

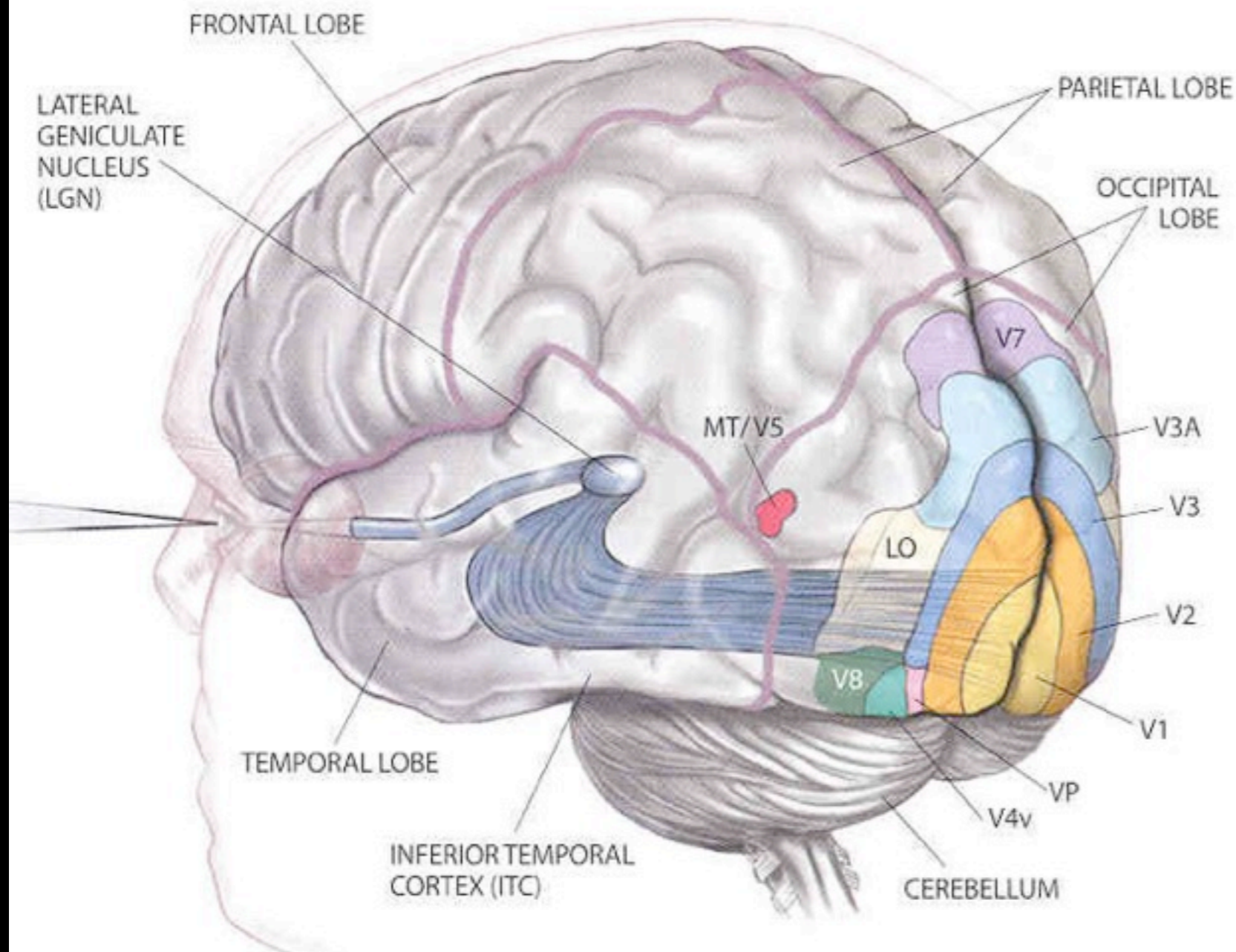
THE ANATOMICAL RECORD (NEW ANAT.) 261:111-125, 2000

FEATURE ARTICLE

Chordate Evolution and the Origin of Craniates: An Old Brain in a New Head

ANN B.BUTLER*





KEY TO FUNCTION

- V1:** Primary visual cortex; receives all visual input. Begins processing of color, motion and shape. Cells in this area have the smallest receptive fields.

- V2,** **V3** and **VP:** Continue processing; cells of each area have progressively larger receptive fields.

- V3A:** Biased for perceiving motion.

- V4v:** Function unknown.

- MT/V5:** Detects motion.

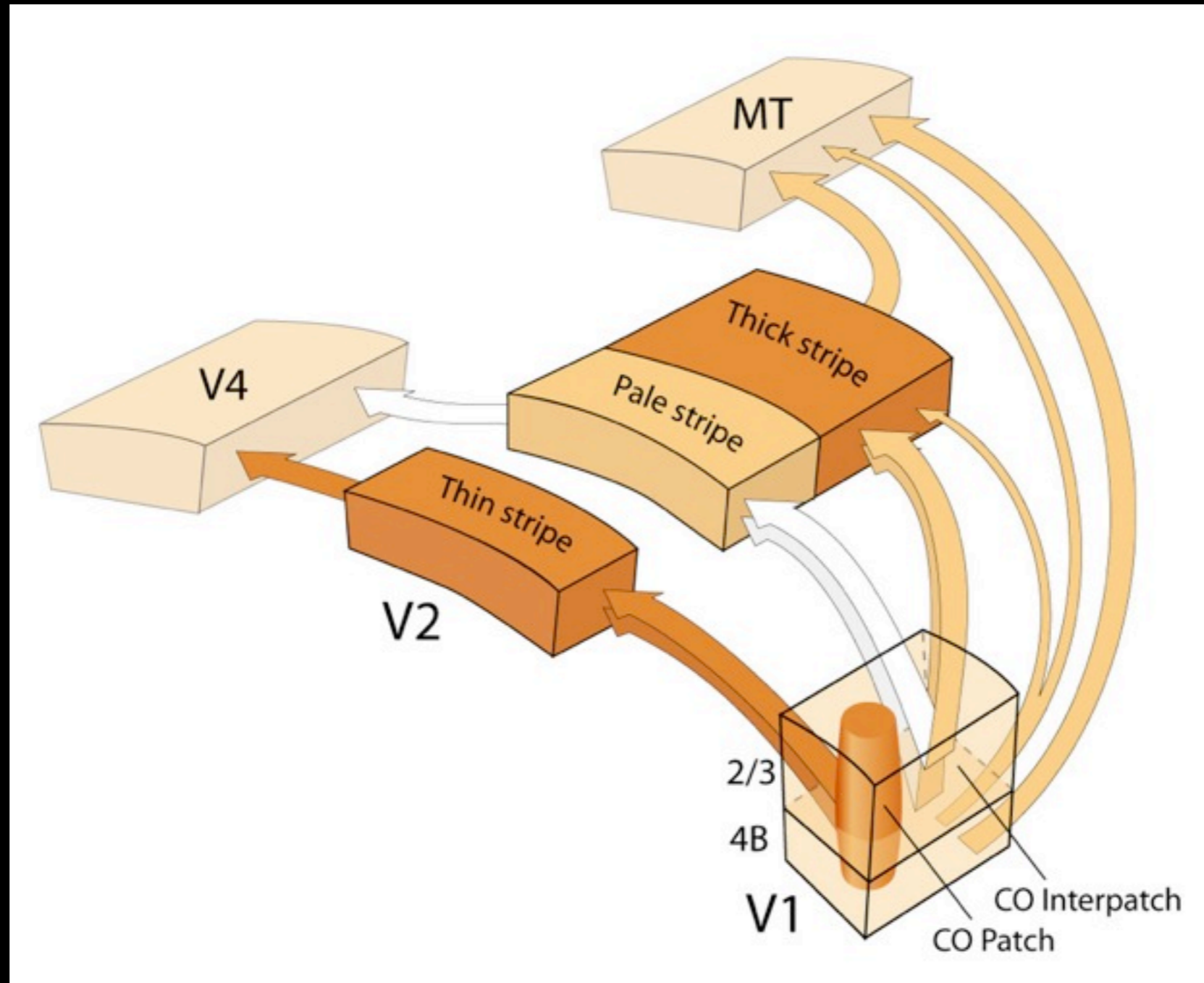
- V7:** Function unknown.

- V8:** Processes color vision.

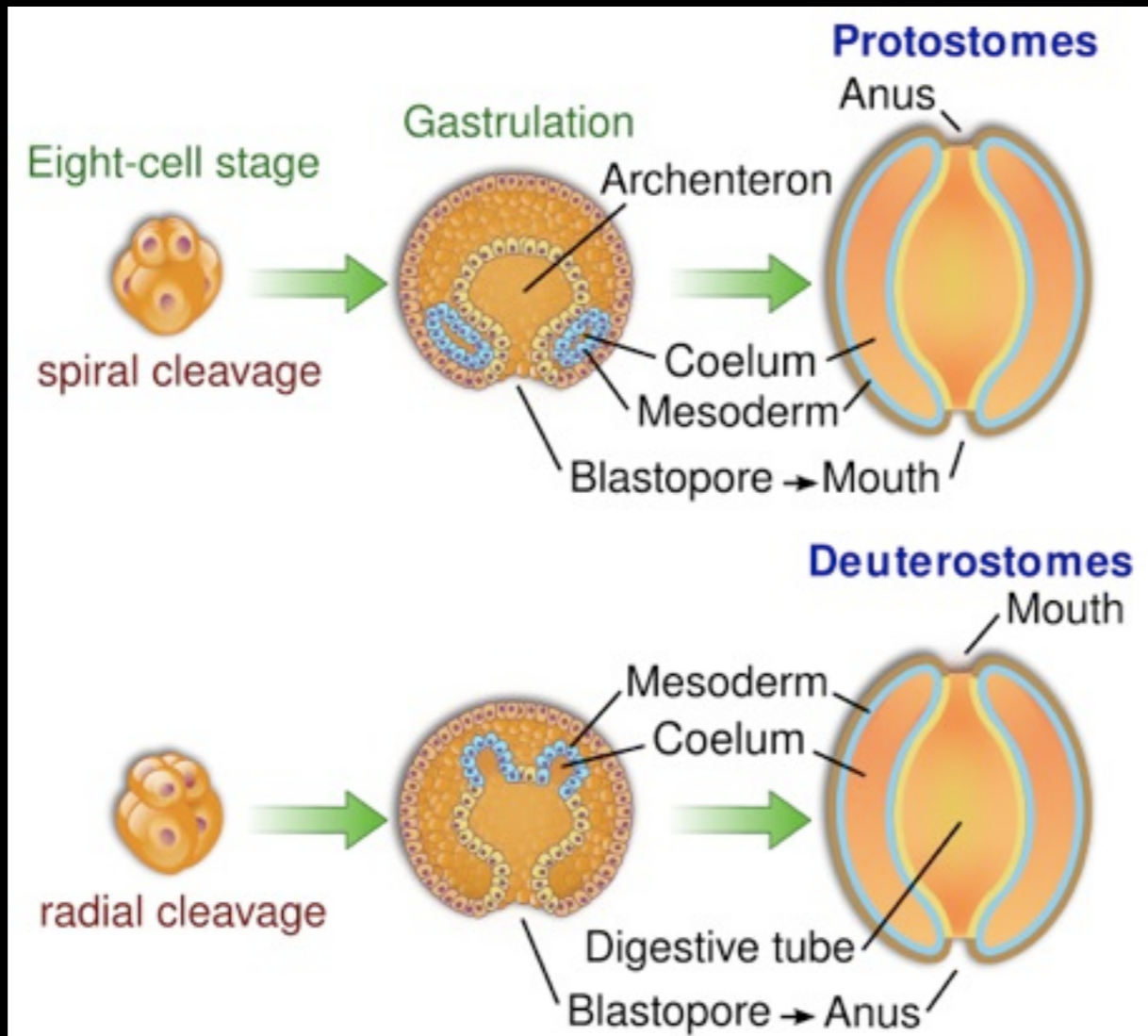
- LO:** Plays a role in recognizing large-scale objects.

