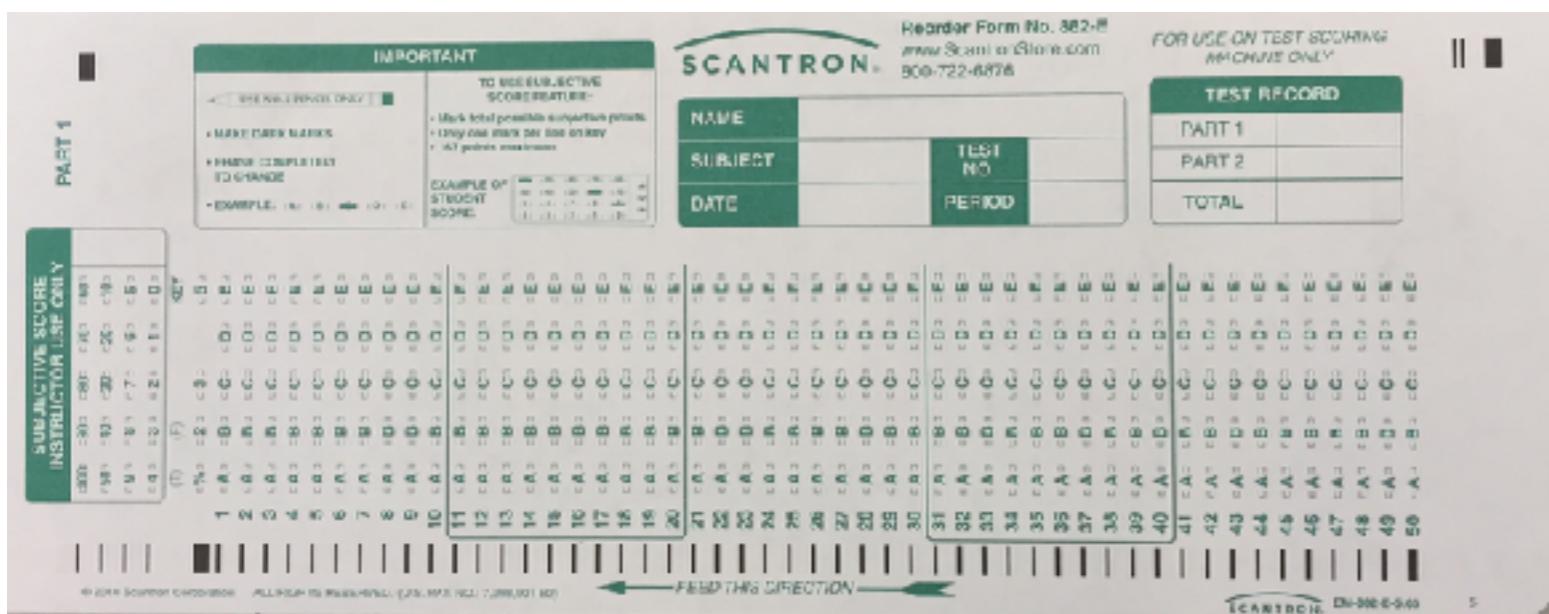
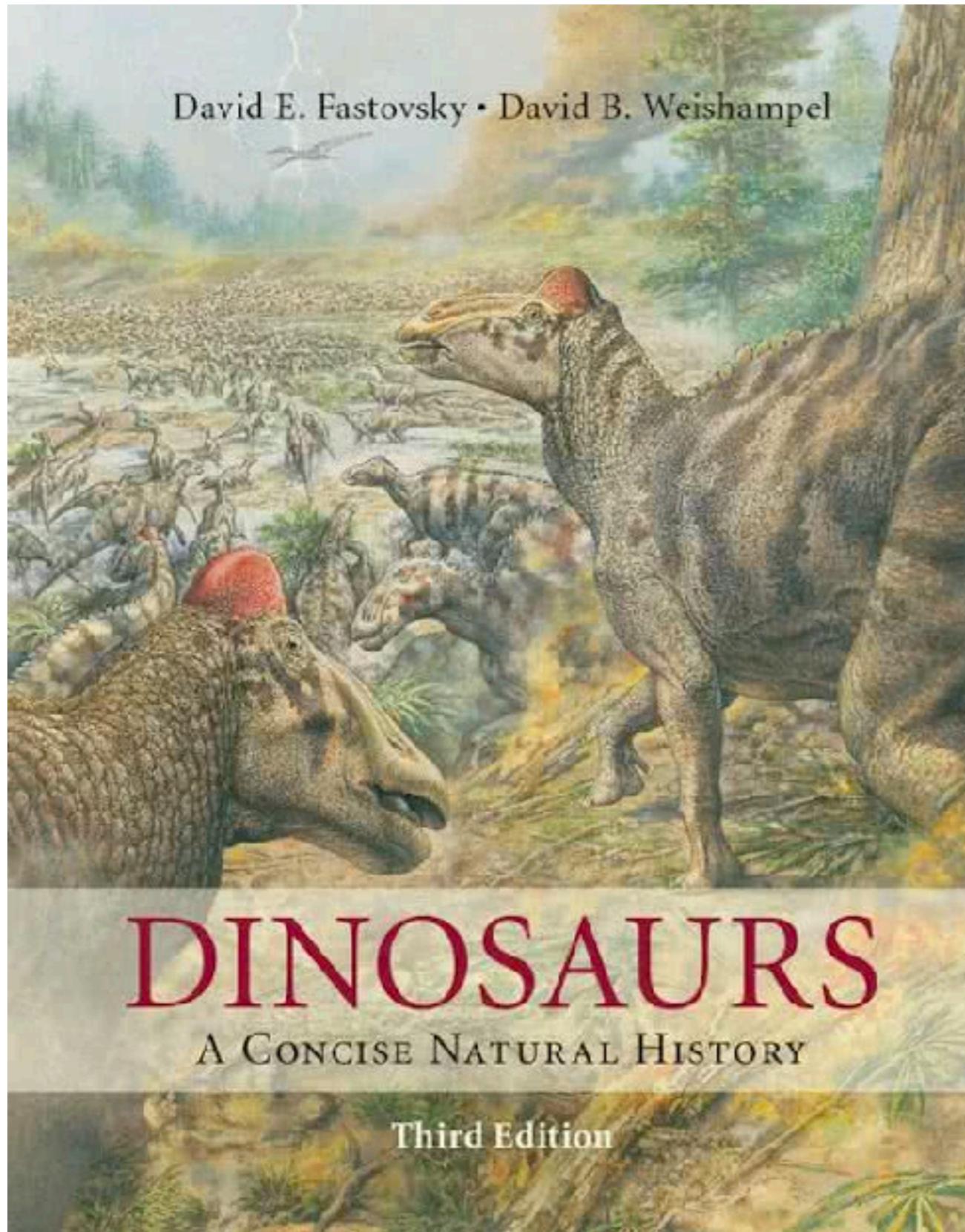


# CHANGE TO THE SYLLABUS AND EXAM DATE

Today: Finish intro to Dinosauria and review

## Monday (2/12): EXAM I





Exam 1 will cover:

