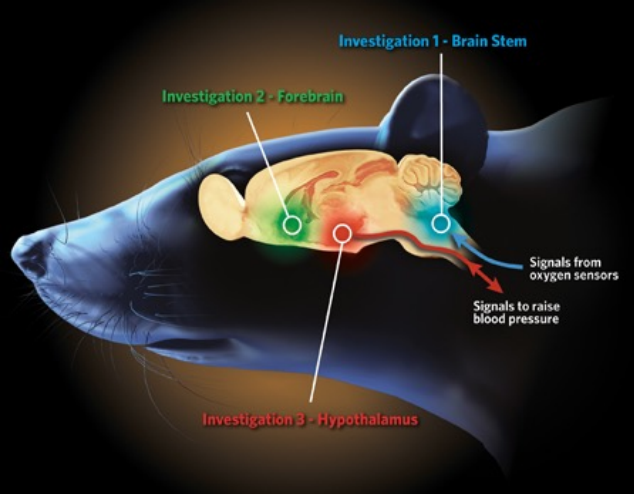


BMD ENG 301
Quantitative Systems Physiology
(Nervous System)

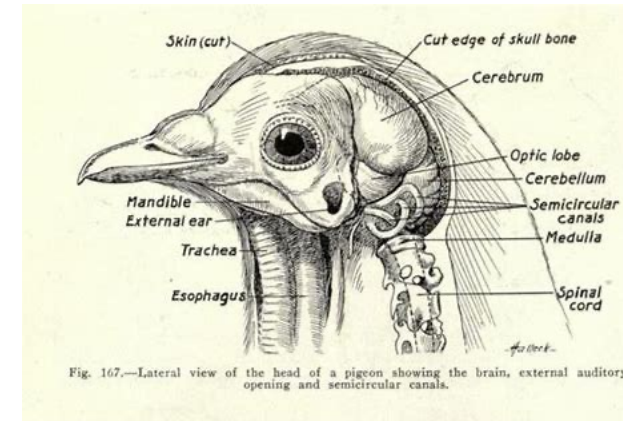
Lecture 3: Neurons

Professor Malcolm A. MacIver



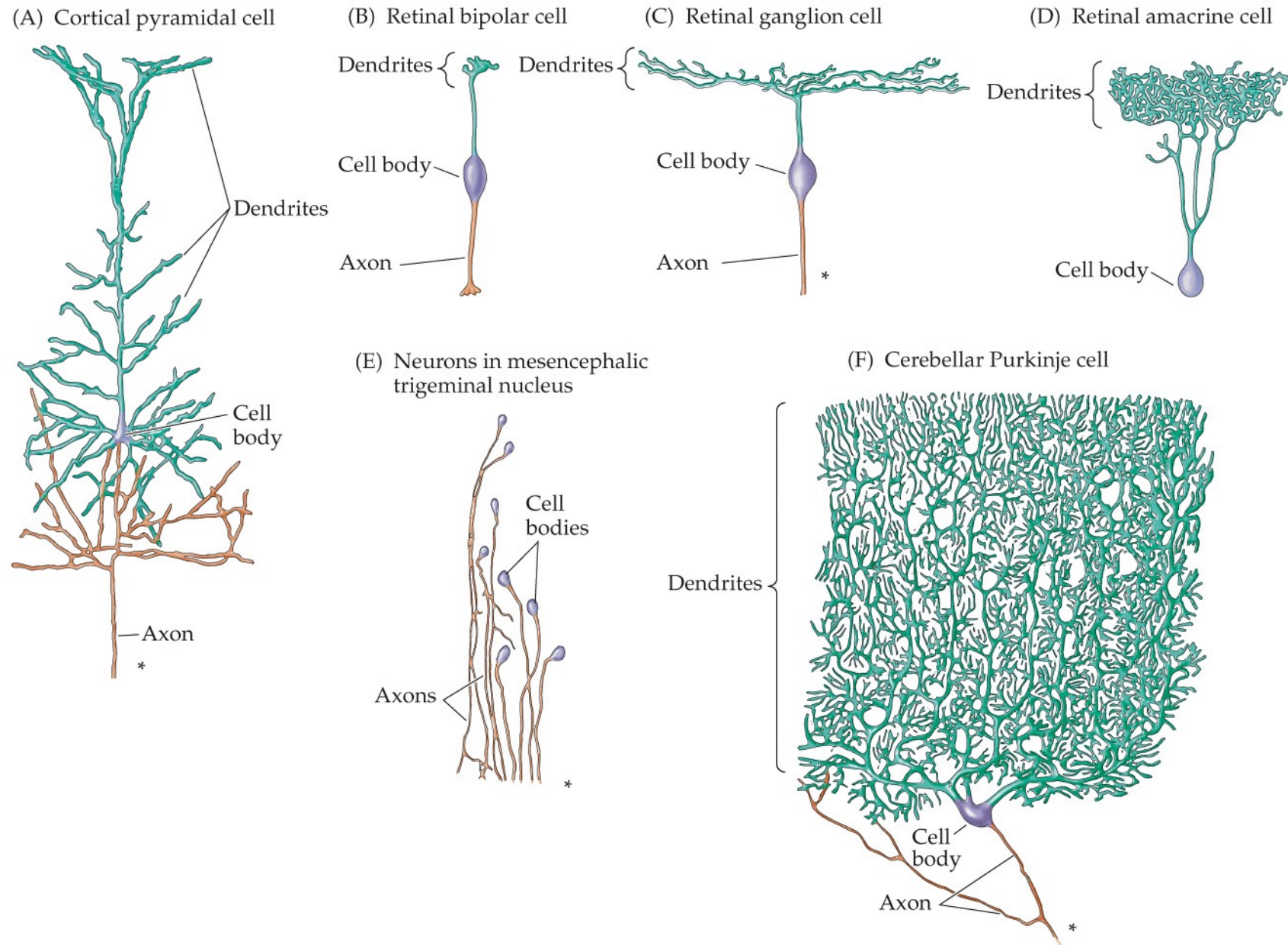
Neurons

How many neurons are there in the human brain?