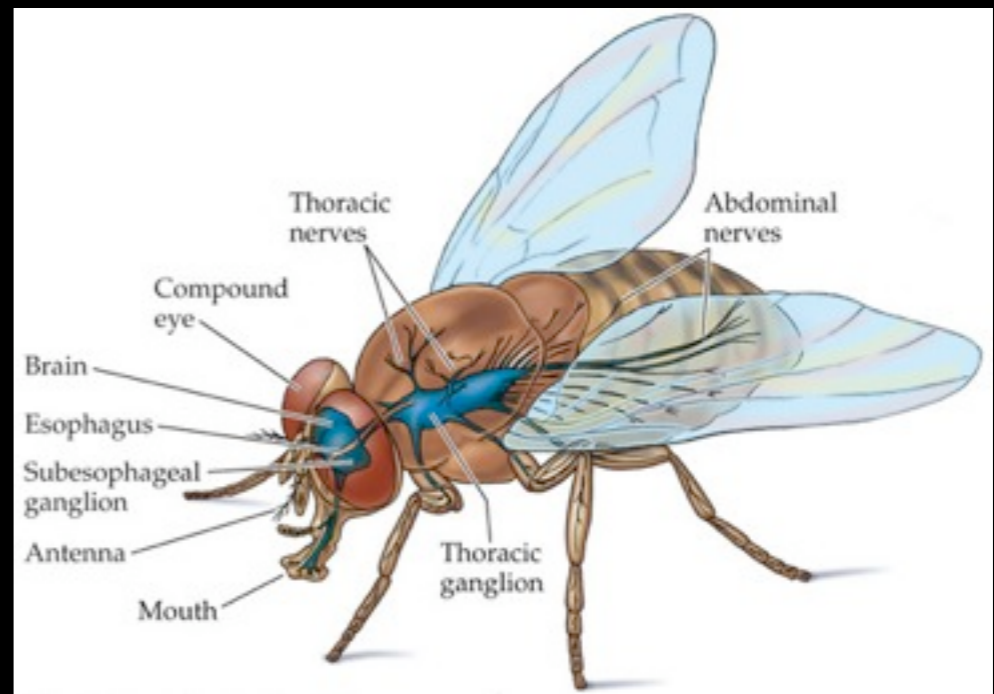
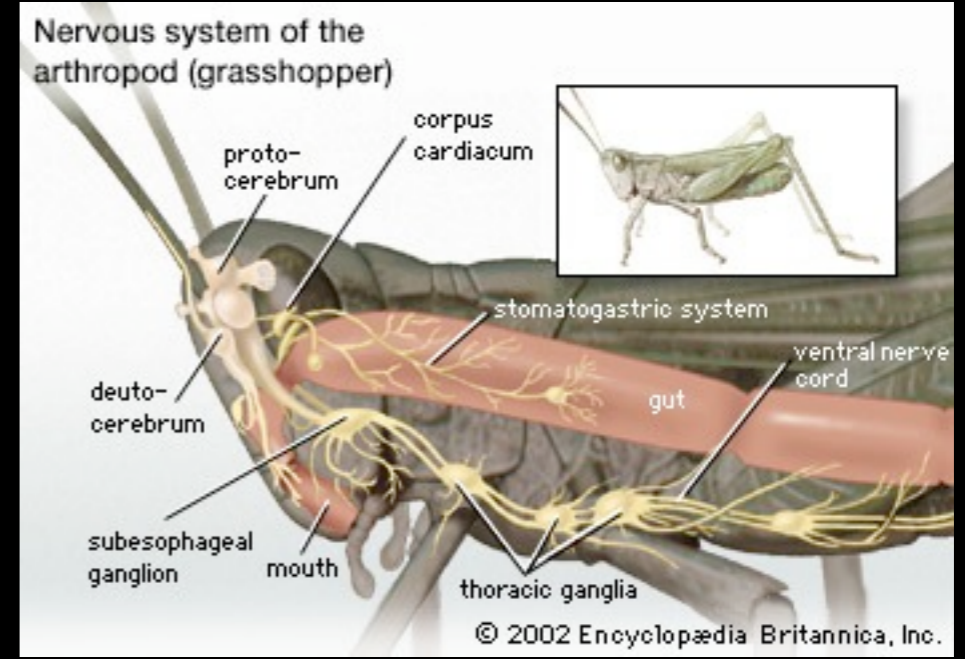
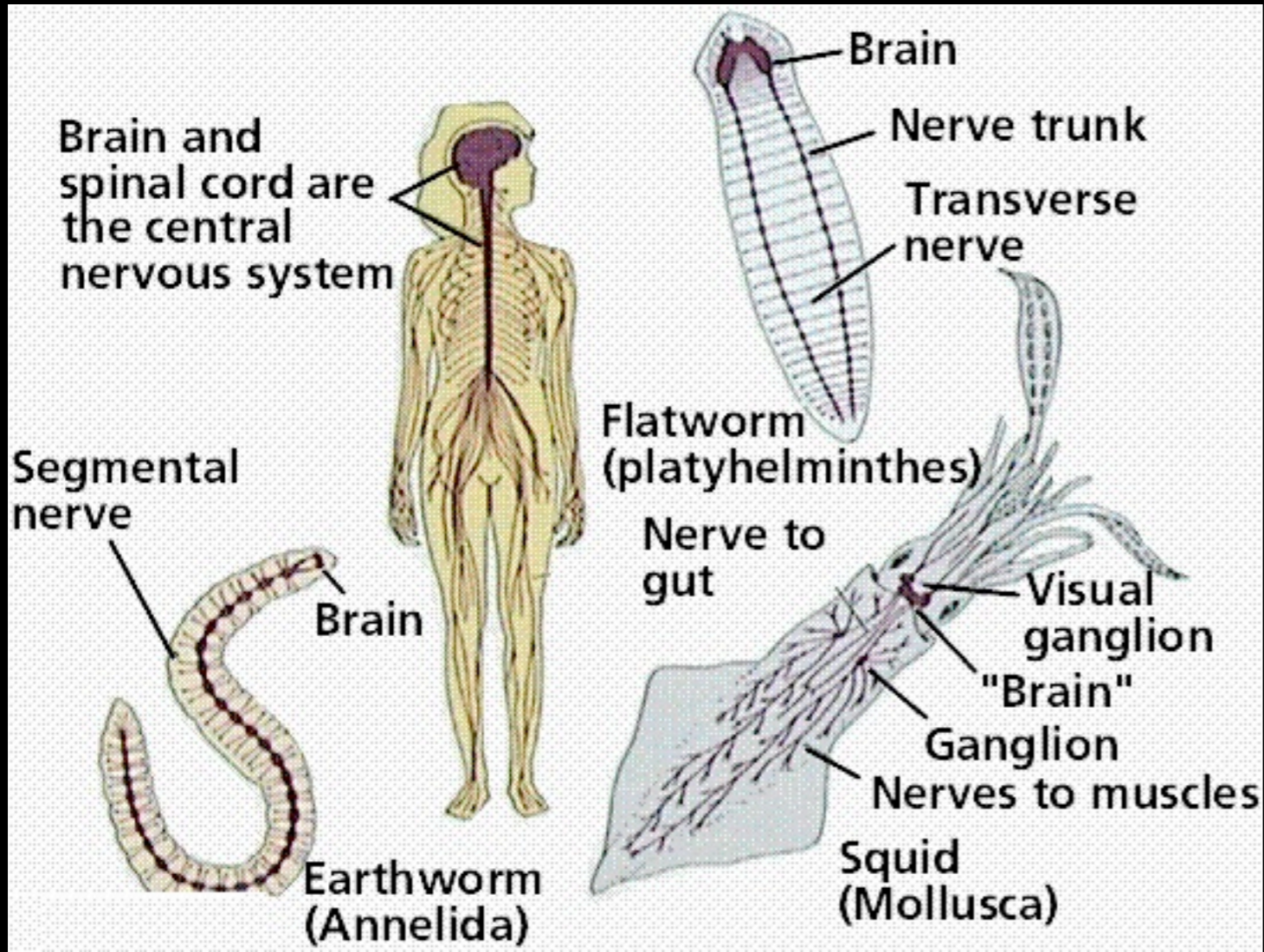
Note: A V6 region has been identified only in monkeys.

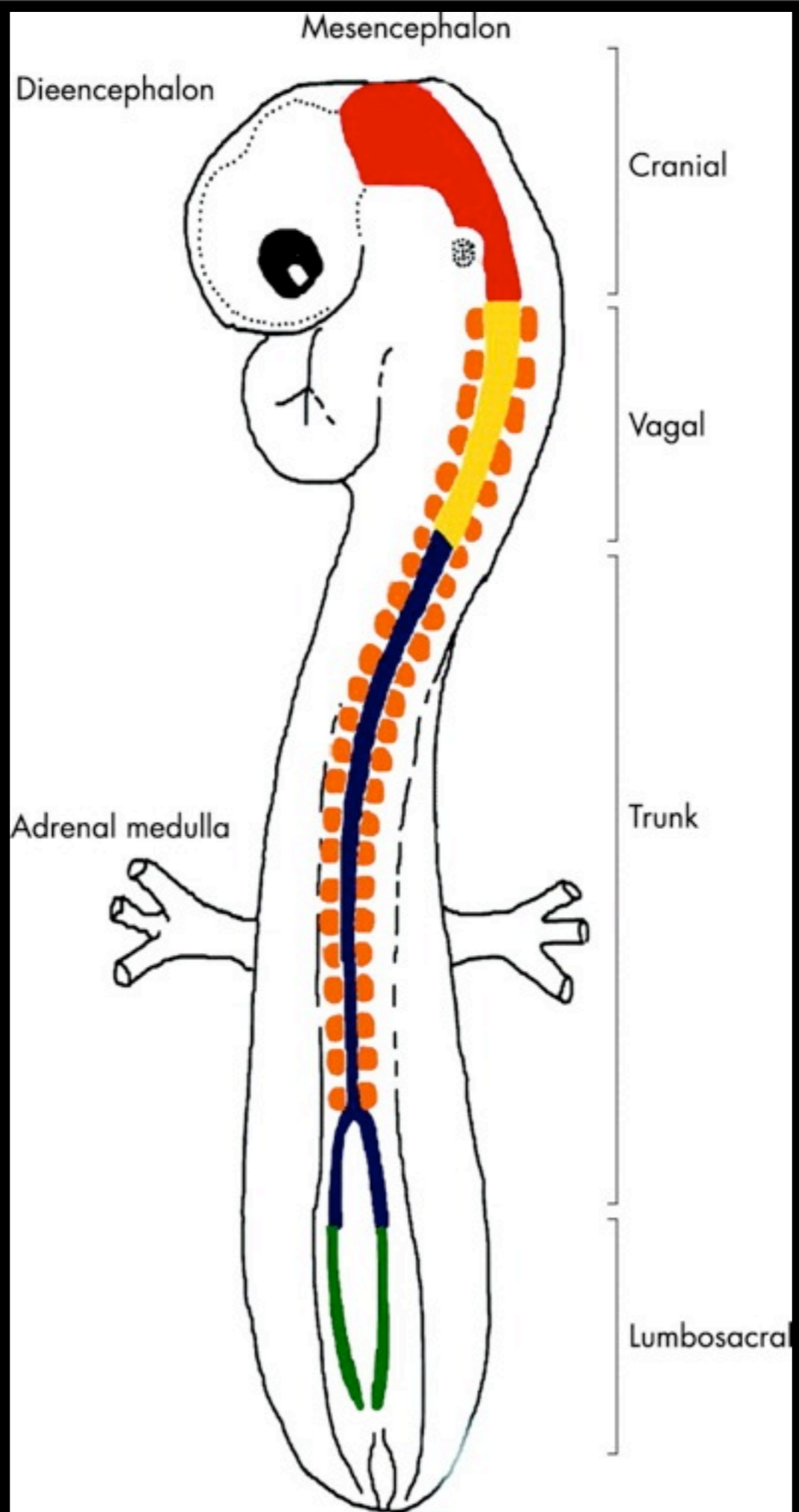
J. AND ROGER TOOTELL, Harvard Medical School