**Chapter 1: To catch a Dinosaur**

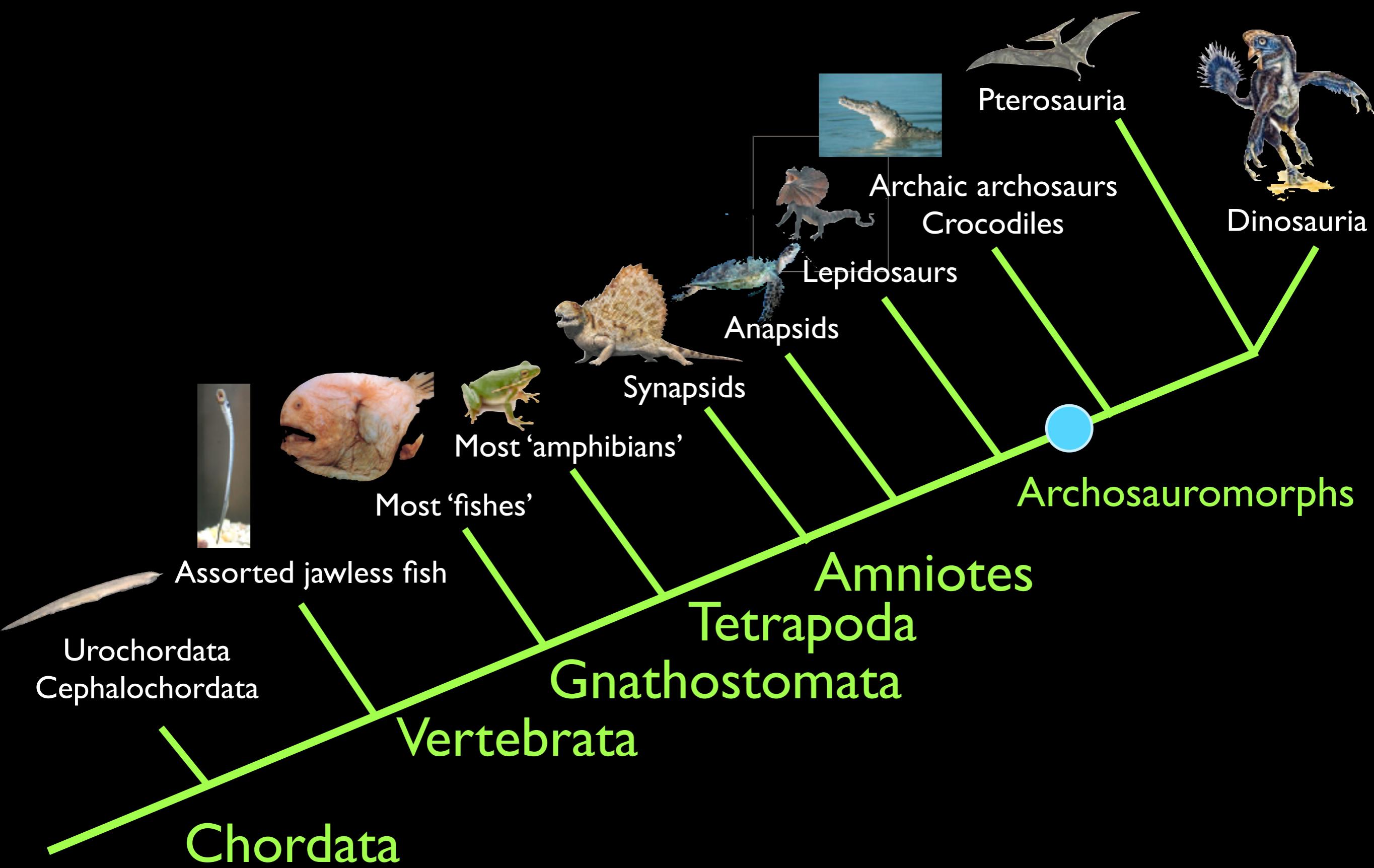
**Chapter 2: Dinosaur days**

**Chapter 3: Who's related to whom?**

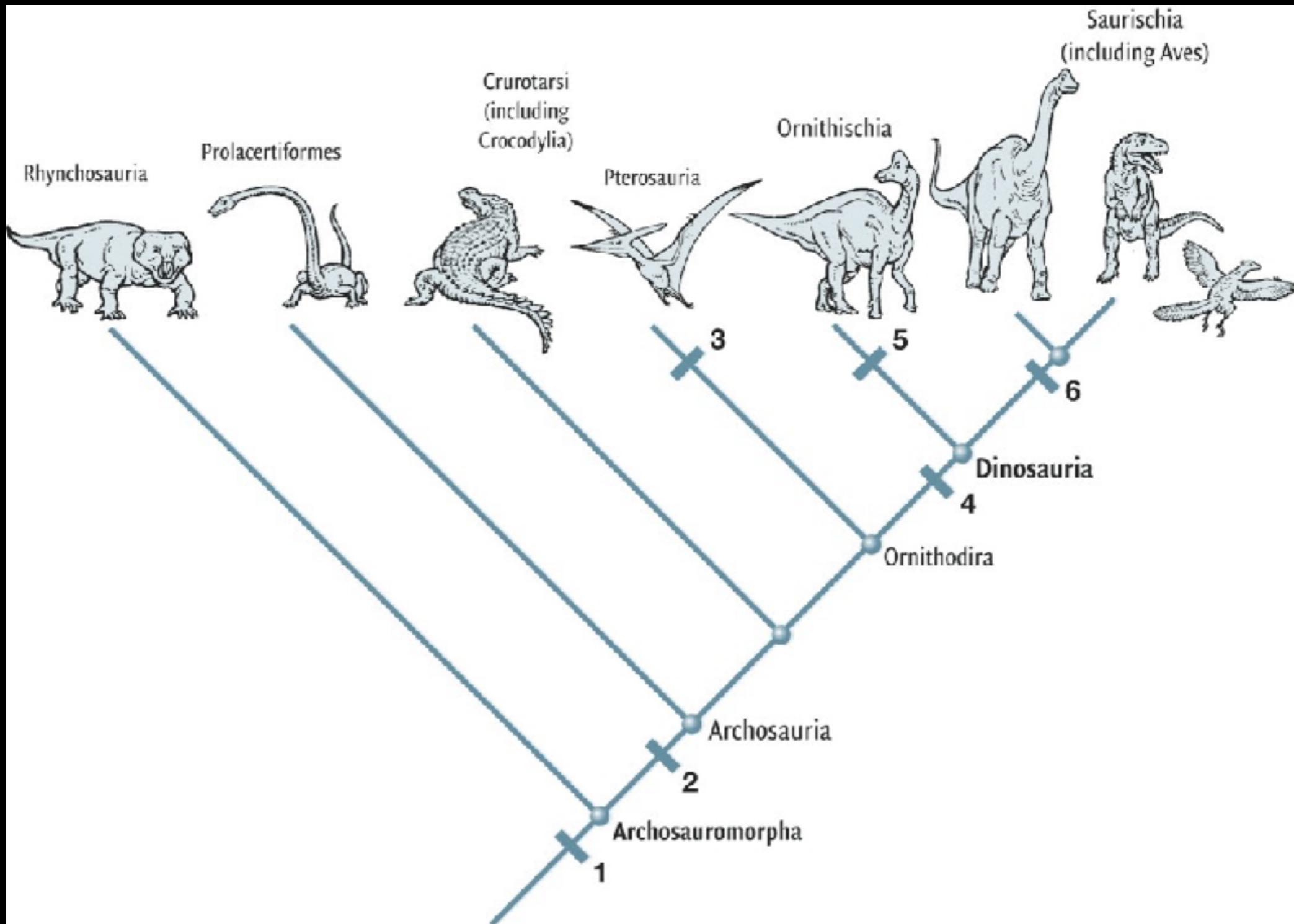
**Chapter 4: Who are the dinosaurs?**

**Chapter 5: Dinosaurs in the beginning**

**Part III: Intro to Ornithischia (pgs 227-**



# The RISE of the ARCHOSAUROMORPHS!



# Rhynchosauria

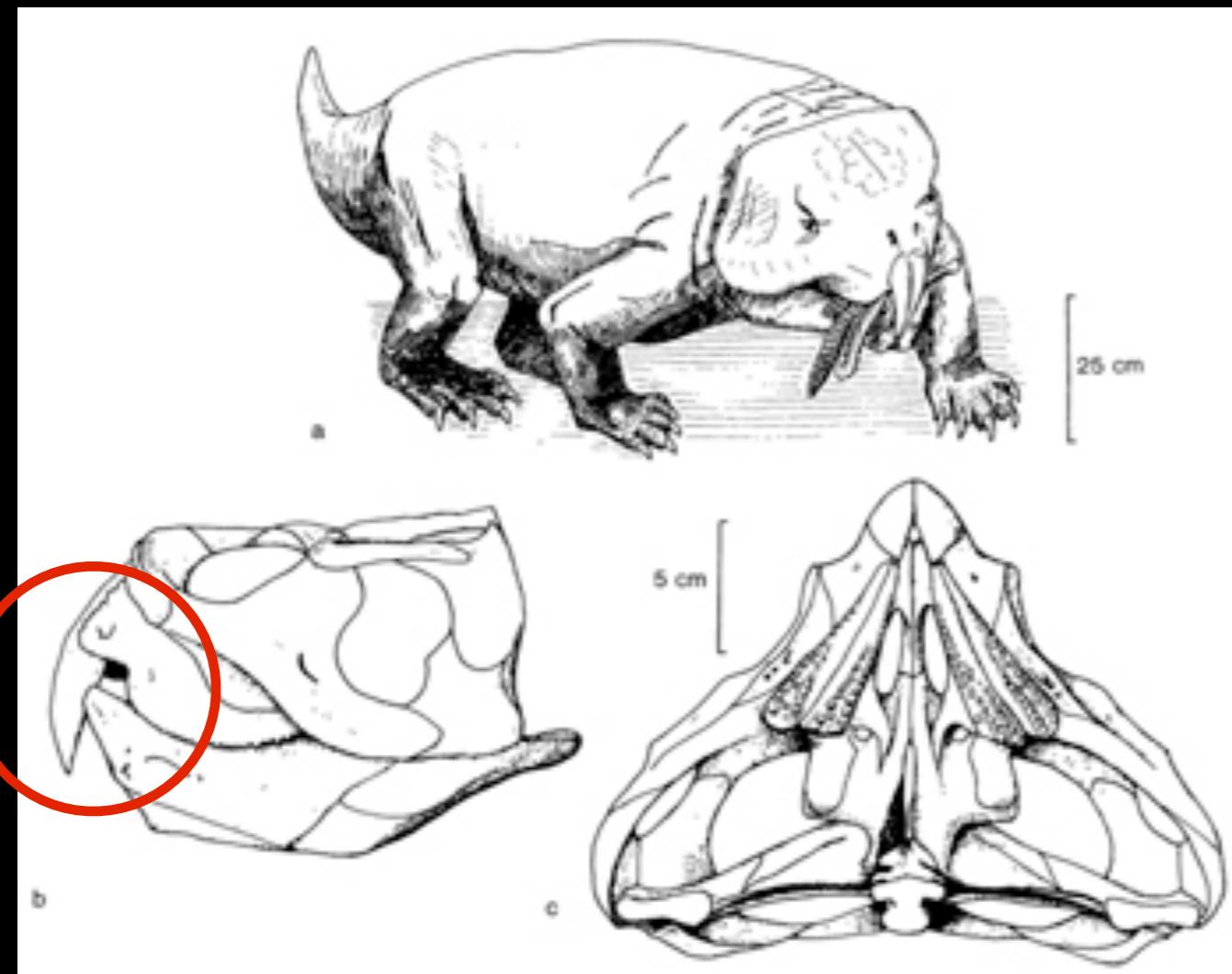
early Triassic

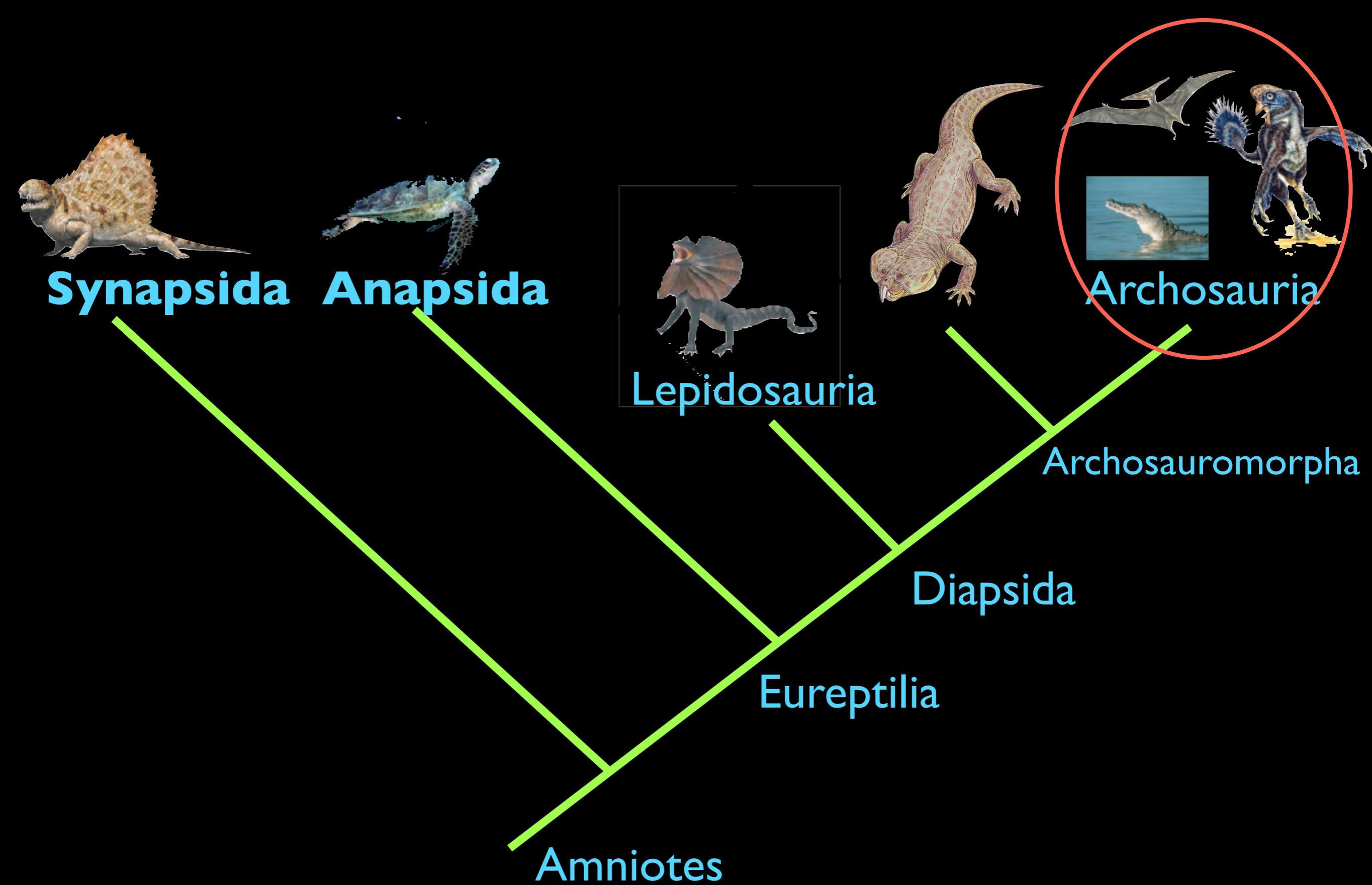
VERY abundant

Herbivorous

Pen-Knife Premaxilla/Dentary vs. 'rostral bone'

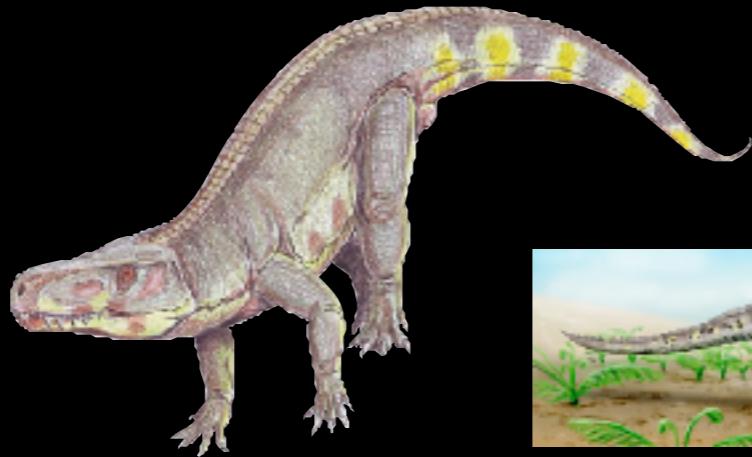
Precision Shear







Crocodylomorpha



“Rauisuchia”



Ornithosuchidae



Pterosauria

Dinosauria

Crurotarsi

Basal archosaurs

Ornithodira

Crown-clade Archosauria

Archosauria

# Archosauria: synapomorphies

Antorbital fenestra (in front of eye)