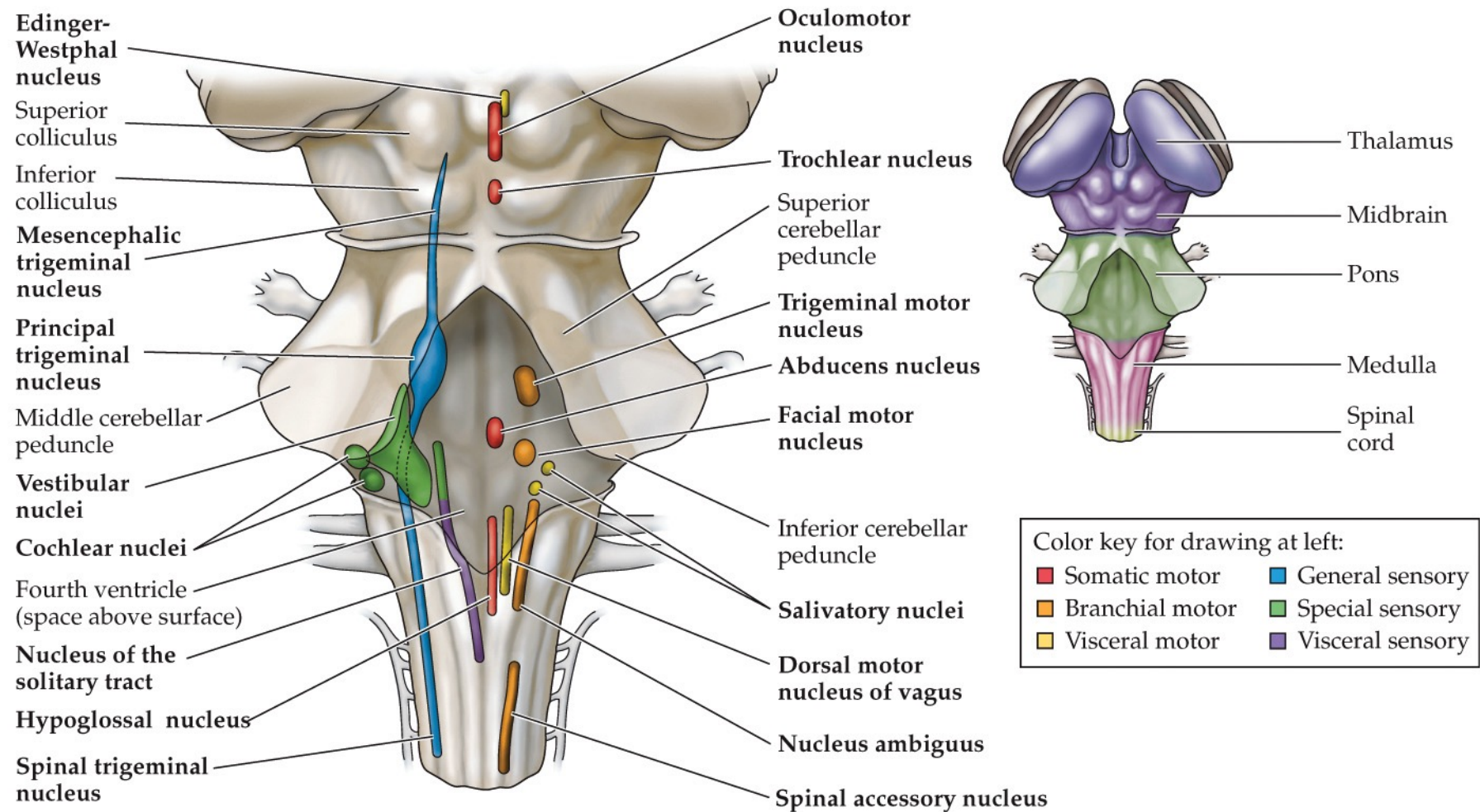


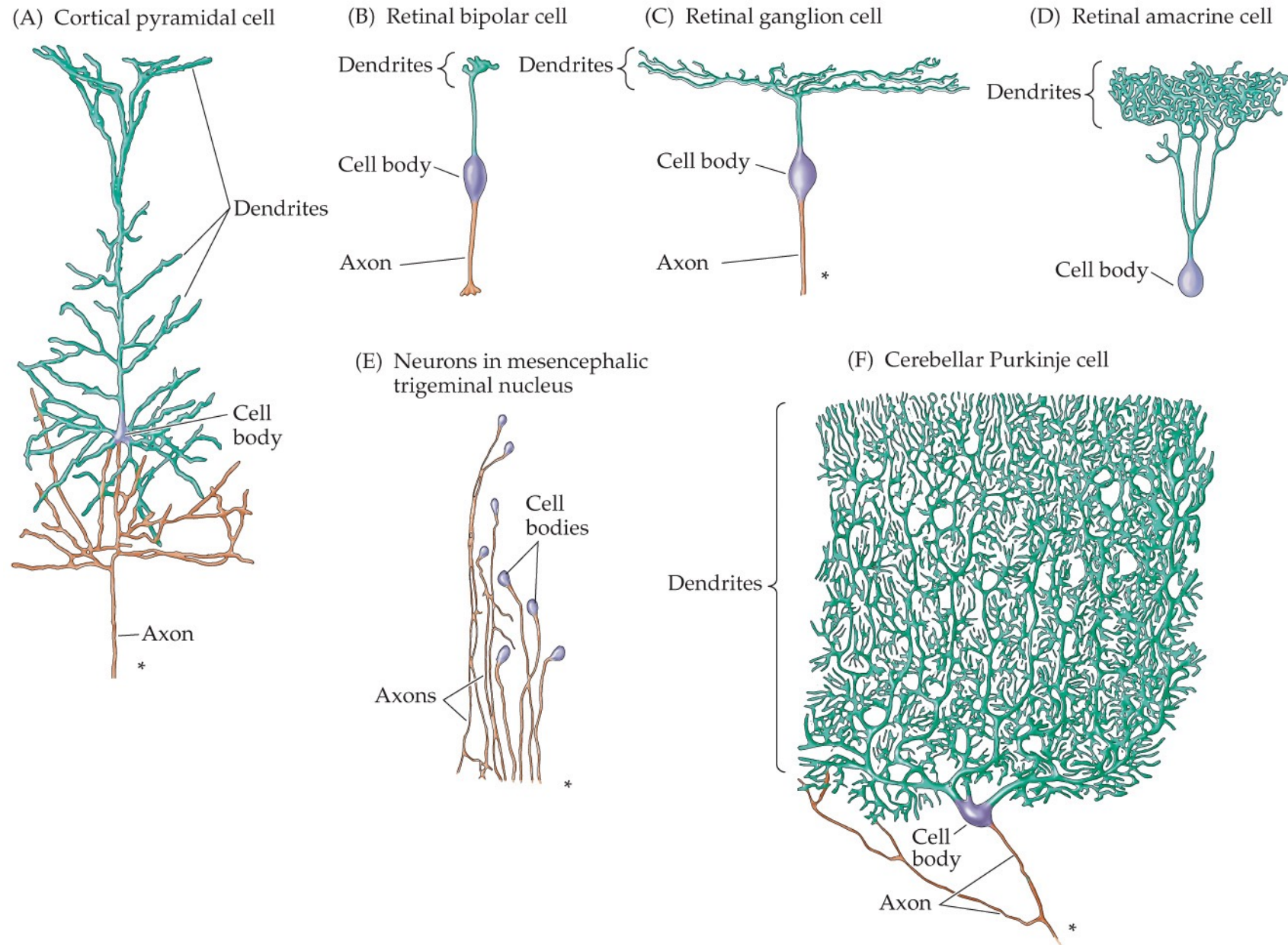
Neurons

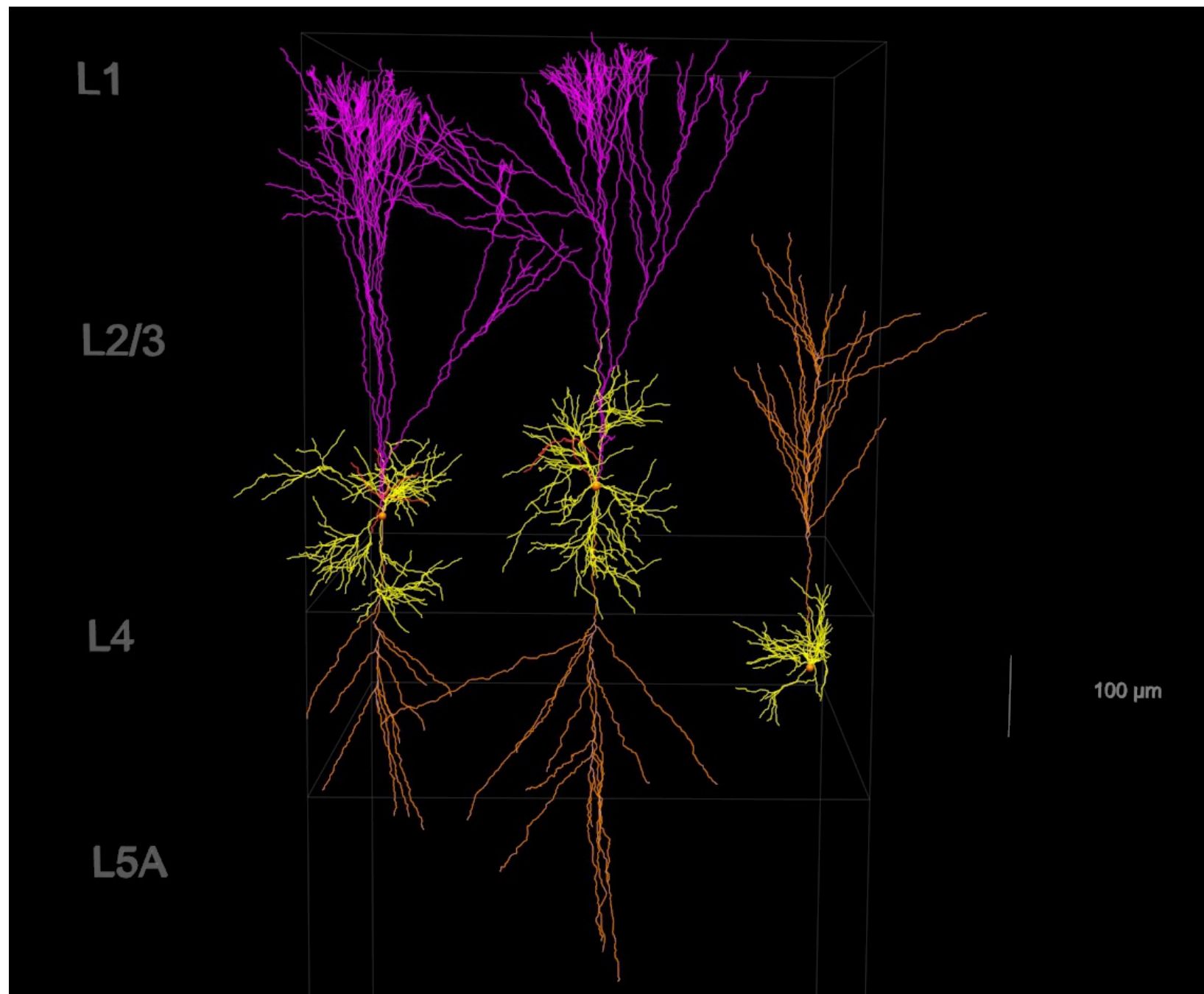
Is there such a thing as a typical neuron?

