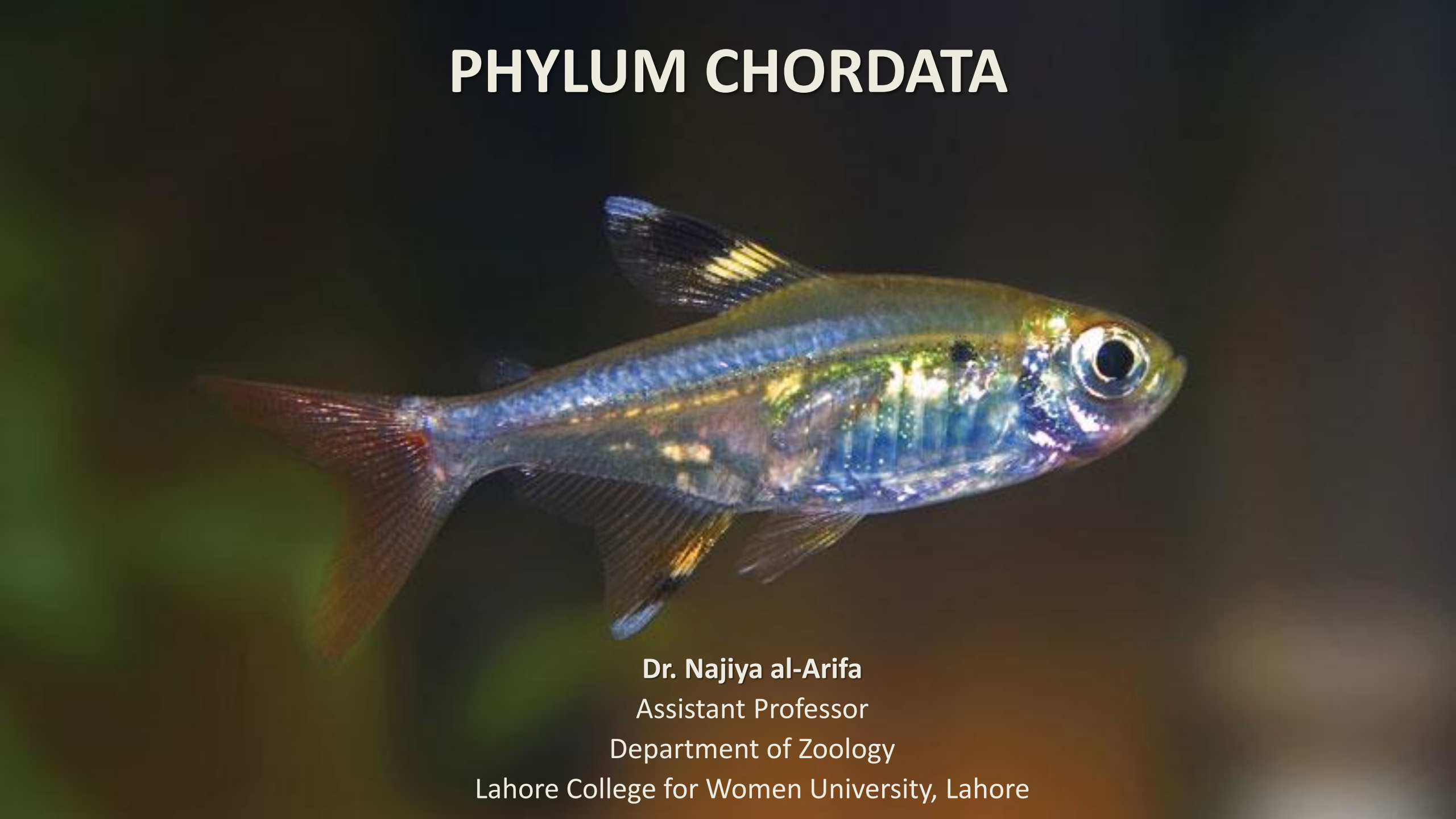
PHYLUM CHORDATA



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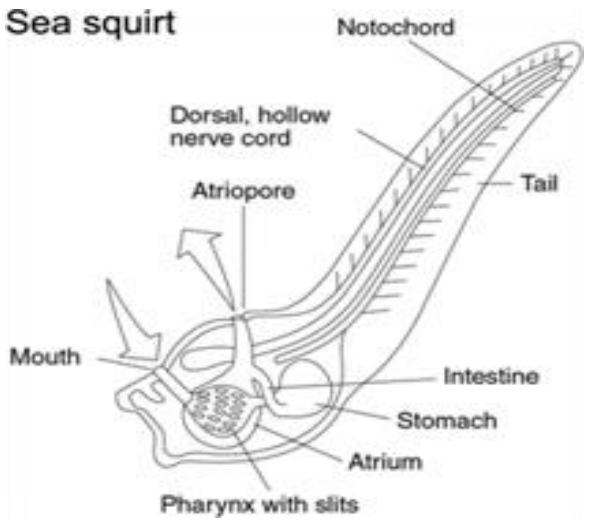
INTRODUCTION

