

Natural Sciences 360

Legacy of Life

Lecture 10

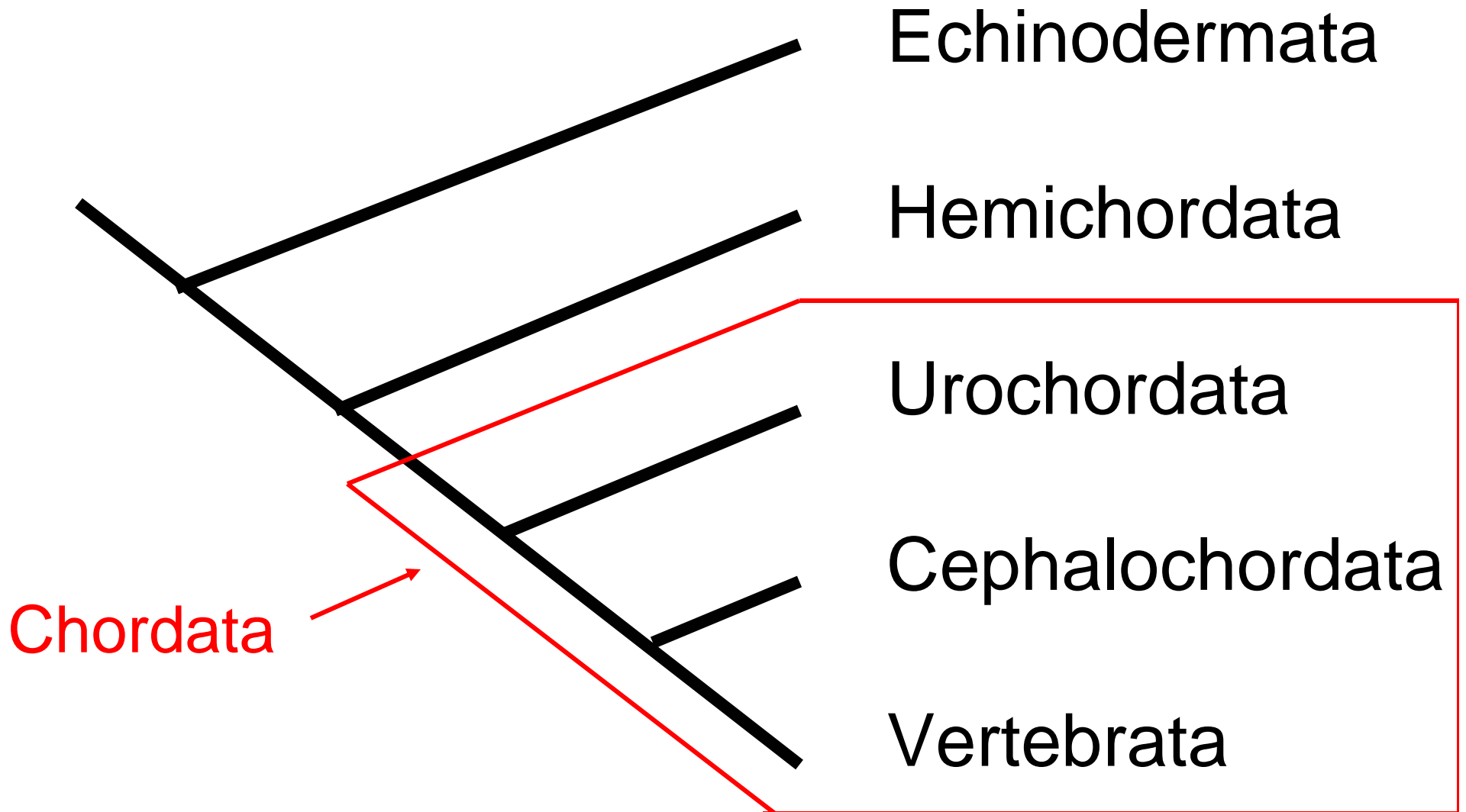
Dr. Stuart Sumida

PHYLUM CHORDATA
Subphylum VERTEBRATA

FISHES

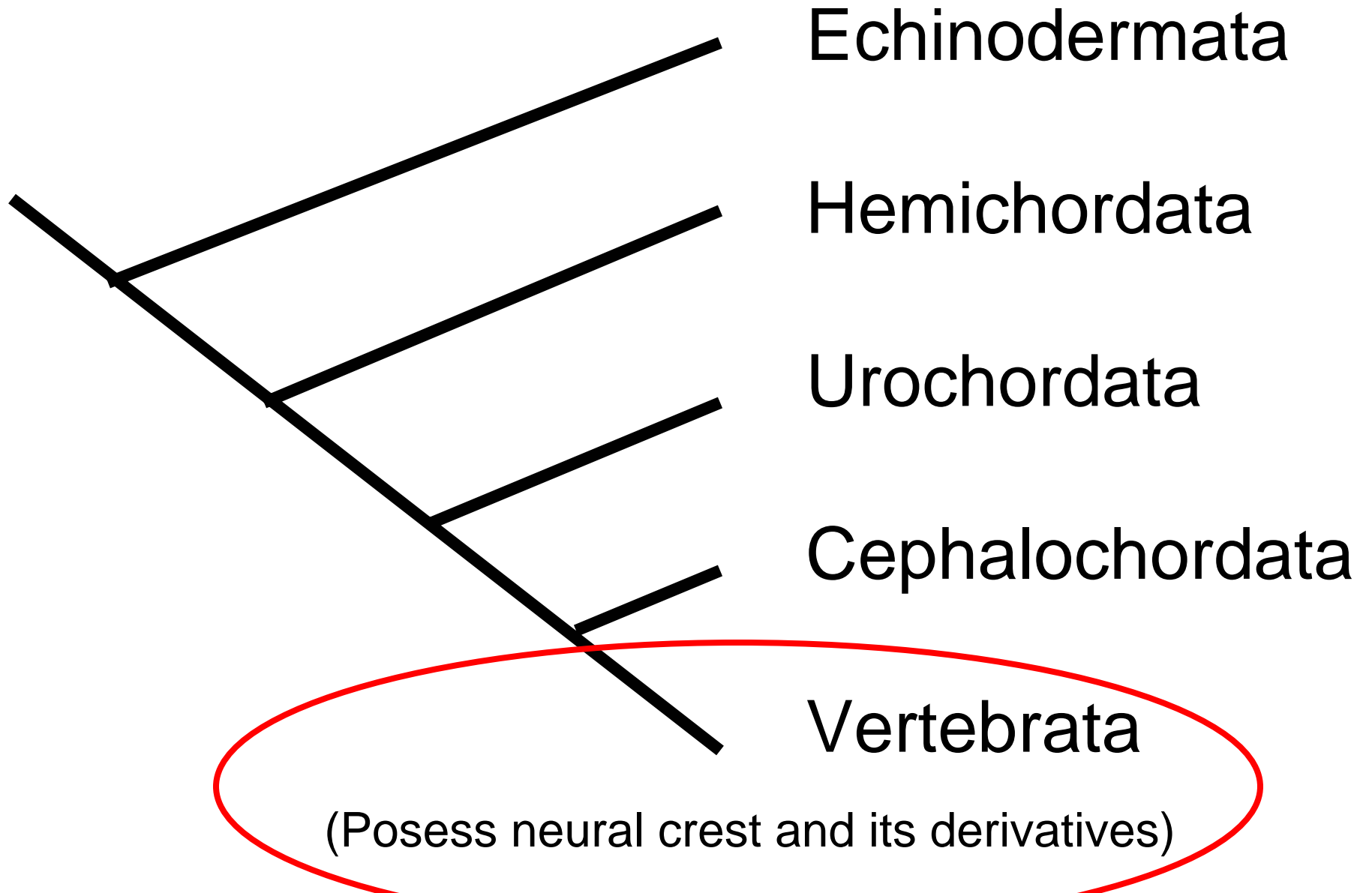
So, then
what's a
vertebrate...?

Phylogenetic Context for Vertebrata: Vertebrates are chordates



All vertebrates possess an embryological material known as NEURAL CREST. Neural crest gives rise to particular structures found in all vertebrates, and only in vertebrates.

Phylogenetic Context for Vertebrata



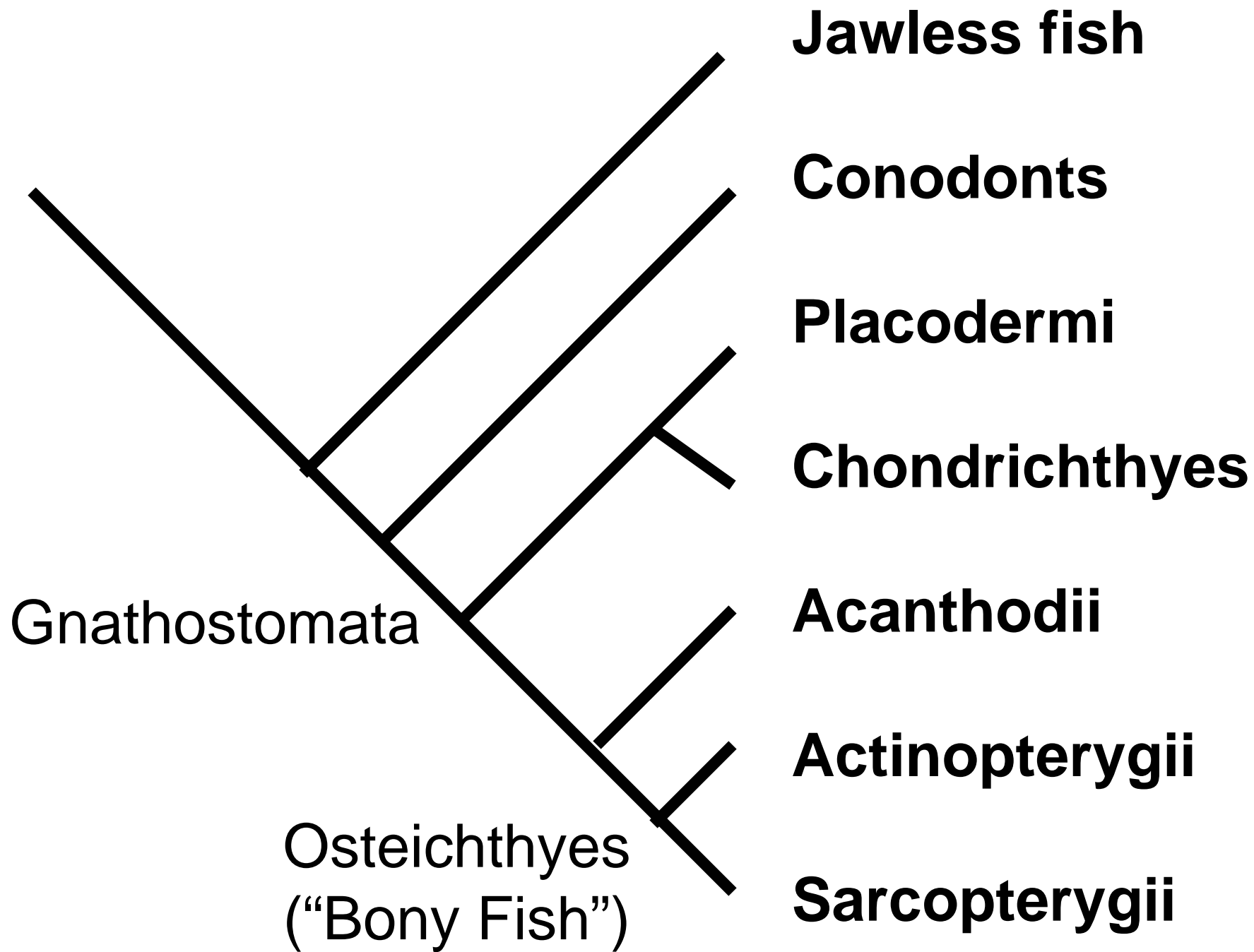
EVERYONE will be
able to demonstrate a
cross-sectional view
of a vertebrate...

