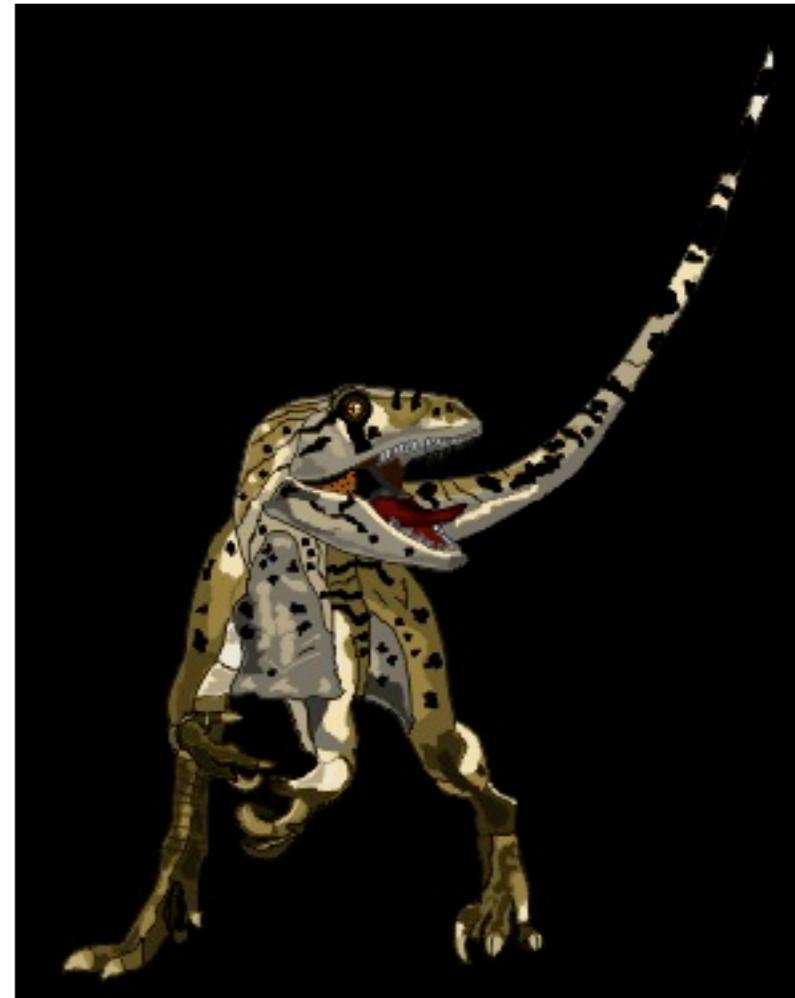


Theropoda: Roadrunners from HELL.



Enter Saurischia!

Saurischians:

Two major clades:

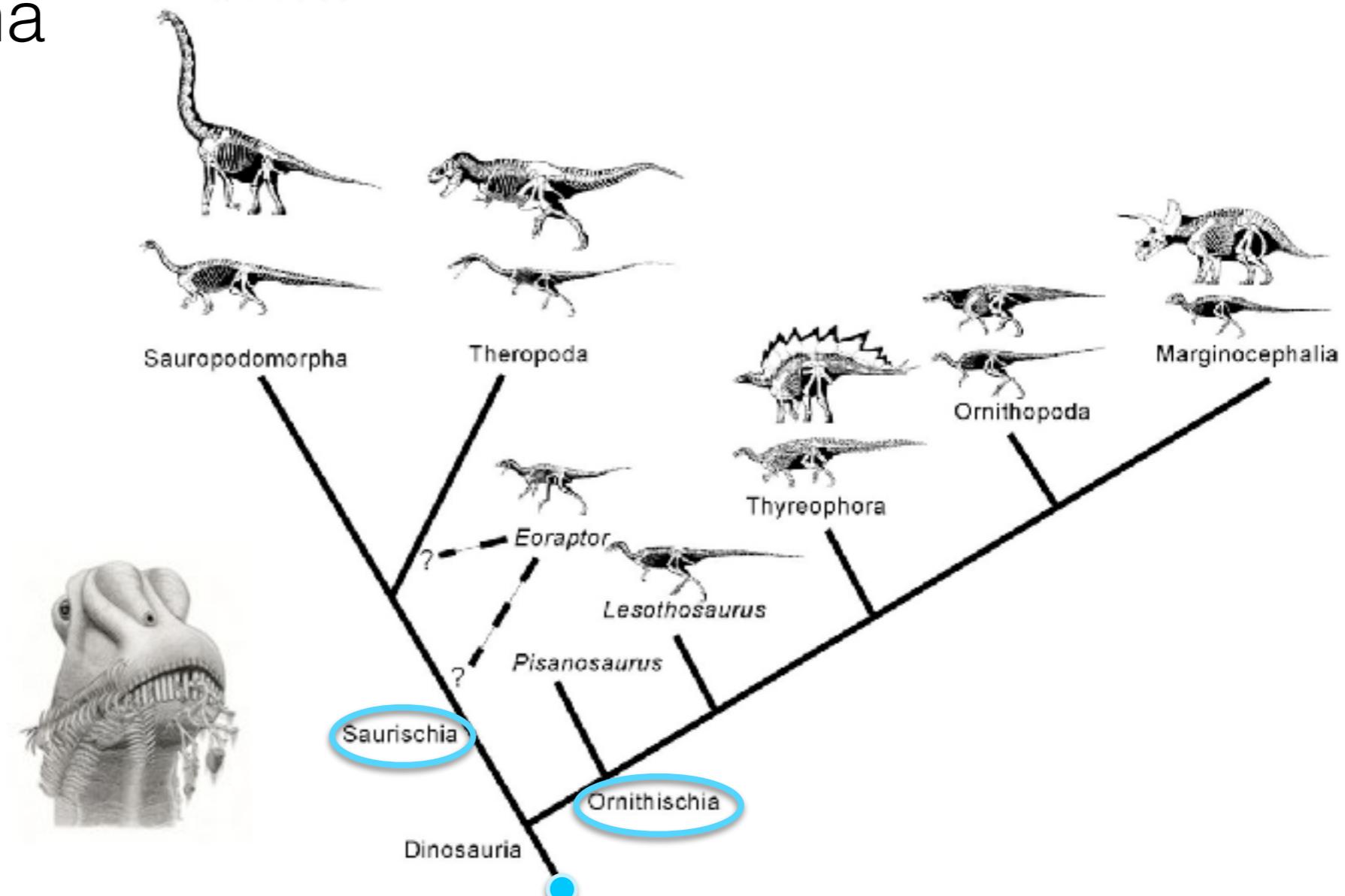
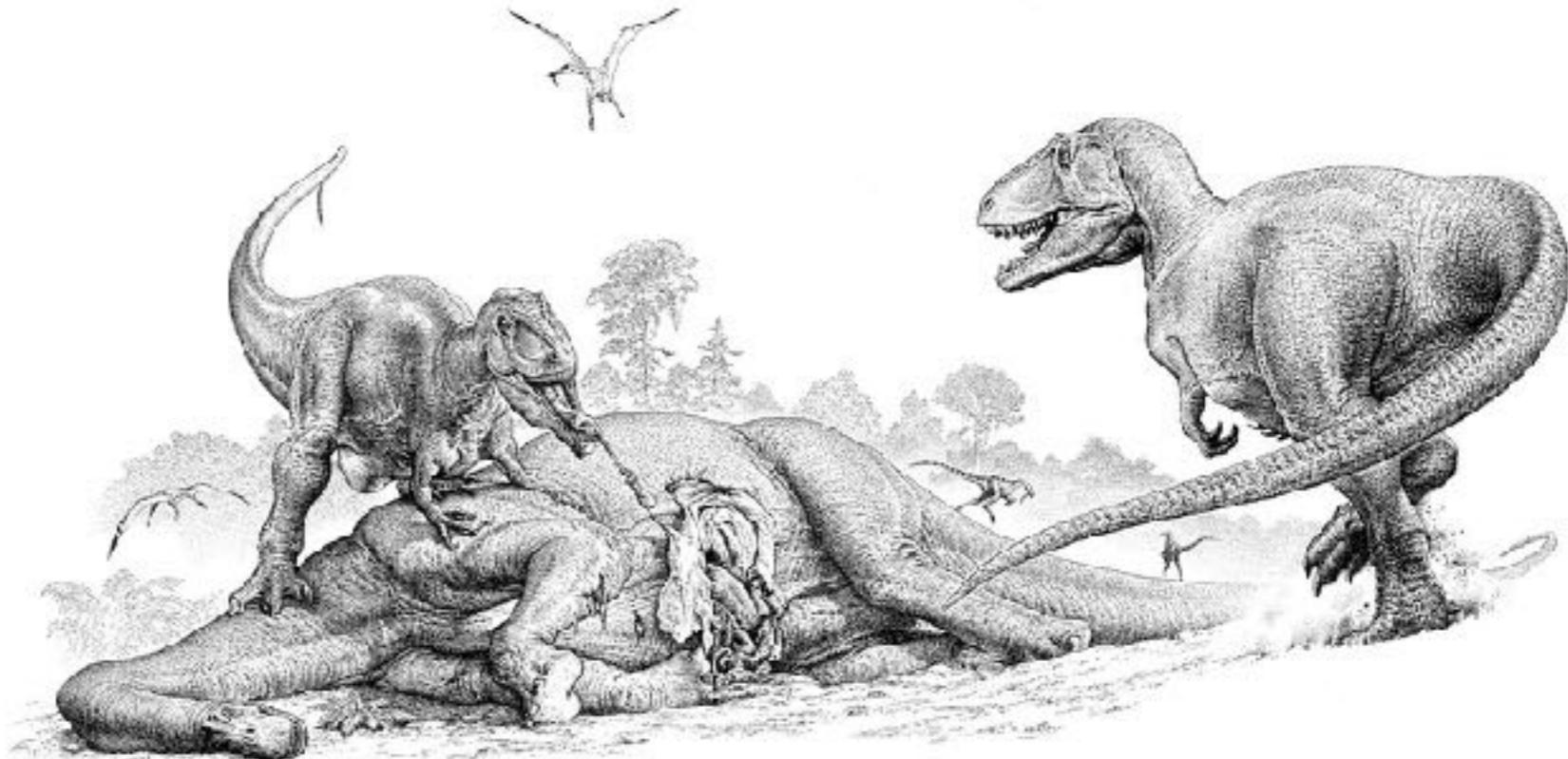
-Sauro**pod**omorpha

The Big

-Theropoda

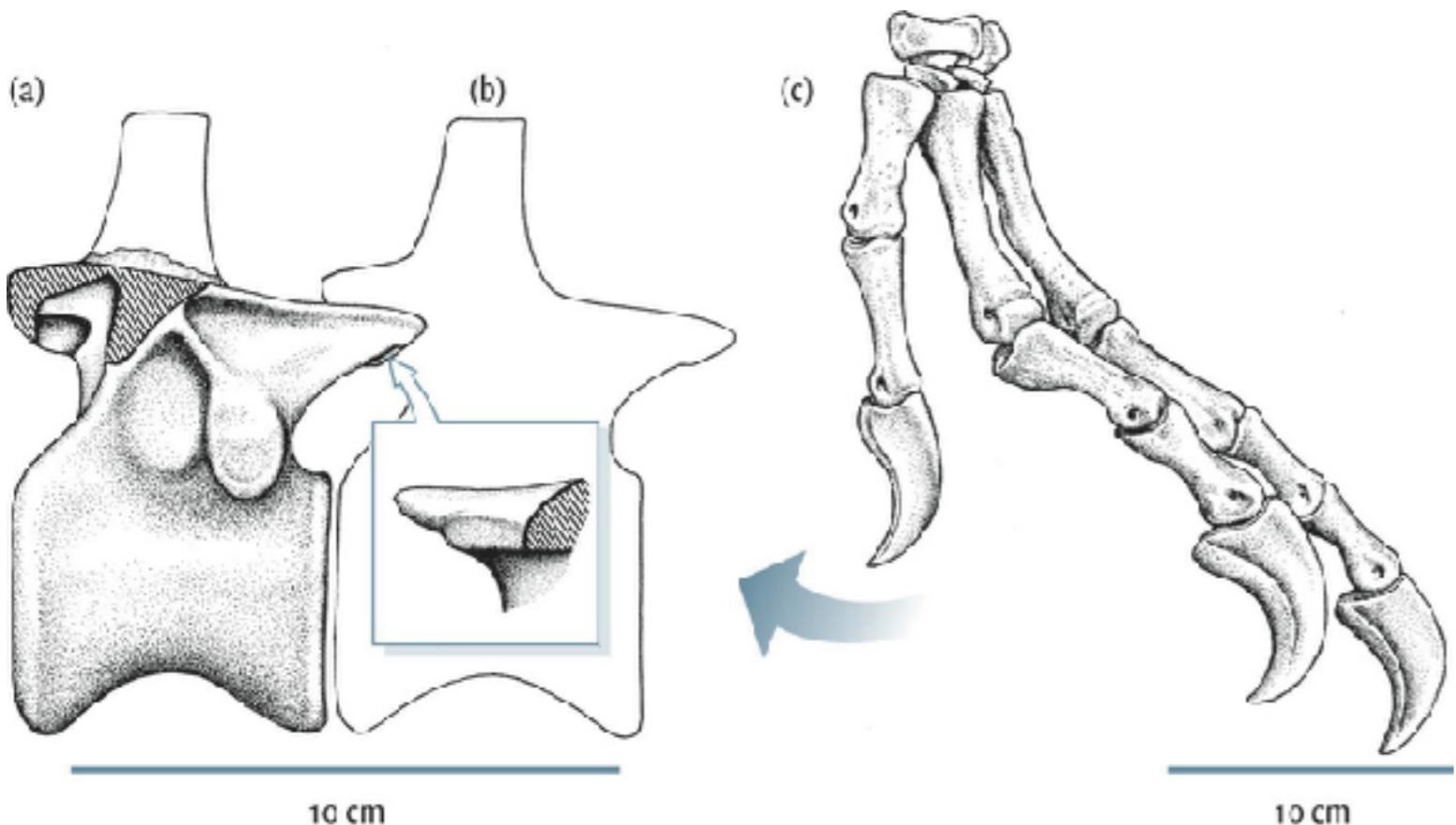
The Bad

The Ugly



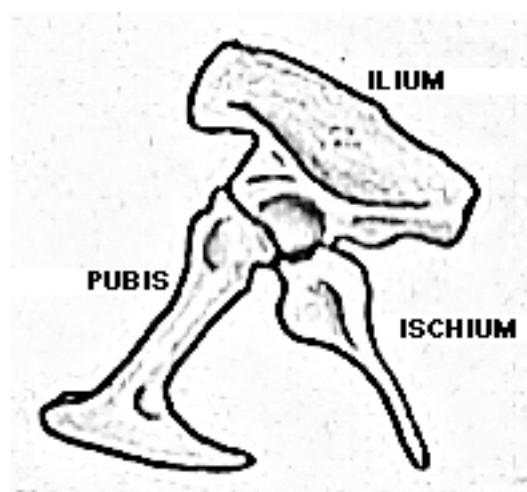
What characterizes Saurischian Dinosaurs?

1. Subnarial foramen
2. Extra articulation on dorsal vertebrae
3. Twisted thumb



Tyrannosaurus

Ancestral characteristics:
-'Lizard Hip' three-pronged pelvis structure



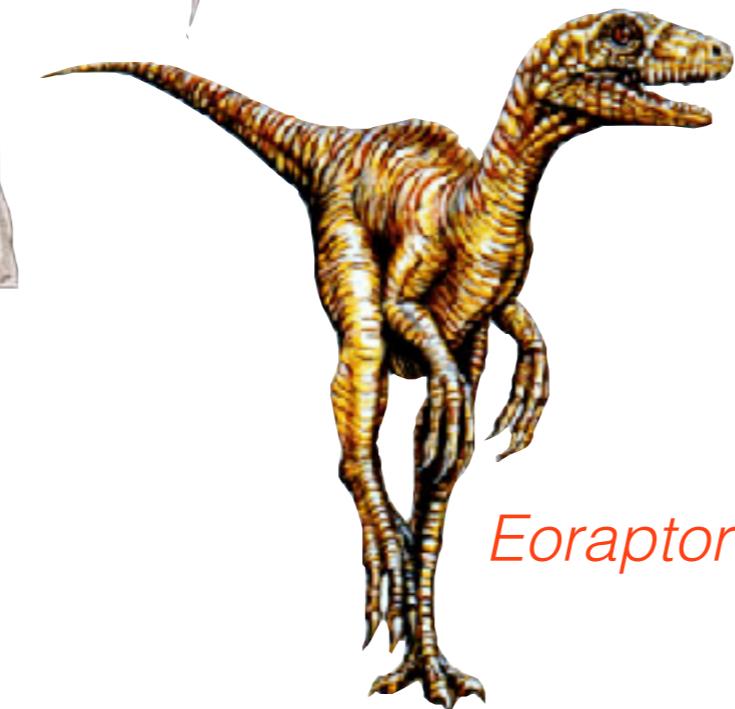


Basal, non-sauropoda Saurischians

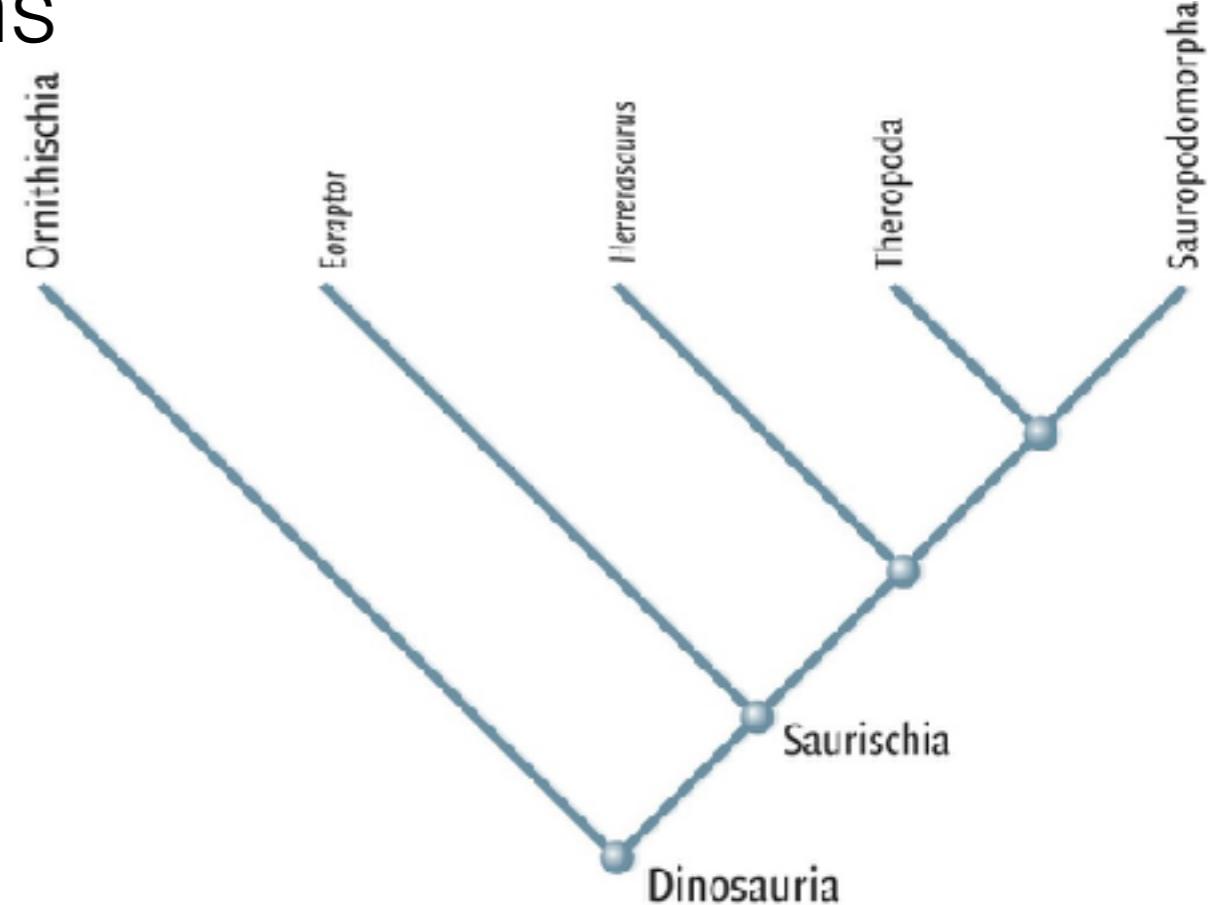
Small
Bipedal
Fast-moving (how can you tell?)
Carnivorous



Herrerasaurus



Eoraptor



Possibly a very early sauropodomorpha: *Saturnalia*



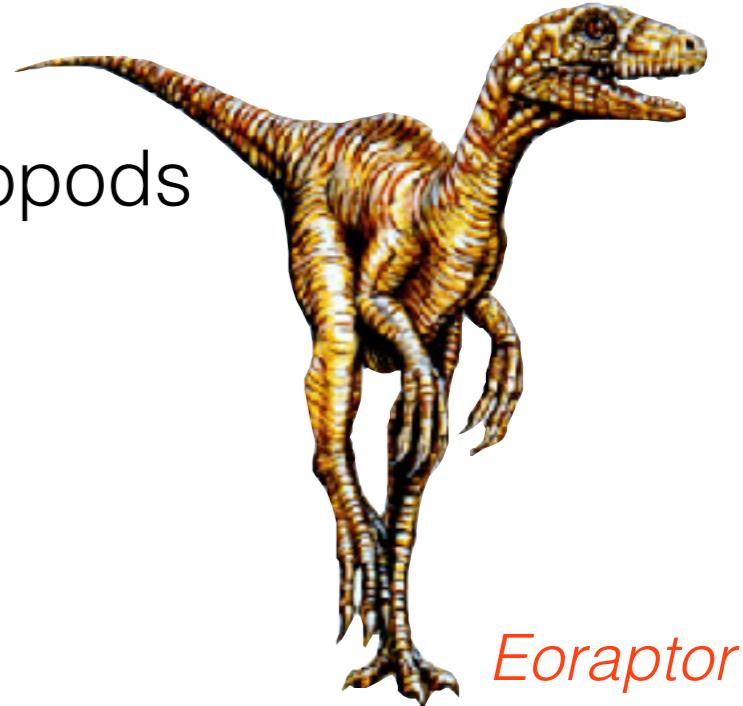
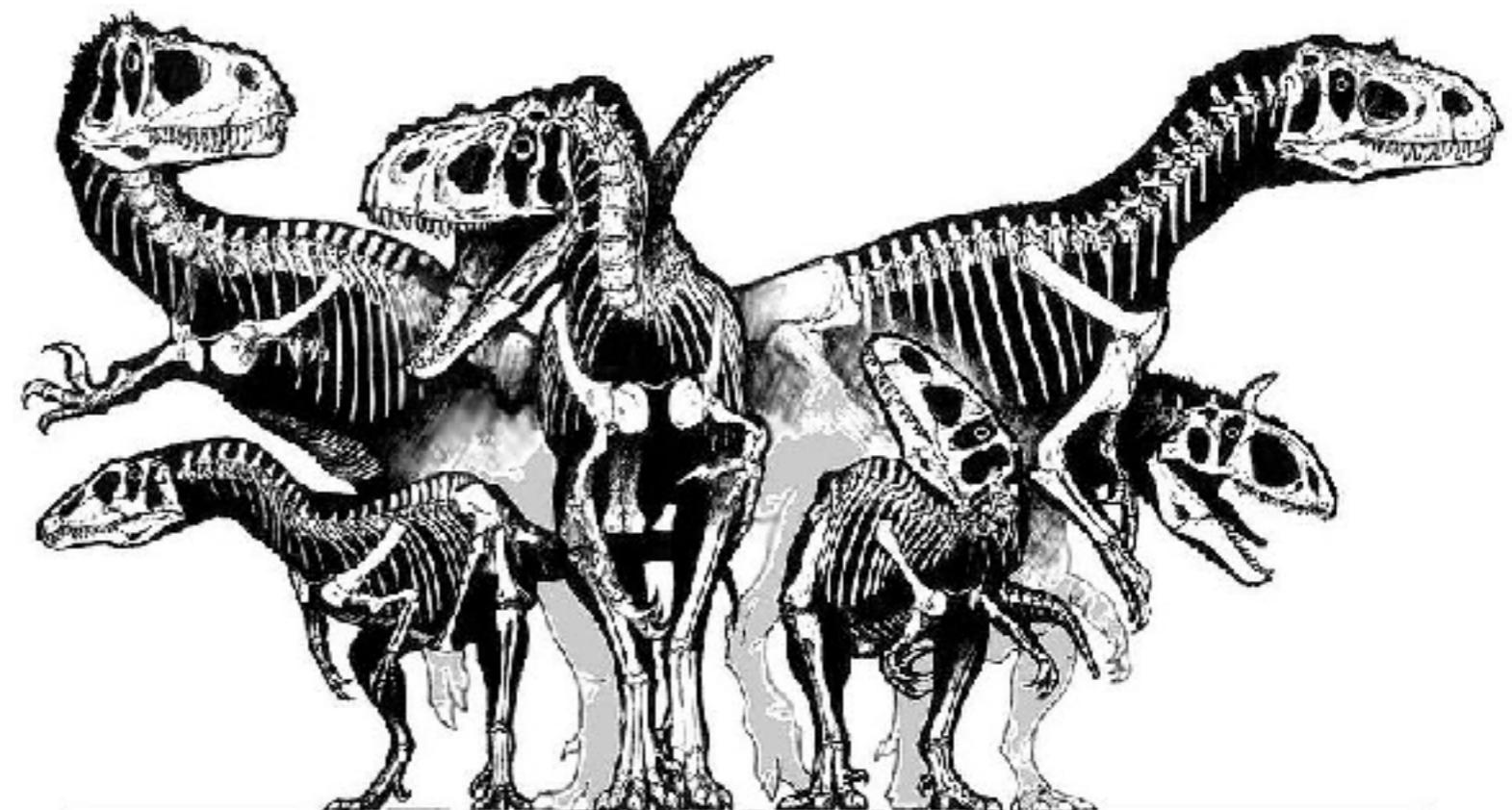
Who were the Theropod dinosaurs?

