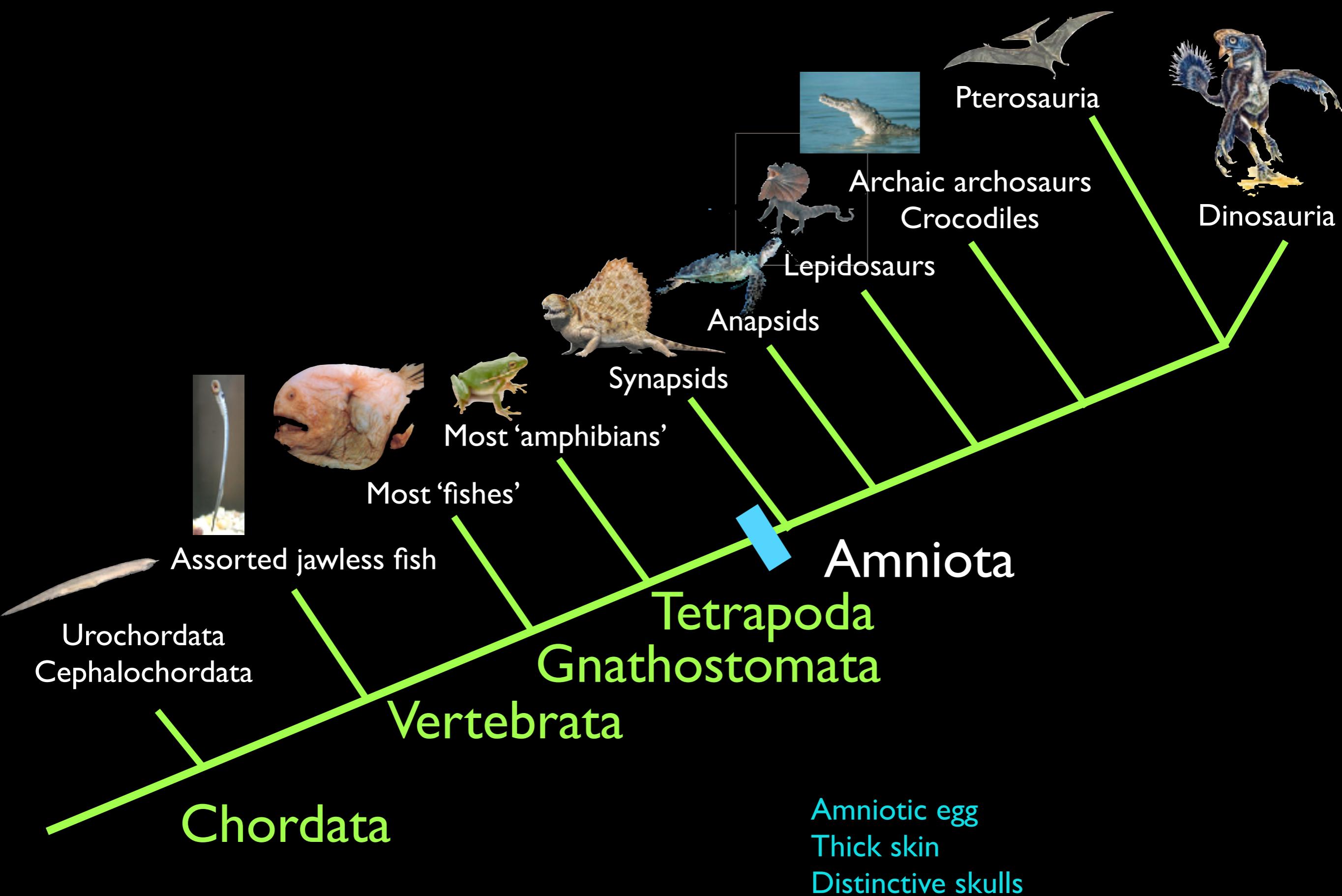
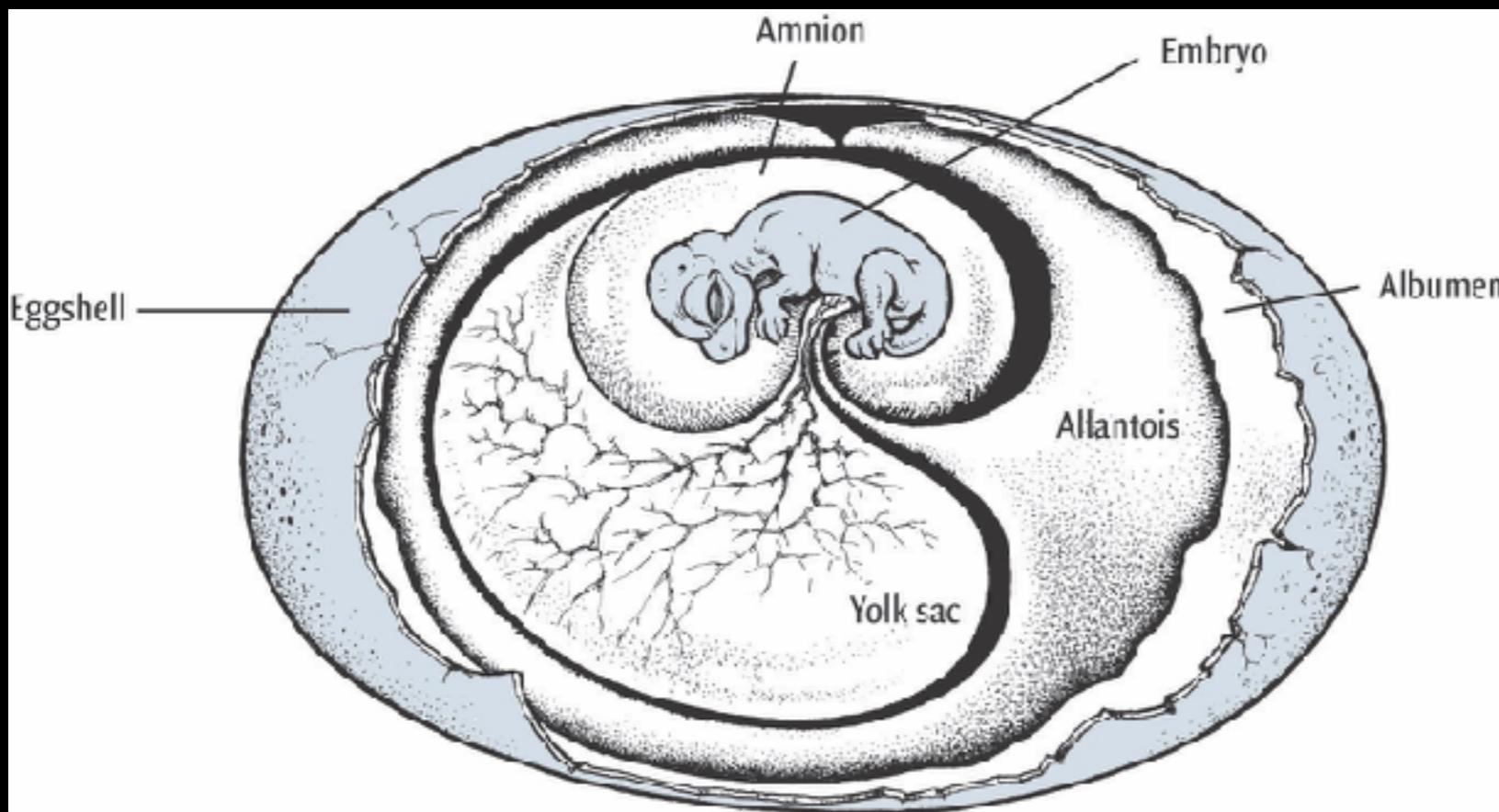


Meet the Amniotes: The great terrestrial adaptation





The cleidoic egg: a private pond



Eggshell: Semipermeable

Calcareous or leathery

Albumen: Egg cytoplasm

Amnion: Protection / Gas transfer

Yolk Sac: Nutrient Pool

Allantois: Waste Pool



Synapsida



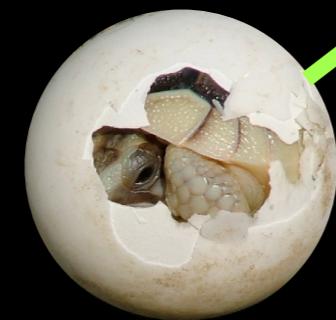
Anapsida



Lepidosauria



Archosauria



Amniotes

First amniotes
in record (!!)

Eureptilia

Diapsida



Walking with Monsters

Chapter 2 1:10-5:00

Evolution of Eggs?



Some modern amphibians lay eggs on land... why?

- One inner membrane
- I. escape predation

To deal with longer time periods on dry land, tougher shells were selected for. Gas exchange and waste devices evolved for complete eggtonomy

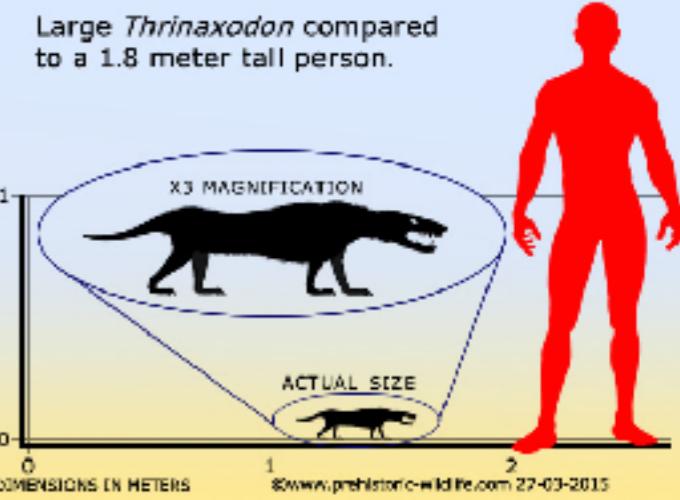
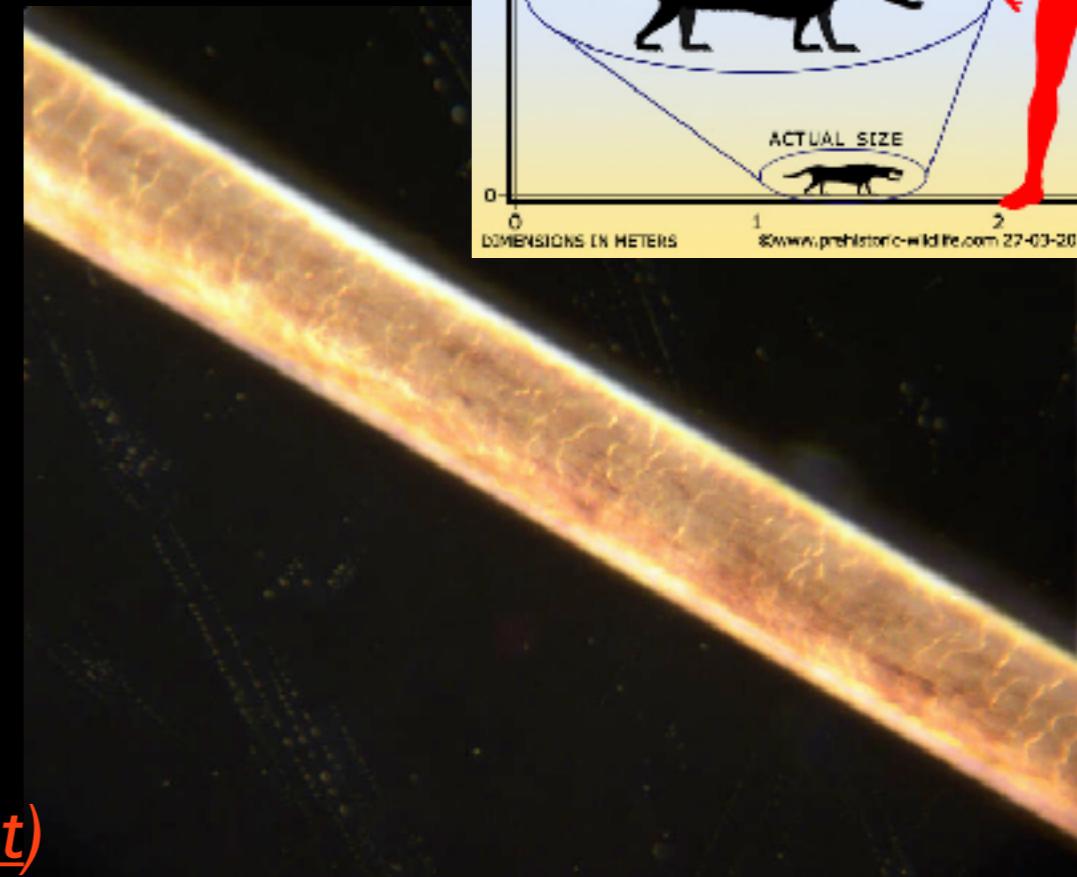
Eggs became larger, tougher. Large eggs can produce larger babies, which had a higher likelihood of survival in a tough world.