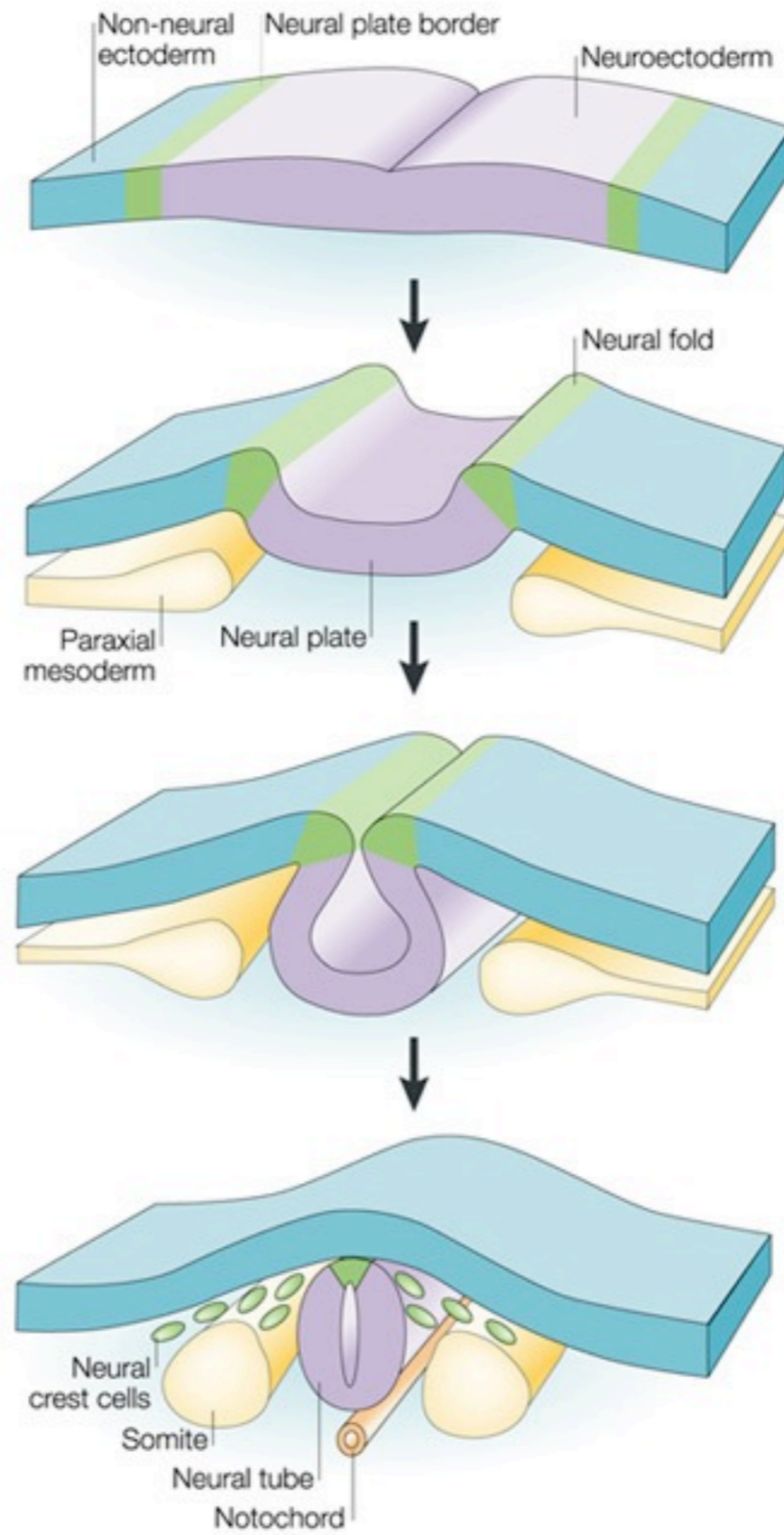


Bilateria



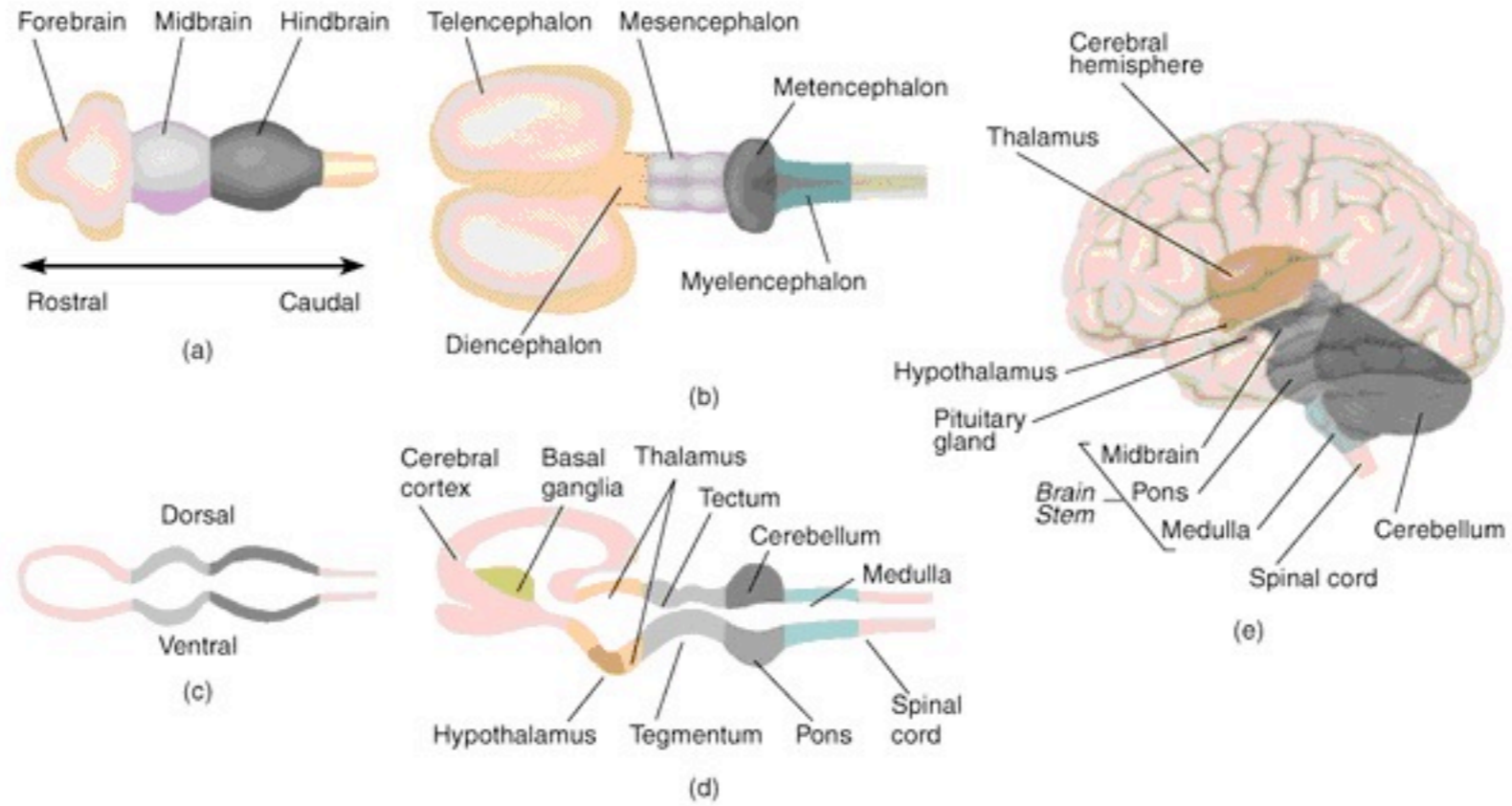


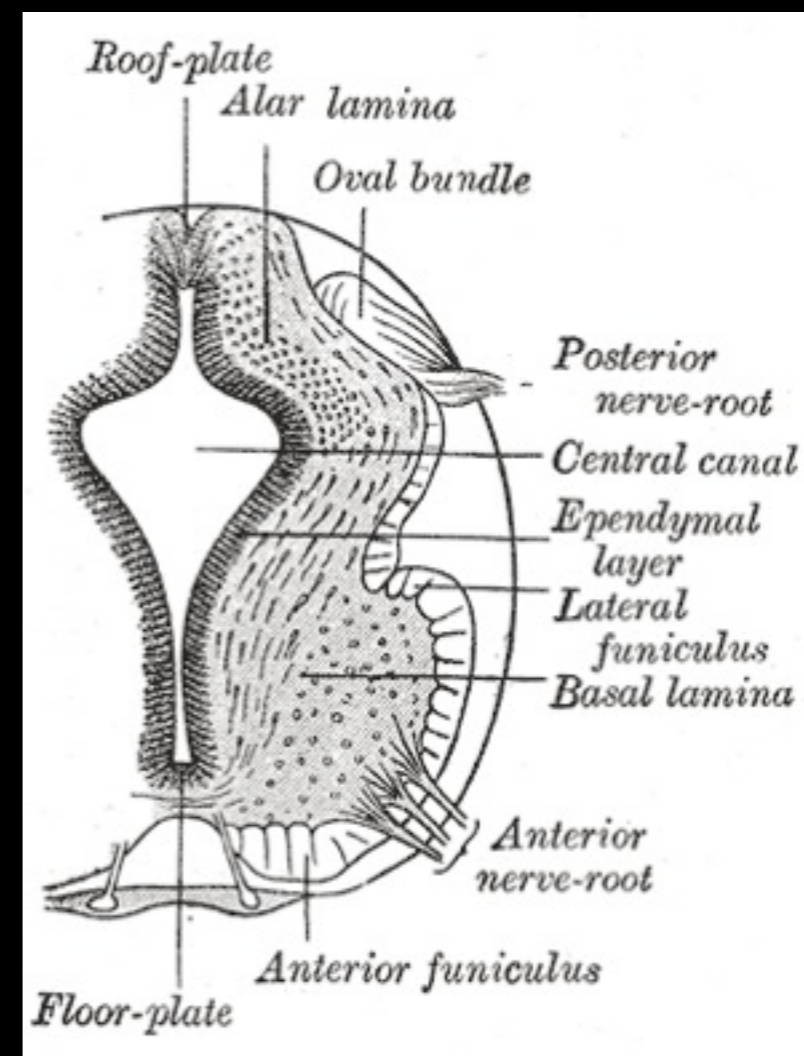
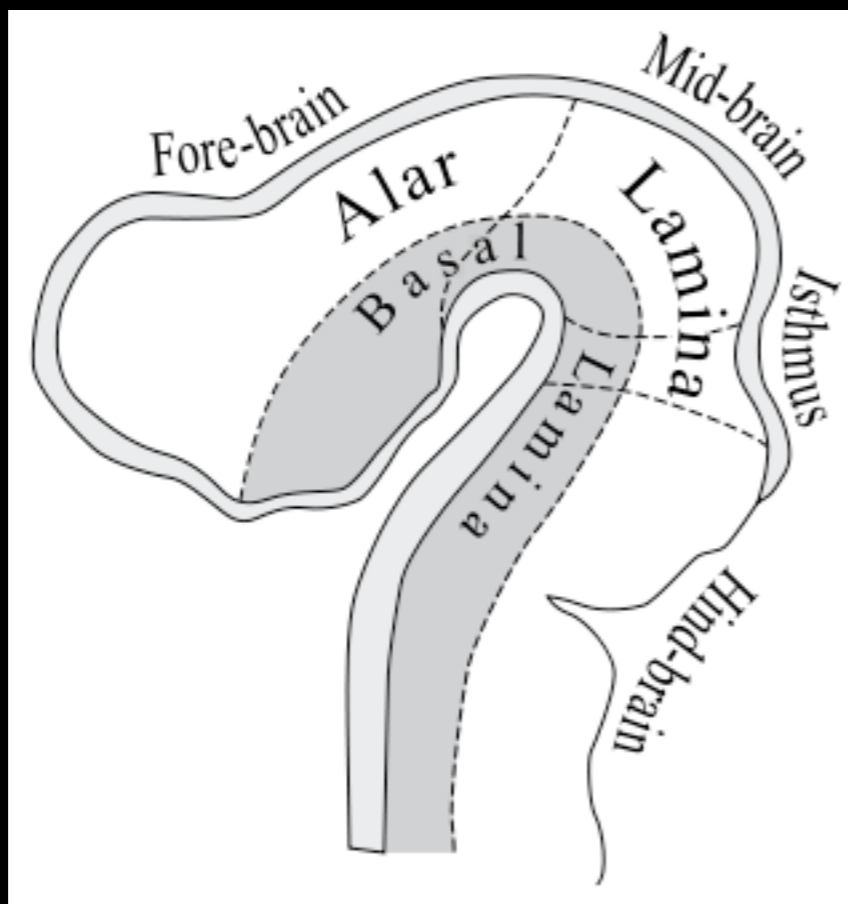




