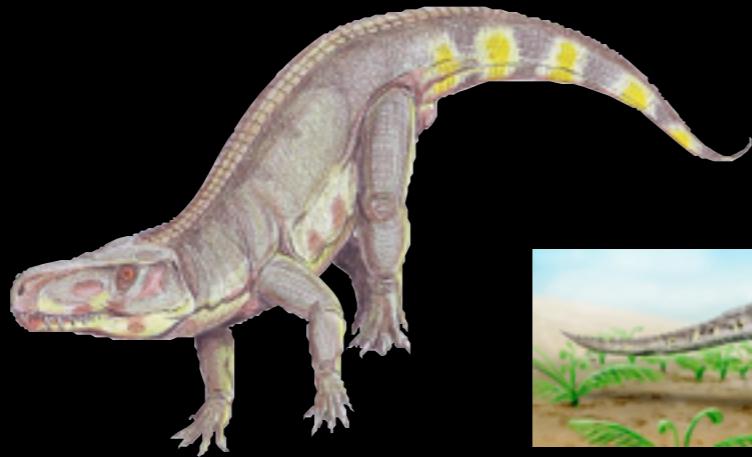




Crocodylomorpha



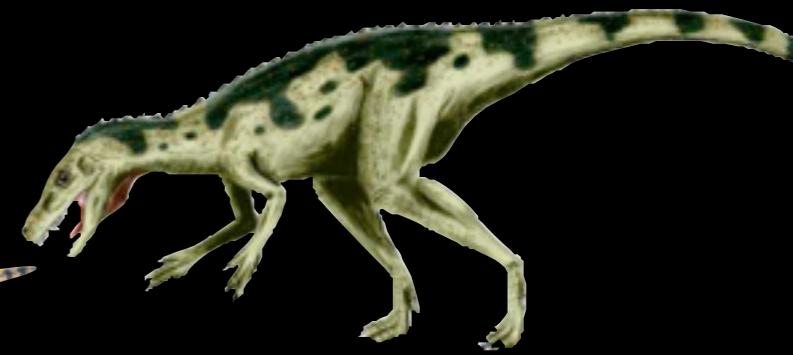
“Rauisuchia”



Ornithosuchidae



Pterosauria



Dinosauria

Ornithodira

Crown-clade Archosauria

Crurotarsi

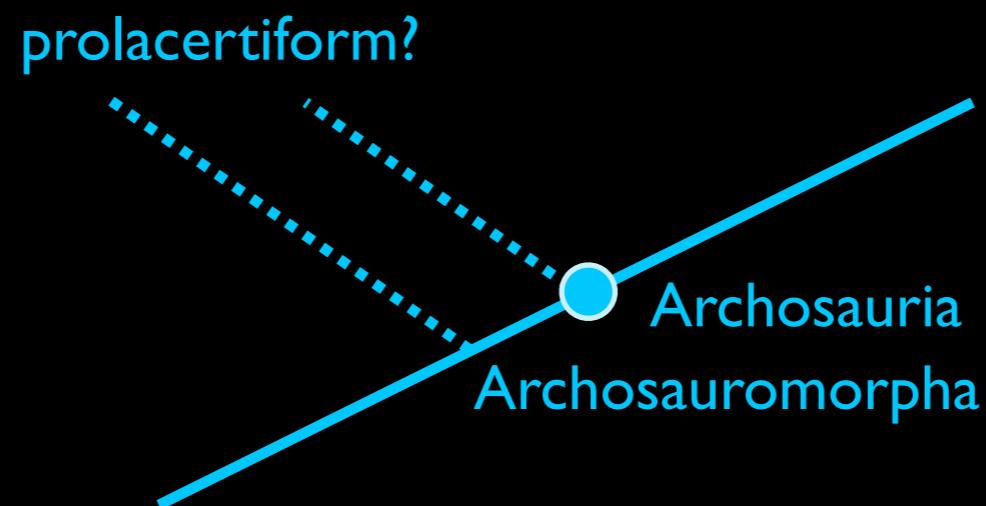
Basal archosaurs

Archosauria

*Tanystropheus*  
Prolacertiform



Basal archosaur?  
Maybe... or it split off *before* archosauria



# Archosauria: synapomorphies

Antorbital fenestra (in front of eye)