Evolution of Hair?

Amniotes all have the gene for hair:
alpha keratin

In birds/lizards, it's expressed in claws

In mammals, it's used in hair & nails



Thrinaxodon (Cynodont)

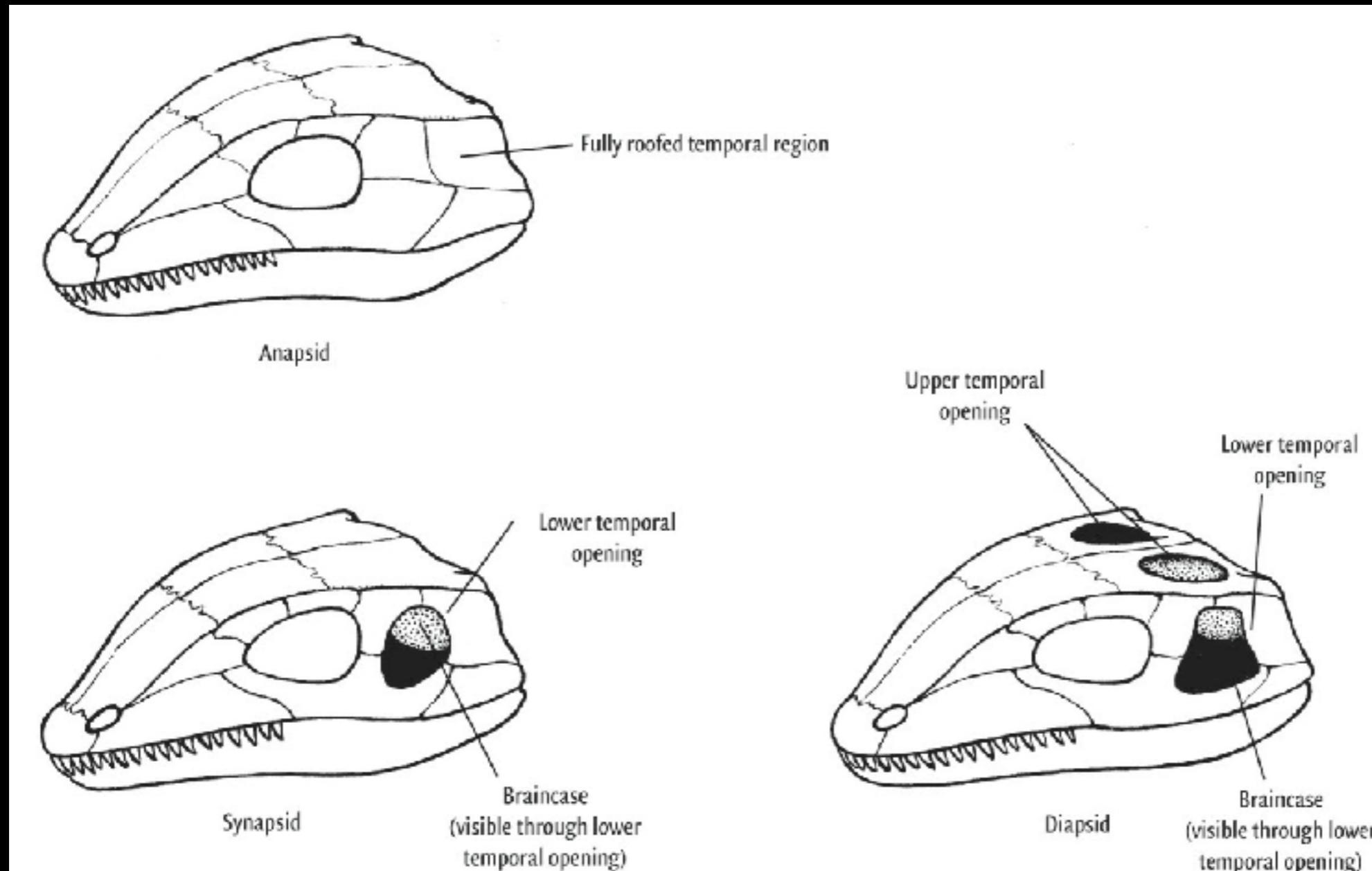
Blood vessel channels on premaxillae, maxillae
~vibrassae (whiskers)
(early Triassic)



Castorcauda (*almost a mammal*)

First direct fossil evidence of hair
(mid-Jurassic)

Meet the Amniotes



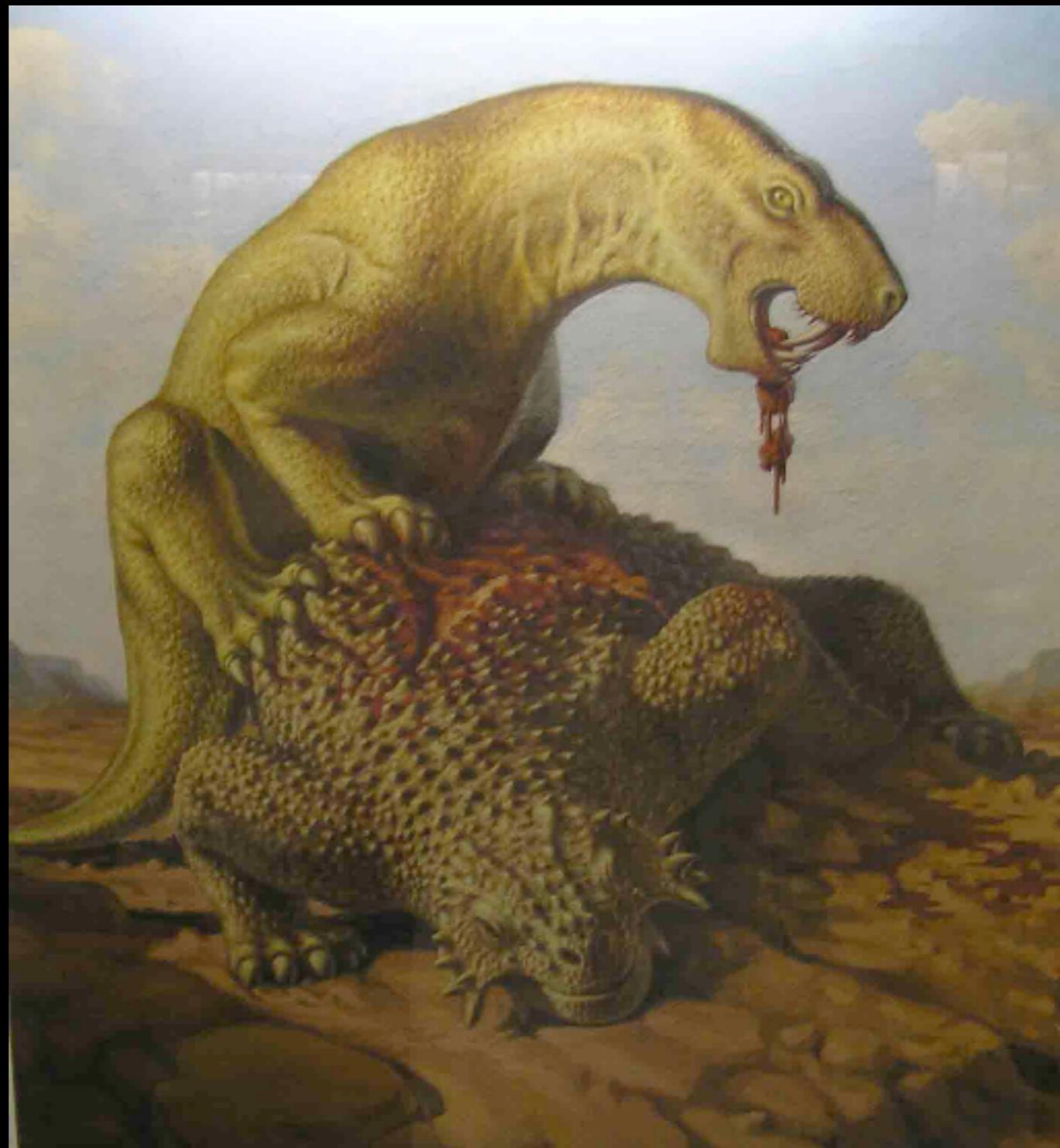
Single temporal
fenestra

fenestra = 'window'

