

Natural Sciences 360

Legacy of Life

Lecture 14

Dr. Stuart S. Sumida

The Diversity of Extinct Flying Reptiles: Examples of Convergent Evolution

Starting Dinosaurs

Remember, we're studying AMNIOTES.

Defined by:

EMBRYOLOGICAL FEATURES: amnion, chorion, allantois, yolk sac.

ANATOMICAL FEATURES: lack of an intertemporal bone.

ALSO, FUNCTIONAL FEATURES:

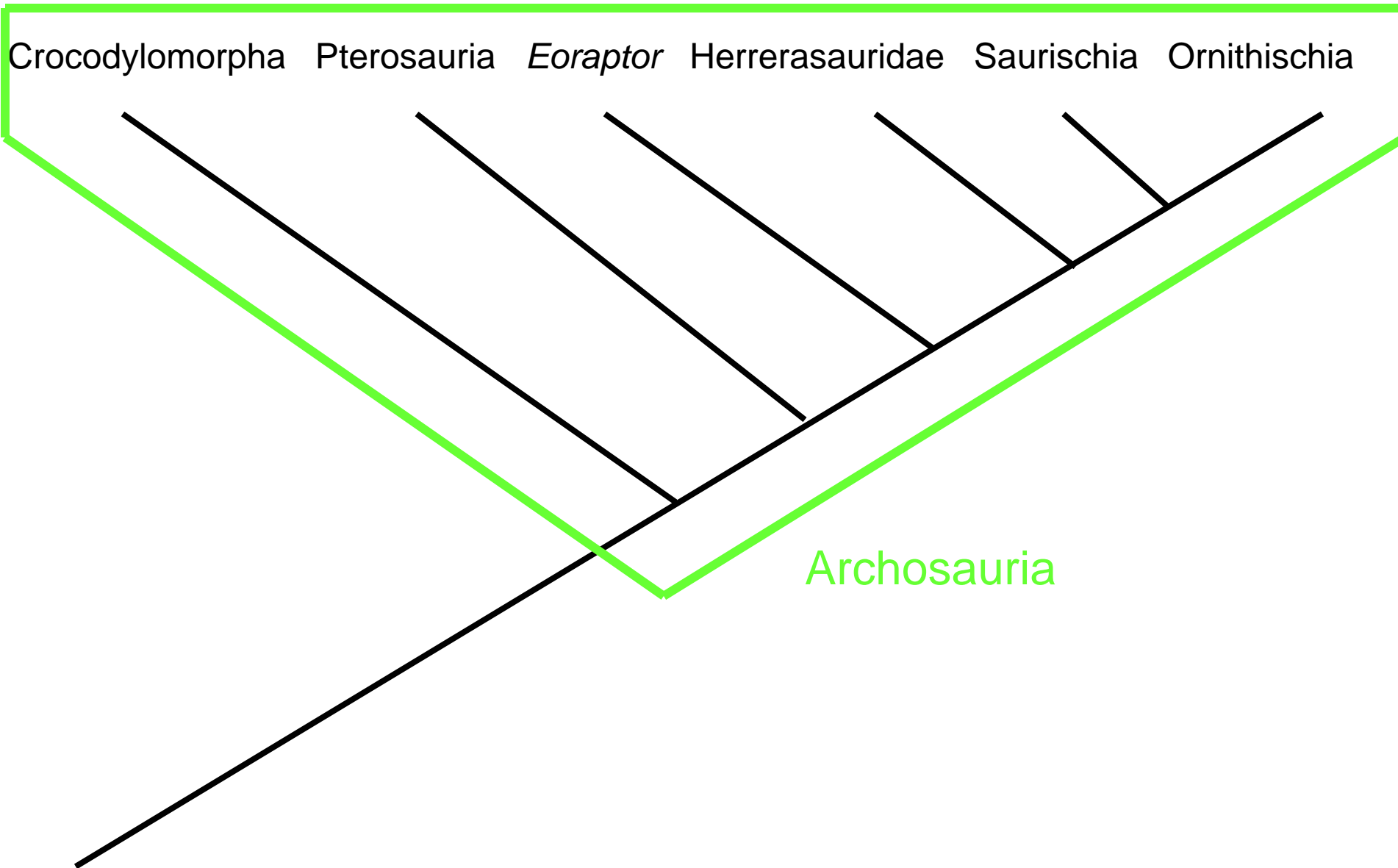
- Costal breathing (inhaling using movement of the ribs).
- Active exhalation using movement of ribs to push air out.

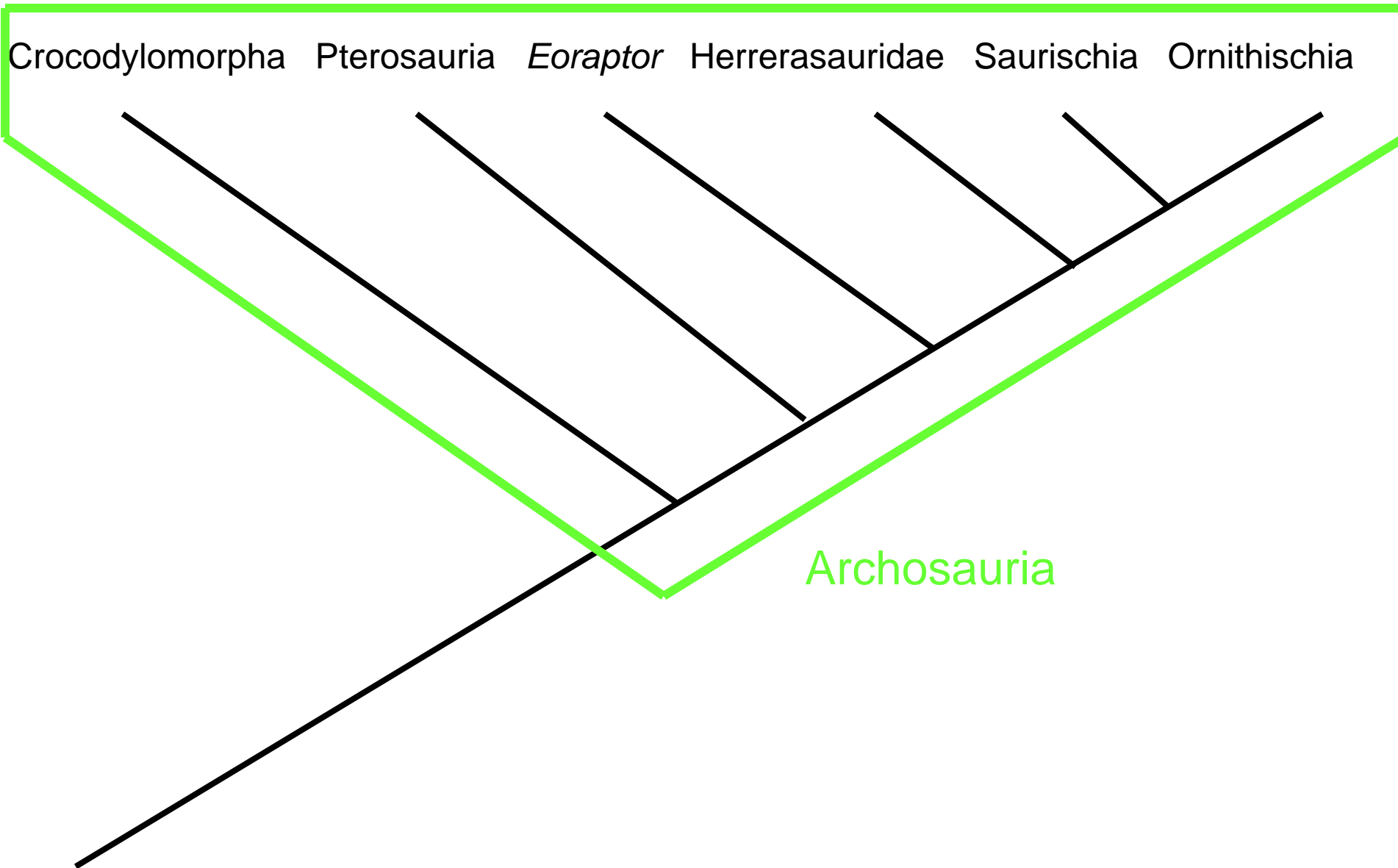
ARCHOSAURIA

ARCHOSAURS ARE DIAPSID REPTILES

ARCHOSAURIA INCLUDES:

- Crocodylomorpha
- Pterosauria
- Dinosauria
 - Aves (Birds)