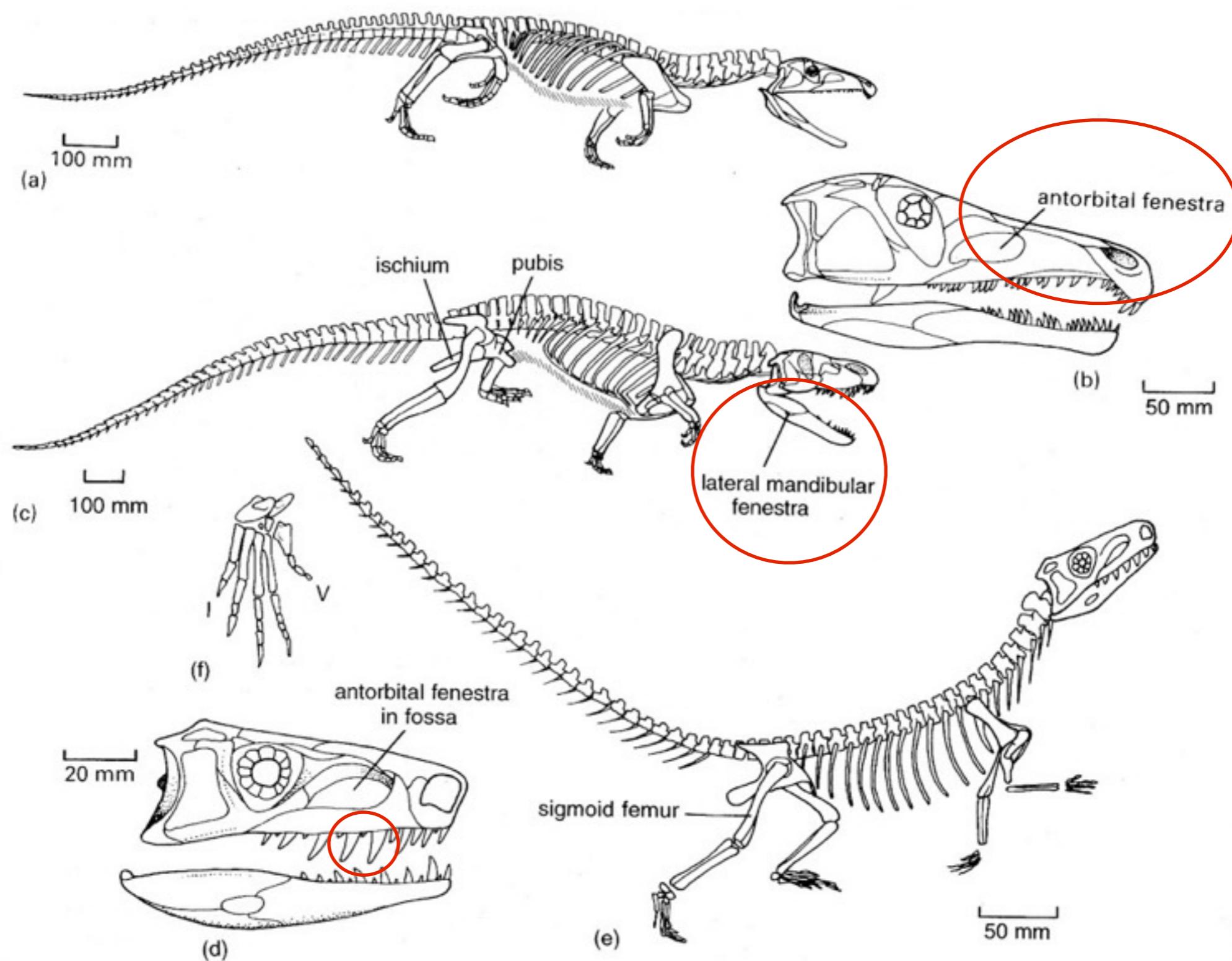
Teeth with serrated margins

Mandibular fenestra



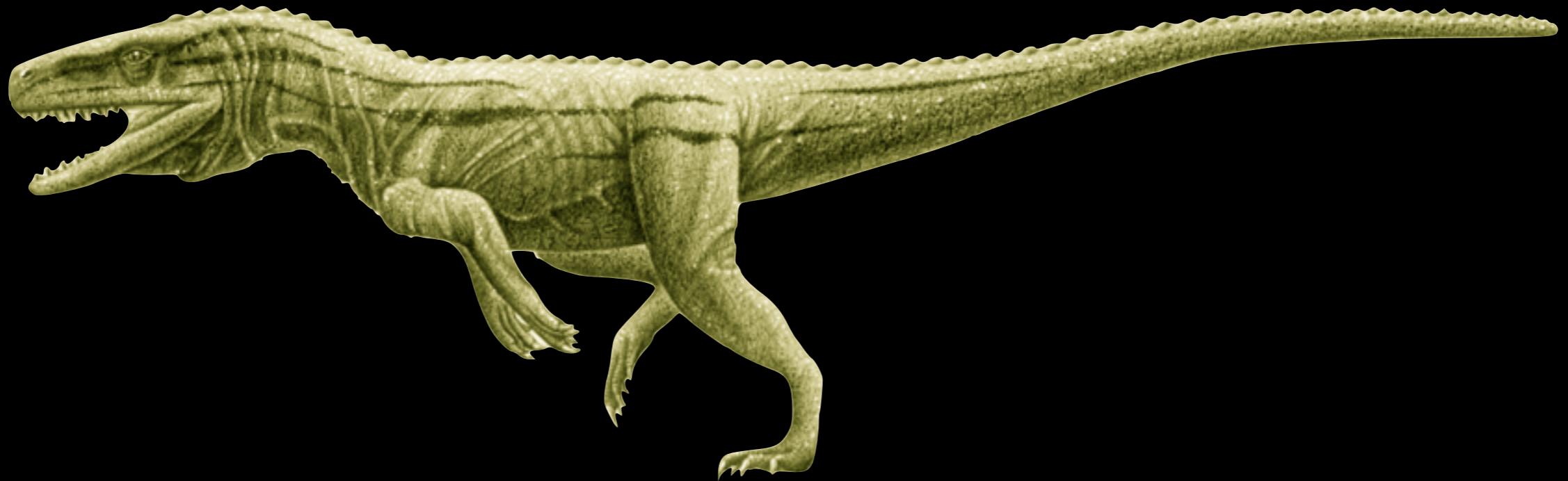
*Proterosuchus*

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

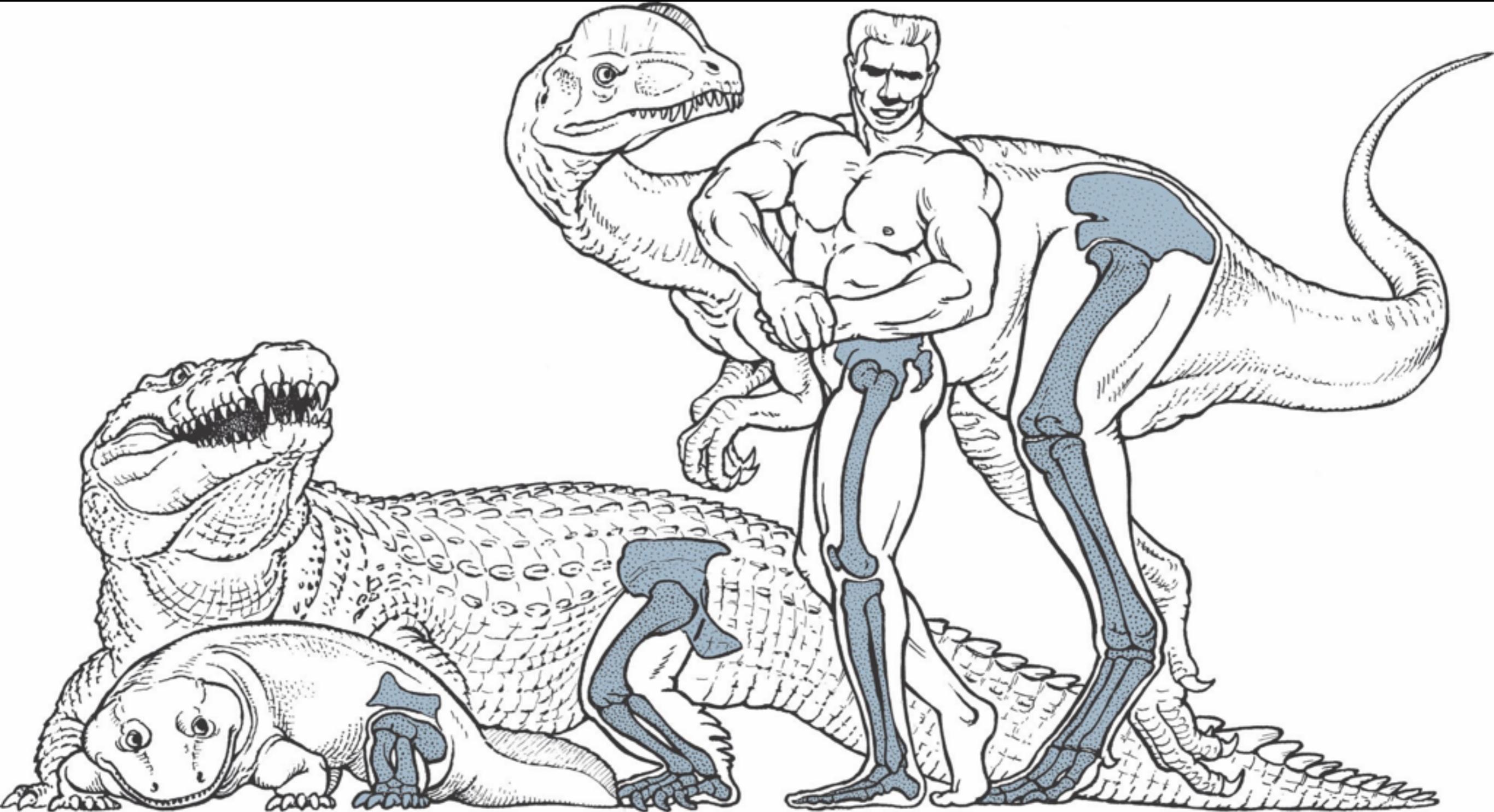


*Euoplokeria* (Facultative biped)