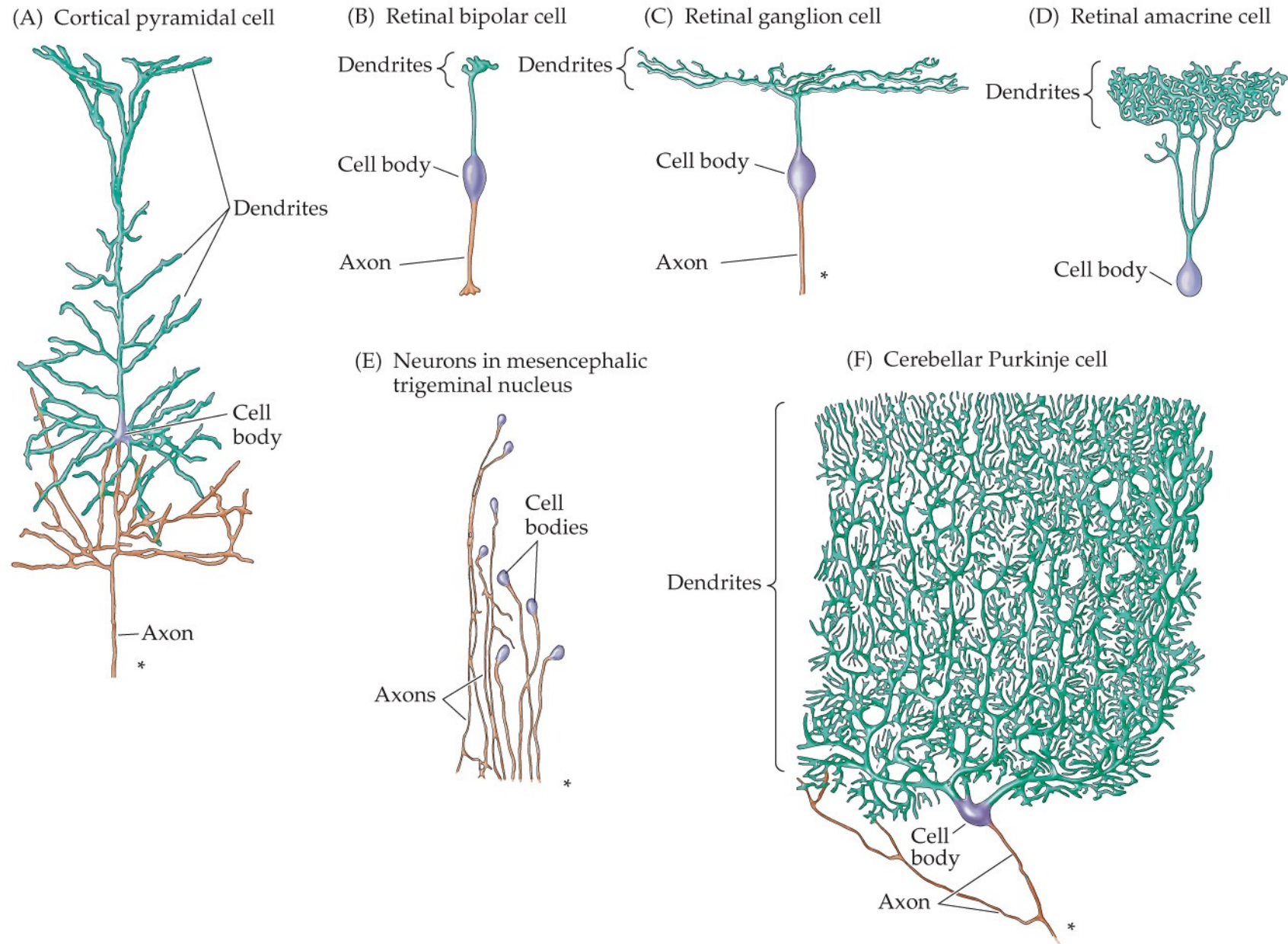


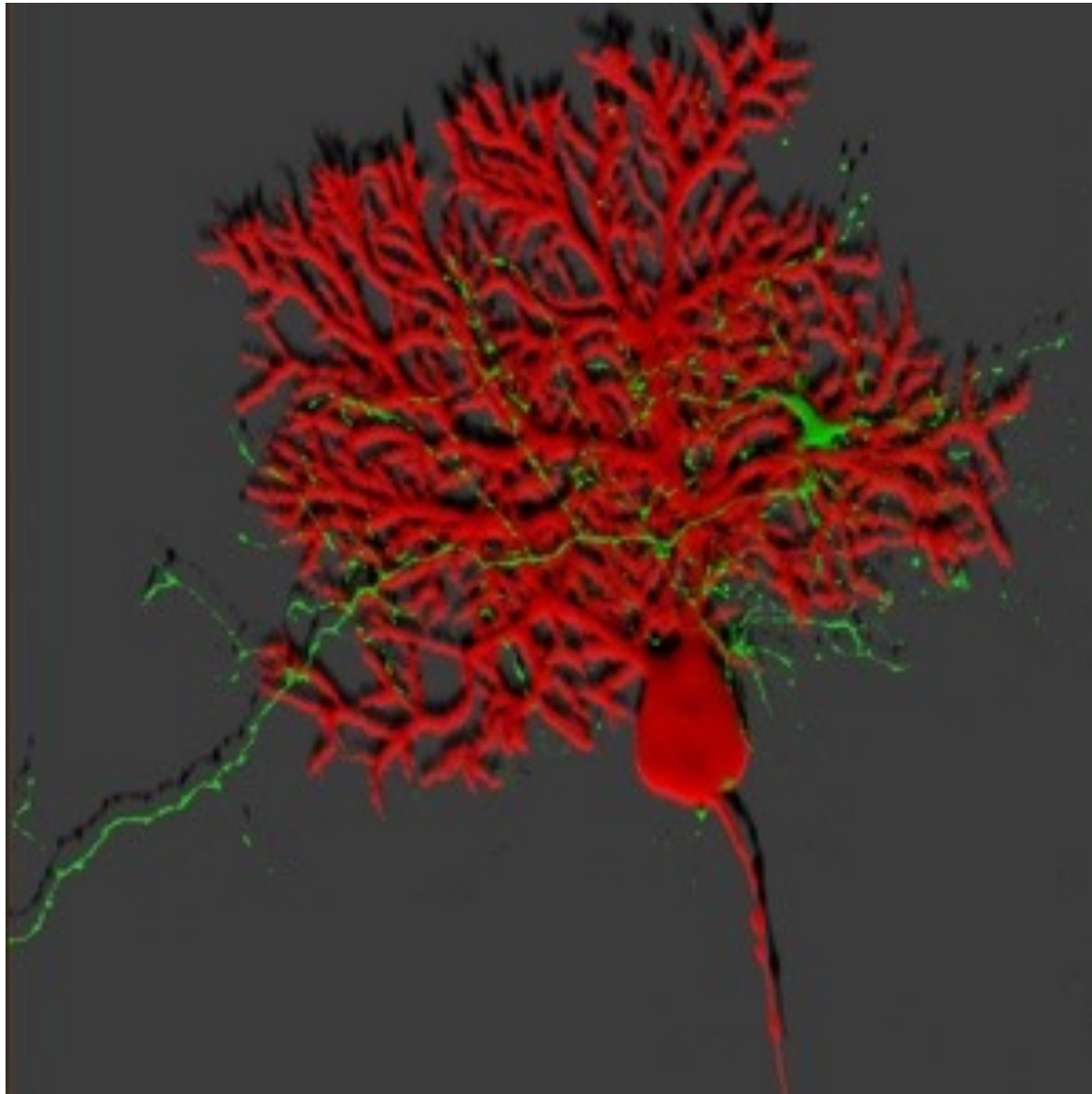
Cranial nerve nuclei of the brainstem





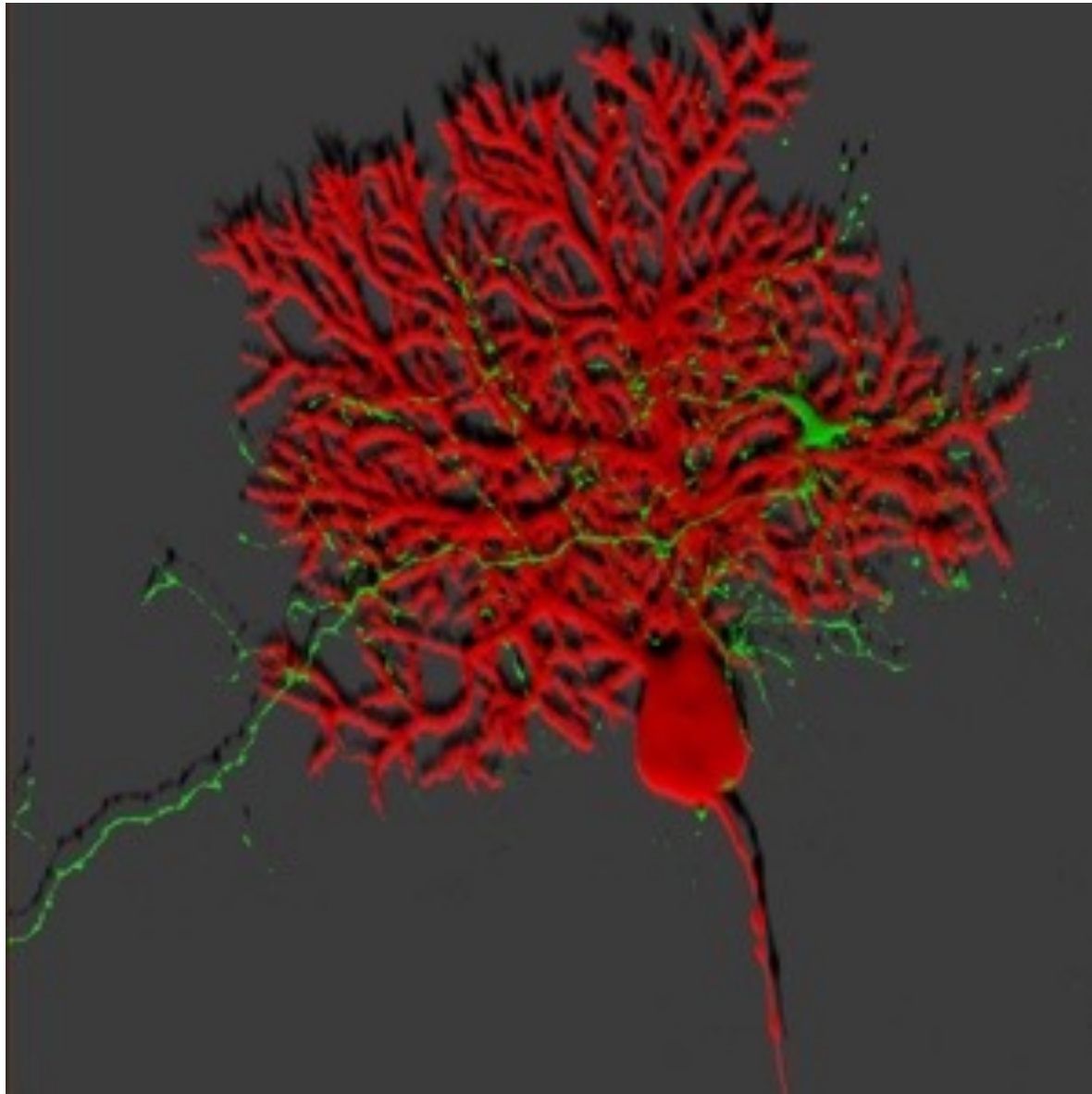






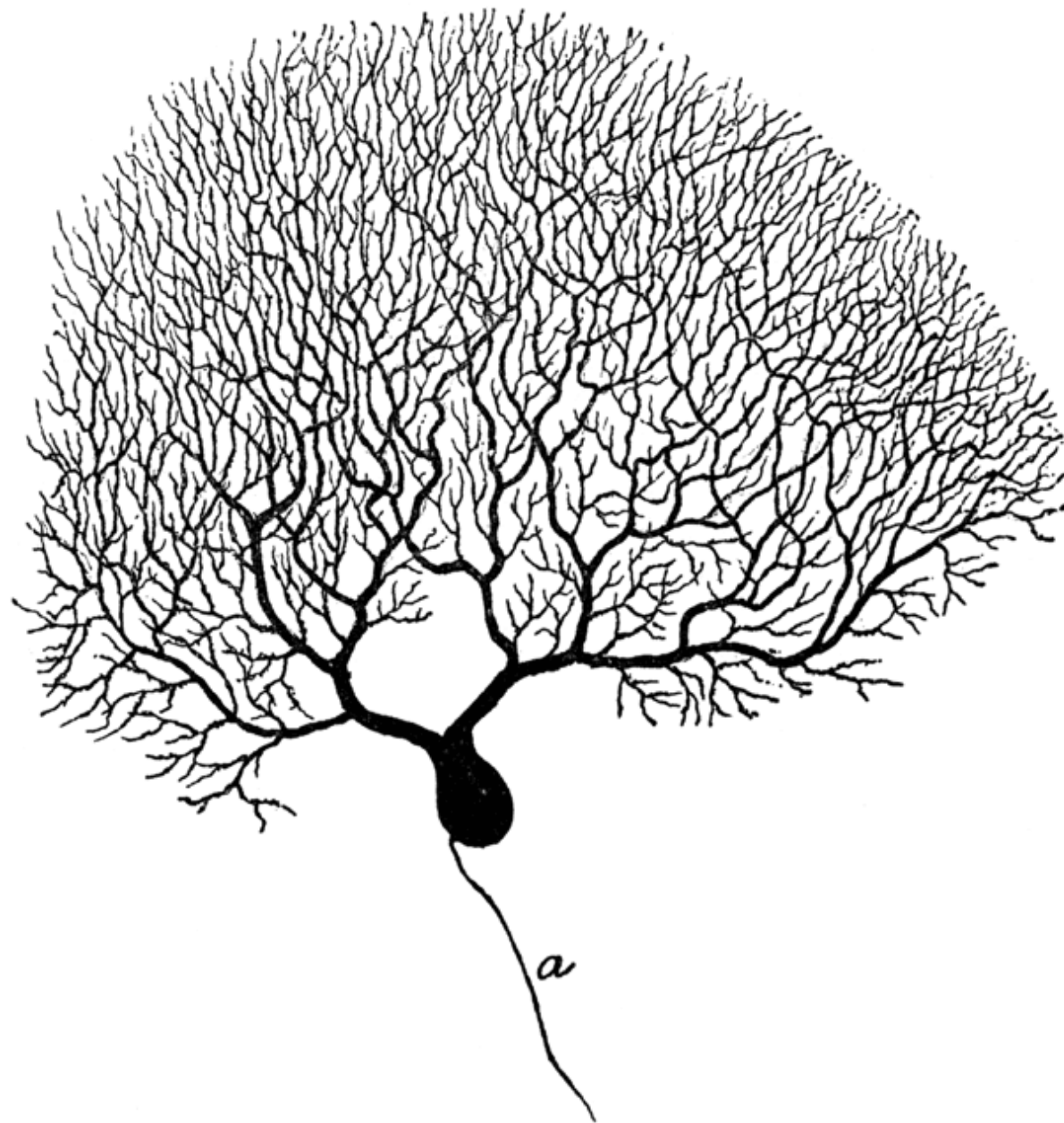
Confocal image of Purkinje cell (red) and an afferent (green): M. Hausser (University College London, UK)