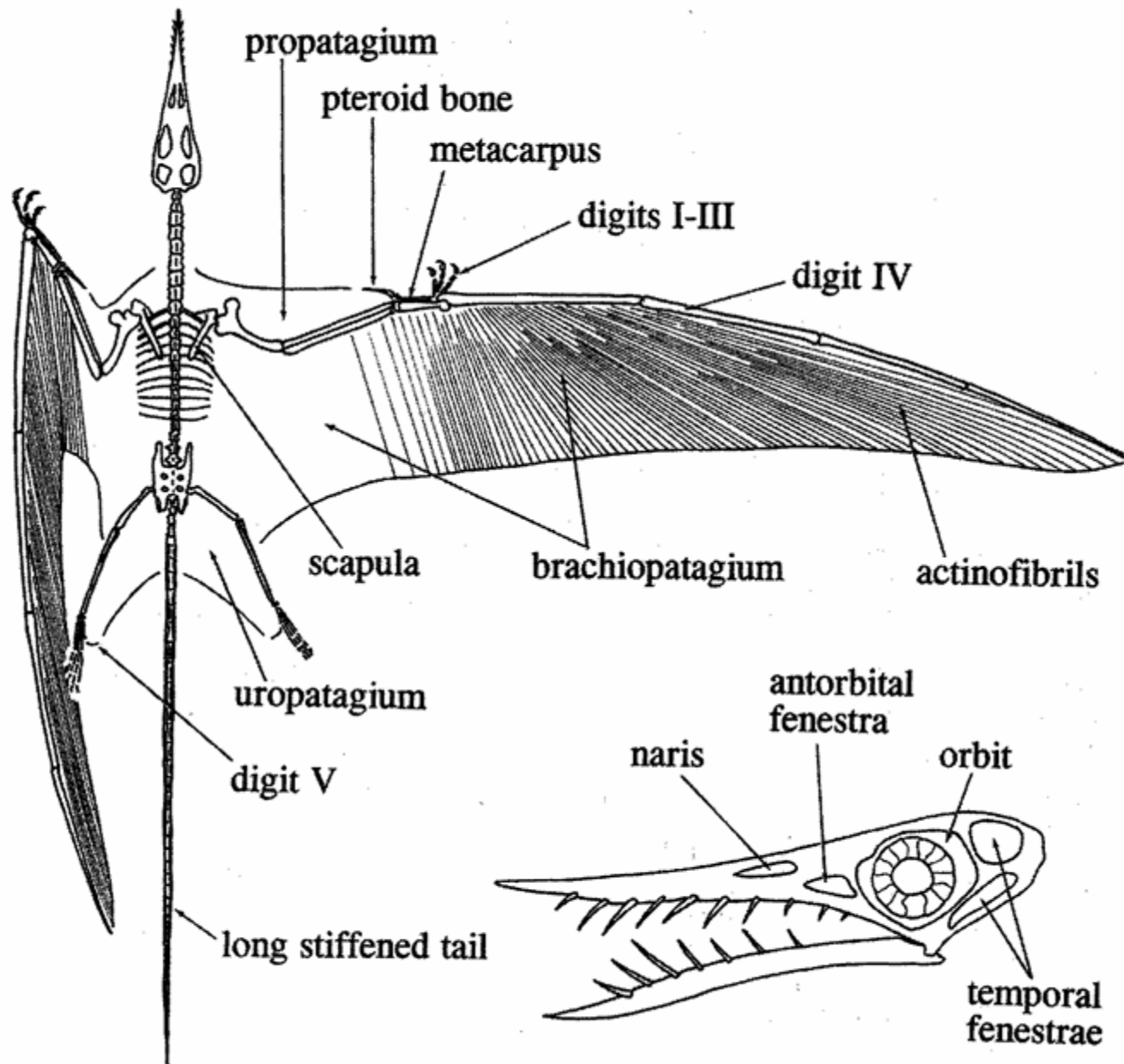
PTEROSAURIA:

Flying Reptiles of the Mesozoic

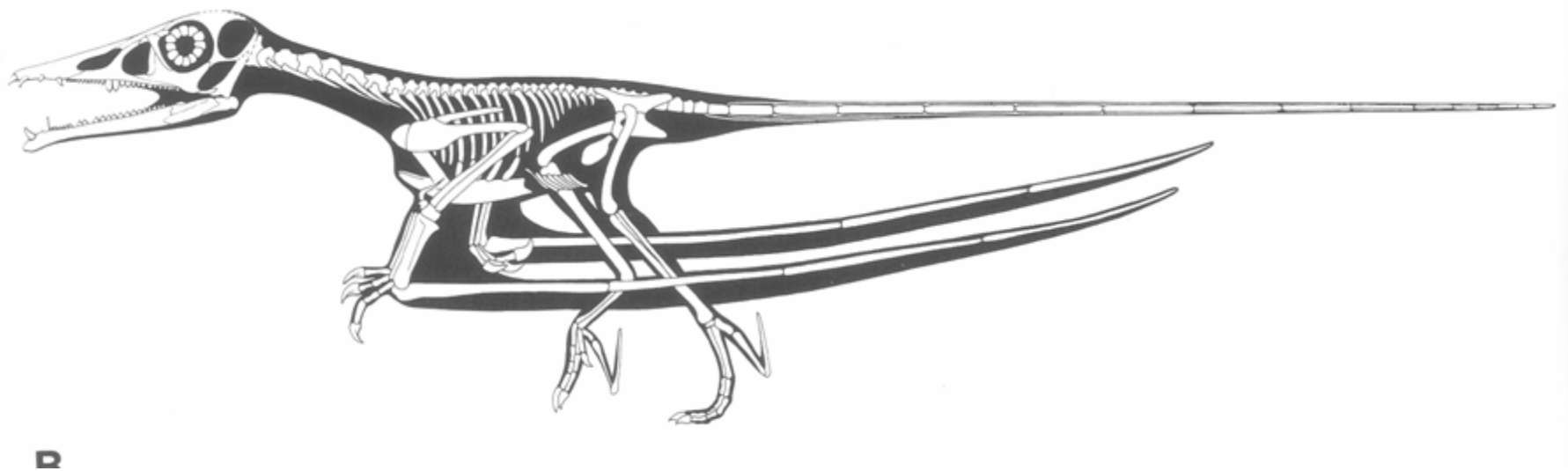
They are the closest relatives of dinosaurs, but they are not actually dinosaurs.

They used elongate 4th finger to support a wing.

The wing DID NOT attach to the leg.



Rhamphorhynchus sp.



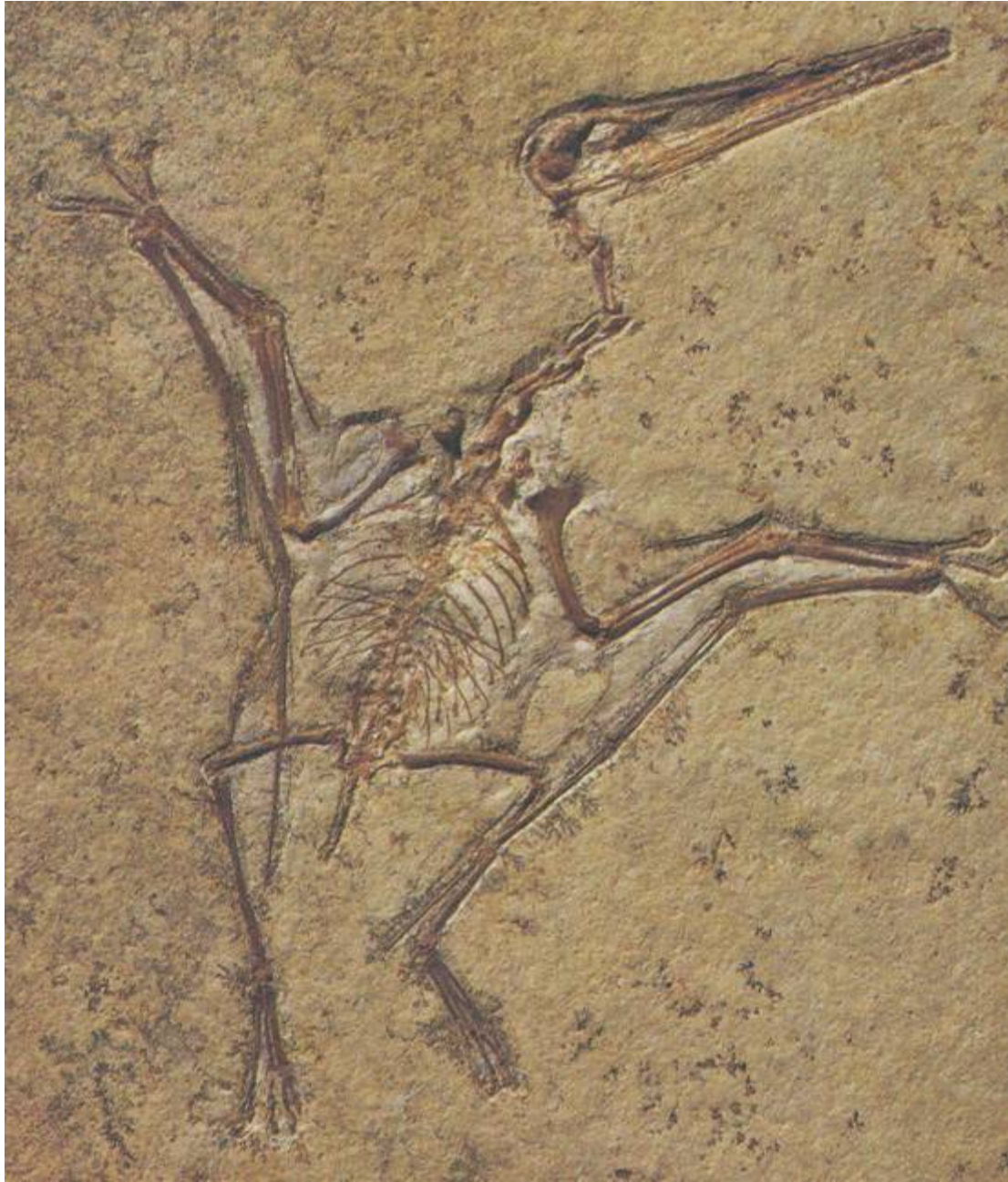
Reconstruction of the pterosaur *Eudimorphodon* in pronograde, bipedal walking.