Second half of Saurischia, most closely related to Sauropods

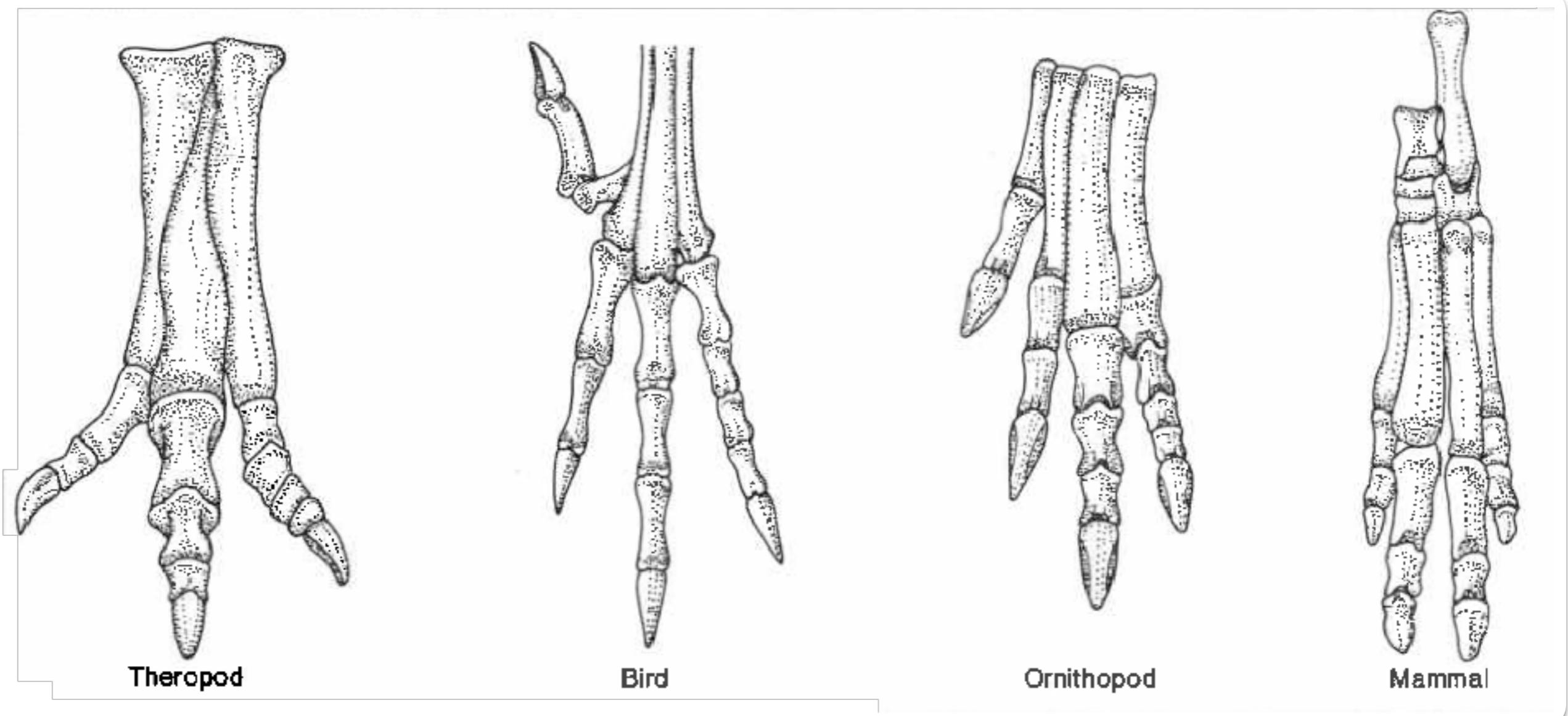
Represent some of the earliest known dinosaurs



Herrerasaurus

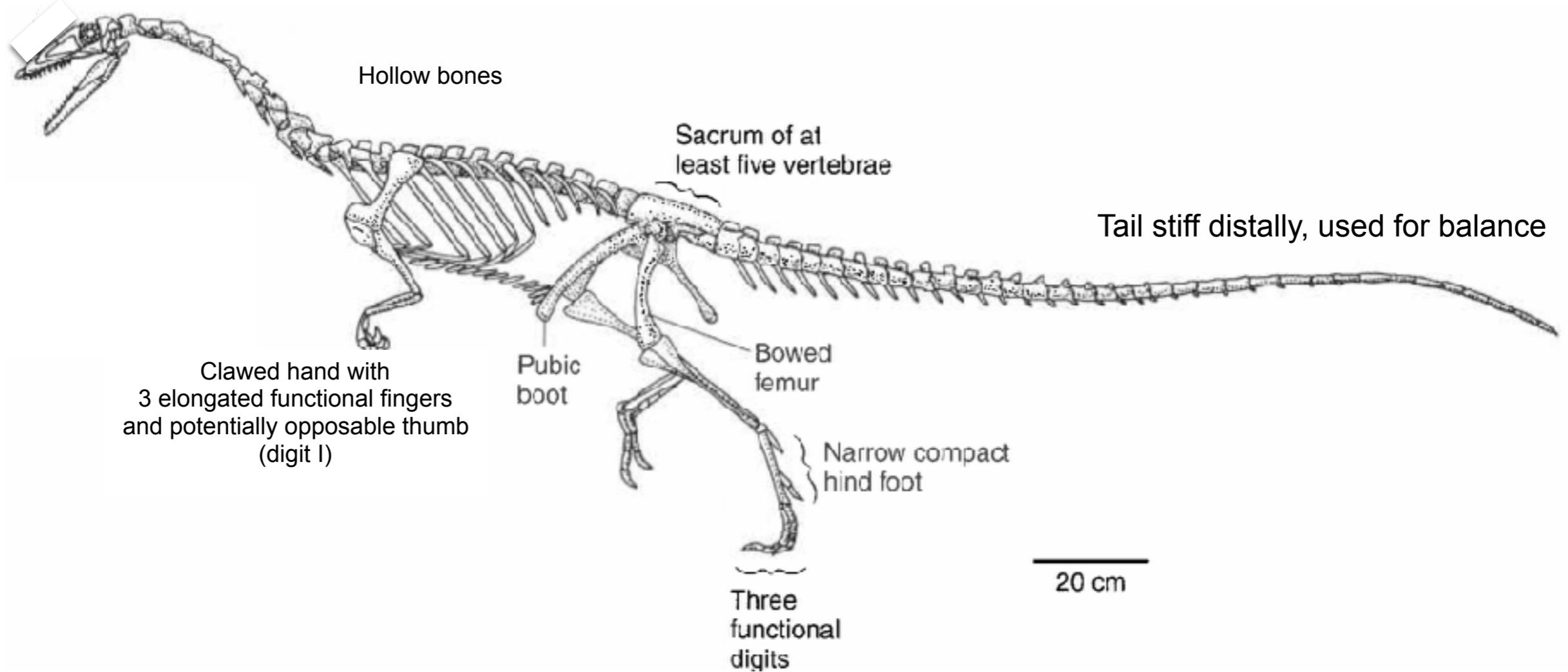


Eoraptor



Beast Foot

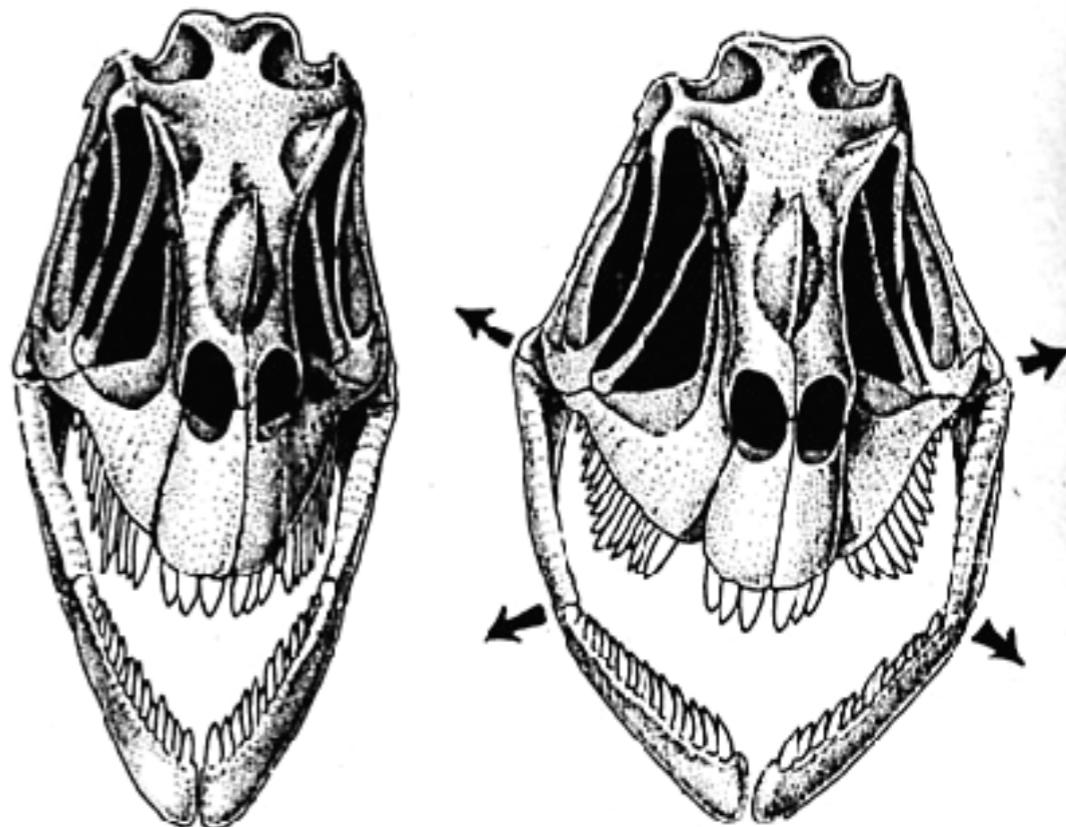
Bird Foot



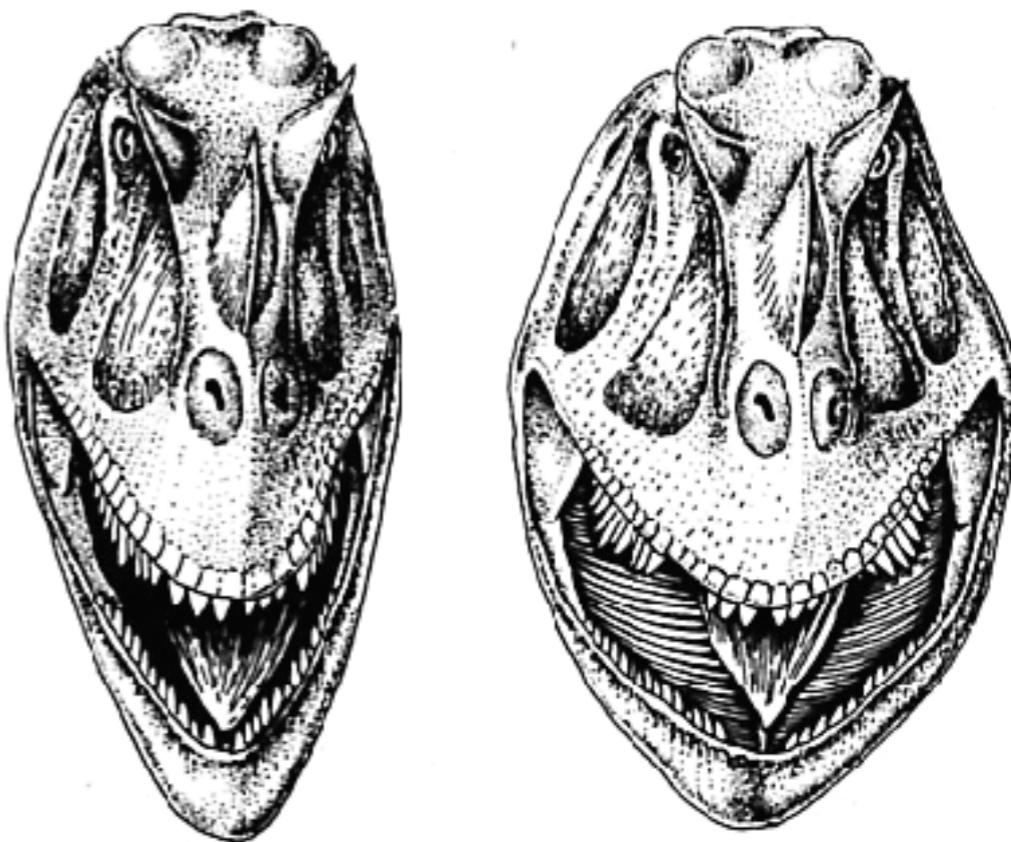
Shared, Derived Characteristics:

- 1) Clawed bipeds
- 2) Sharp, serrated teeth
- 3) Hollow vertebrae and limb bones
- 4) Reduction of outer fingers of hand
- 5) Stiff tail
- 6) 3 functional digits in foot

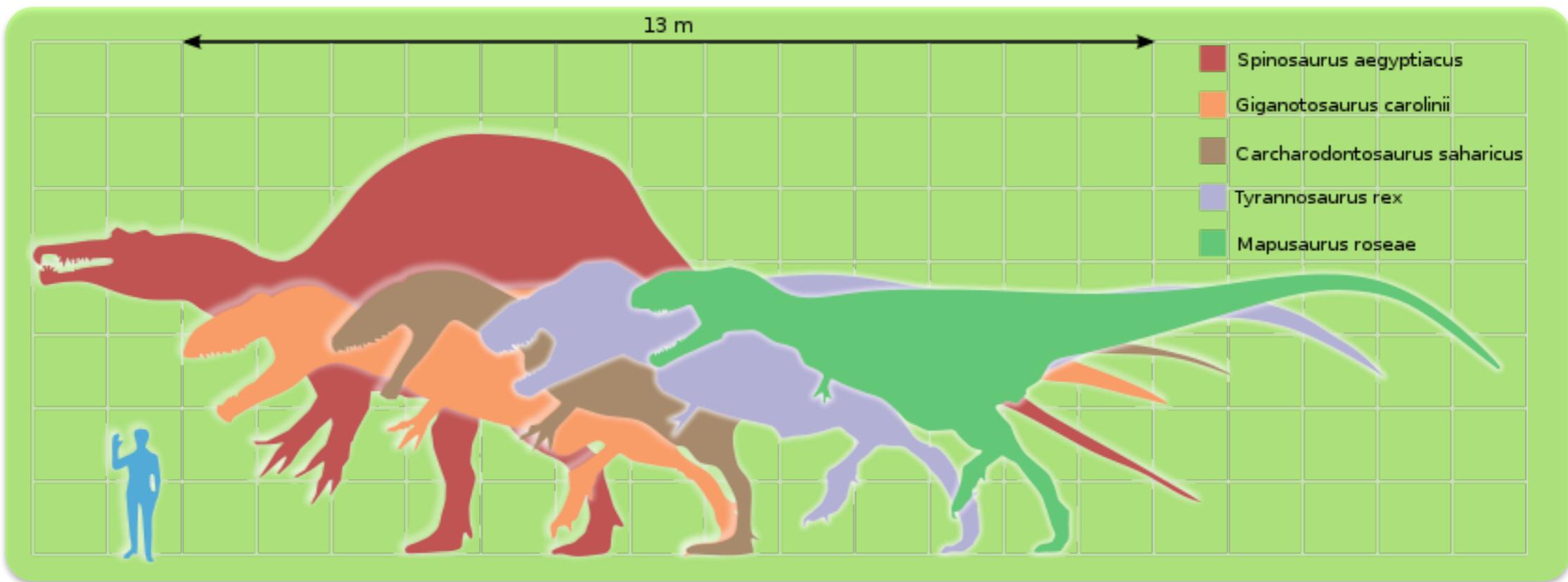
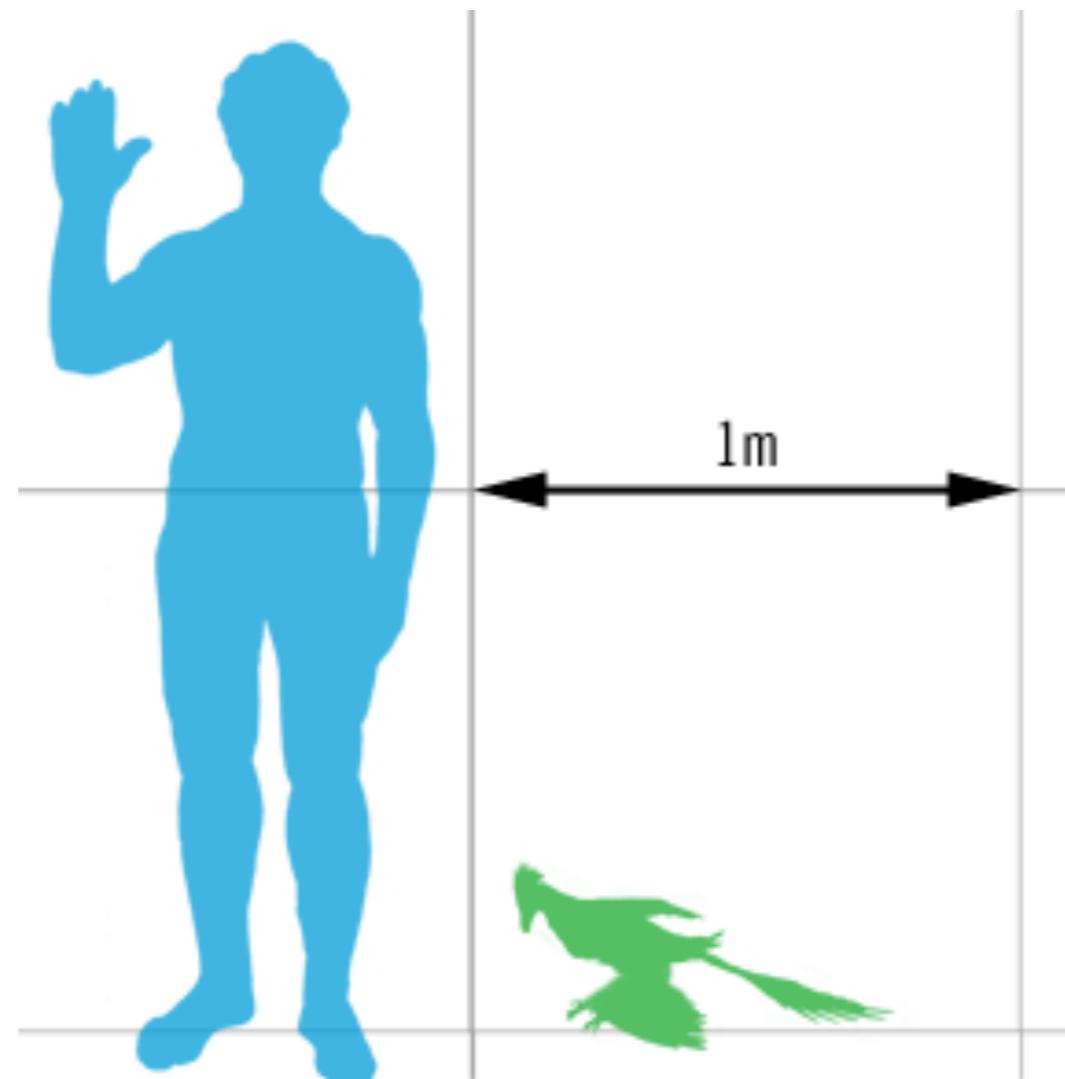
Loosely jointed, kinetic skulls



How to swallow something larger than your head—dinosaur-style. Face-front view of *Ceratosaurus*. All the bones of the skull's side were loosely hinged to the skull top, so the head expanded sideways when the beast swallowed an extra-large meat chunk. And a hinge in each lower jaw opened outward, just like a boa constrictor.



Theropod sizes



'Bee Hummingbird' is actually the smallest Theropod.



All Theropods are obligate bipeds

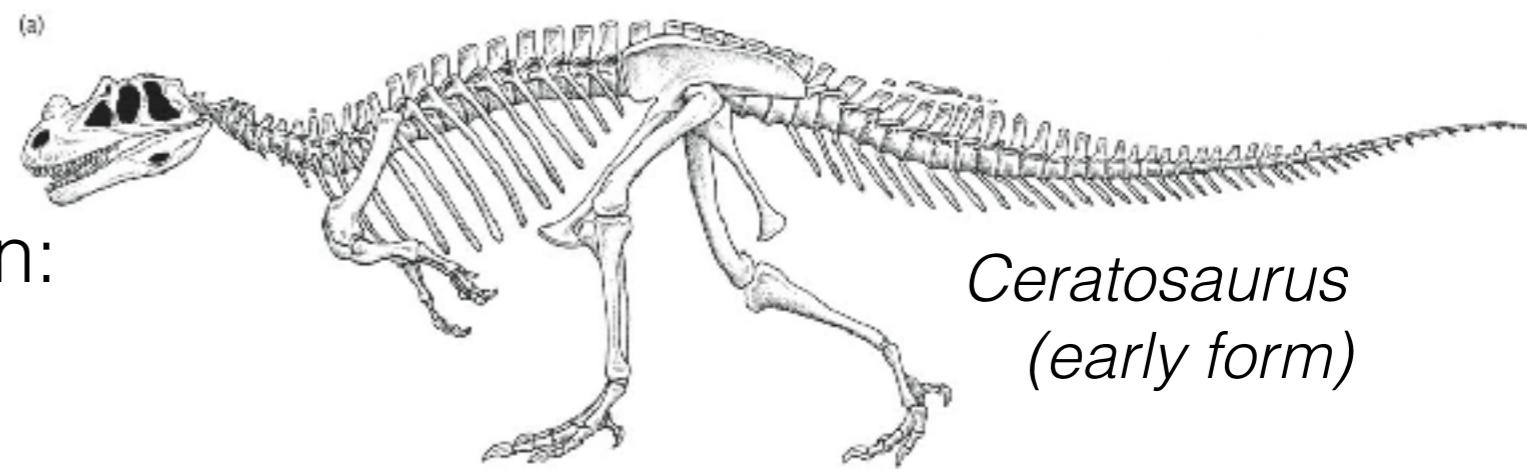
Feet close to the midline

Structural design was focused on:

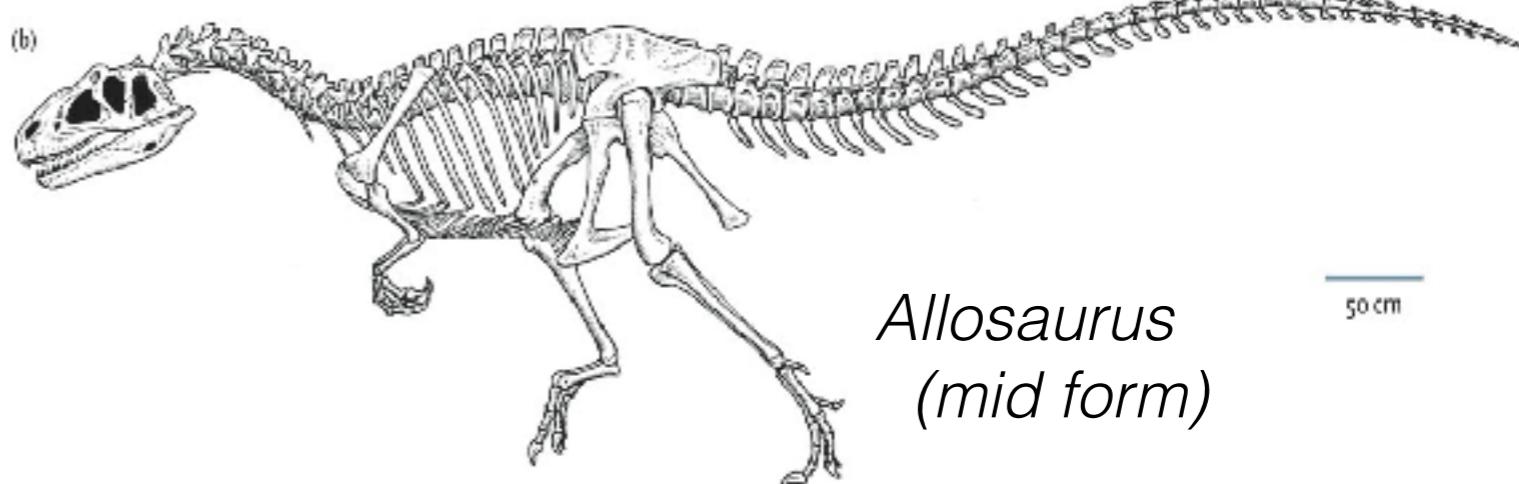
tracking

attacking

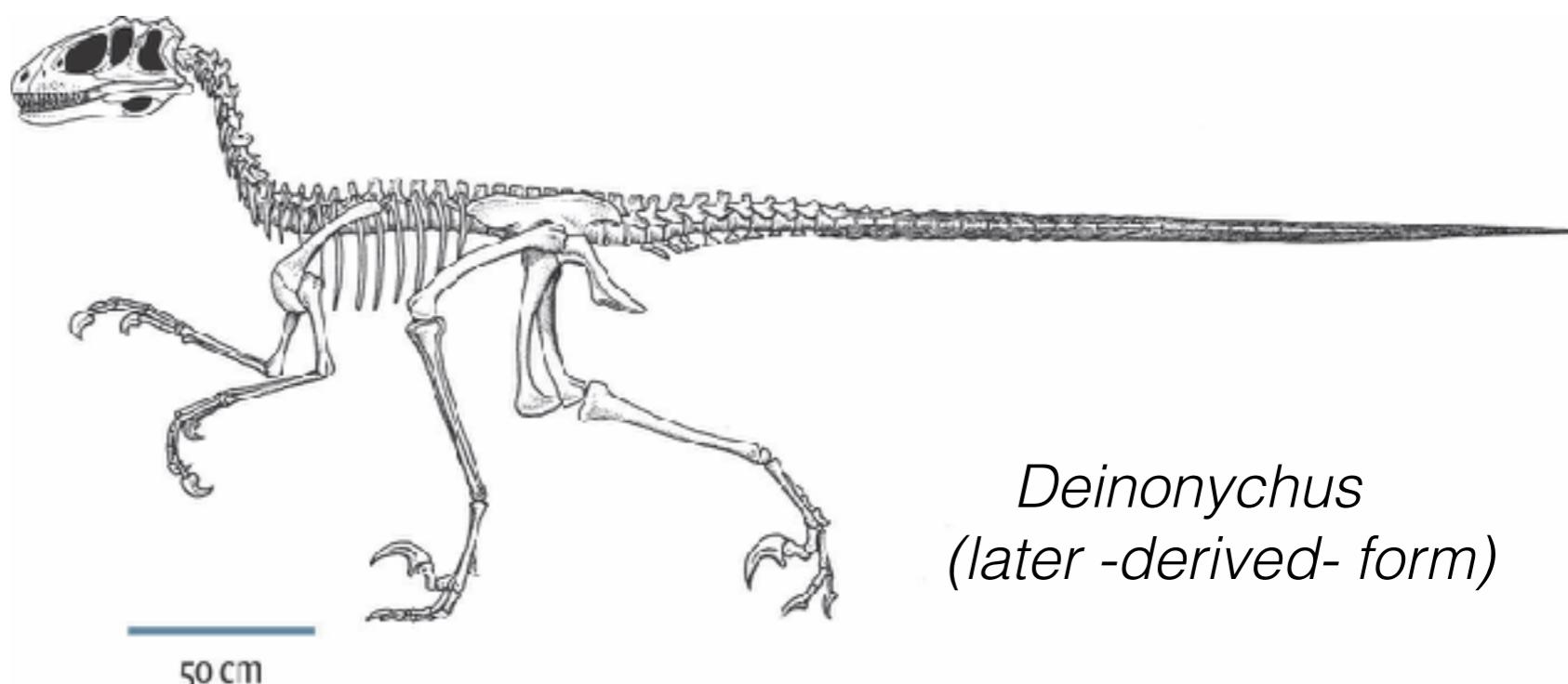
feeding



Ceratosaurus
(early form)