- Phylum Chordata has about 45,000 species
- Hemichordates and chordates are distantly related deuterostomes derived from a common, as yet undiscovered, diploblastic or triploblastic ancestor
- Its members have been very successful at adapting to aquatic and terrestrial environments throughout the world
- Members of the phylum chordata are
  - Sea squirts
  - Subphylum Urochordata
  - Subphylum Cephalochordata (lancelets)
  - Vertebrates



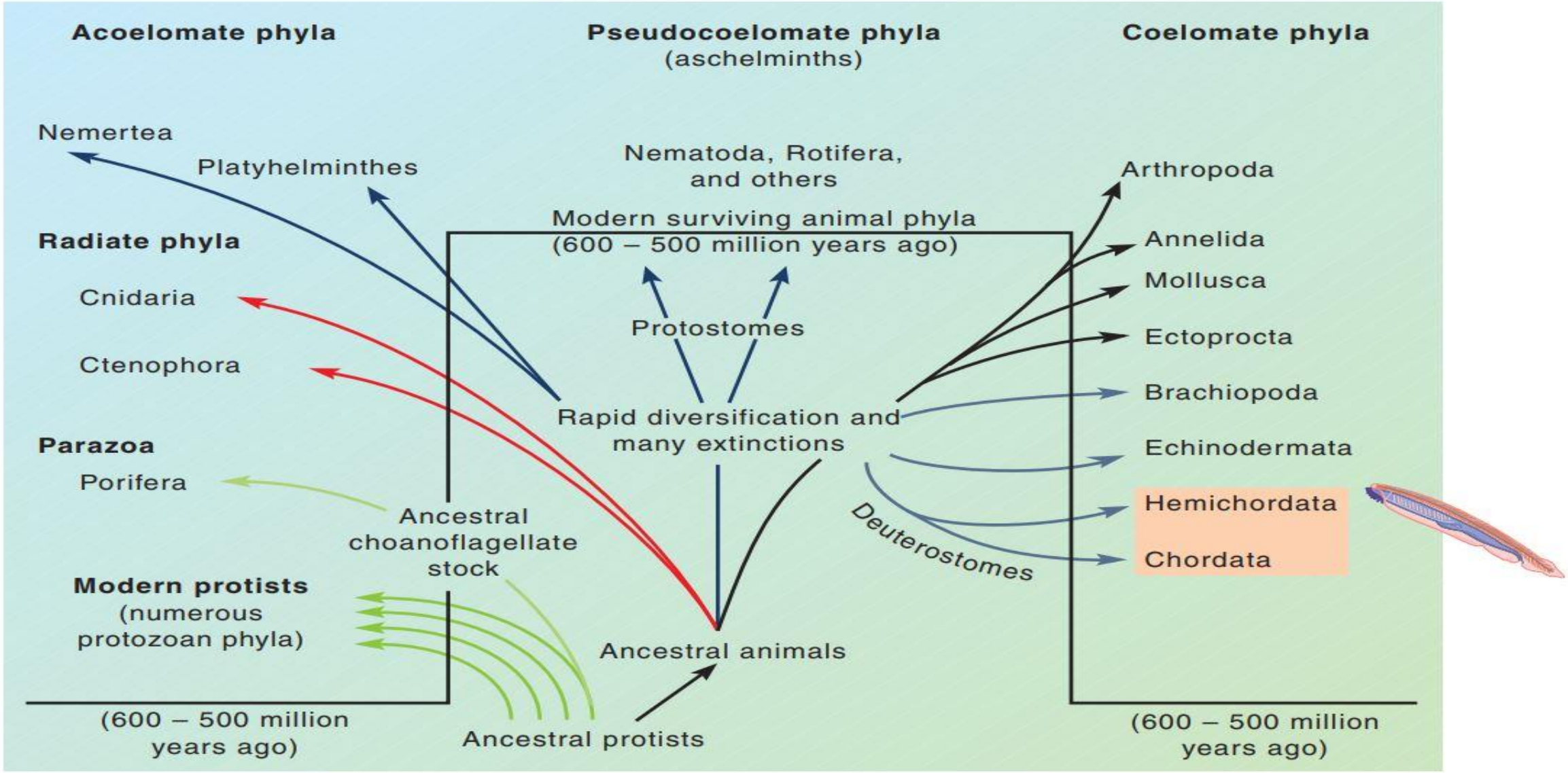


Figure 1: Phylogenetic Relationships among the Hemichordata and Chordata

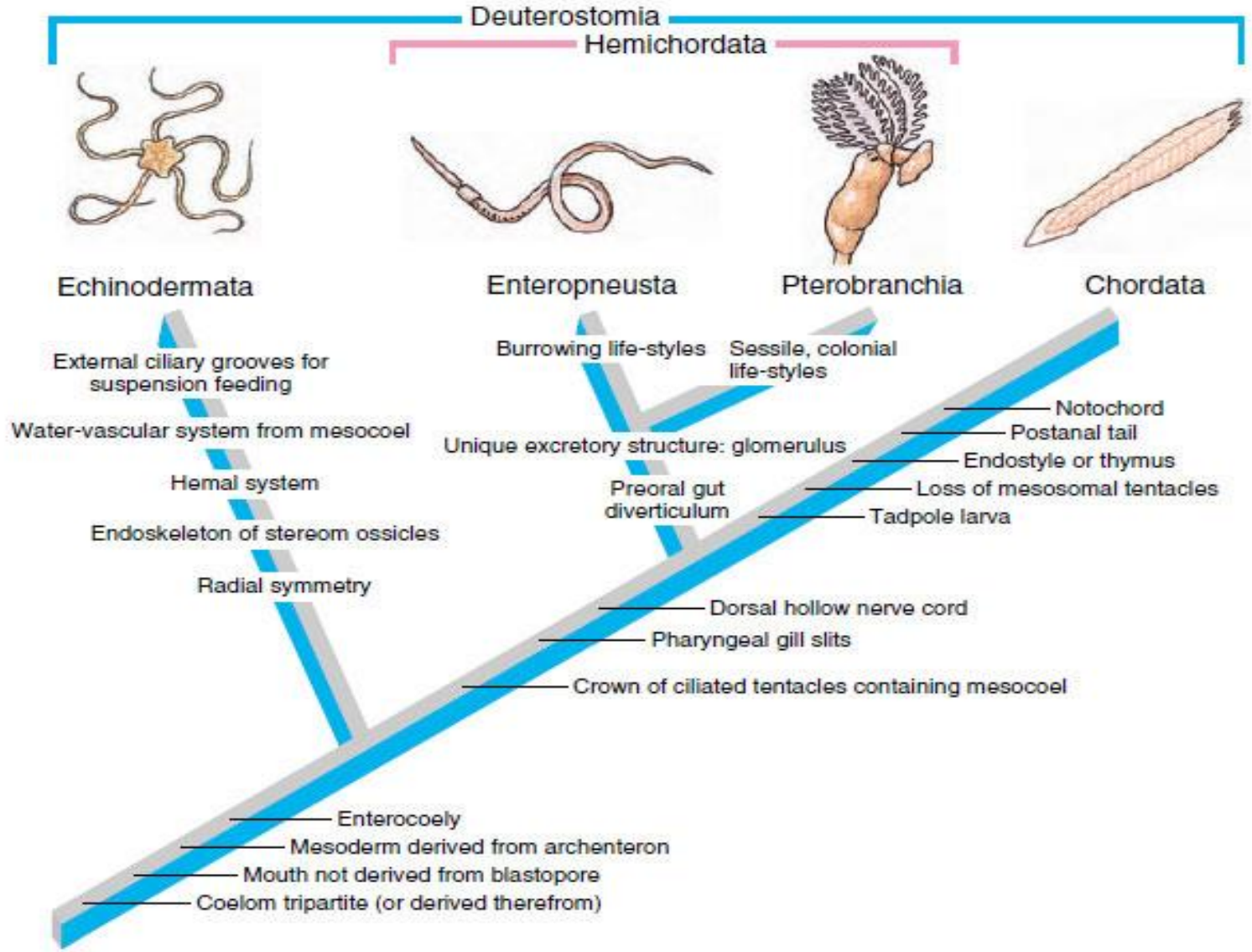


Figure 2: Cladogram showing hypothetical relationships among deuterostome phyla

CHARACTERISTICS

- Deuterostomate animals
- Bilaterally symmetrical
- Presence of nerve cord, and post-anal tail
- Presence of an endostyle or thyroid gland
- Complete digestive tract
- Ventral, contractile blood vessel (heart)