TERMS FOR POSTURE

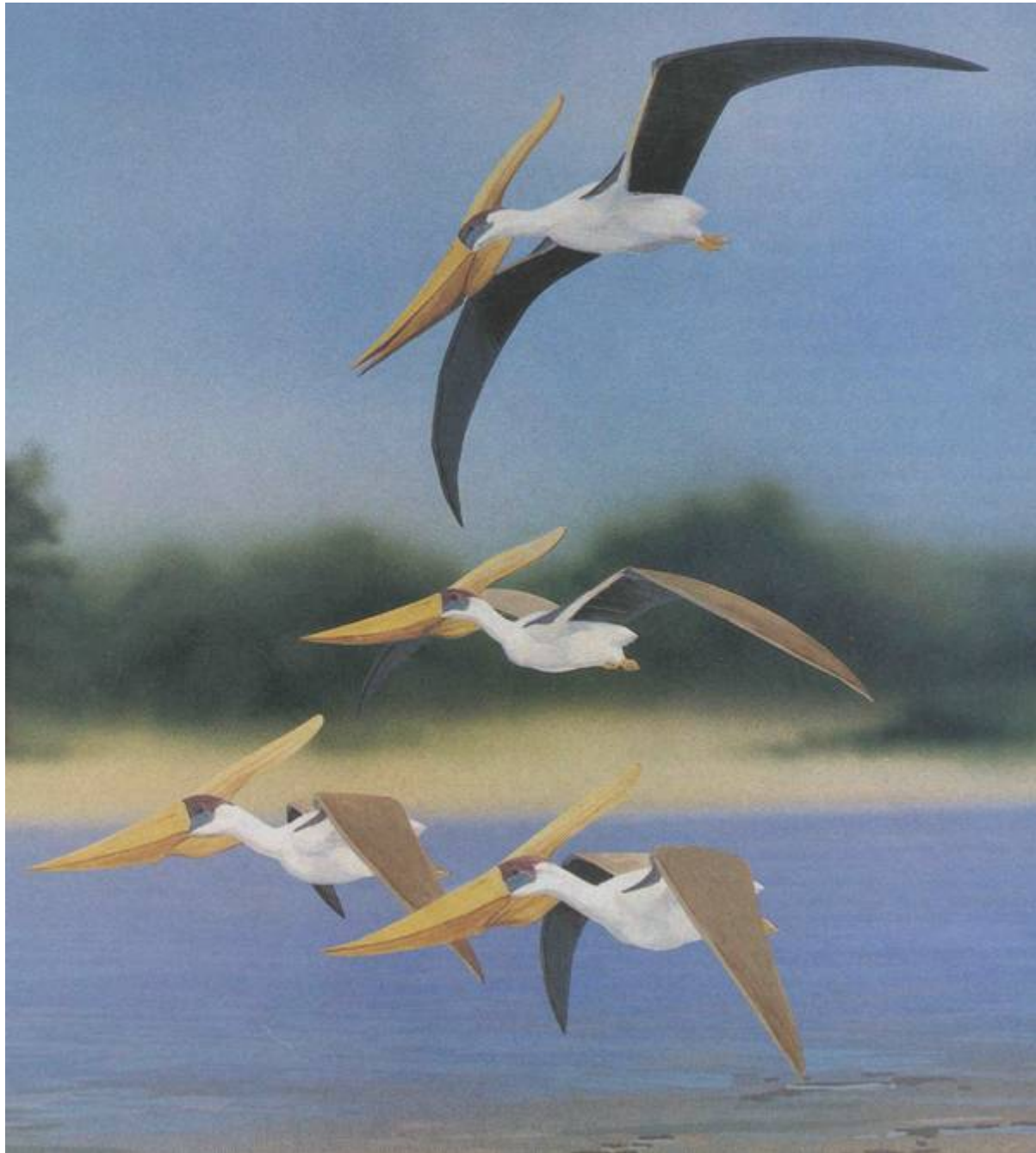
Pronograde: backbone parallel to ground

Orthograde: backbone perpendicular to ground

BIPEDAL and QUADRUPEDAL ***are not*** postural terms.



