TO KNOW:

• Craniata

• Vertebrata

• Gnathostomata

• Osteichthyes

• Sarcopterygii

• Tetrapoda

• Amniota

• Synapsida-

- Single fenestra behind orbit

- Synapsids (mammals and mammal-like reptiles)

-includes all amniotes descended from a common ancestor with the synapsid type of temporal fenestration

-first amniotes to radiate in terrestrial habitats

- Paleozoic - Late Carboniferous

-Permian - synapsids were the most abundant terrestrial vertebrates

-Triassic - top carnivores

[Most synapsids were medium-large carnivores and disappeared around Late Triassic while the little things were surviving]

• Pelycosauria (mammal-like reptile)-

-Not monophyletic

-Generalized amniotes

-Most were generalized carnivores

-Includes "sailbacks" such as Dimetrodon

-Notable characteristics

-Complexity of dentition, arched palate, lower jaw flange

[First non-mammalian synapsids, large carnivores, could rip prey apart, "sail back" used for temperature regulation and display purposes, ectotherm, tooth variety (dentition) (multiple cusps on teeth), arched palate (separation of mouth and nasal passage)]

• Therapsida (mammal-like reptile)-

-Not monophyletic

-Includes Non-cynodont therapsids and cynodont [Non-cynodont split from cynodont because therapsids aren't monophyletic and cynodonts were more closely related to humans/mammals]

-Appeared in the Middle/Late Permian

-Often called advanced mammal-like reptiles

-Herbivorous and carnivorous forms

-Possibly replaced the Pelycosaurs

-Start seeing trends towards a more mammalian form

1. Modifications suggesting increased metabolic rate
2. Increased neck flexibility
3. Pectoral and pelvic girdles less massive
4. Limbs more slender

Noncynodont therapsids- Some lived for long periods of time, dominant herbivores, etc.

[Diverse group, "cynodont"= dog tooth, lots of sizes and niches, larger temporal fenestrae and arched palate are signs of increased metabolic rate, infraorbital foramen are sensory nerves from snout to brain for smells, turbinate is a bone in the nose that helps regulate air temperature going into the body]

• Cynodontia (mammal-like reptile)-

-mammalian ancestors

-More modifications for increased metabolic rate (see next slides)

-Reduction in body size

-Enlarged infraorbital foramen

-Evidence of turbinates

NEED TO KNOW:

1. **Be aware of the characteristics of Amniotes (and which taxa are amniotes)**
 1. Amniotic egg
 - An egg with elaborate extraembryonic membranes, surrounded by a shell
 2. Impermeable skin
 - Amniotes have a much thicker epidermis, with elaborate keratinous structures (scales, feathers and hair)
 3. Costal ventilation of Lungs
 - Have an advanced method of lung ventilation that involves the rib cage
 4. Temporal Fenestration
 - Skulls are characterized by fenestra (openings) - which vary between and within groups of amniotes
2. **What is the synapsid type of temporal fenestration and how does it compare to anapsids and diapsids?**
 - Synapsid is one temporal fenestration
 - Anapsid is no temporal fenestrations
 - Diapsid is two temporal fenestrations
 - (Anapsids and Diapsids make up Sauropsids)
3. **Who does the synapsid clade include? (which 2 groups?)**
 1. Nonmammalian synapsids, or "Mammal-like reptiles" (extinct)
 2. Mammals
4. **Who are the nonmammalian synapsids? (which 3 groups?)**
 1. Pelycosaurs
 2. Non-cynodont therapsids
 3. Cynodonts
5. **Be aware of the Geologic Time Scale (Eras, Periods, etc., major events)**
6. **When did the synapsids begin to radiate?**

Paleozoic - Late Carboniferous
7. **Were the pelycosaurs monophyletic?**

NO!
8. **Were the non-cynodont therapsids monophyletic?**

NO!
9. **Know an example of a pelycosaur and a little bit about its biology**

***at the top
10. **When did the therapsids appear and how did they interact with the Pelycosaurs?**

Appeared in the Middle/Late Permian, they replaced the Pelycosaurs
11. **Many of the trends we see in non-mammalian synapsids are for what 2 major purposes?**

Increased metabolism and endothermy
12. **Know the 11 trends in non-mammalian synapsida (not just the list, know what each means)**
 - 1) Size of temporal fenestra
 - More jaw muscles
 - 2) Lower temporal bar
 - Massetermuscle
 - Zygomatic arch
 - 3) Lower jaw and jaw joint
 - Expansion of the dentary
 - More on this later