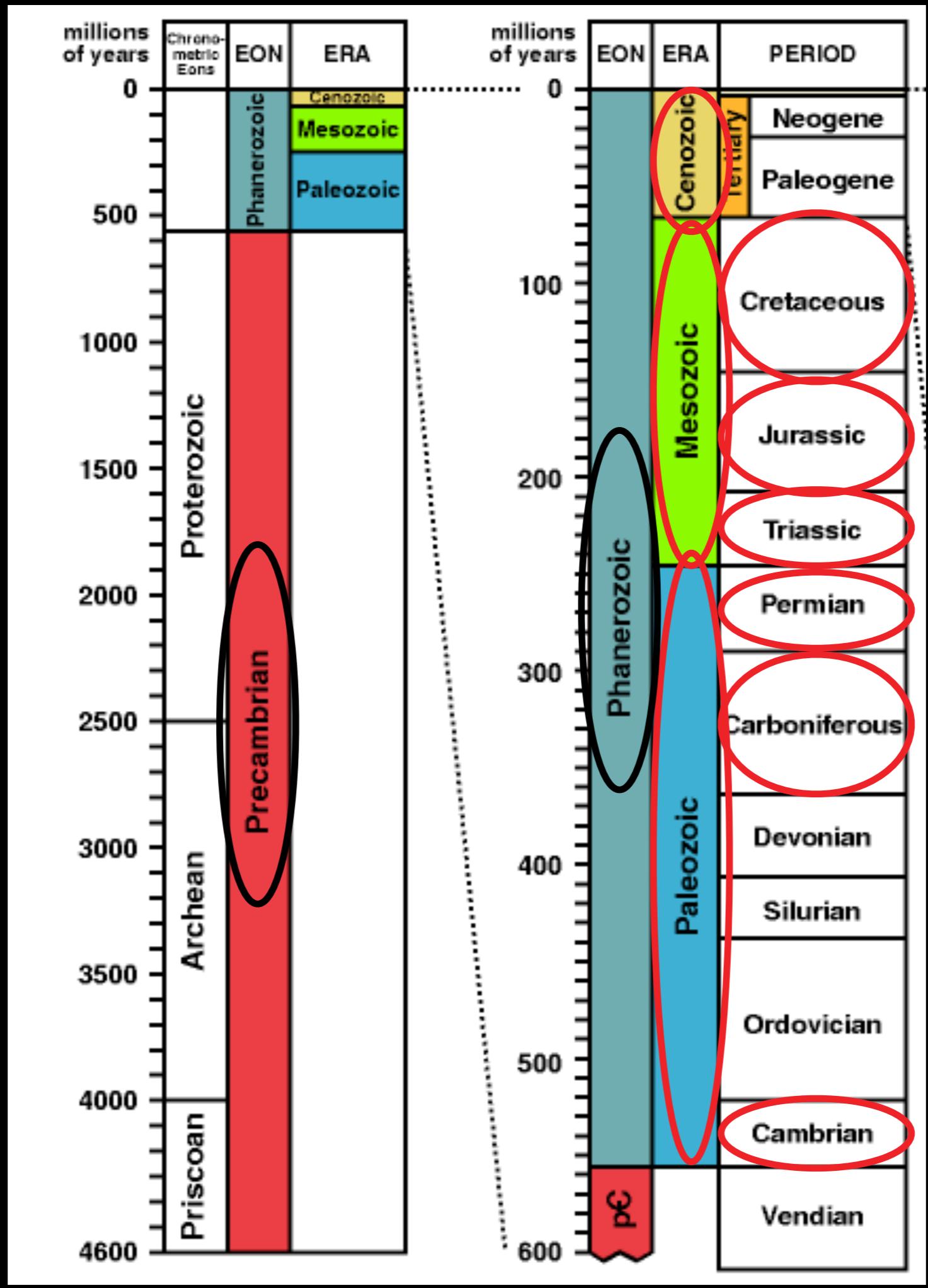
Upper temporal
fenestra
Lower temporal
fenestra



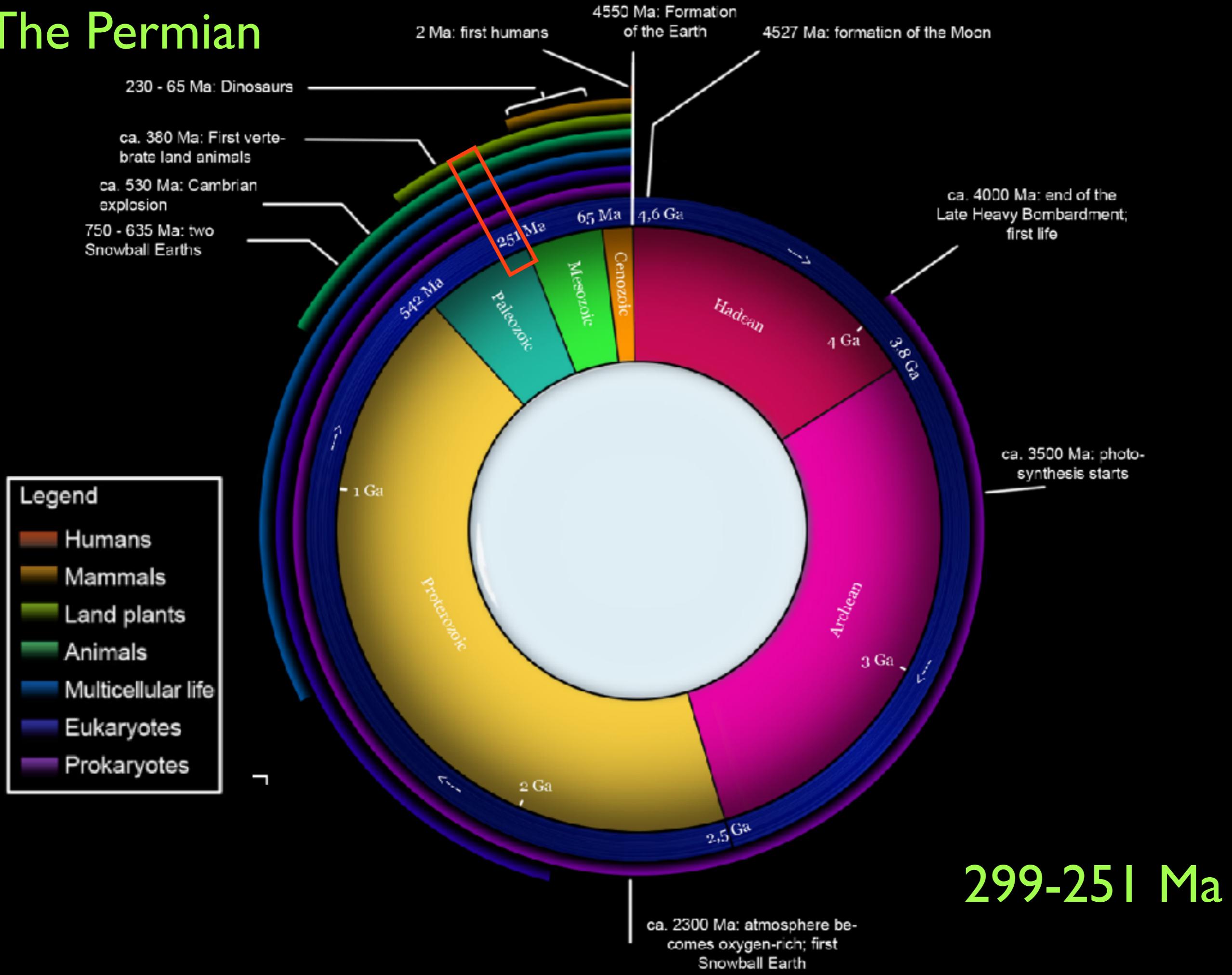
The Permian

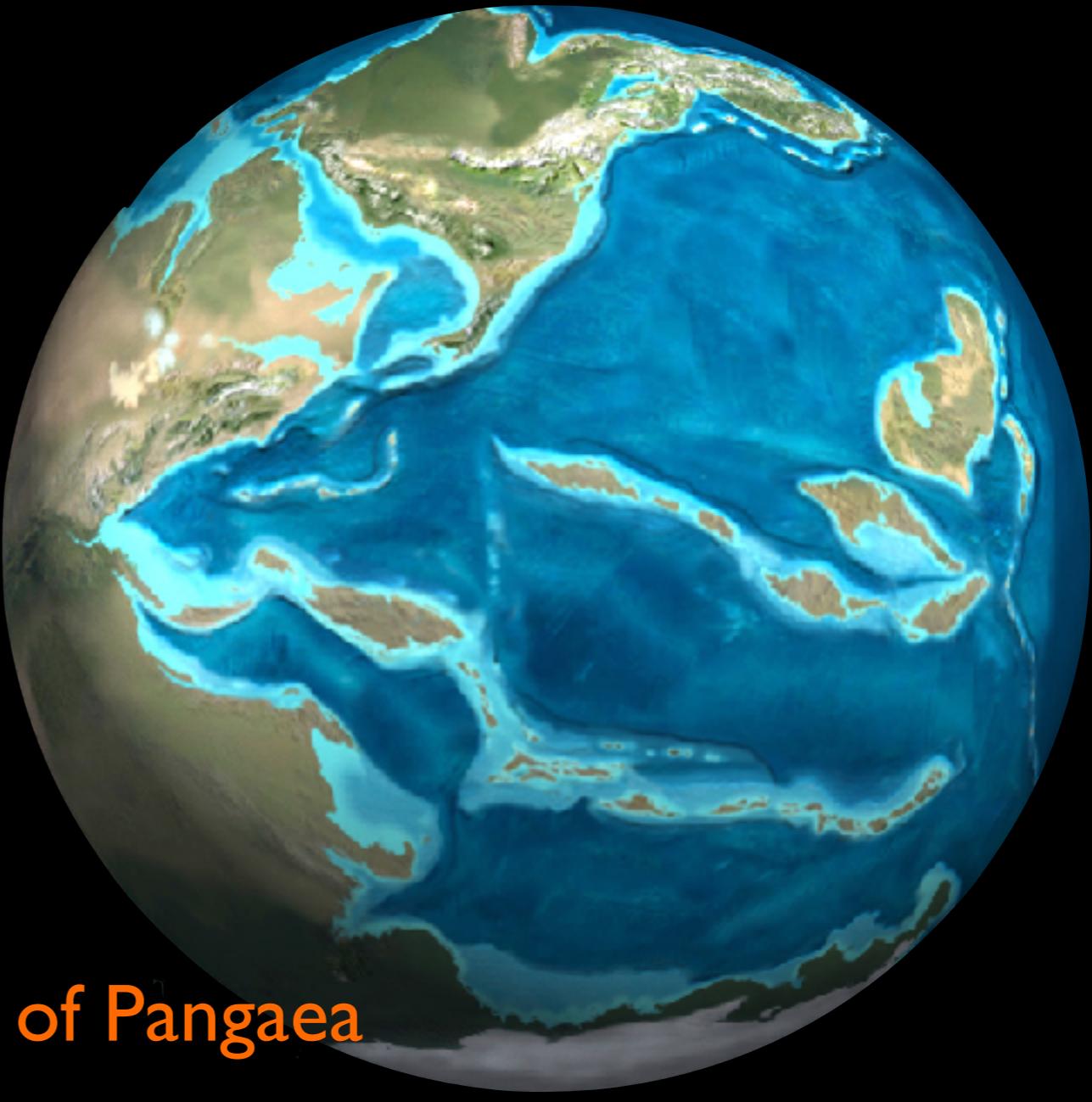
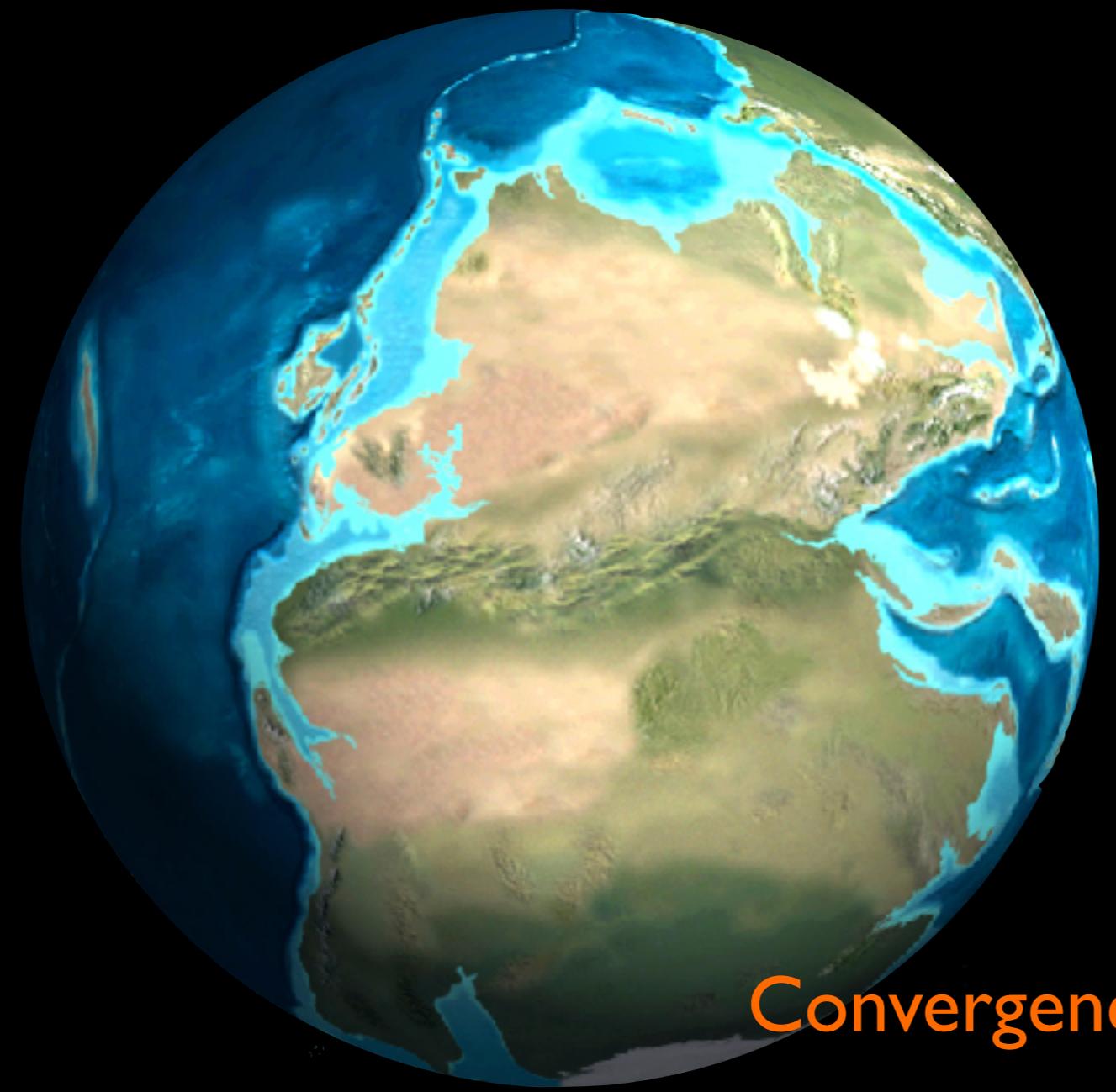