Afferent



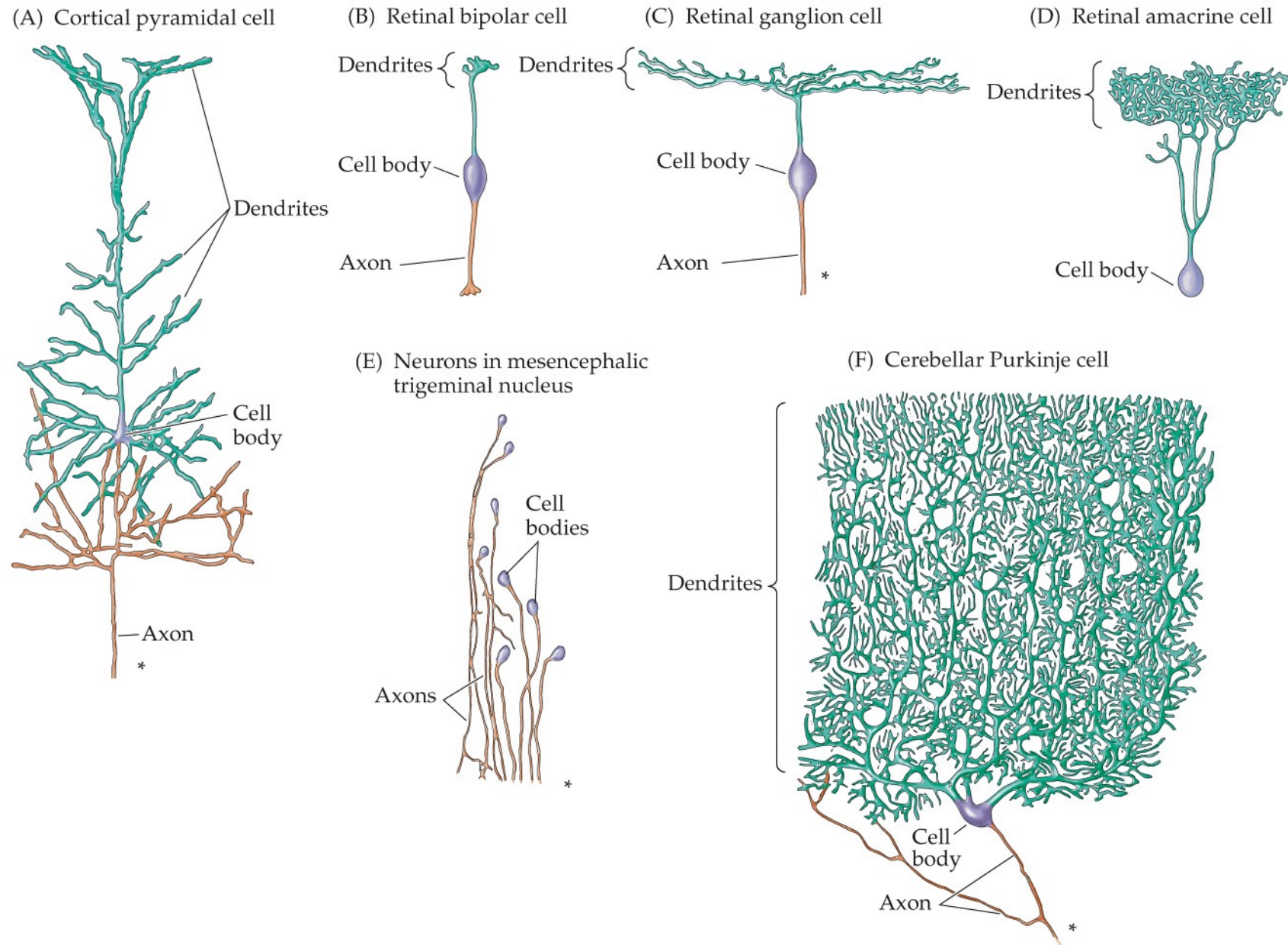
Efferent

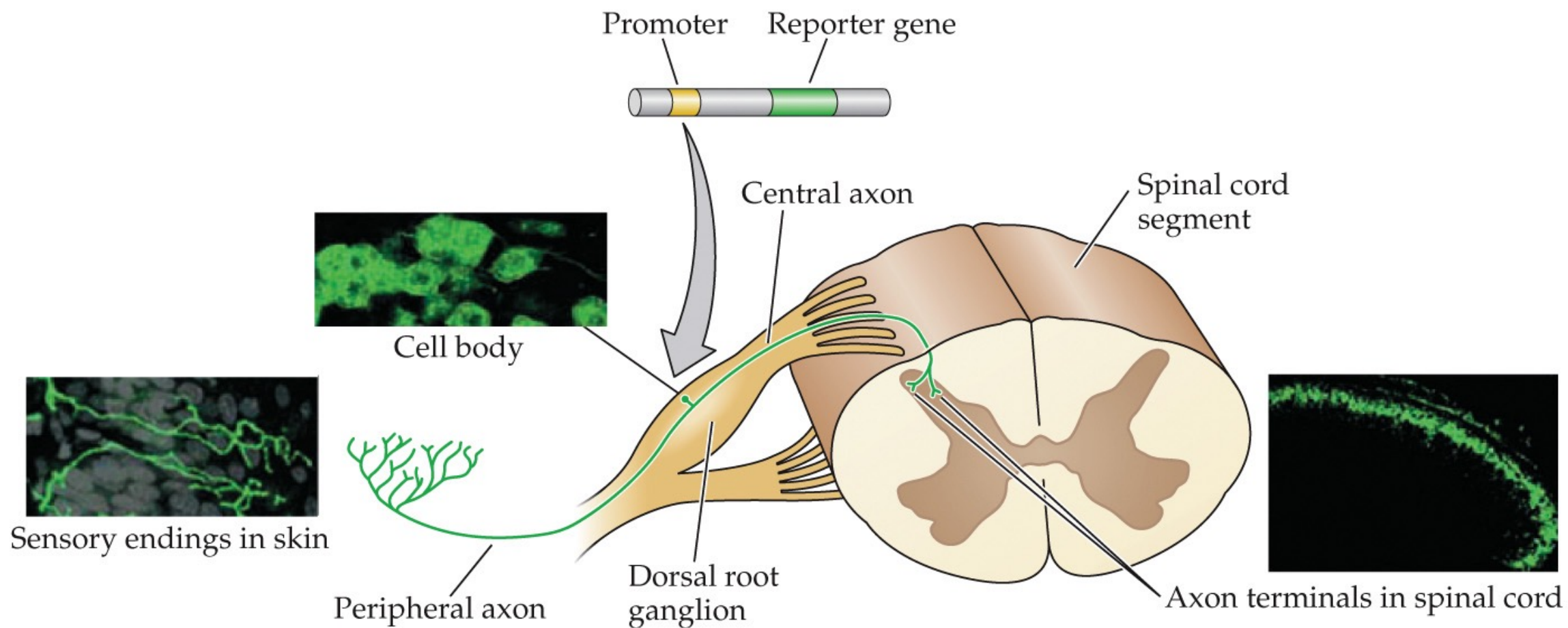
A



B



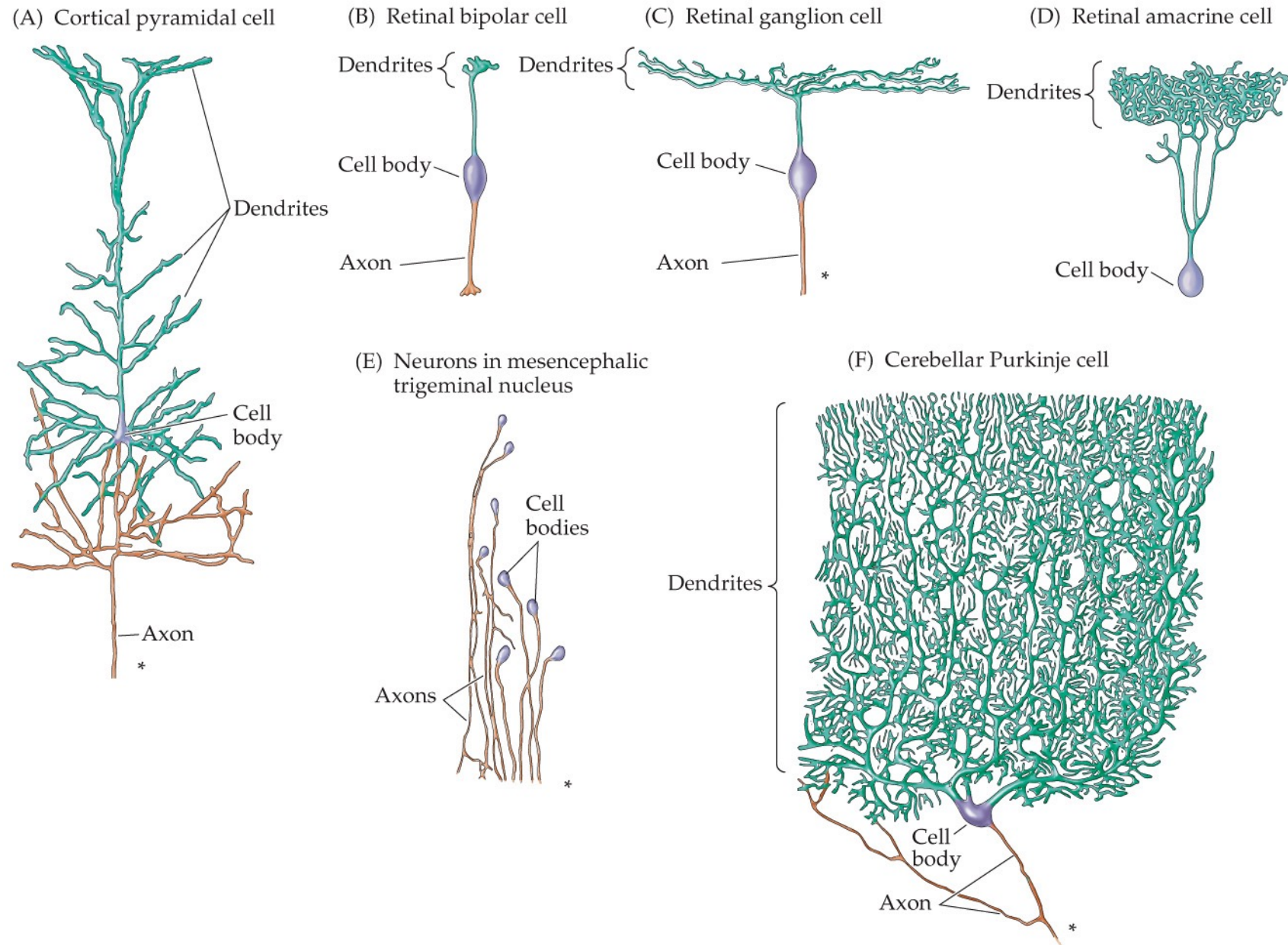




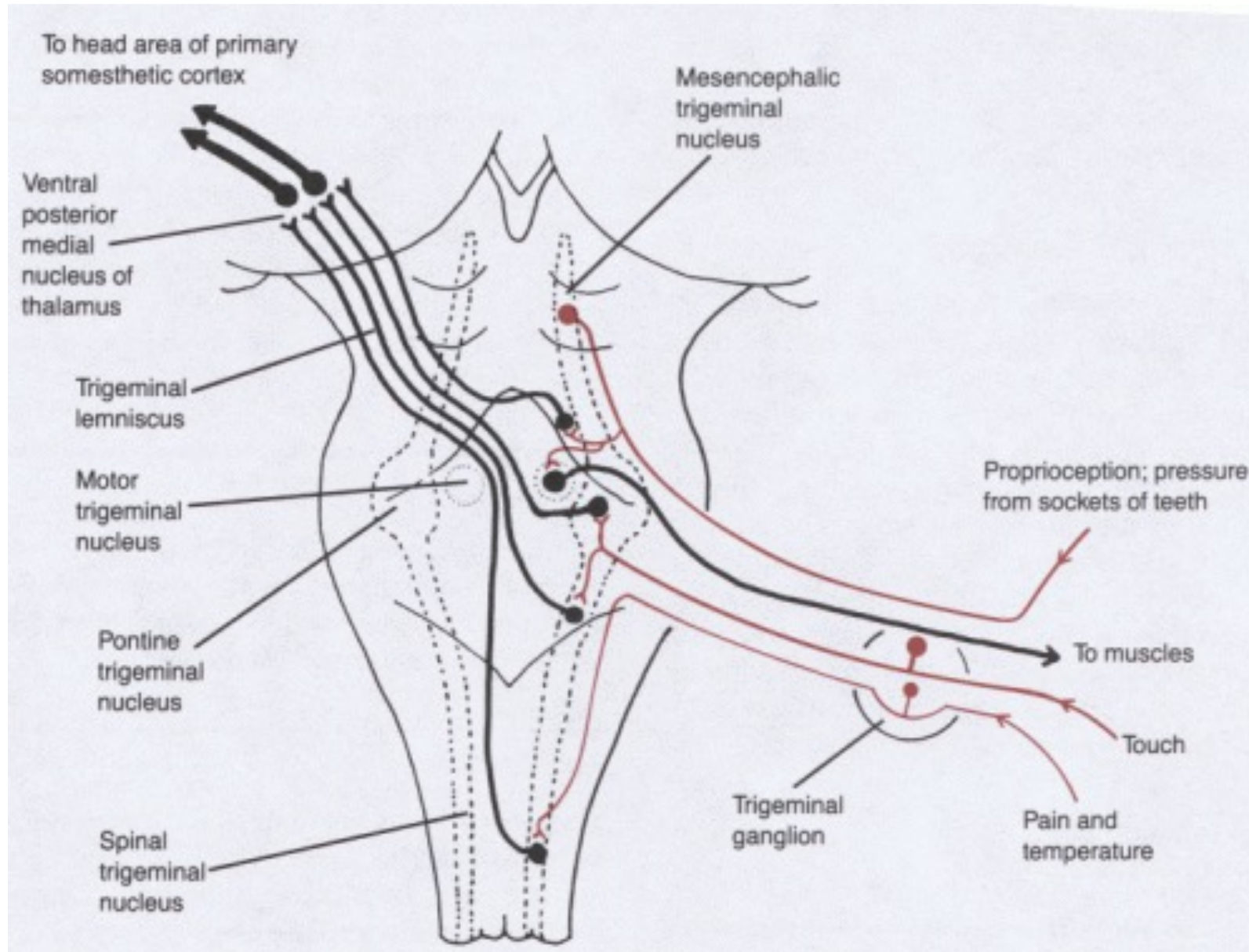
From Zylka et al. (2005) *Neuron* 46: 17–25.