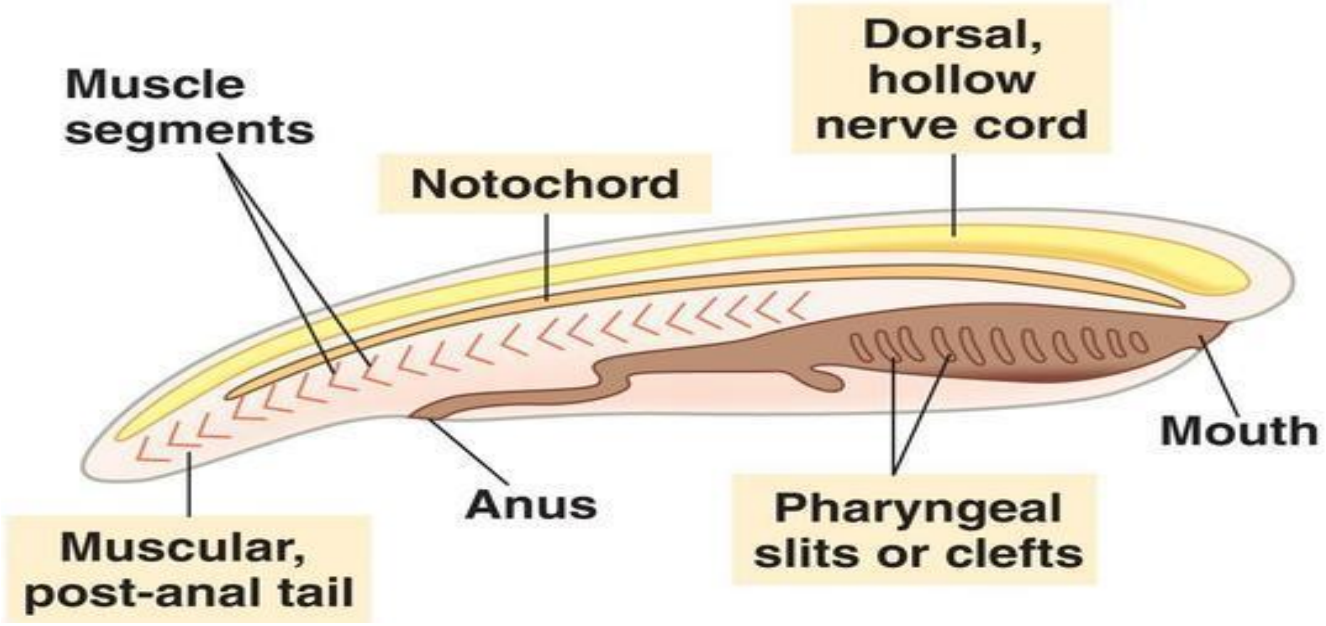
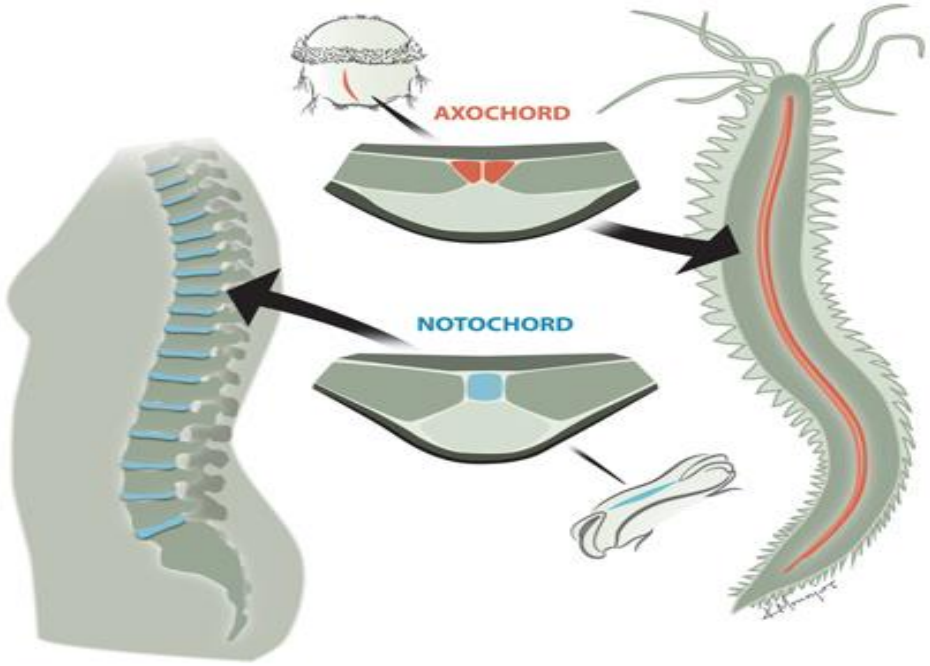


Figure 3: The glass catfish (*Kryptopterus vitreolus*)

UNIQUE CHARACTERISTICS

- Following four unique characteristics are present at some stage in the chordate development
  - Notochord
  - Pharyngeal slits or pouches
  - Dorsal tubular nerve cord
  - Post-anal Tail