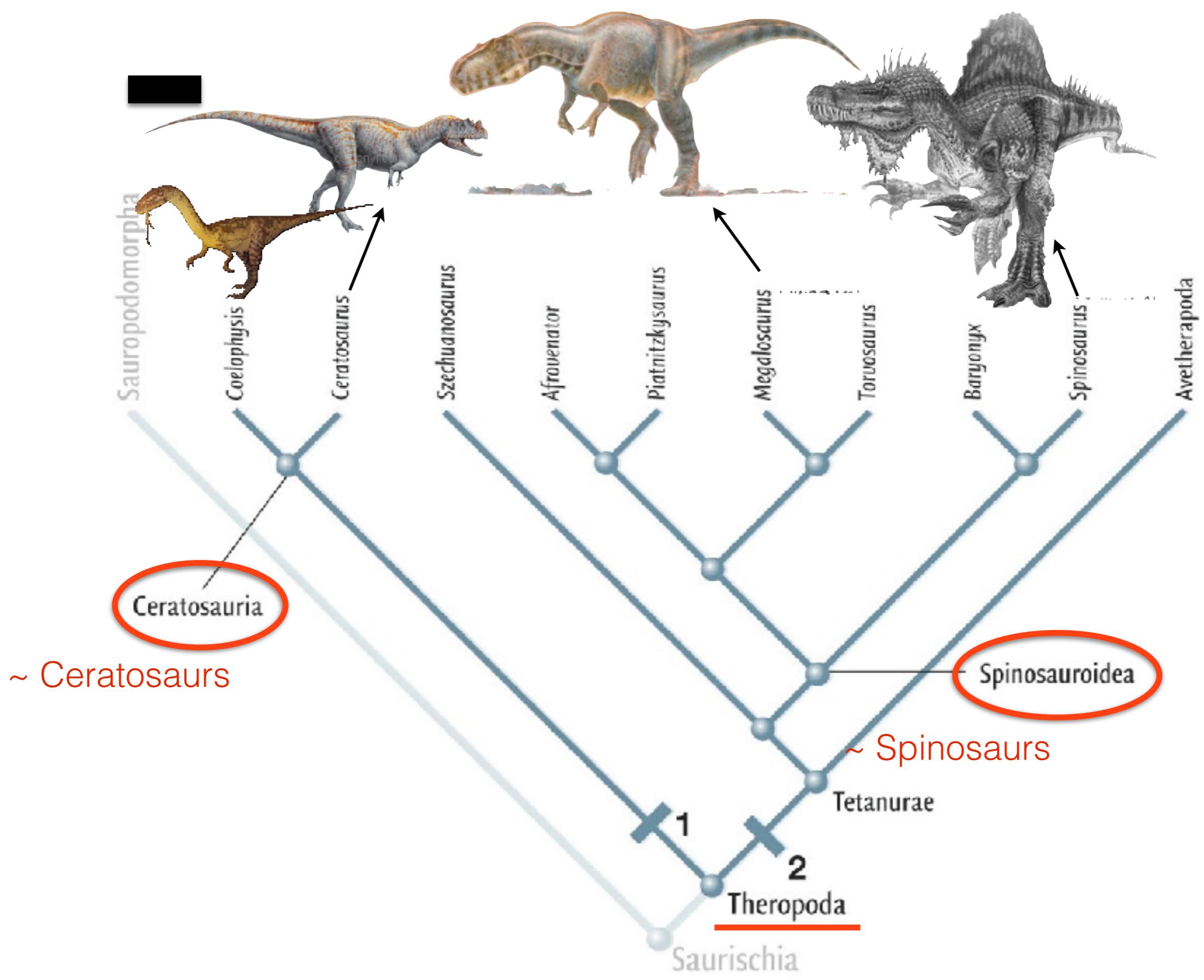


Allosaurus
(mid form)



Deinonychus
(later -derived- form)

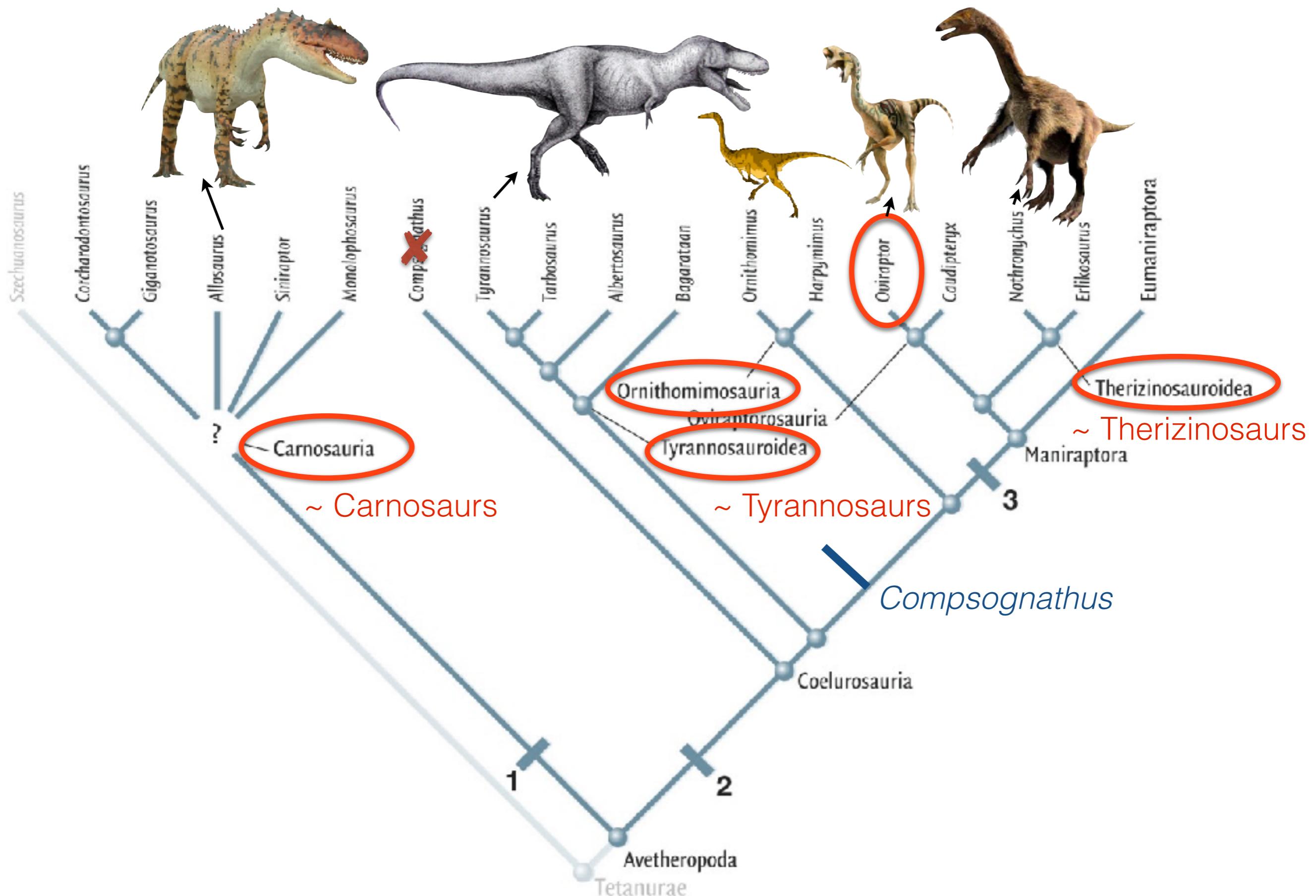




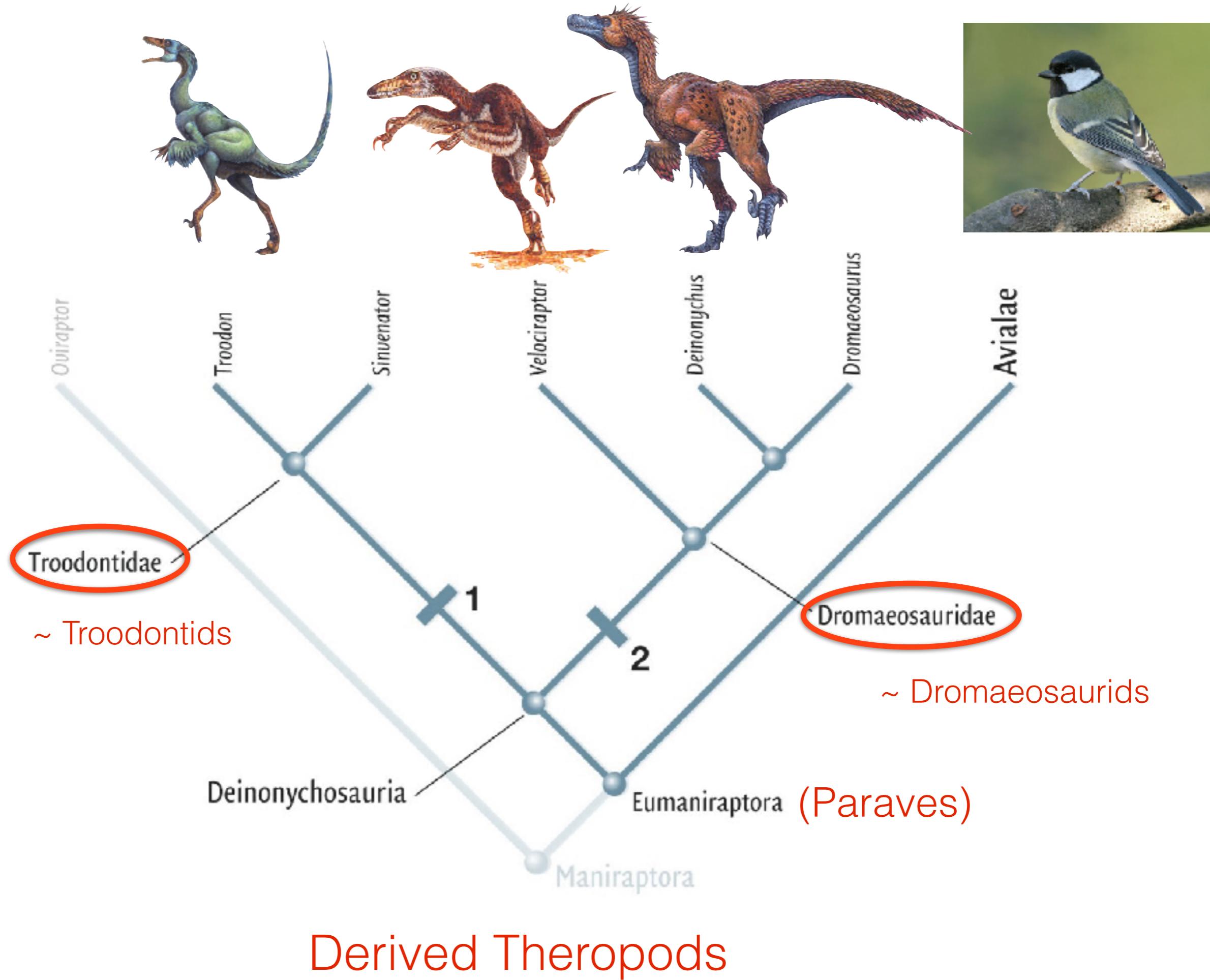
Basal Theropods



Distribution of Basal Theropods

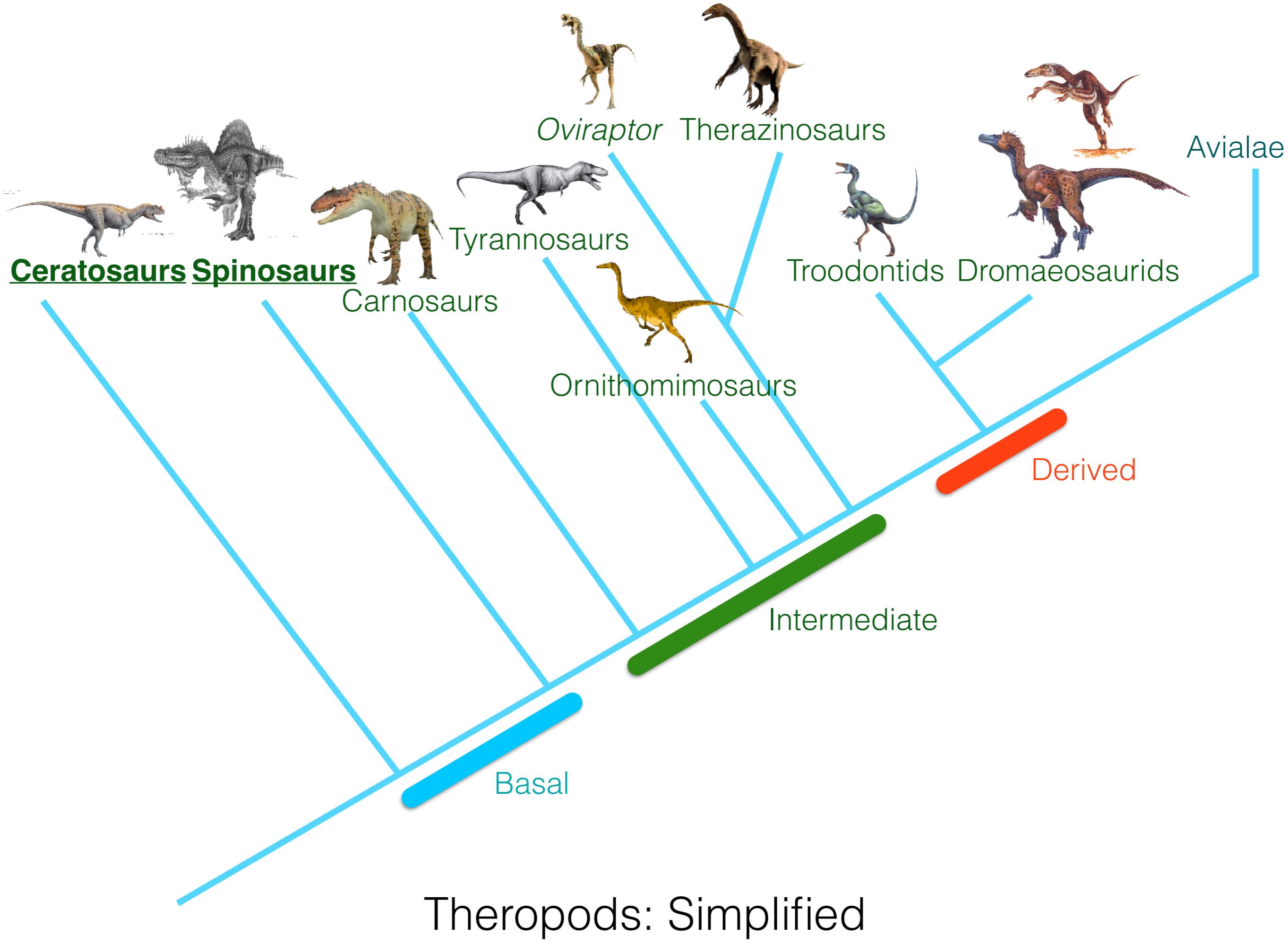


Intermediate Theropods



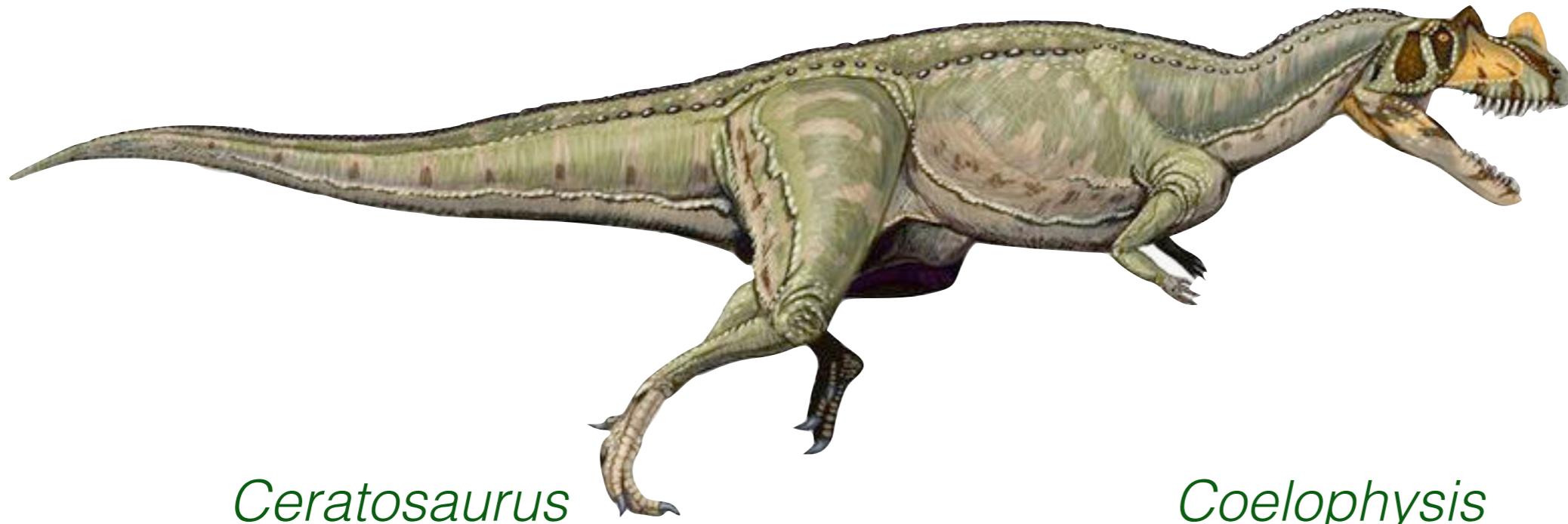


Distribution of Intermediate and Derived Theropods





Ceratosaurs



Ceratosaurus

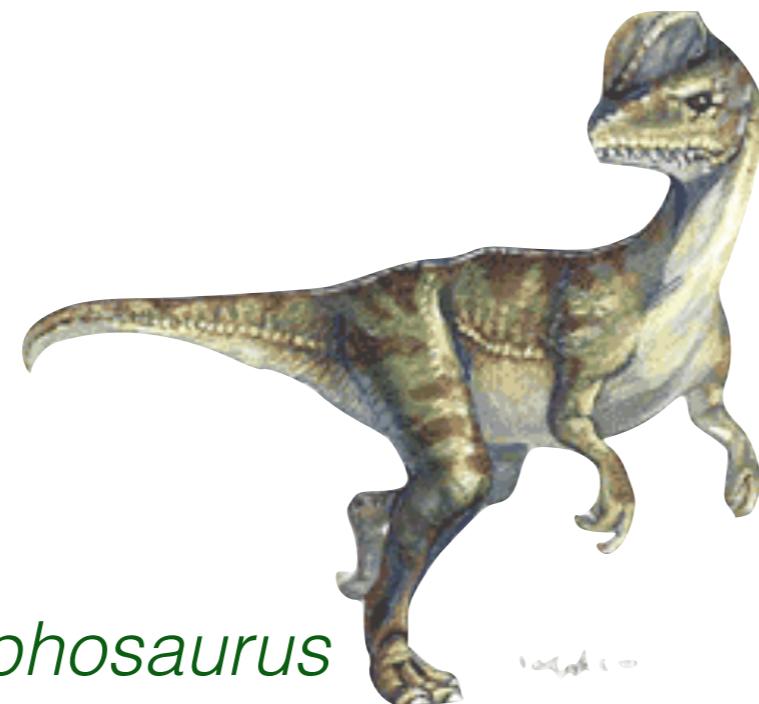
Robust hip joint

Fusion of upper ankle bones for support

Late Jurassic to Early Cretaceous

Enormous bonebeds known for

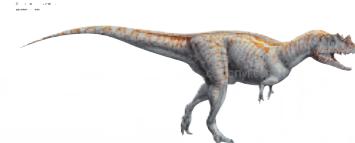
Coelophysis



Dilophosaurus

Coelophysis





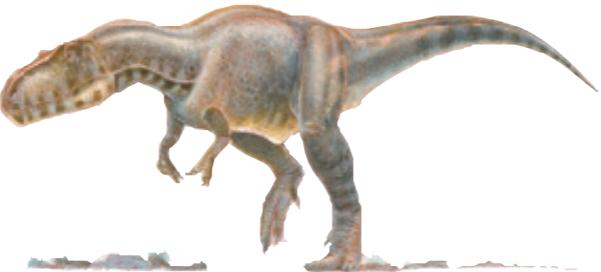
Ceratosaurs



Dracoraptor ~ earliest Jurassic
Fed on small vertebrates
Survived the Triassic Extinction

Looks very 'raptor-like',
but a distant ancestor





Spinosaurus

Megalosaurus



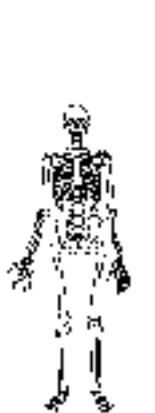
Strong shoulder, long arms

Long, narrow snout

Probably fish eaters

Includes Megalosaurids

Known for giant sails (but not across all taxa)



Spinosaurus



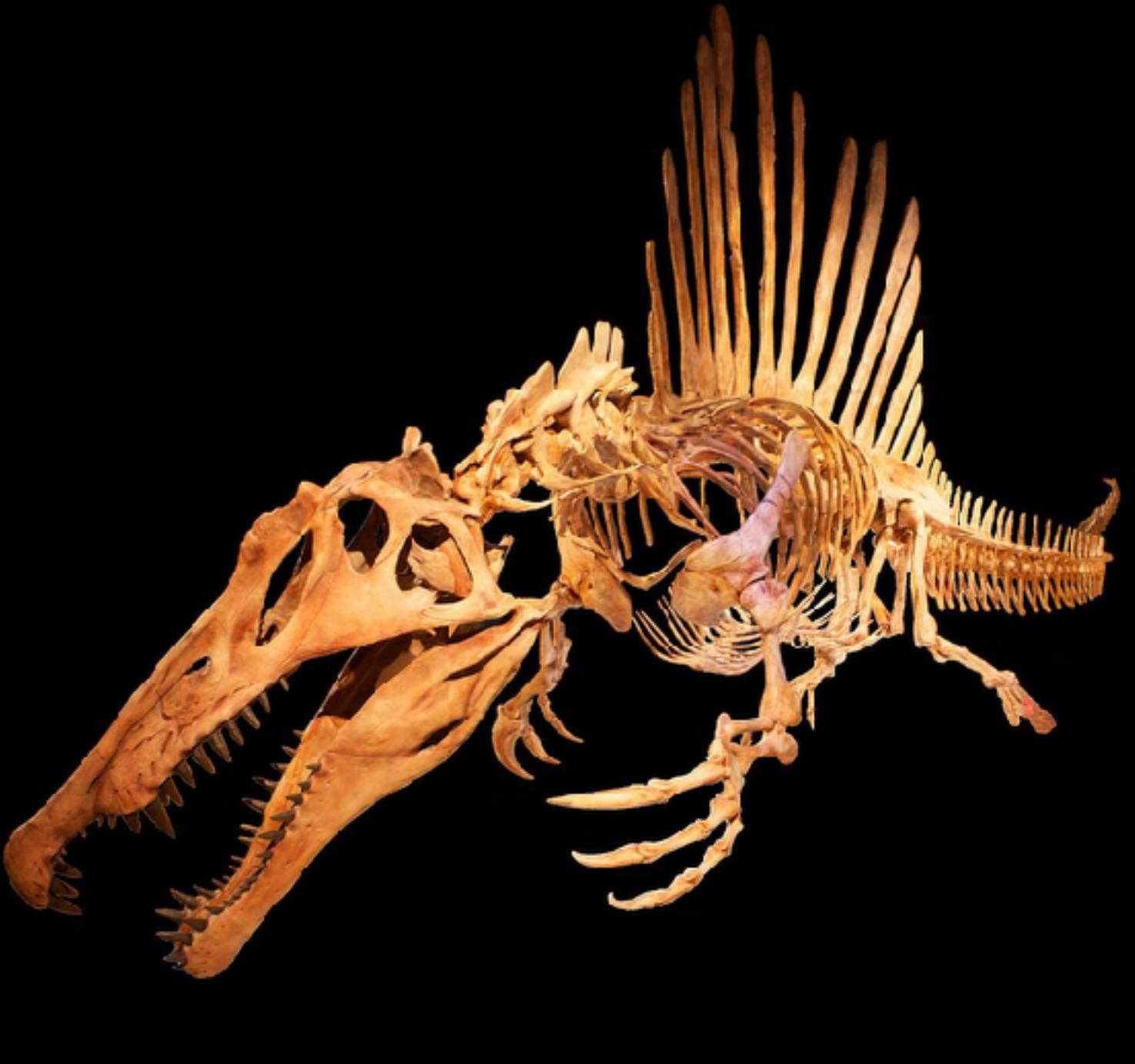
Spinosaurus

Skulls are long, thin, and narrow

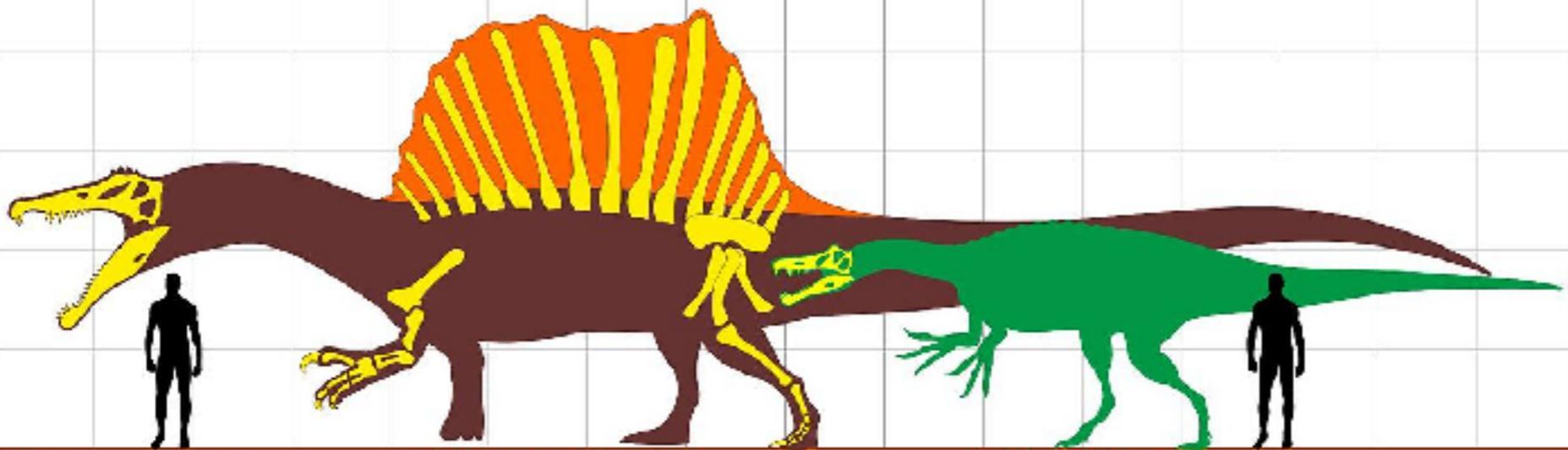
Not good for attacking large, herbivores or any animal that would put up a fight (JP3 notwithstanding)