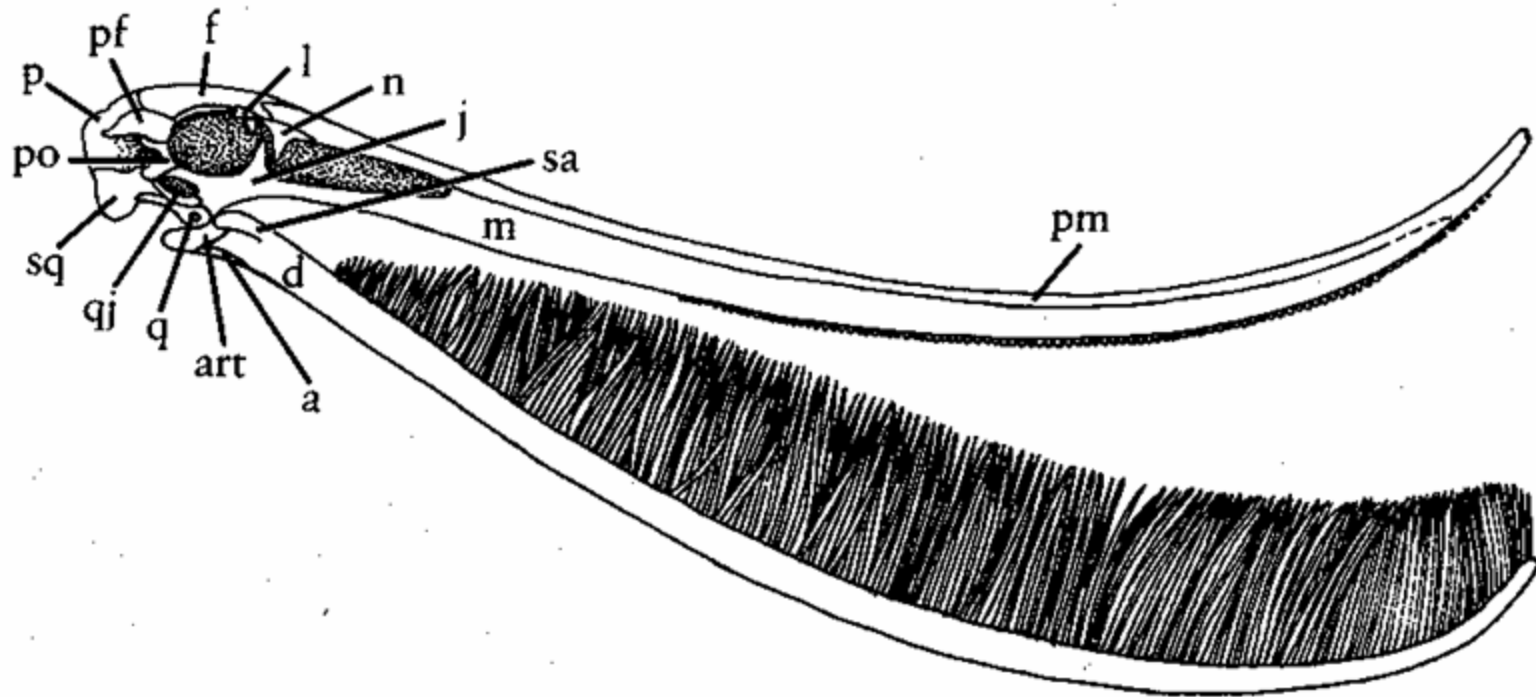
Pterydactylus



Reconstruction
of *Pteranodon*

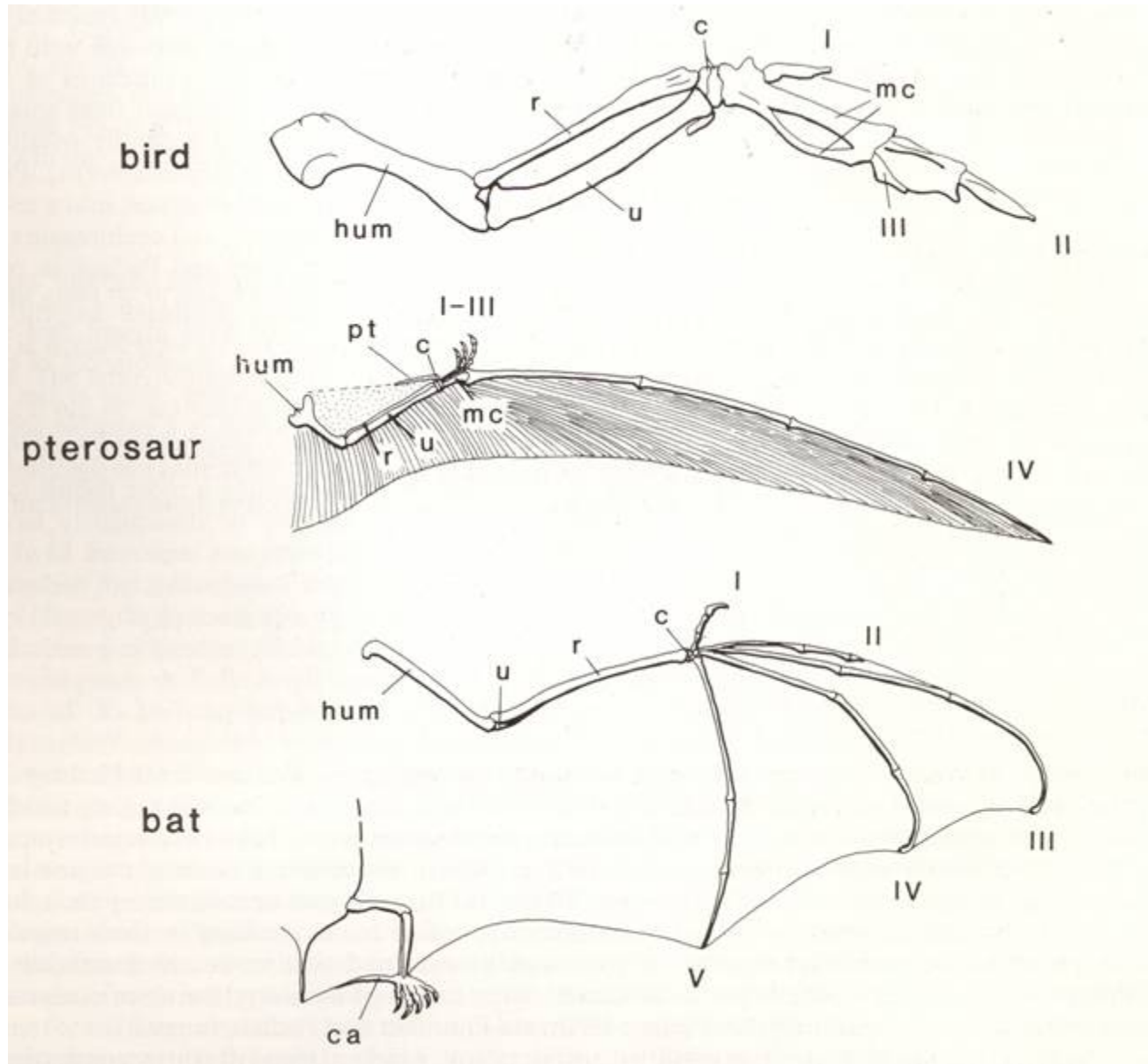


Reconstruction of *Pteranodon*

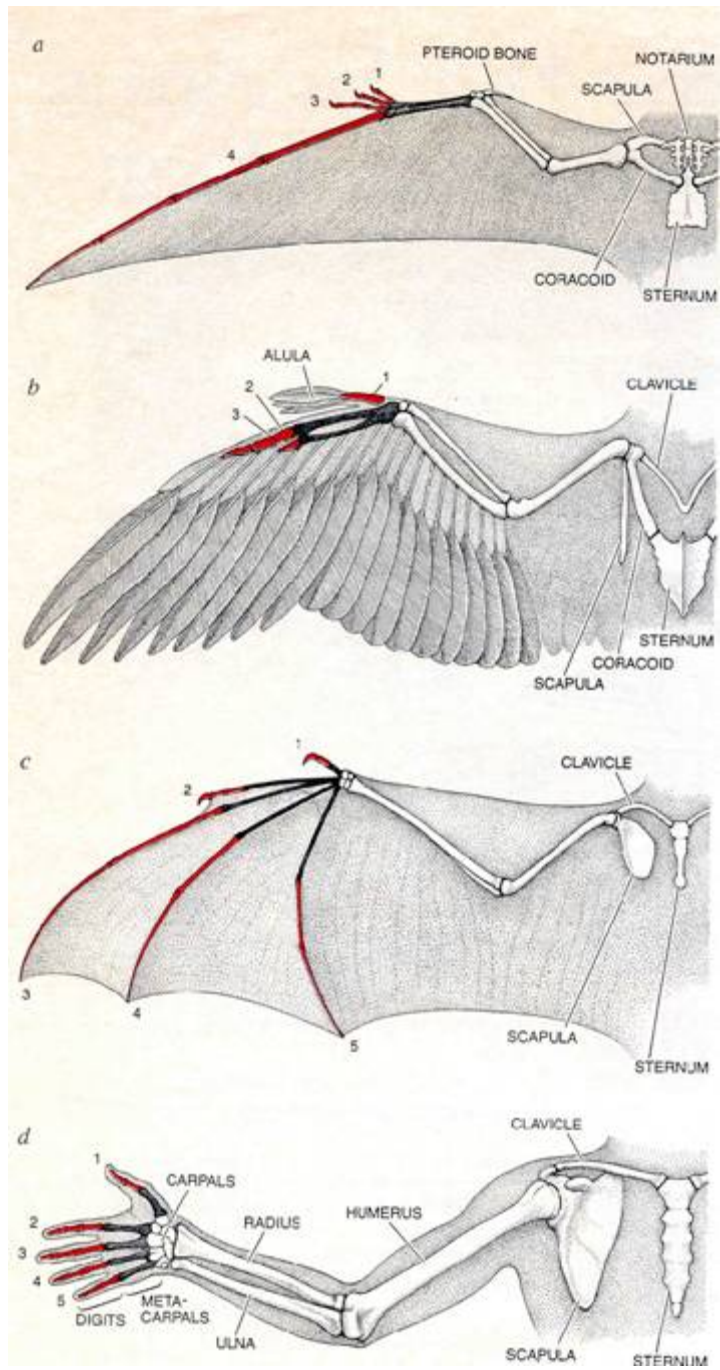


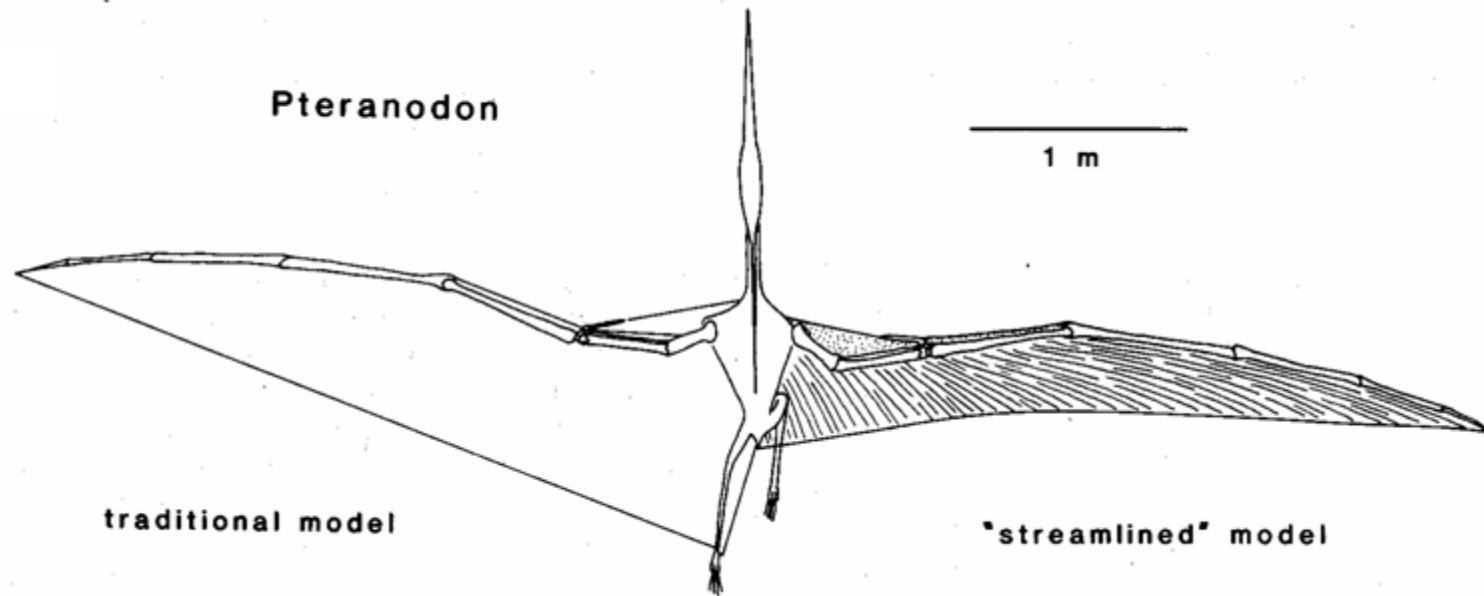
Some pterodactyloids had wildly developed skulls.

This one, *Pterodaustro* (Upper Cretaceous of Argentina) had numerous teeth that probably probably functioned similar to whale baleen.