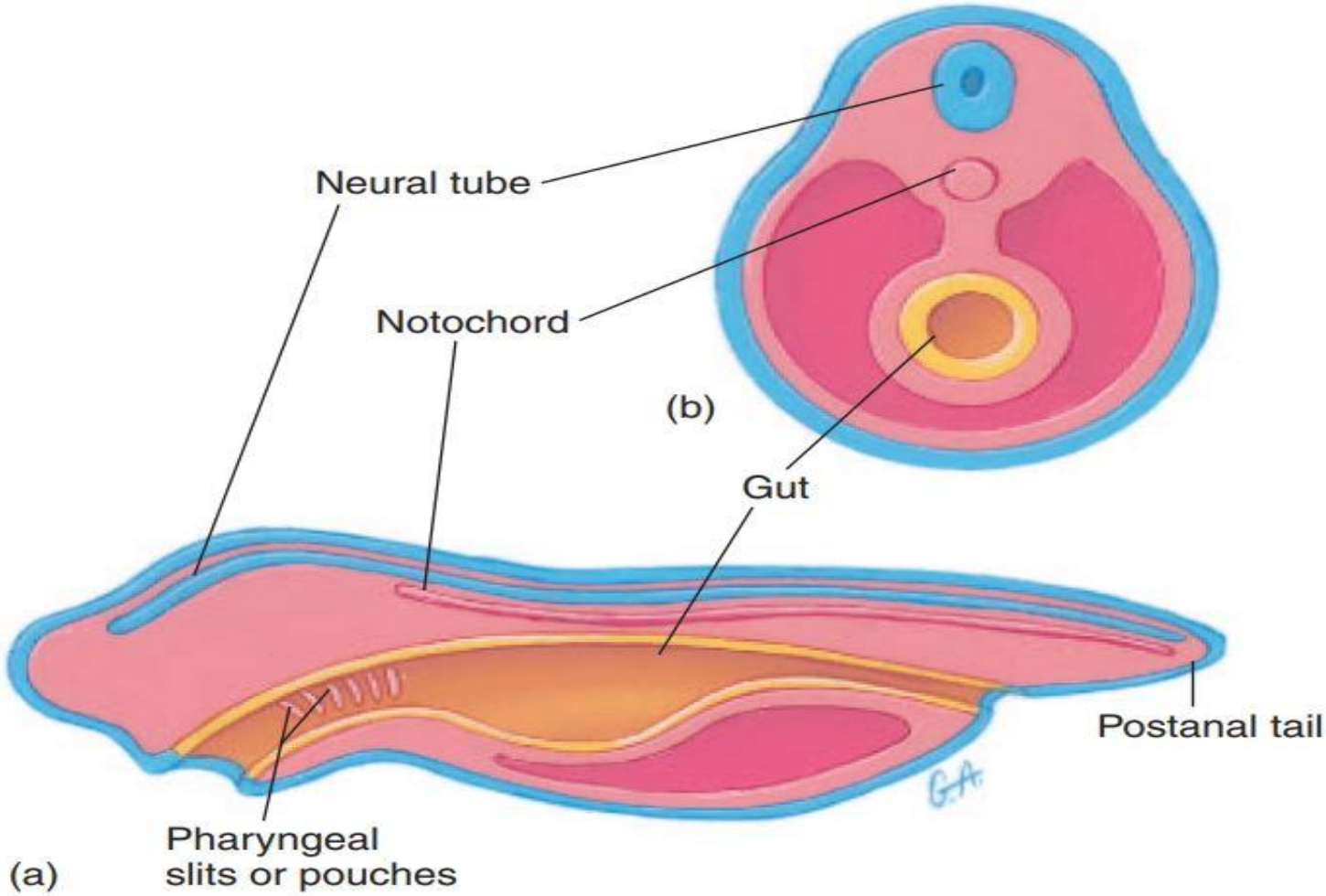


Figure 4: Chordate Body Plan. The development of all chordates involves the formation of a neural tube, the notochord, pharyngeal slits or pouches, and a post-anal tail. Derivatives of all three primary germ layers are present (a) Lateral view (b) Cross section

NOTOCHORD

- The phylum is named after the notochord
- Notochord is a supportive rod that extends most of the length of the animal dorsal to the body cavity and into the tail
- It consists of a connective-tissue sheath that encloses cells, each of
- which contains a large, fluid-filled vacuole
- This arrangement gives the notochord some turgidity, which prevents compression along the anteroposterior axis
- At the same time, the notochord is flexible enough to allow lateral bending, as in the lateral undulations of a fish during swimming
- In most adult vertebrates, cartilage or bone partly or entirely replaces the notochord