Remember the basic chordate features:

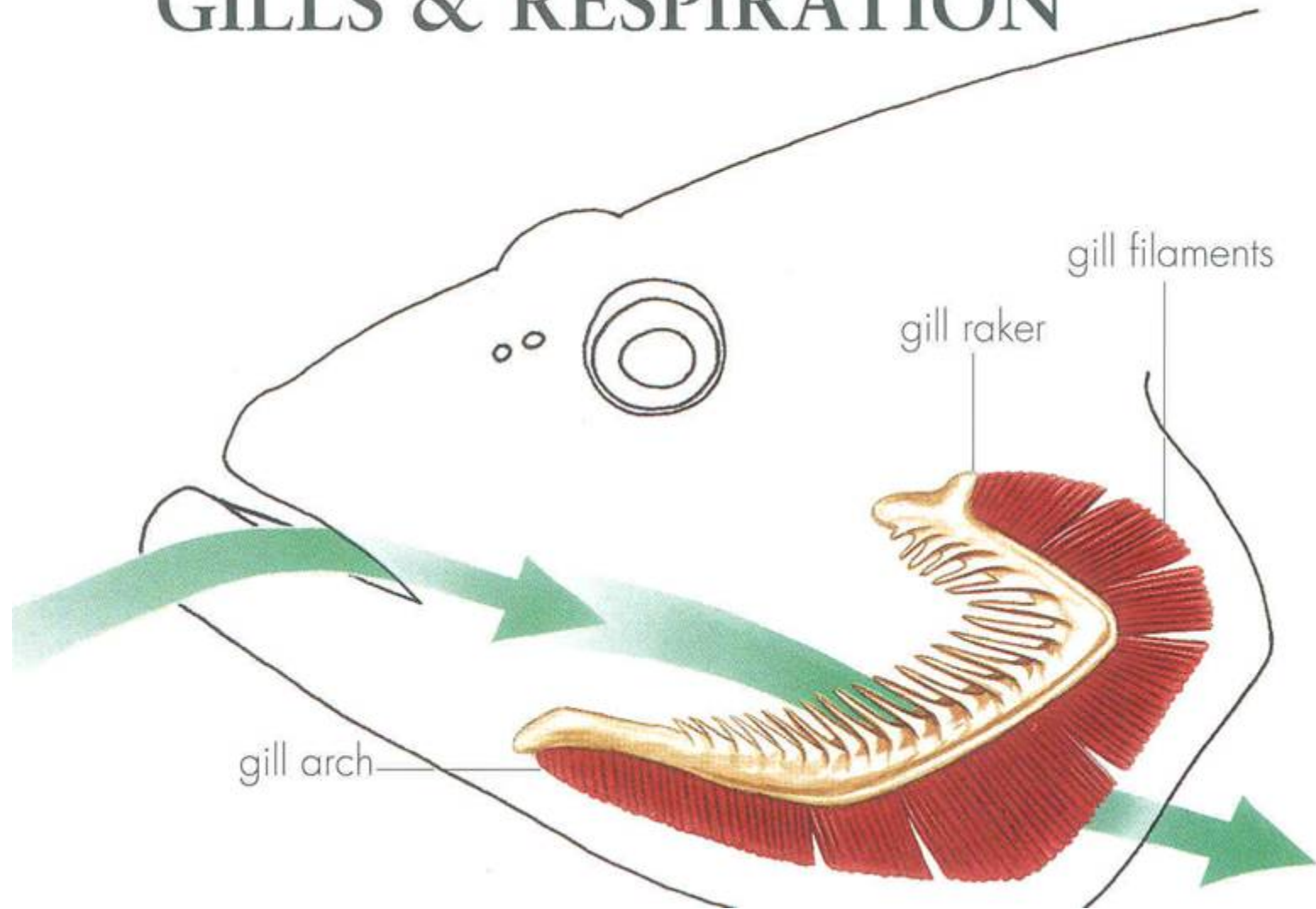
- Dorsal Hollow Nerve Cord
- Notochord
- Pharyngeal Gill Slits
- Post Anal Tail



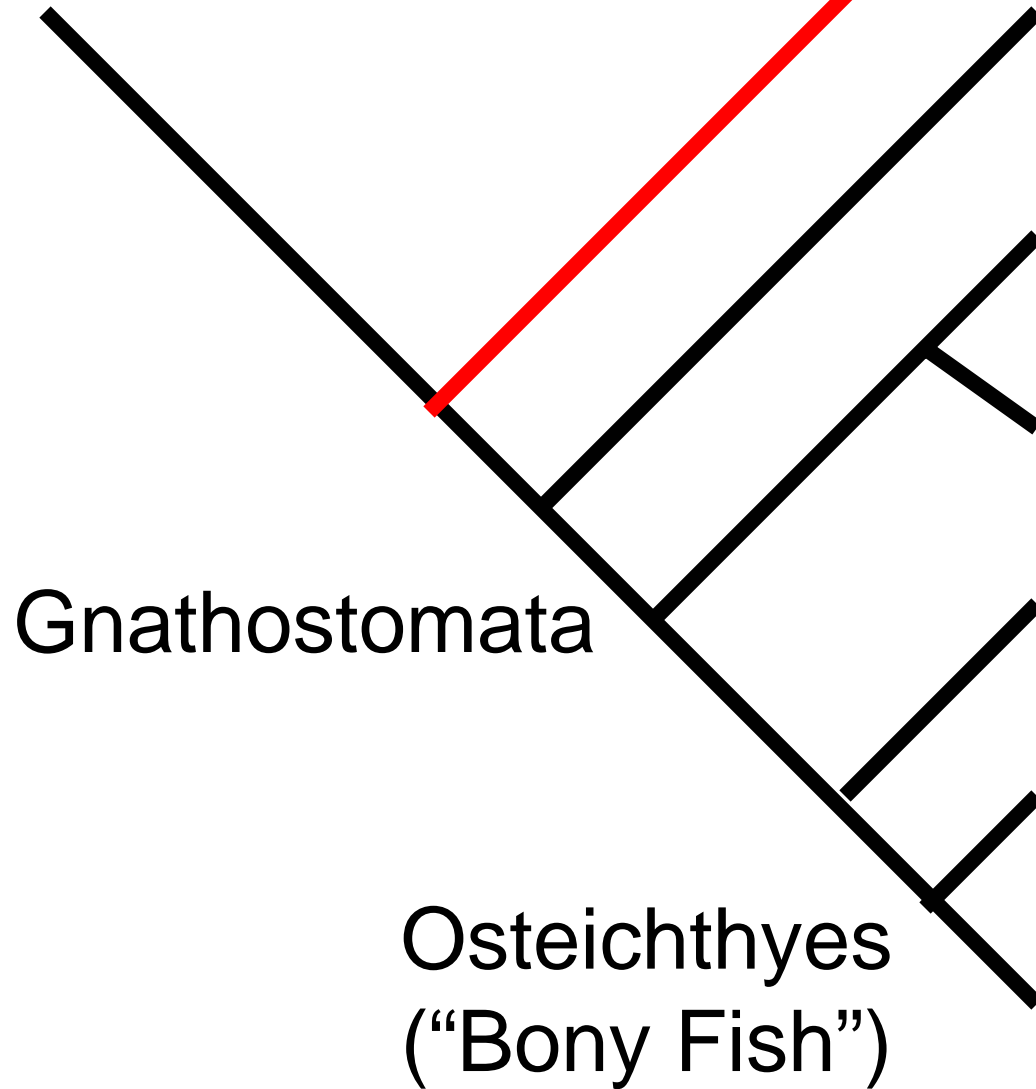
So what
exactly is a
fish....?