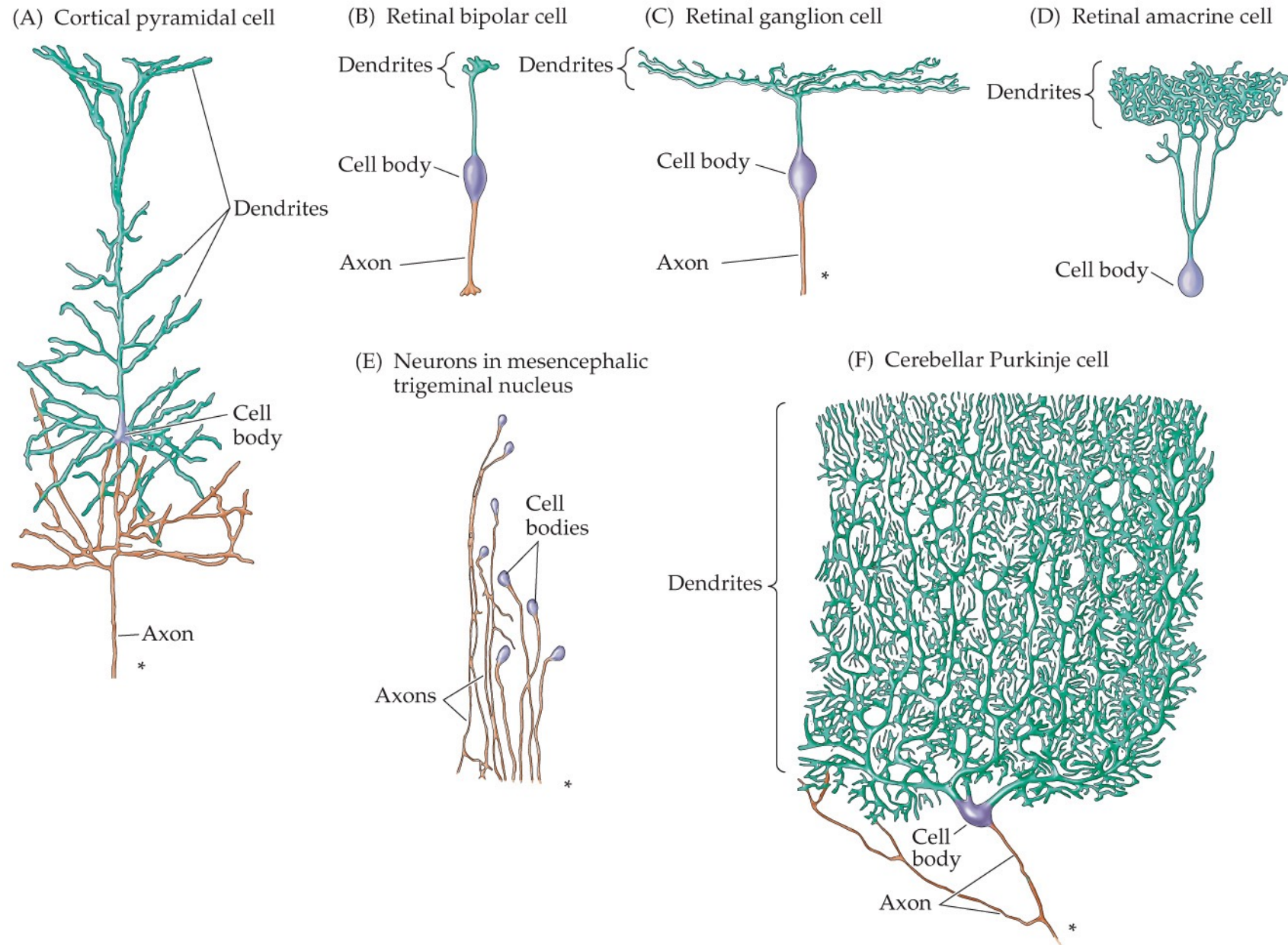
NEUROSCIENCE 6e, Figure 1.15

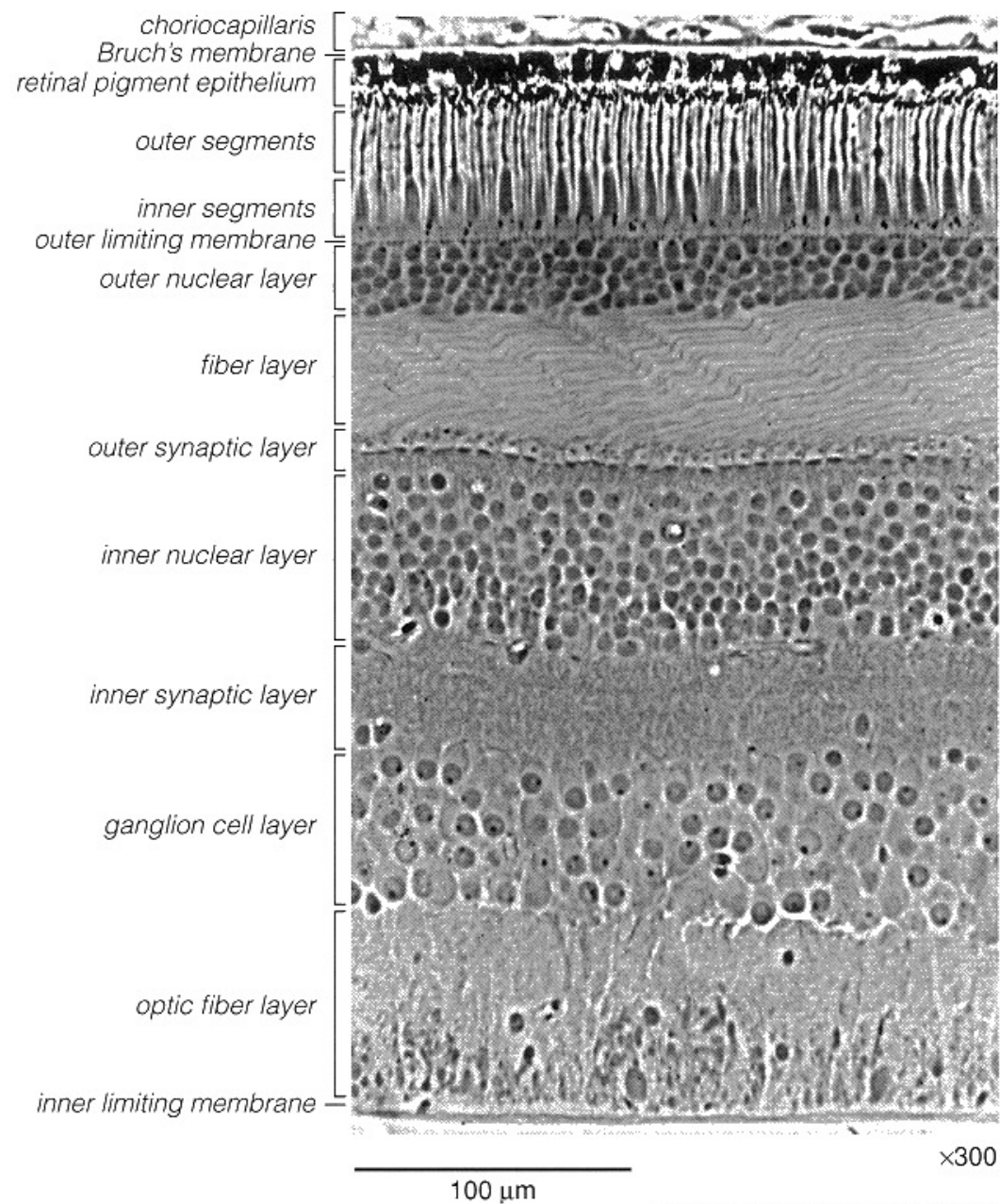
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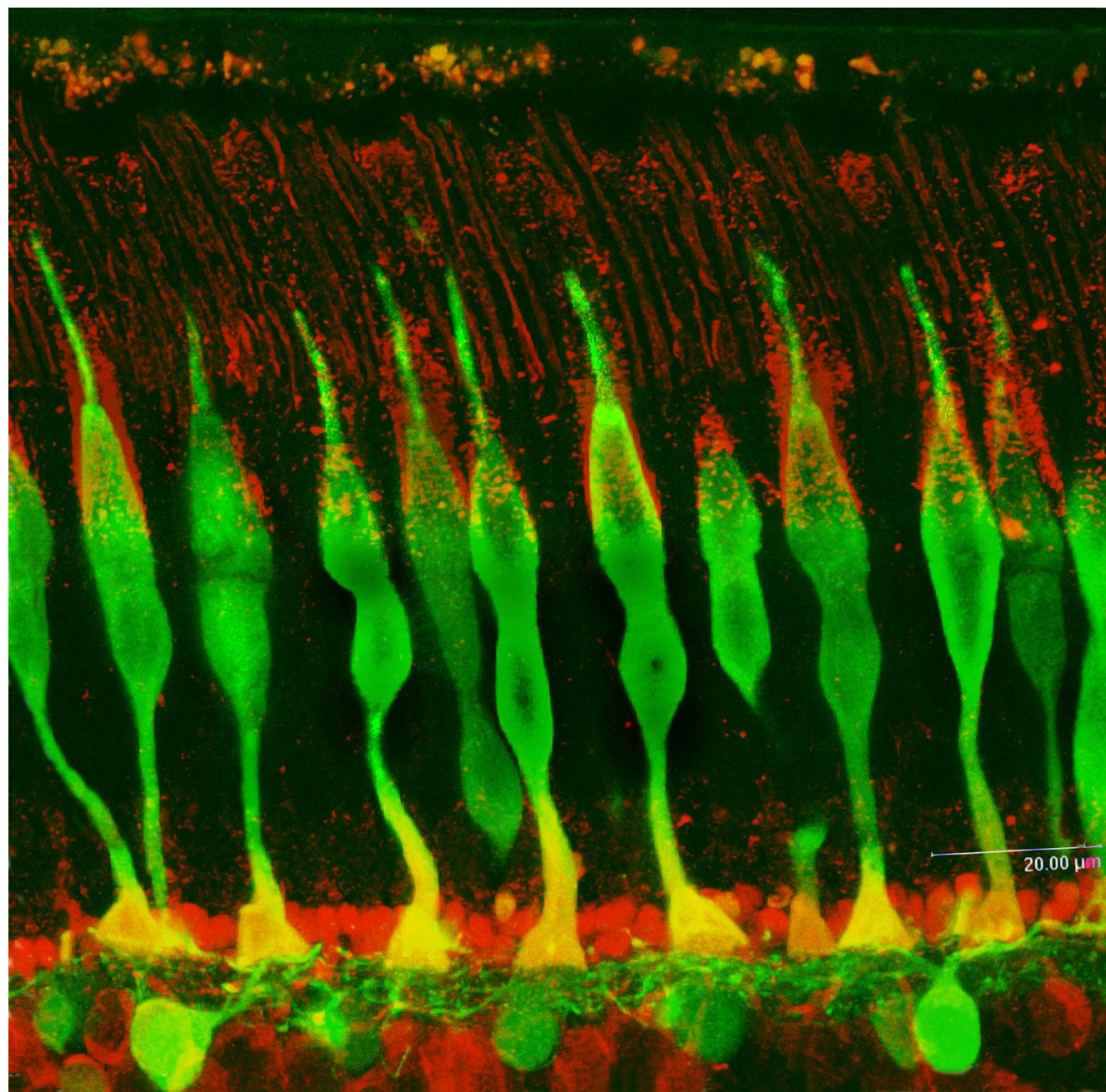
Cranial Nerve V (Trigeminal Nerve)