299-251 Ma



The Permian





Convergence of Pangaea

The effects of the landscape on climate:

Heat distributed more equally through fluids than solids

Oceans slower to warm/cool than continents

Pangaea: Rapid warming/cooling ~ more intense than today

Temperature extremes

Our modern continents are ‘tempered’ by oceans between them. Not Pangaea

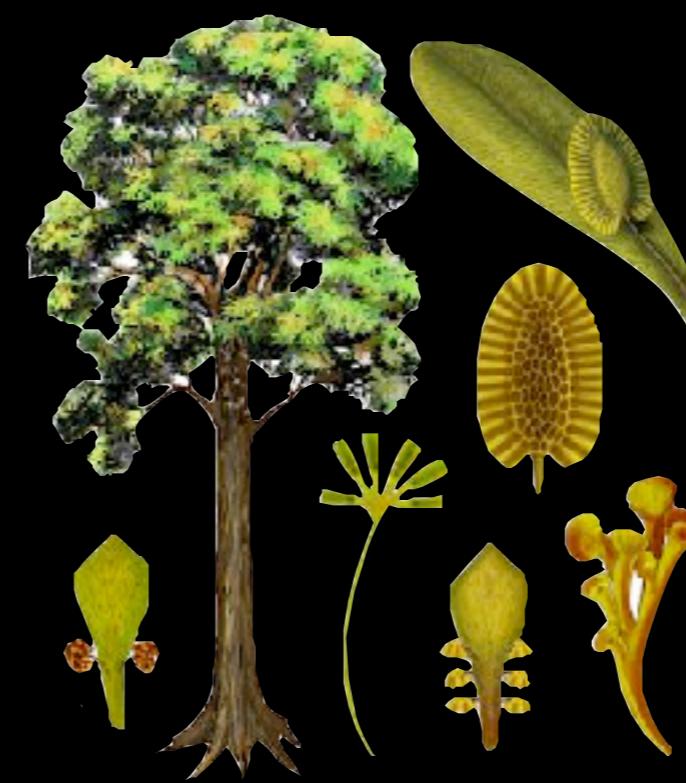
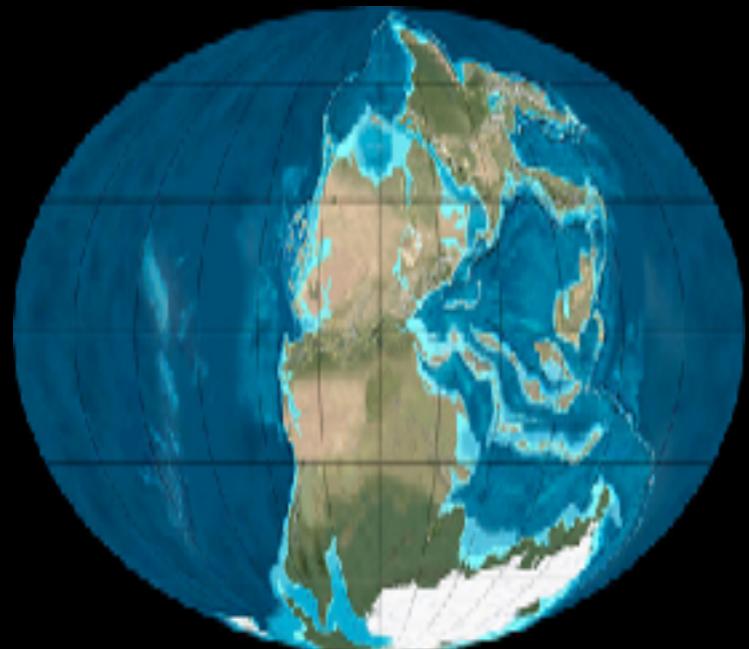