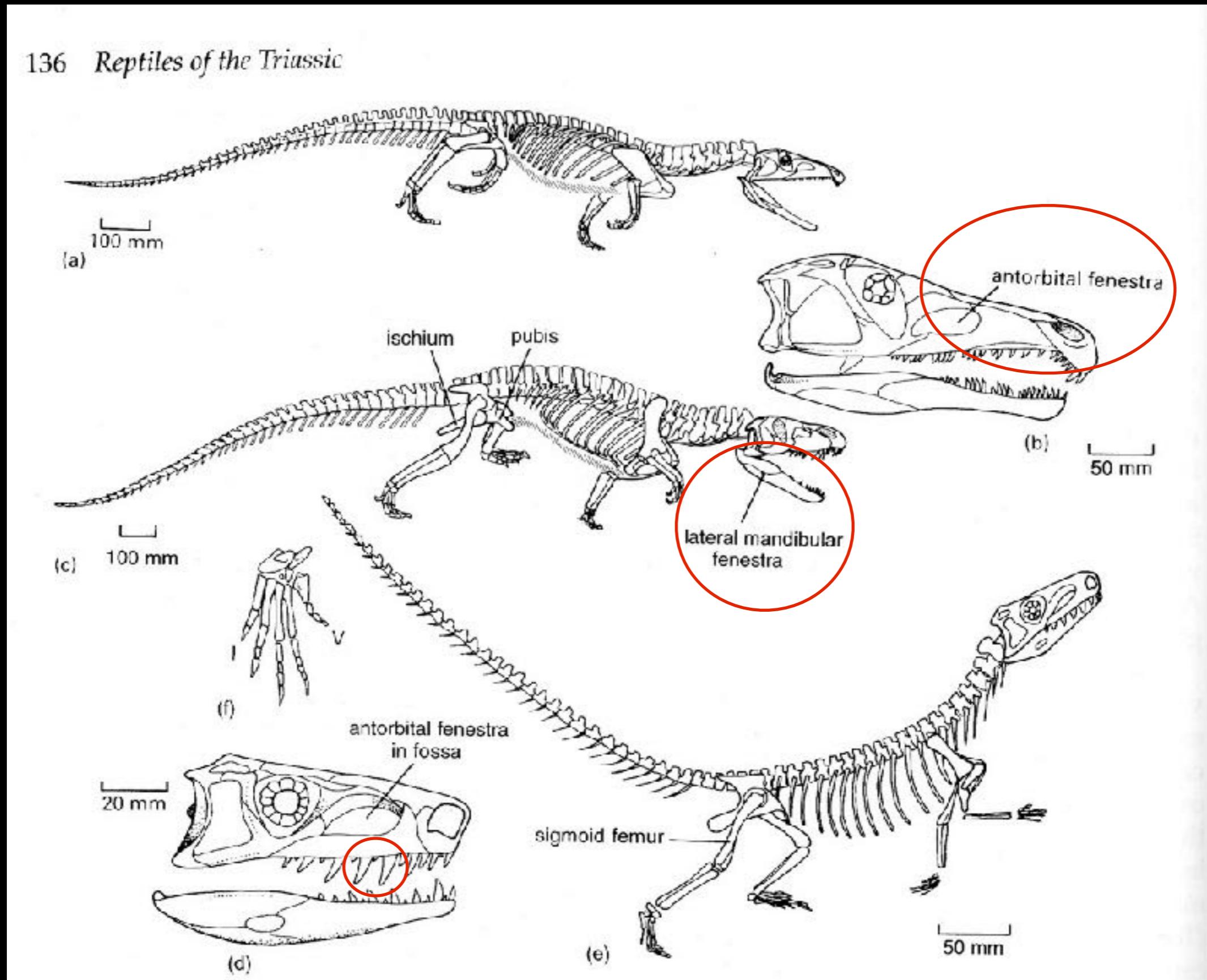
Teeth with serrated margins

Mandibular fenestra



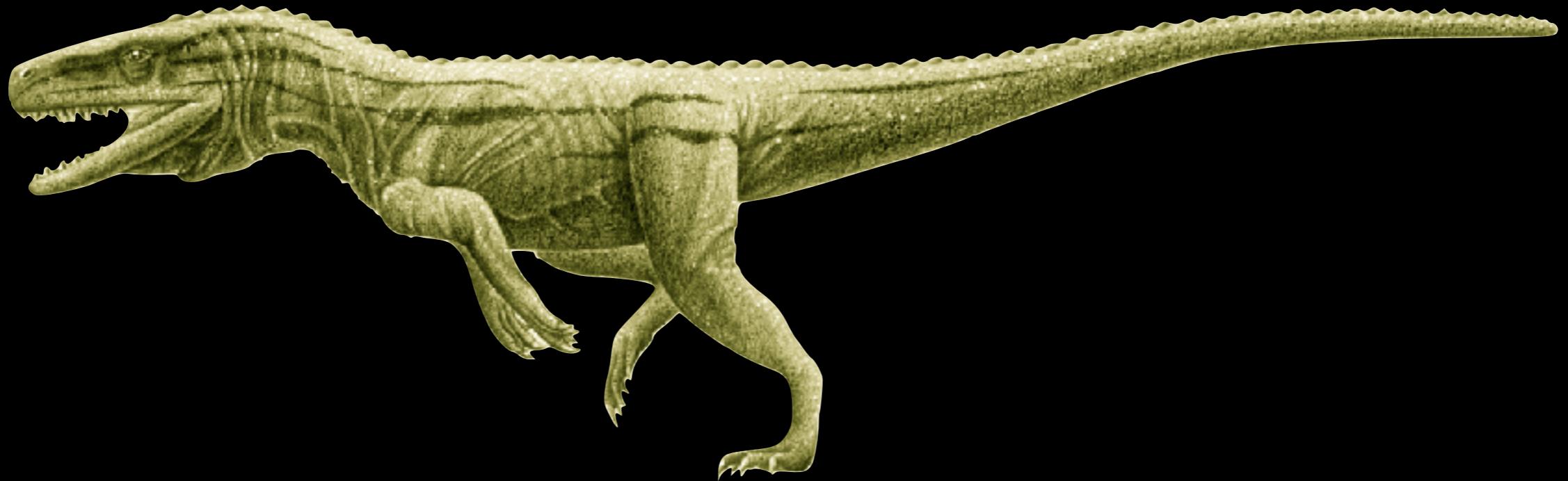
*Proterosuchus*

Basal Archosaur



**Fig. 6.2** Early Triassic archosaurs: (a, b) the proterosuchid *Proterosuchus*, skeleton in running posture, and skull; (c) the erythrosuchid *Vjushkovia*, skeleton in running posture; (d-f) the agile *Euparkeria*, skull in lateral view, skeleton, and foot. [Figures (a, c) based on Greg Paul, in Parrish 1986; (b) after Cruickshank, 1972; (c-f) after Ewer, 1965.]

## Facultative biped vs. Obligate biped



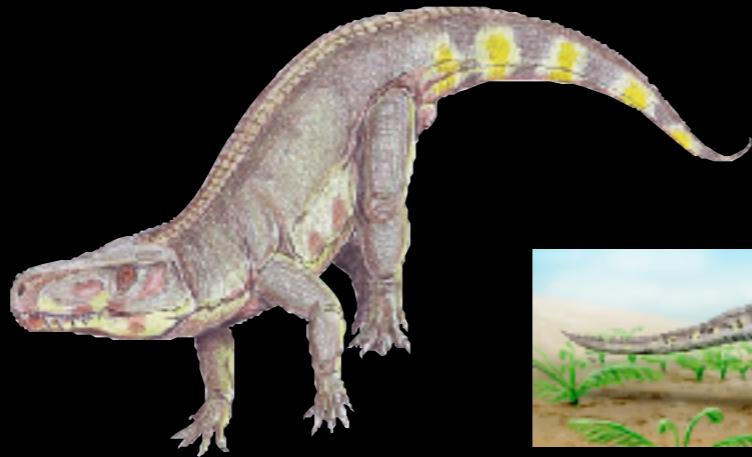
*Euparkeria*

Derived, Basal Archosaur

Bony dermal plates down back



Crocodylomorpha



“Rauisuchia”



Ornithosuchidae



Pterosauria

Dinosauria

Crurotarsi

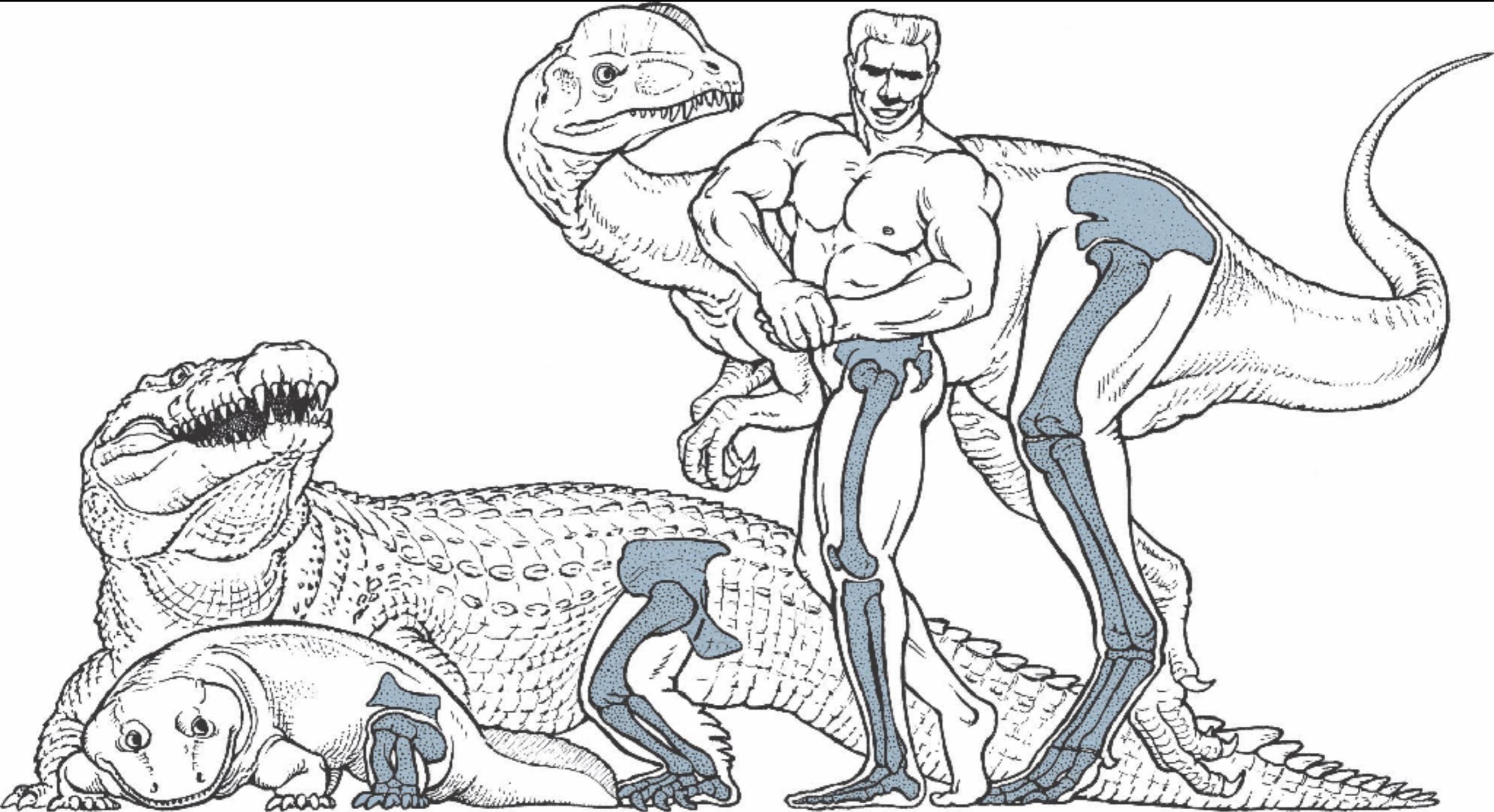
Basal archosaurs

Crown-clade Archosauria



Archosauria

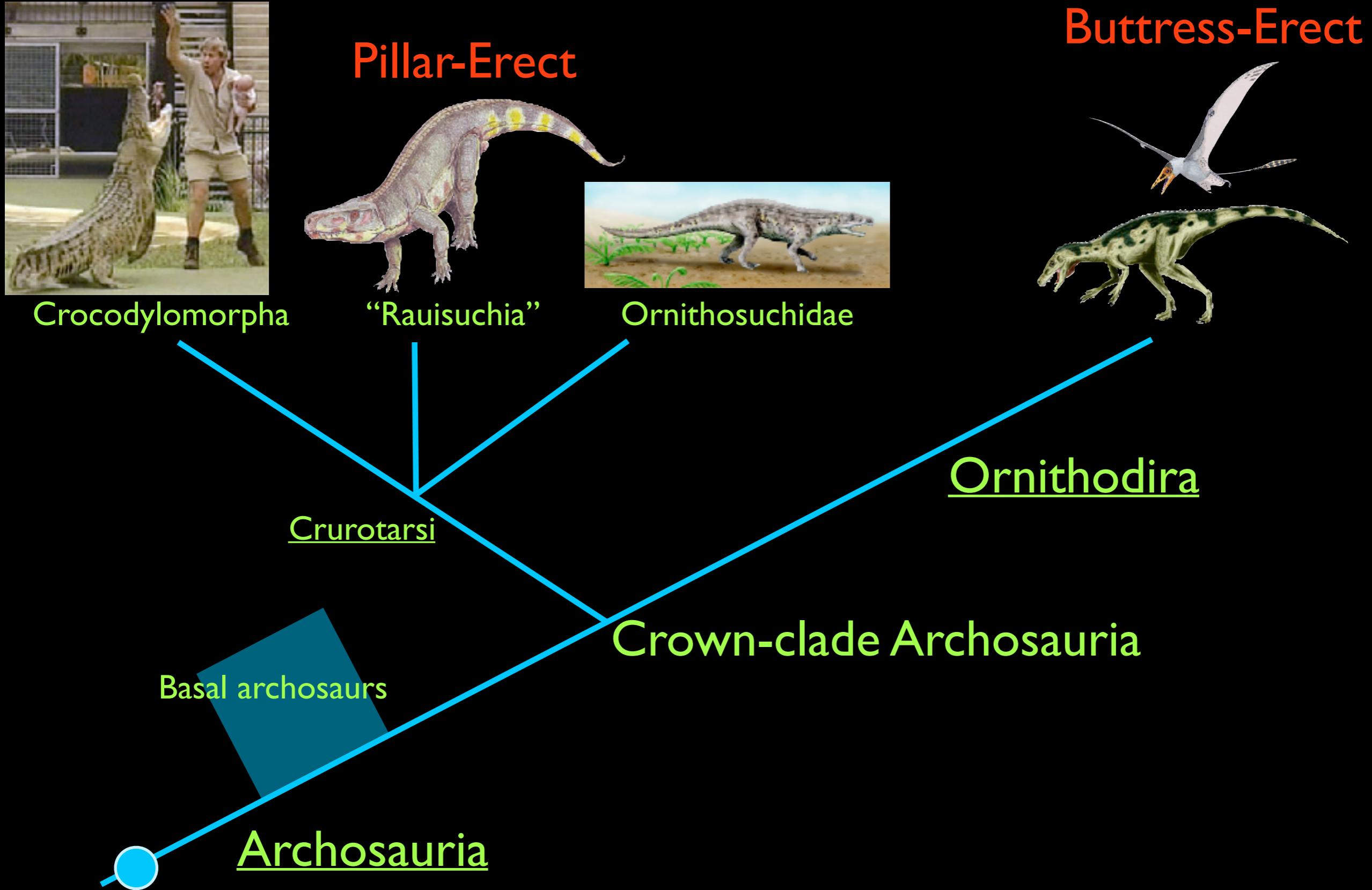
Stances:  
sprawling <=> semi-erect <=> erect  
aquatic <=> terrestrial