Comparative wing structure in flying vertebrates



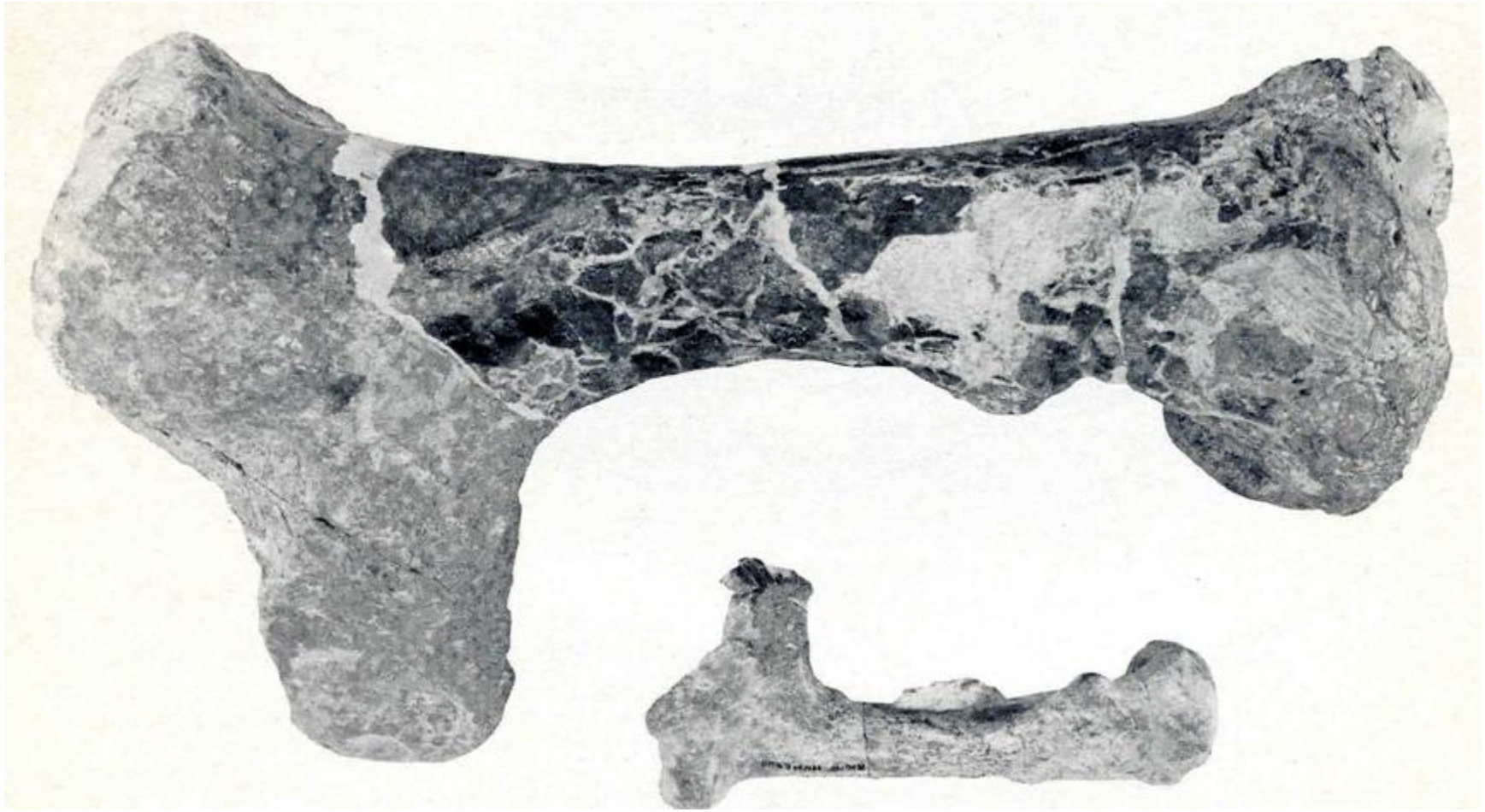


Two hypotheses of wing reconstruction in *Pteranodon*.

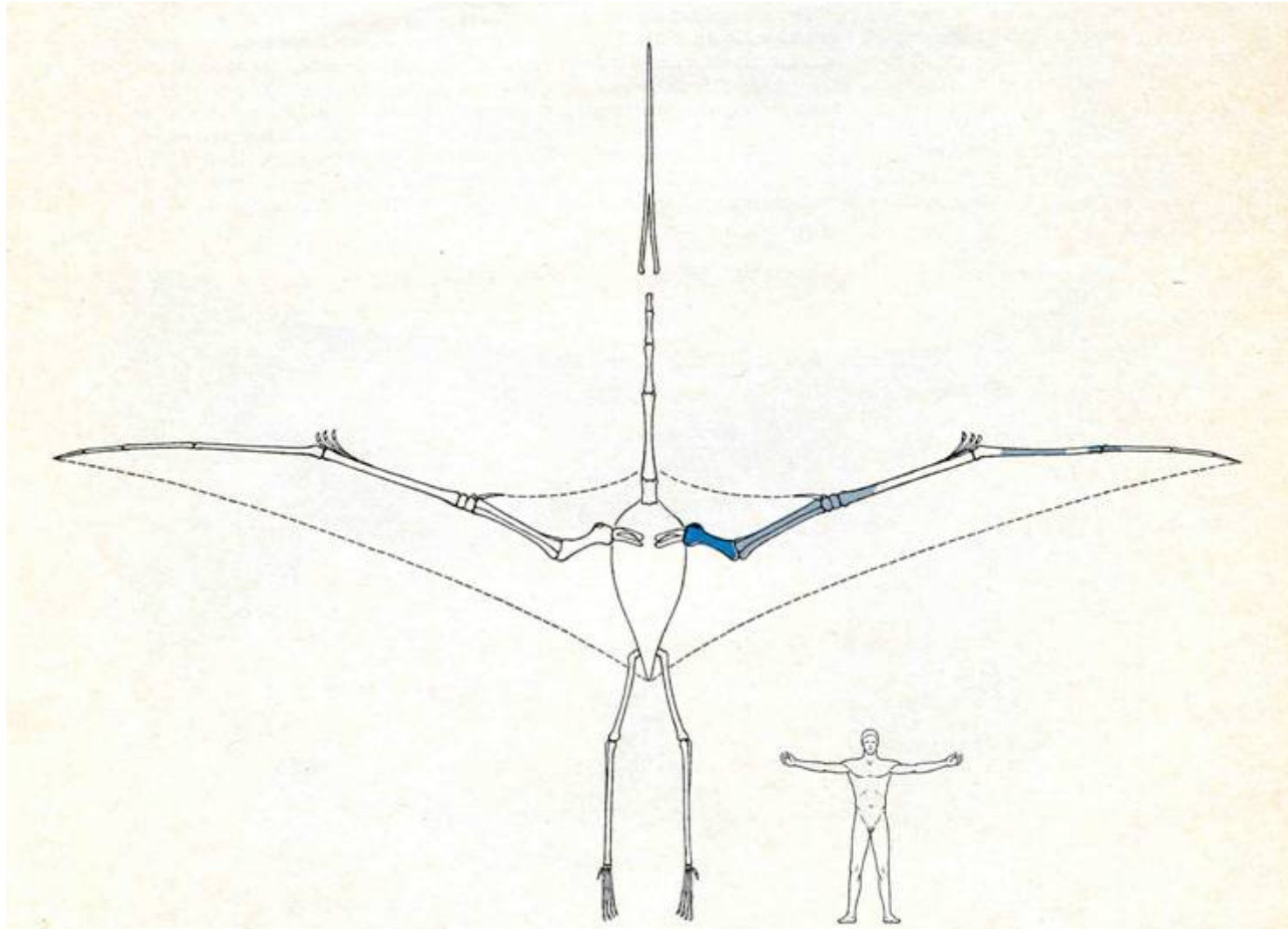
The largest of the Late Cretaceous pterosaurs were probably so large they were restricted to being gliders only.

Quetzalcoatlus northropi had a wingspan of approximately 11-13 meters.

Humerus of *Quetzalcoatlus northropi* – over ½ meter long.

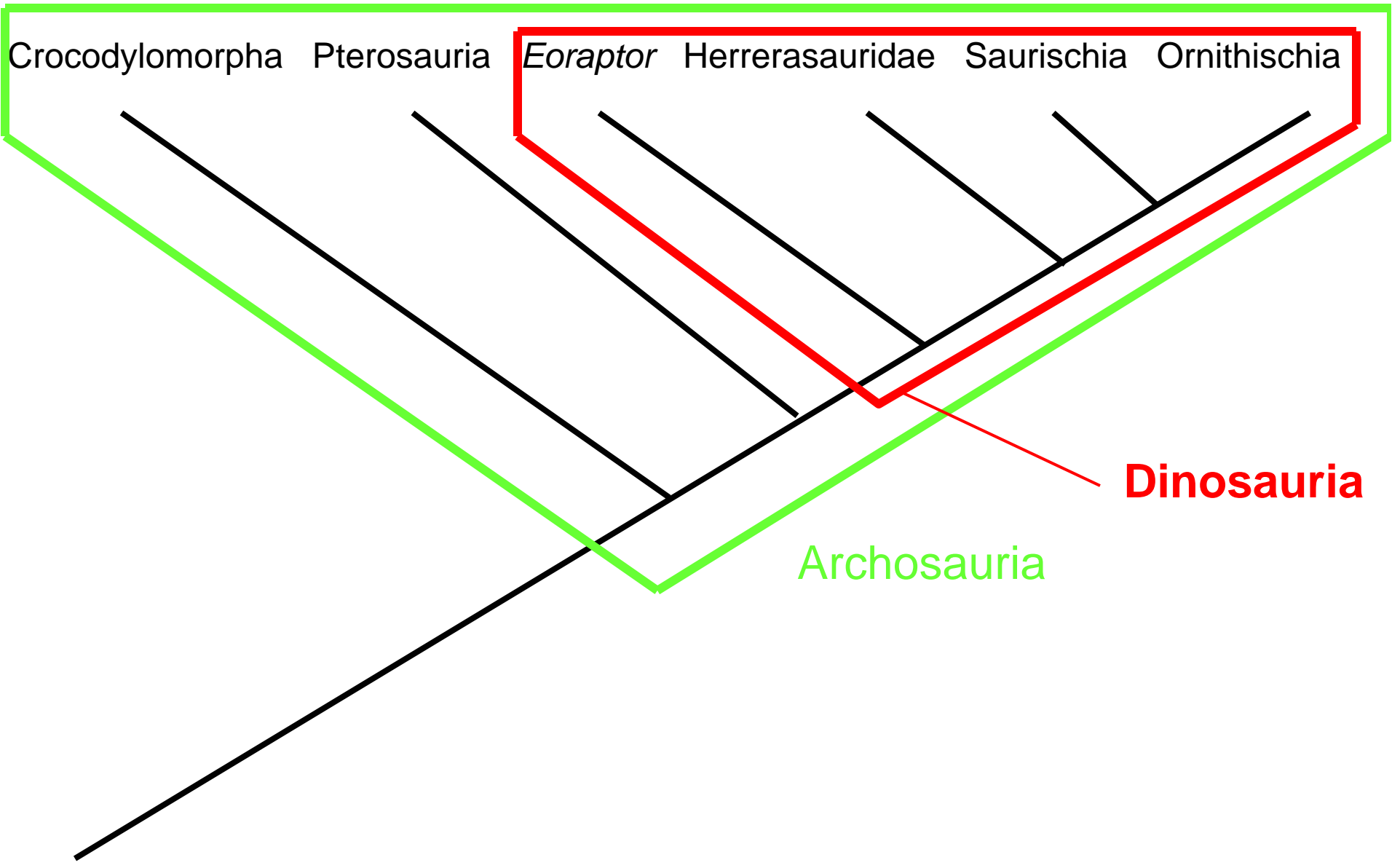


Humerus (young?) *Q. northropi* – about 0.25 meter long.



Quetzalcoatlus northropi had a wingspan of approximately 11-13 meters.