Nature Reviews | Neuroscience

► **A Schematic Outline of Brain Development, Showing Its Relation to the Ventricles. (a) and (c) Early Development. (b) and (d) Later Development. (e) A Lateral View of the Left Side of a Semitransparent Human Brain**

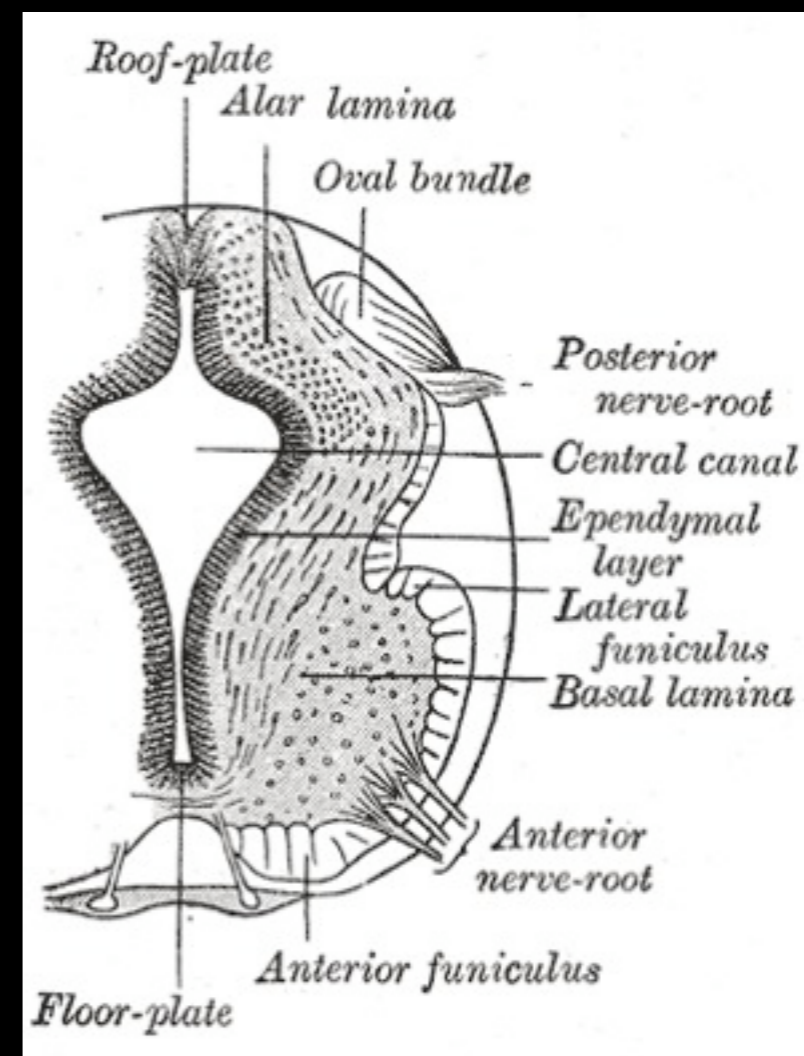
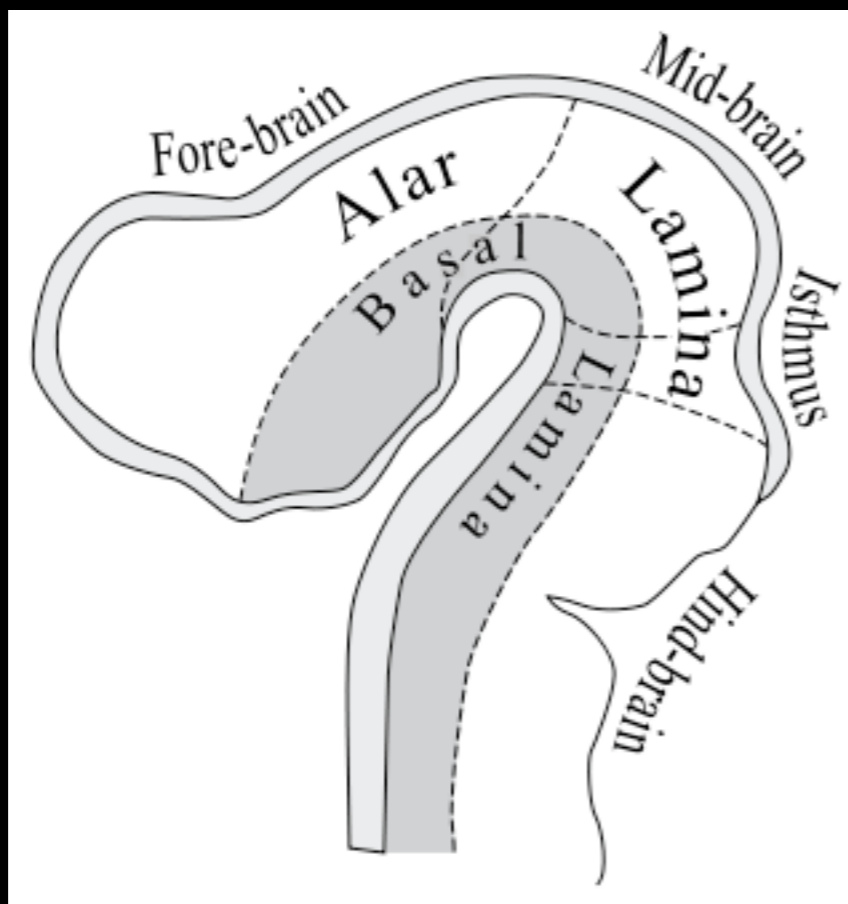




Alar plate:

The alar plate (or alar lamina) is a neural structure in the embryonic nervous system, part of the dorsal side of neural tube, that involves the communication of general somatic and general visceral sensory impulses. The caudal part later becomes sensory axon part of the spinal cord.

The alar plate specifically later on becomes the dorsal gray of the spinal cord, and develops into the sensory nuclei of cranial nerves V, VII, VIII, IX, and X. The inferior olivary nucleus, mesencephalic nucleus of V, main sensory nucleus of V, and red nucleus are also developed from this plate.



Basal plate:

In the developing nervous system, the basal plate is the region of the neural tube ventral to the sulcus limitans. It extends from the rostral mesencephalon to the end of the spinal cord and contains primarily motor neurons, whereas neurons found in the alar plate are primarily associated with sensory functions. The cell types of the basal plate include lower motor neurons and four types of interneuron.