Hot, arid terrains formed in the northern hemisphere
~Evaporite deposits



Northern conifer forests

Wetland plants mostly replaced by seed-bearing plants and conifers

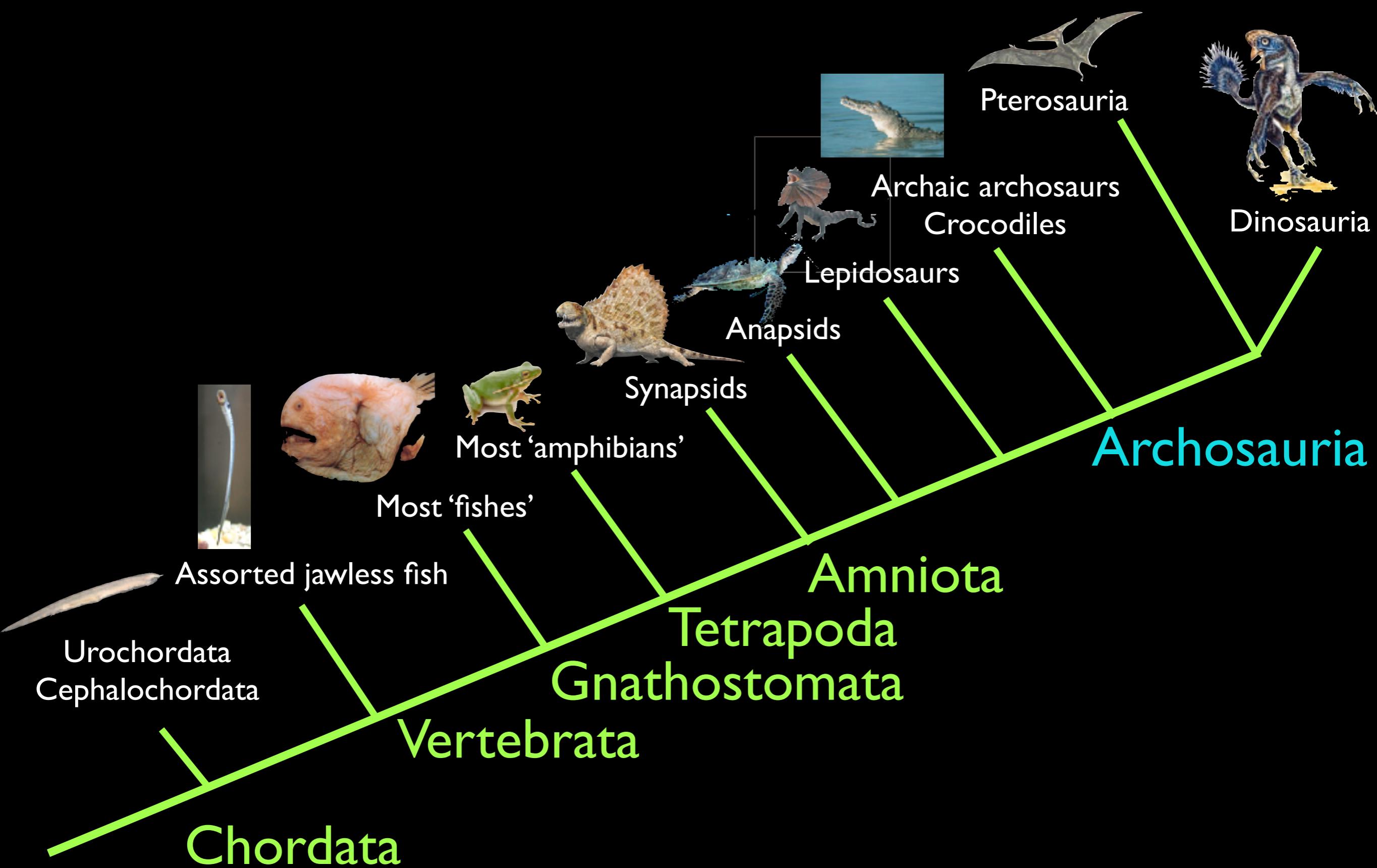


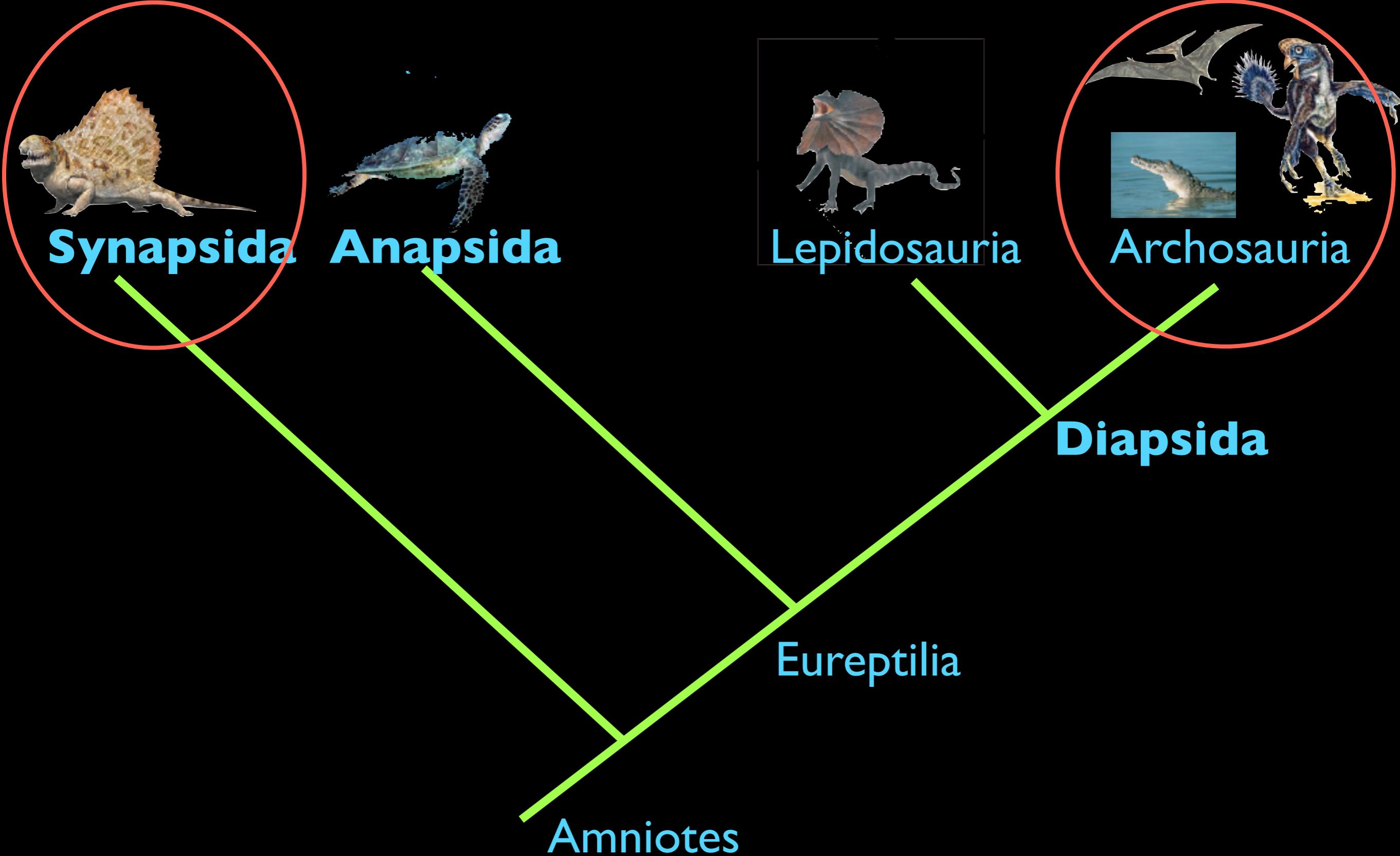
Southern glossopterid forests:
pteridosperms, or seed-ferns



A bit about seed-ferns:

- A paraphyletic group of seed-bearing extinct plants
- Refer to members of a group that are fern-like & seed-bearing, but are not angiosperms, ginkgophytes, conifers, or cycadophytes (distinct by elimination)
- Related to other seed plants
- Flourished during Carboniferous, Permian
- Declined during Cretaceous
- They aren't ferns





Ecological Turnover: Basal tetrapods => amniotes

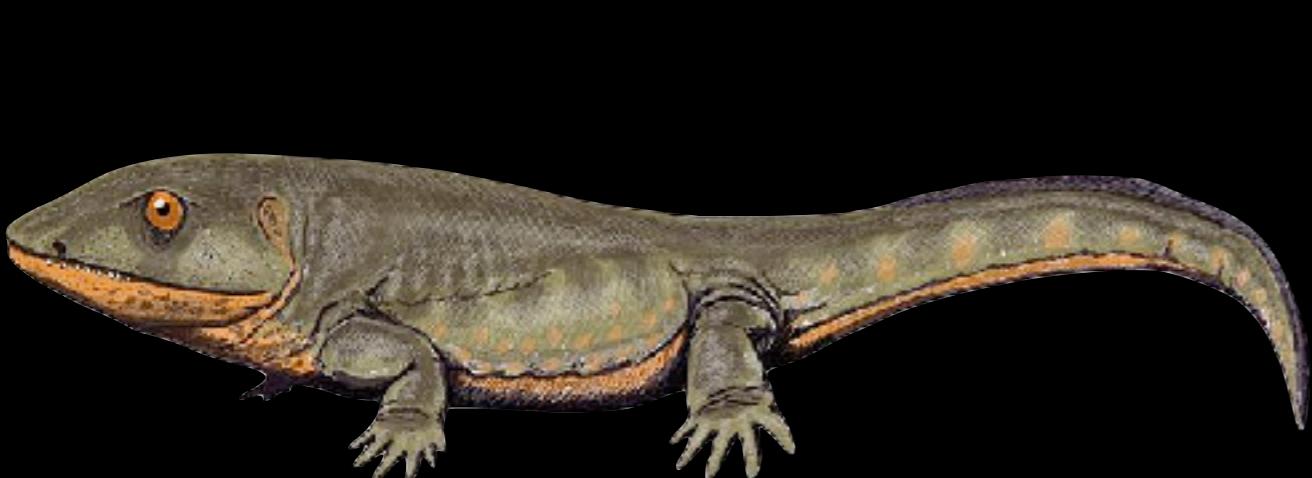
Exploit the dry land!