Derived, Basal Archosaur

Bony dermal plates down back

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



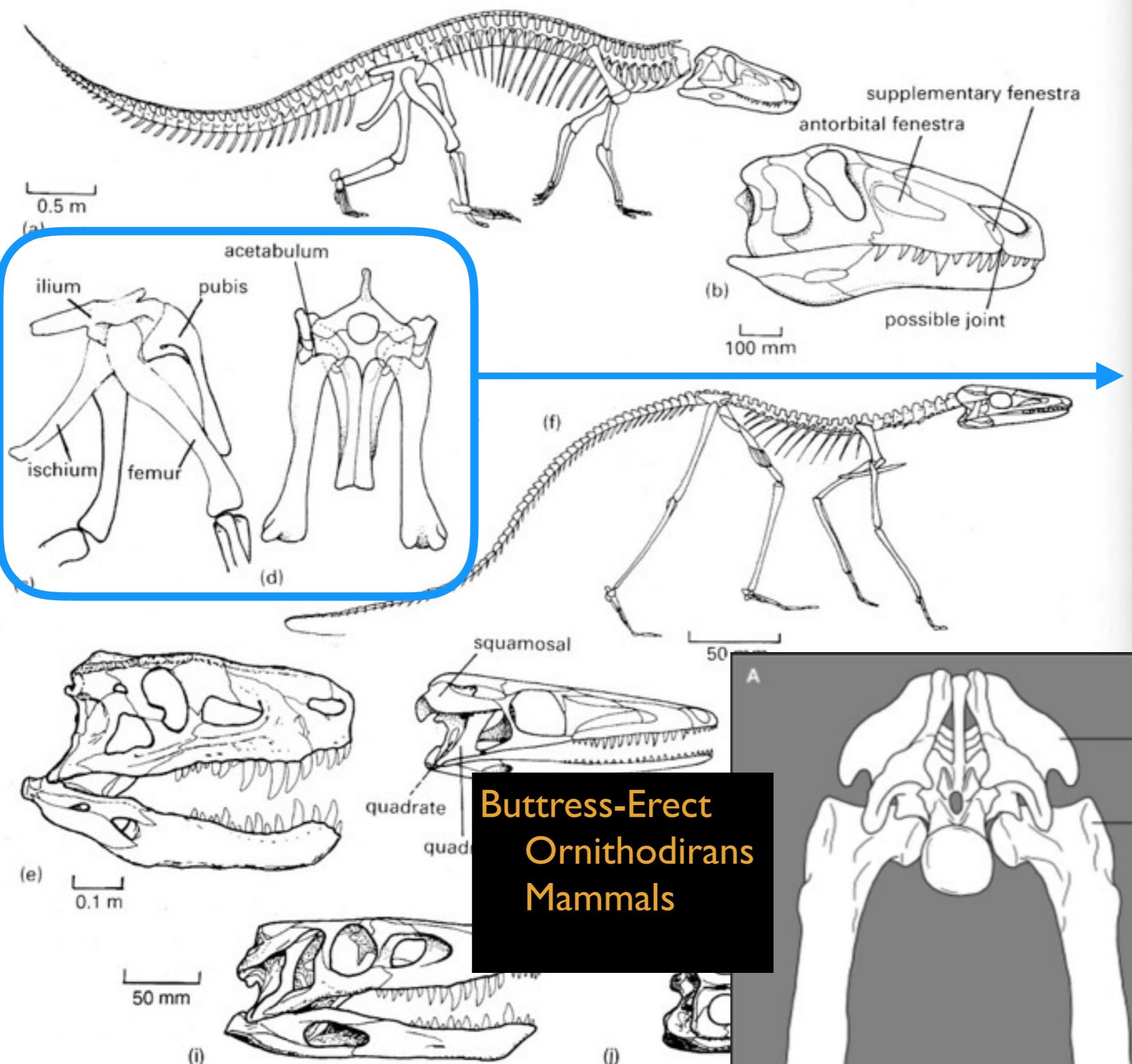


5reb.com



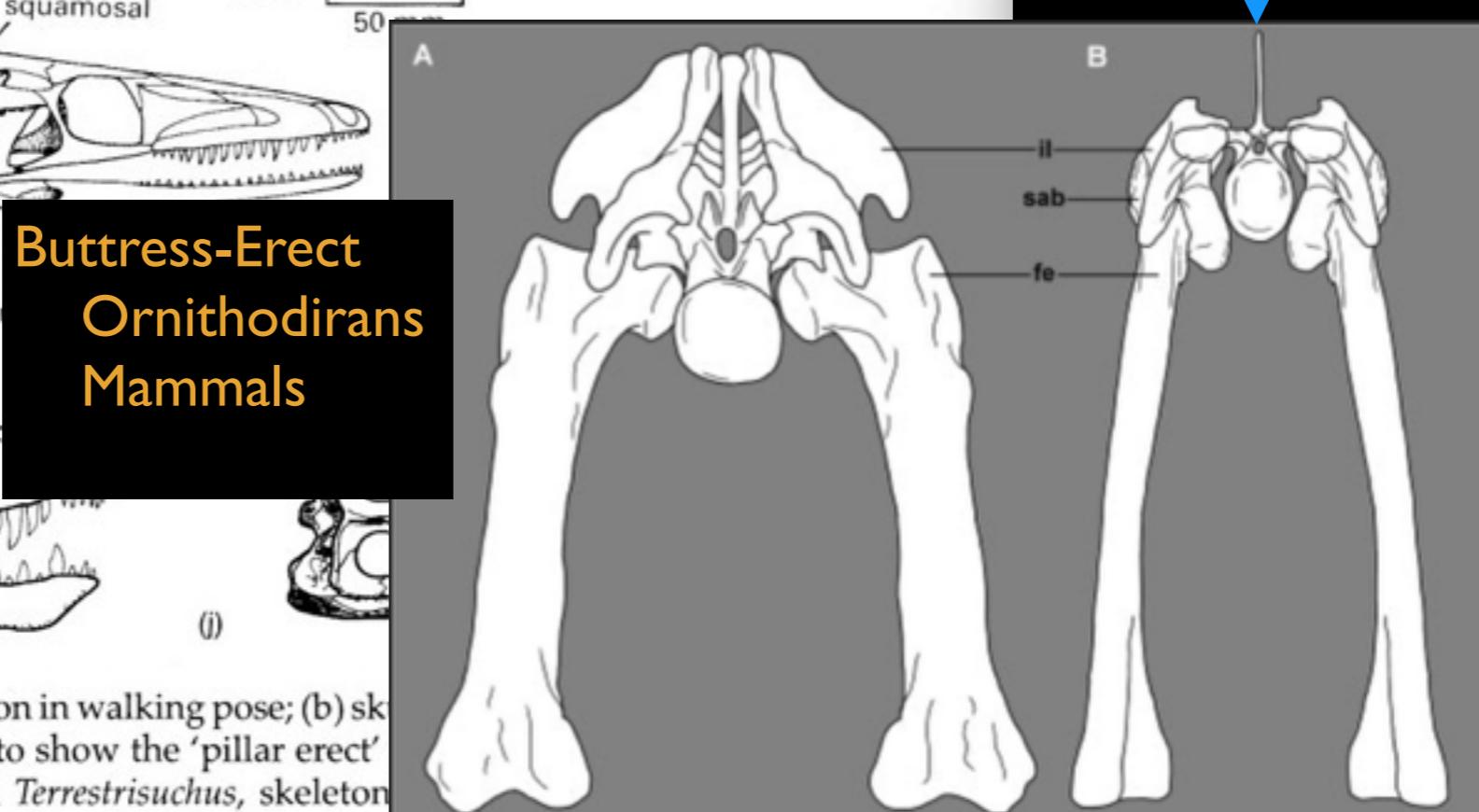
5reb.com

# Locomotion (Pelvis)

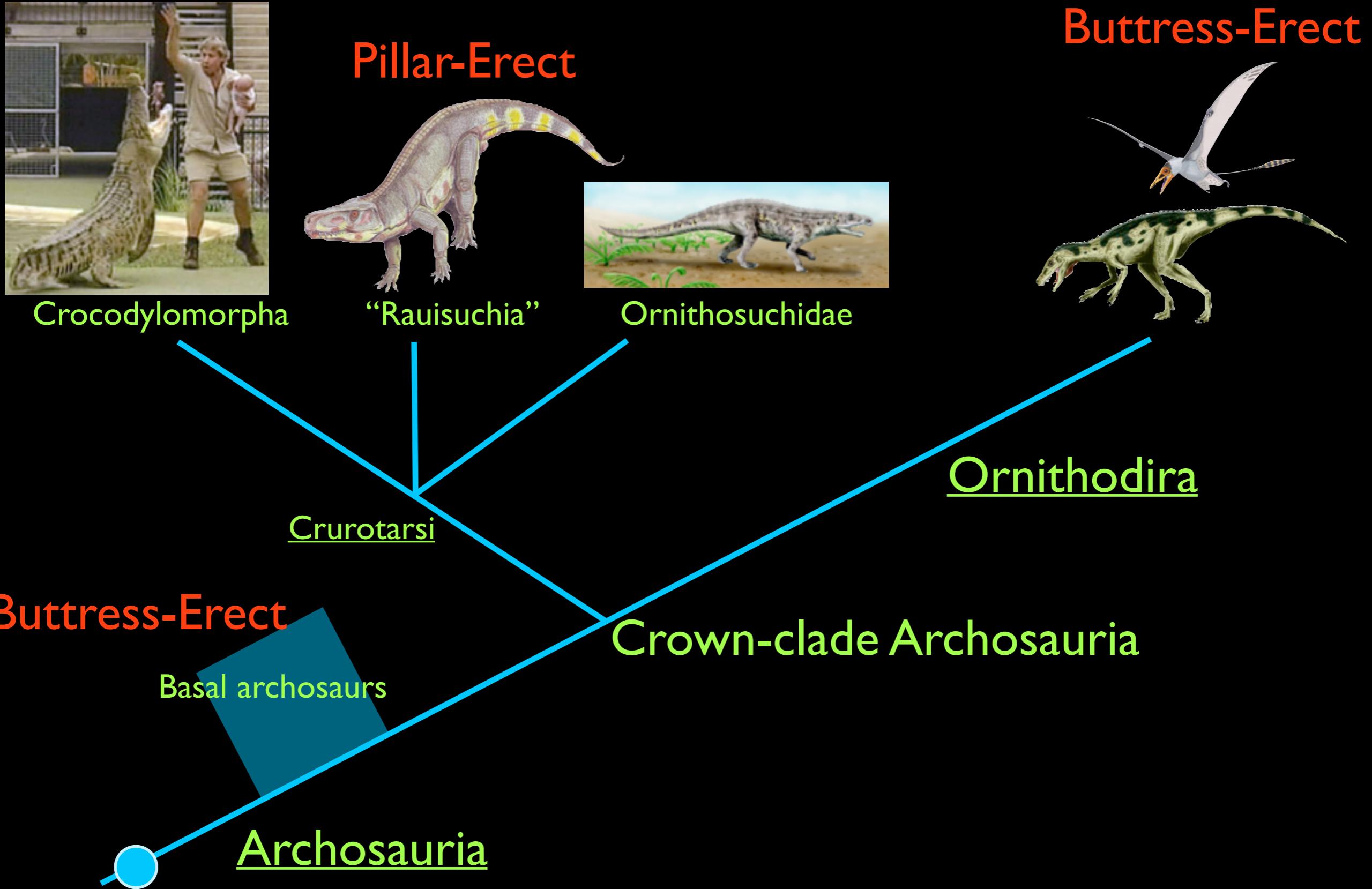


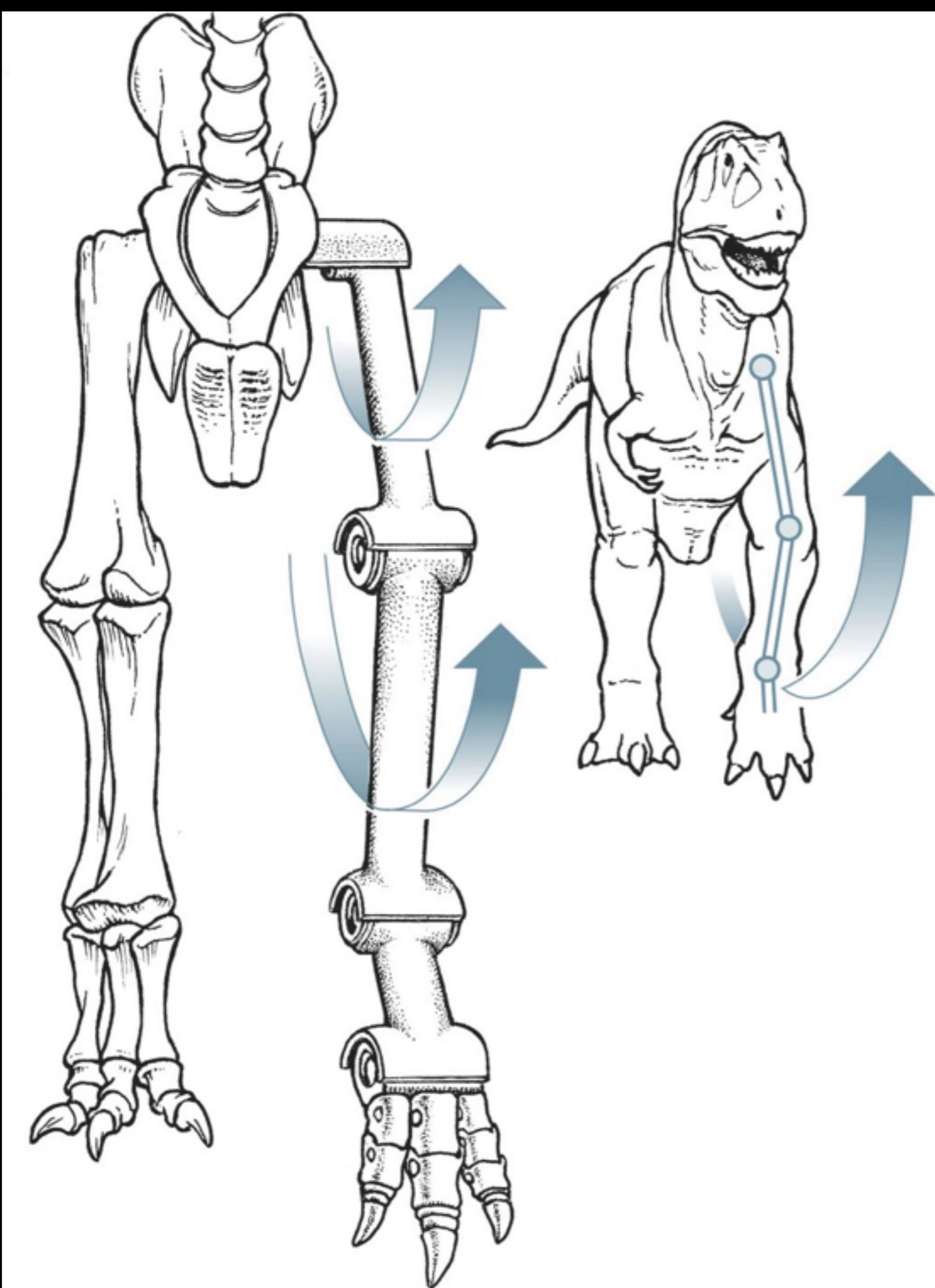
**Buttress-Erect  
Ornithodirans  
Mammals**

**Fig. 6.4** The rauisuchid *Saurosuchus*: (a) skeleton in walking pose; (b) skull in lateral view; (c-d) pelvis and hind limbs in lateral and anterior views to show the 'pillar erect' posture; (e) skull in lateral view; (f-h) the saltoposuchid *Terrestrisuchus*, skeleton in lateral 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.]



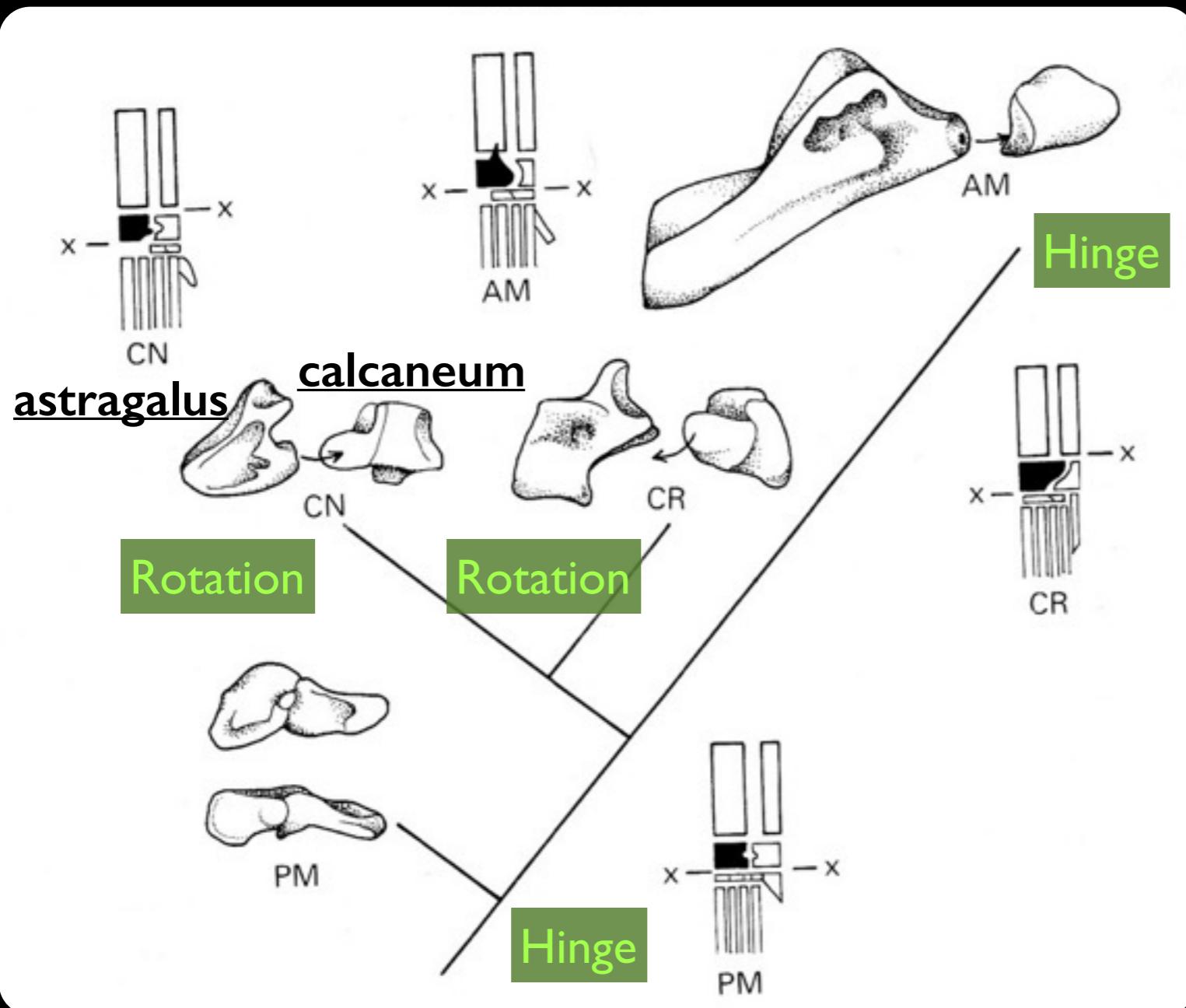
# Locomotion: Pelvic/Hind leg conditions:





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

Digitigrade  
vs.  
Plantigrade



PM: Primitive Metatarsal

CN: Crocodyle Normal  
Crocodylomorphs/Rauisuchians

CR: Crocodyle Reversed  
Ornithosuchids

AM: Advanced Mesotarsal  
Pterosaurs, Dinosaurs



Proterosuchus

The importance of a twisting ankle for animals with sprawling-erect posture



The importance of a twisting ankle for animals with sprawling-erect posture



Buttress-erect\*

Rotation



Crocodylomorpha

Pillar-Erect

Rotation



"Rauisuchia"

Buttress-erect

Rotation



Ornithosuchidae

Buttress-erect

Hinge



Ornithodira

Sprawling/Semi-erect

Hinge

Basal archosaurs

Crurotarsi

Crown-clade Archosauria

Archosauria

buttress-erect = parasagittal

Crocodylomorpha

Late Triassic

*Terrestrisuchus*

*Saltoposuchus*

BIPEDAL!/TERRESTRIAL!

Buttress-erect\*

Rotation



*Terrestrisuchus*



*Saltoposuchus*

A return to aquatic environments was more recent for crocodylomorphs



Pterosauria

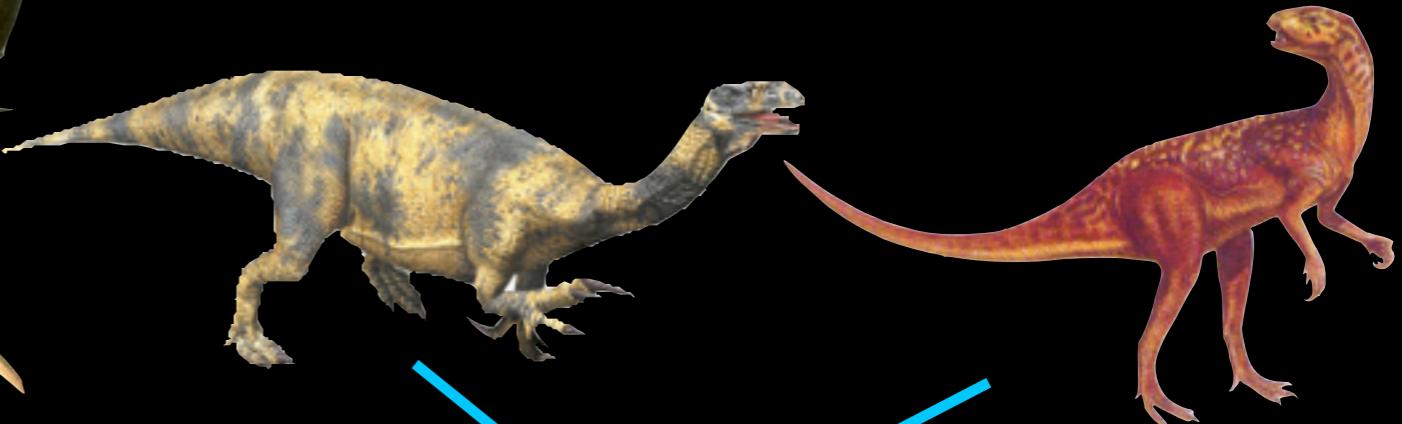
(later)