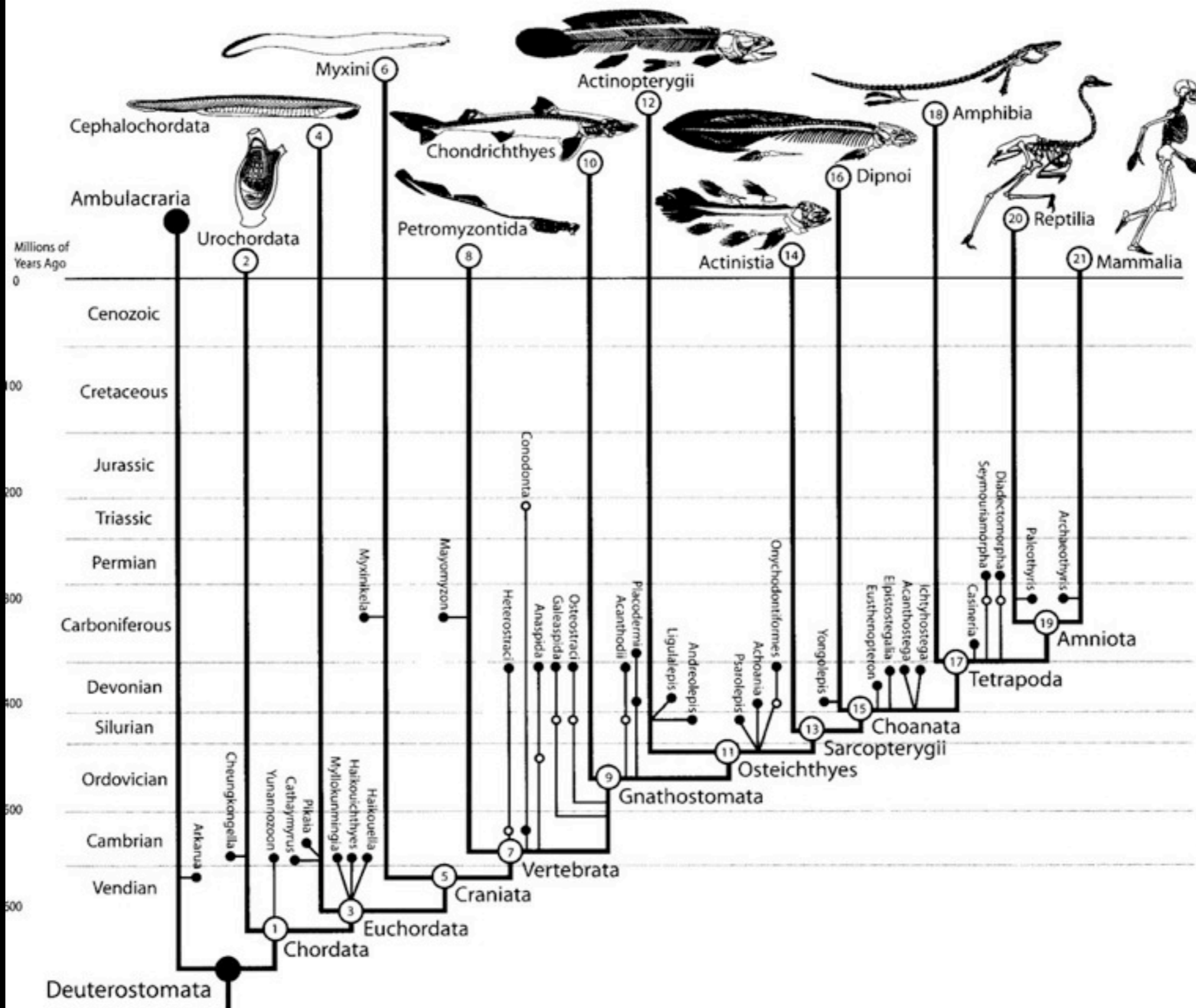
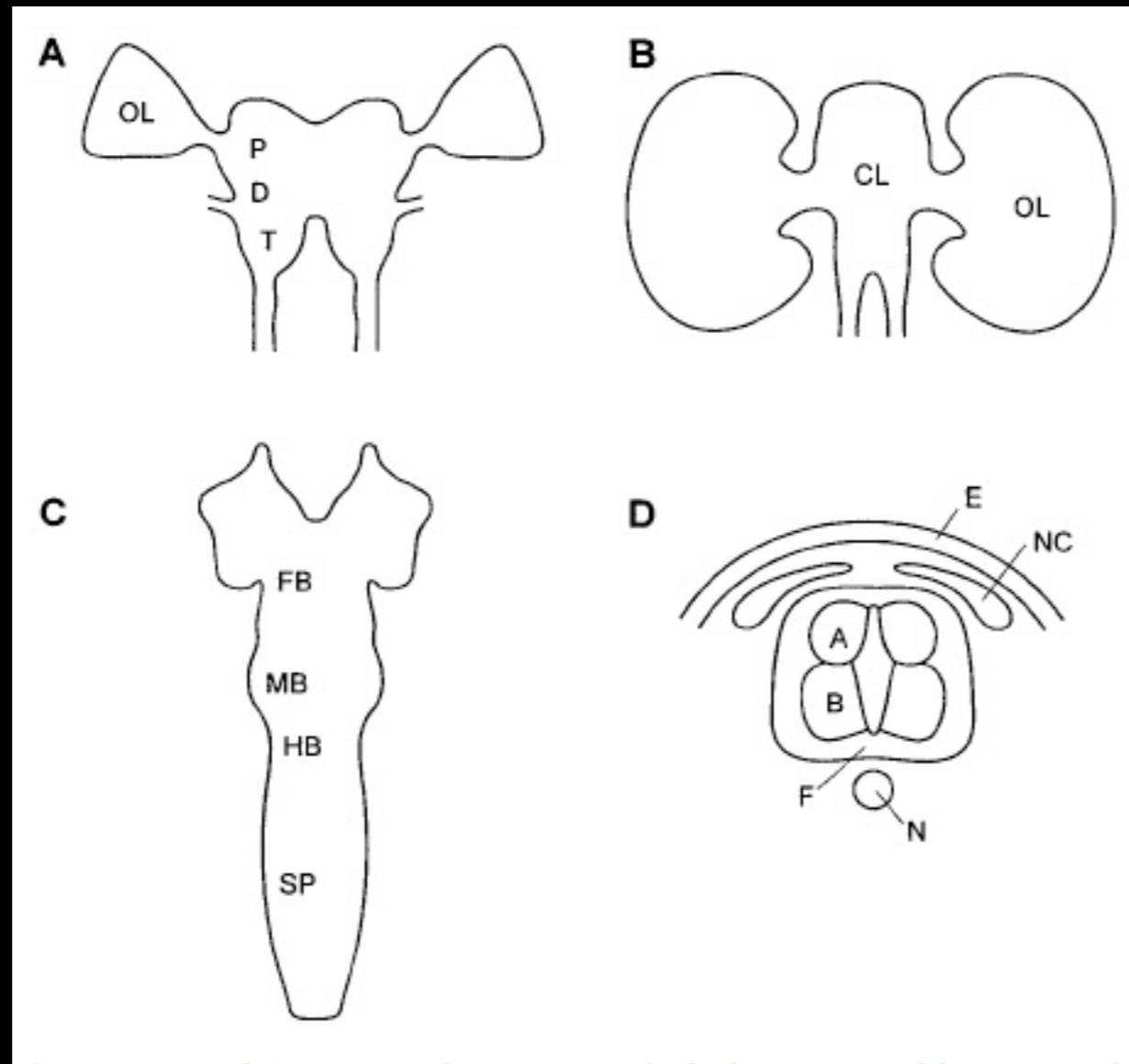
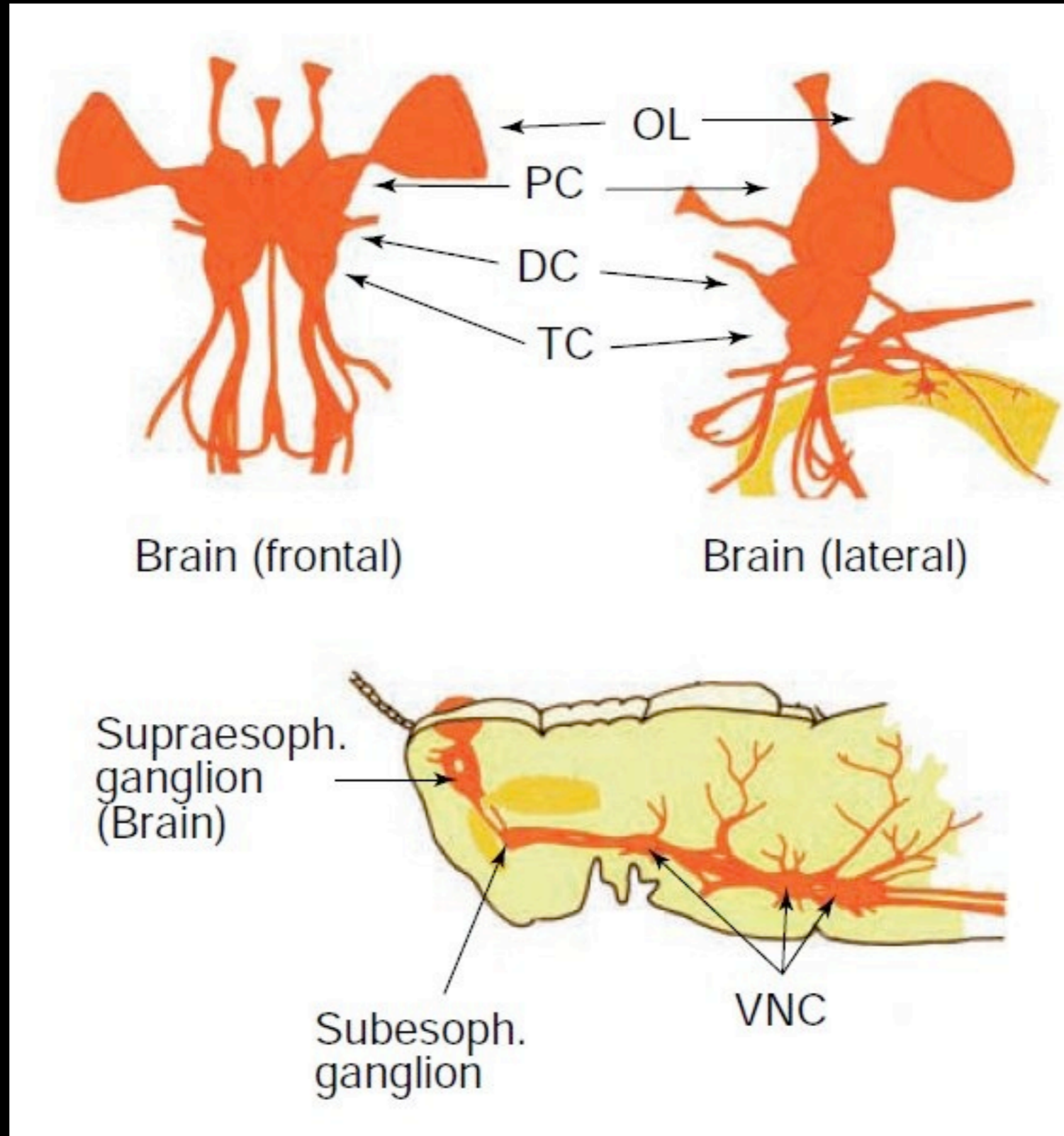
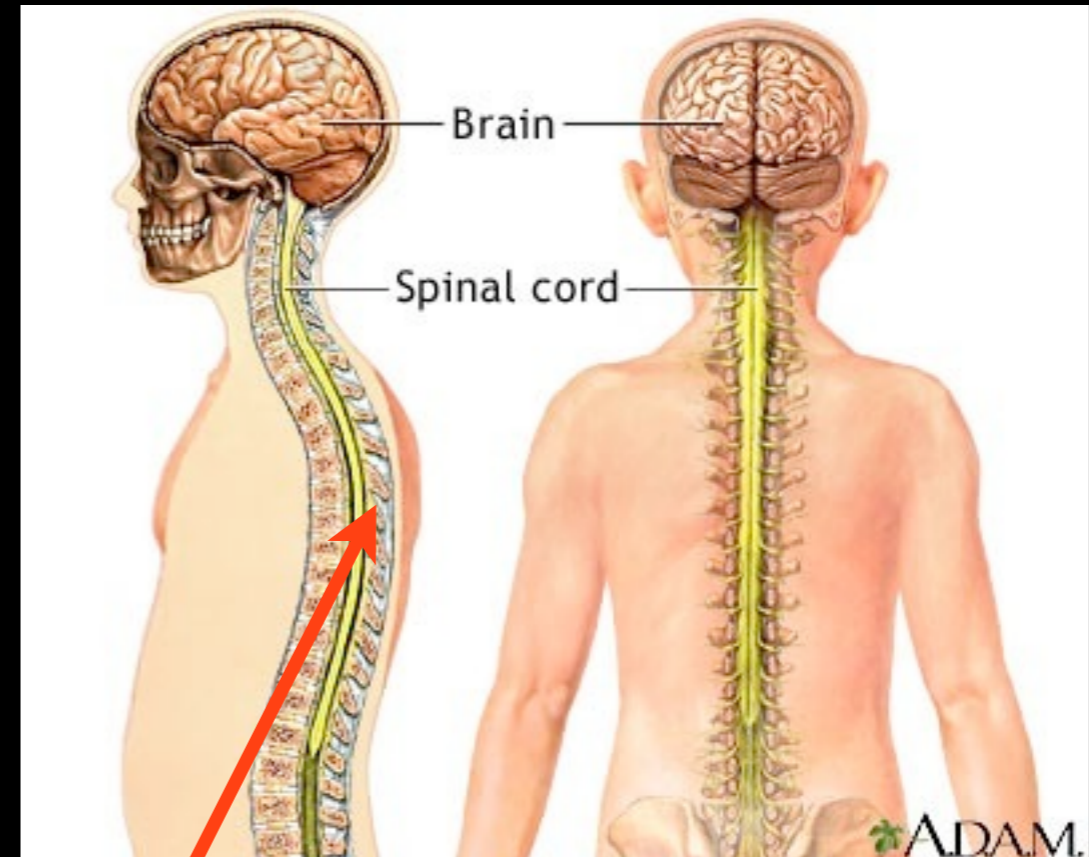
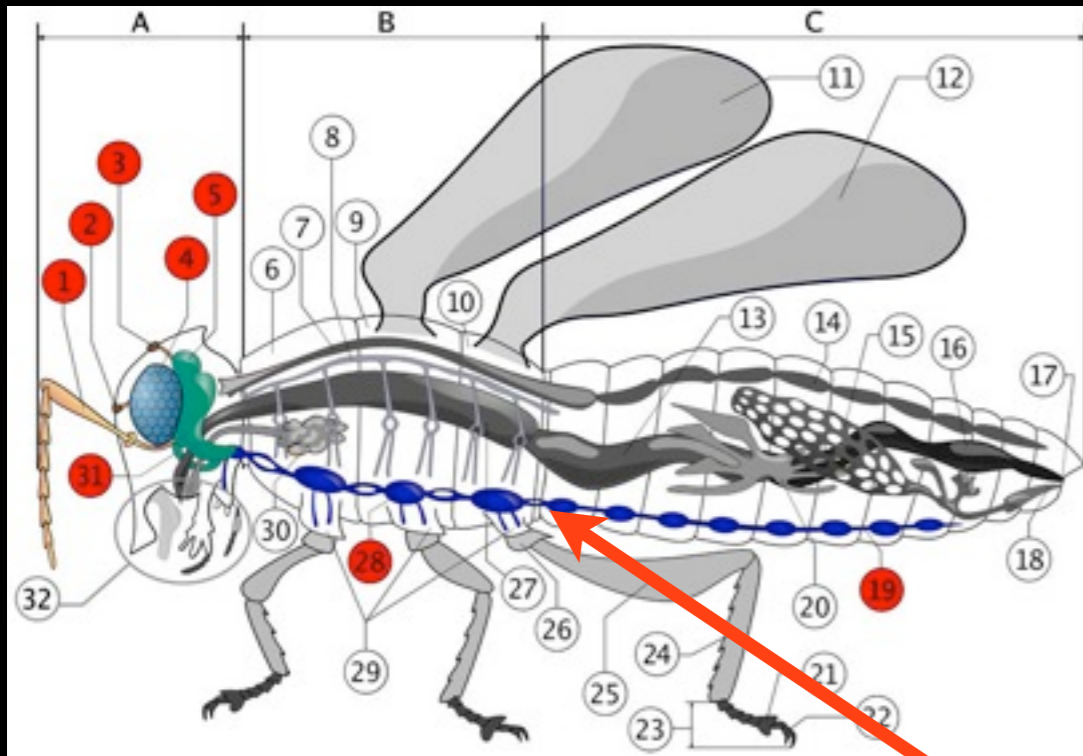


Figure 23.1. Chordate phylogeny, showing the relationships of extant lineages and the oldest fossils, superimposed on a geological time column. Nodal numbers are keyed to text headings.