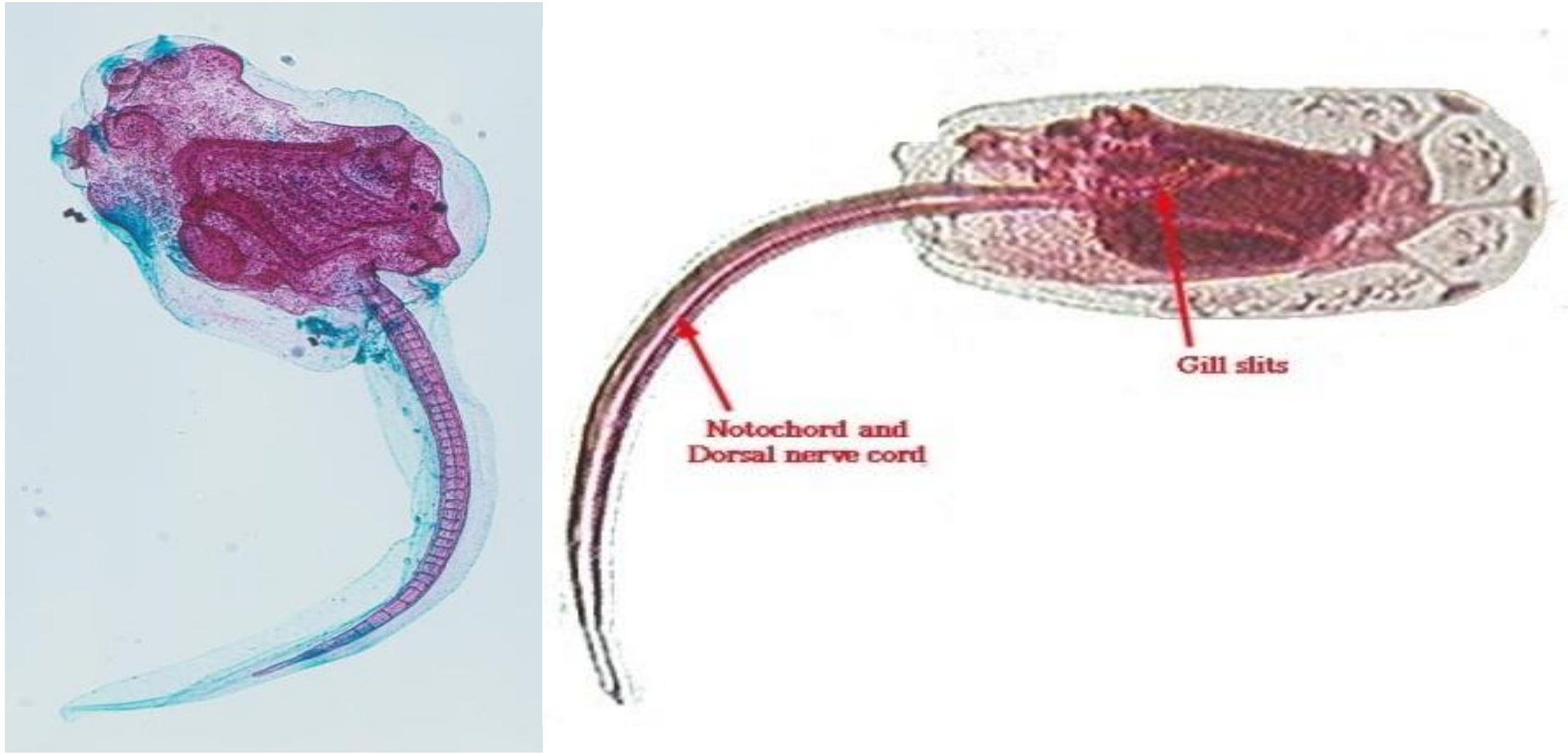


Figure 5: Notochord in Tunicate larva

PHARYNGEAL SLITS

- Pharyngeal slits are a series of openings in the pharyngeal region between the digestive tract and the outside of the body
- In some chordates, diverticula from the gut in the pharyngeal region never break through to form an open passageway to the outside
- These diverticula are then called pharyngeal pouches
- The earliest chordates used the slits for filter feeding; some living chordates still use them for feeding
- Other chordates have developed gills in the pharyngeal pouches for gas exchange
- The pharyngeal slits of terrestrial vertebrates are mainly embryonic features and may be incomplete