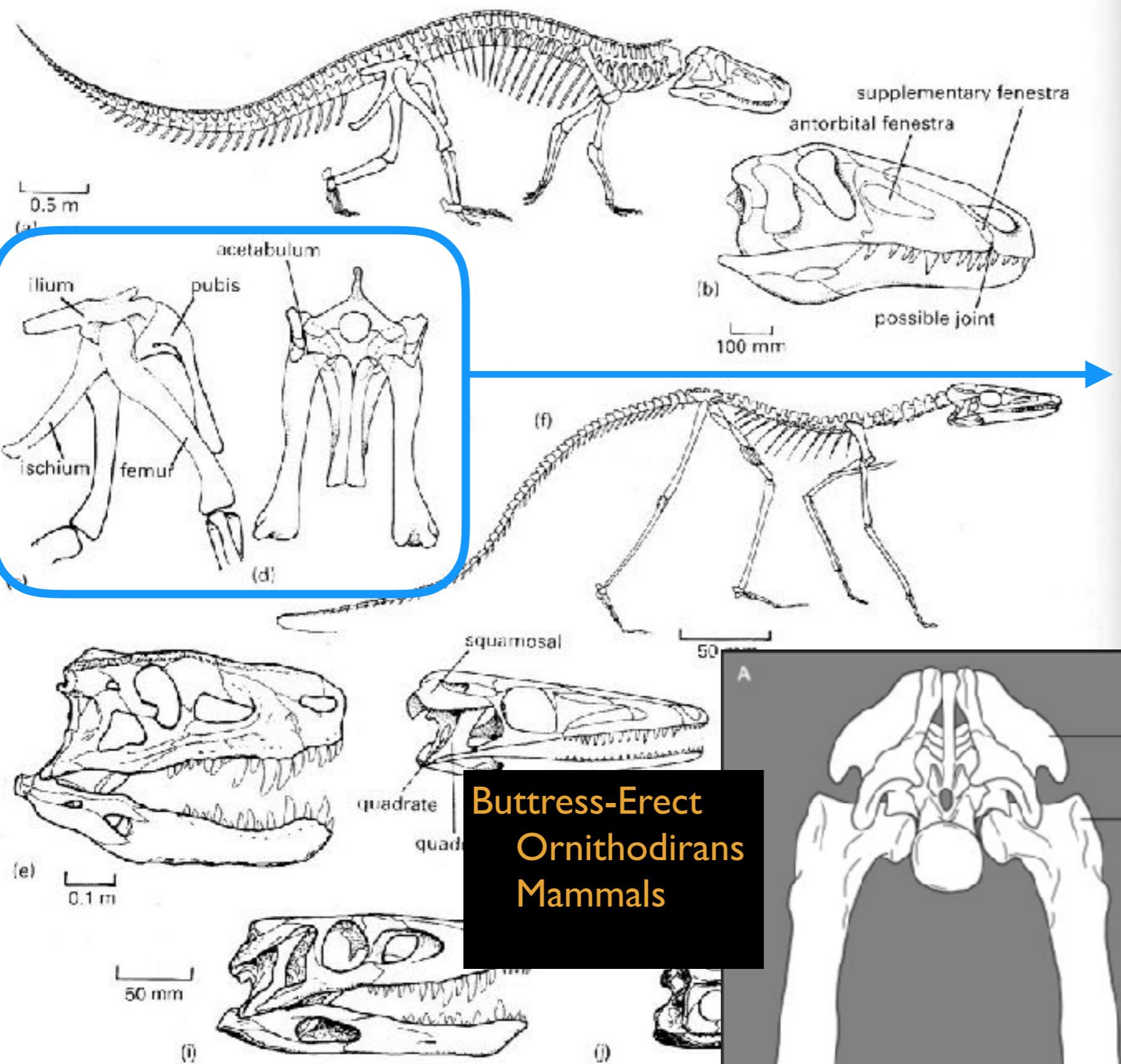


5reb.com

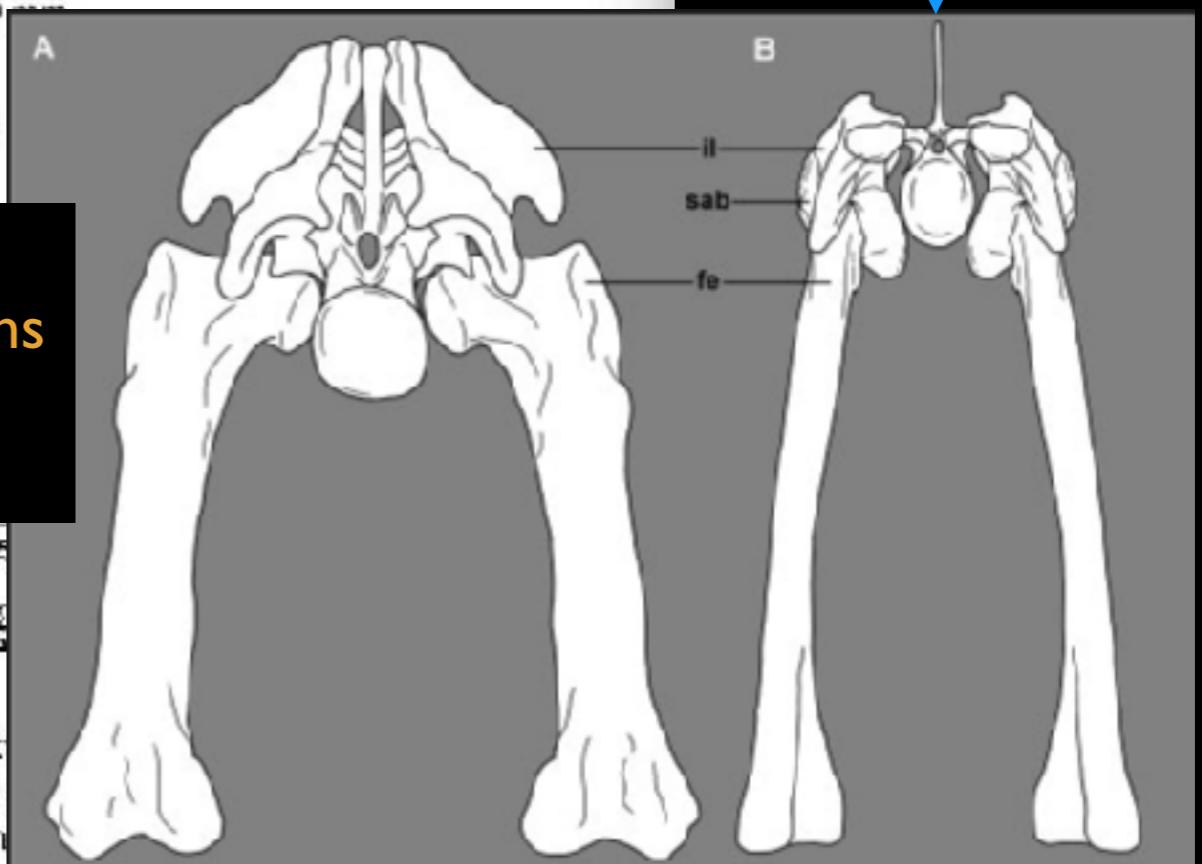
# Locomotion: Pelvic/Hind leg conditions:



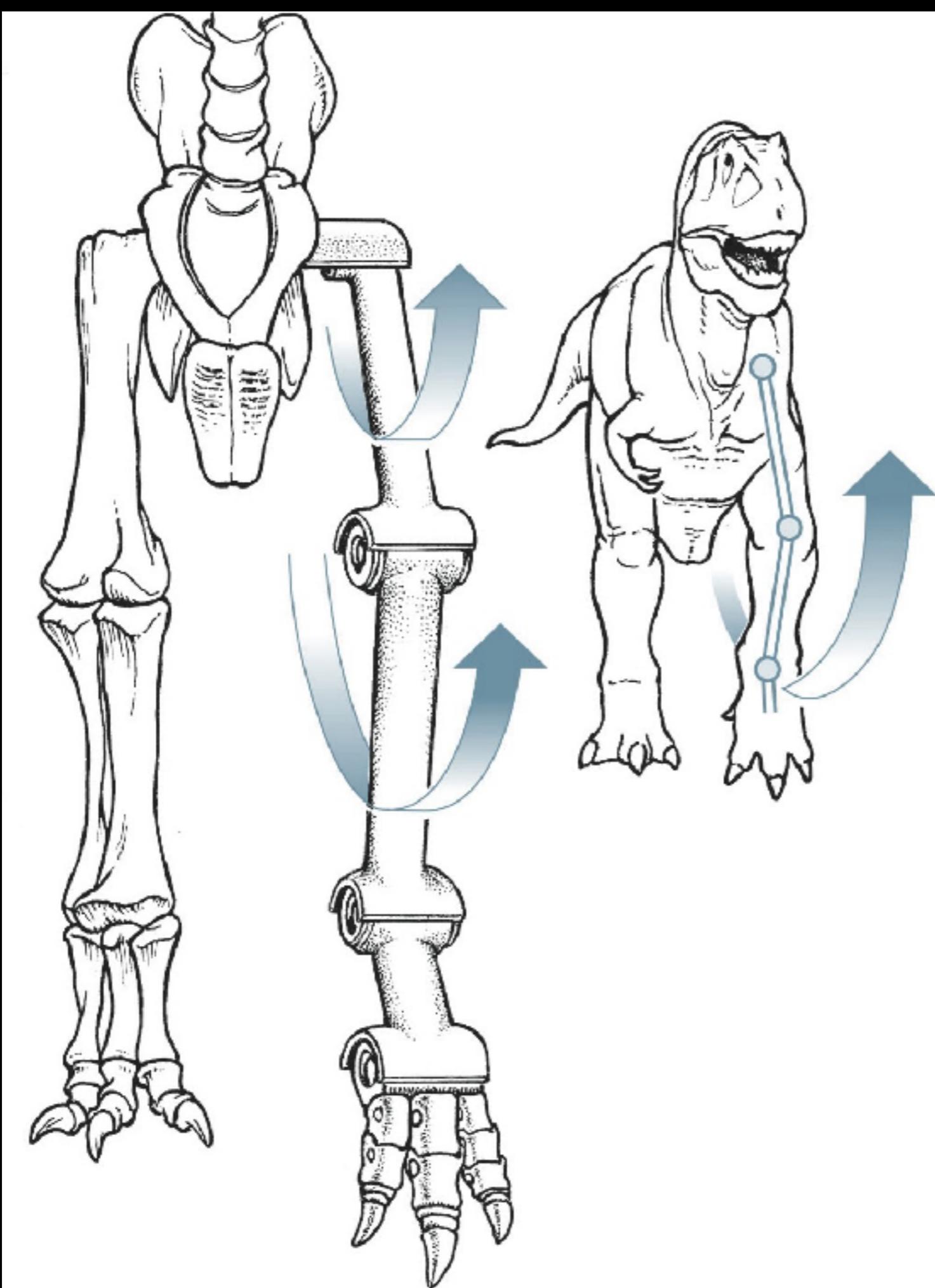
# Locomotion (Pelvis)



Rauisuchians  
-Pillar-Erect Posture



**Fig. 6.4** The rauisuchid *Saurosuchus*: (a) skeleton in walking pose; (b) skull and hind limbs in lateral and anterior views to show the 'pillar erect' skull in lateral view; (f-h) the saltoposuchid *Terrestrisuchus*, skeleton, anterior view; (i, j) the sphenosuchid *Sphenosuchus*, skull in lateral and dorsal views. [Figures (a-d) after Bonaparte, 1981; (e) modified from Murry and Long, 1995; (f-h), after Crush, 1984; (i, j) modified from Walker, 1990.]



Barrel-like articulation  
Constrained 'twisting'  
motion to the plane  
parallel with its body

Digitigrade  
vs.  
Plantigrade

Crocodylomorpha

Late Triassic

*Terrestrisuchus*

*Saltoposuchus*

BIPEDAL!/TERRESTRIAL!



*Terrestrisuchus*



*Saltoposuchus*

A return to aquatic environments was more recent for crocodylomorphs

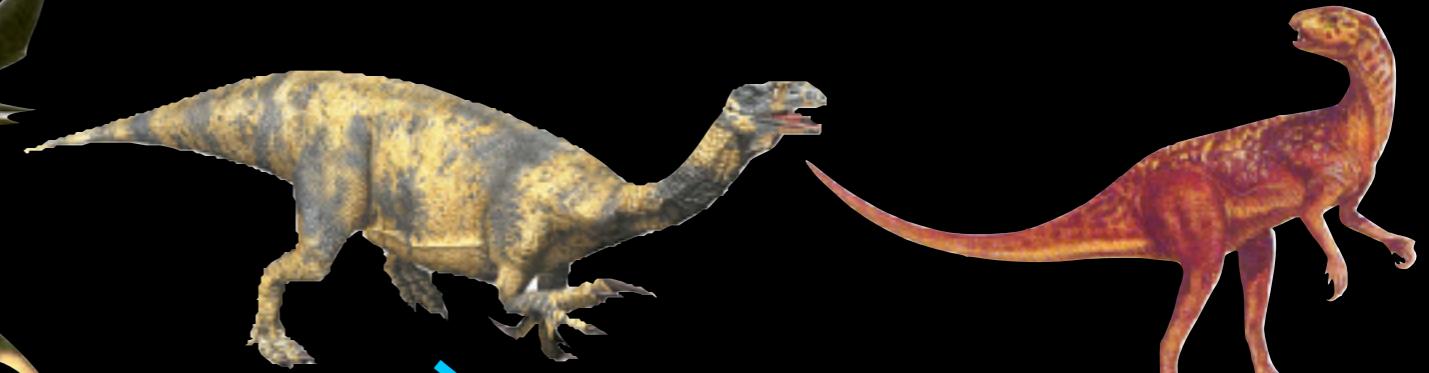


Pterosauria

(later)