Protocerebrum (PC), deutocerebrum (DC), tritocerebrum (TC)



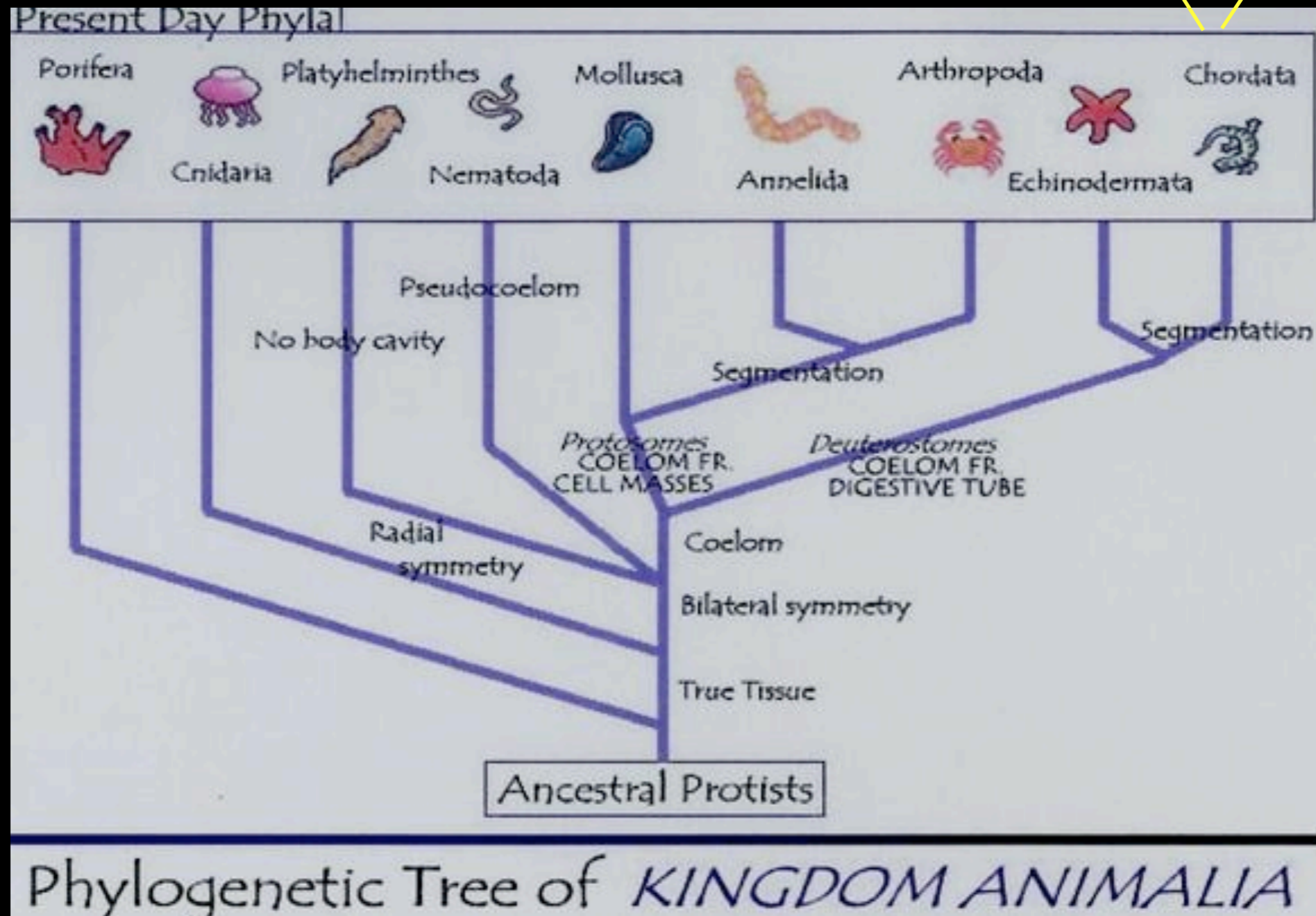


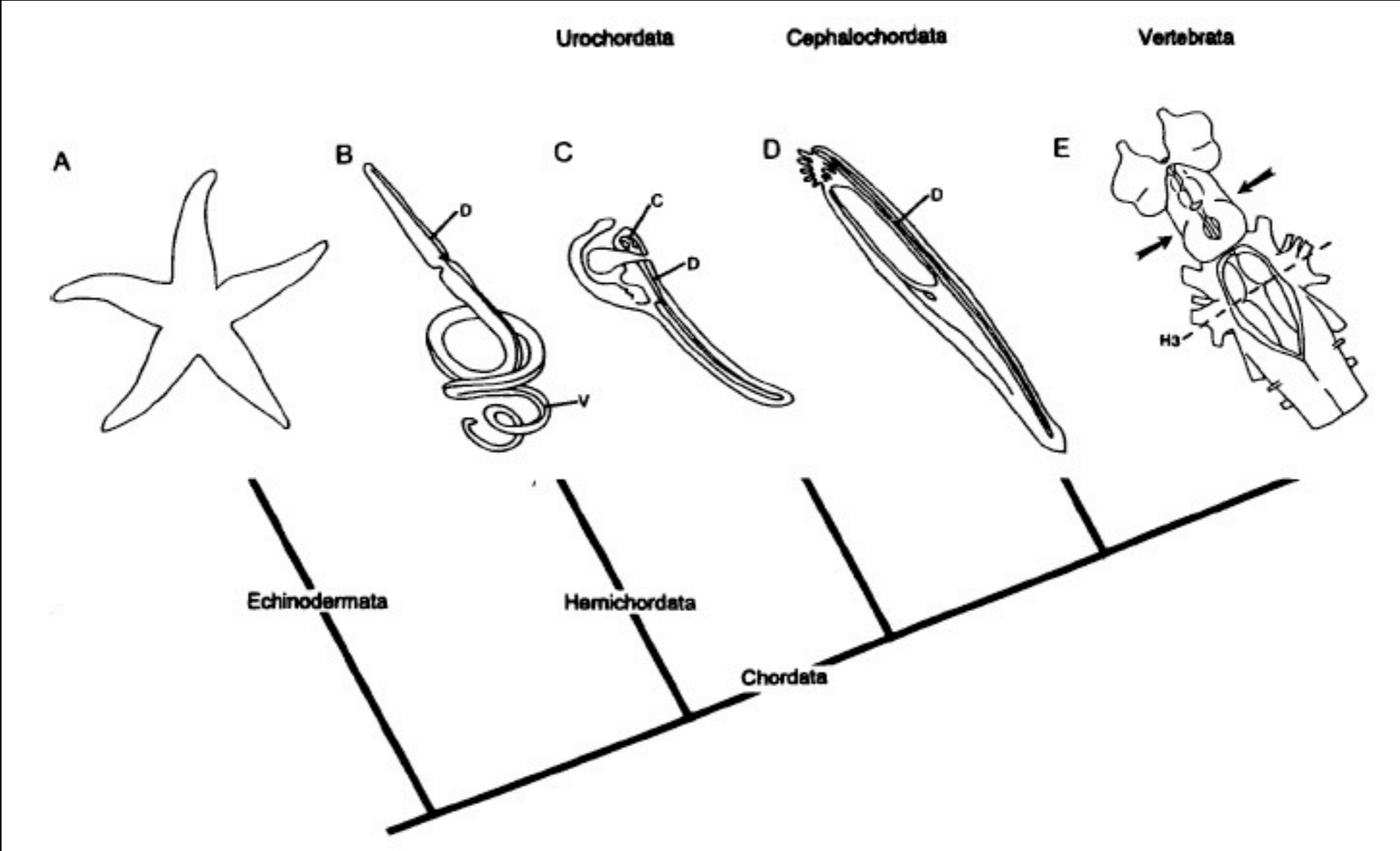
Neural side (instead of dorsal/ventral)