GILLS & RESPIRATION



THE ORIGINAL CONDITION
OF VEWRTEBRATES WAS
WITHOUT JAWS



Jawless fish

Conodonts

Placodermi

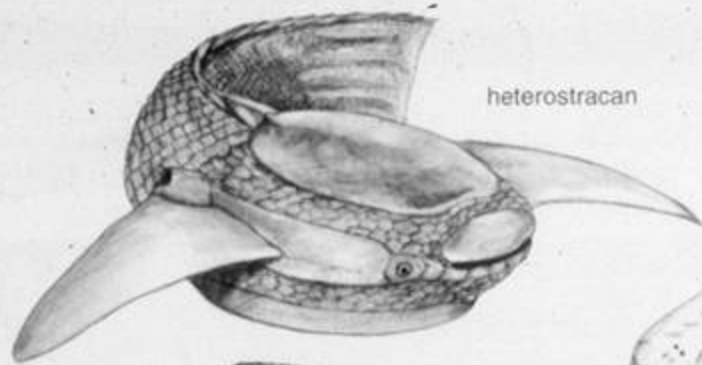
Chondrichthyes

Acanthodii

Actinopterygii

Sarcopterygii





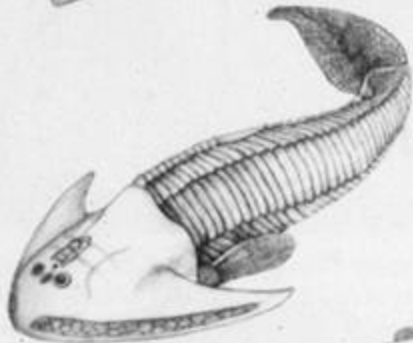
heterostracan



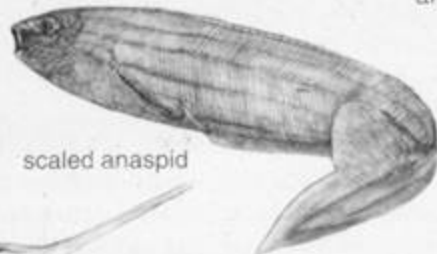
arandaspid



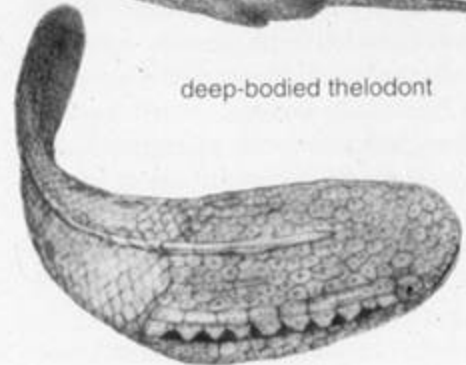
deep-bodied thelodont



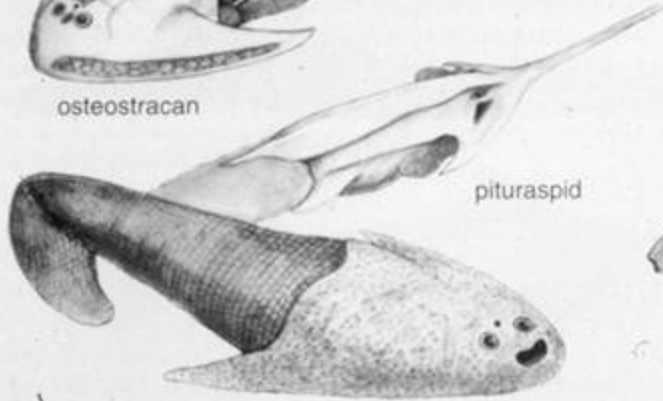
osteostracan



scaled anaspid



astraspid



pituraspid



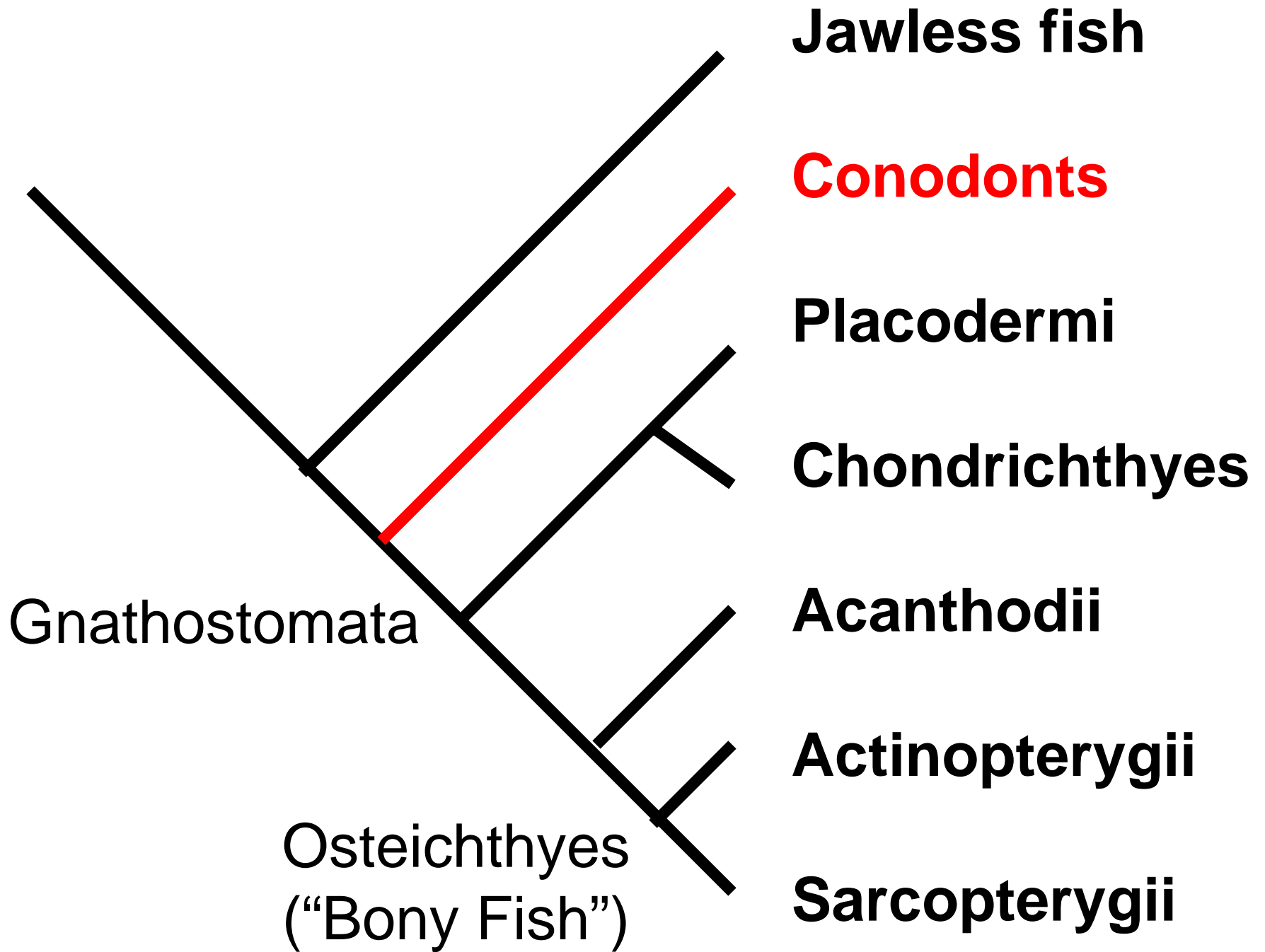
anaspid-like agnathan



flat-bodied thelodont

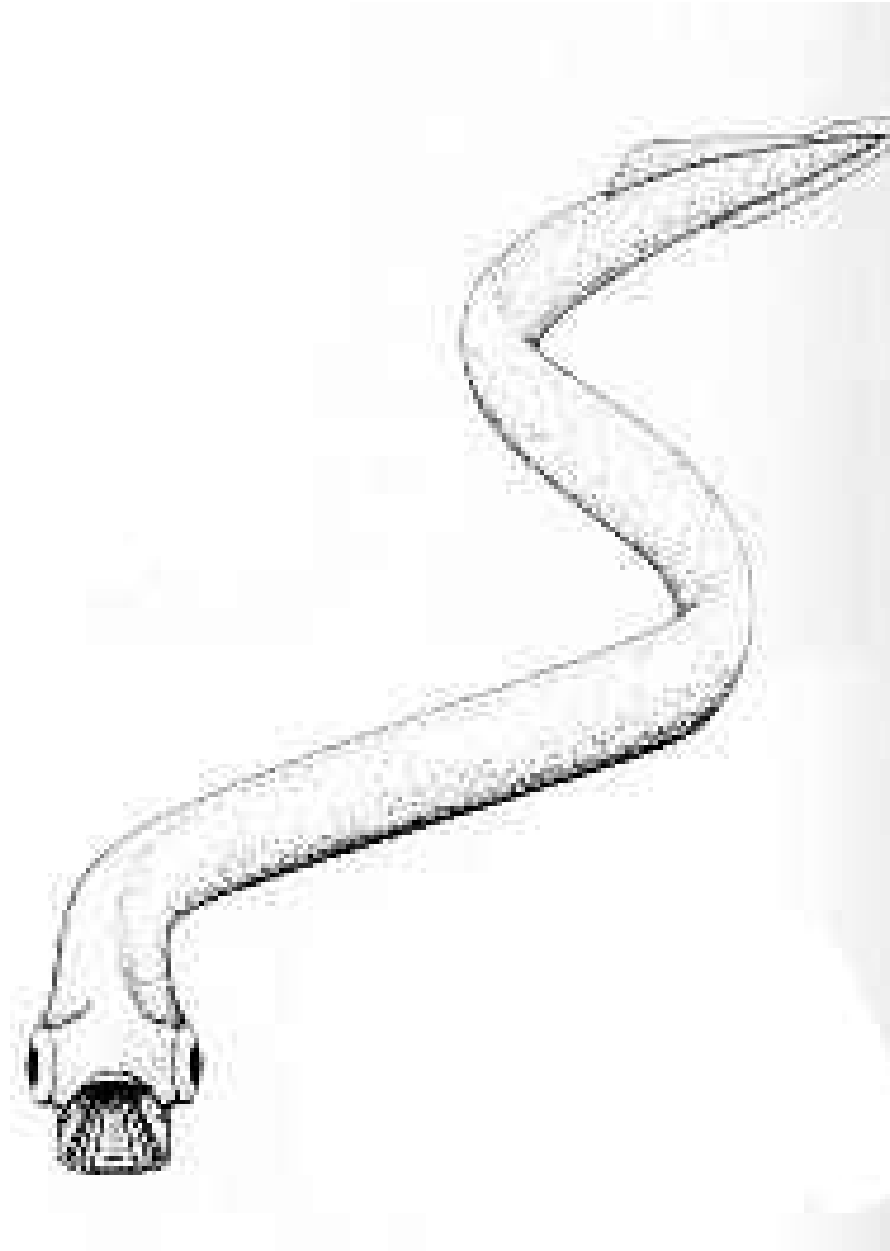