Quick, powerful strikes on small prey

Semi-aquatic lifestyles



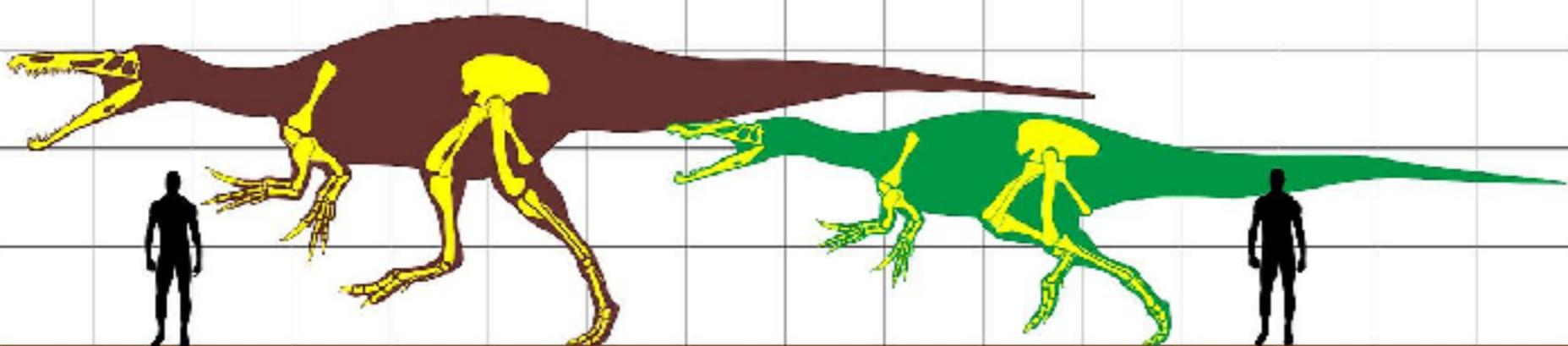




Spinosaurinae

Spinosaurus aegyptiacus
uzunluk (length) ~15 m
ağırlık (weight) ~7-9 t
kafa (skull length) ~1.5 m

Irritator challengeri
uzunluk (length) ~8 m
ağırlık (weight) ~2-3 t
kafa (skull length) ~84 cm

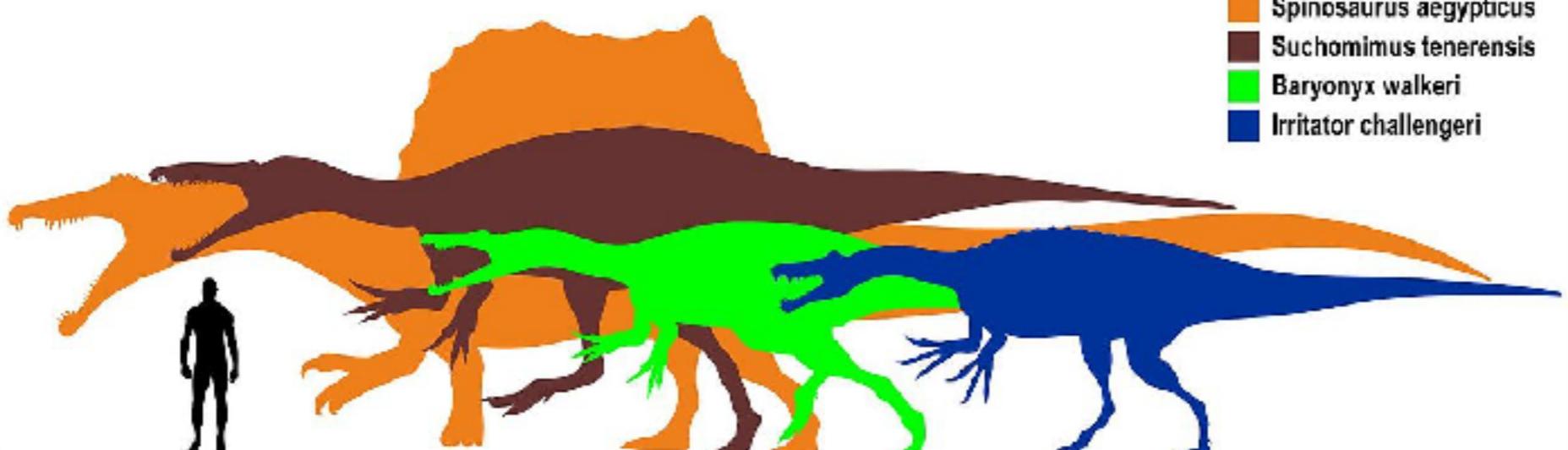


Baryonychinae

***Suchomimus tenerensis* (MNHN GDF 500)**
uzunluk (length) ~11 m
kalça yük. (hip height) ~3.6 m
ağırlık (weight) ~2.9-4.8 t
kafa (skull length) ~1.2 m

***Baryonyx walkeri* (BMNH R9951)**
uzunluk (length) ~8.5-9.5 m
kalça yük. (hip height) ~2.6-2.75 m
ağırlık (weight) ~1.7-2.7 t
kafa (skull length) ~0.915 m

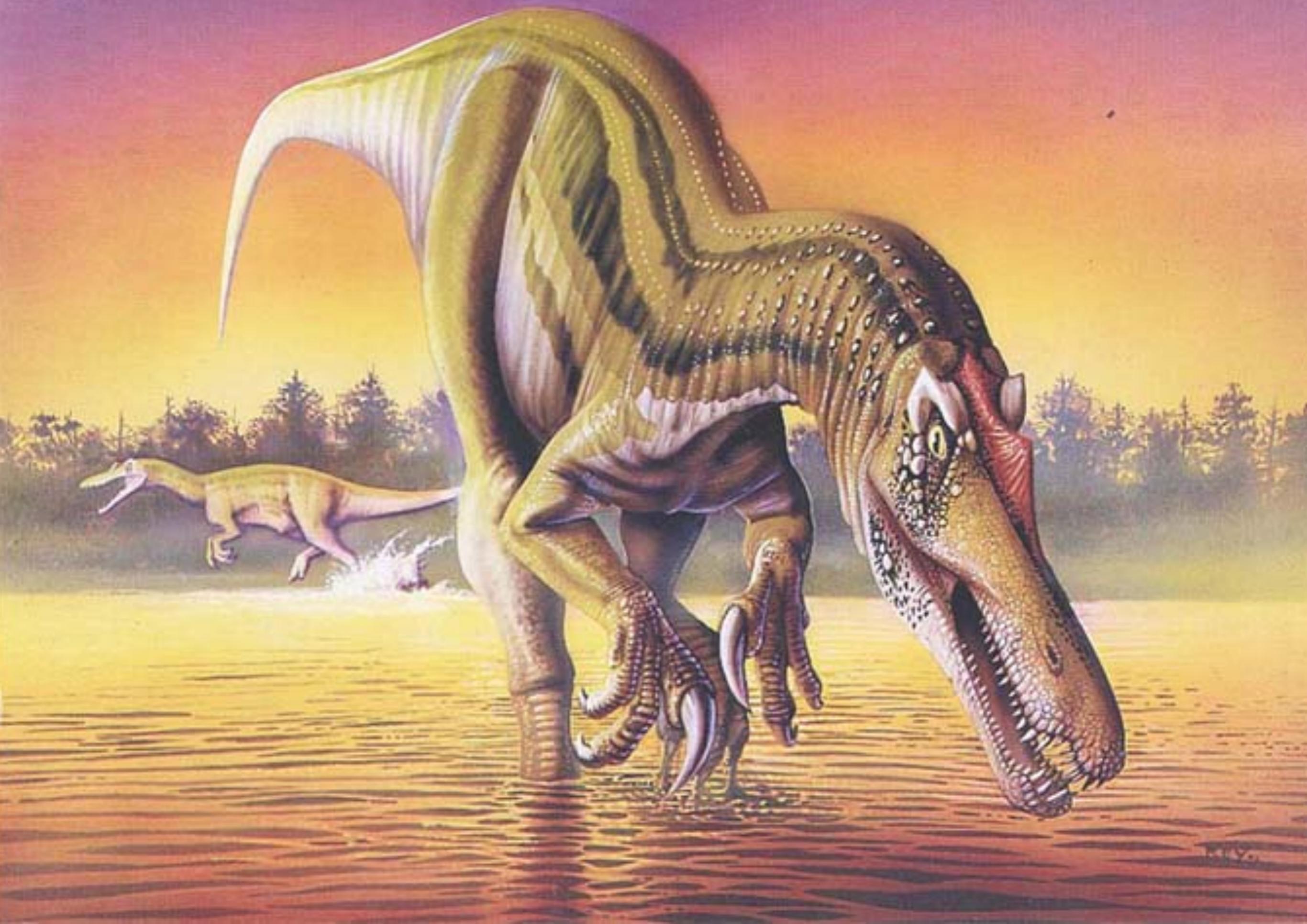
- **Spinosaurus aegyptiacus**
- **Suchomimus tenerensis**
- **Baryonyx walkeri**
- **Irritator challengeri**

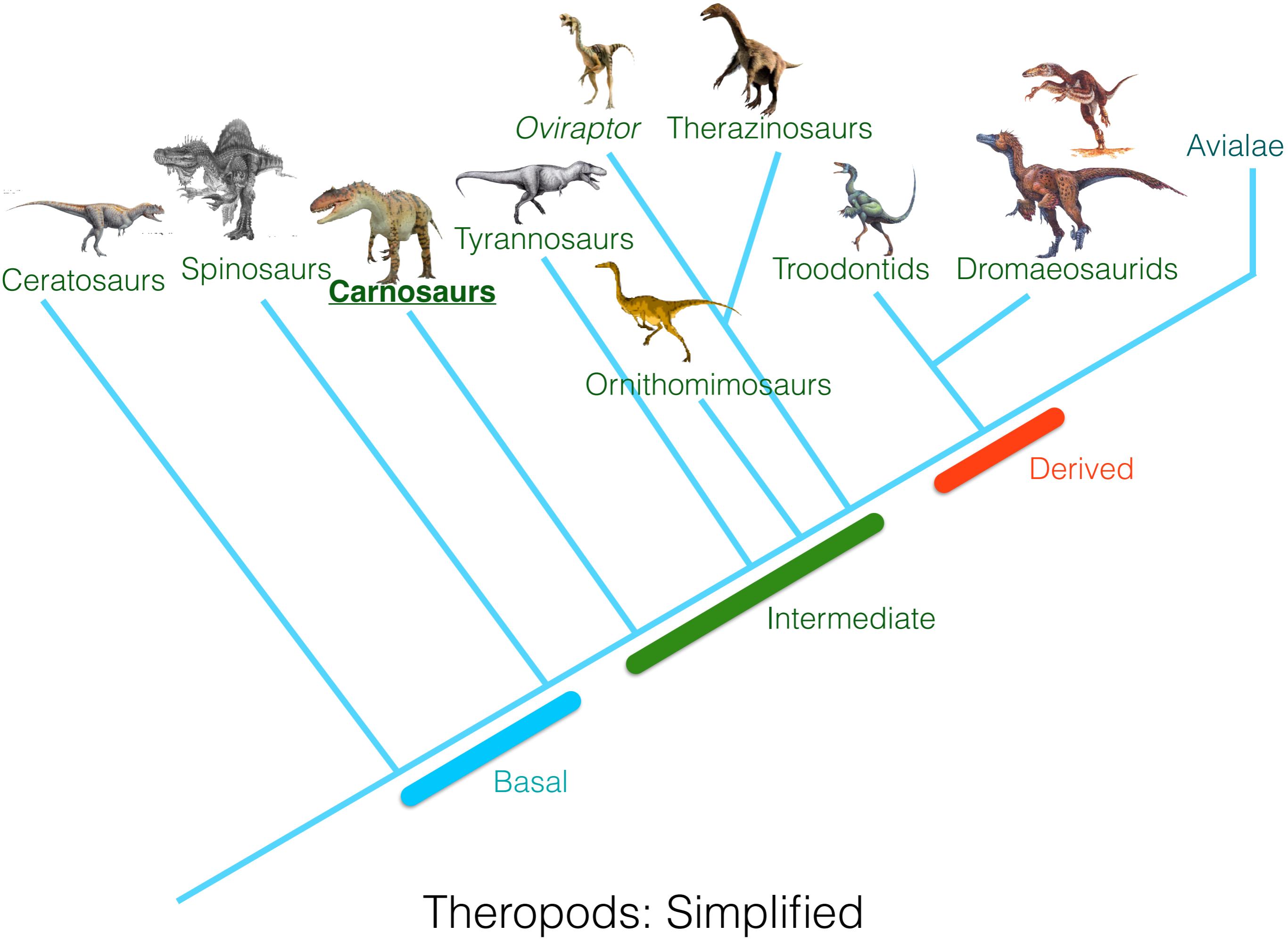


Suchomimus



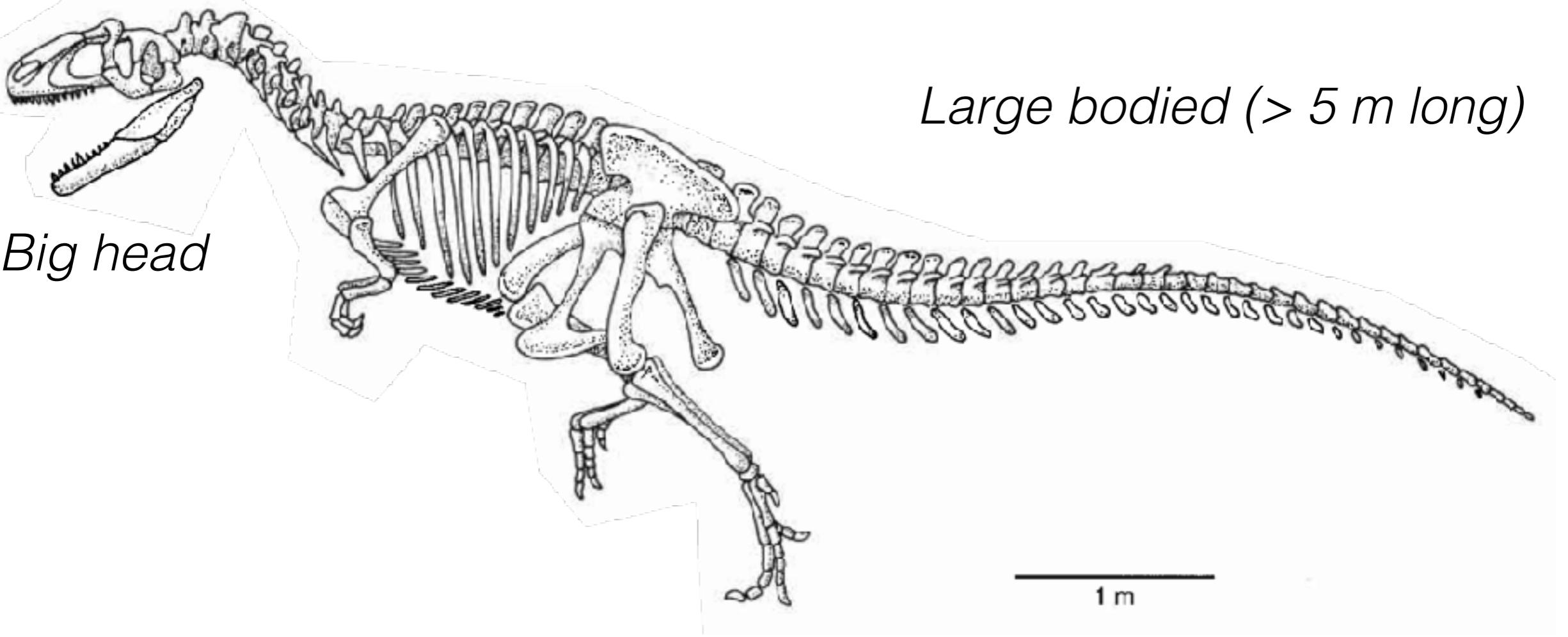
Baryonyx





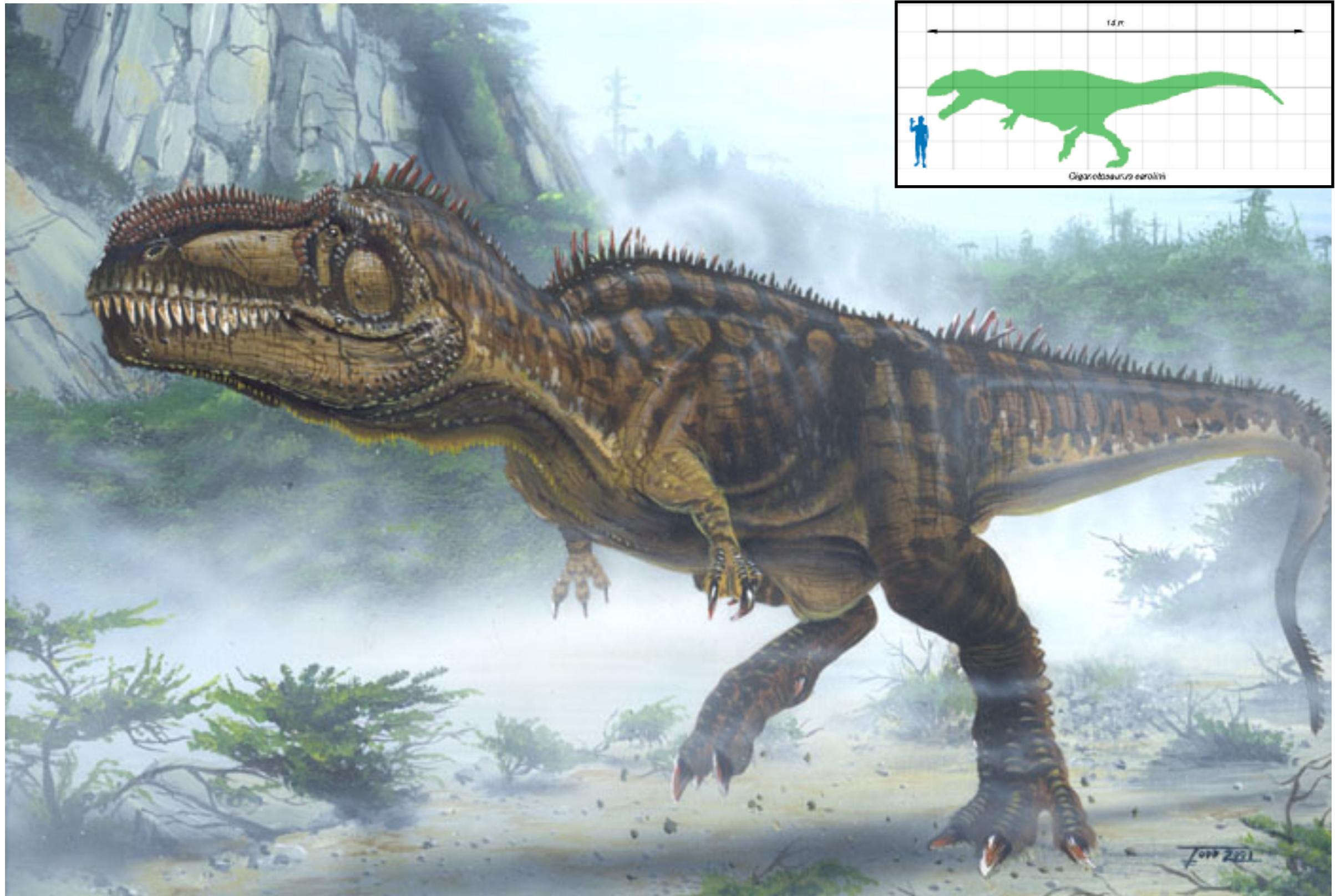
Carnosaurs

Big nostrils and elaborate sinuses



Allosaurus

Carnosaurs



Giganotosaurus; Late Cretaceous South America
16 meters (52 ft) long

Skull was 6.3 ft long
May have preyed on large Sauropods



*Possibly a pack hunter.
16% larger brain than similar-sized
carnivores
*WINNING**

*Giganotosaurus; Late Cretaceous South America
16 meters (52 ft) long*

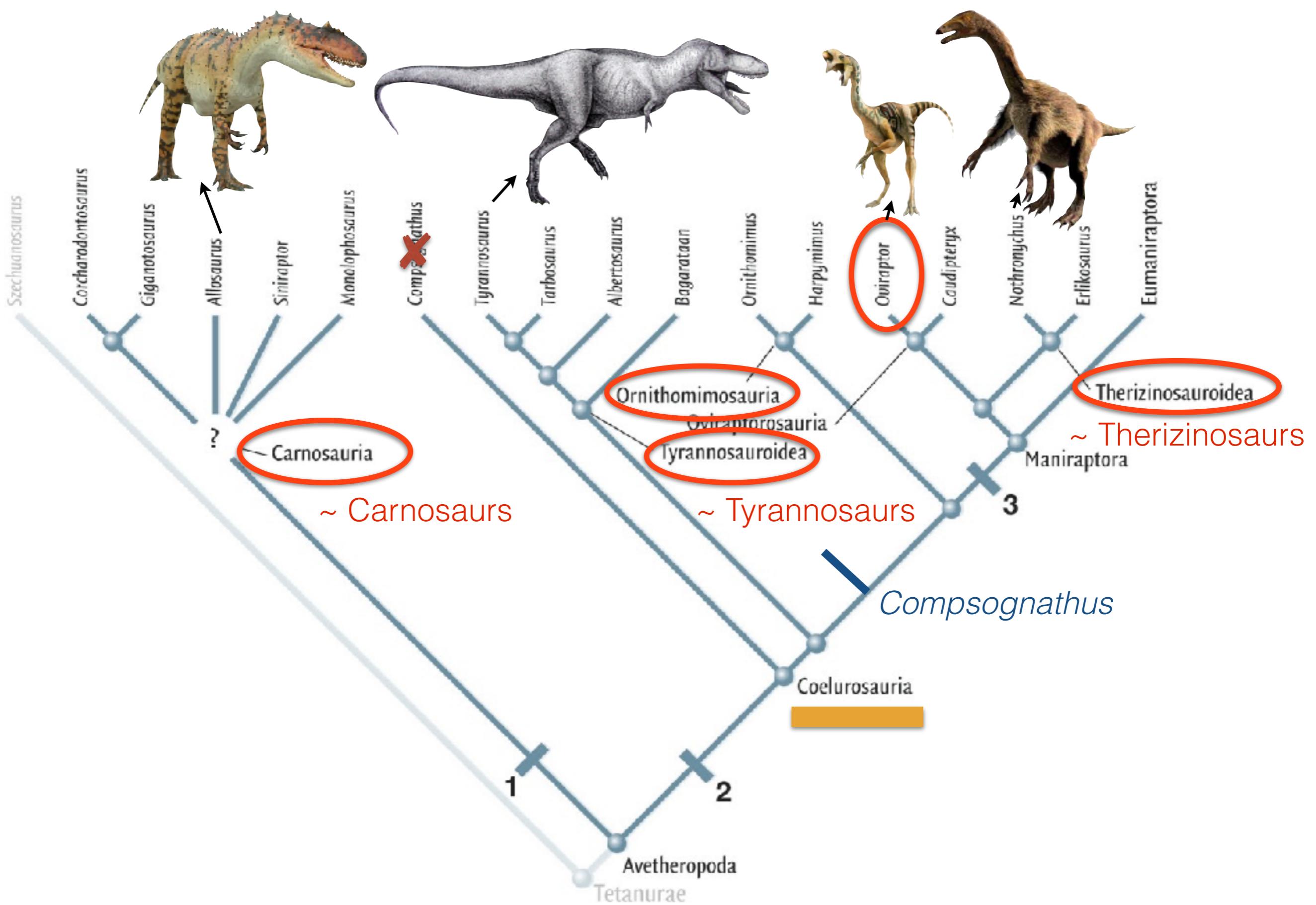
Carnosaurs



*Charcarodontosaurus; Mid Cretaceous Africa
15 meters (50 ft) long*

Carcharodontosaurus
‘jagged tooth’-reptile



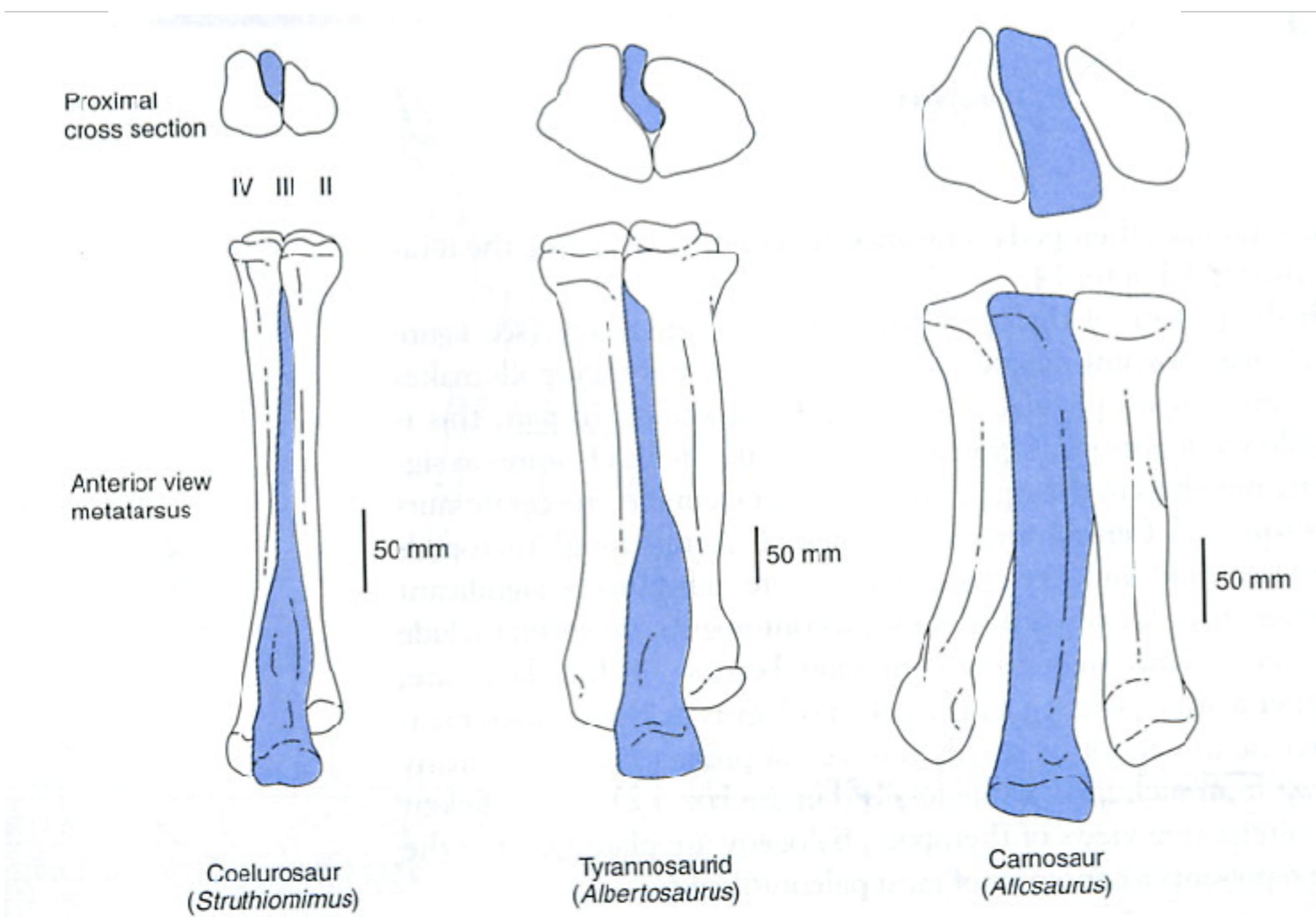


Coelurosauria

Arctometatarsal ankle

=

faster runners?