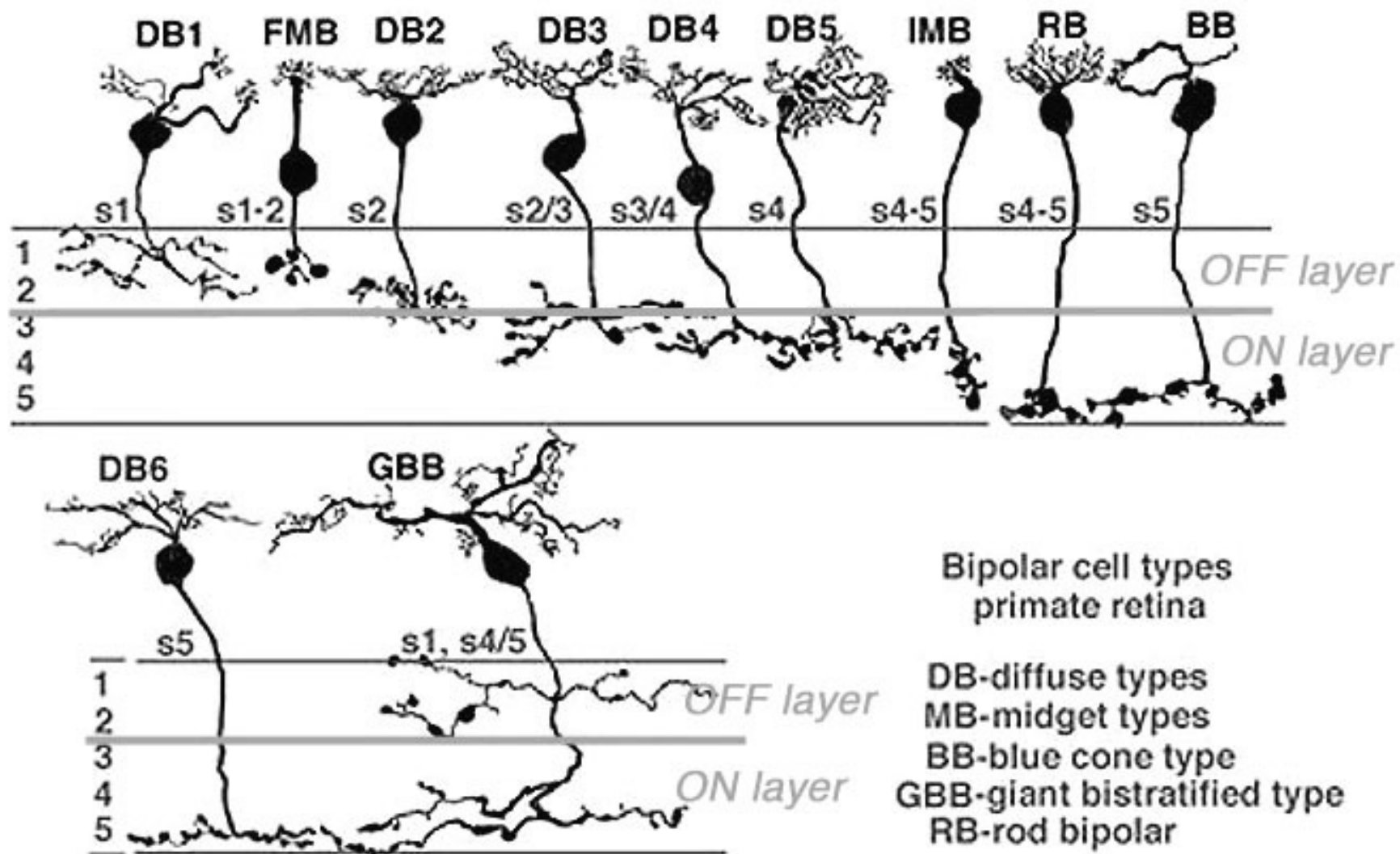




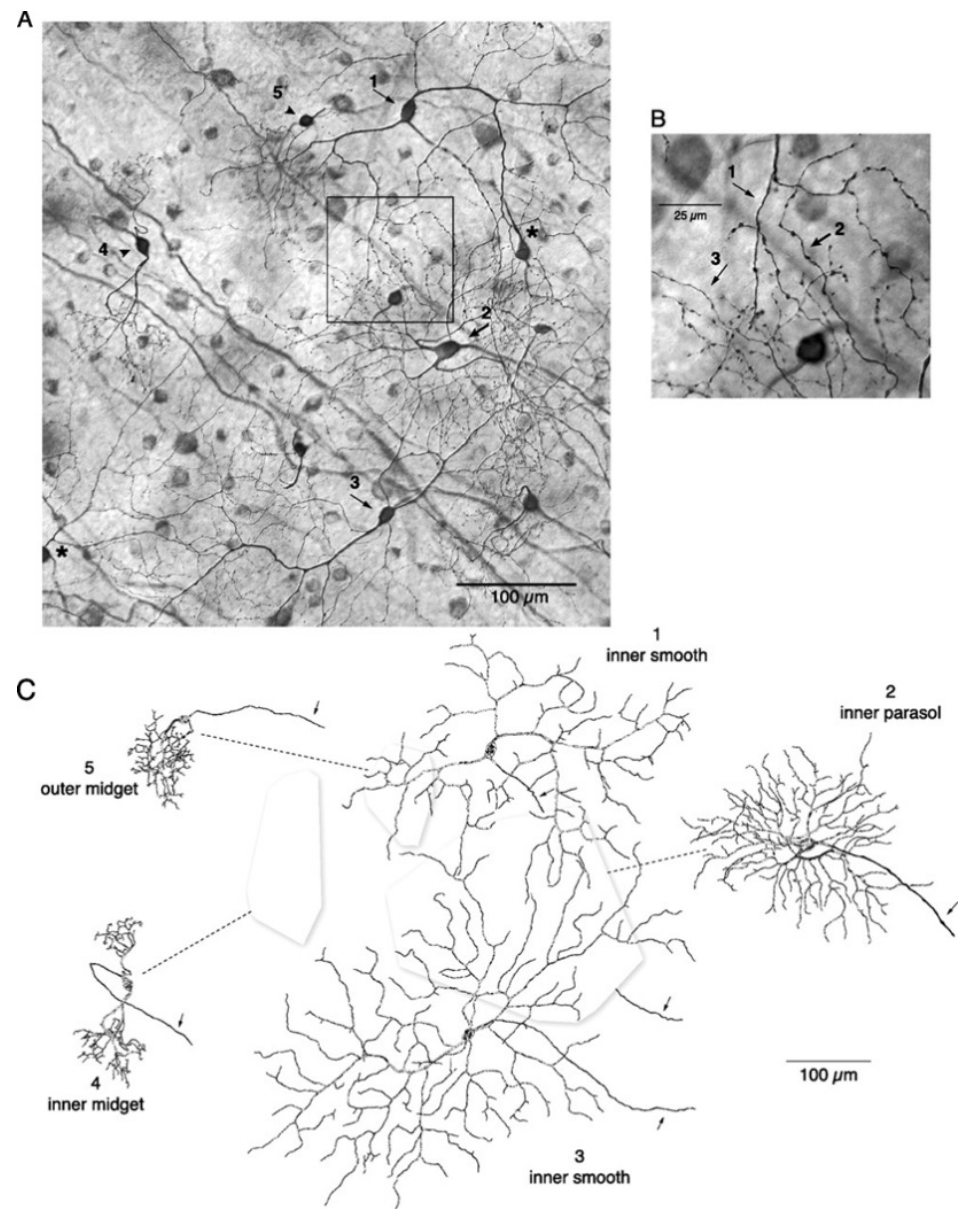
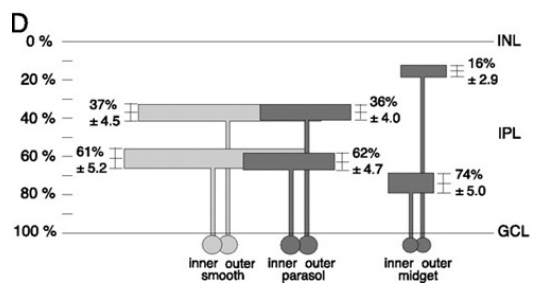
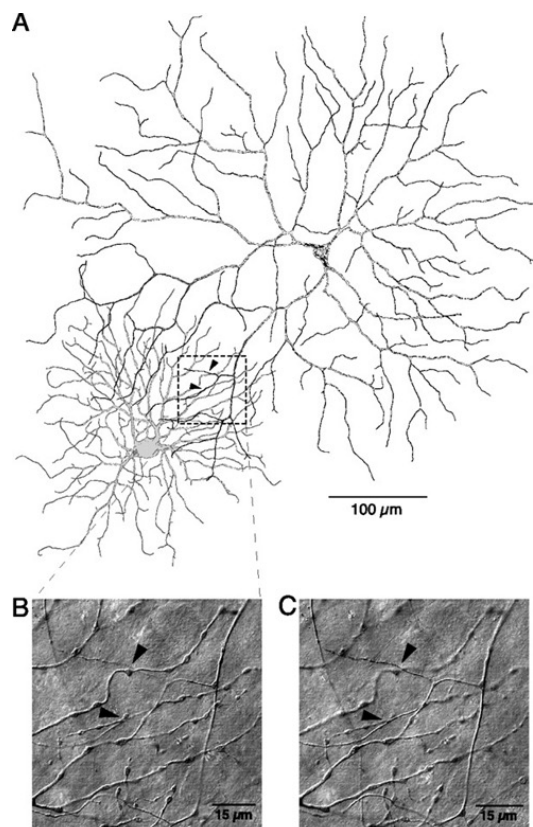


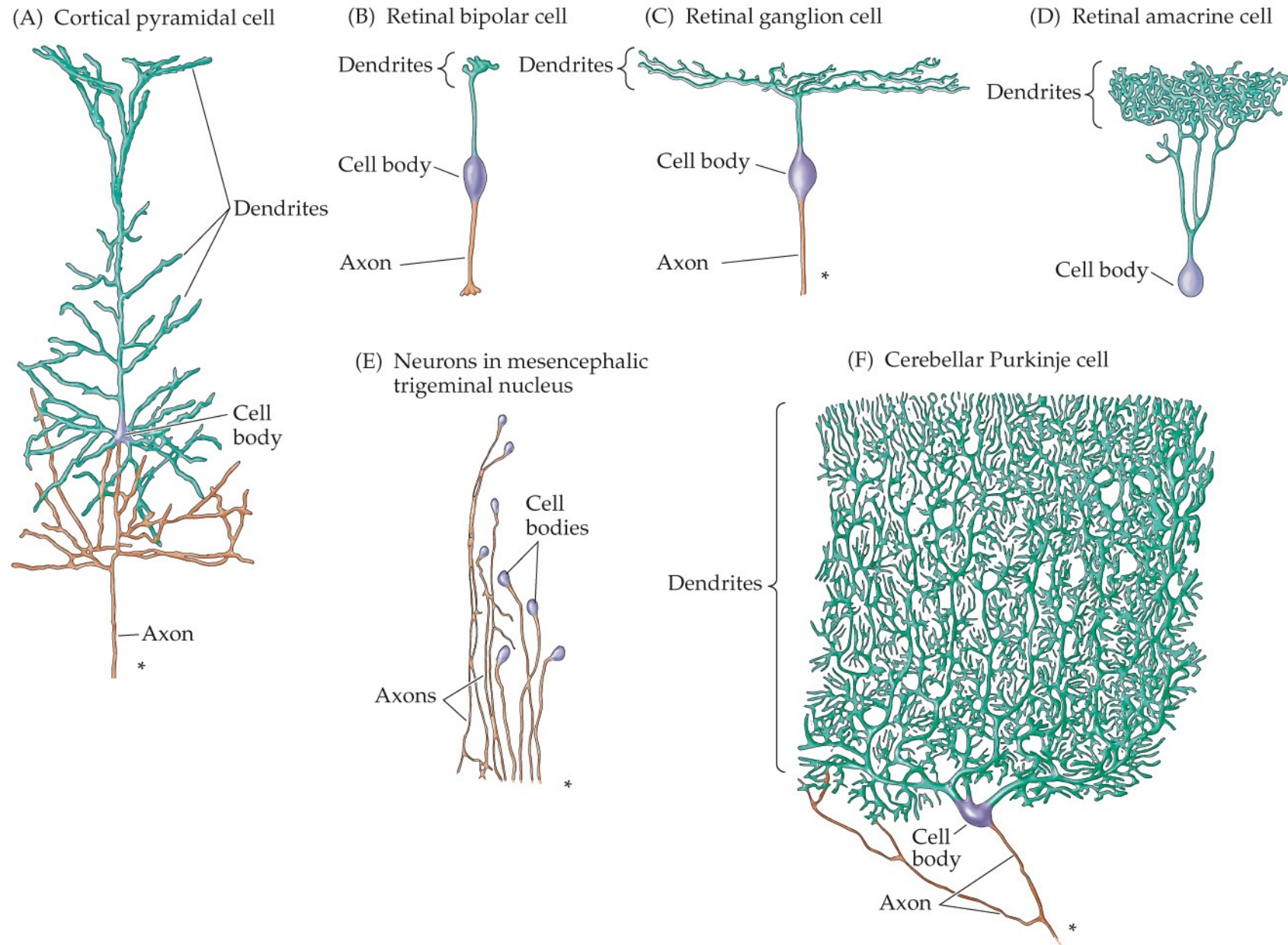
source: Boycott and Dowling, 1969





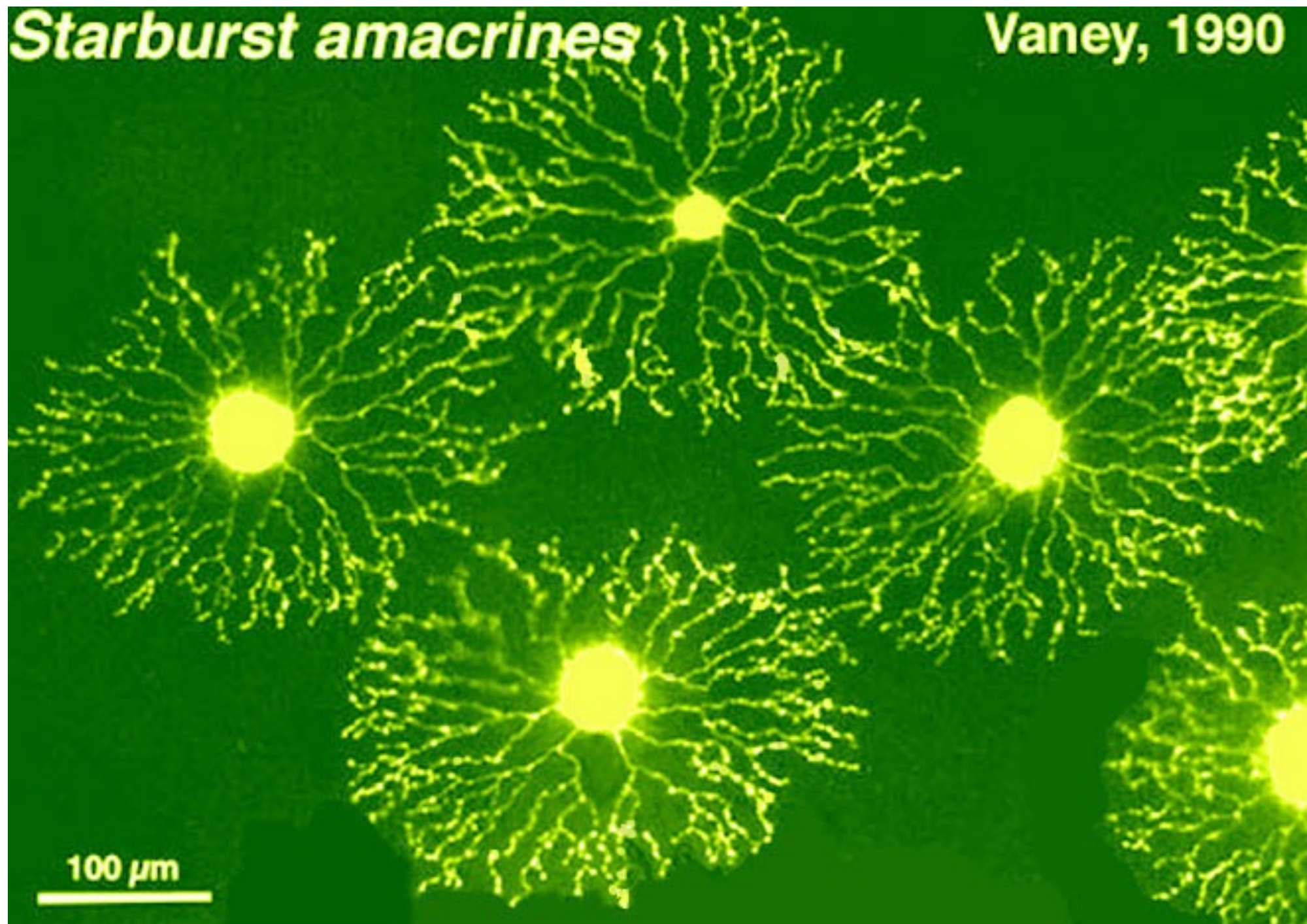
Bipolar cell types in human retina. (From Golgi staining).