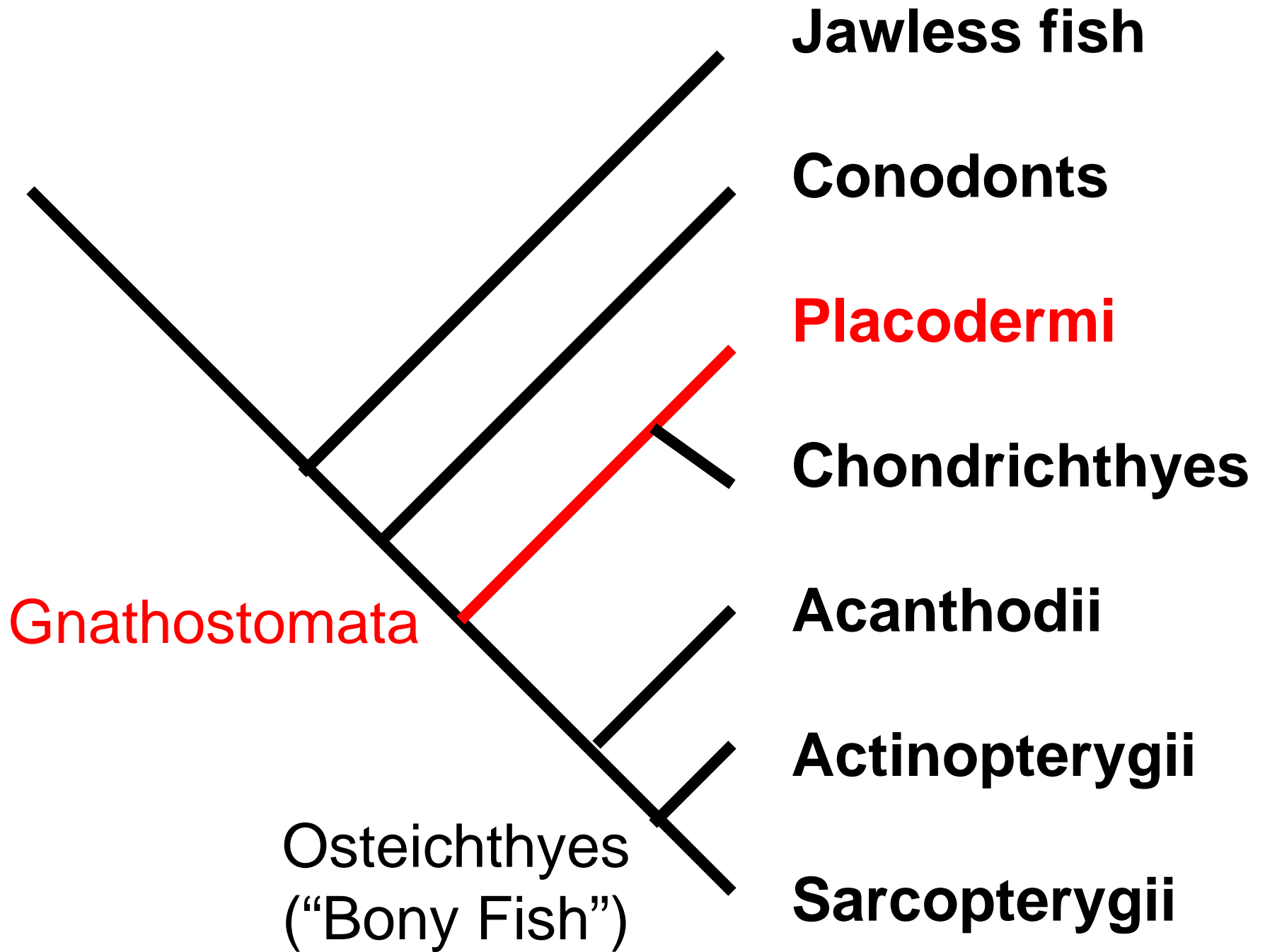
galeaspid



CONDONTS: Originally thought not to be vertebrates, but their best known components made of same material as teeth and bones (probably from neural crest material)

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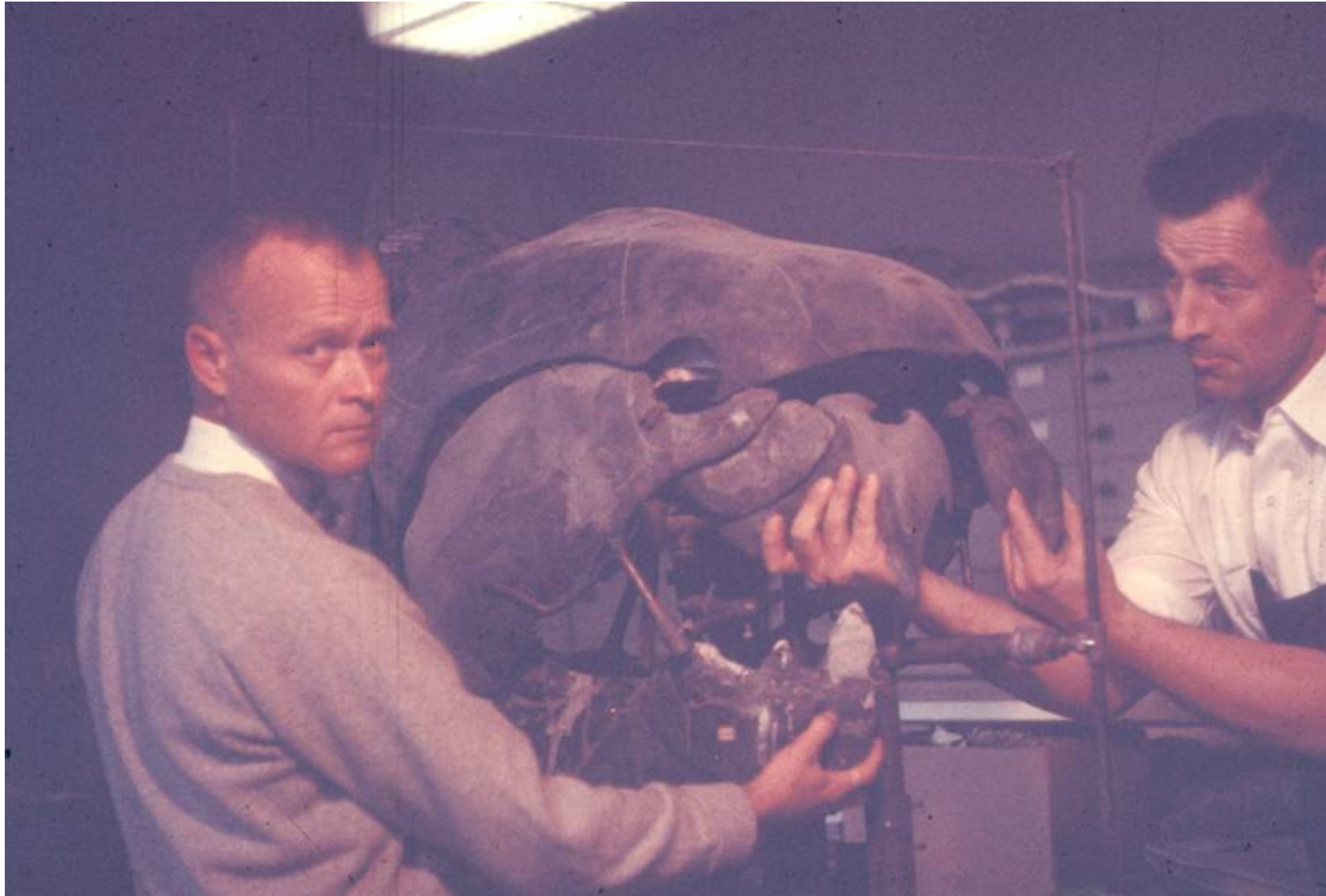
PLACODERMI

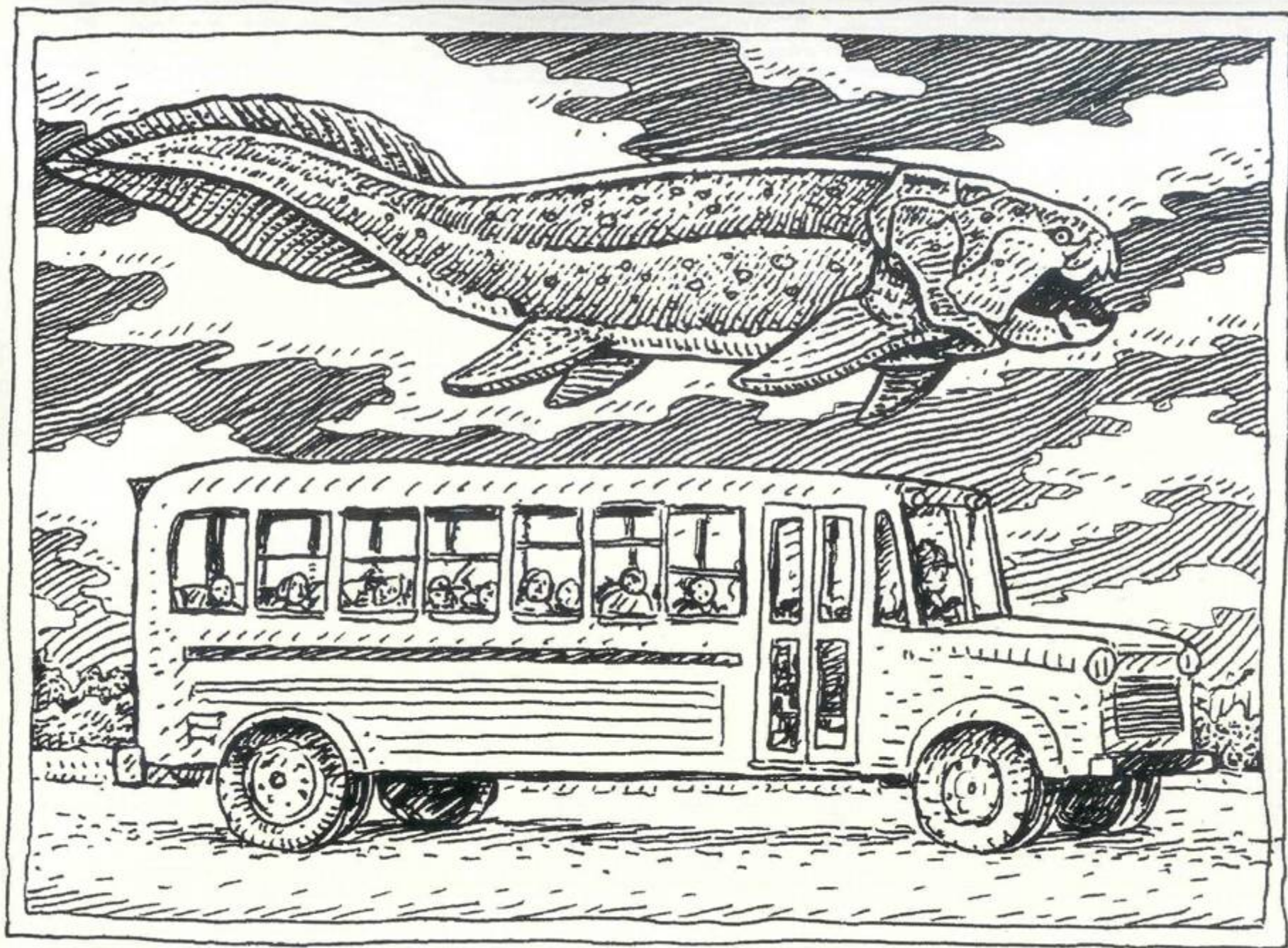
- Closest relatives of living cartilaginous fishes
- Known since Devonian
- Big cutting jaw plates, but not true teeth



PLACODERMI: Closest relatives of living cartilagenous fishes; Known since Devonian; Big cutting jaw plates, but not true teeth