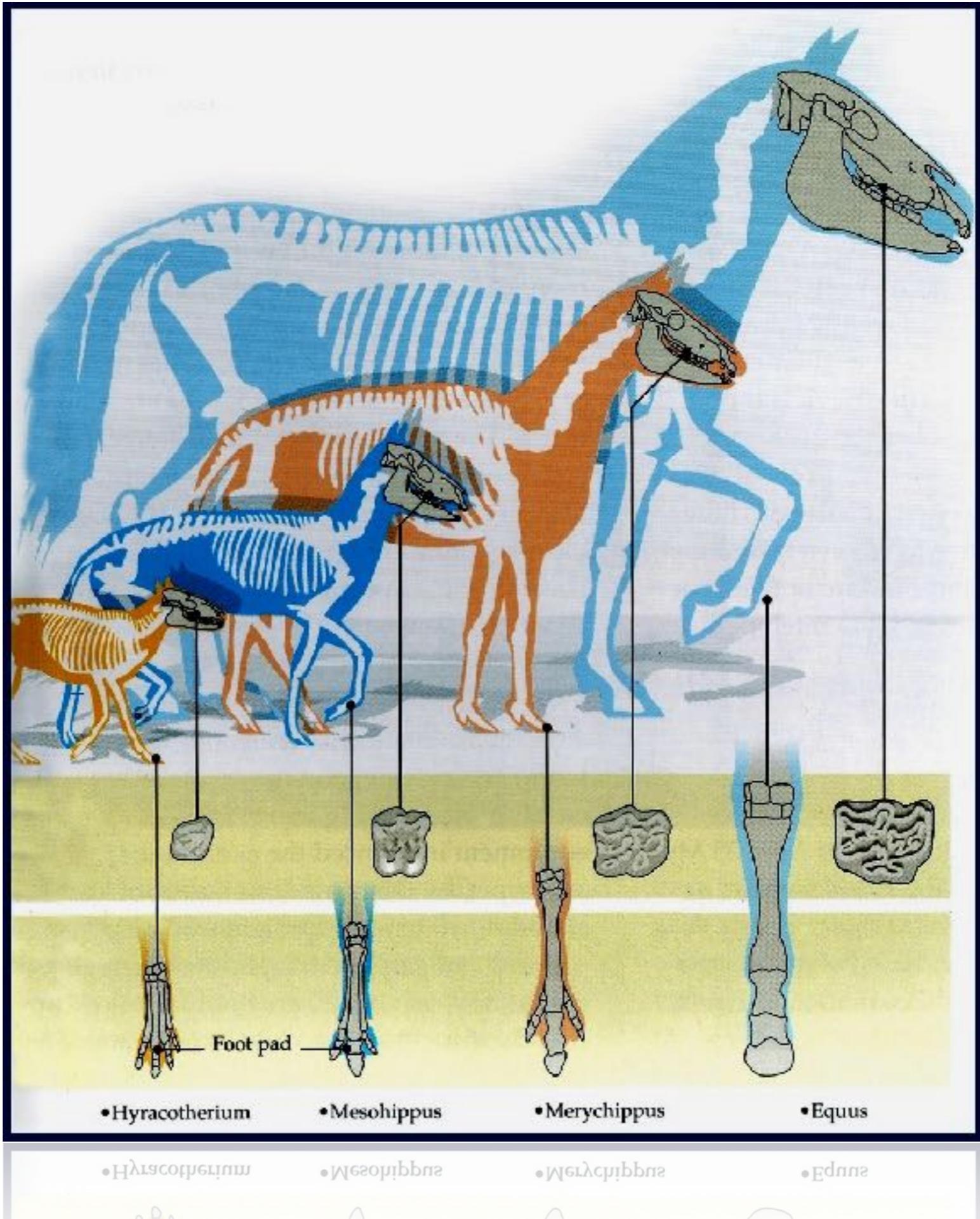


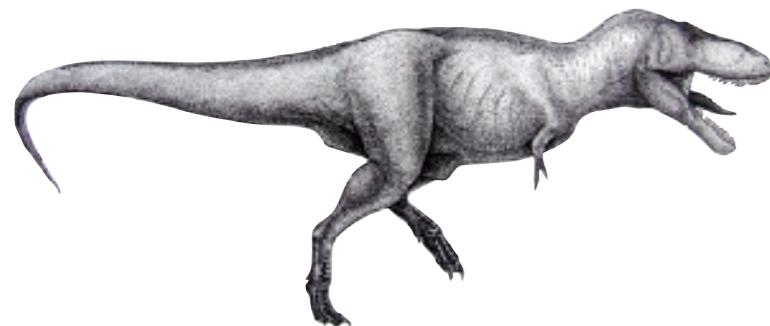
yes

yes

no

Coelurosaurs: An Equine Analogue

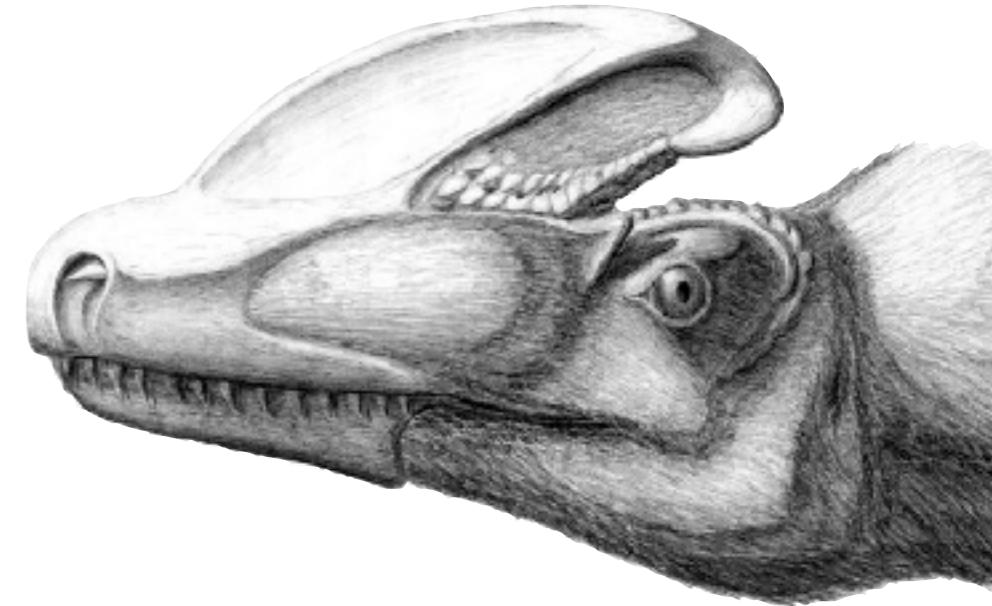




Tyrannosaurs



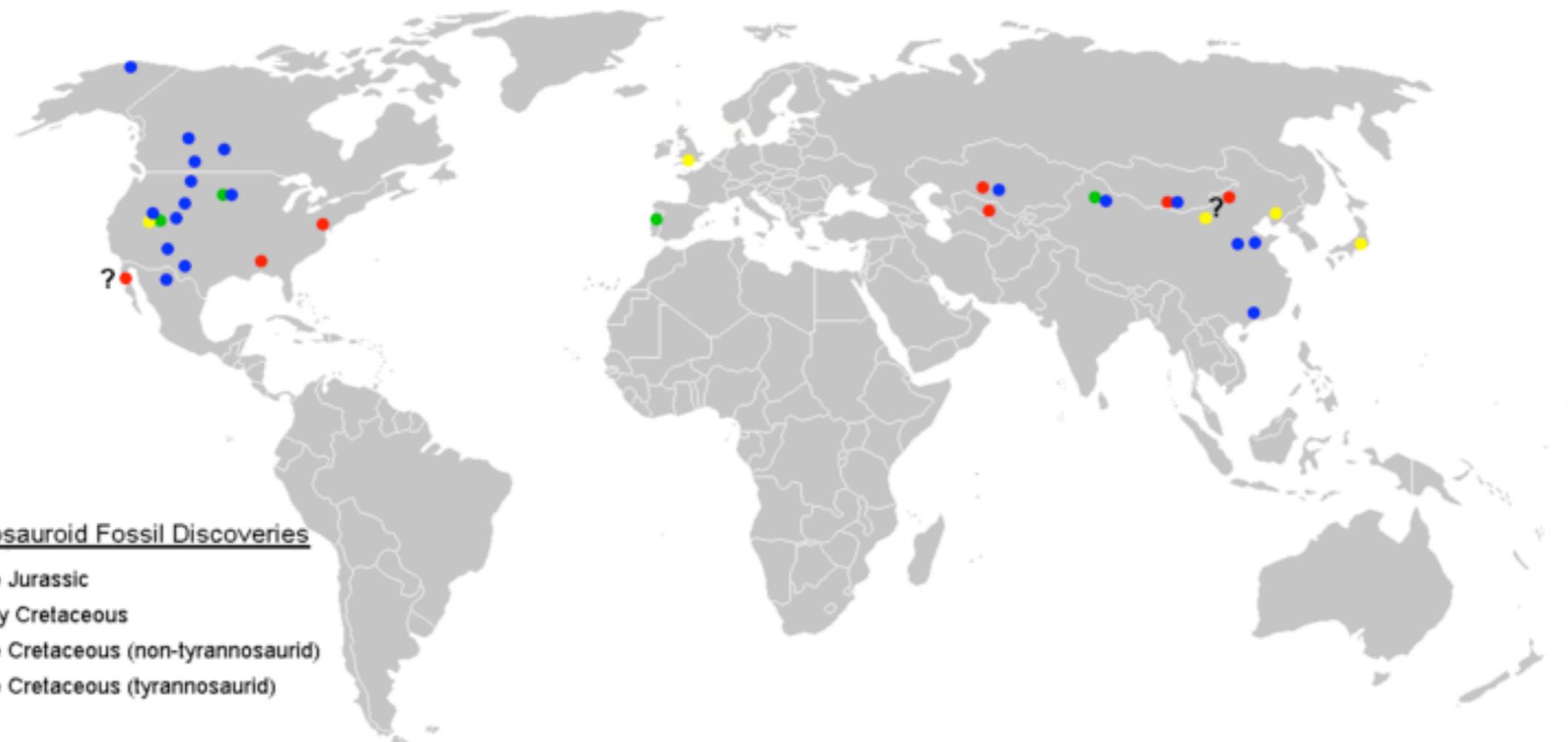
Laelaps



Guanlong: basal
Tyrannosaur

Large bodies, short arms

T. rex: last and largest Tyrannosaur



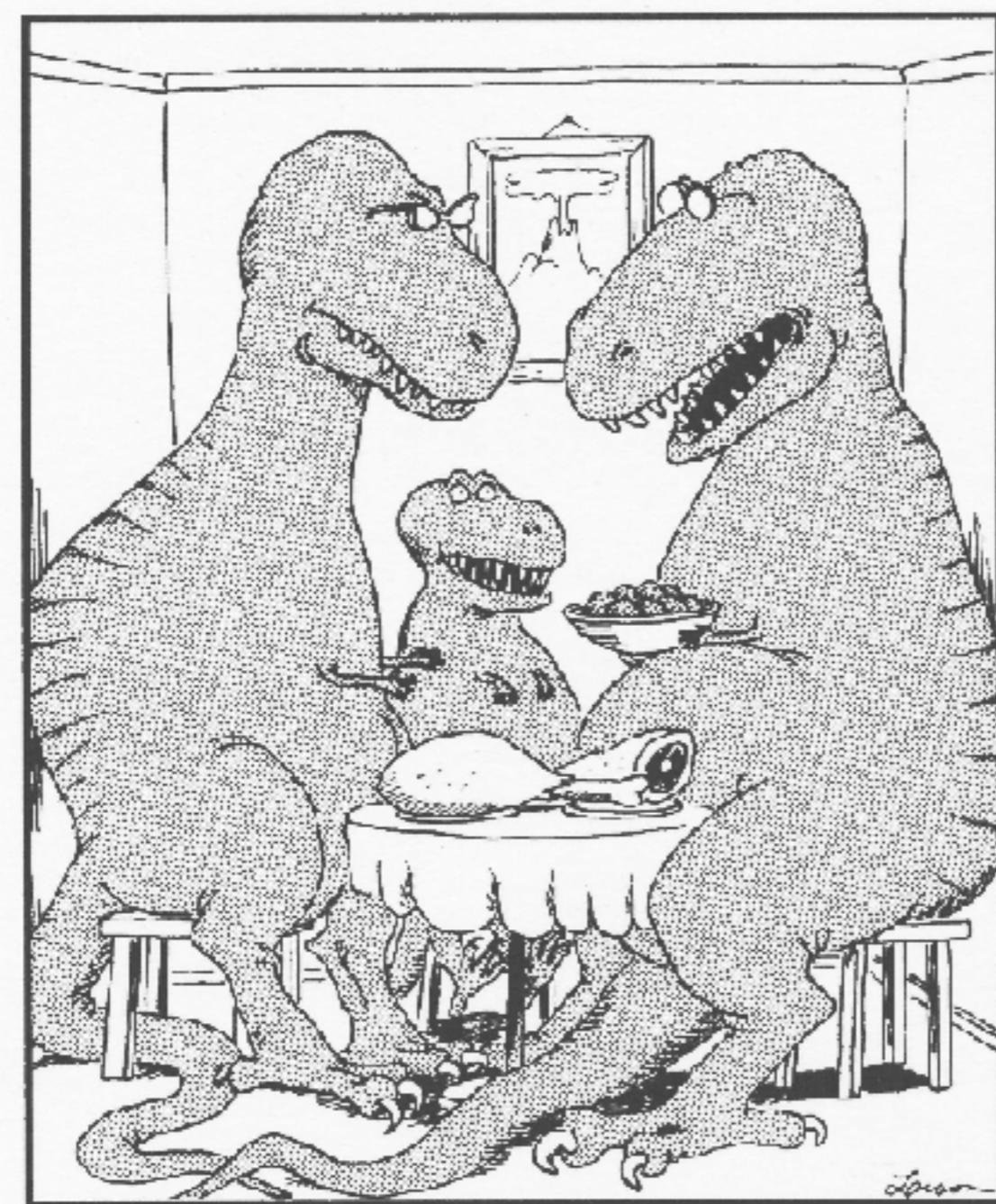
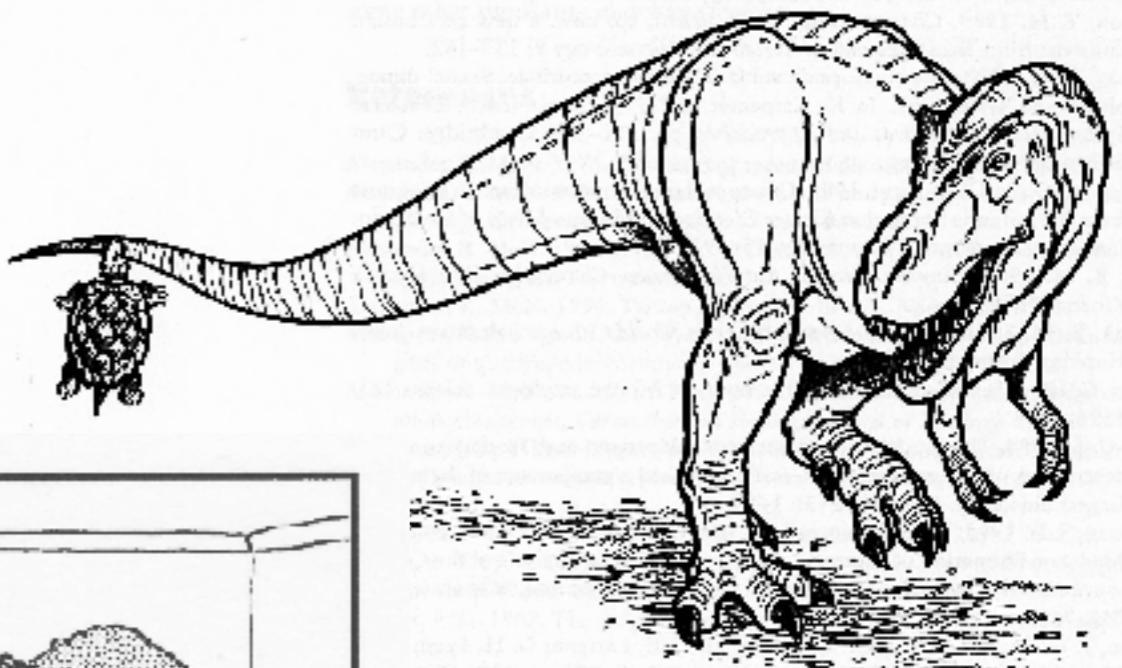


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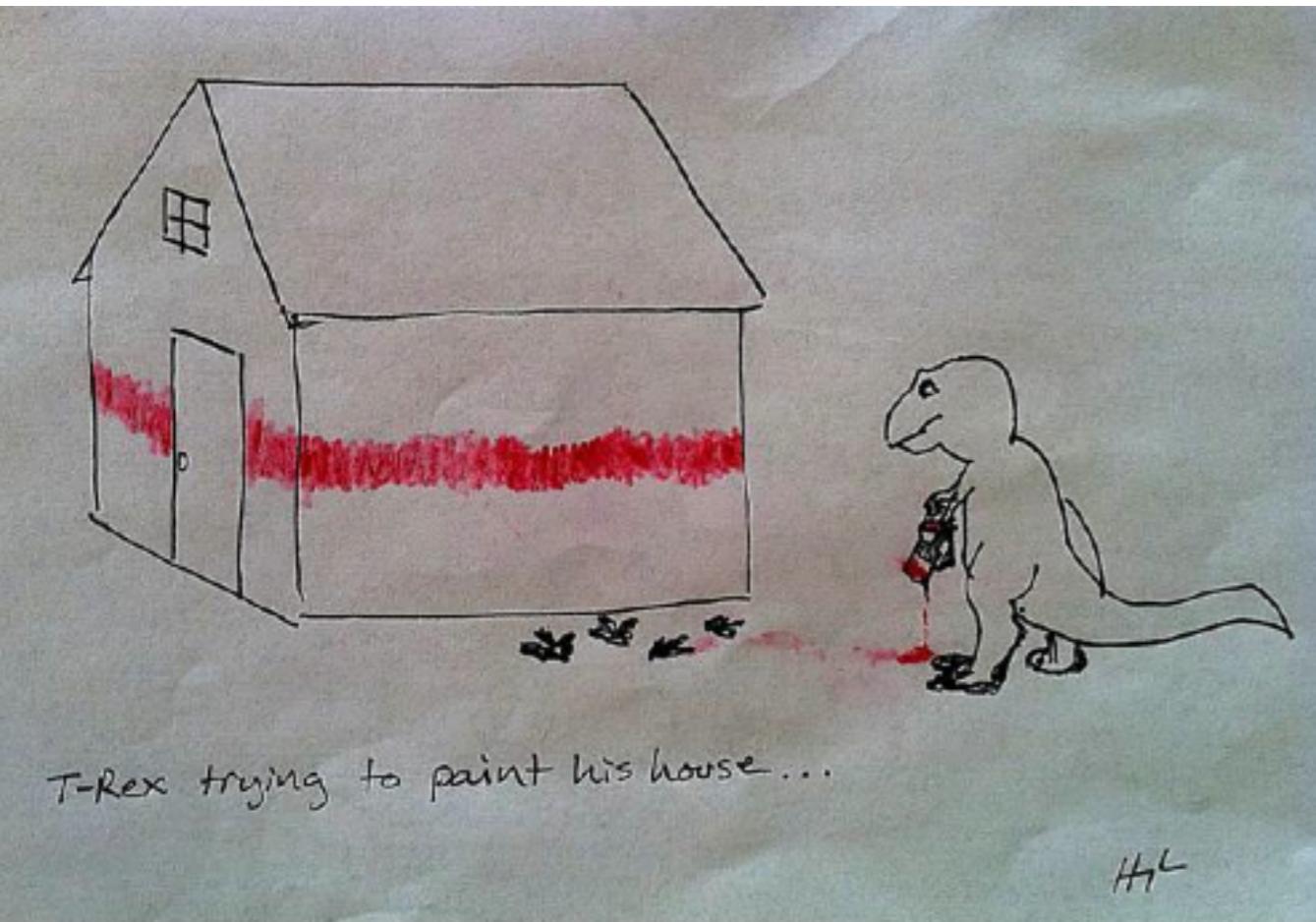


Horse-sized primitive tyrannosaur *Timurlengia euotica* from the middle Cretaceous (ca. 90 million to 92 million years ago) of Uzbekistan.



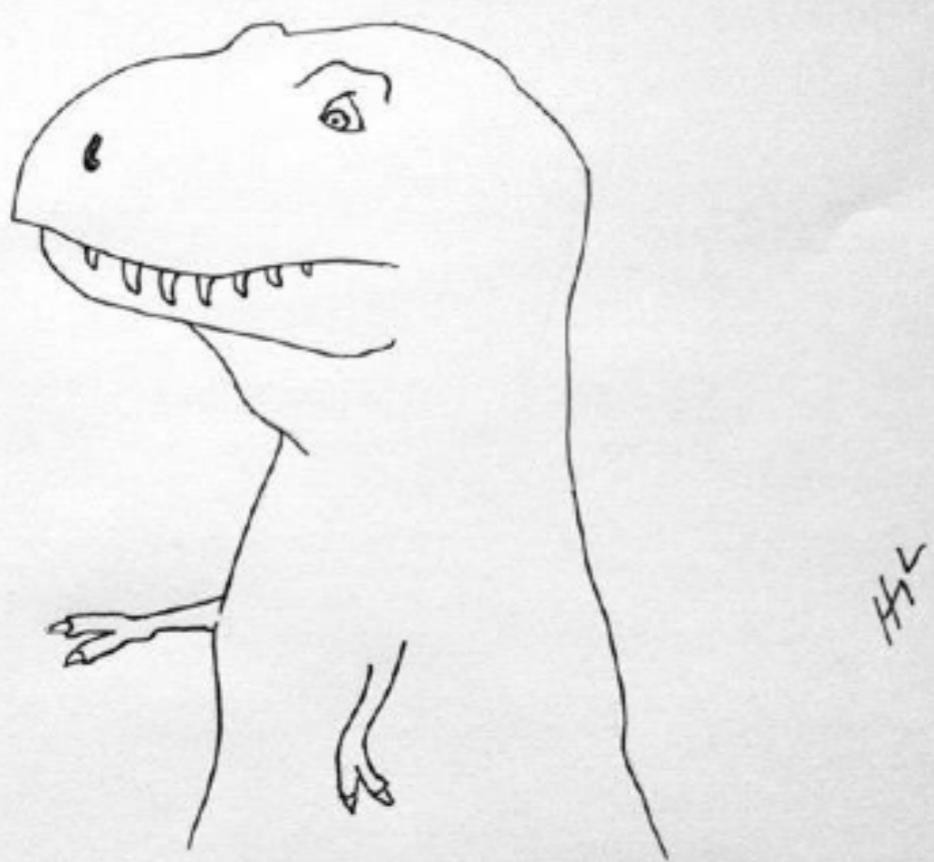


"Hey! I'm *trying* to pass the potatoes! ... Remember,
my forearms are just as useless as yours!"



T-Rex trying to paint his house...

HL



T-Rex trying to play rock-paper-scissors...

KVV



T-Rex tryin' to play the flute...