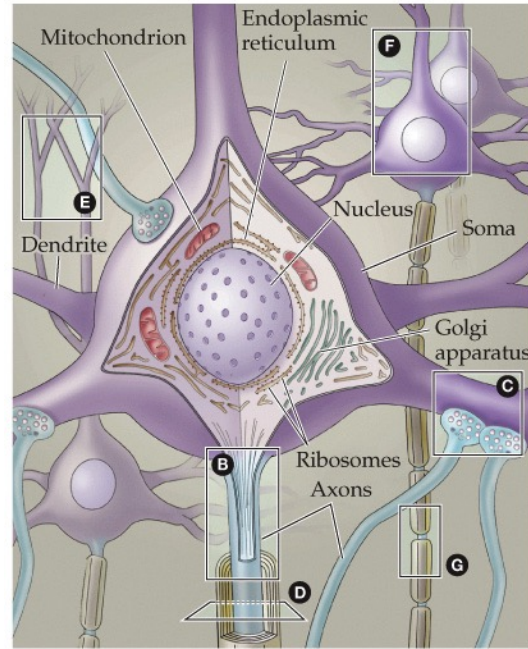


Starburst amacrines

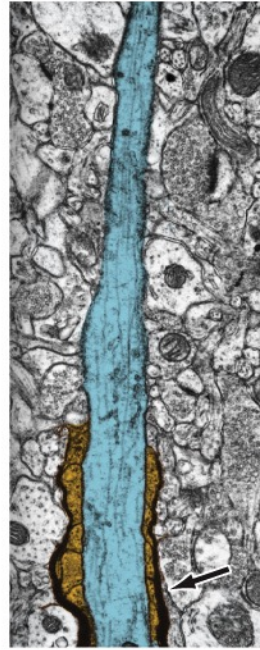
Vaney, 1990



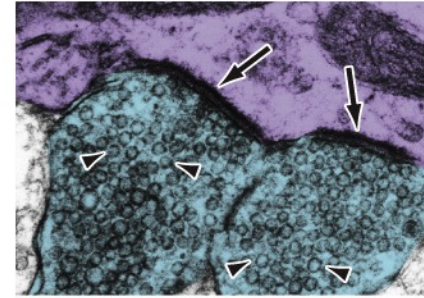
(A)



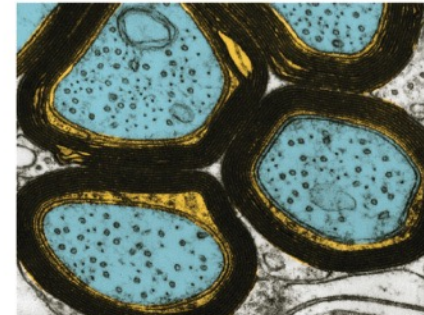
(B) Axon



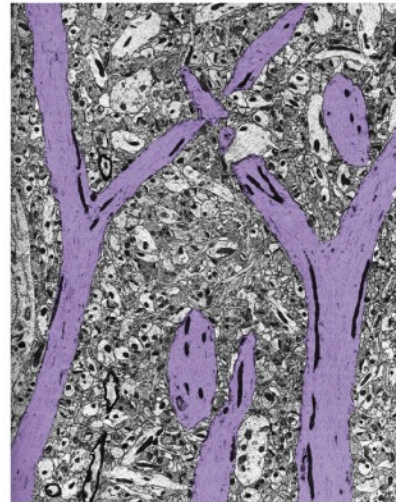
(C) Synaptic endings (terminal boutons)



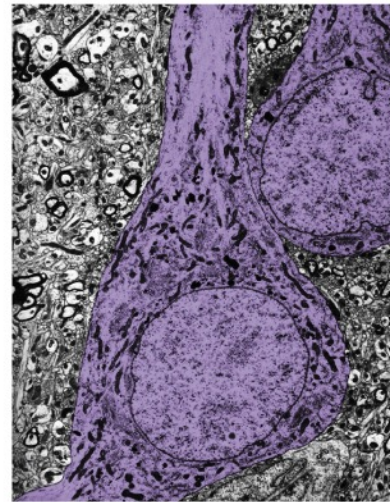
(D) Myelinated axons



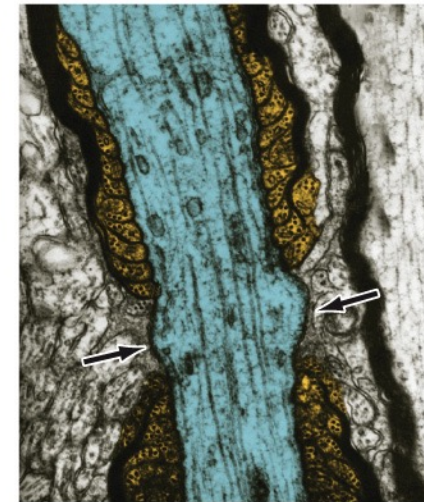
(E) Dendrites



(F) Cell body (soma)

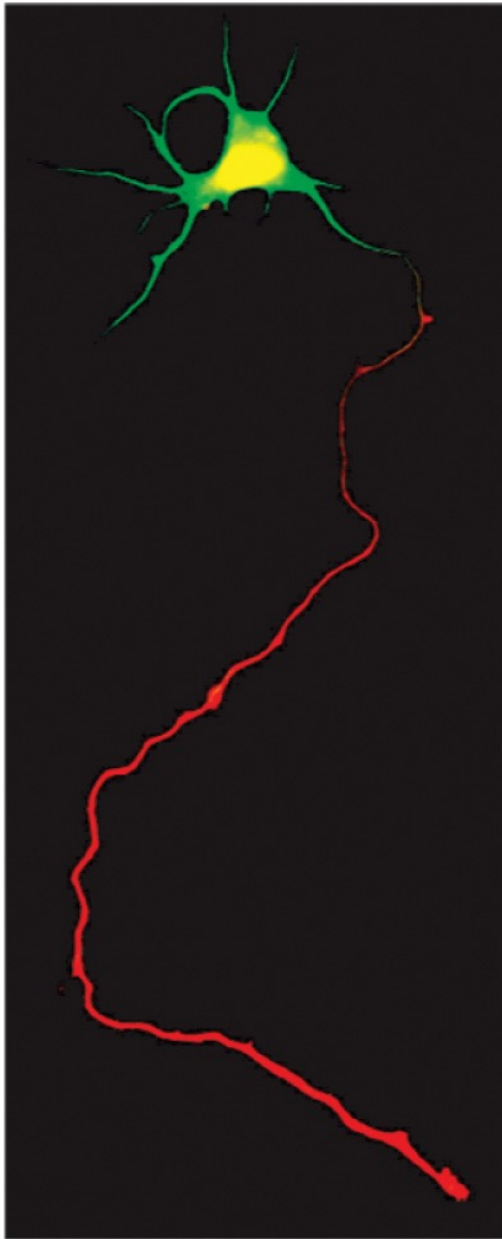


(G) Myelinated axon and node of Ranvier



Photos: From Peters et al. (1991) *Neurons and Their Supporting Cells*, 3rd Edition, Oxford University Press, New York.

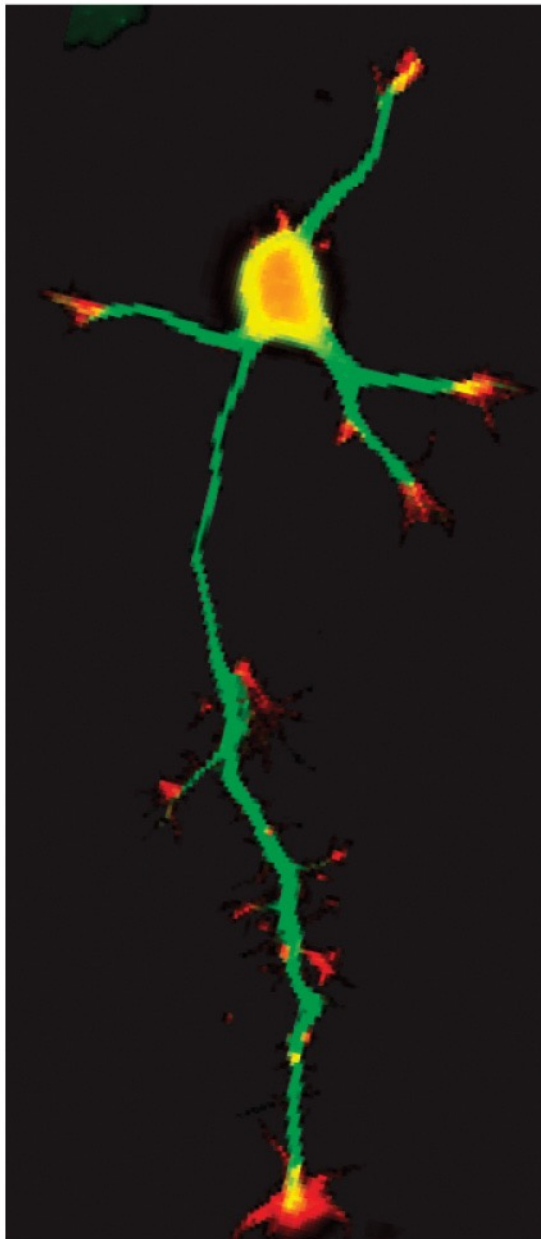
(A)



Courtesy of Y. N. Jan.

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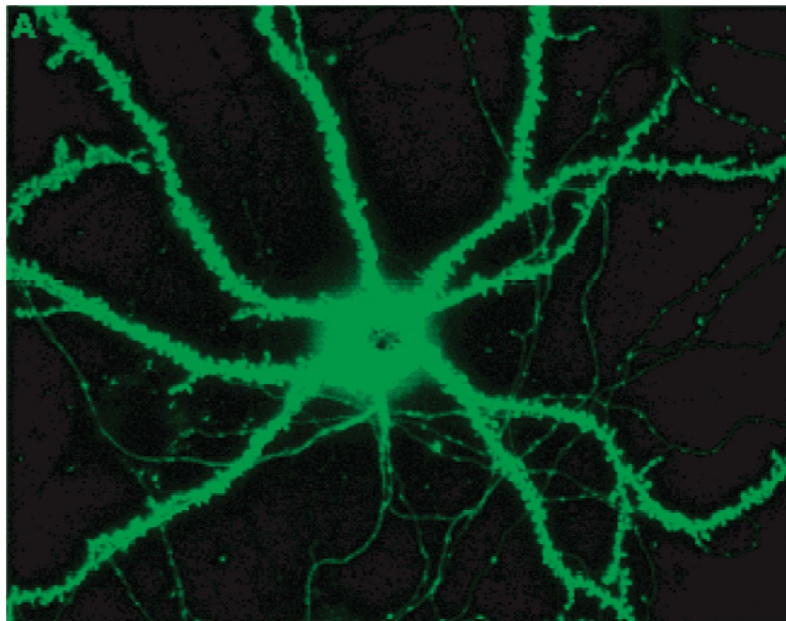
(B)



From Kail et al. (2000) *Developmental Neurobiology* 44: 145–158.