Saurischia

Ornithischia

Ornithodira

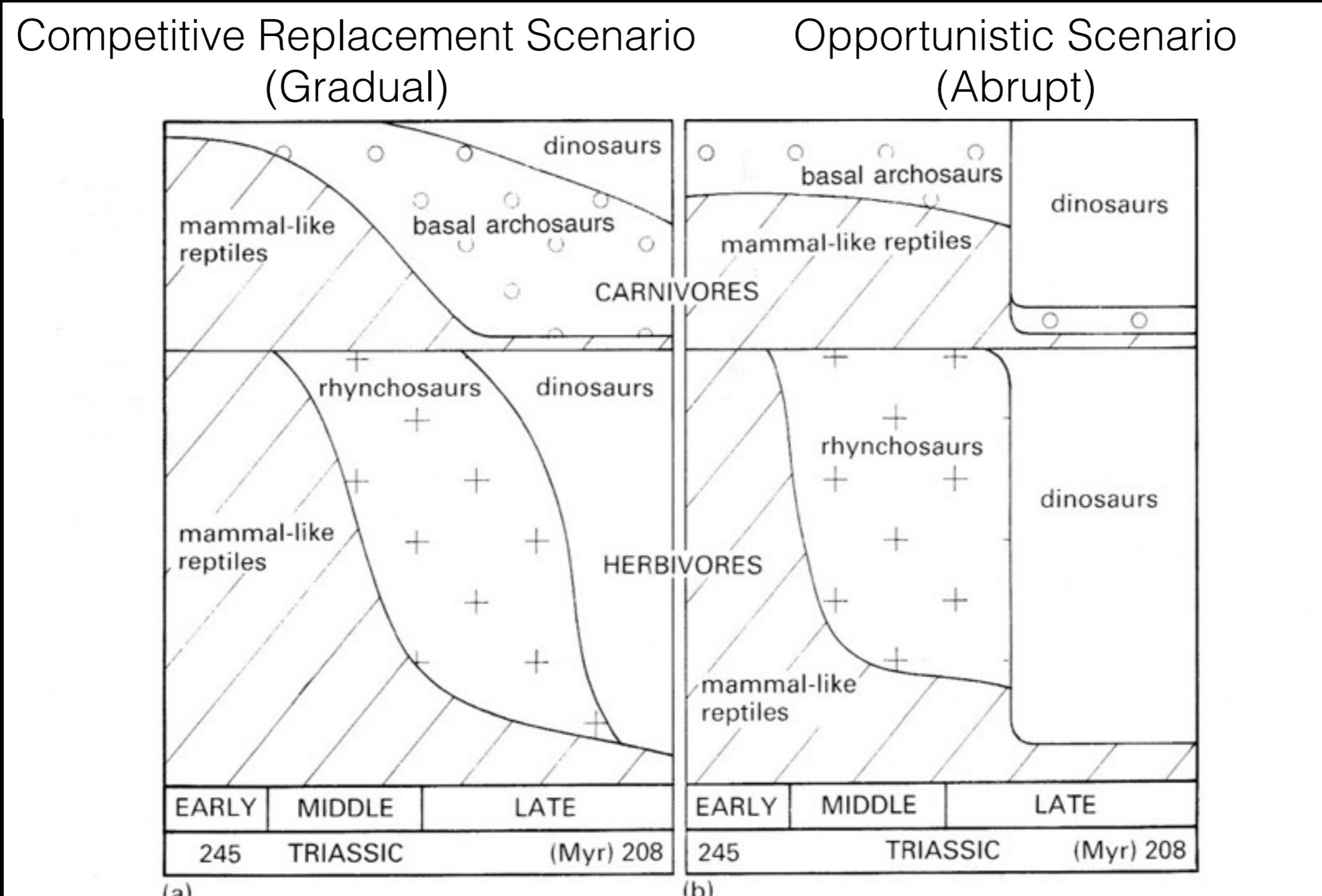
Dinosauria





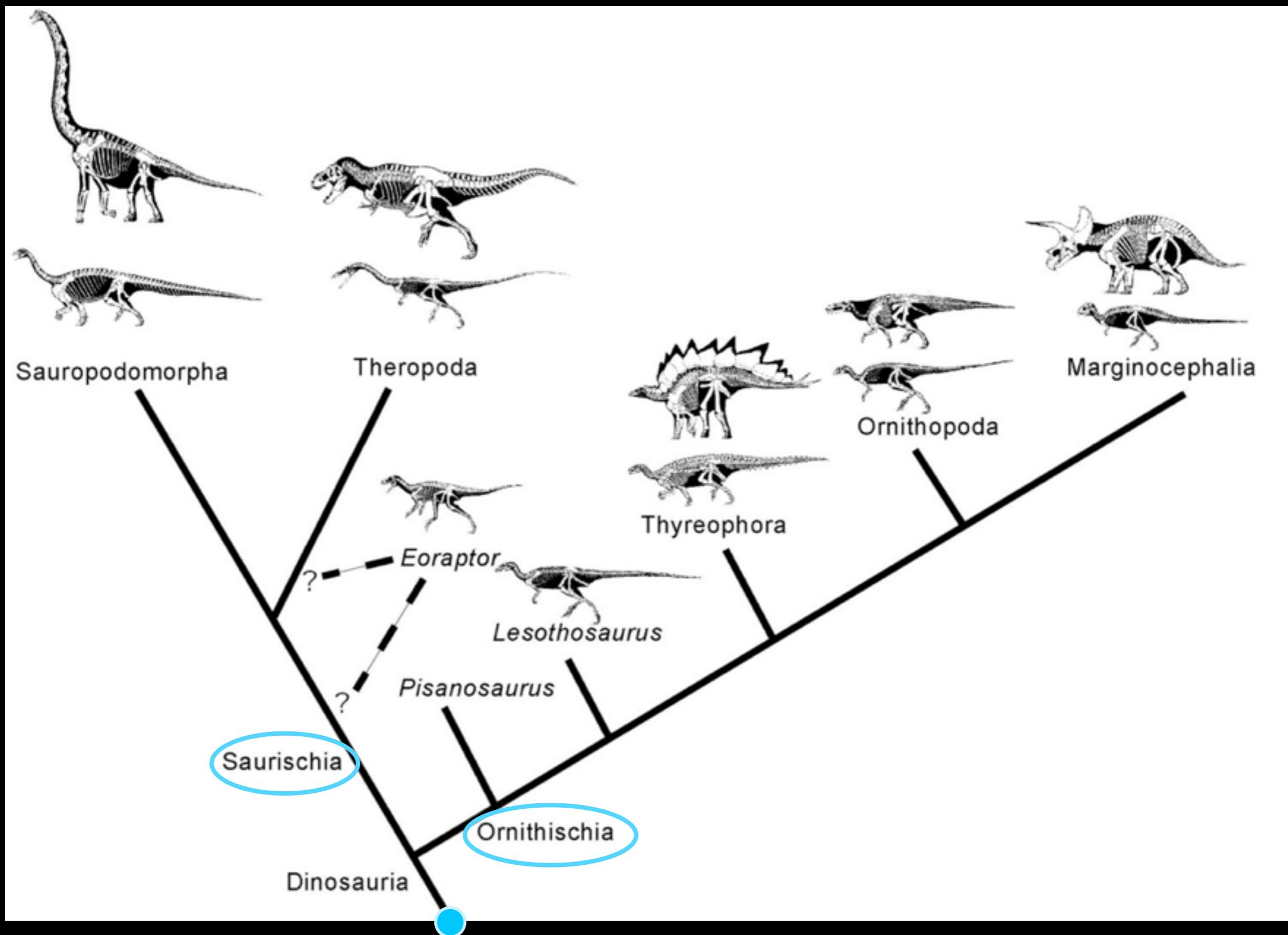


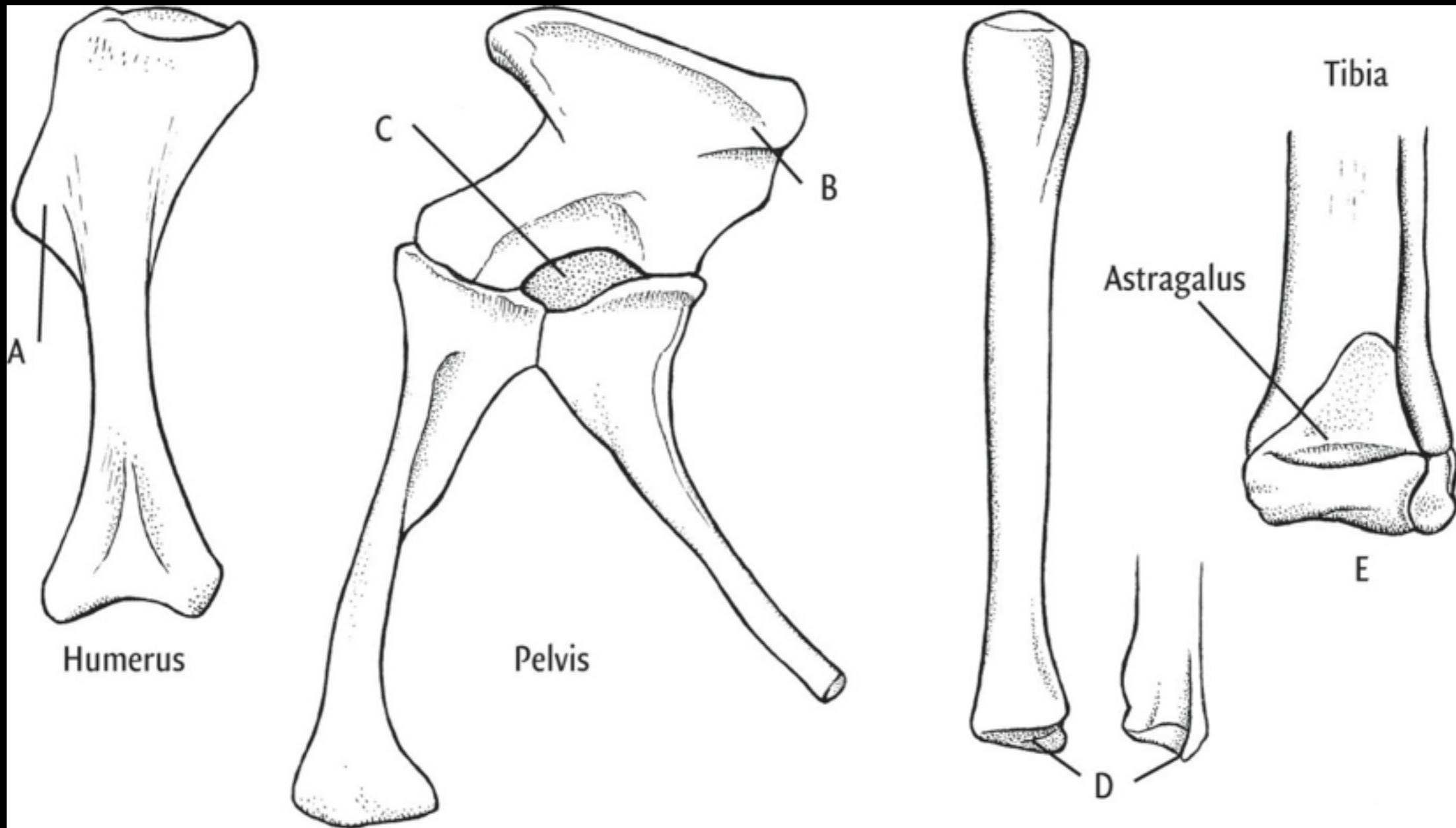
# Dinosaur expansion: multiple models



**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.

# DINOSAURS

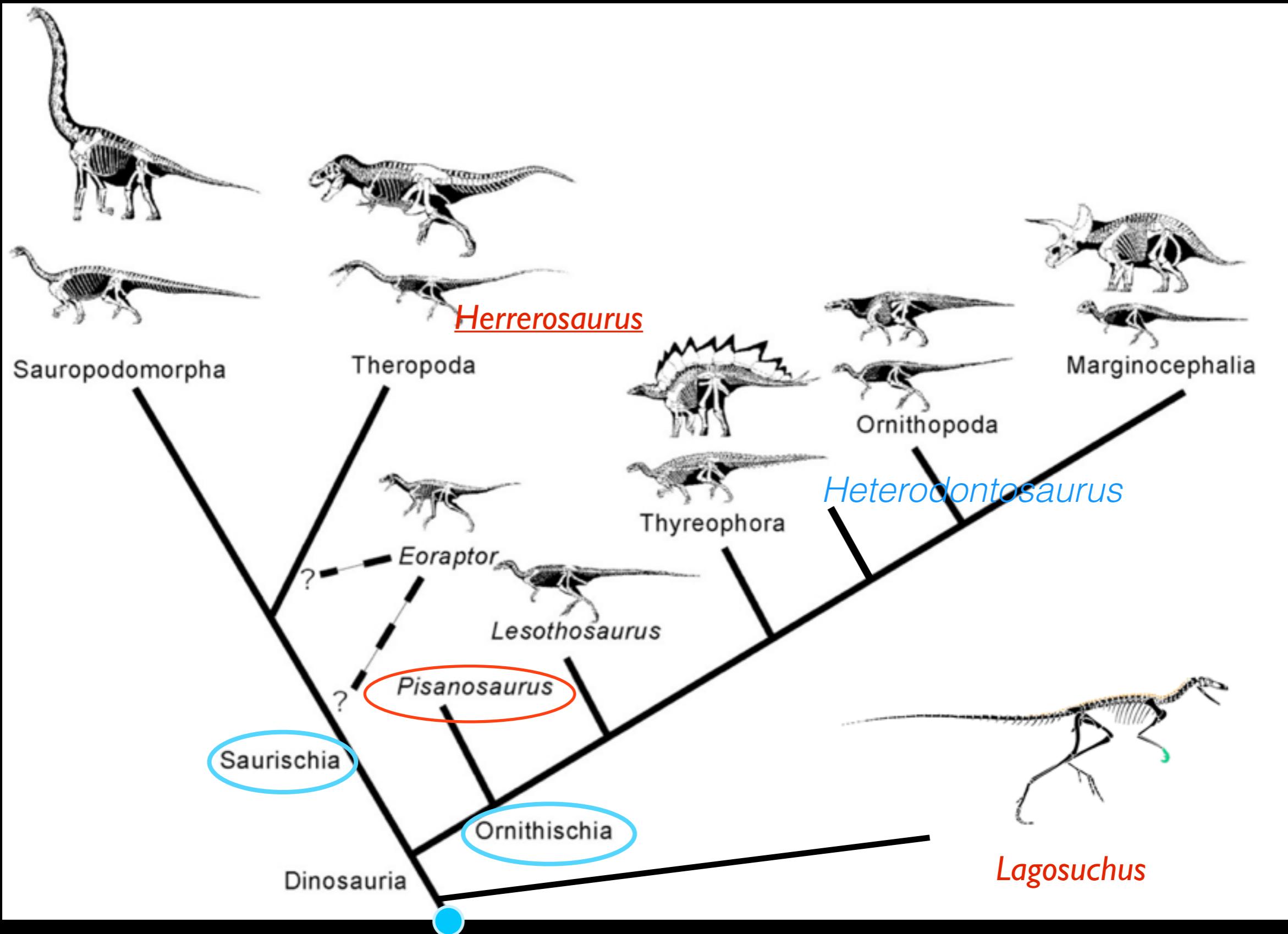




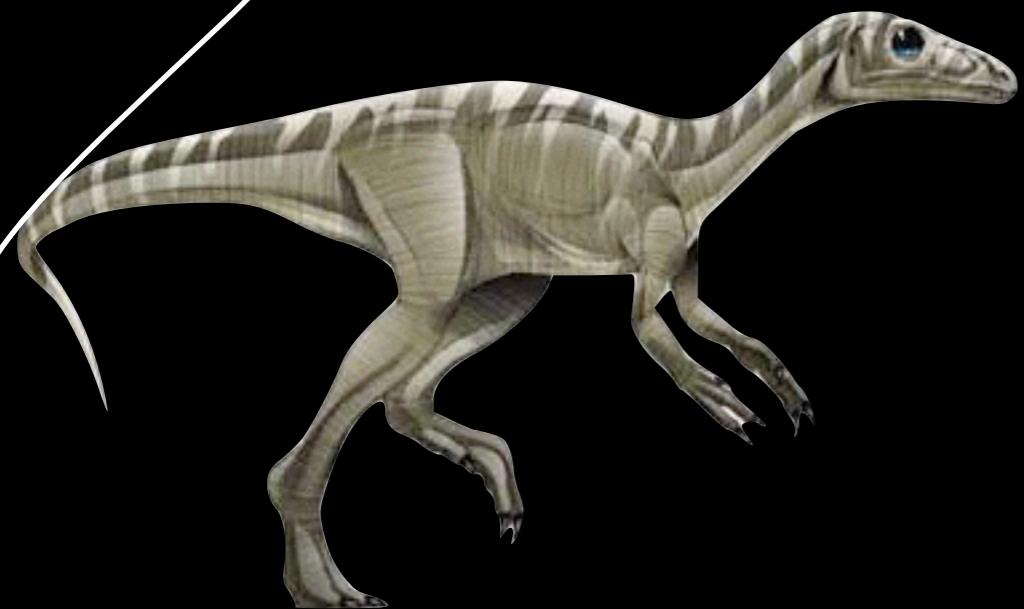
## Dinosaur synapomorphies

- 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

# DINOSAURS



## Basal Dinosaurs



*Eoraptor*



*Pisanosaurus*

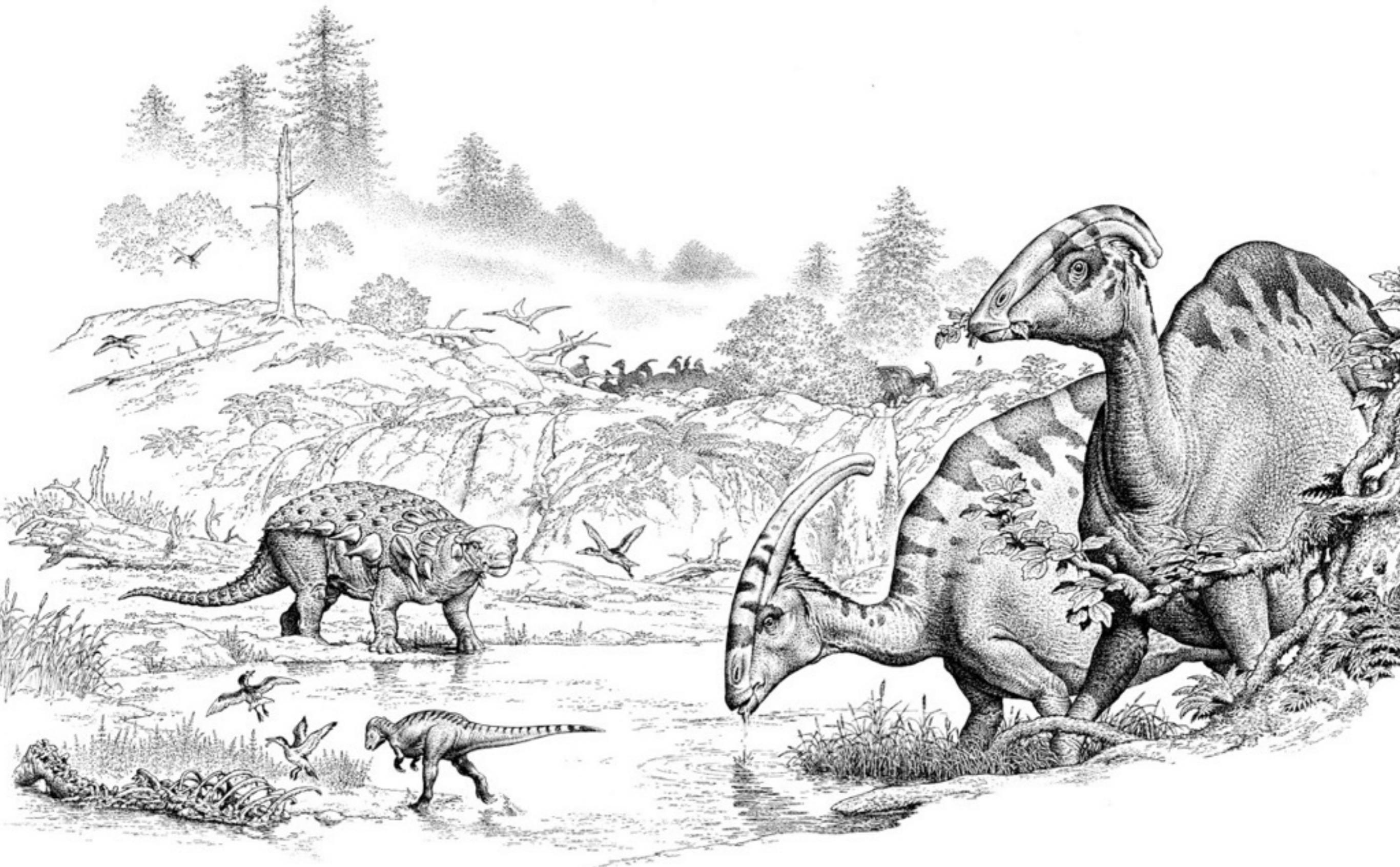