HL

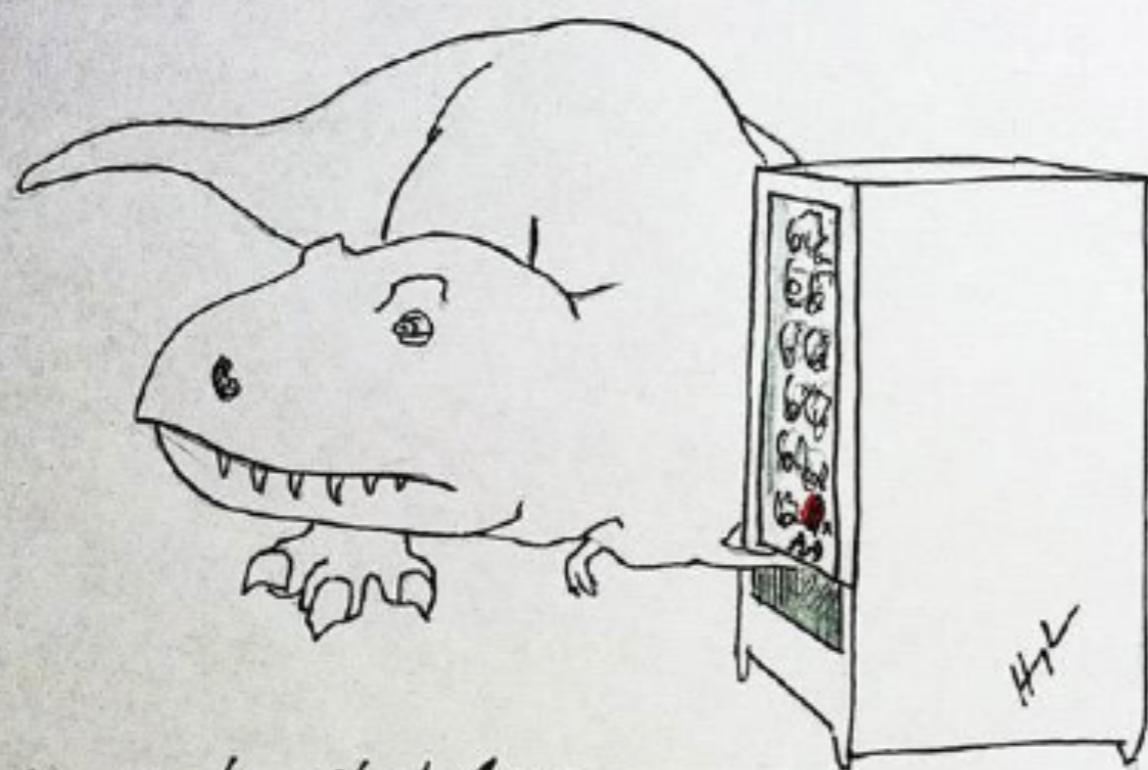


T-Rex tryin' to row a boat...

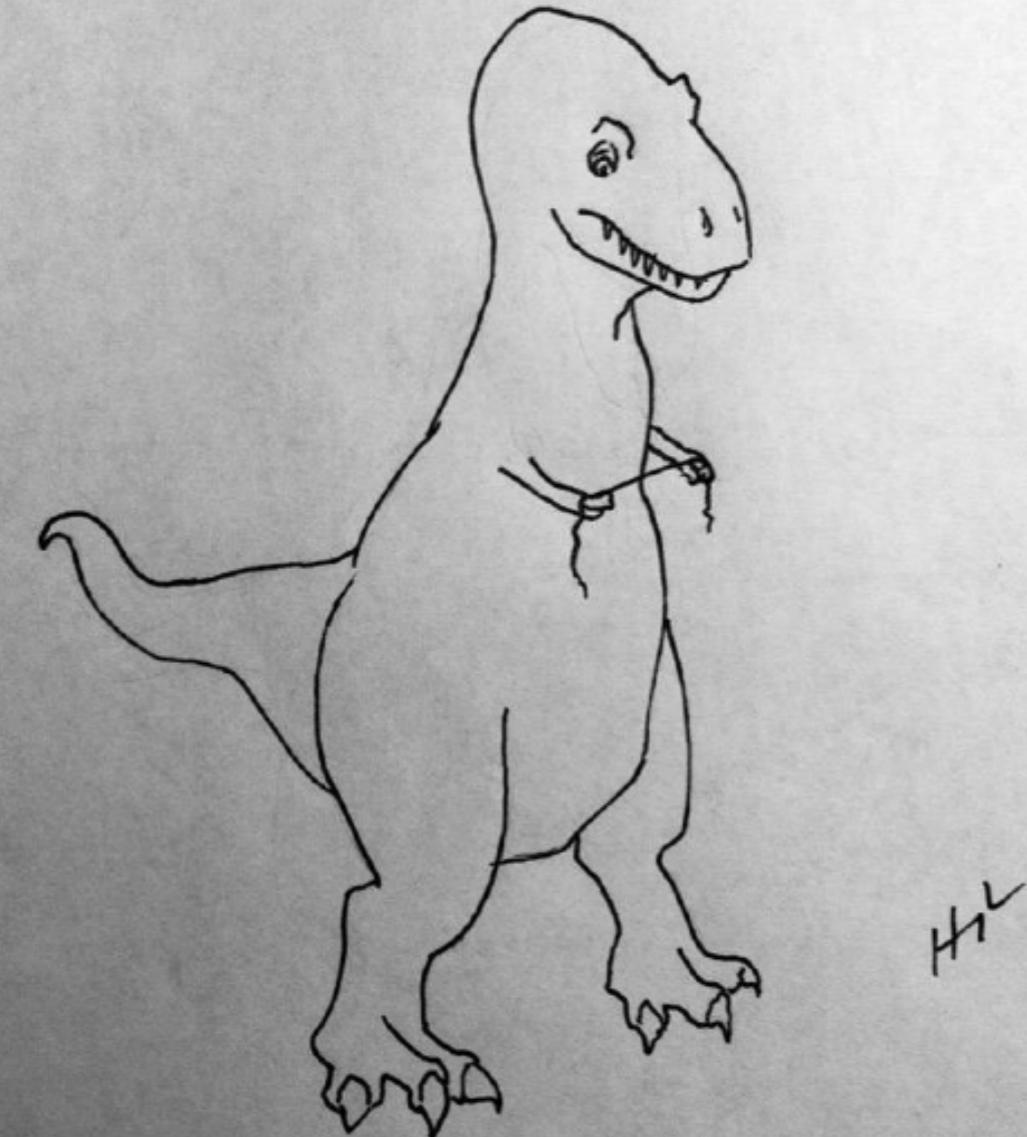
HL



T-Rex tryin' Archery



T-Rex trying to steal from a vending machine...



T-Rex trying to floss...

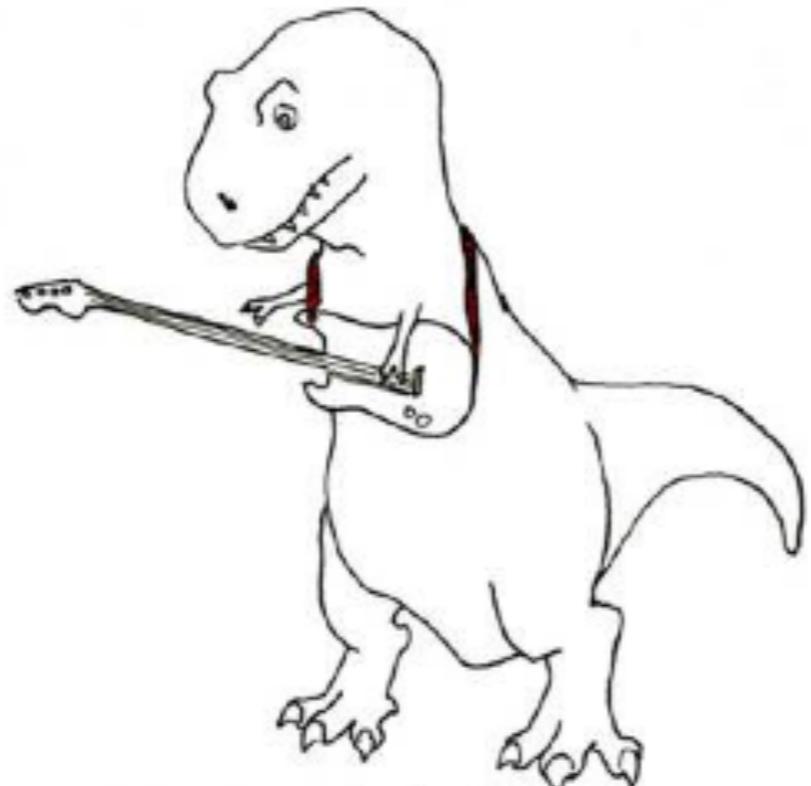


T-Rex trying to make snow angels...

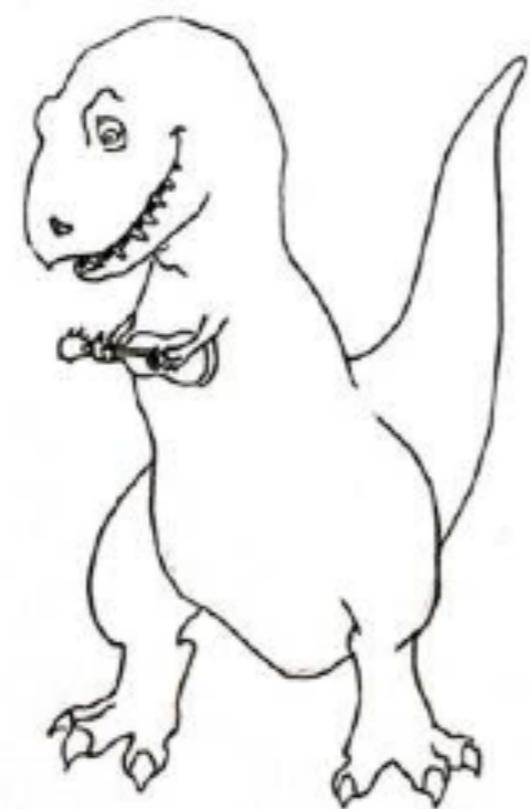
T-Rex trying to make snow angels...



T-Rex trying to shuffle a deck of cards...



T-Rex trying to play the bass...



the UKULELE !!!



the banjo...

KV

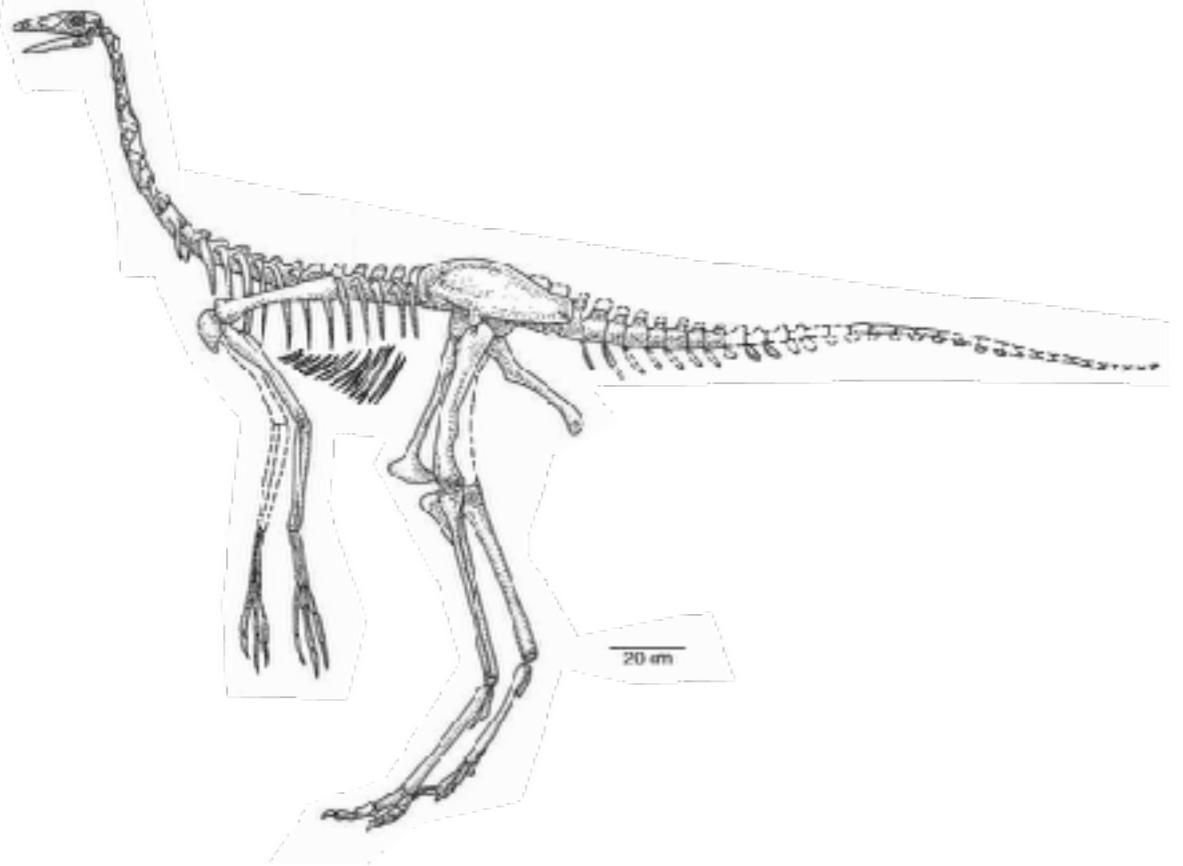
Compsognathus



Sharped recurved teeth: Carnivory/insectivory



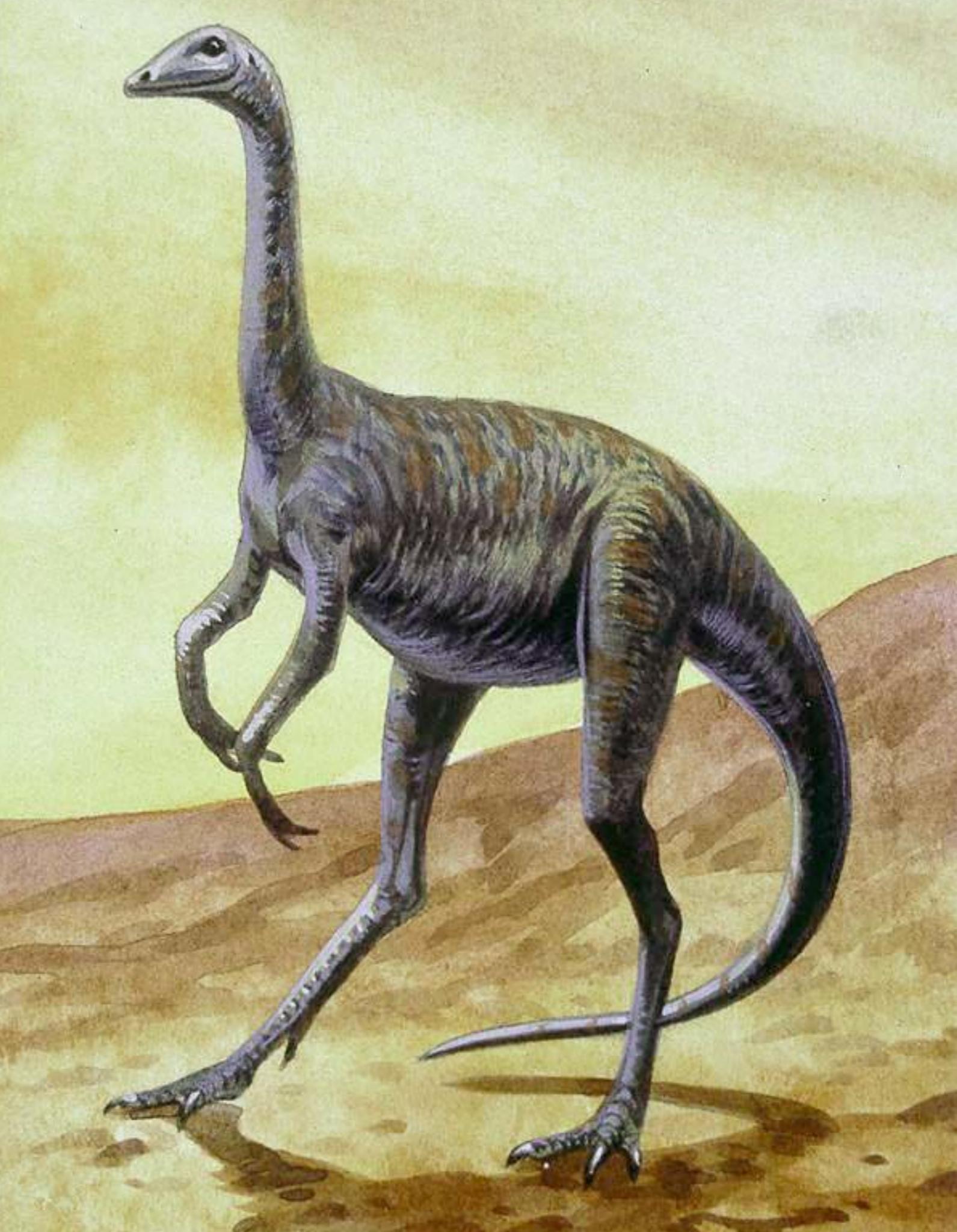
Ornithomimosaurs



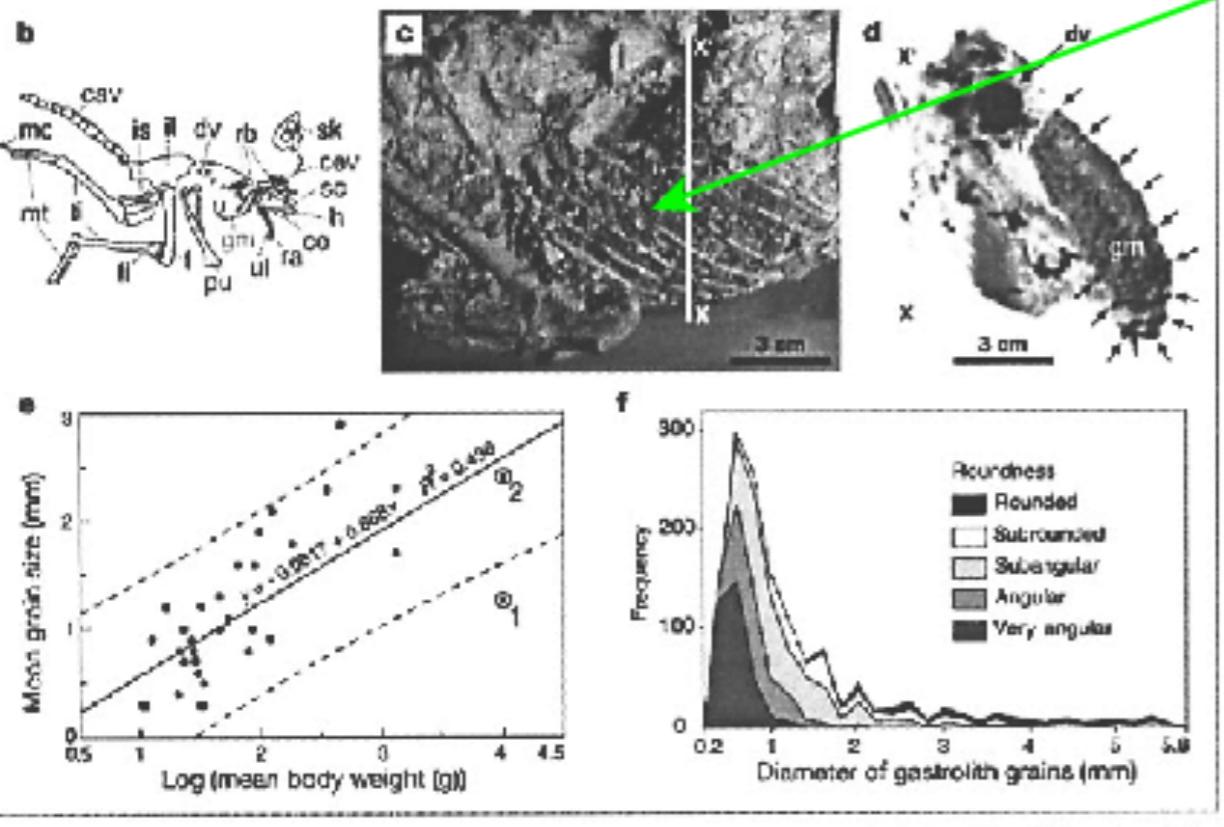
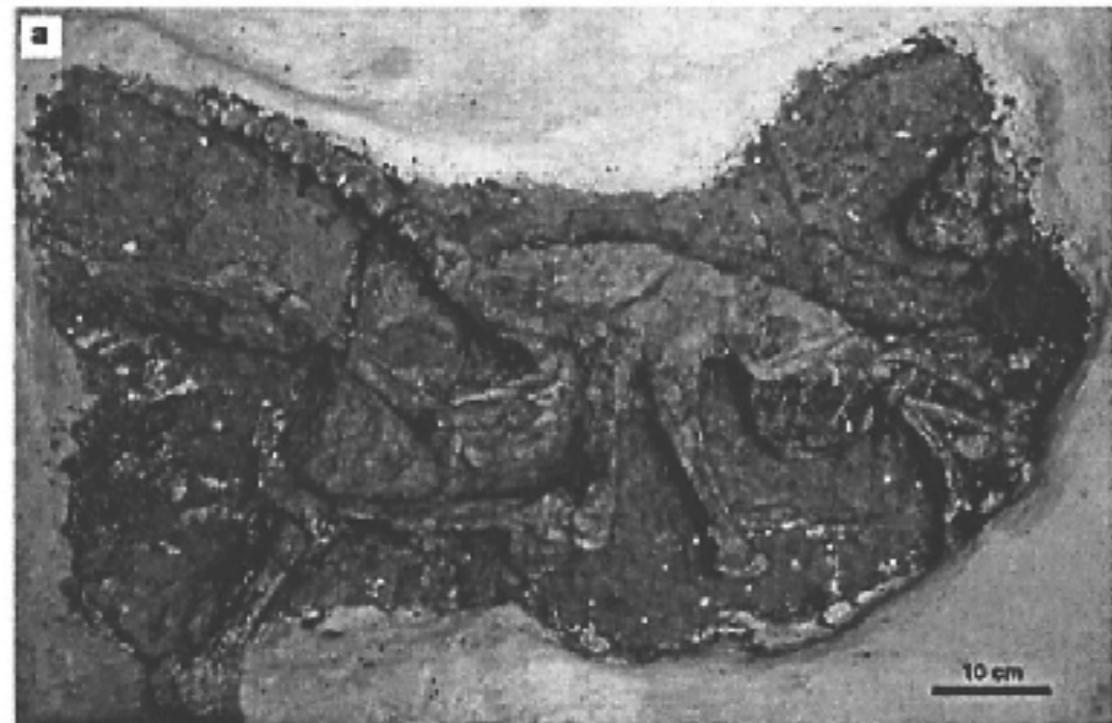
*Small, lightly built skulls with tiny orbits
No upper teeth, few lower teeth
Long arms*



Struthiomimus; Late
Cretaceous N. America
4.3 meters (14 ft) long

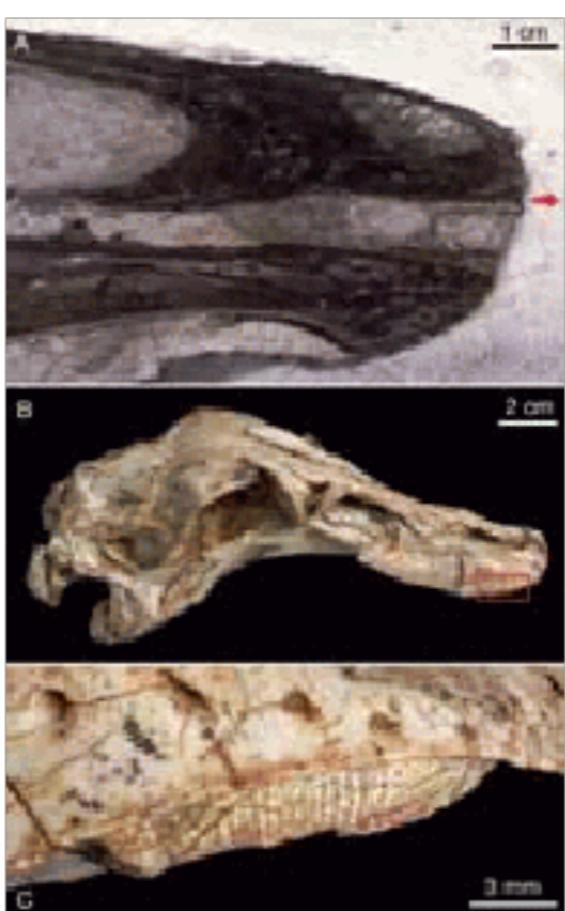


Ornithomimids



Baleen-like strainers! →

Gastroliths!
(12 Mongolian specimens)