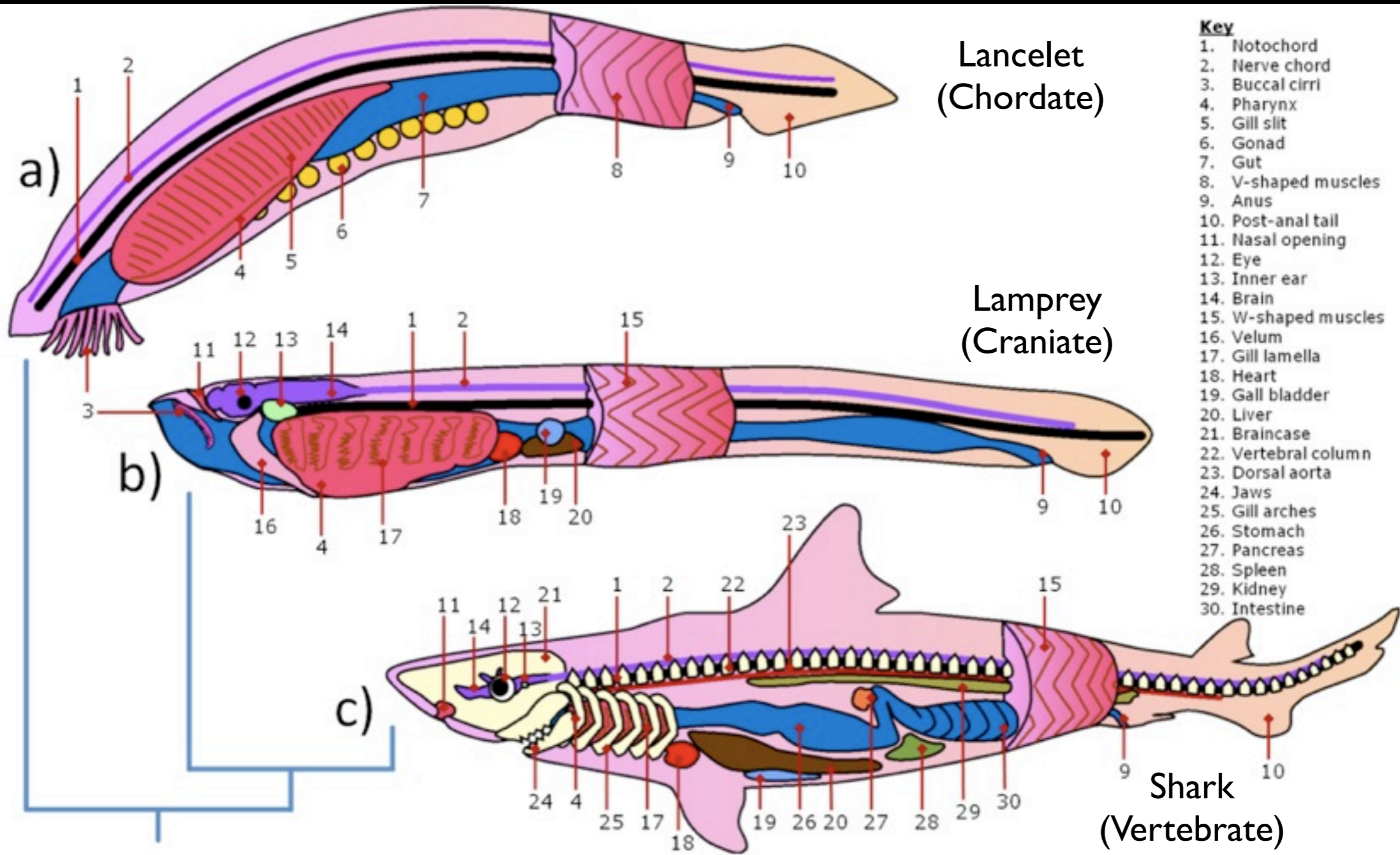


Non Craniates

Craniates



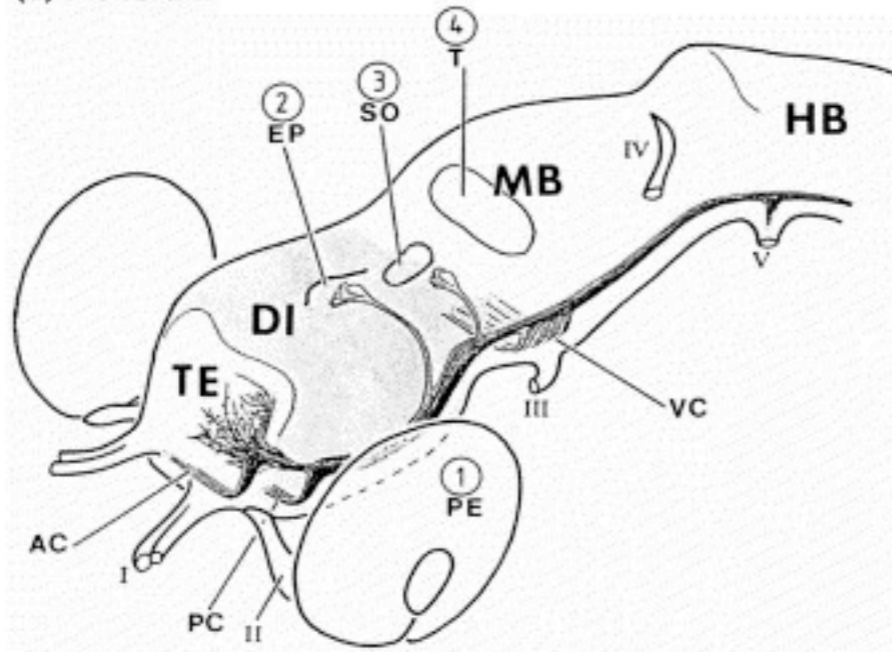




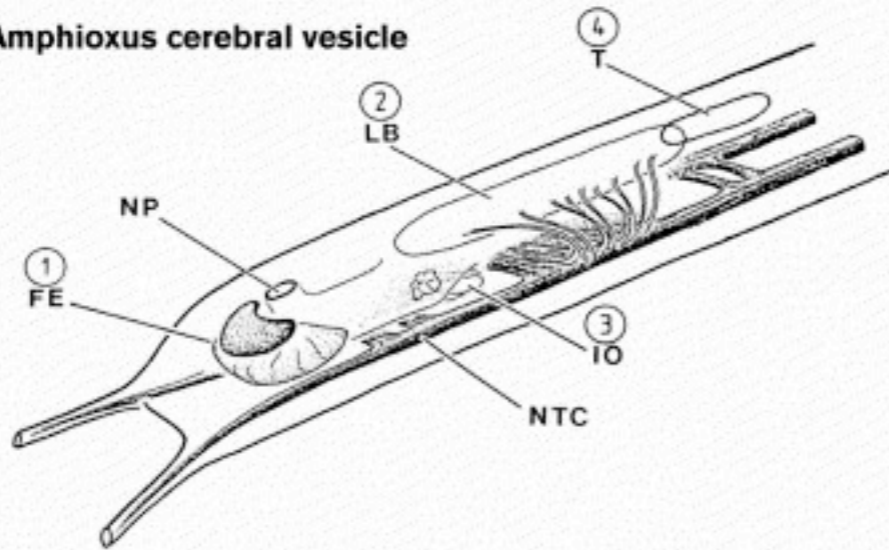
Fish
(Vertebrate)