DINOSAURIA



Crocodylomorpha

Pterosauria

Eoraptor

Herrerasauridae

Saurischia

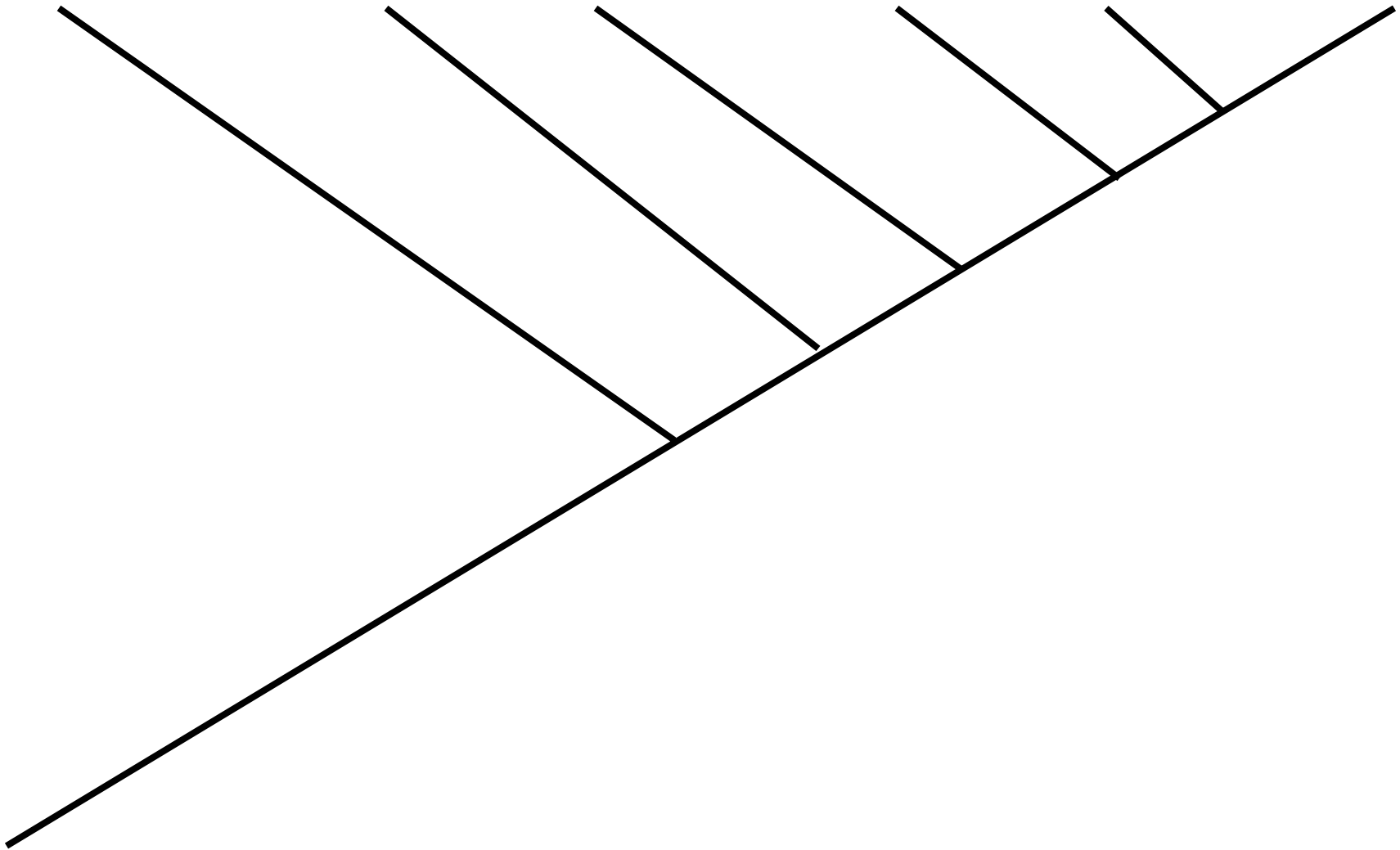
Ornithischia

Dinosauria

Archosauria

THE MOST PRIMITIVE DINOSAURS

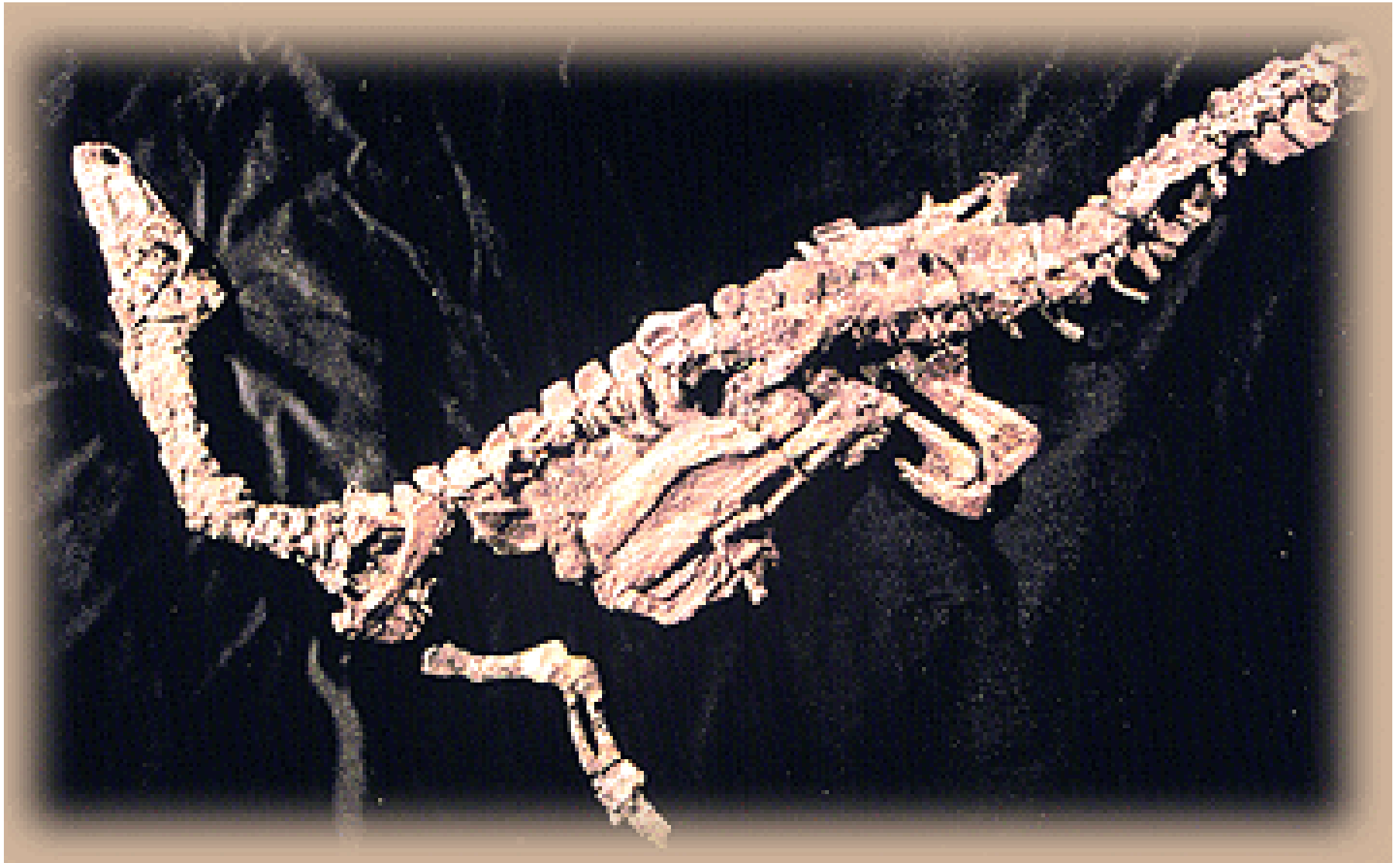
Crocodylomorpha Pterosauria *Eoraptor* Herrerasauridae Saurischia Ornithischia



Eoraptor lunensis (“Dawn Raptor”)

- From the Upper Triassic of Argentina.
- Thought to be amongst the most primitive of dinosaurs.
- Its hip is like that of dinosaurs: it has a “perforate” acetabulum. (A hole in the hip socket.)

Eoraptor lunensis (“Dawn Raptor”)