Dave Dunkle and *Dunkleosteus*

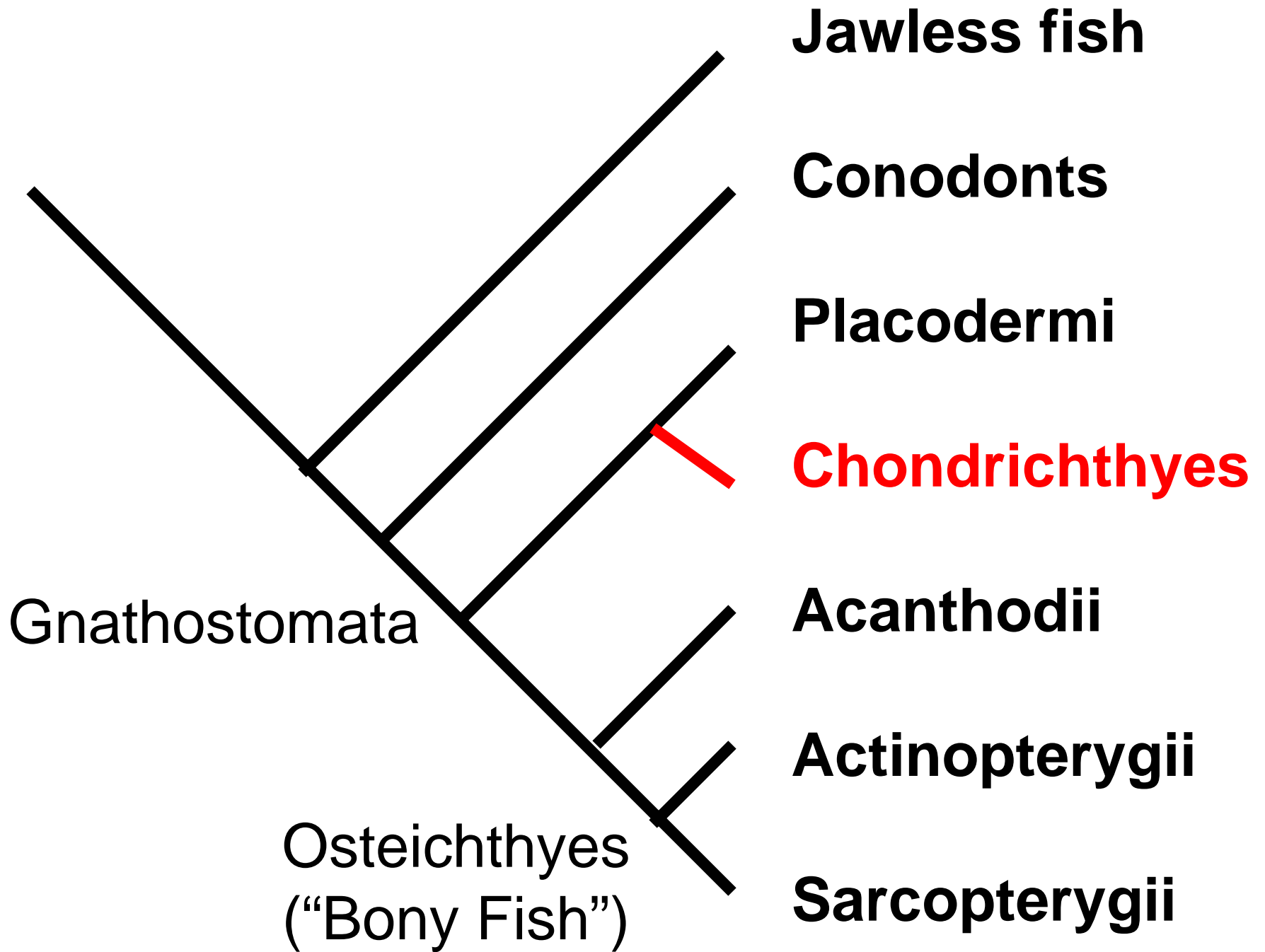




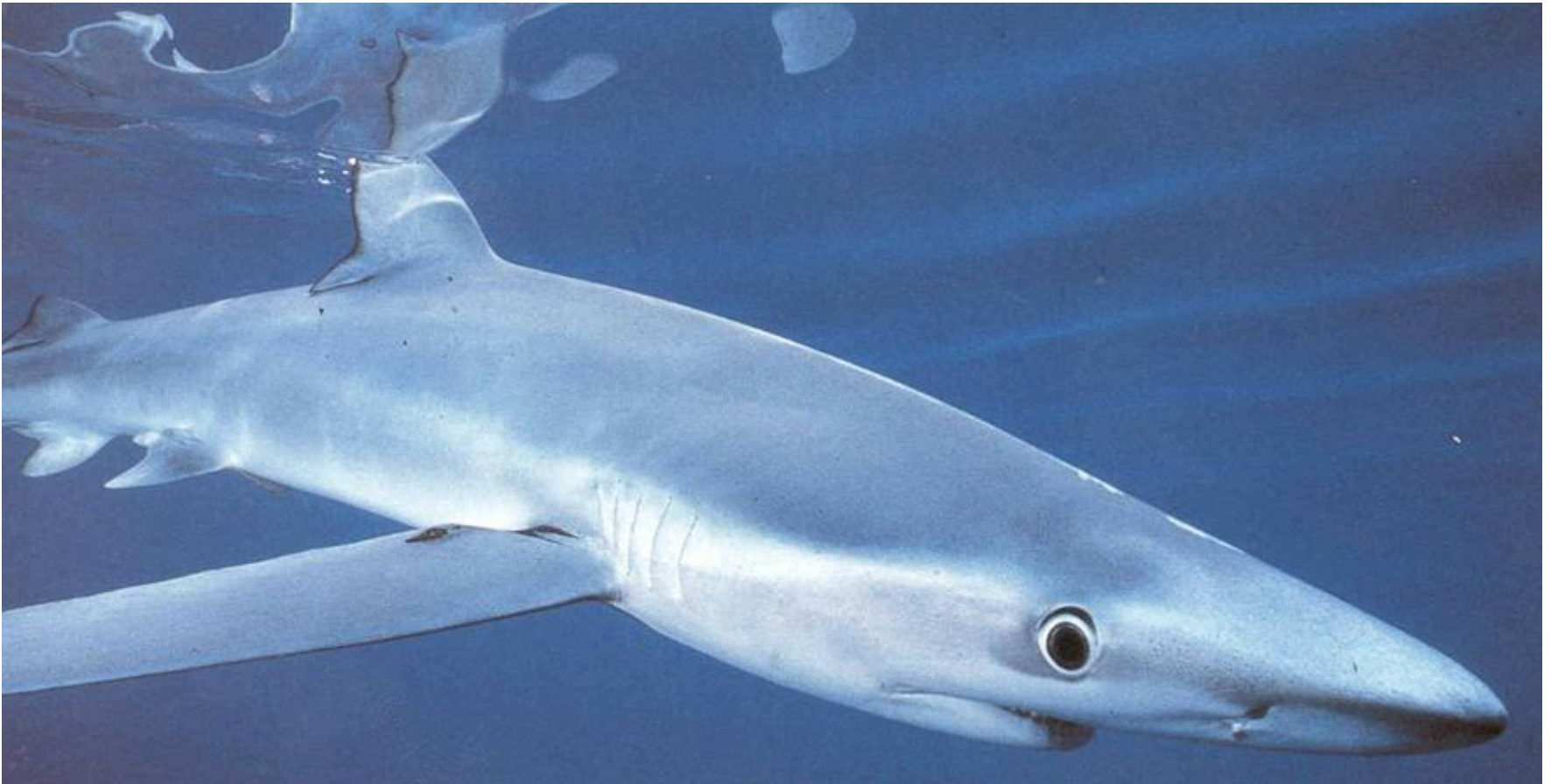
DUNKLEOSTEUS - A DEVONIAN FISH AS BIG AS A SCHOOL BUS