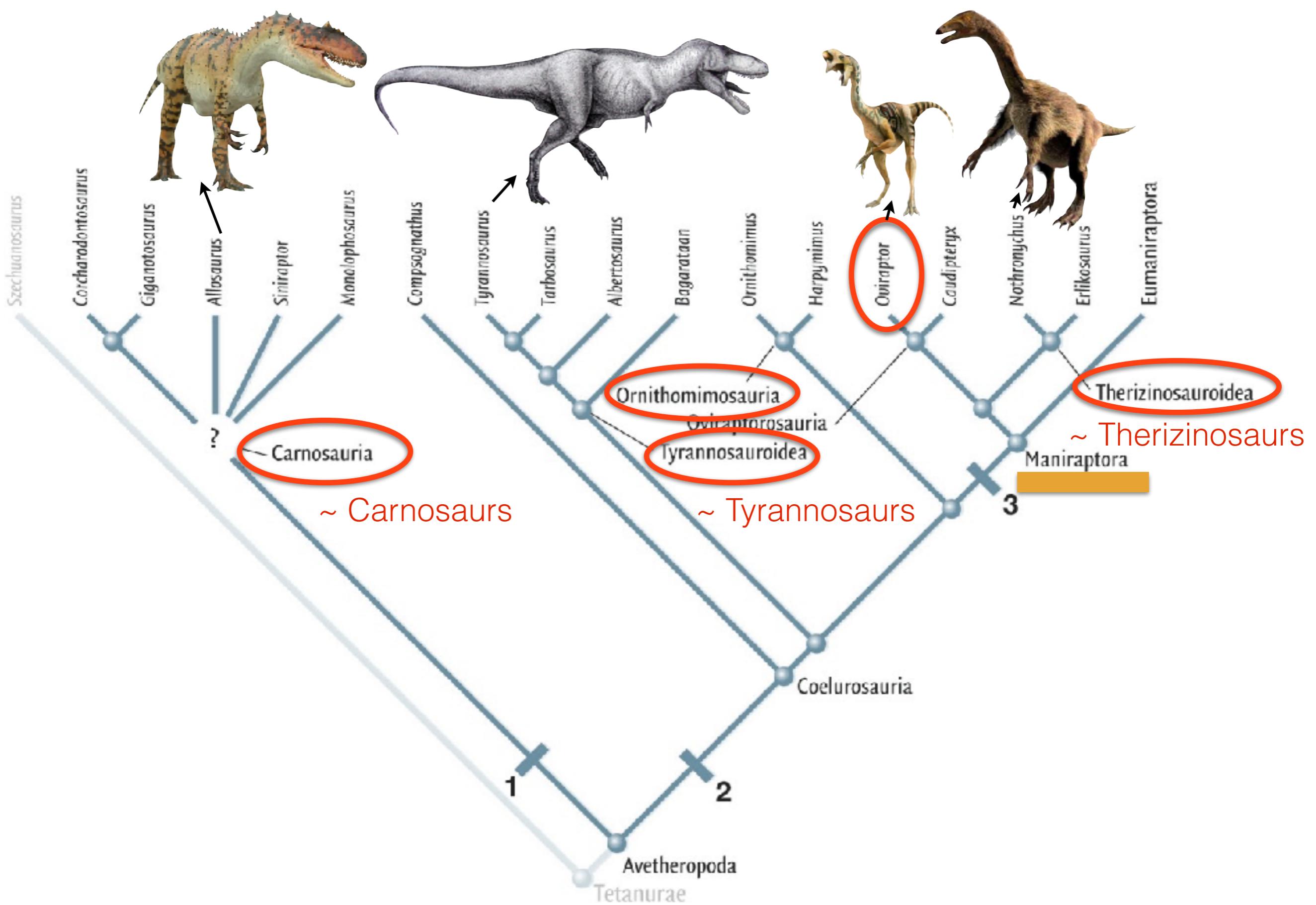


Gallimimus bullatus

MWS 2001

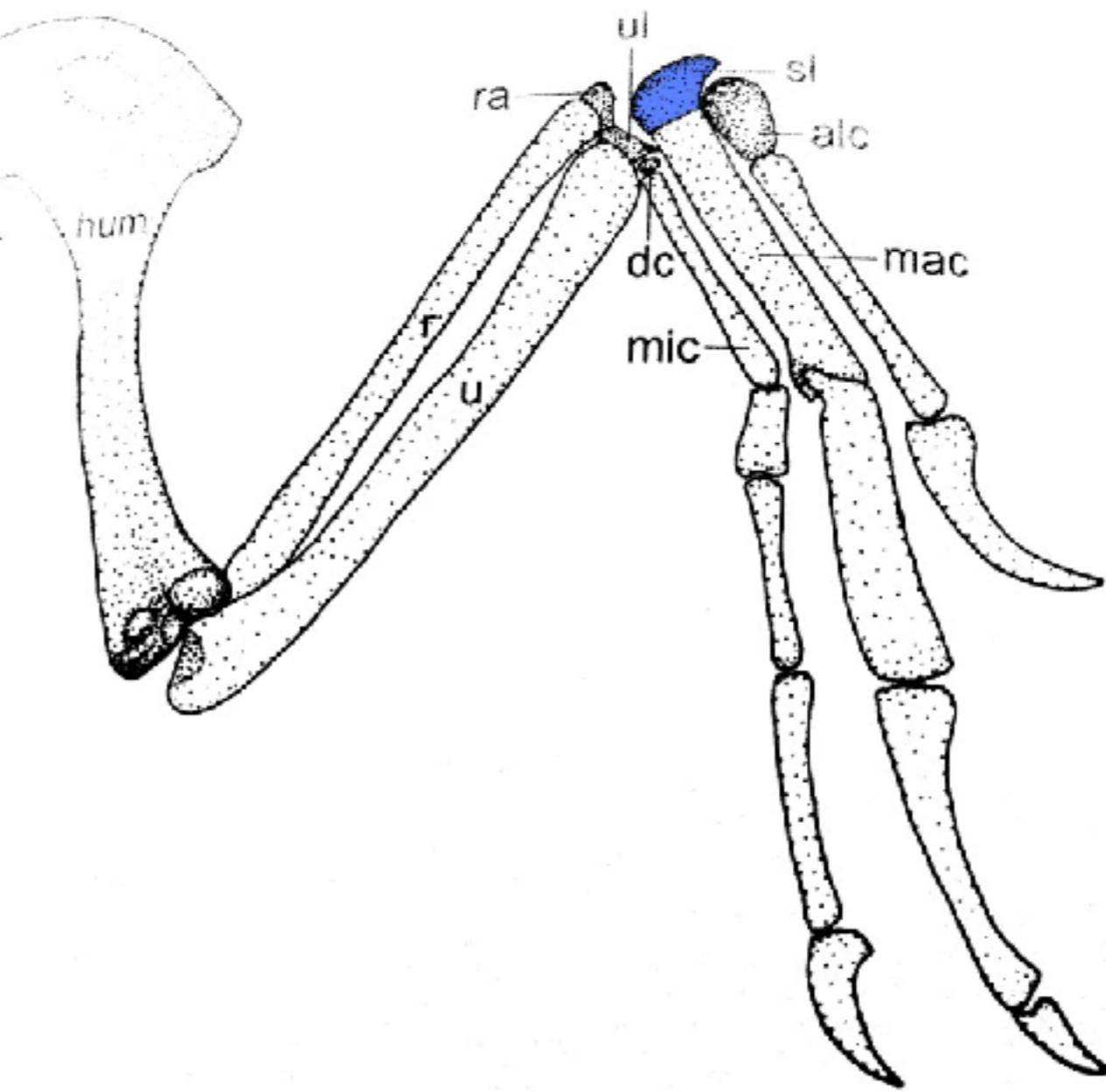
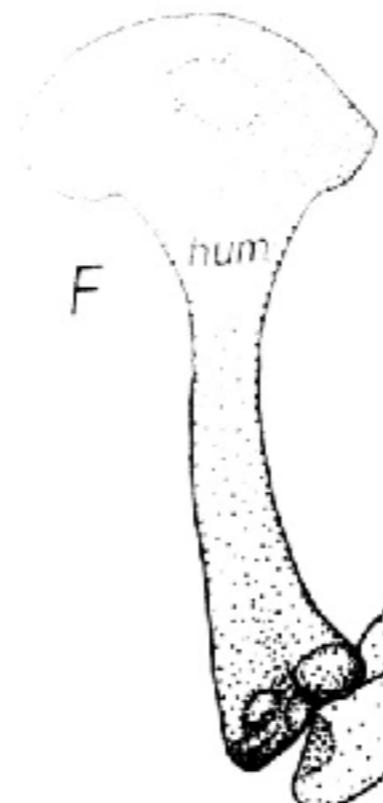


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Coelurosauria

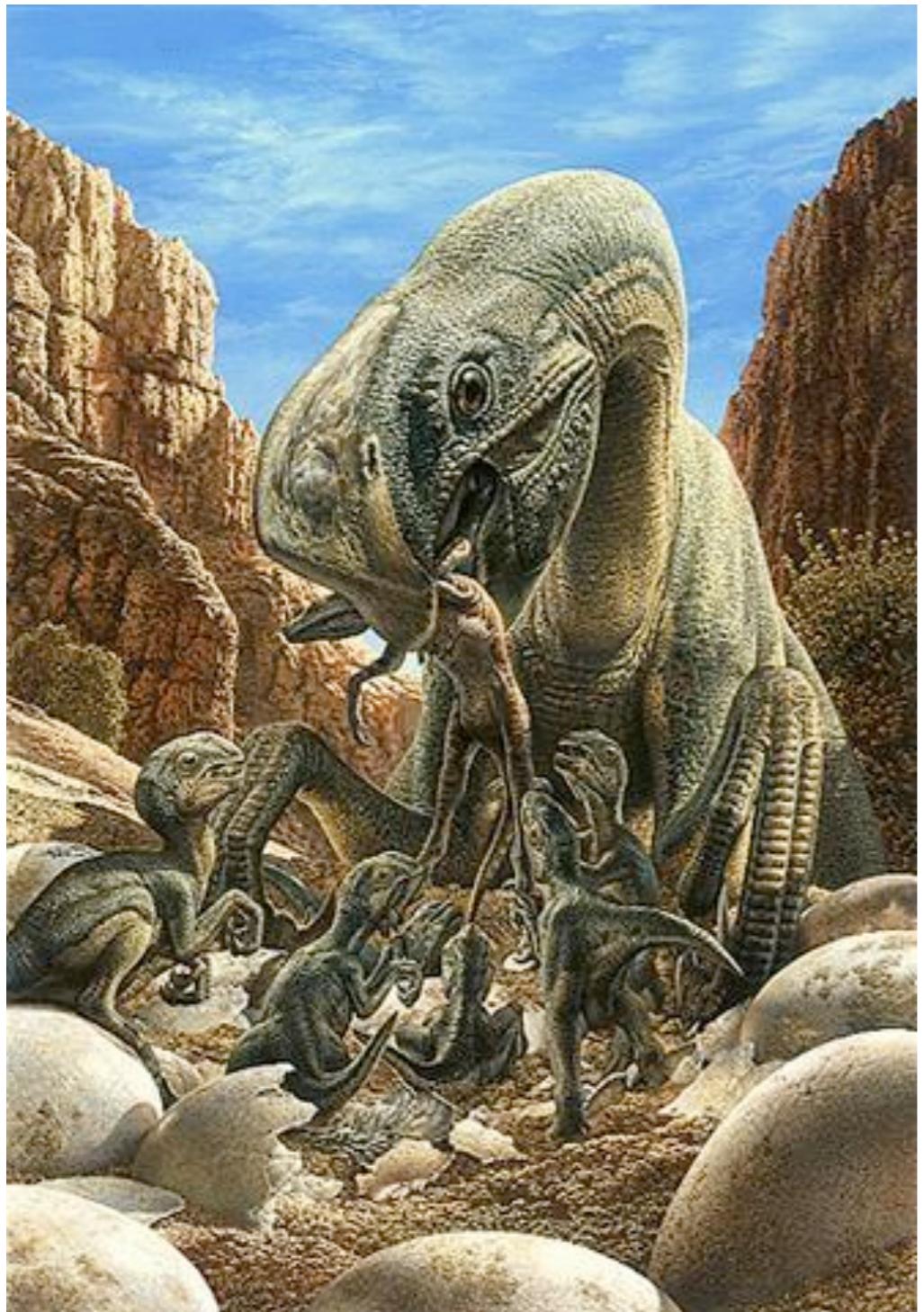
Maniraptorans: Evolution of the semi-lunate
carpal ~ wrist bone that increased hand
dexterity

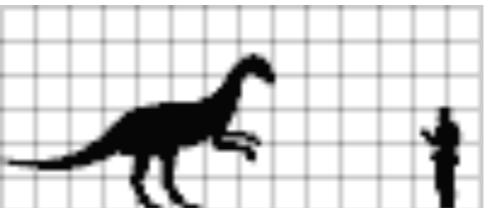


5 cm



Oviraptor





Therizinosaurs

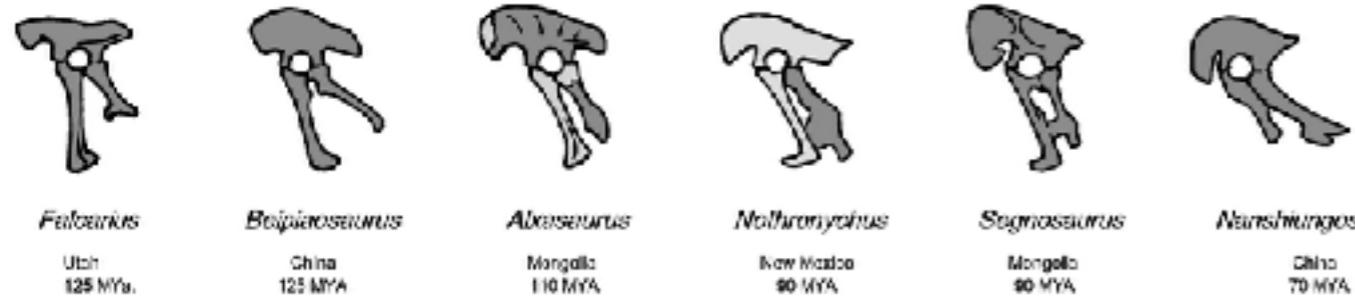


Plant-eating teeth?
Backward pointing hips
3 ft. long claws



Nothronychus

Erlikosaurus

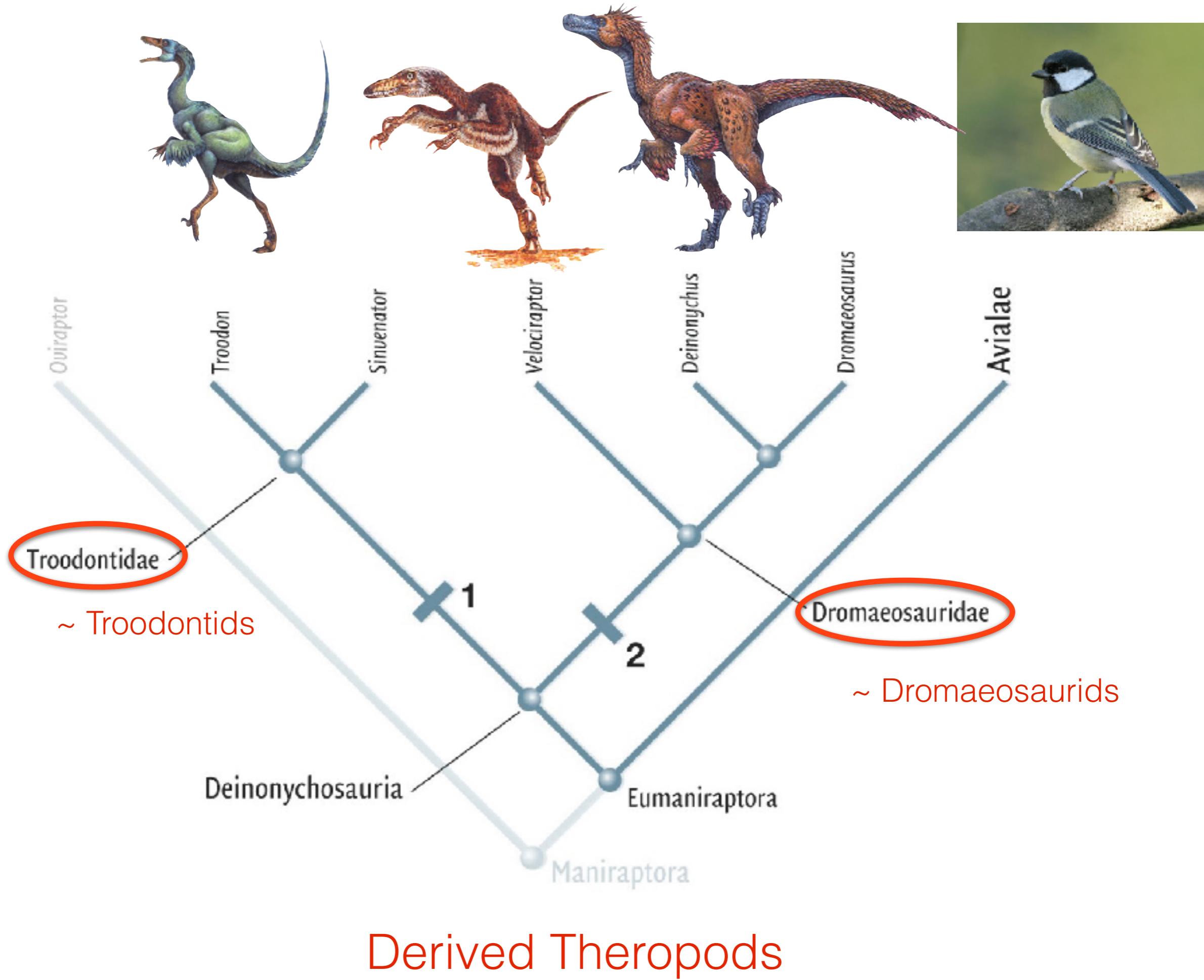




Therizinosaurs

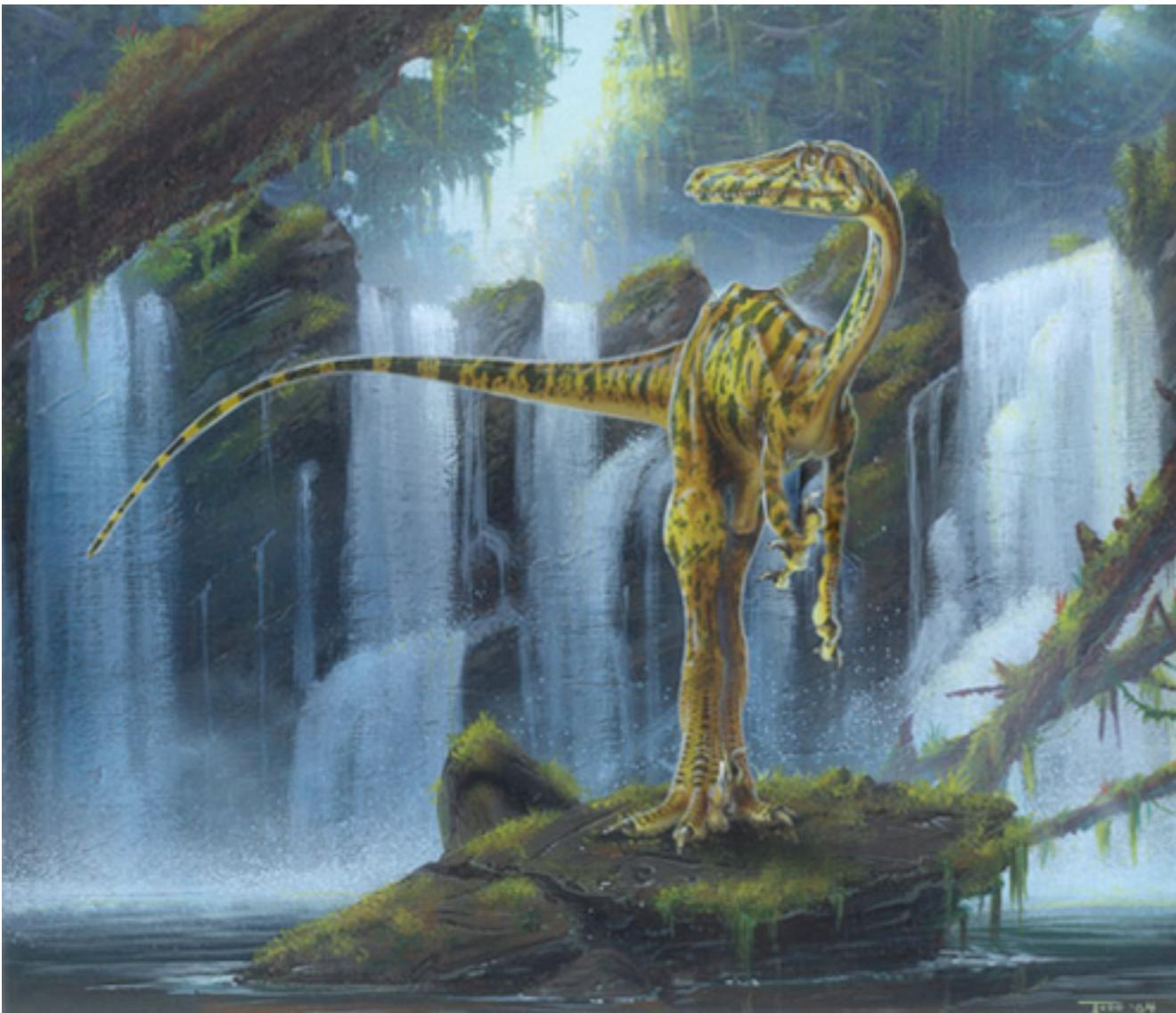


Ground Sloths of the Mesozoic?