Capetus



Captorhinus



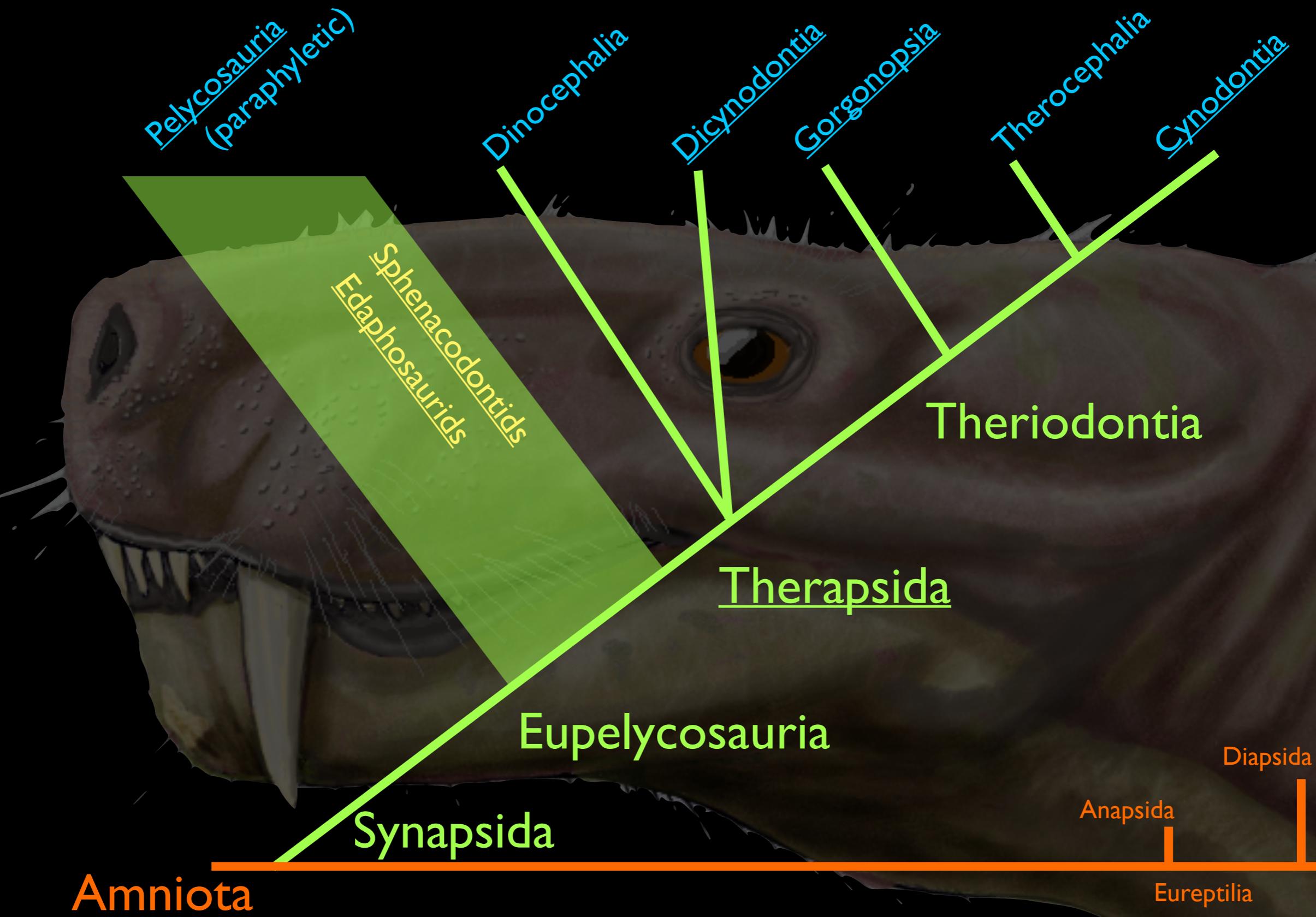
Pederpes



Mesosaurus

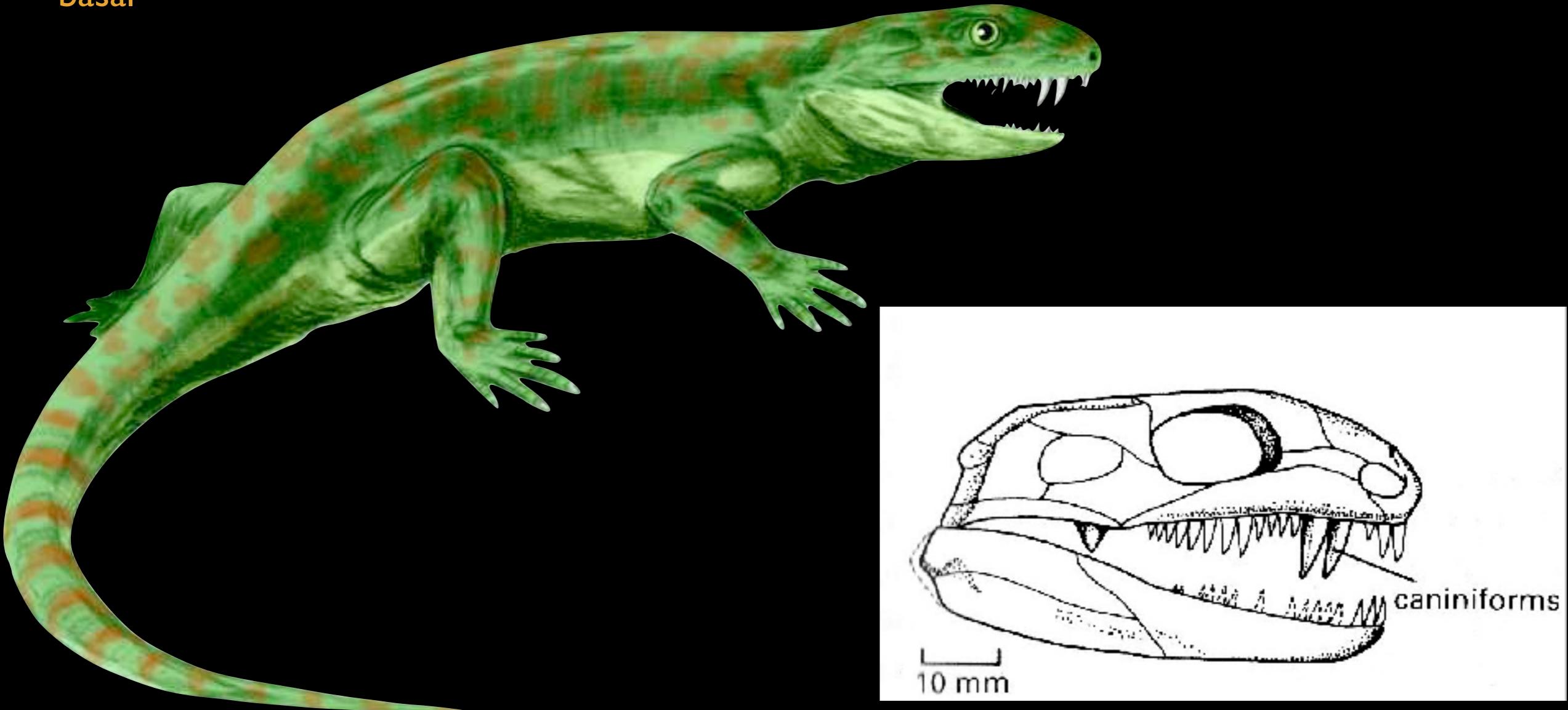


Milleretta



Pelycosauria

- early Permian
- most diverse group (70% of genera)
- basal

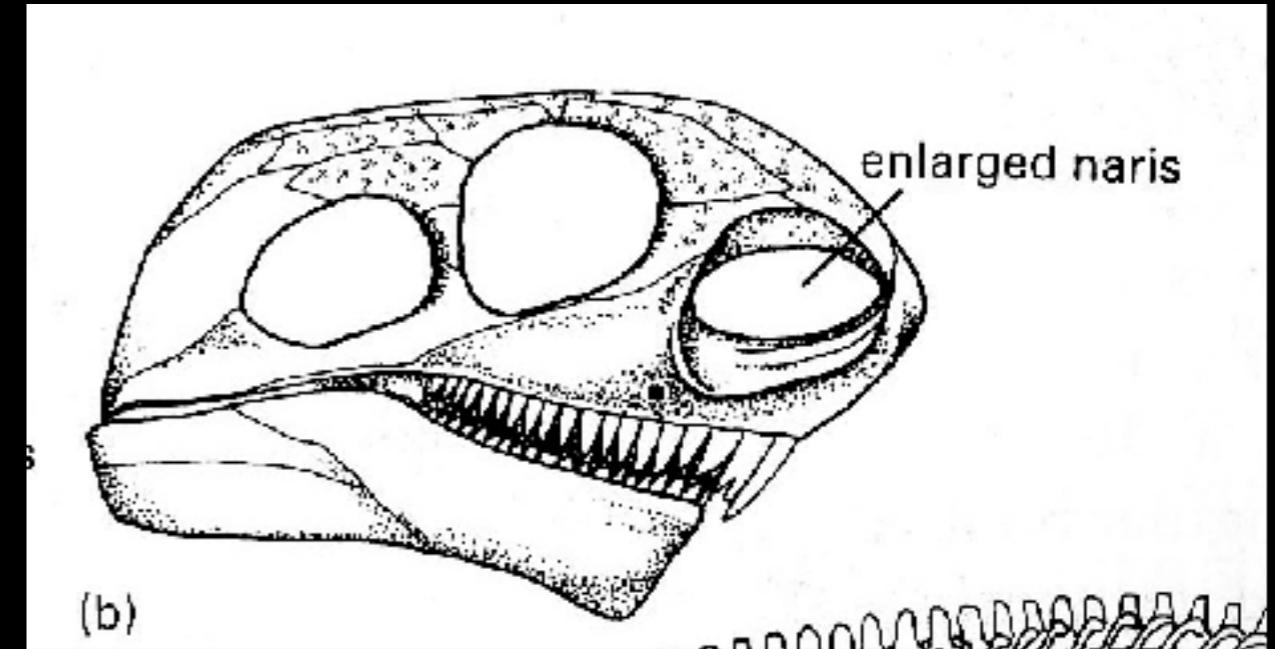


Early Pelycosaurs: small, carnivorous
Eothyris: early Permian
-Large canine teeth

Pelycosauria

-most diverse group (70% of genera)

-caseids

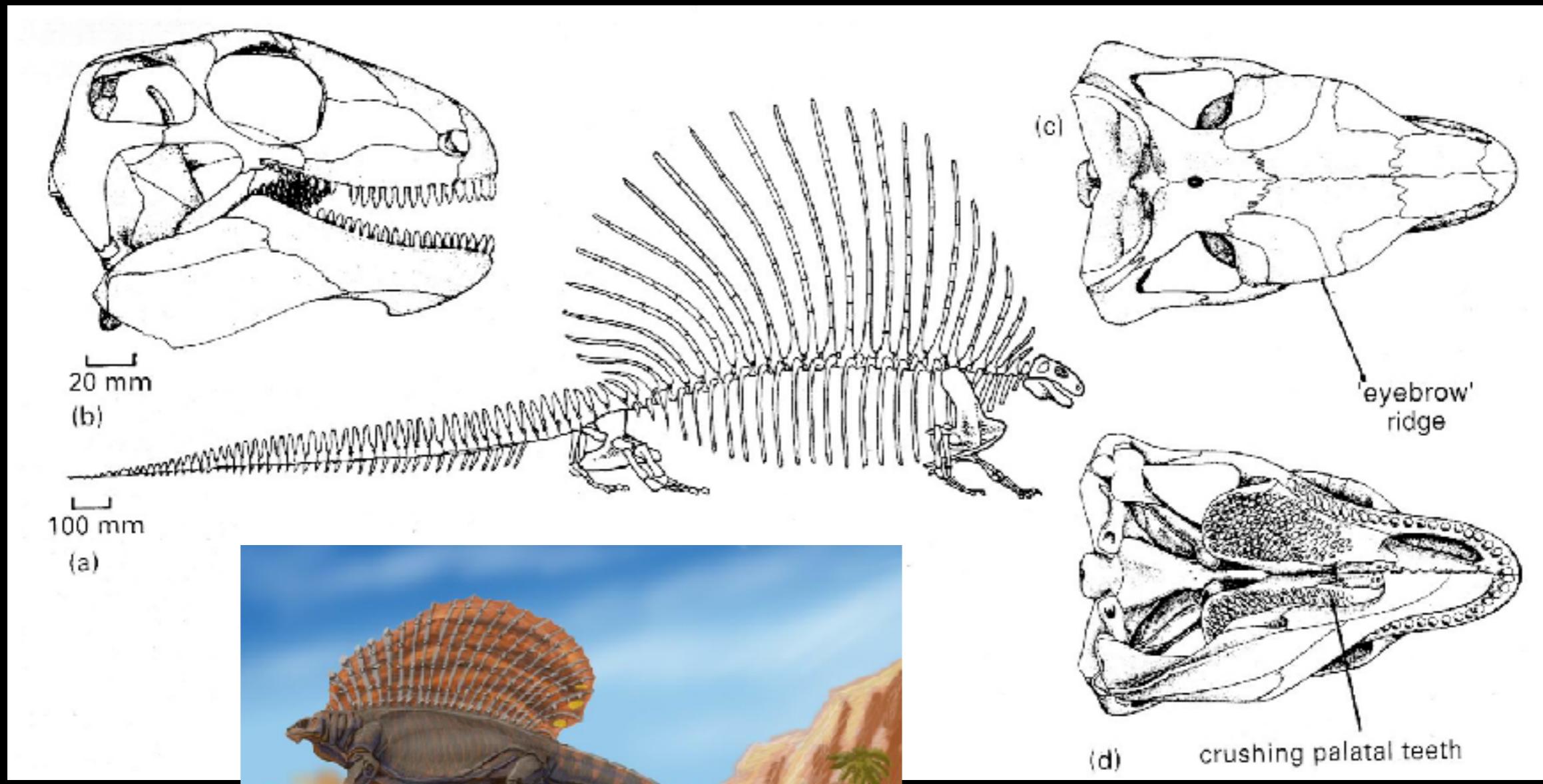


Herbivorous Pelycosaurs: large
Cotylorynchus: mid-Permian
-Largest Pelycosaur
-Peg-like Teeth
-Enormous gut cavity
-Angled Jaw

Pelycosauria

-most diverse group (70% of genera)