Bothriolepis

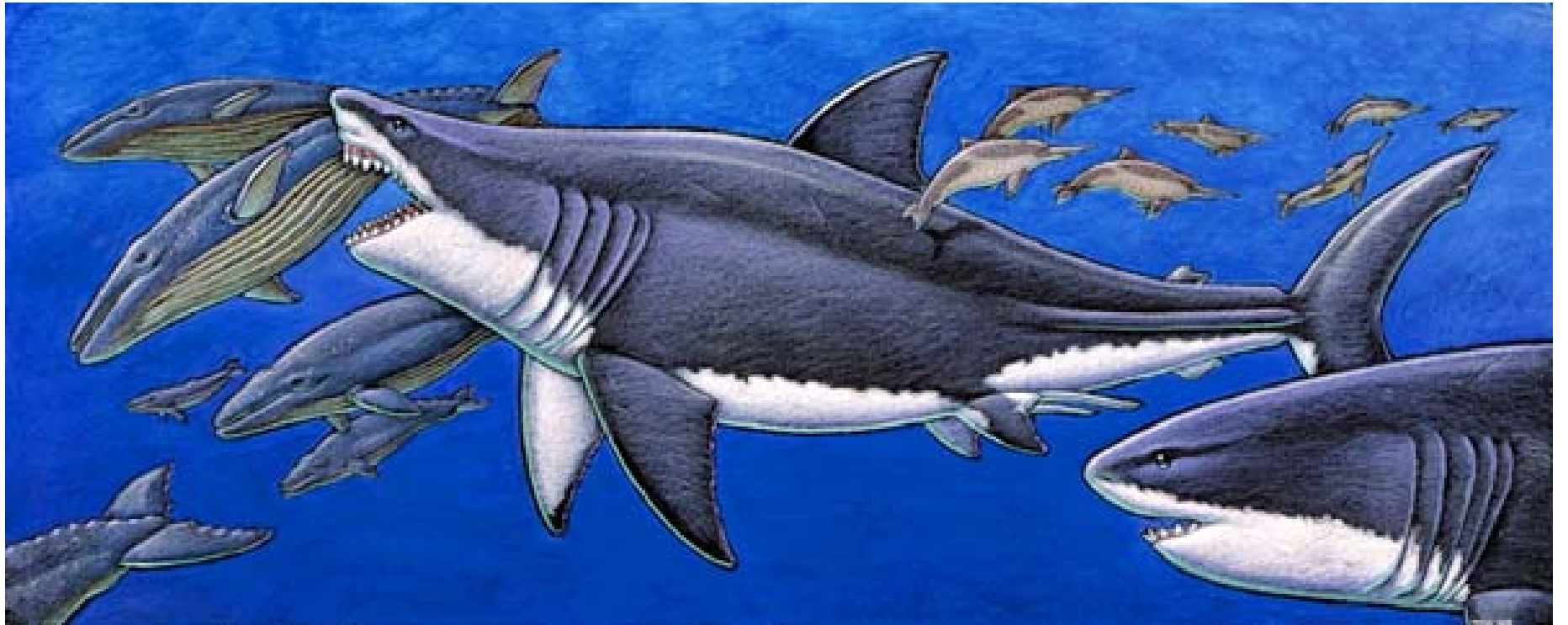


CHONDRICHTHYES: The Cartilaginous Fishes



Includes: sharks, skates and rays, holocephalians





Iniopterygians



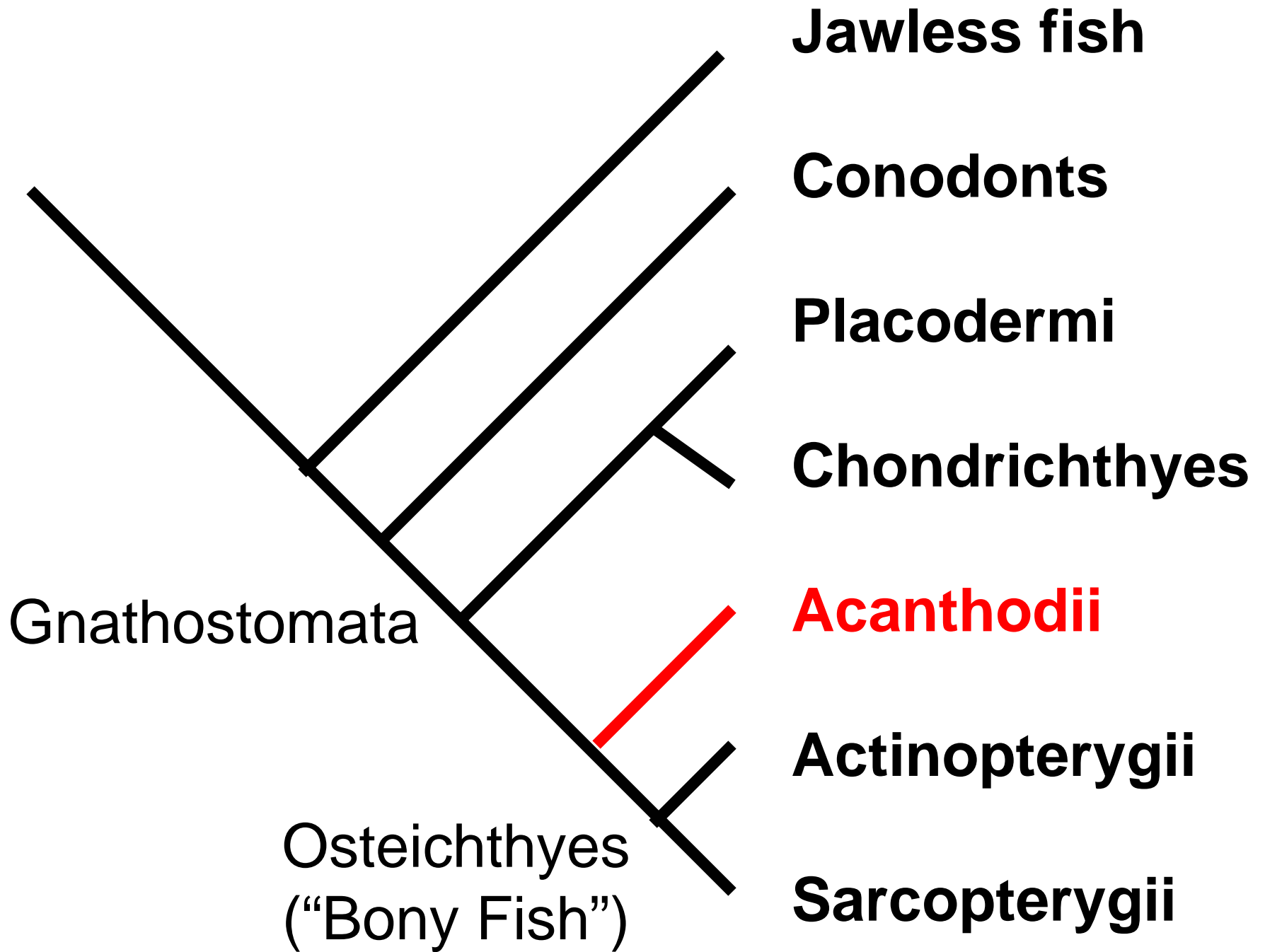
Helicoprion





A Chimera (a holocephalian)

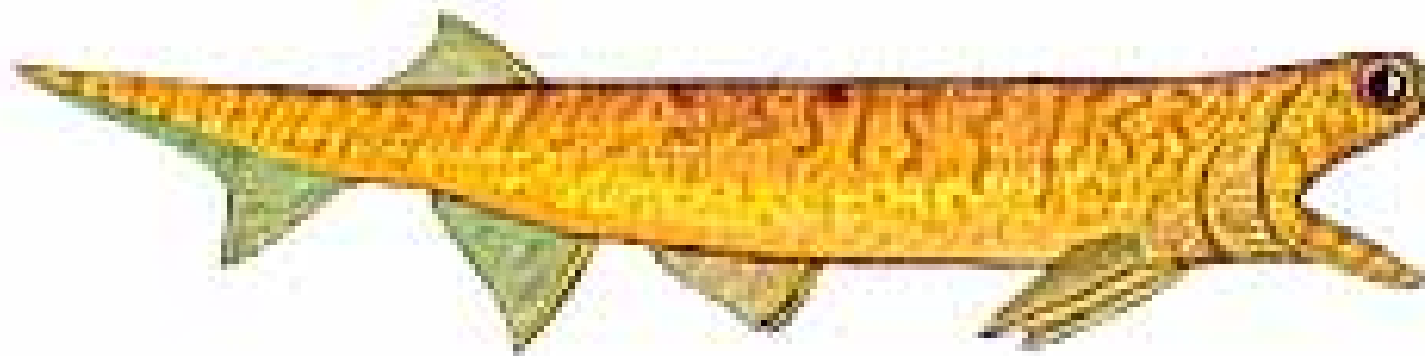


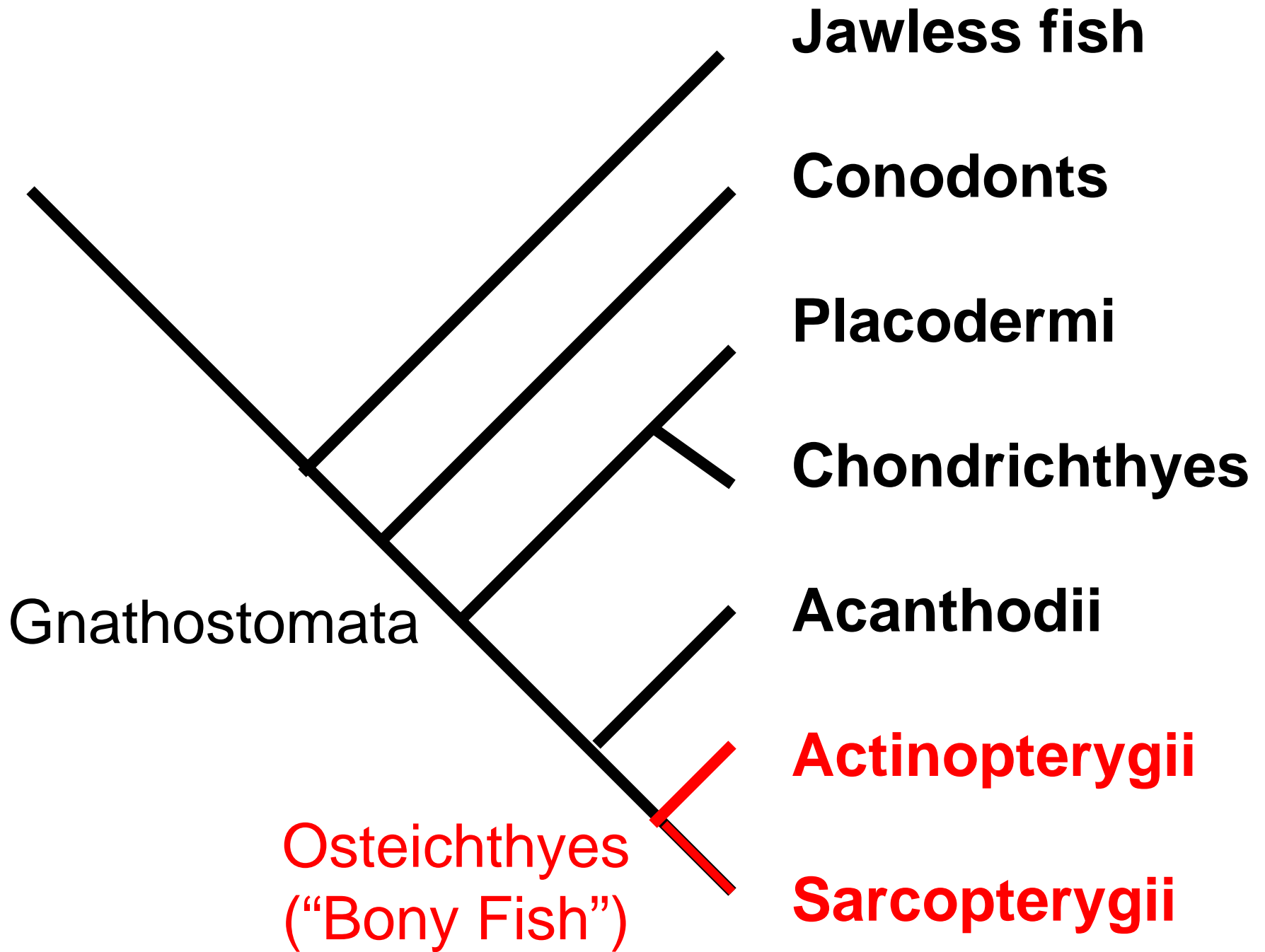


ACANTHODII

- Acanthodians are often referred to as “spiny sharks” – but not real sharks.
- Known as far back as Silurian
- Abundant until Early Permian

Howittacanthus – an acanthodian





OSTEICHTHYTES (BONY FISH)

Most diverse groups of vertebrates
Enormous diversity of sizes, shapes,
habitats.