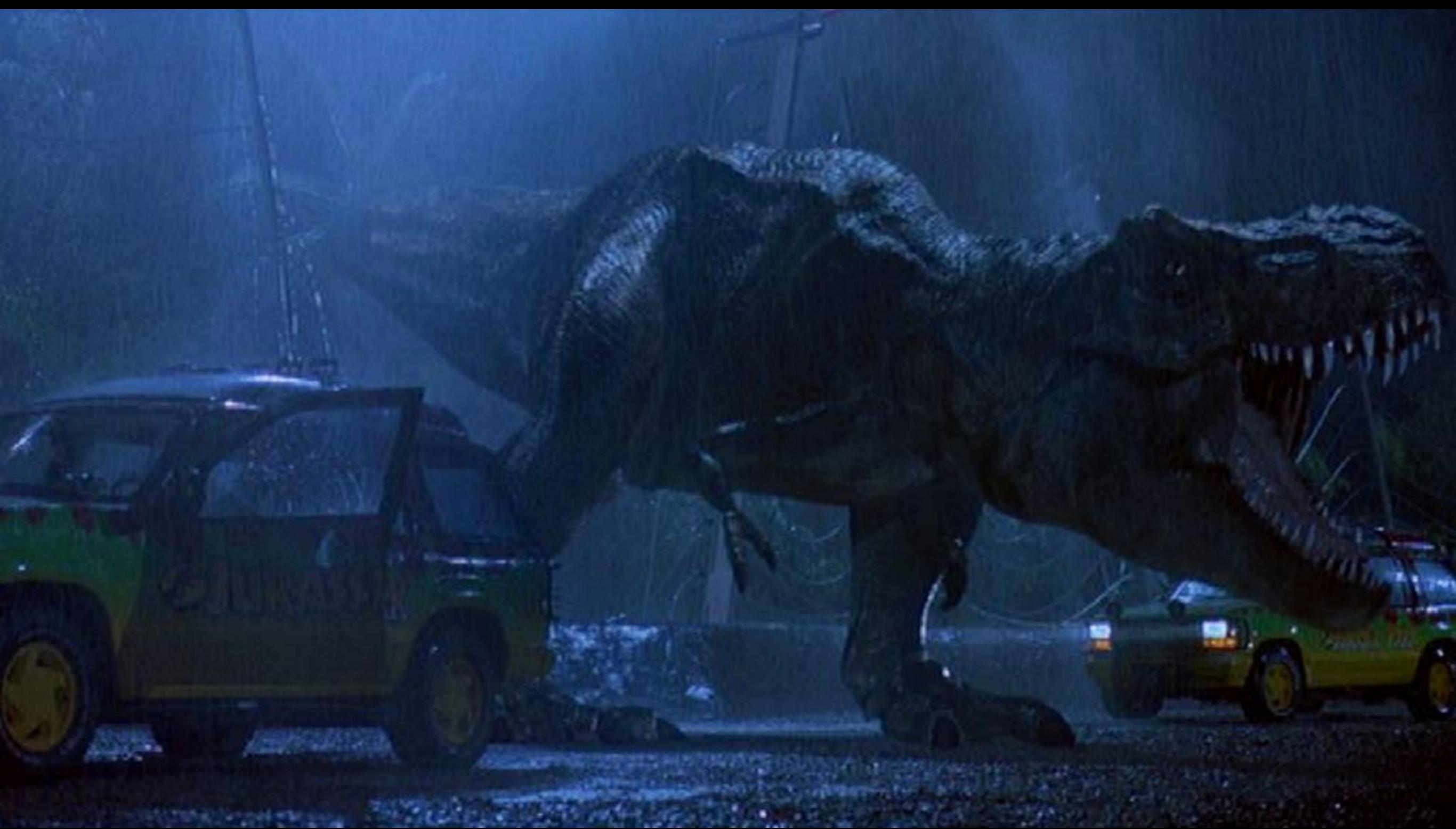
Saurischia

Ornithischia

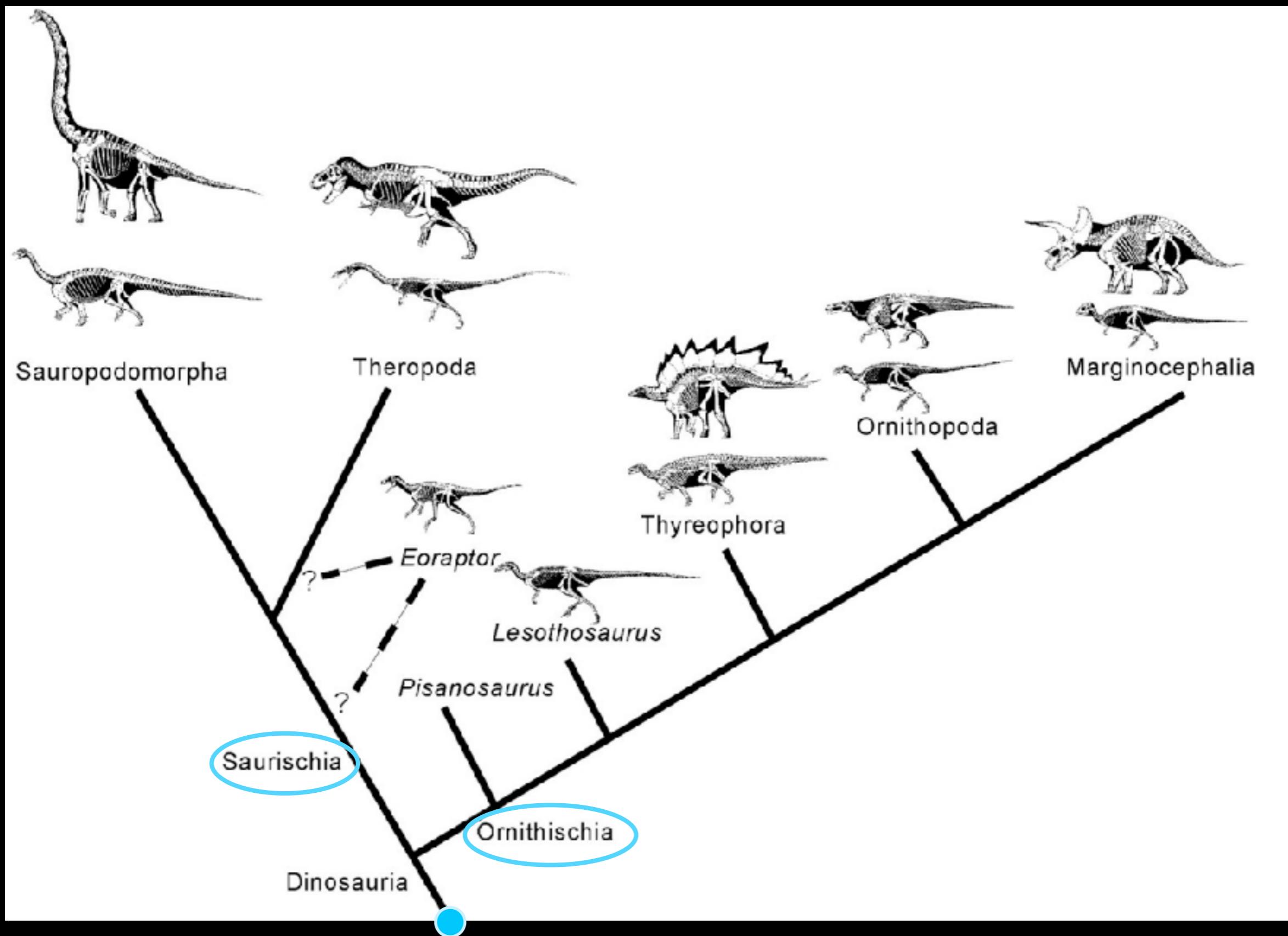


Dinosauria

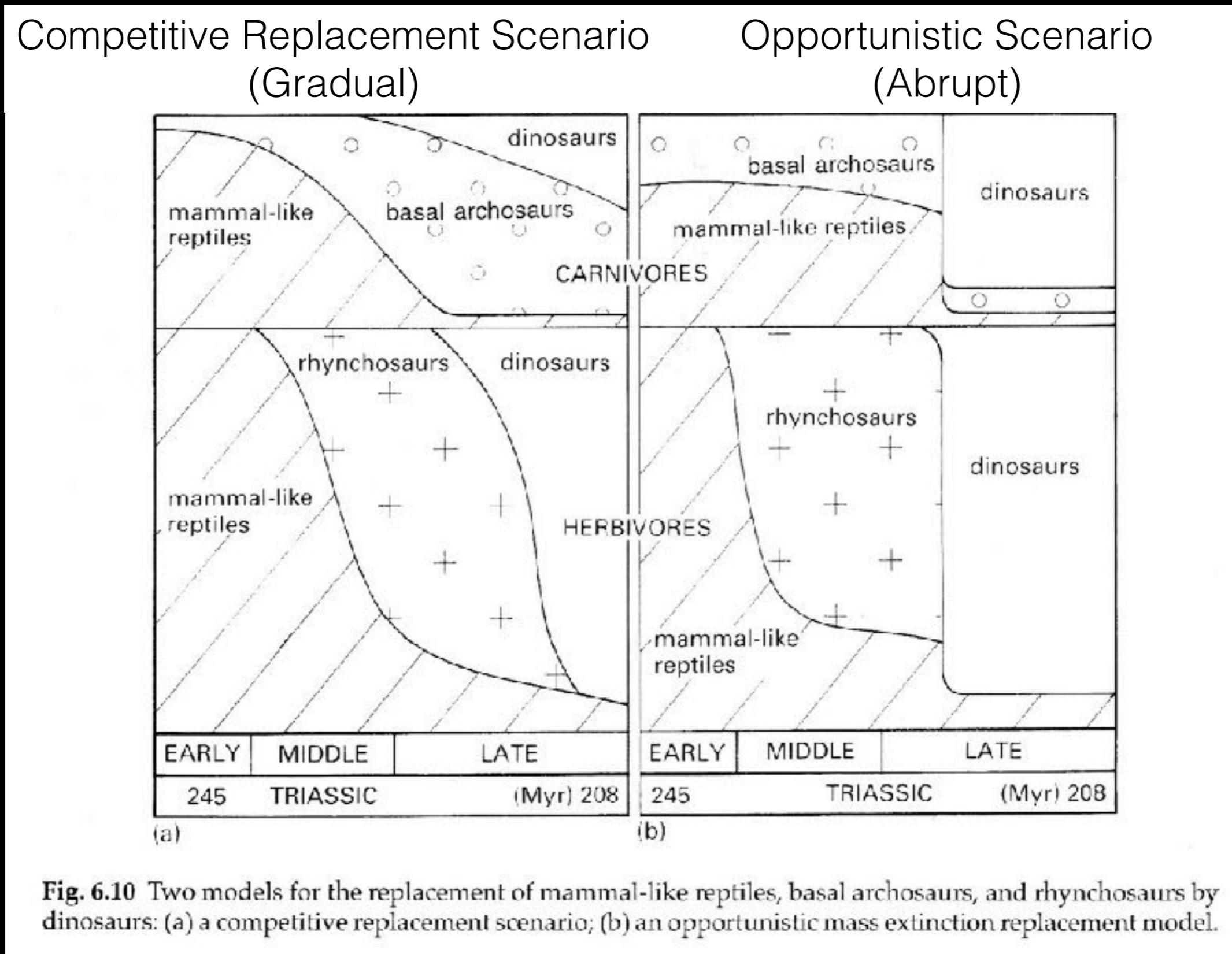
Ornithodira



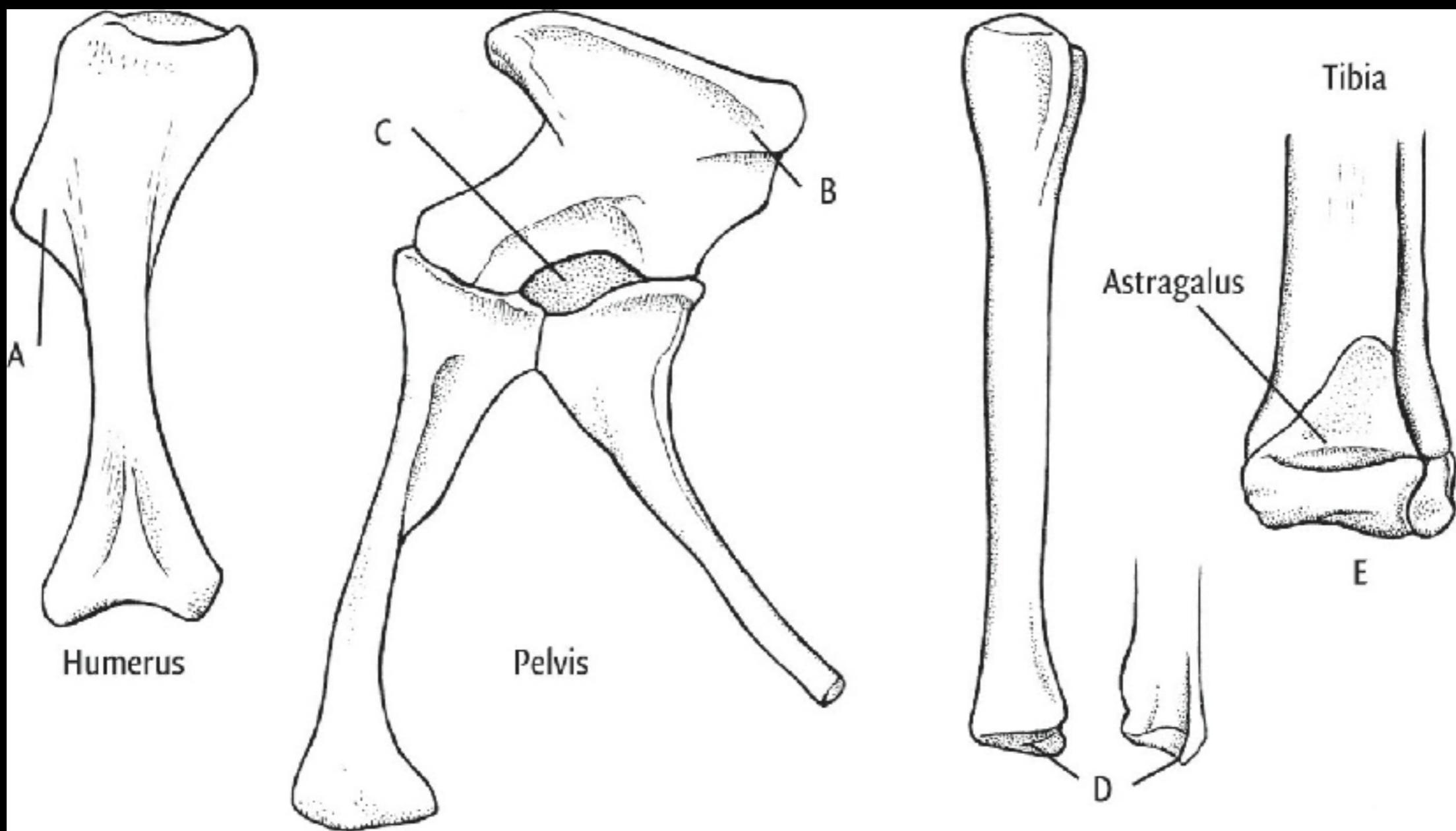
# DINOSAURS



# Dinosaur expansion: multiple models



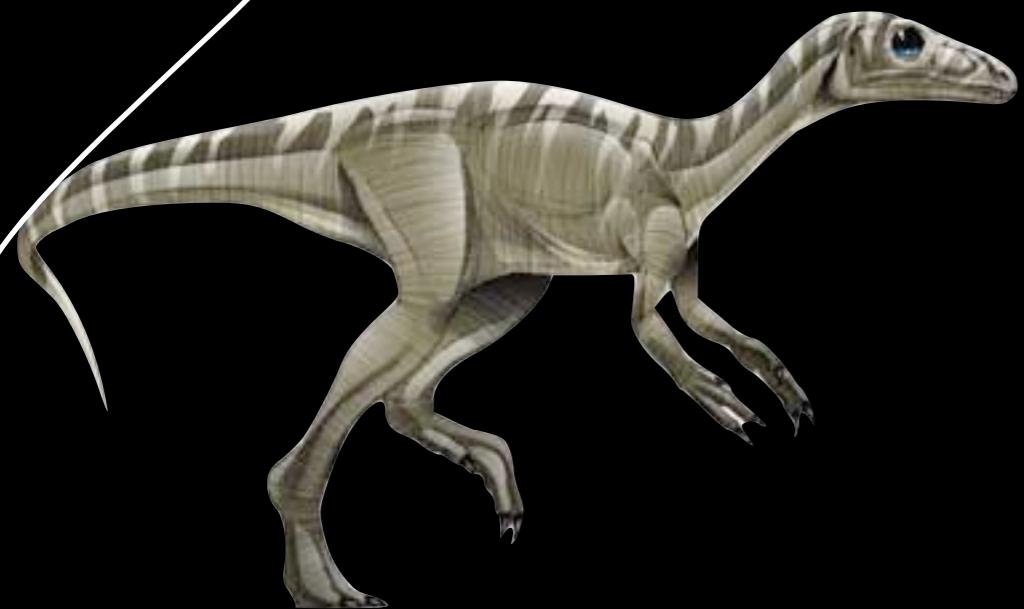
**Fig. 6.10** Two models for the replacement of mammal-like reptiles, basal archosaurs, and rhynchosaurians by dinosaurs: (a) a competitive replacement scenario; (b) an opportunistic mass extinction replacement model.