*Herrerosaurus*



*Coelophysis*

# Ornithischians!



*Lesothosaurus*

Saurischia

Dinosauria

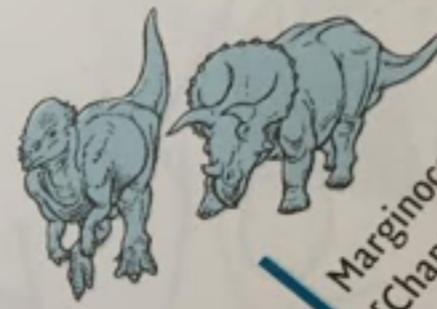
1

2

4

Thyreophora  
[Chapter 5]

Heterodontosauridae

Marginocephalia  
[Chapter 6]

'Cheeky' saurs

Genasauria

2

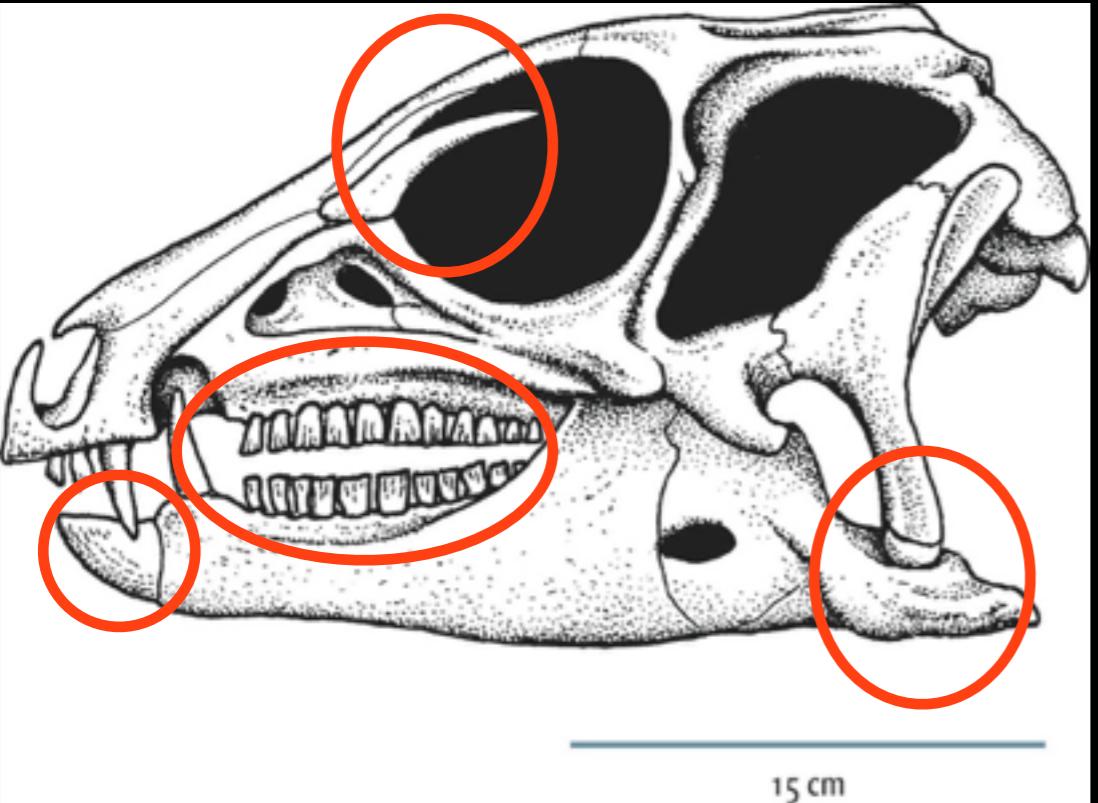
Ornithischia

1

Cerapoda

3

Ornithopoda  
[Chapter 7]



*Heterodontosaurus*

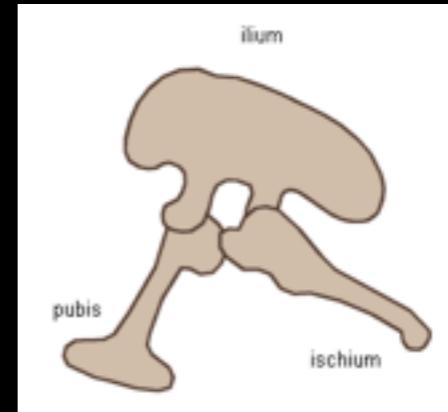
Shared, derived traits of skull

Predentary

Low jaw joint

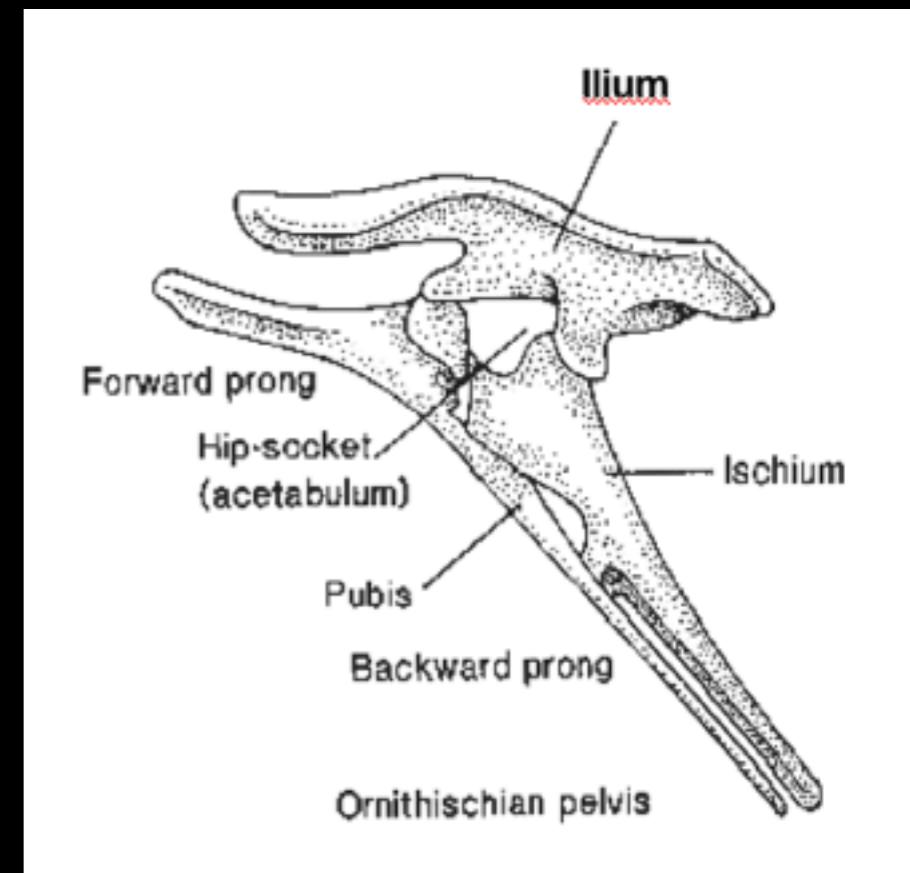
Palpebral bone: EAGLE EYE!