Includes:

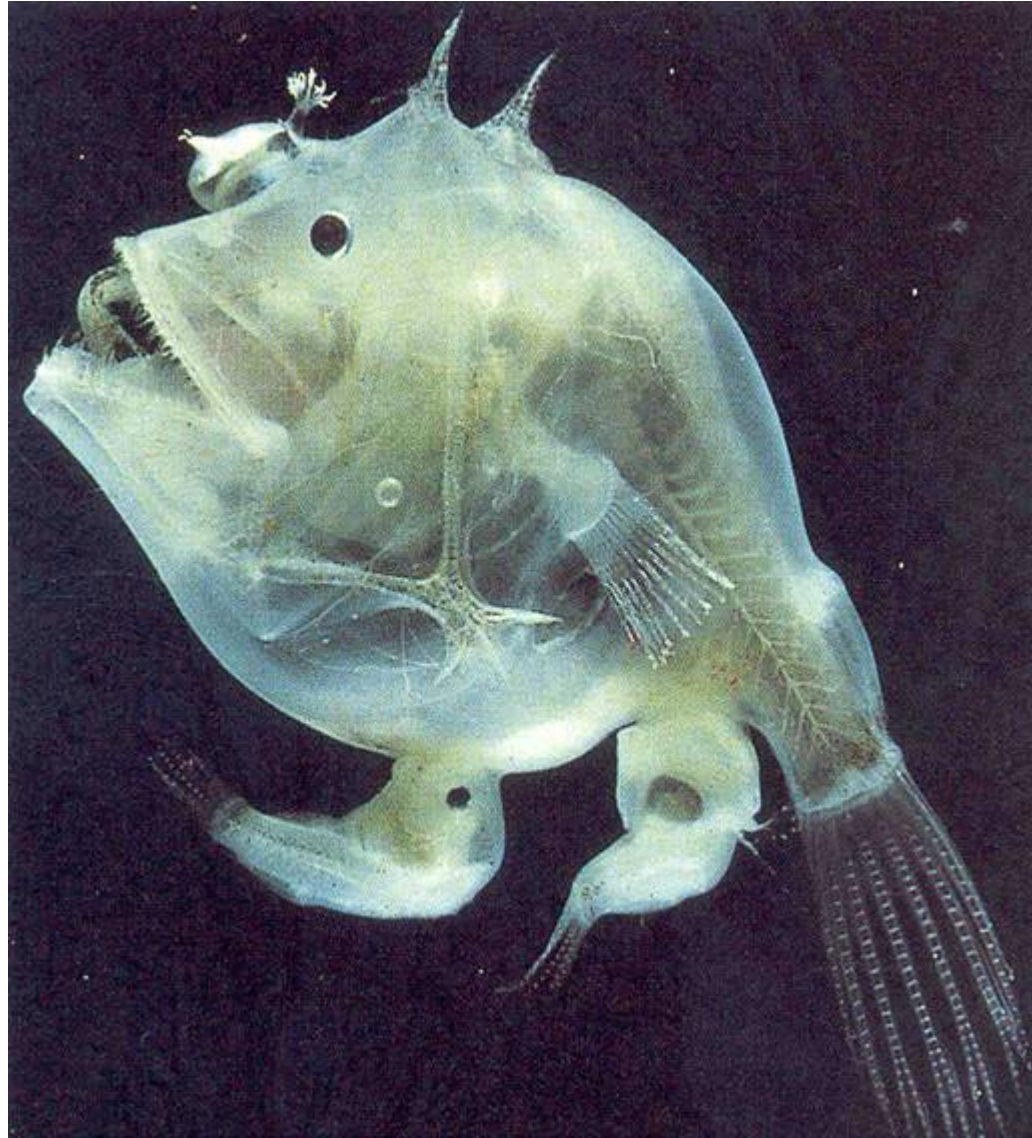
- Actinopterygii
- Sarcopterygii

(Both groups known as far back as
early Devonian)

Garibaldi: The California State Marine Fish

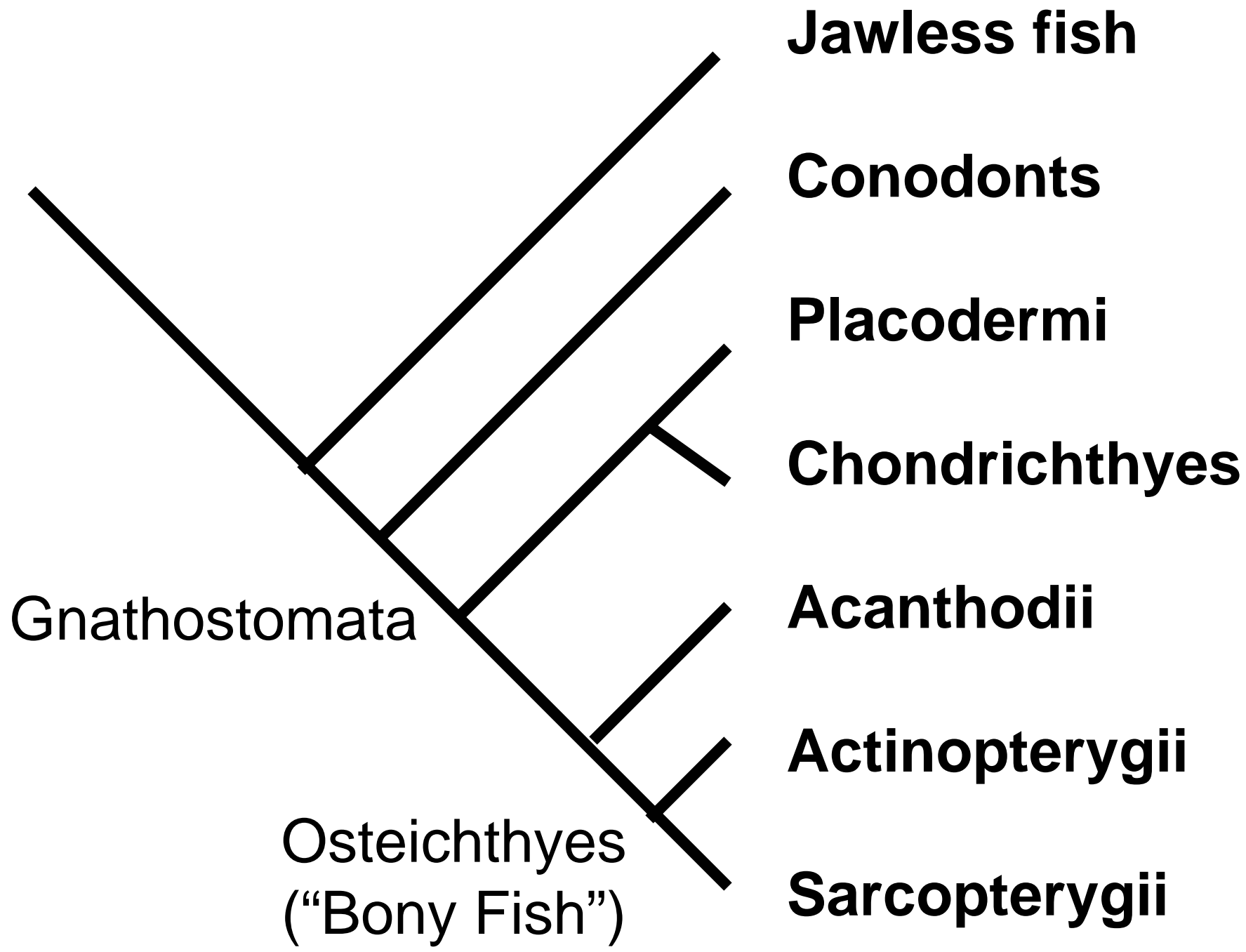












SARCOPTERYGII – THE LOBE-FINNED FISHES

Includes

- Dipnoi (lungfishes)
- Crossopterygii

Crossopterygians include “tetrapods” – 4-legged land-dwelling vertebrates.