-Edaphosaurids



Pelycosauria

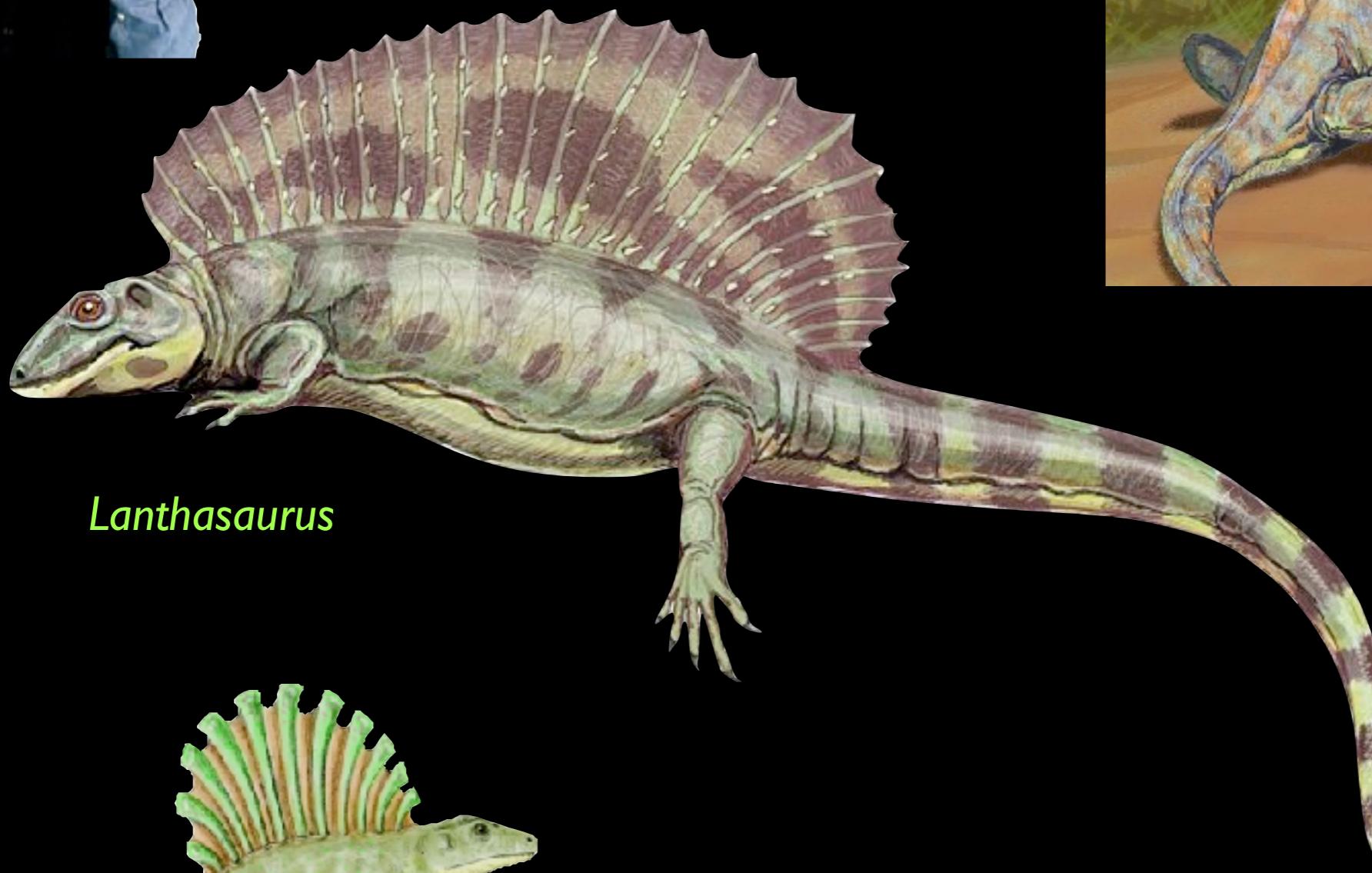
-Sphenacodontids Large Carnivores, early to mid Permian



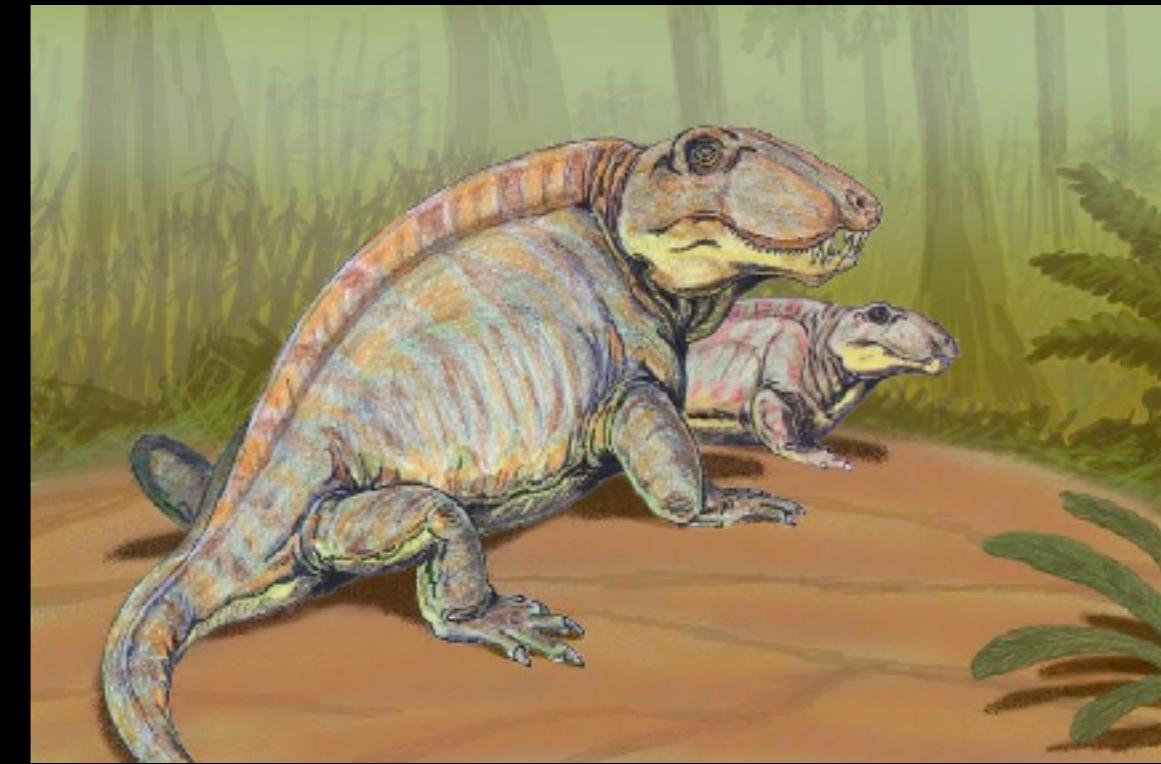
Dimetrodon



What's the deal with the sail?



Lanthasaurus



Sphenacodon



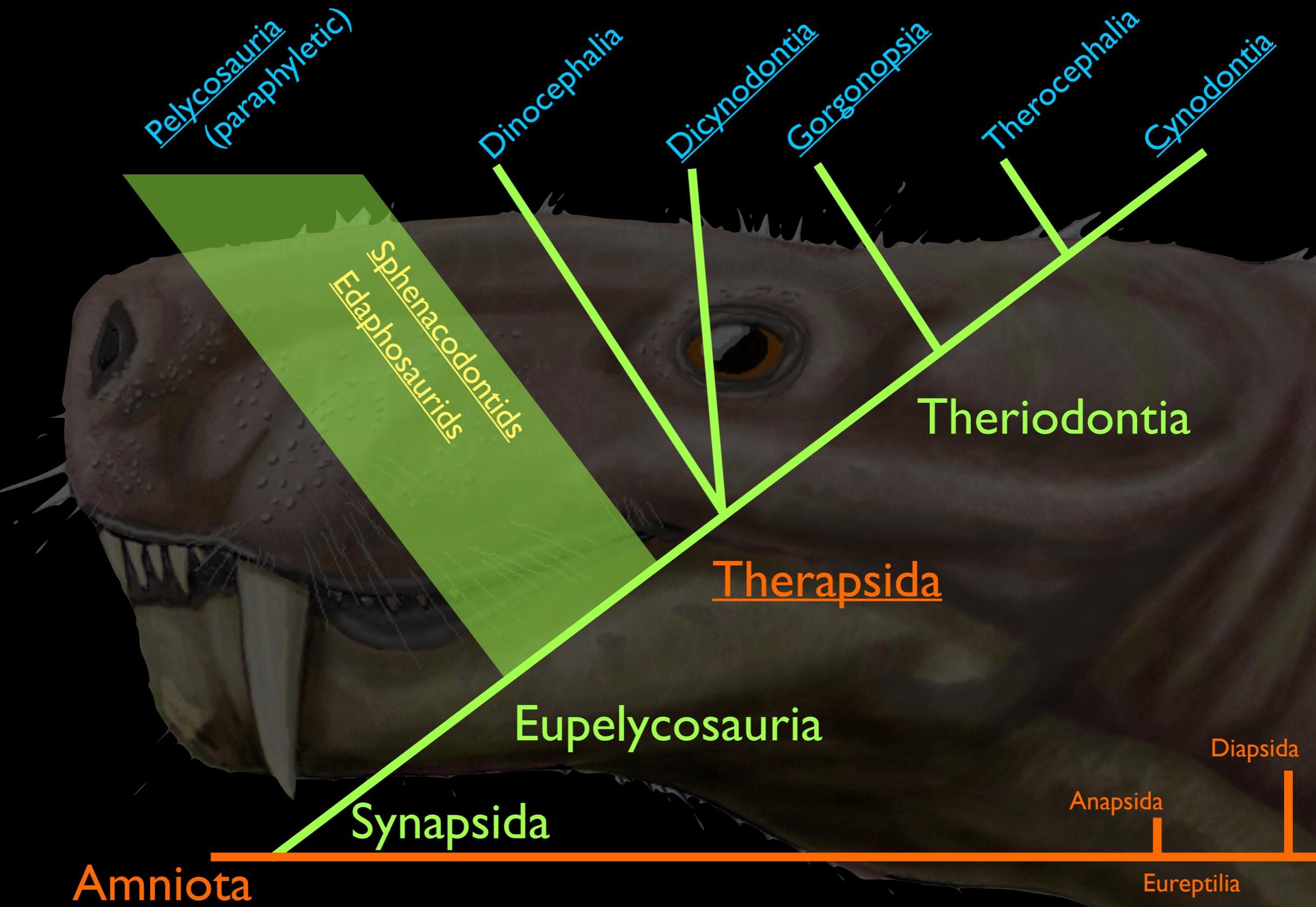
Platyhystrix (Temnospondyl)
Contemporary of Pelycosaurs
CONVERGENT EVOLUTION

Poikilotherms





Walking with Monsters
Chapter 2
11:58-18:06



Therapsids

-Late Permian



Tetraceratops

Basal Therapsid

enlarged temporal fenestra

reduction in palatal teeth

- **Basal**
- Dinocephalia
- Dicynodontia
- Gorgonopsids
- Mammal Ancest.



Biarmosuchus

Single prominent Canine tooth

Therapsids

-Late Permian

Late Permian

40 genera

Herbivores & Carnivores



Titanophoneus

Moschops

Largest terrestrial animal of the time
Placed hind legs directly under body
Headbutting?