## Dinosaur synapomorphies

- A) Crest on humerus
- B) Shelf on top surface of ilium
- C) Perforated acetabulum
- D) Tibia w/ expanded end
- E) Ascending astragalar process on front surface of tibia

## Basal Dinosaurs



*Eoraptor*



*Pisanosaurus*



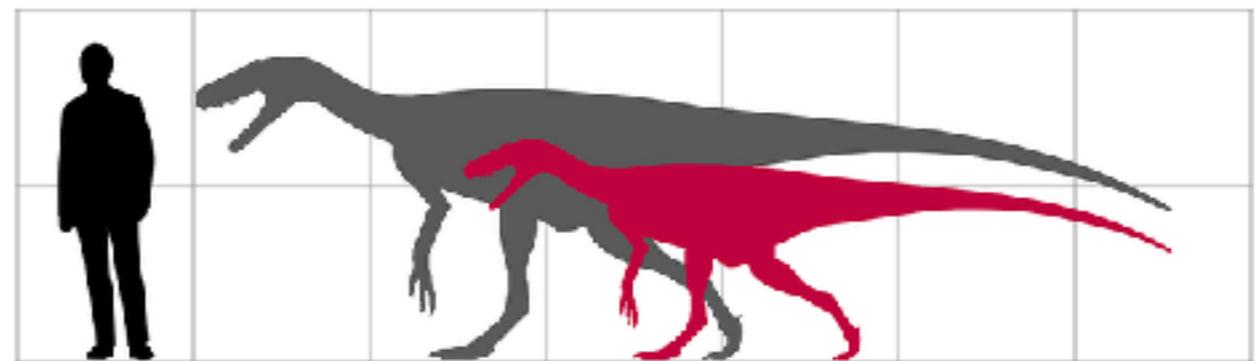
*Herrerasaurus*



*Coelophysis*

Saurischia

# Herrerasaurus

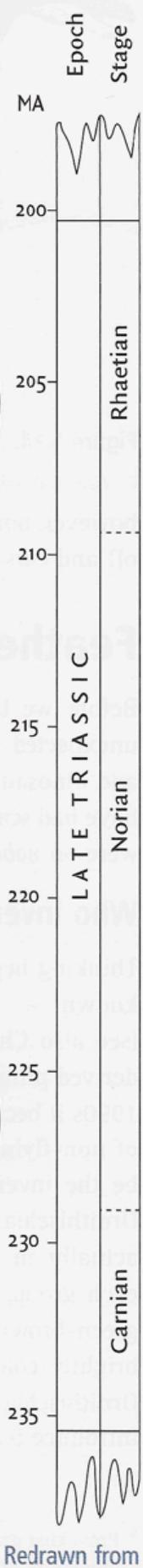
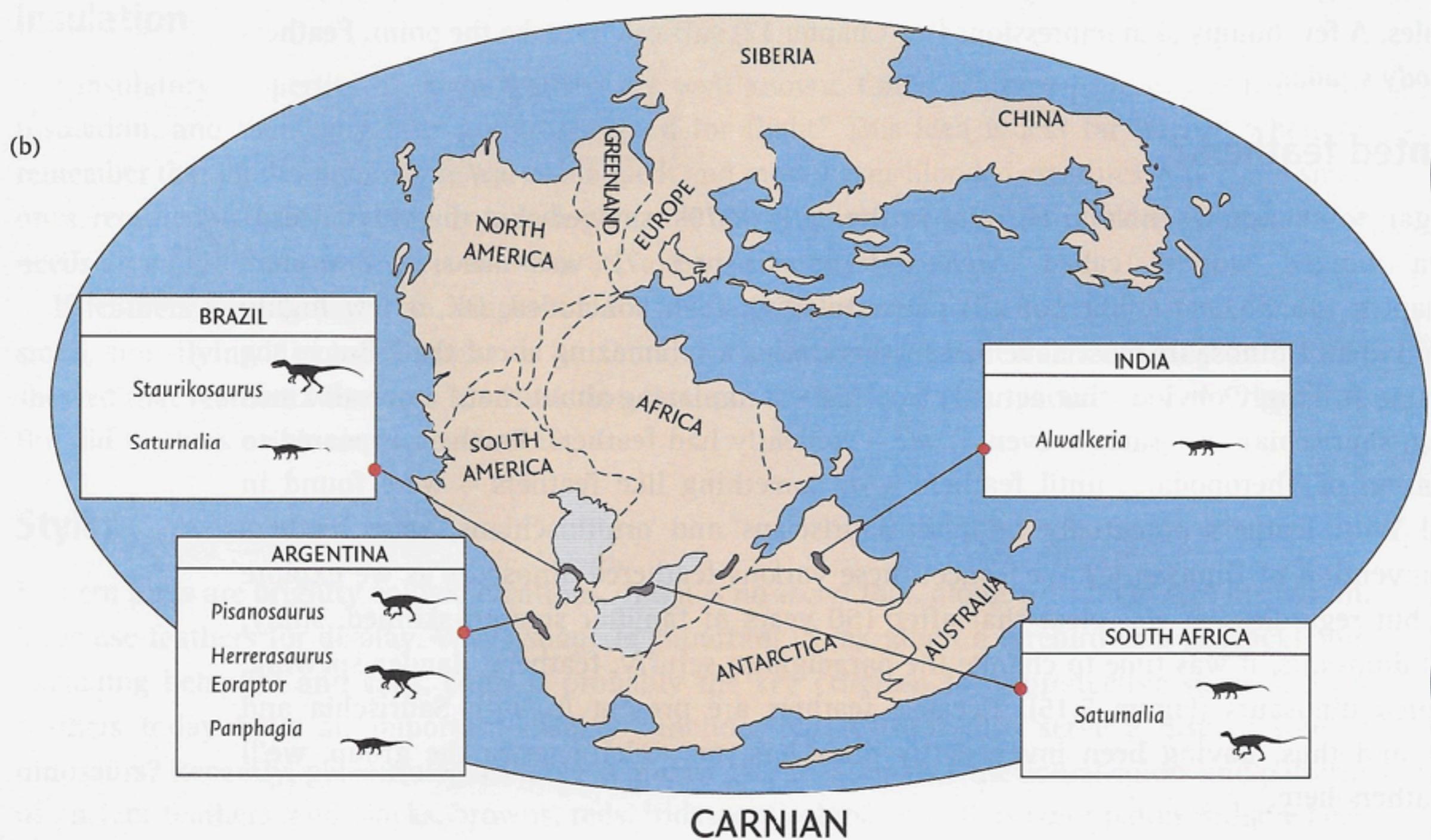


Hunted small-mid sized dinosaurs and synapsids such as *Pisanosaurus*

-gut could dissolve bone



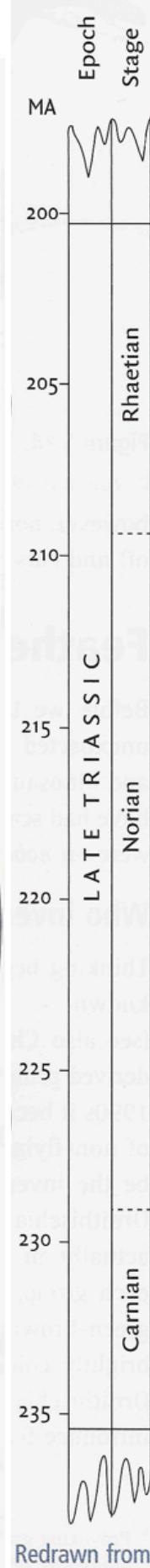
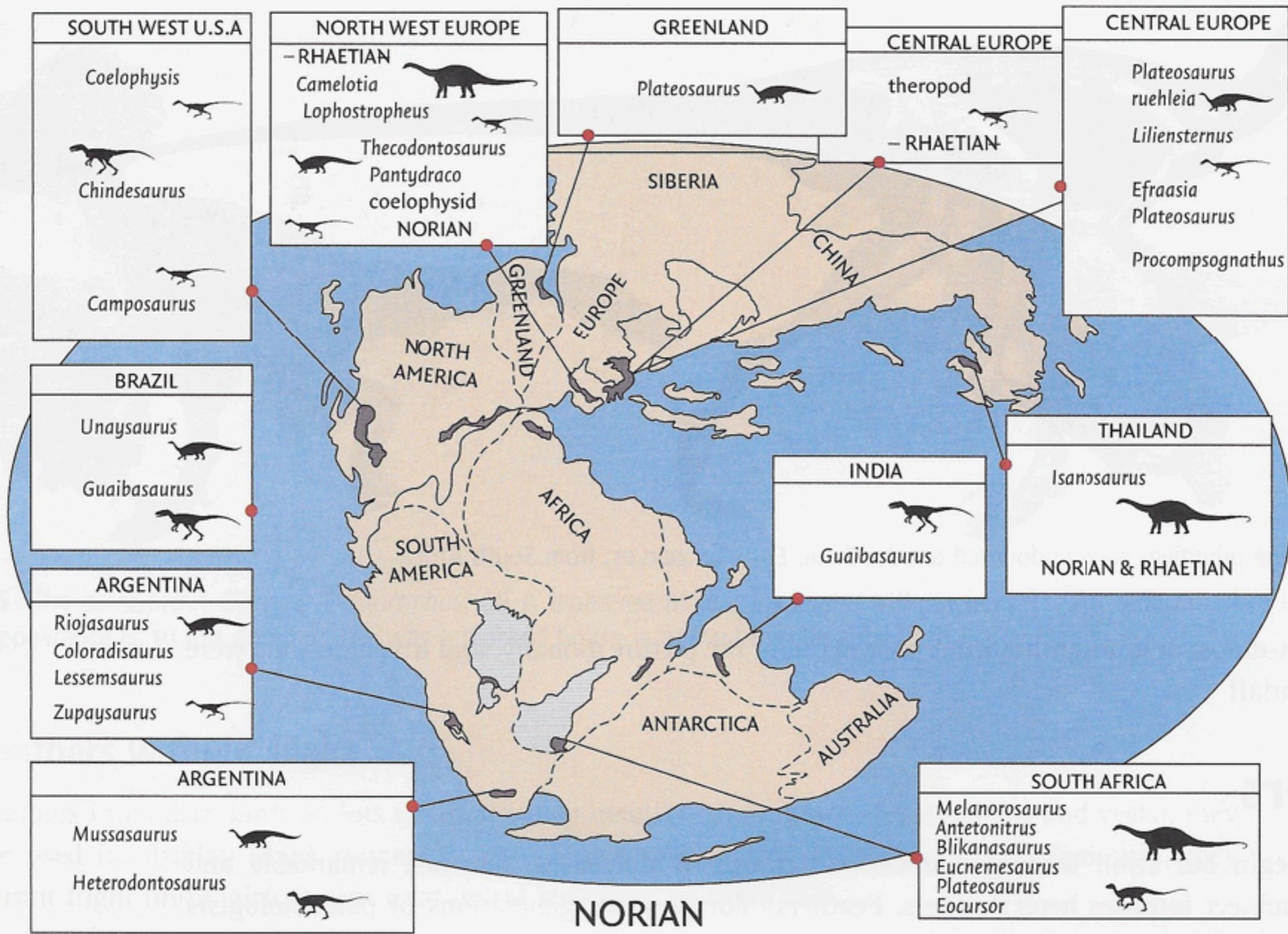
# Between 235-230 MA