Troodontids



Troodon



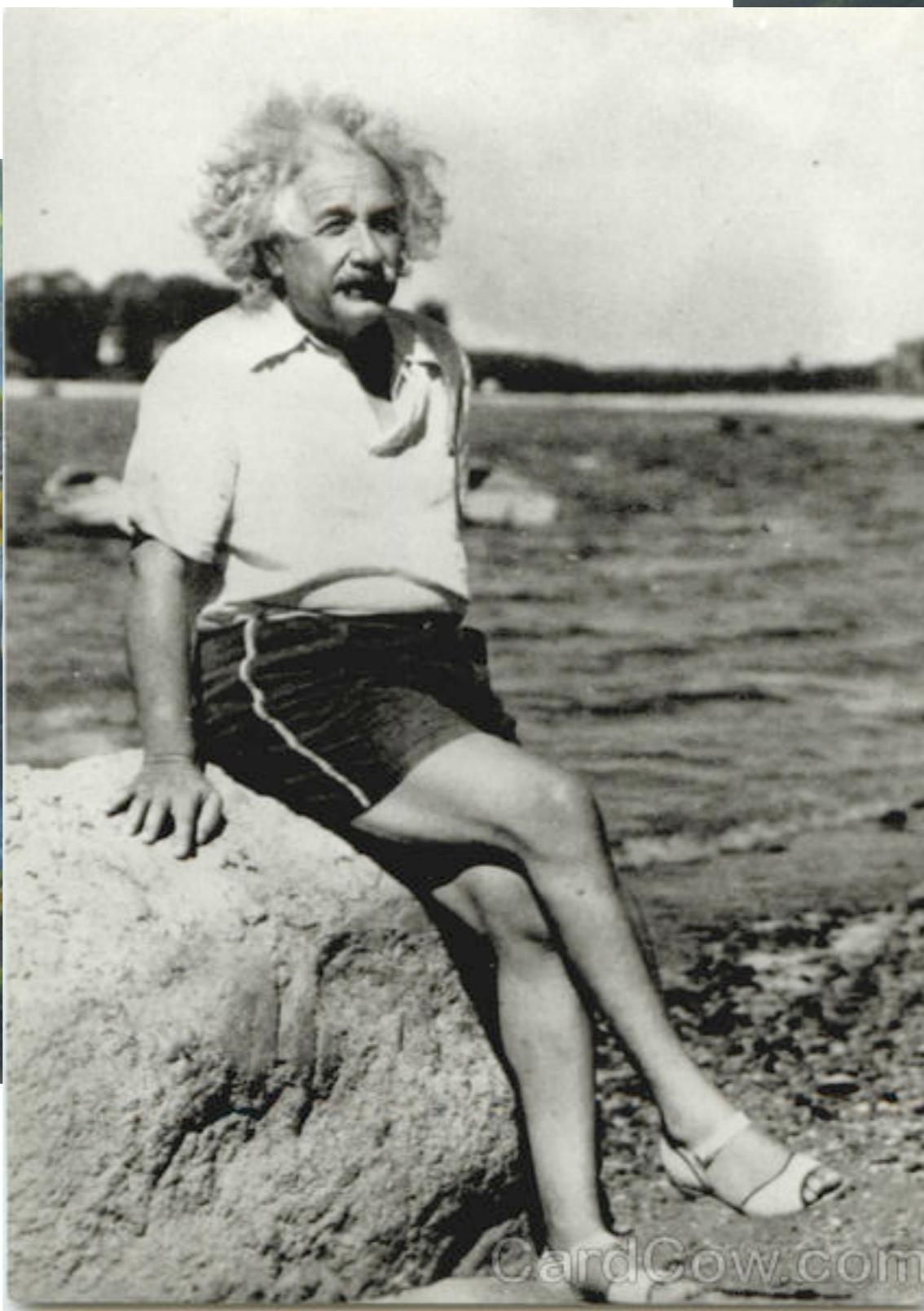
Sinovenator



Troodontids



Troodon



CardCow.com



enator

EQ - Encephalization Quotient

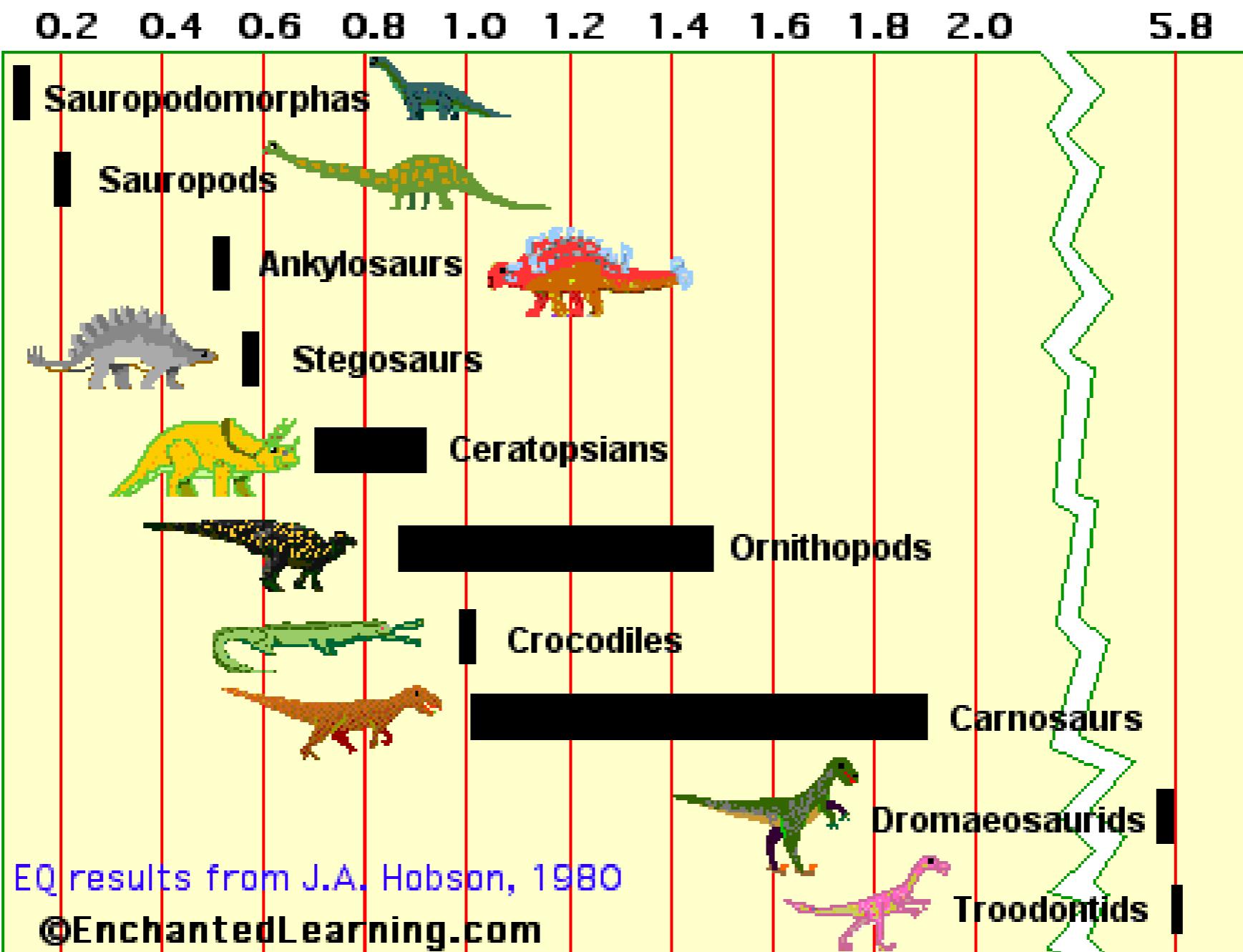


Fig. 2

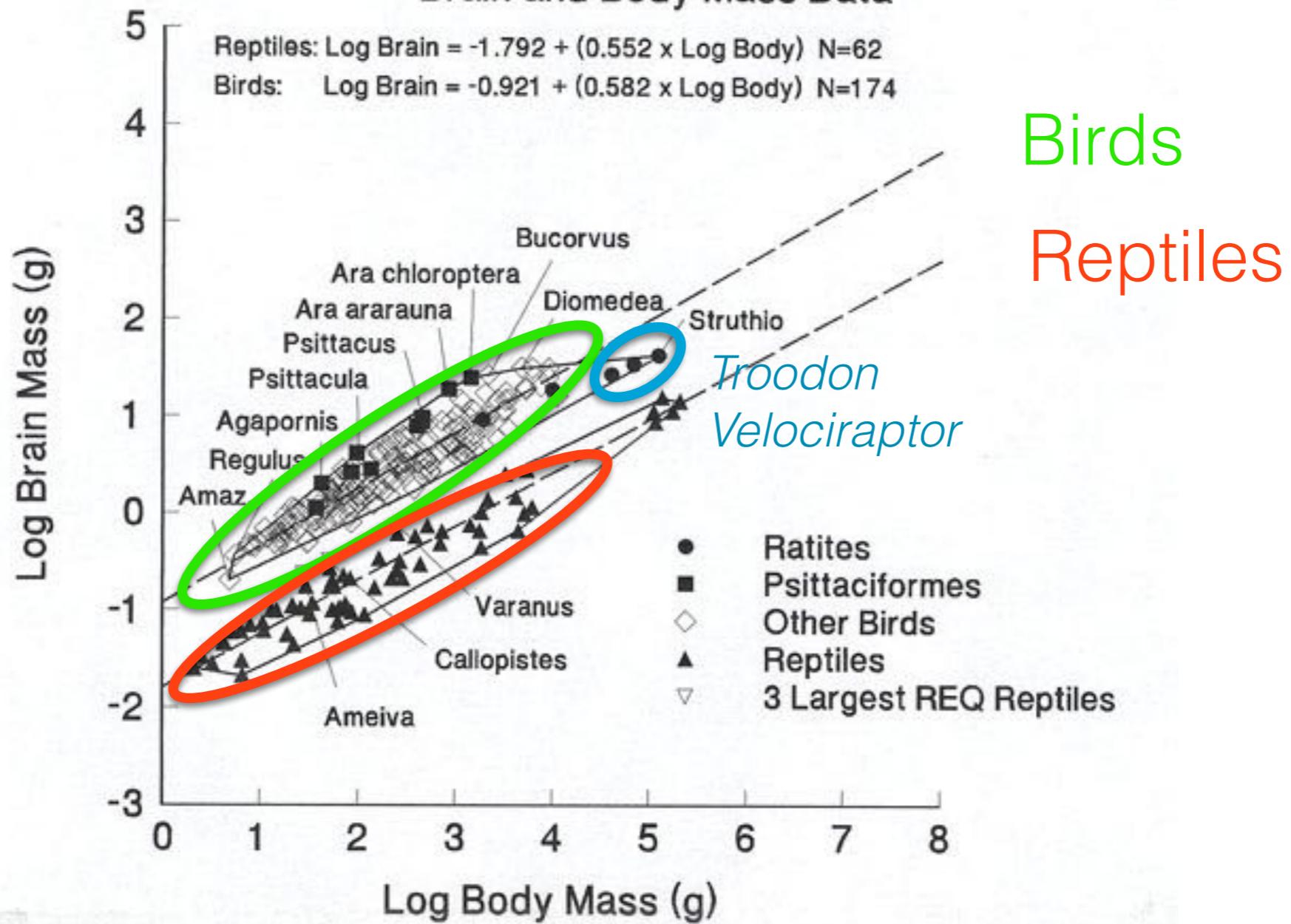
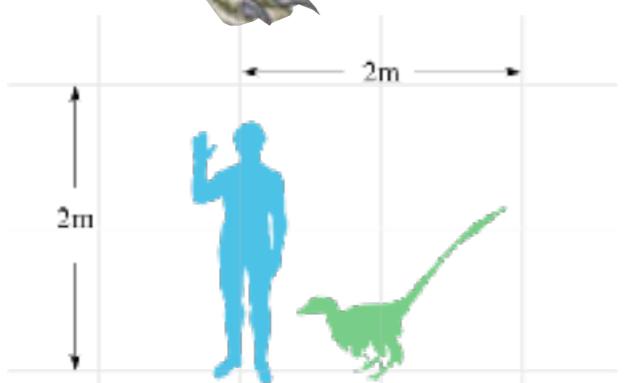
Birds and Reptiles:
Brain and Body Mass Data

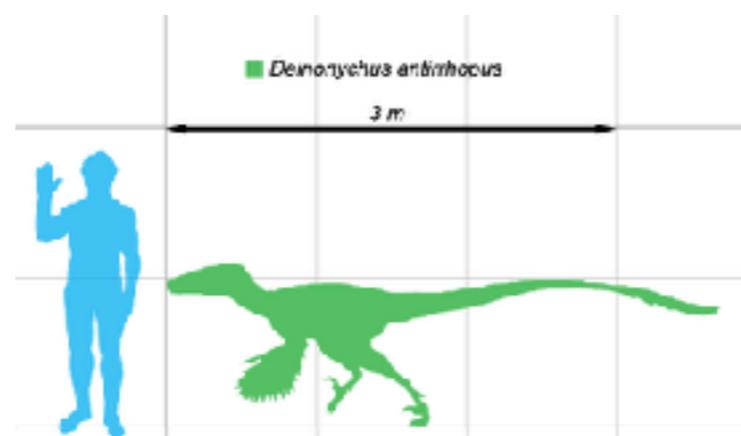
Figure 2. Graph of Log Brain and Body Mass of 174 recent bird species and 62 recent reptile species, with two specimens each of Boa, Alligator, and *Crocodylus*). Minimum convex polygons surround the point scatters of each of birds and reptiles; bird and reptile brain-body regression lines are also shown.



Dromaeosaurids



Velociraptor



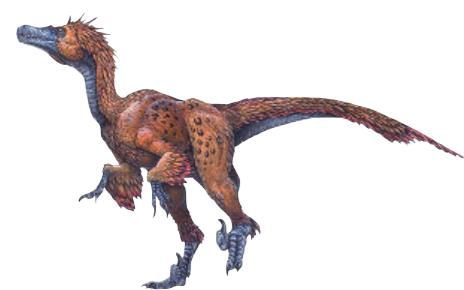
Deinonychus





“*Boreonykus*, a new species of dinosaur about the size of a dog and possessing a lethal claw. The remains of the *Boreonykus* were discovered at the Pipestone Creek bonebed — a huge gravesite of the plant-eating dinosaur *Pachyrhinosaurus* that dates back 73 million years.”





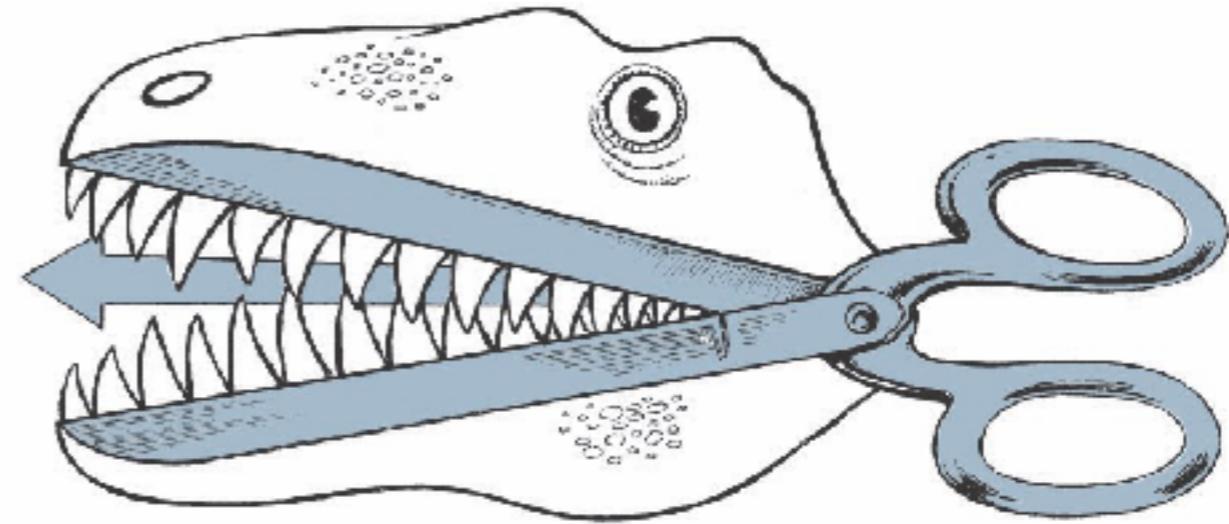
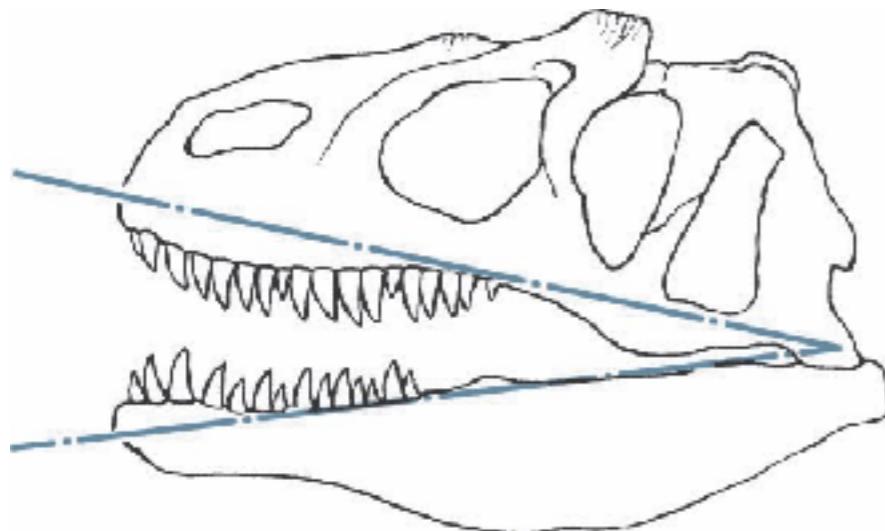
Dromaeosaurids



Utahraptor

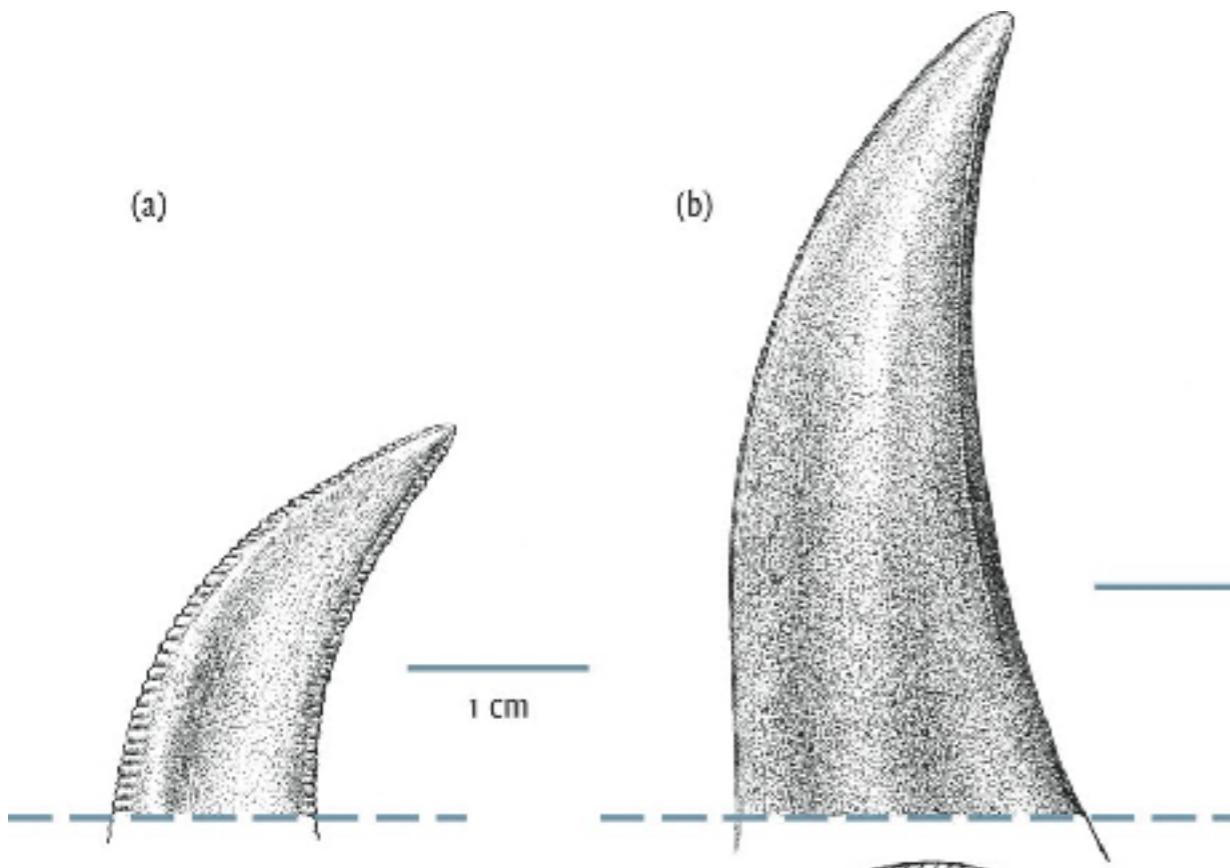


Theropod Teeth



(a)

(b)



Dromaeosaurus

Tyrannosaurus

Dromaeosaurids

Recurved

Larger serration-length to tooth-length ratio
slash-and-tear

Tyrannosaurids

Conical; bulky

Smaller serration-length to tooth-length ratio
CRUSH-AND-DESTROY



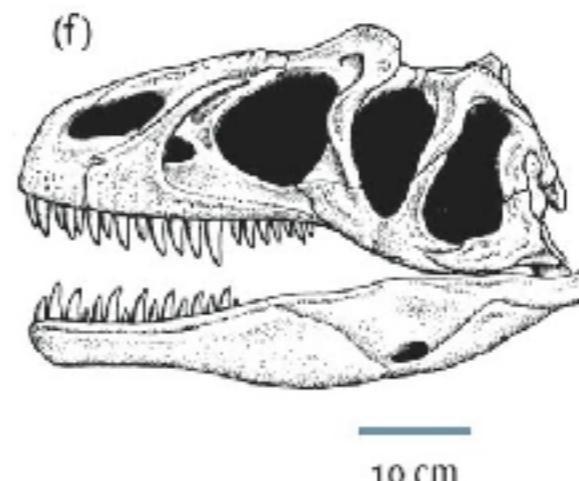
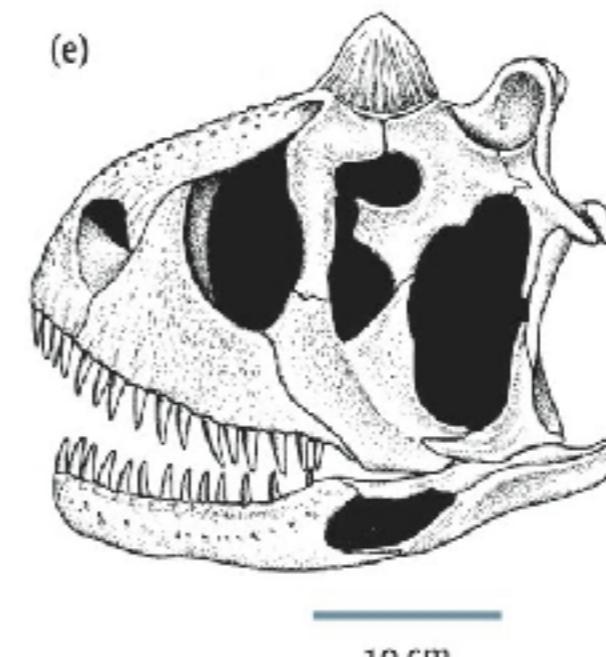
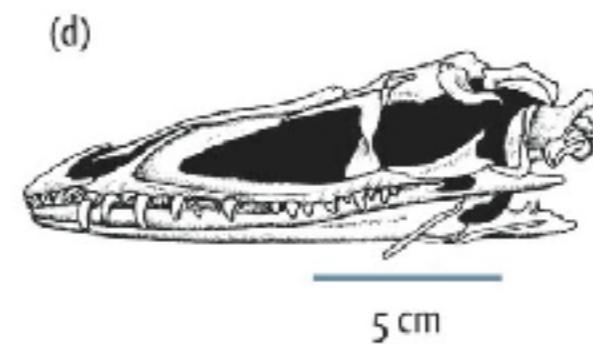
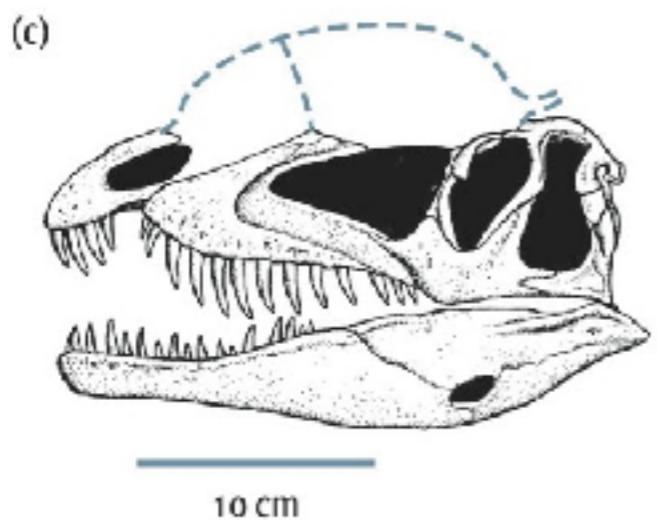
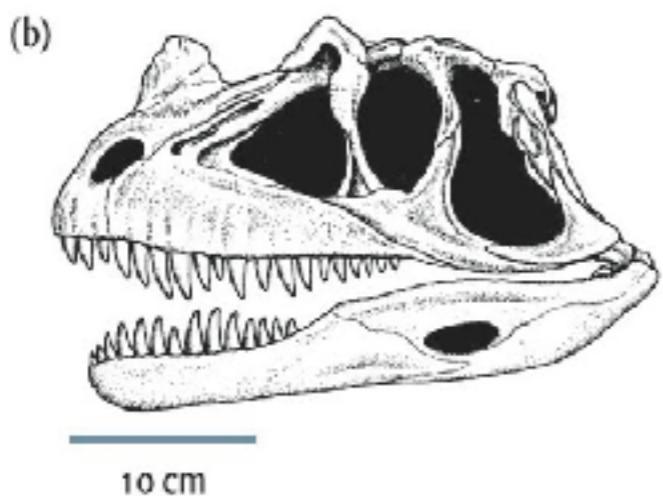
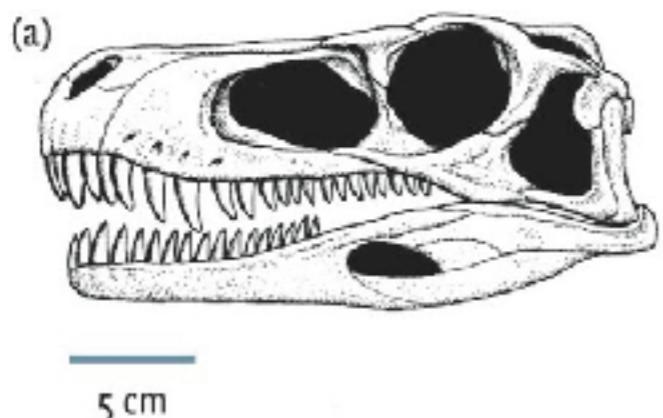


*Independent loss of teeth among
Theropod dinosaurs*
Oviraptors: Egg eaters? Nope.
Mollusk shells?
Large seeds?



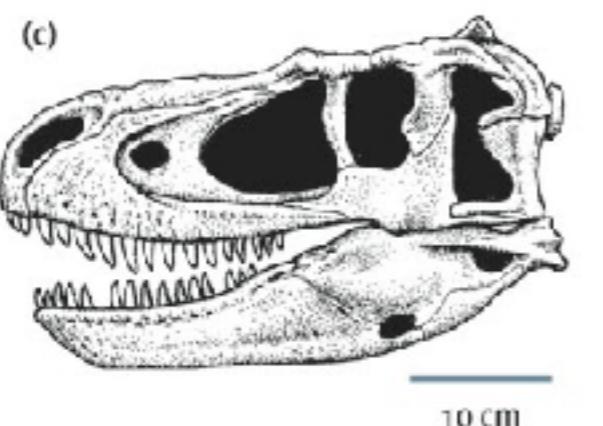
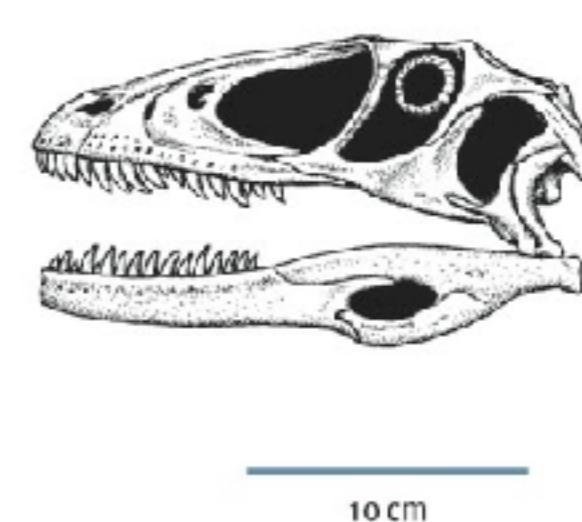
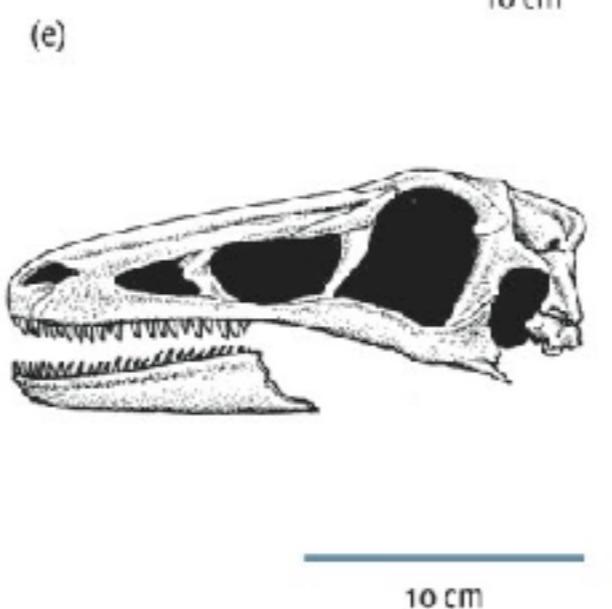
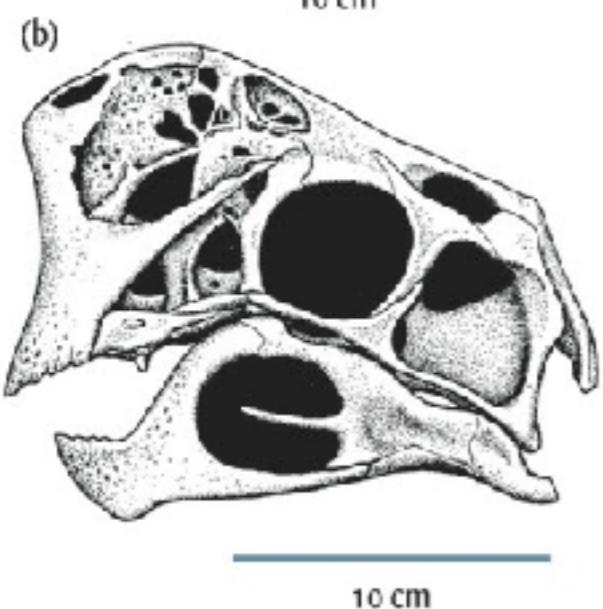
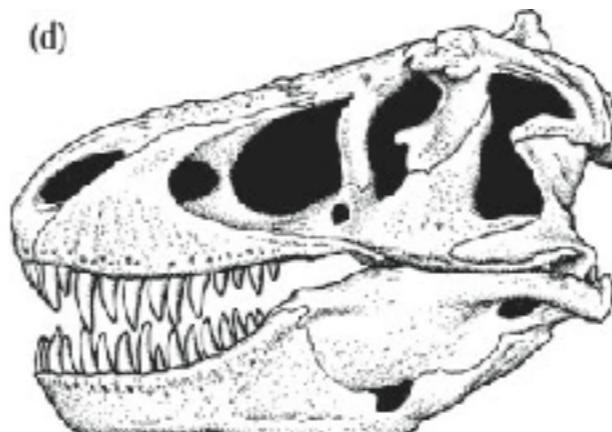
Ornithomimids: Omnivorous?
Small vertebrates/invertebrates
Eggs, Seeds, Fruits

Theropod Skulls



Robust

Theropod Skulls



Gracile