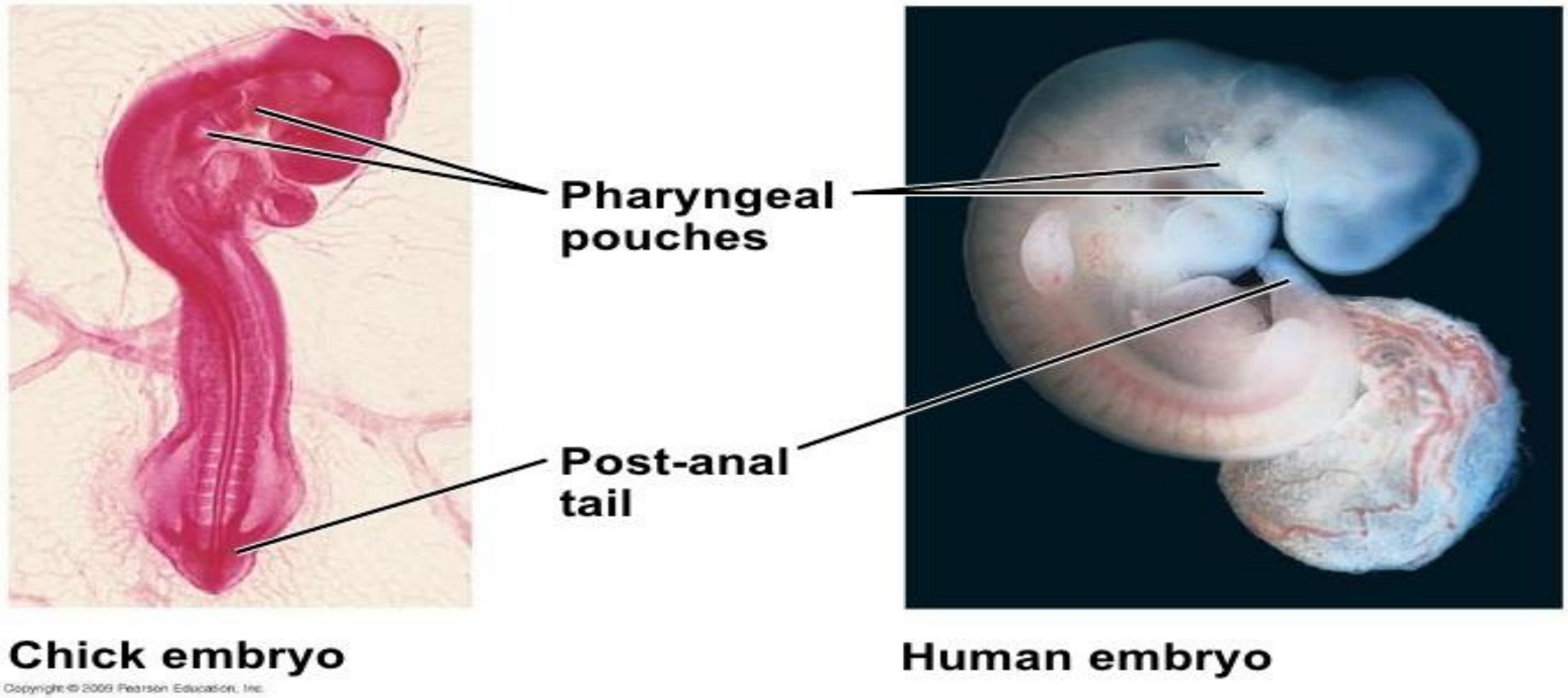


Figure 6: Pharyngeal pouches in Chick and Human embryos

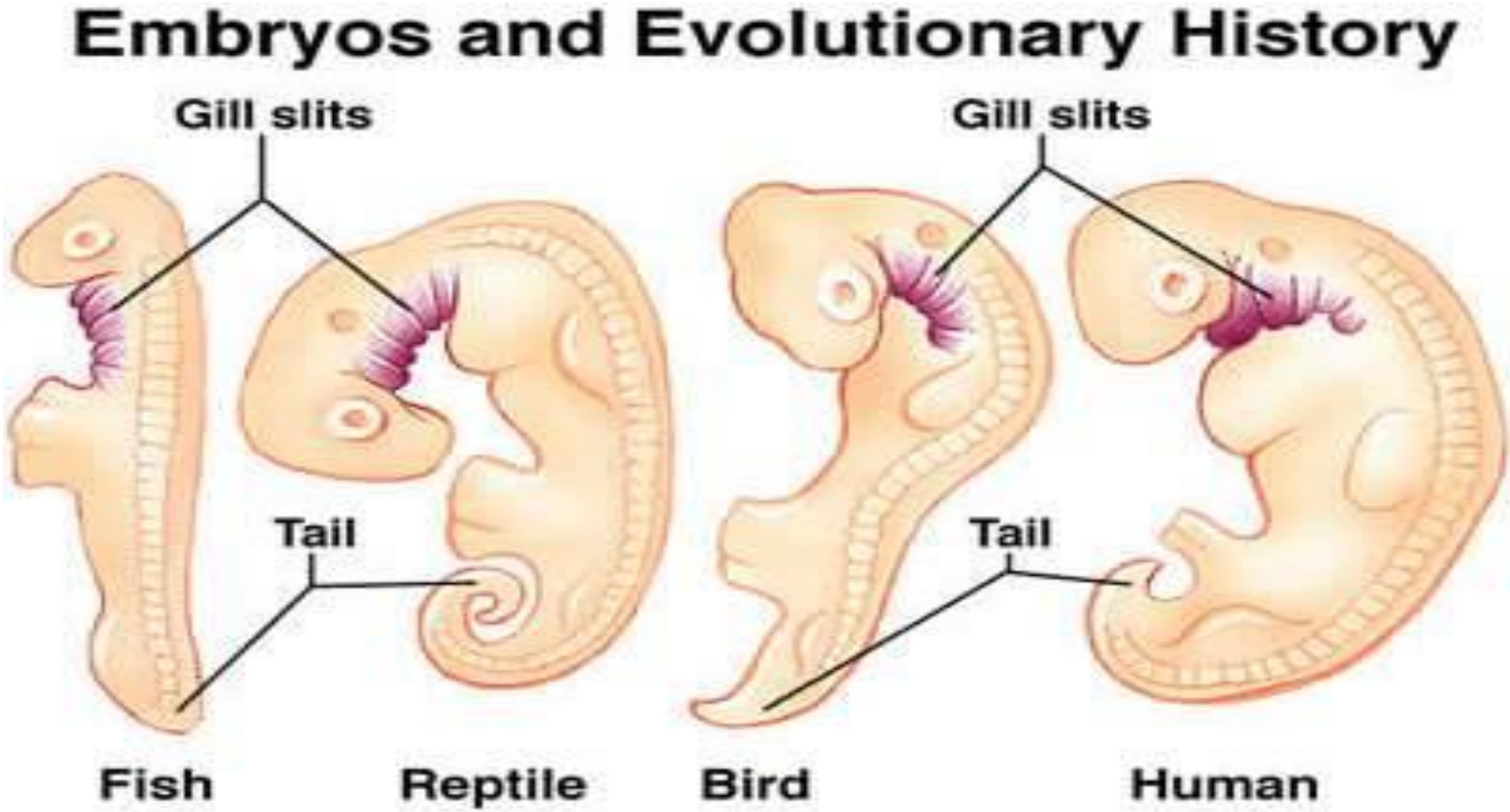


Figure 7: Gill slits and post-anal tail in Fish, Reptile, Bird and Human embryos

NERVE CORD

- The tubular nerve cord and its associated structures are largely responsible for chordate success
- The nerve cord runs along the longitudinal axis of the body, just dorsal to the notochord, and usually expands anteriorly as a brain