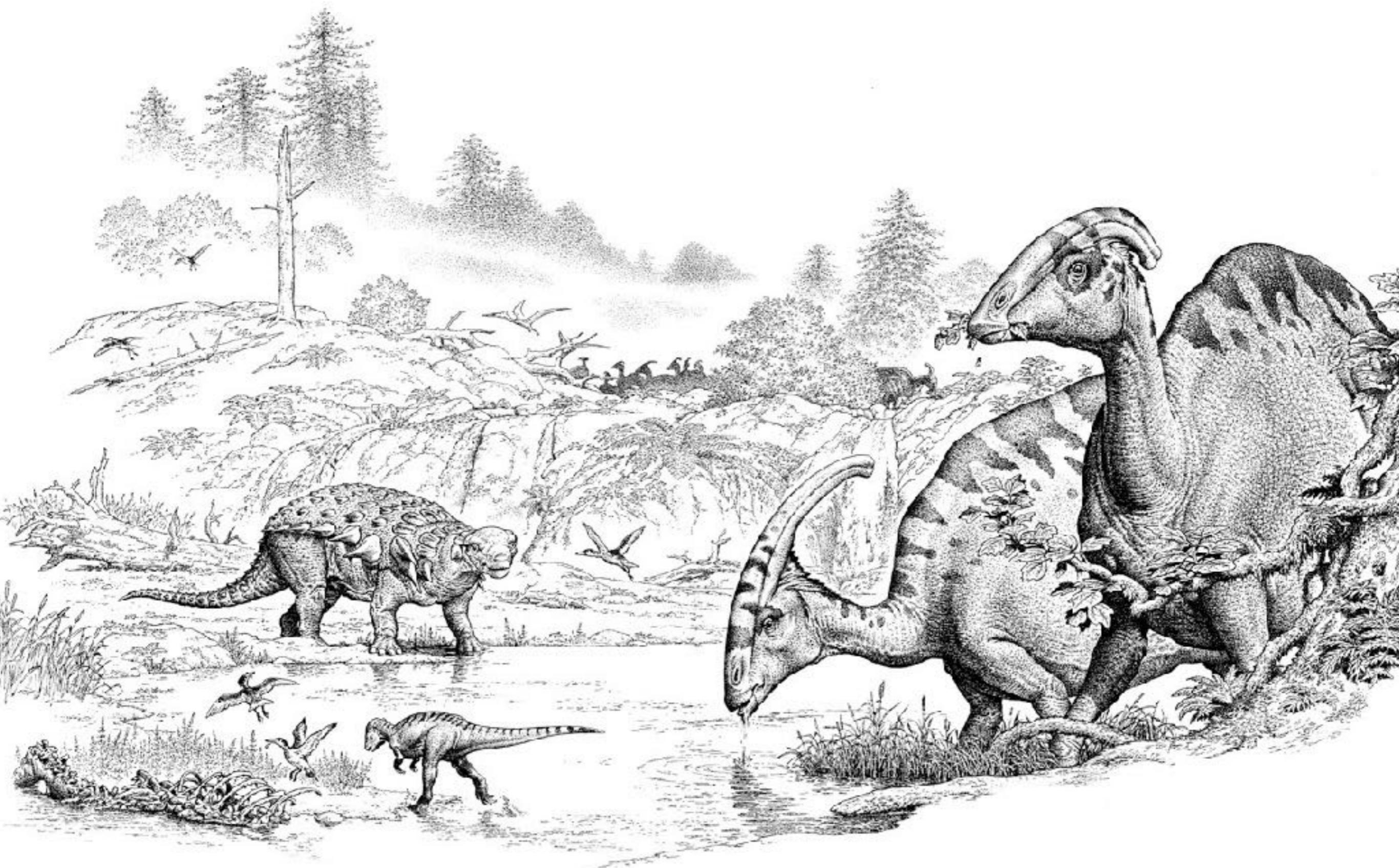
Redrawn from

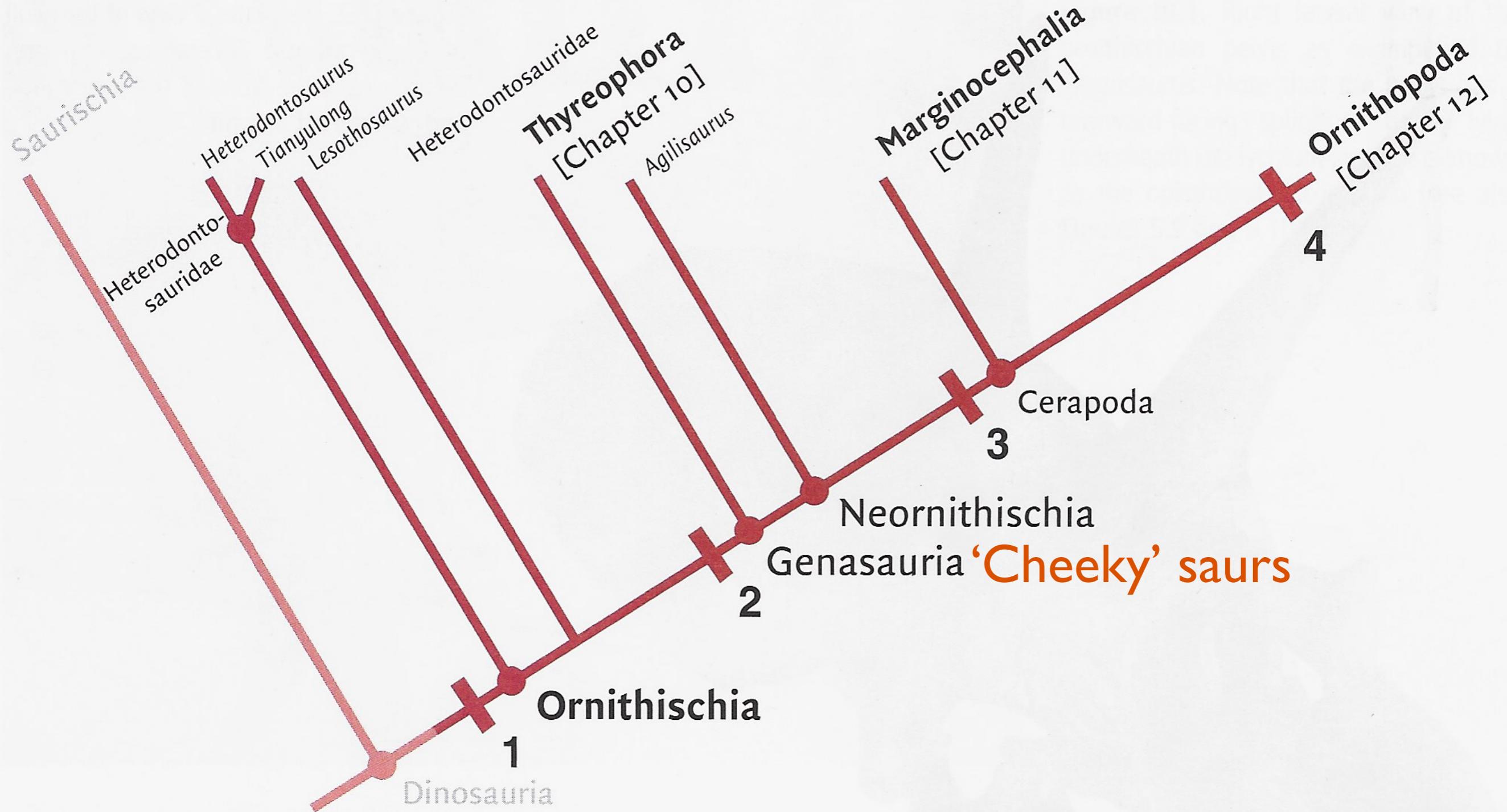
# Between 230-200 MA

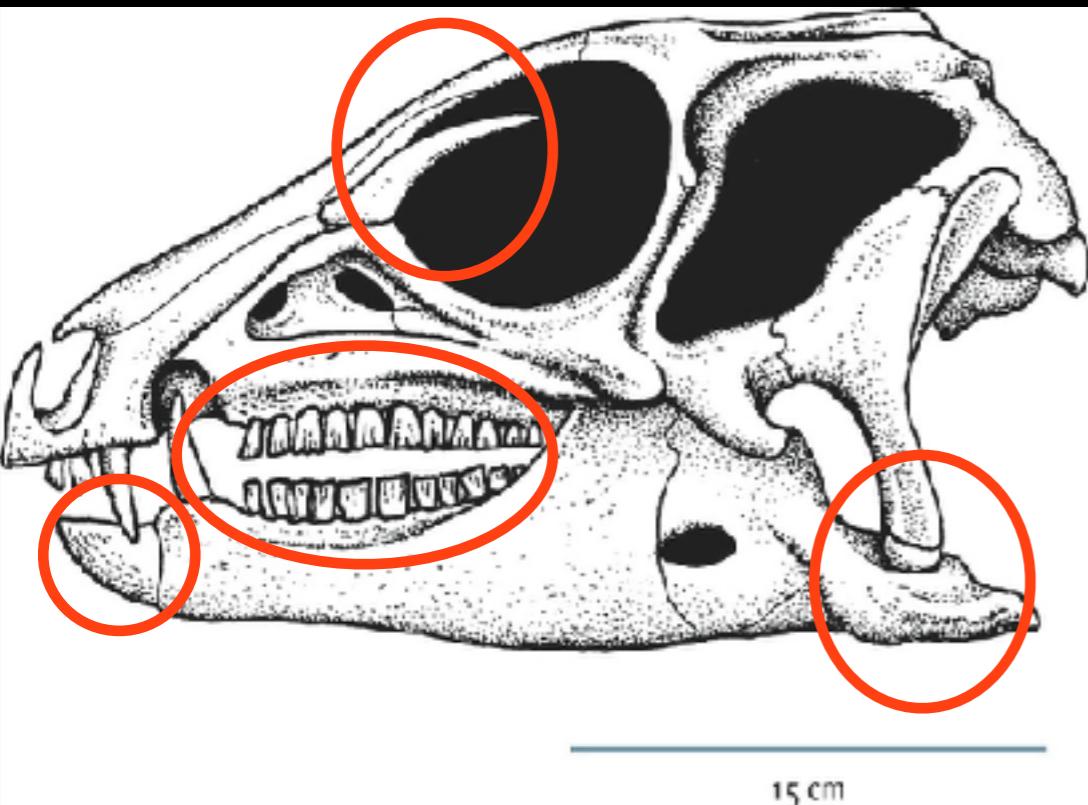
(a)



# Ornithischians!







Heterodontosaurus

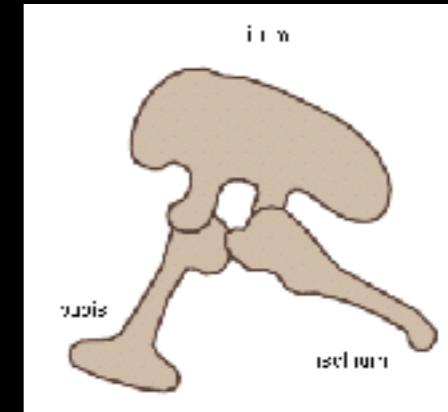
Shared, derived traits of skull

Predatory

Low jaw joint

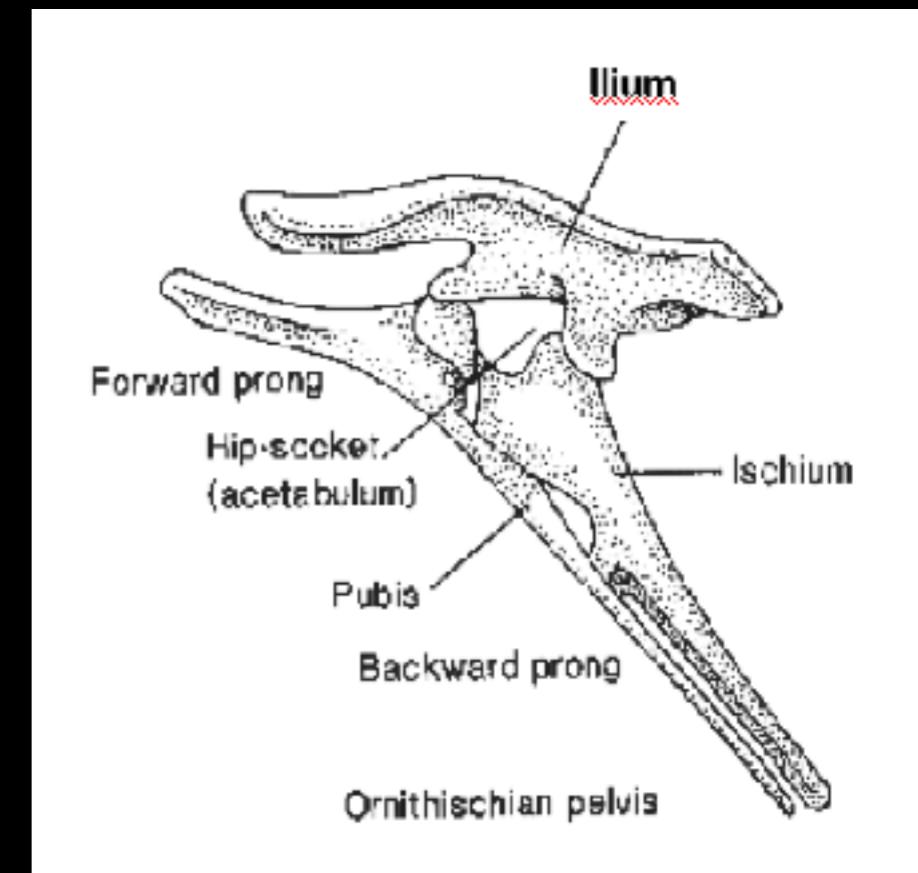
Palpebral bone: EAGLE EYE!

Deep set cheek teeth



Basal  
**Ornithodiran**  
condition

Head ← Tail →



Hip shared, derived, trait

‘Opisthopubic pelvis’