Deep set cheek teeth



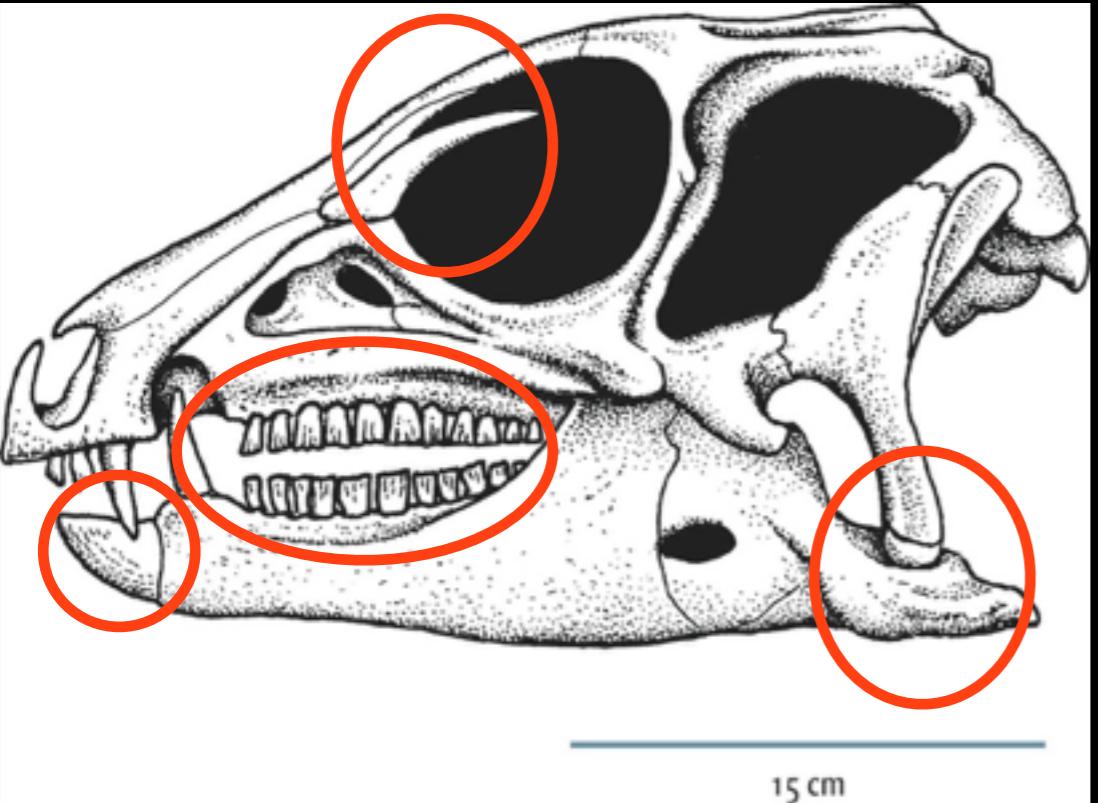
Basal  
Ornithodiran  
condition

Head ← Tail →



Hip shared, derived, trait

‘Opisthopubic pelvis’



*Heterodontosaurus*

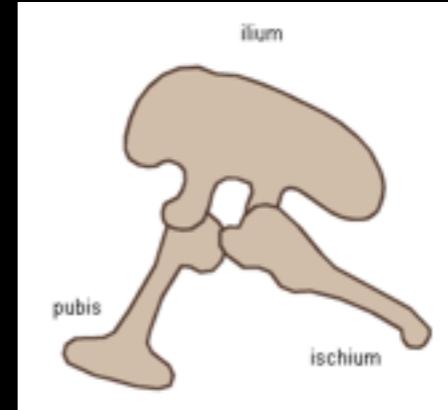
Shared, derived traits of skull

Predatory

Low jaw joint

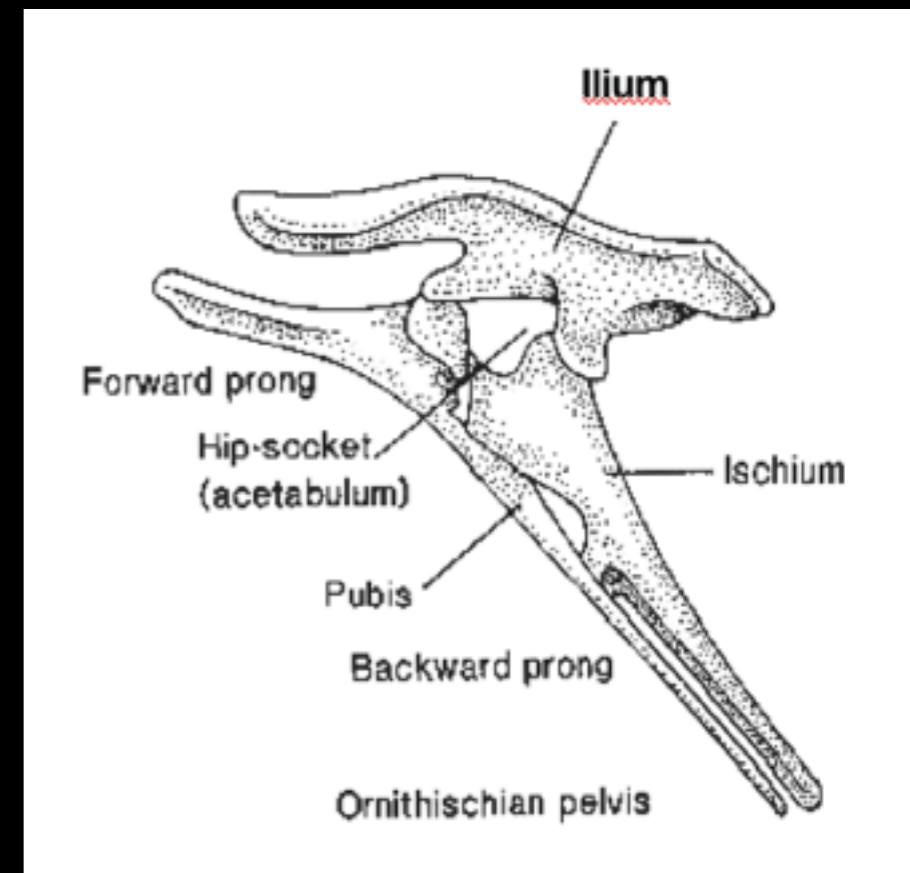
Palpebral bone: EAGLE EYE!

Deep set cheek teeth



Basal  
Ornithodiran  
condition

Head ← Tail →



Hip shared, derived, trait

‘Opisthopubic pelvis’