A lungfish







Eusthenopteron

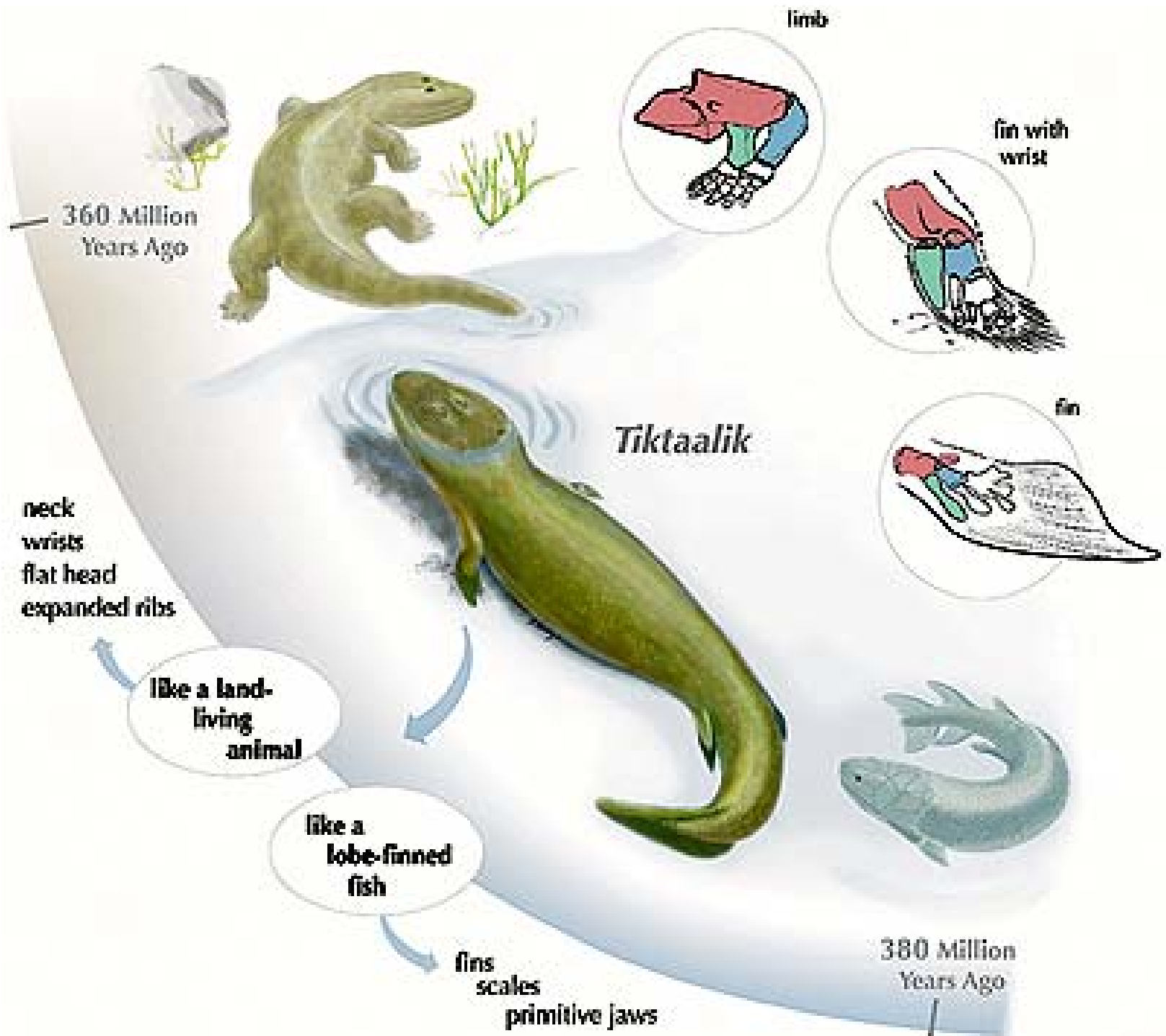


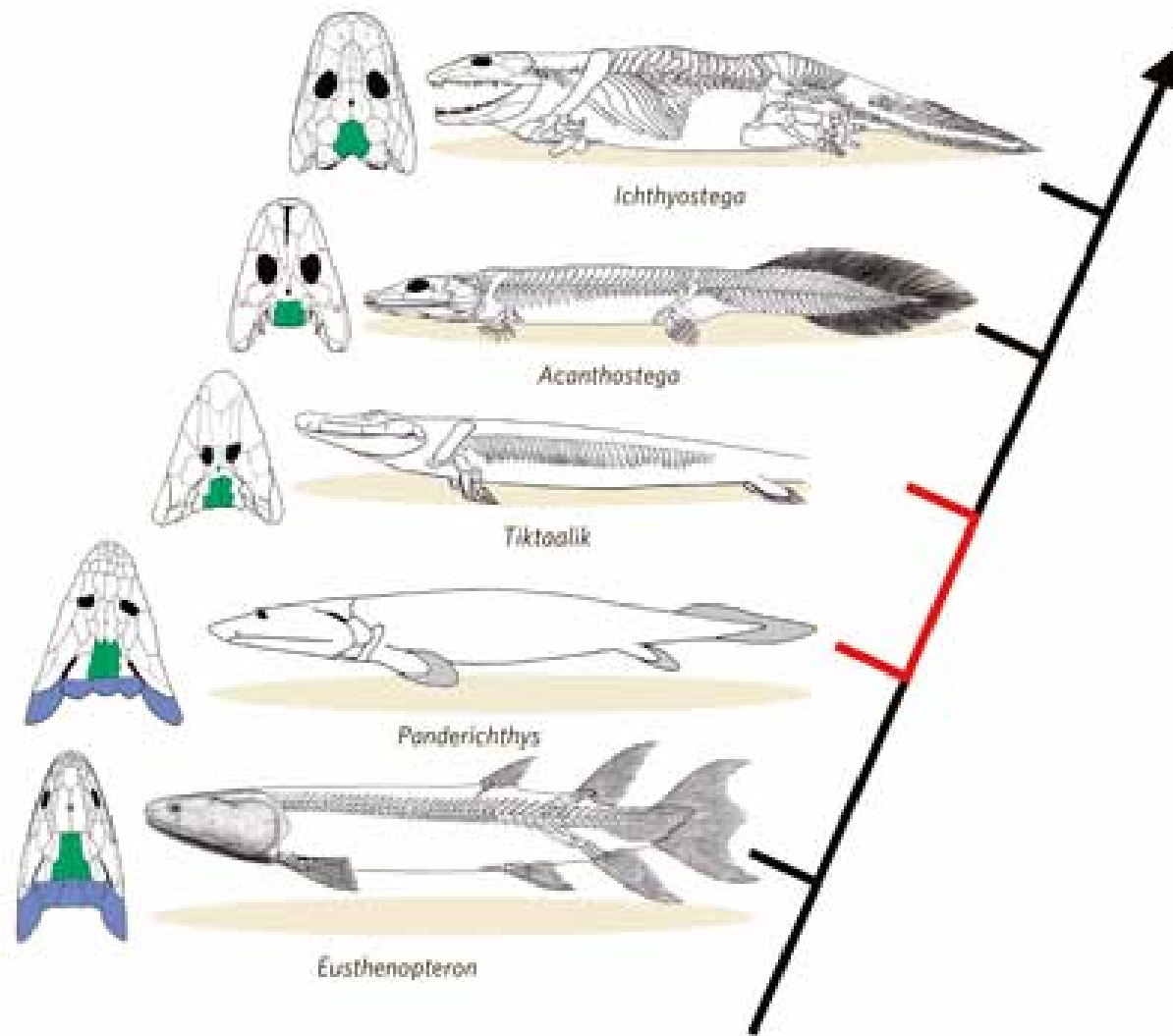
Tiktaalik roseae – a lobe-finned fish intermediate between typical sarcopterygians and basal tetrapods.



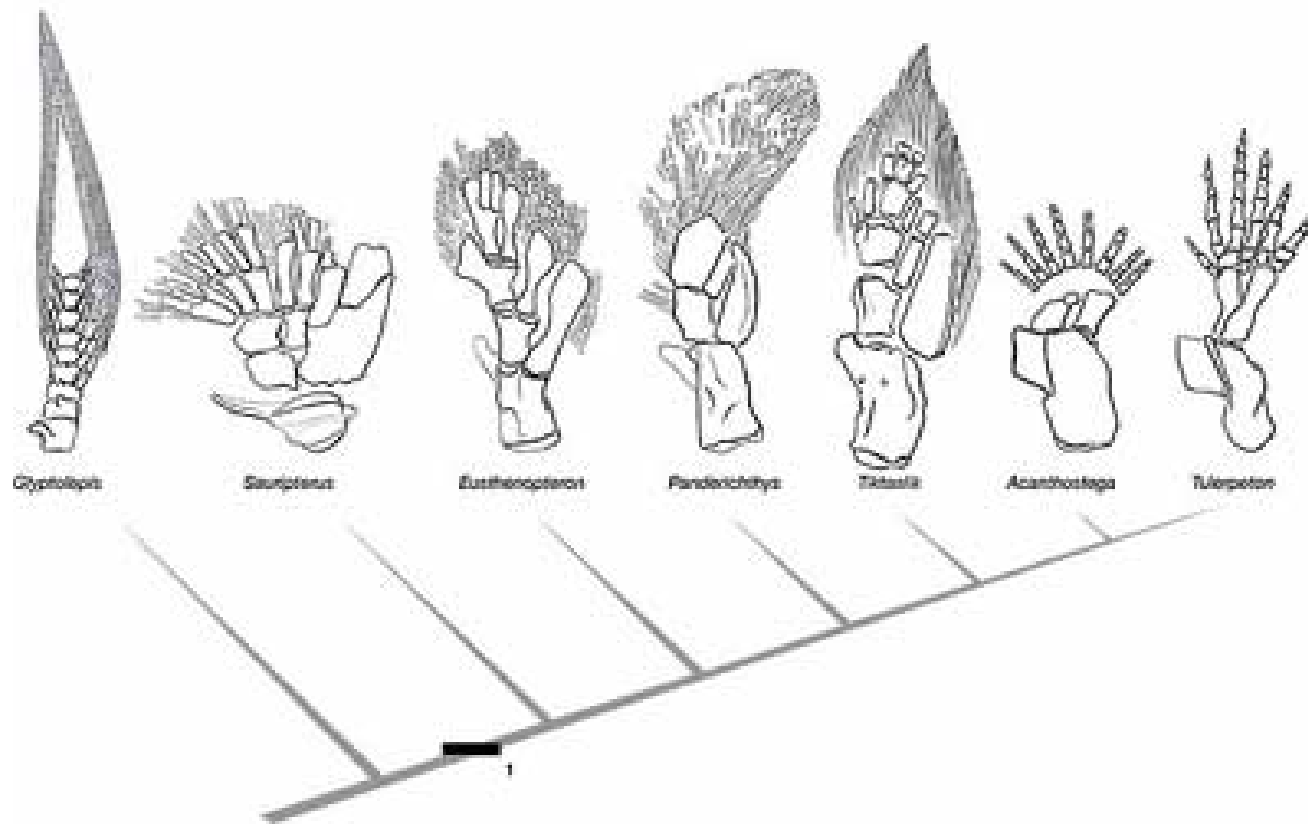
Mid to Late Devonian; 375 million years old.



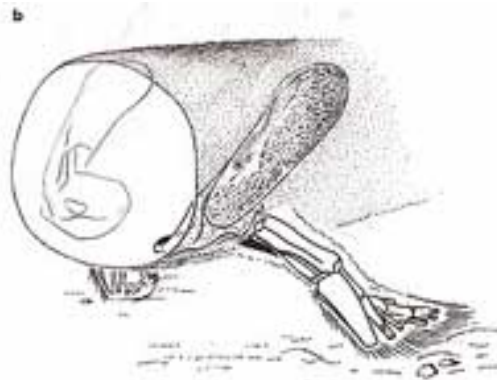
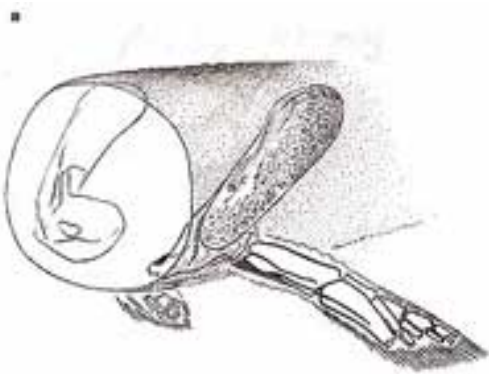
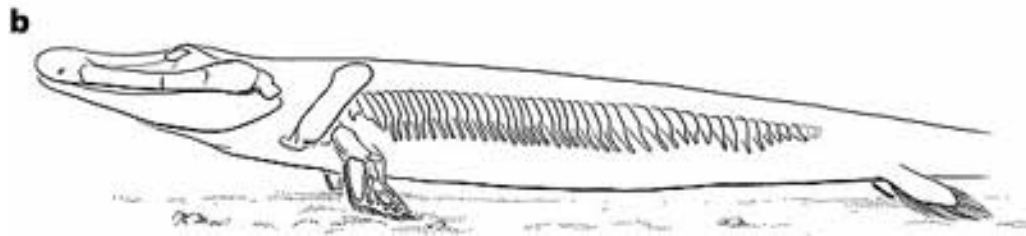
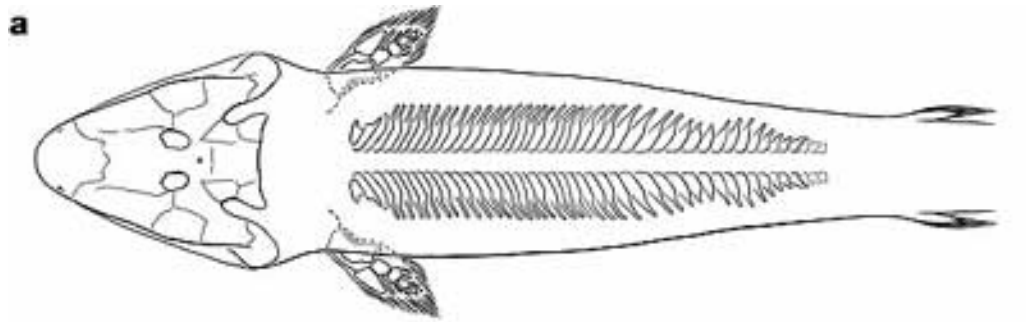




The back end of *Tiktaalik*'s skull is intermediate between fishes and tetrapods.



Tiktaalik is a fish with wrist bones, yet still retaining fin rays.



The posture of *Tiktaalik's* fin/limb is intermediate between that of fishes and tetrapods.

OUT OF THE OOZE



AND BORN TO CRUISE