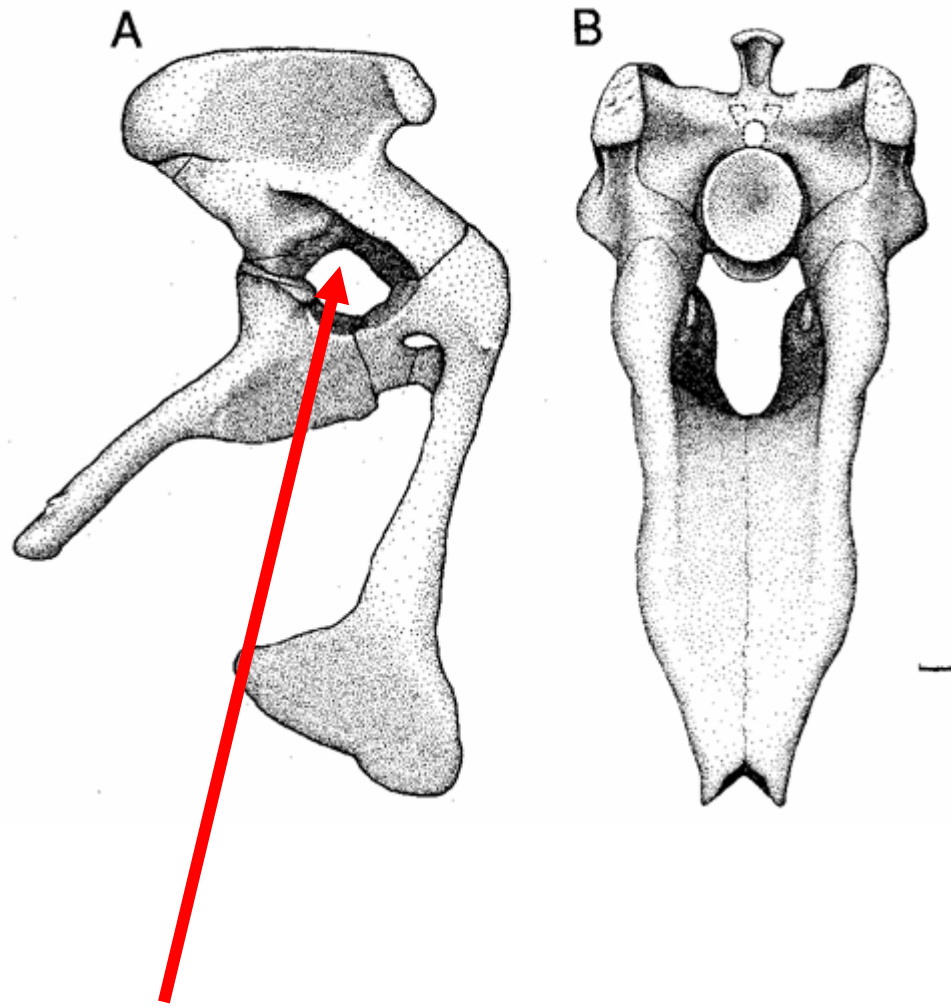




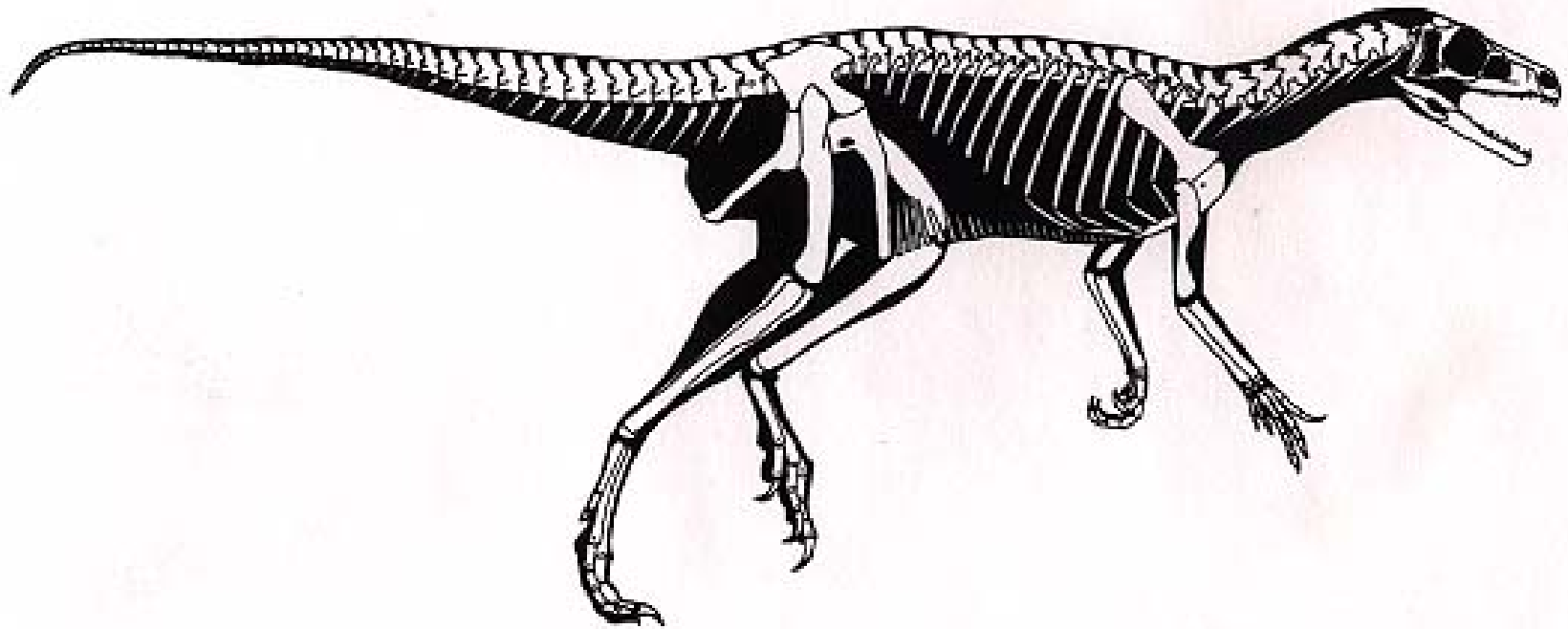
Eoraptor



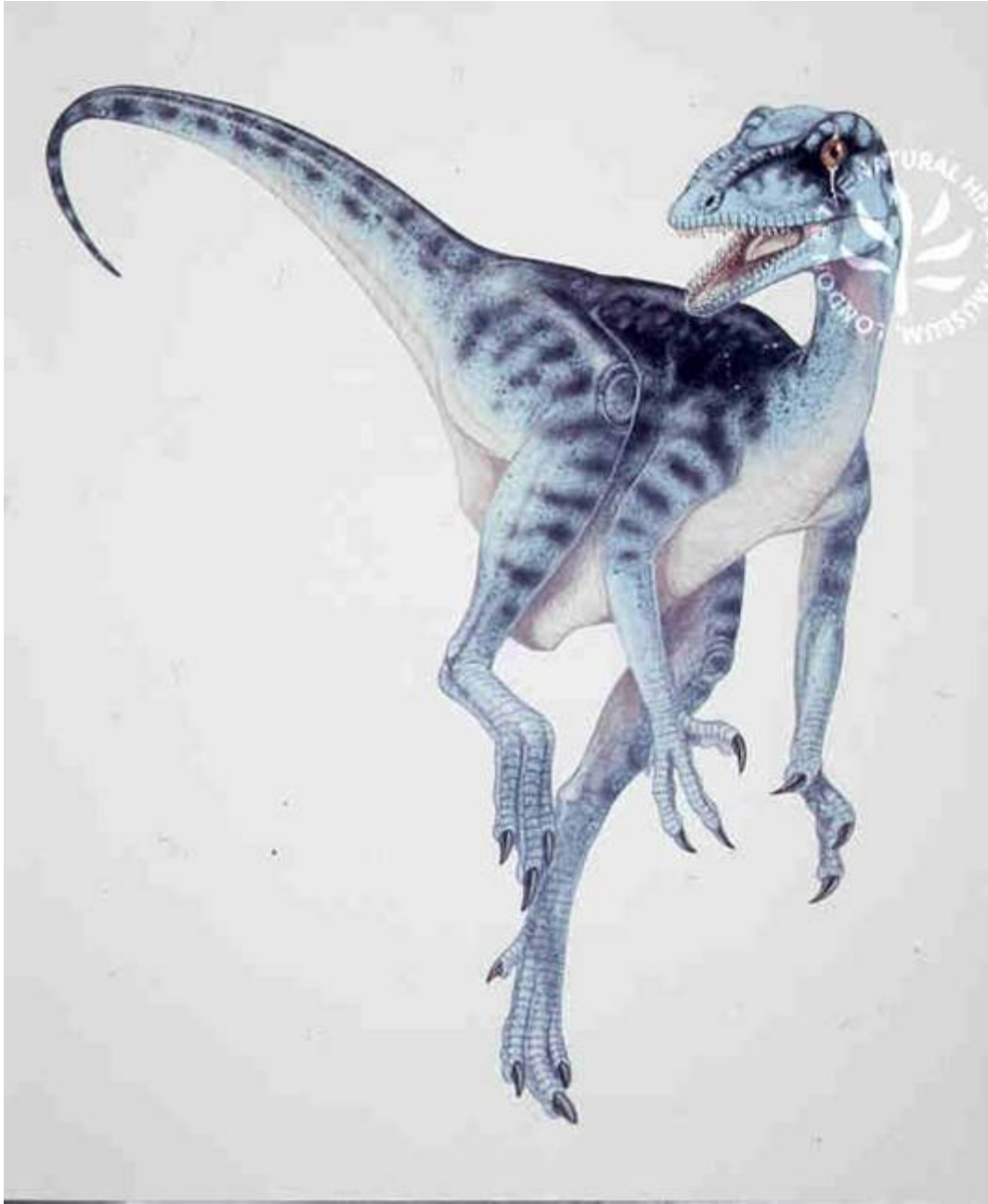
CT Scan of *Eoraptor* skull.