Potentially homologous regions

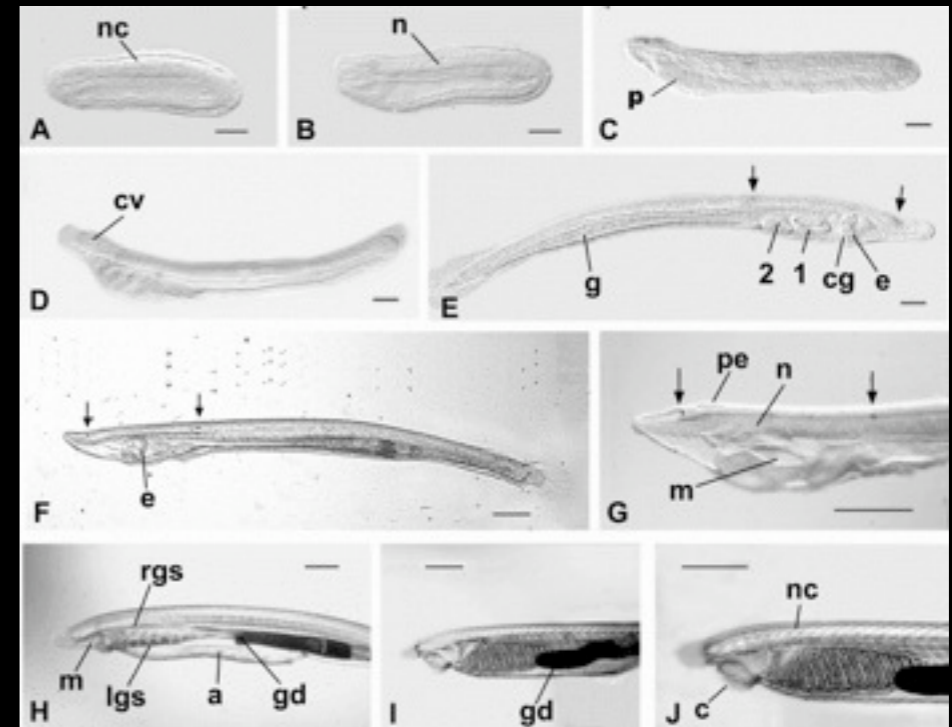
(a) Fishbrain

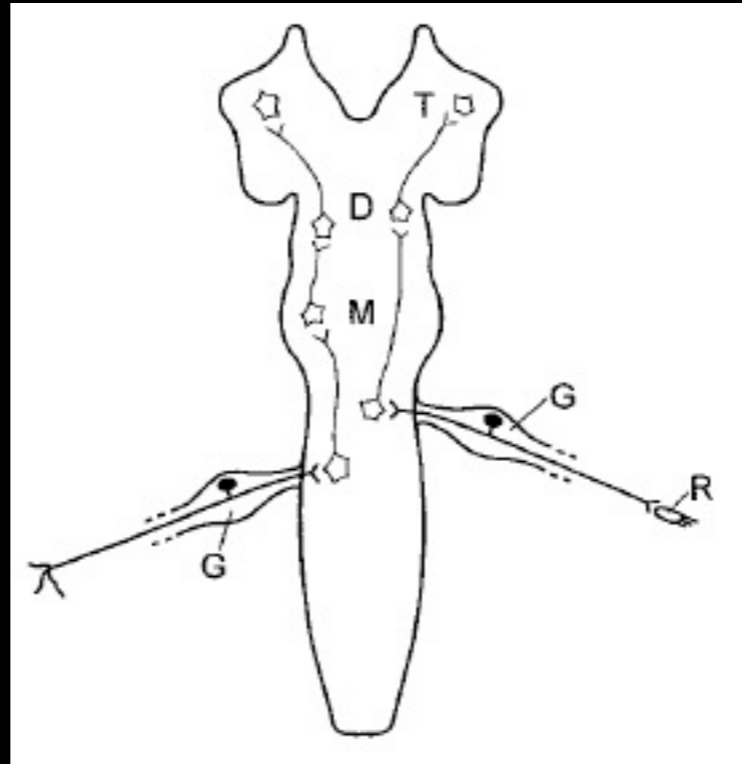


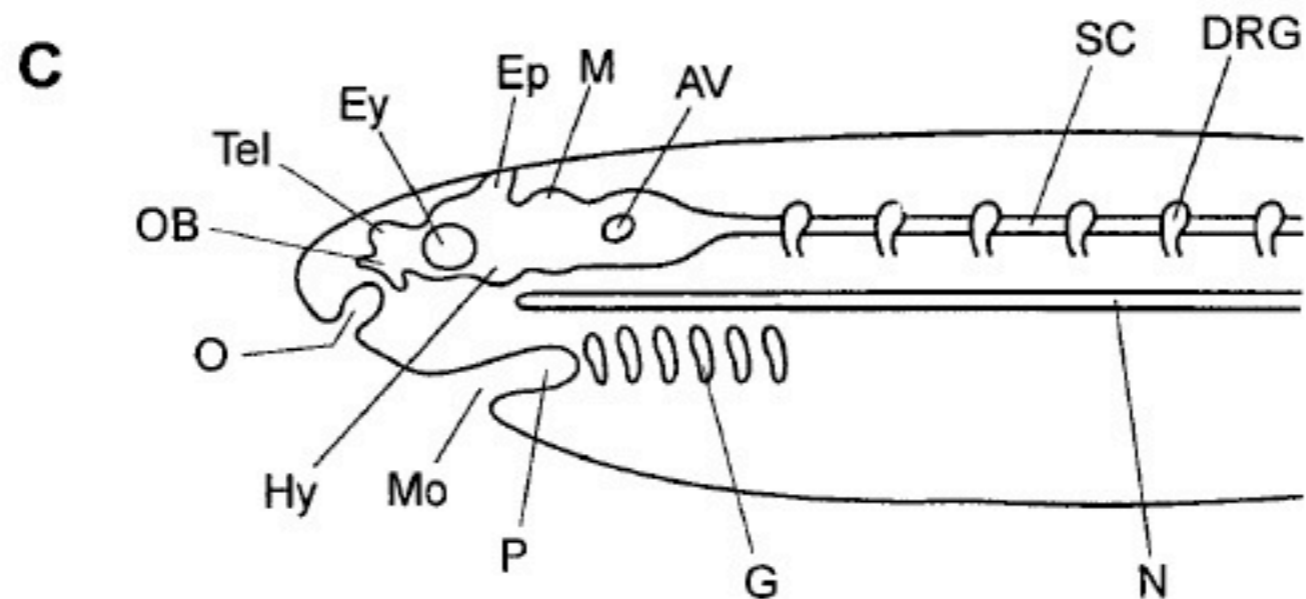
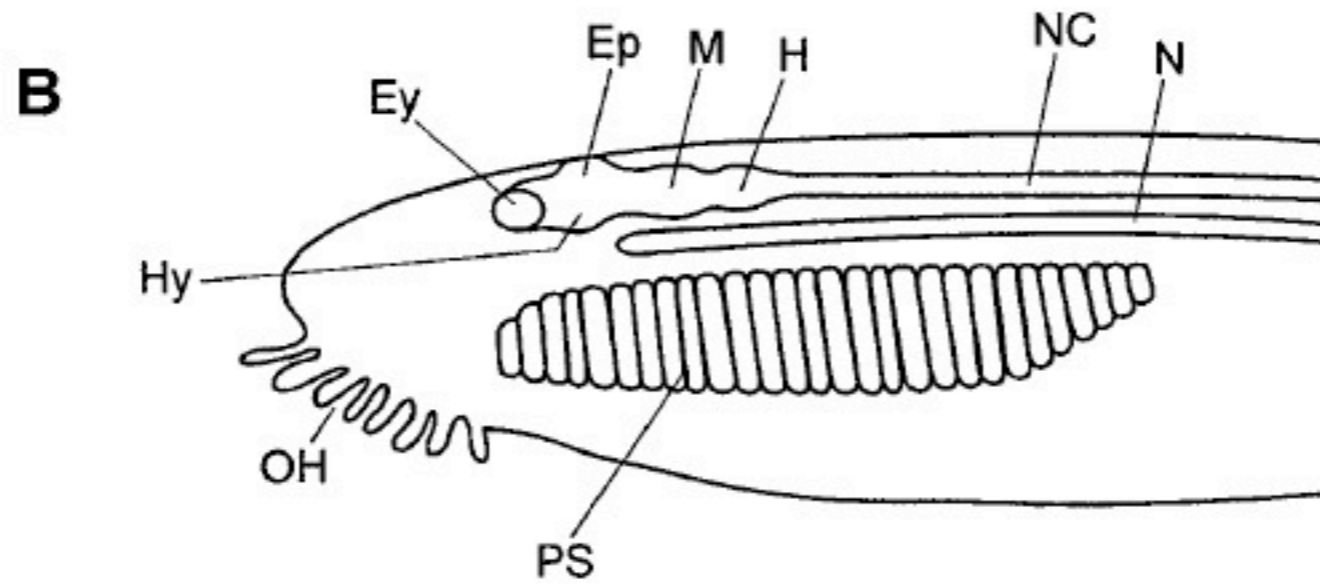
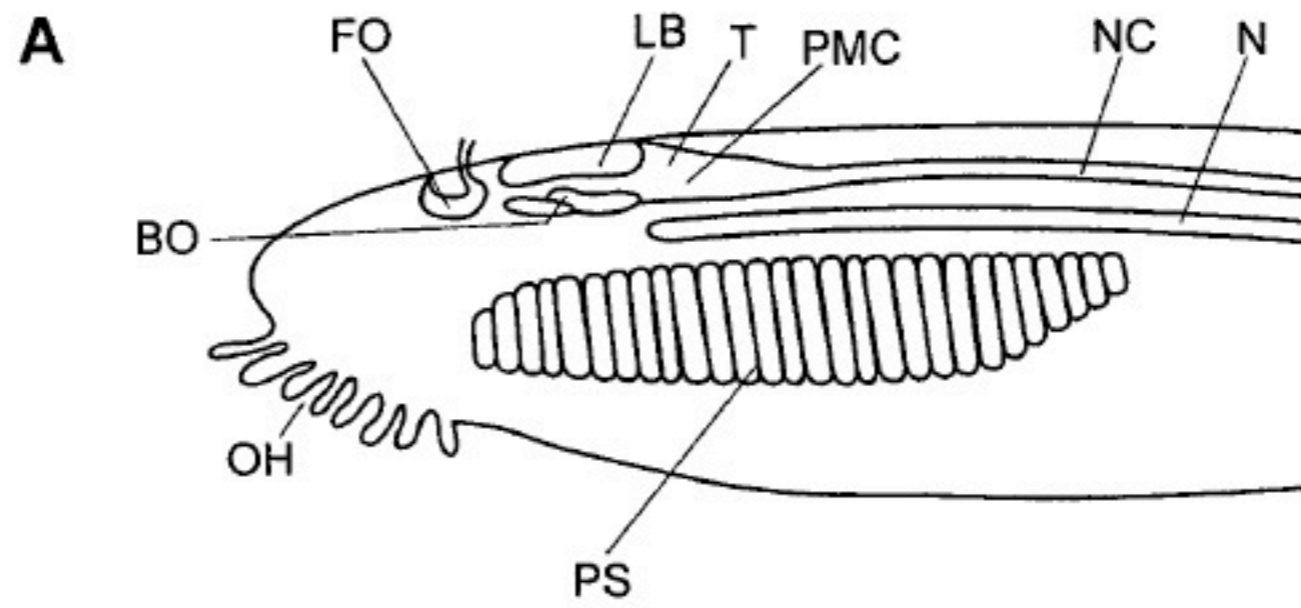
(b) Amphioxus cerebral vesicle



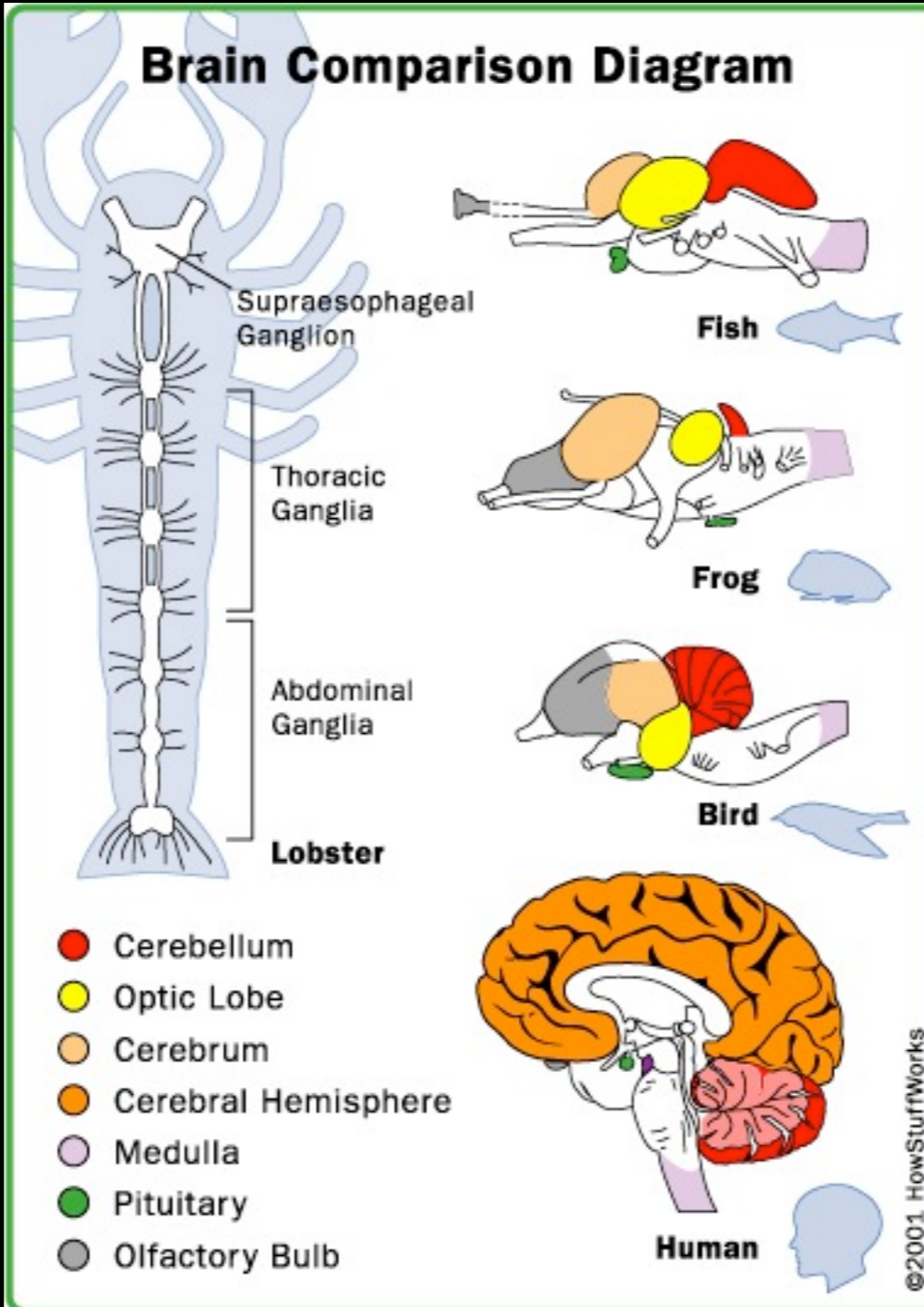
Lancelet
(Cephalocordata)

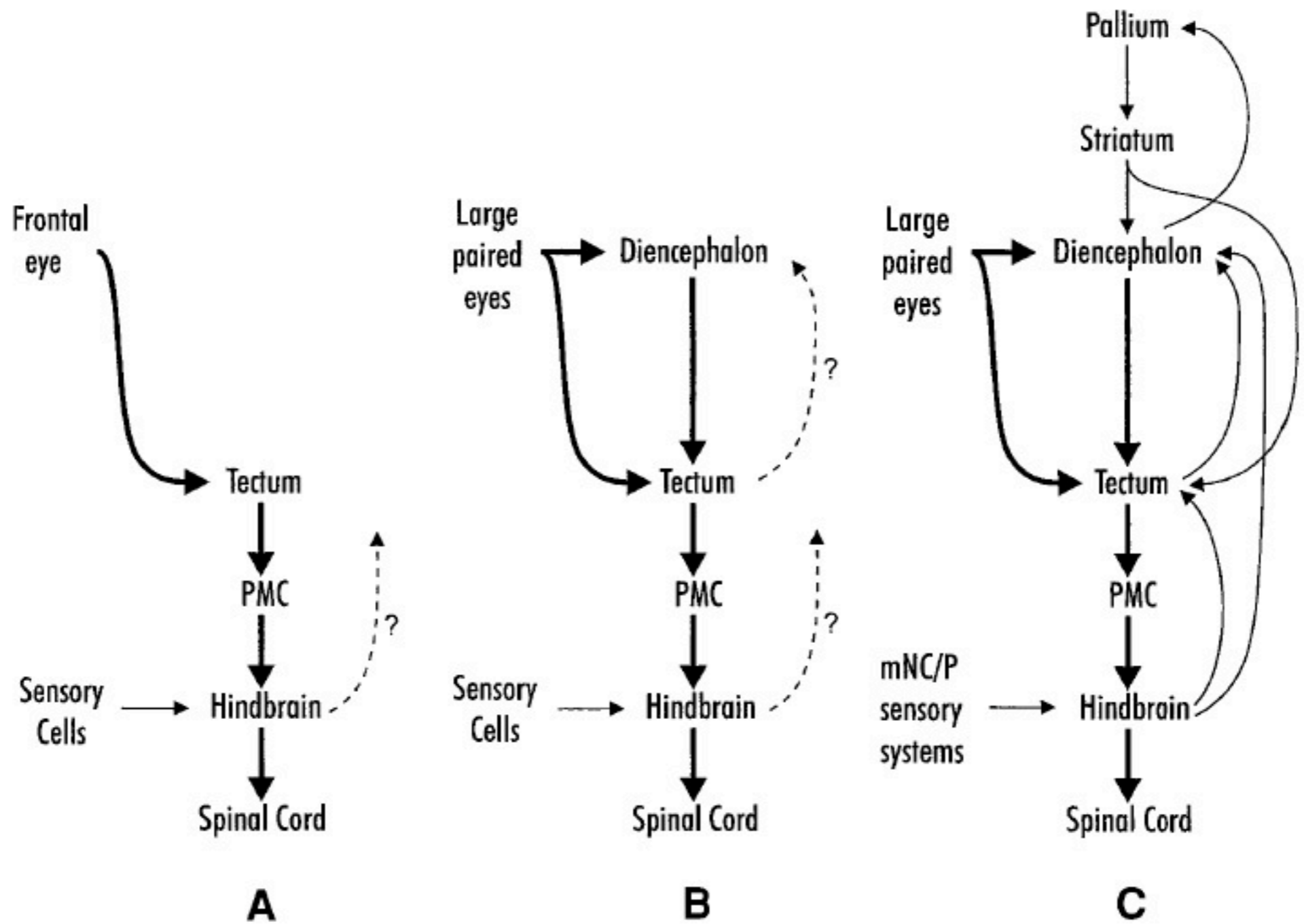






Brain Comparison Diagram





Lancelet:
Descending Visual Pathway

Ancestral Cephalochordate-
Craniate Transitional Condition:
Descending Visual Pathway

Craniate:
Ascending and
Descending Pathways