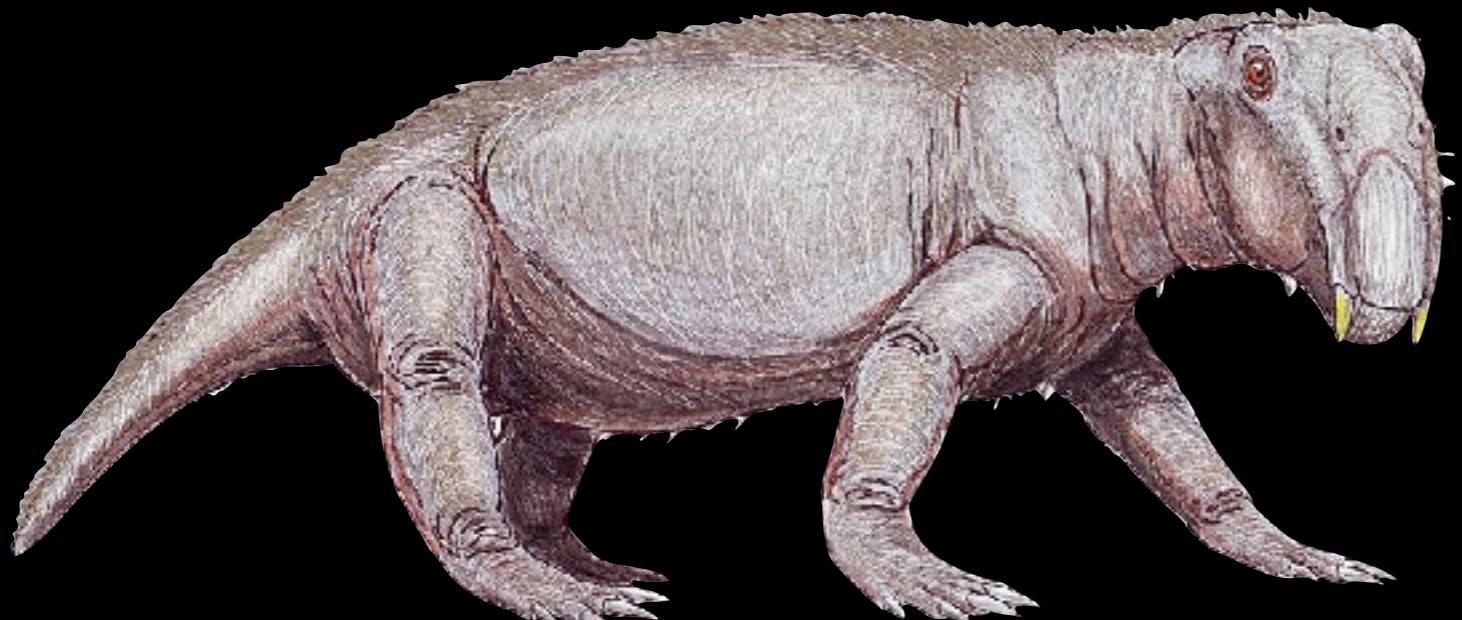


- Basal
- **Dinocephalia**
- Dicynodontia
- Gorgonopsids
- Mammal Ancest.

Therapsids

-Late Permian

- Basal
- Dinocephalia
- **Dicynodontia**
- Gorgonopsids
- Mammal Ancest.



Lystrosaurus



Wadiasaurus



Kingoria



Placerius

The last dicynodont: an Australian Cretaceous relict

Tony Thulborn^{1,2*} and Susan Turner^{1,3}

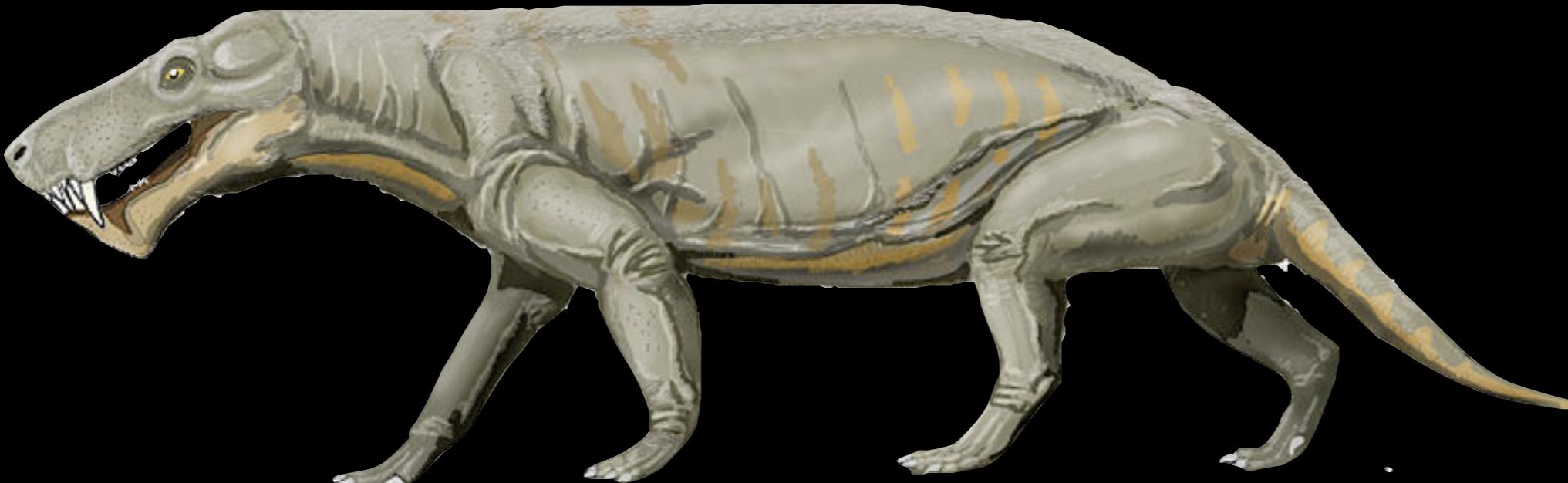


Walking with Monsters
Chapter 3
5:25-7:10

Therapsids

-Late Permian

- Basal
- Dinocephalia
- Dicynodontia
- **Gorgonopsids**
- Mammal Ancest.



Anapsids

-Late Permian

Pareiasaurs

-Vegetarians

Pelycosauria
(paraphyletic)

Dinocephalia

Dicynodontia

Gorgonopsia

Therocephalia

Cynodontia

Sphenacodontids
Edaphosaurids

Theriodontia

Therapsida

Eupelycosauria

Anapsida

Synapsida

Amniota

Eureptilia

Diapsida

Anapsids
-Late Permian
Pareiasaurs
-Vegetarians

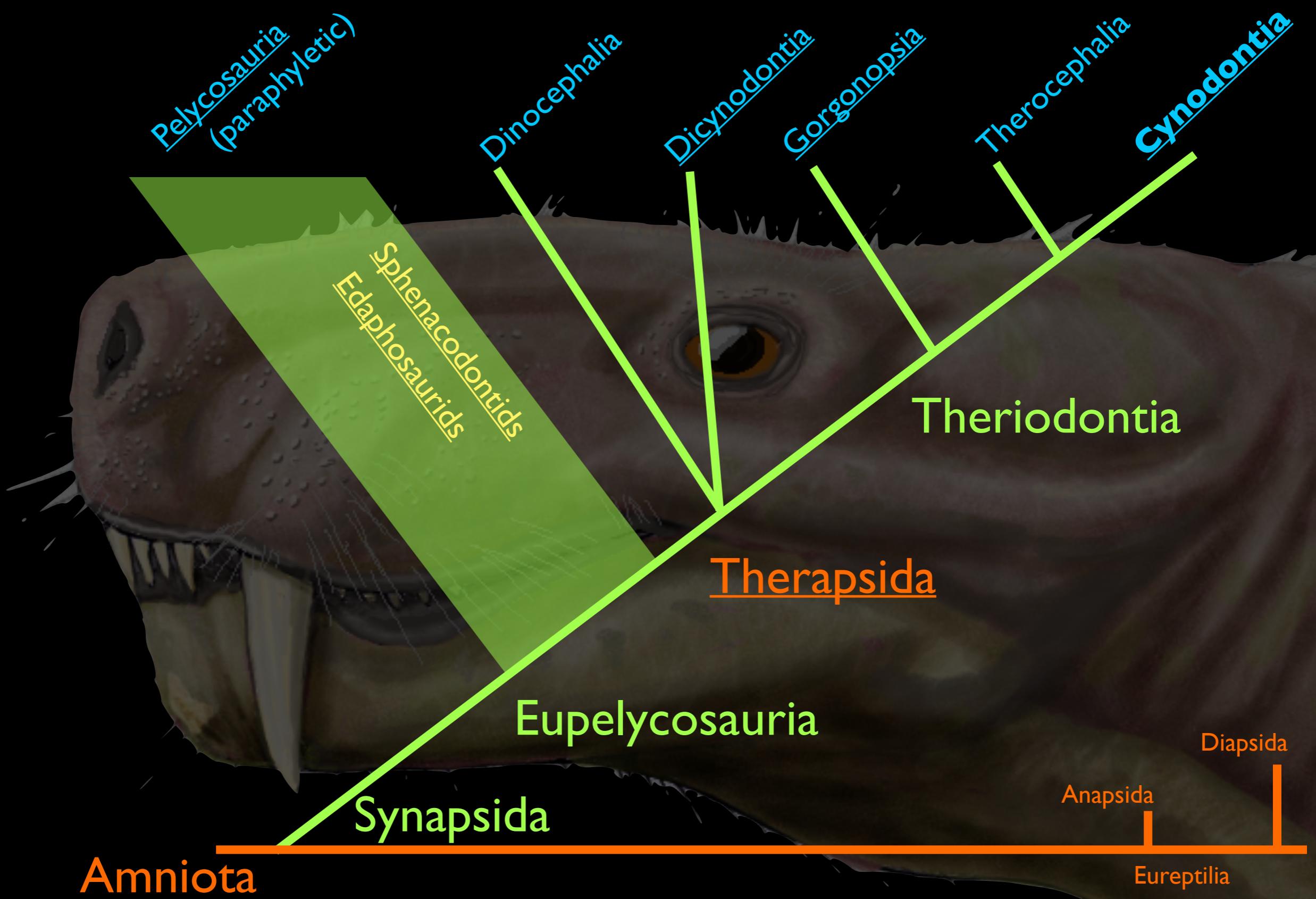


Scutosaurus





Walking with Monsters
Chapter 3
1:00-4:00



Therapsids

-Late Permian

- Basal
- Dinocephalia
- Dicynodontia
- Gorgonopsids
- **Mammal Ancest.**



Cynodontia

Hey Great* $|10^7$ Grandma!

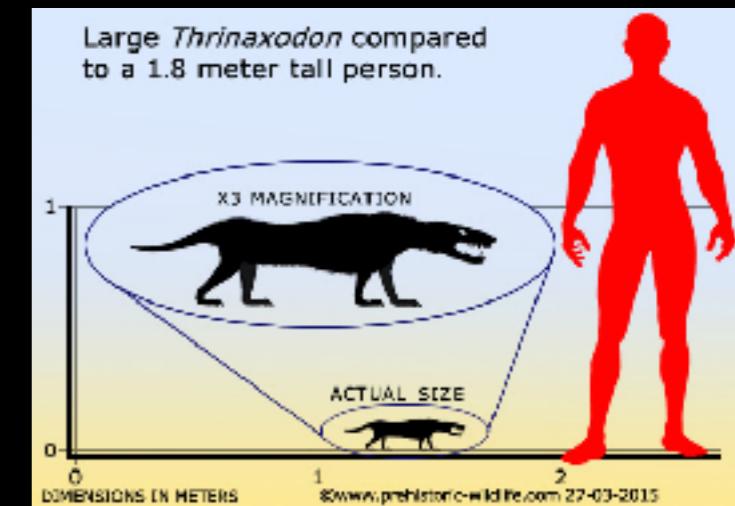


Cynodontia



Thrinaxodon (Cynodont)

Blood vessel channels on premaxillae, maxillae
~vibrassae (whiskers)
(early Triassic)



Sprawling posture

One of the few predators of its time

Unique secondary palate separated nasal passages from mouth

What is the benefit of this?





Synapsida

Anapsida



Lepidosauria



Archosauria

Diapsida

Eureptilia

Amniotes