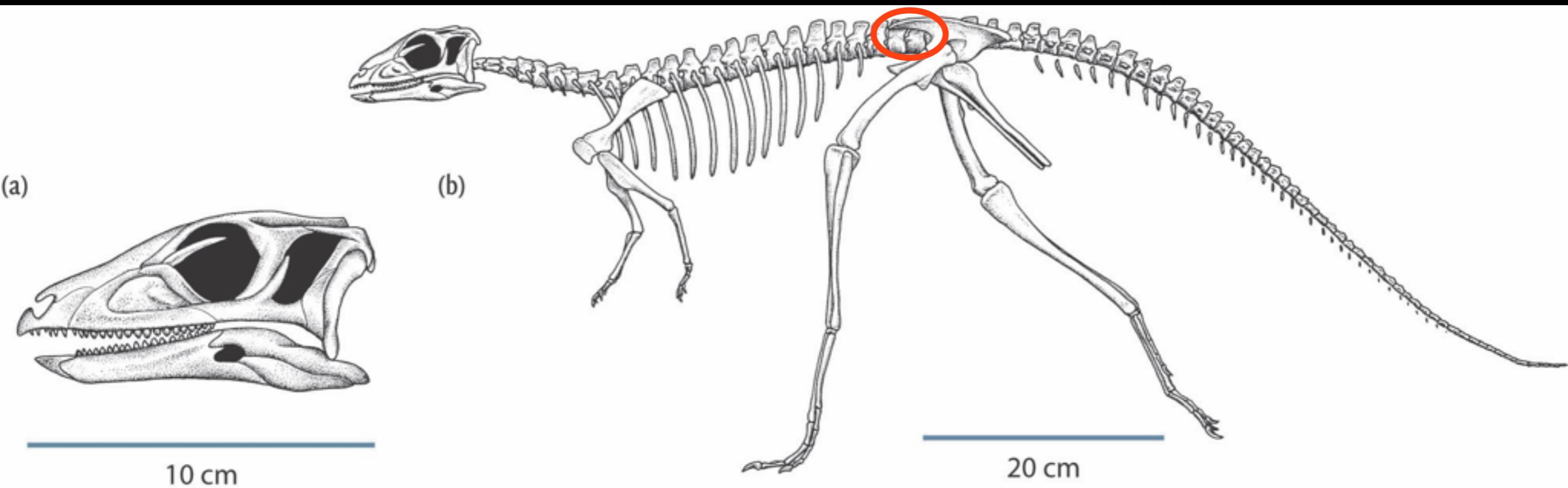
## Other shared, derived traits

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



## How do mammals chew?

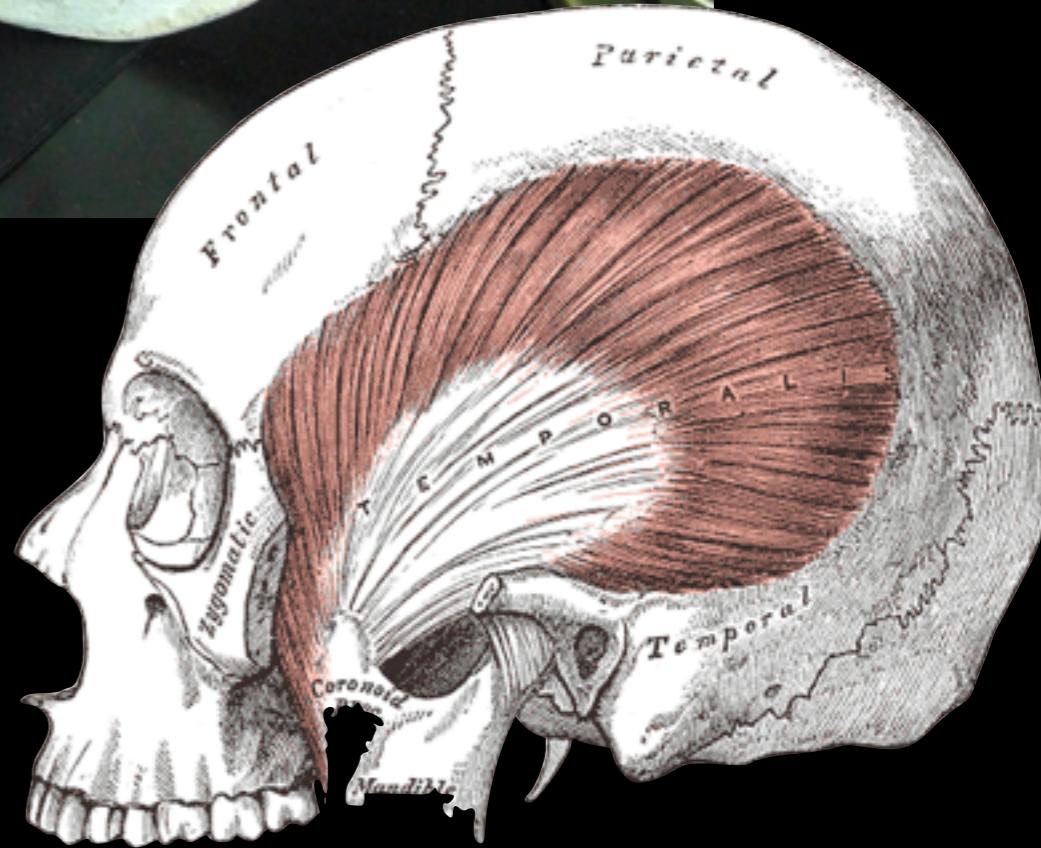
Front: Cropping

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

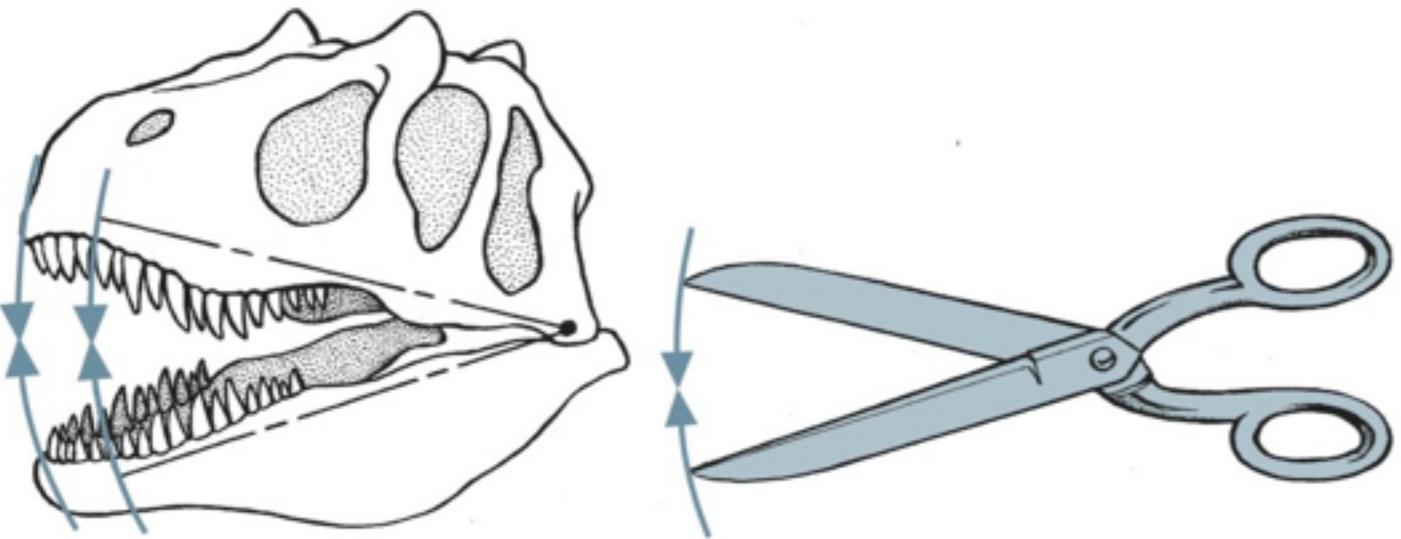
Front: Cropping: carried out by keratin RAMPHOTHECA

Diastem: Manipulation by tongue

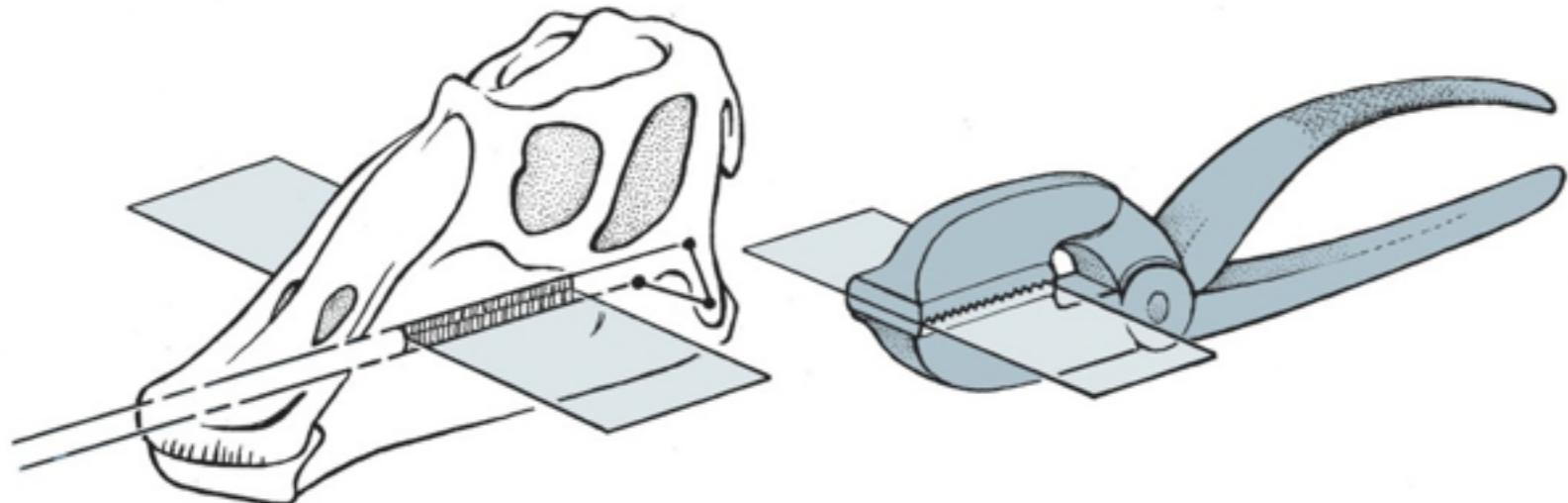
Cheek teeth: Grinding! Dental Batteries

Coronoid Process ~ Different shape, different muscle attachments

Inset molars for cheeks ~ keep food in mouth



**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*

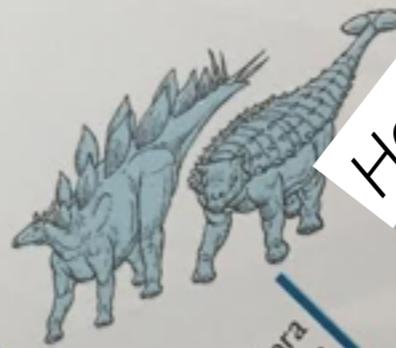


*Lesothosaurus*

Everything else in Ornithischia  
is in Genasauria → Chewing

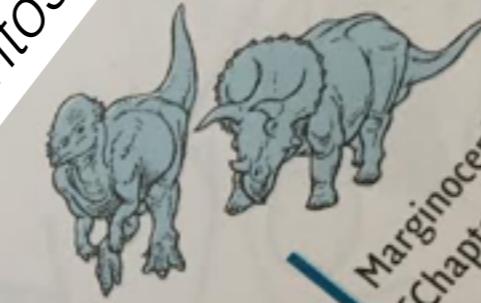
*Lesothosaurus*

Saurischia



Thyreophora  
[Chapter 5]

Heterodontosauridae



Marginocephalia  
[Chapter 6]



Ornithopoda  
[Chapter 7]

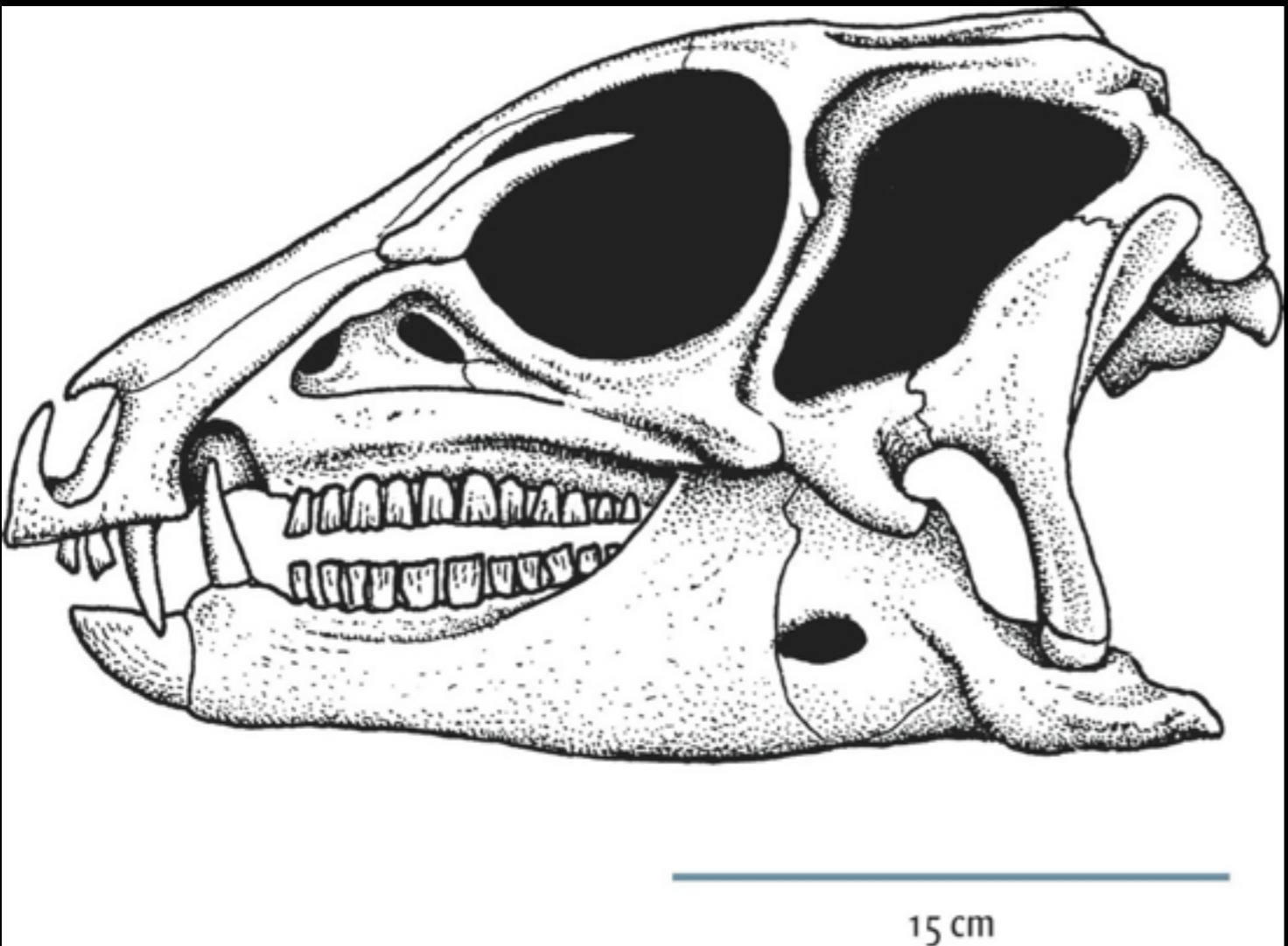
Cerapoda  
3

Genasuria  
2

Ornithischia  
1

‘Cheeky’ saurs

Dinosauria



*Heterodontosaurids: Not Primitive...  
unique chewing.*

*Three kinds of teeth  
Anterior: Snipping/Cropping  
Posterior: Chewing  
Tusks: Potentially display/courtship*