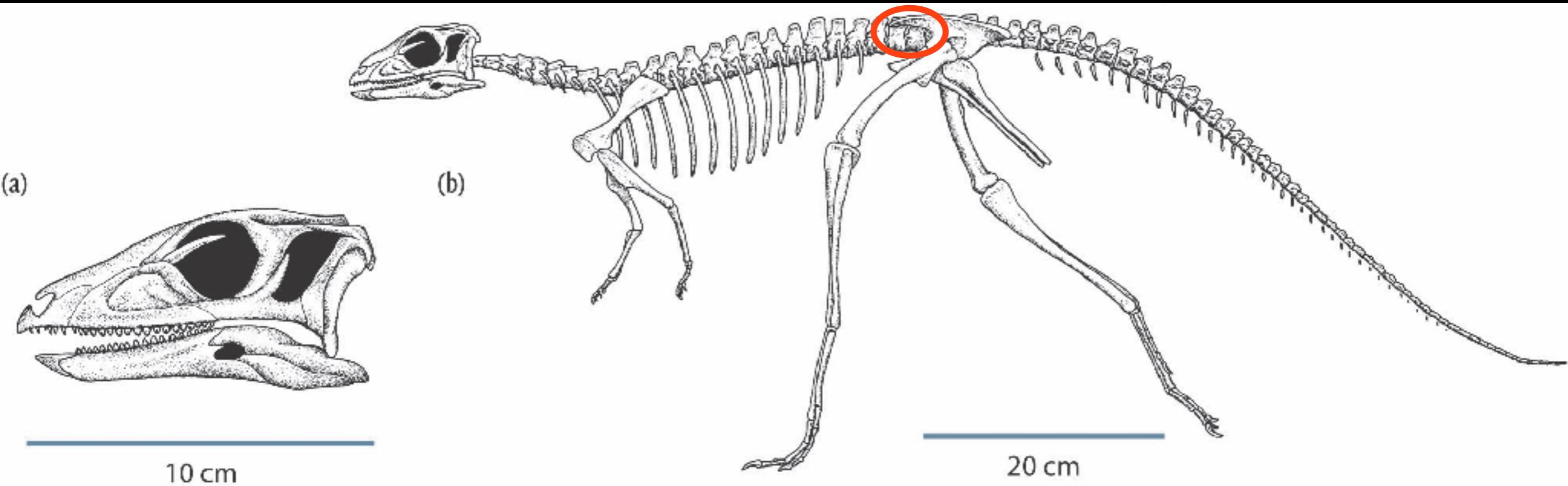
## Other shared, derived traits

At least 5 sacral vertebrae

Ossified tendons above sacral region

Frontal process on illium

*Lesothosaurus*





## How do mammals chew?

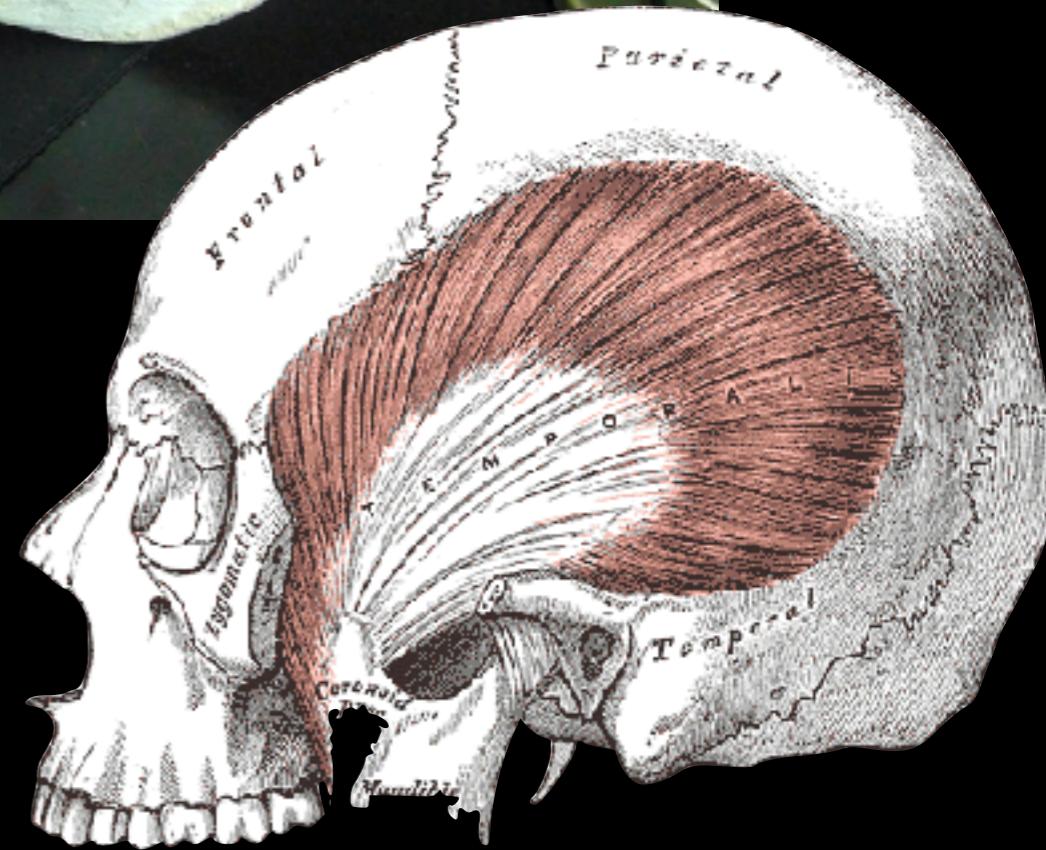
Front: Cropping

**Diastem:** Manipulation by tongue

Cheek teeth: Grinding (occluding)

Coronoid Process ~ Muscle attachments

Inset molars for cheeks ~ keep food in mouth





*Edmontosaurus*  
*Ornithopod*

## How did Ornithischians chew? In very similar ways

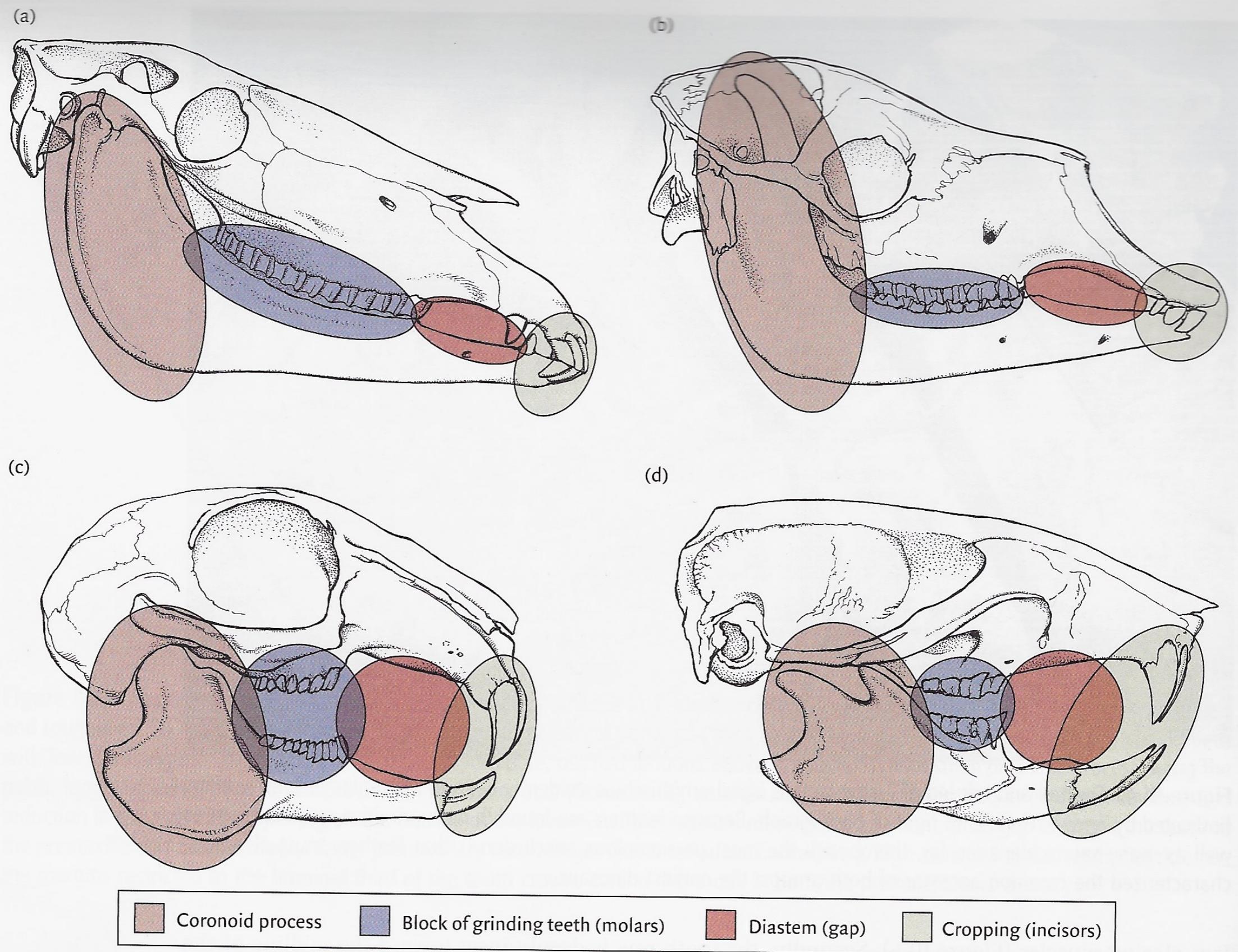
Front: Cropping: carried out by keratin RAMPHOTHECA

Diastem: Manipulation by tongue

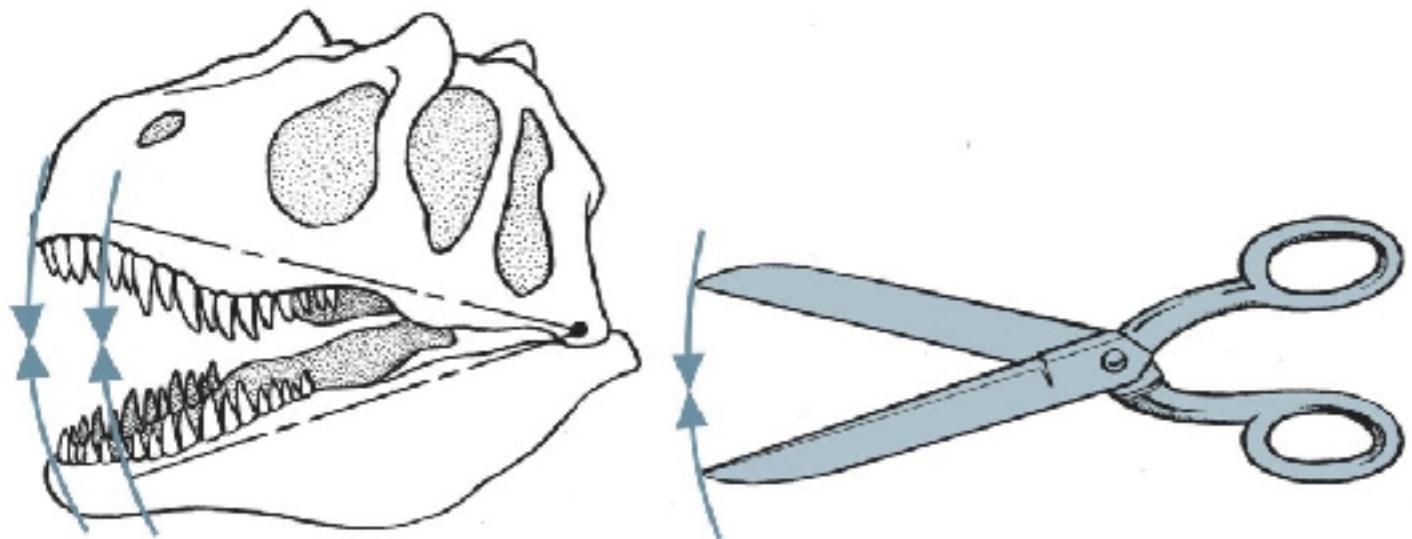
Cheek teeth: Grinding! Dental Batteries

Coronoid Process ~ Different shape, different muscle attachments

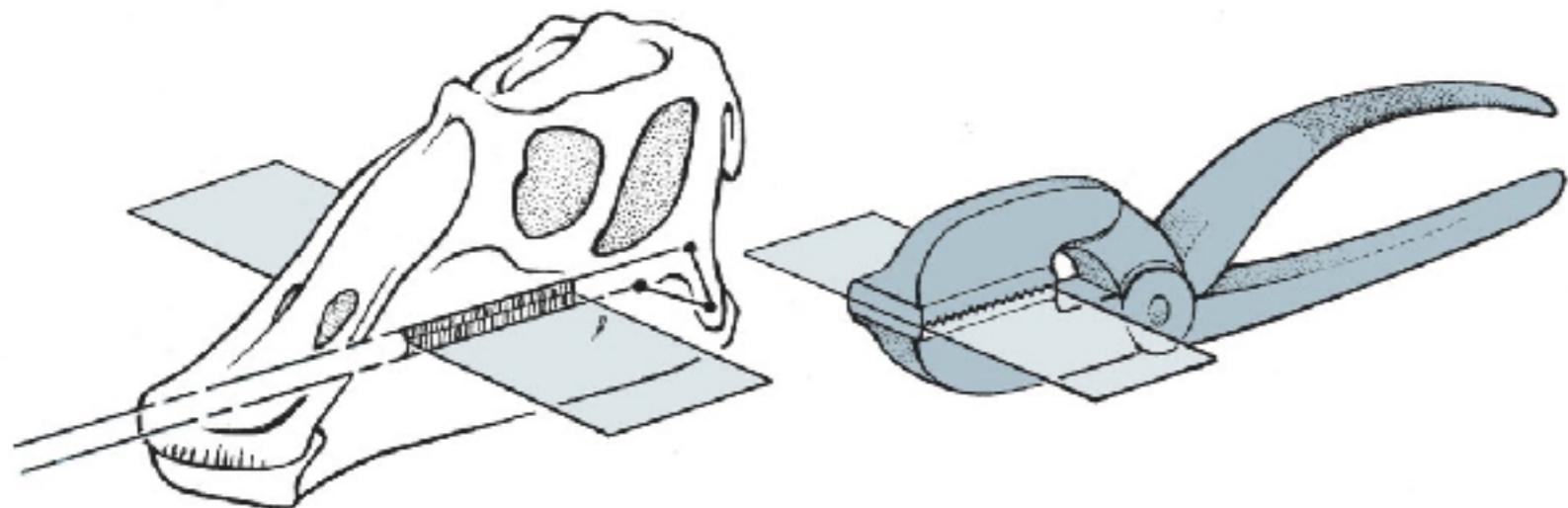
Inset molars for cheeks ~ keep food in mouth



**Figure III.5.** Selected herbivorous mammal skulls (not drawn to scale). (a) Horse (*Equus*), (b) llama (*Lama*), (c) rabbit (*Lepus*), and (d) rat (*Rattus*). Divisions of skulls indicate: anterior cropping section (yellow), diastem (orange), block of grinding cheek teeth (light purple), and coronoid process (light blue). Despite the range of sizes and herbivorous behaviors, all skulls show the same basic organization.



**Traveling force**  
Small area, large force



**Broadly distributed  
force**  
Large area, less force

## How did Ornithischians chew?

The Angle of the jaw. Scissors vs. Pliers

# Basal Ornithischians



*Pisanosaurus*



*Lesothosaurus*



*Heterodontosaurus*

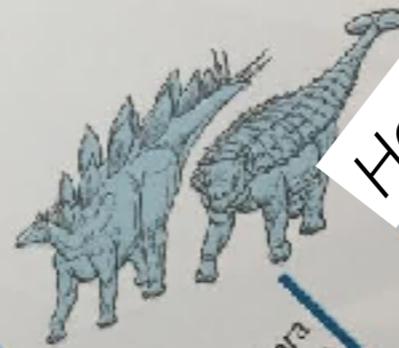
Everything else in Ornithischia  
is in Genasauria



Chewing

*Lesothosaurus*

Saurischia



Thyreophora  
(Chapter 5)

Heterodontosauridae



Marginocephalia  
(Chapter 6)



Ornithopoda  
(Chapter 7)

Cerapoda  
3

Genasauria

2

Ornithischia  
1

‘Cheeky’ saurs