A perforate acetabulum



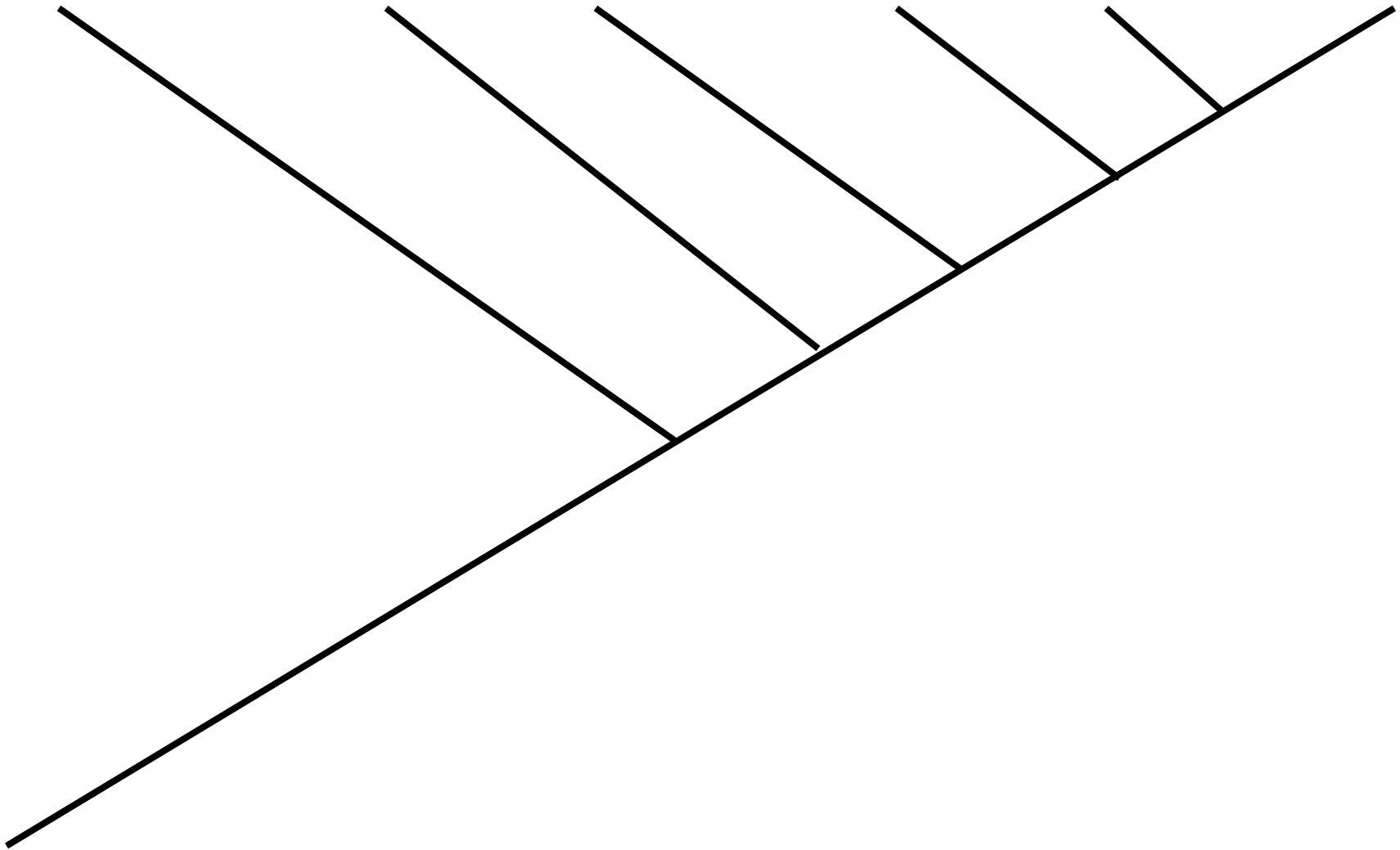
Eoraptor Reconstruction



Eoraptor

Reconstruction

Crocodylomorpha Pterosauria *Eoraptor* Herrerasauridae Saurischia Ornithischia



Herrerasauridae:

Upper Triassic of Argentina

2 – 4.5 meters long.

Long, low skull that is as long as the femur.

24 presacral vertebrae; and the vertebrae are relatively shorter than more primitive forms.



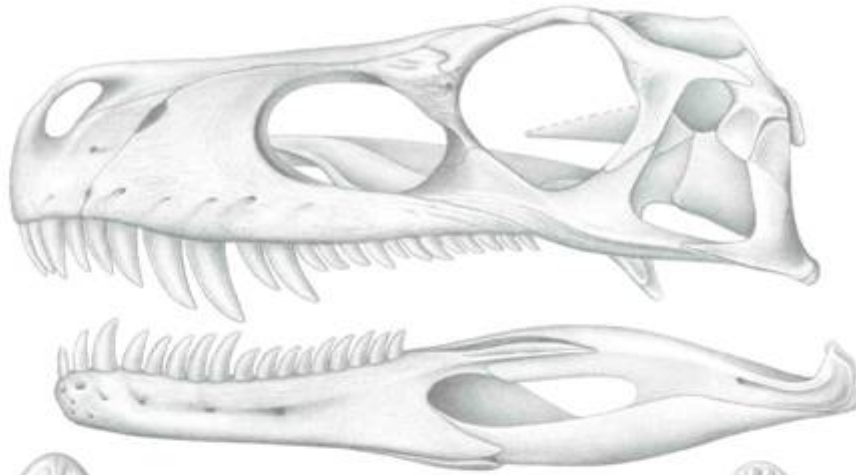
Herrerasaurus ischigualastensis



Stereo-pair view of *Herrerasaurus ischigualastensis* skull.

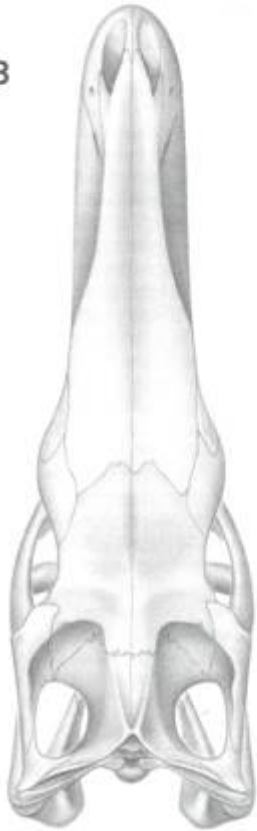
Long, low skull that
is as long as the
femur.

A



*Herrerasaurus
ischigualastensis*

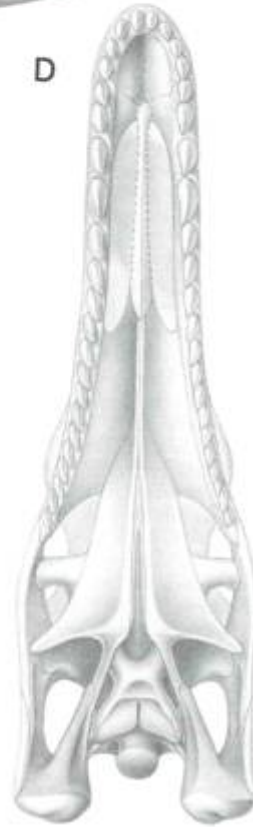
B



C



D



E



Skull reconstruction

Herrerasaurus ischigualastensis

Reconstruction



24 presacral vertebrae; and the vertebrae are relatively shorter than more primitive forms.

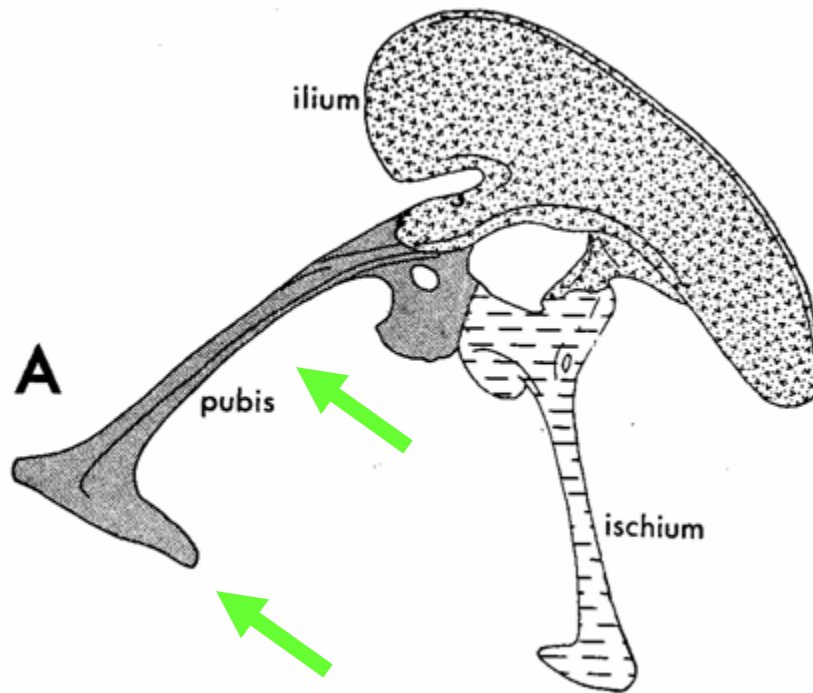


Herrerasaurus ischigualastensis

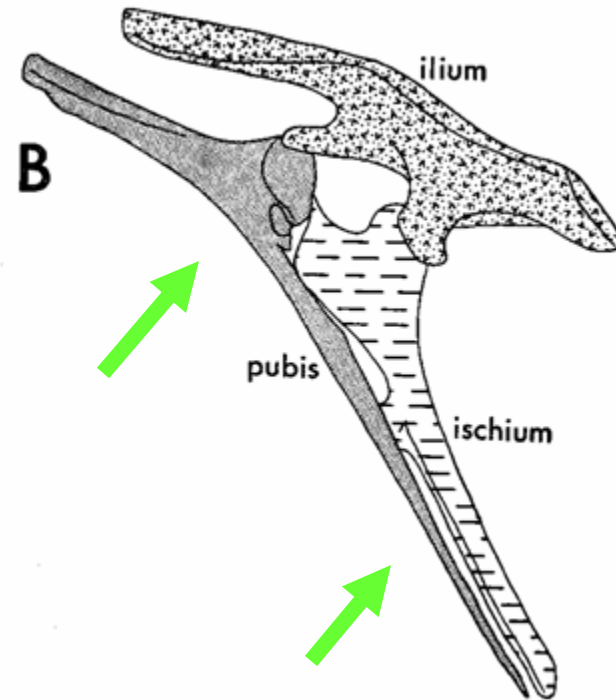


Herrerasaurus ischigualastensis

Dinosaurian groups more derived than Herrerasaurs may be divided into two groups based on hip construction:



SAURISCHIAN



ORNITHISCHIAN

(Note position of pubis.)