- This central nervous system is associated with the development of complex systems for sensory perception, integration, and motor responses

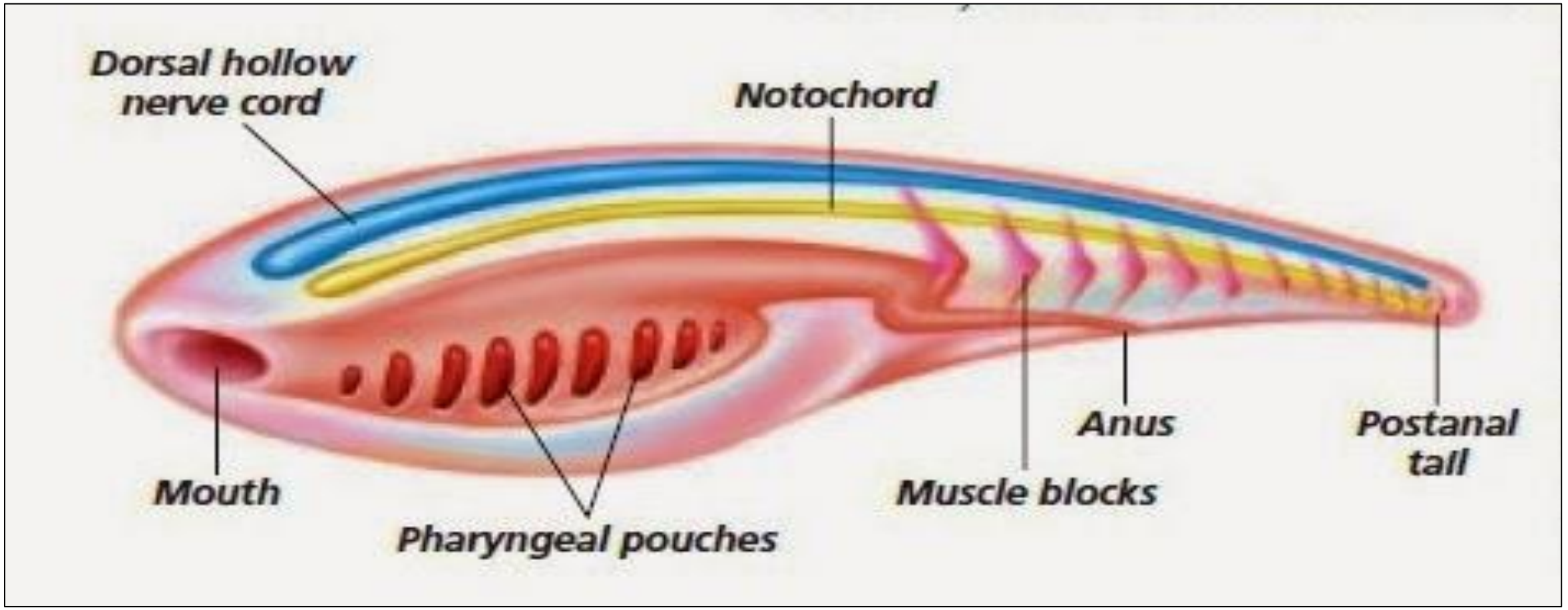


Figure 8: General body plan of a Chordate showing all unique characteristics

Links

- PHYLUM – CHORDATA
- https://youtu.be/yT5iR32Sq90

- Phylum Chordata-Which animals belong?
- https://youtu.be/BJikuVZL8BE

- Chordates CrashCourse Biology #24
- https://youtu.be/Lmz49LHrcgg


The End