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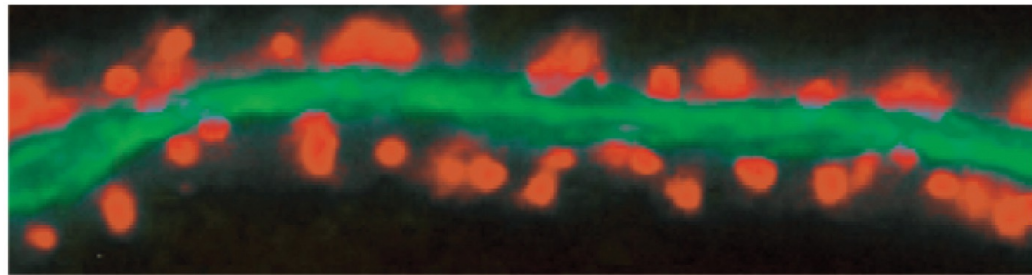
(E)



From Matus (2000) *Science* 290: 754–758.

NEUROSCIENCE 6e, Figure 1.4 (Part 5)
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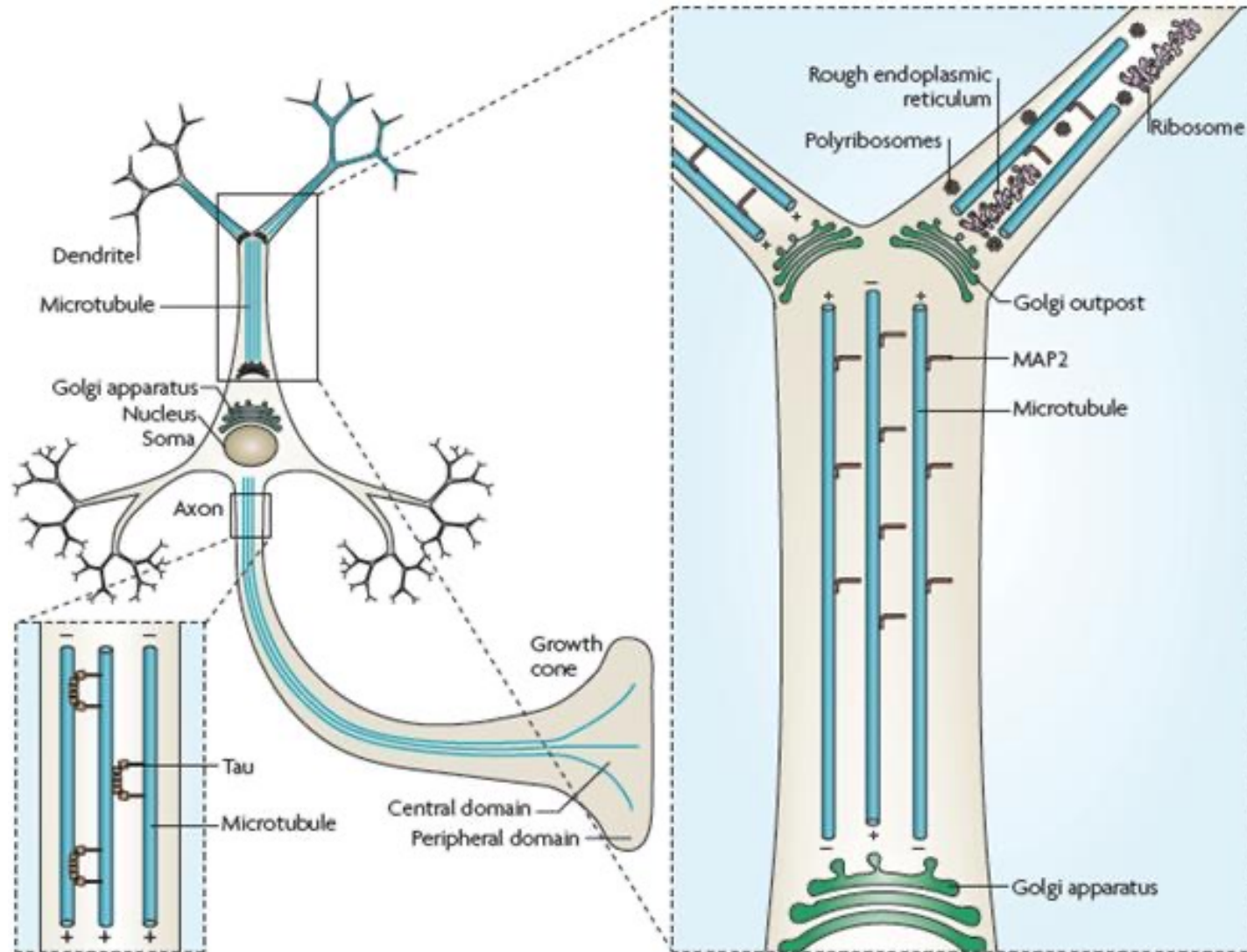
(F)



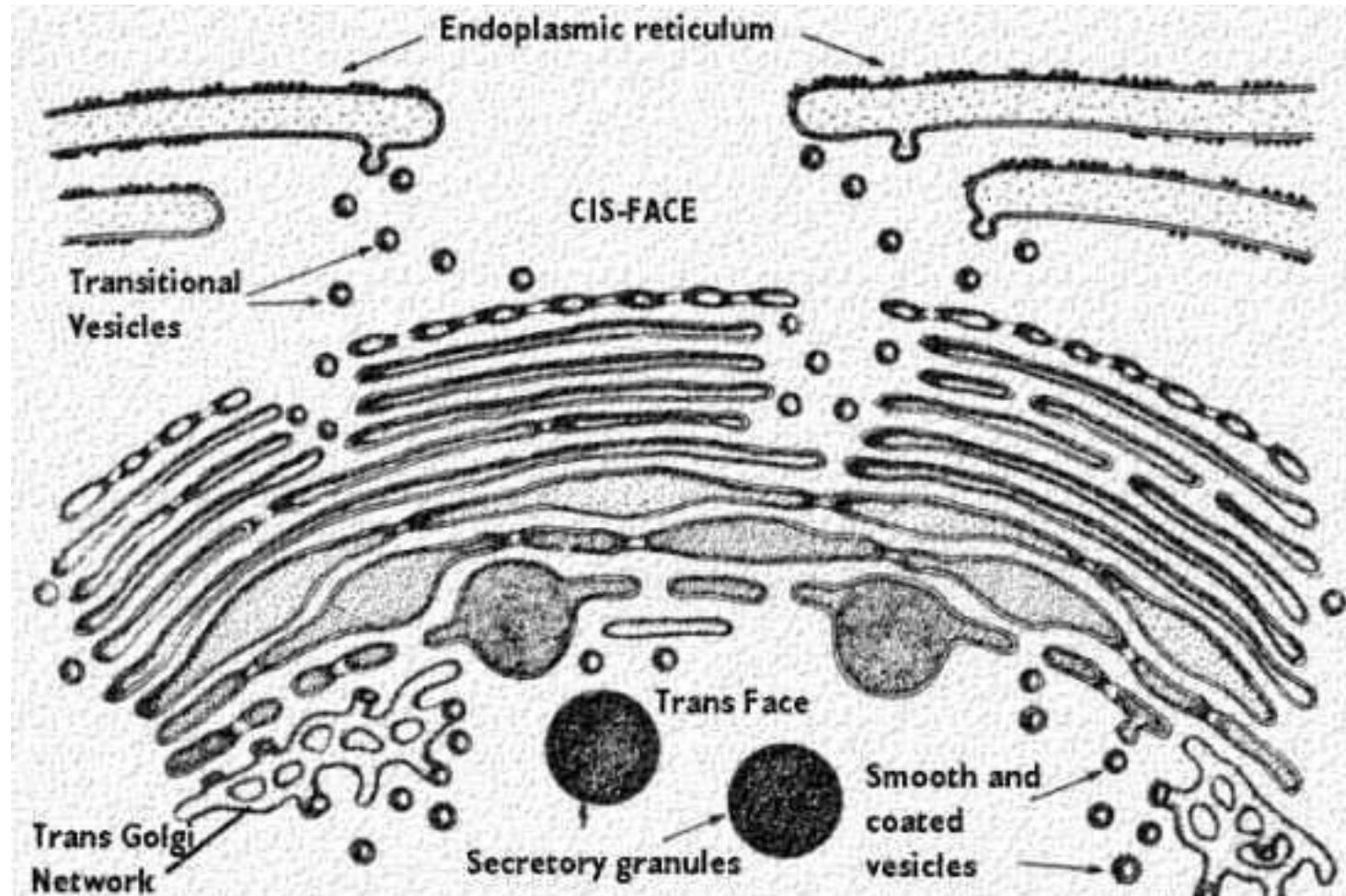
From Matus (2000) *Science* 290: 754–758.

NEUROSCIENCE 6e, Figure 1.4 (Part 6)
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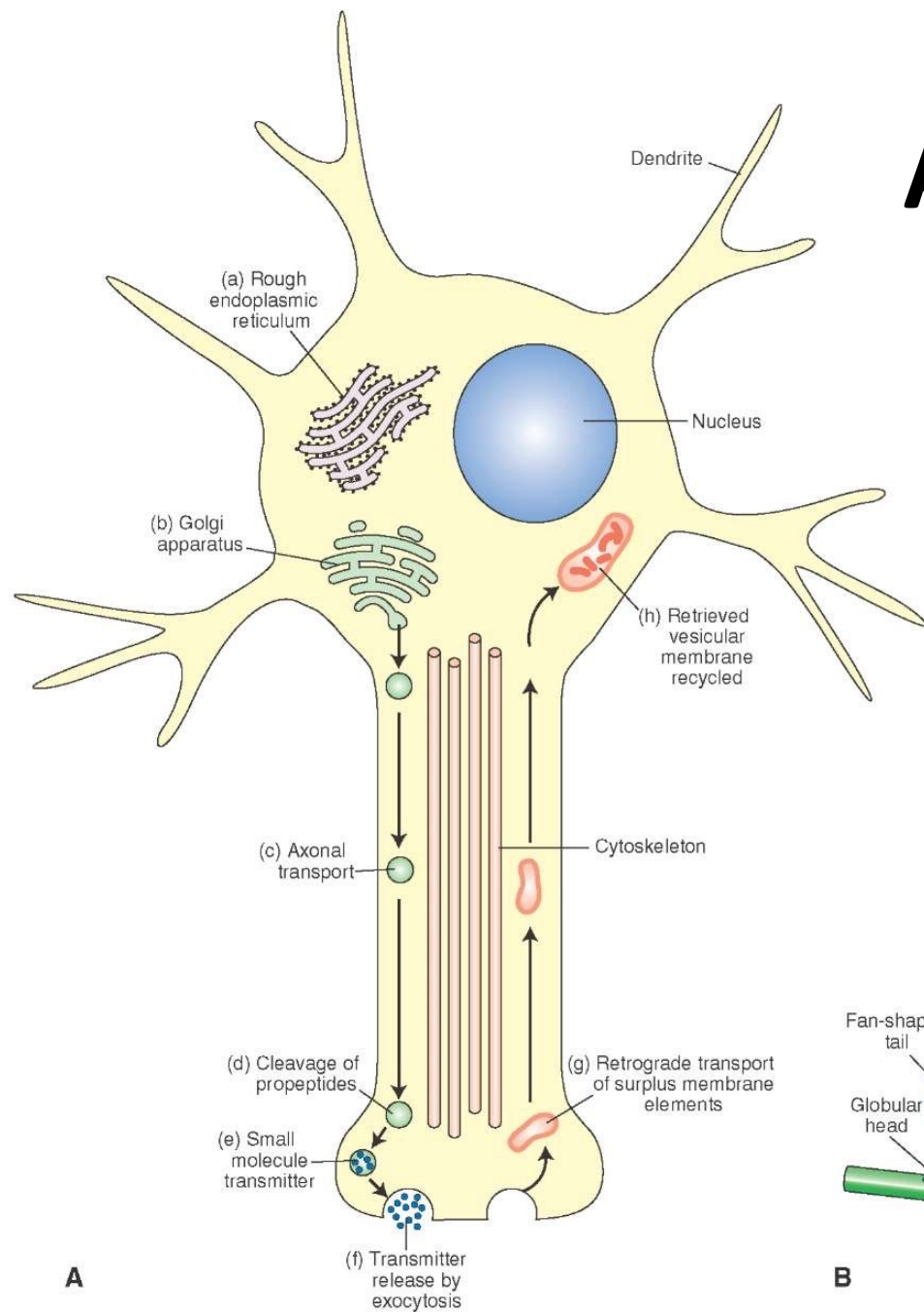
Golgi Complex



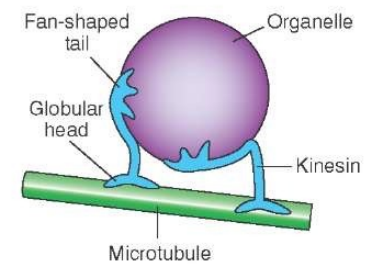
Golgi Complex



Axonal Transport

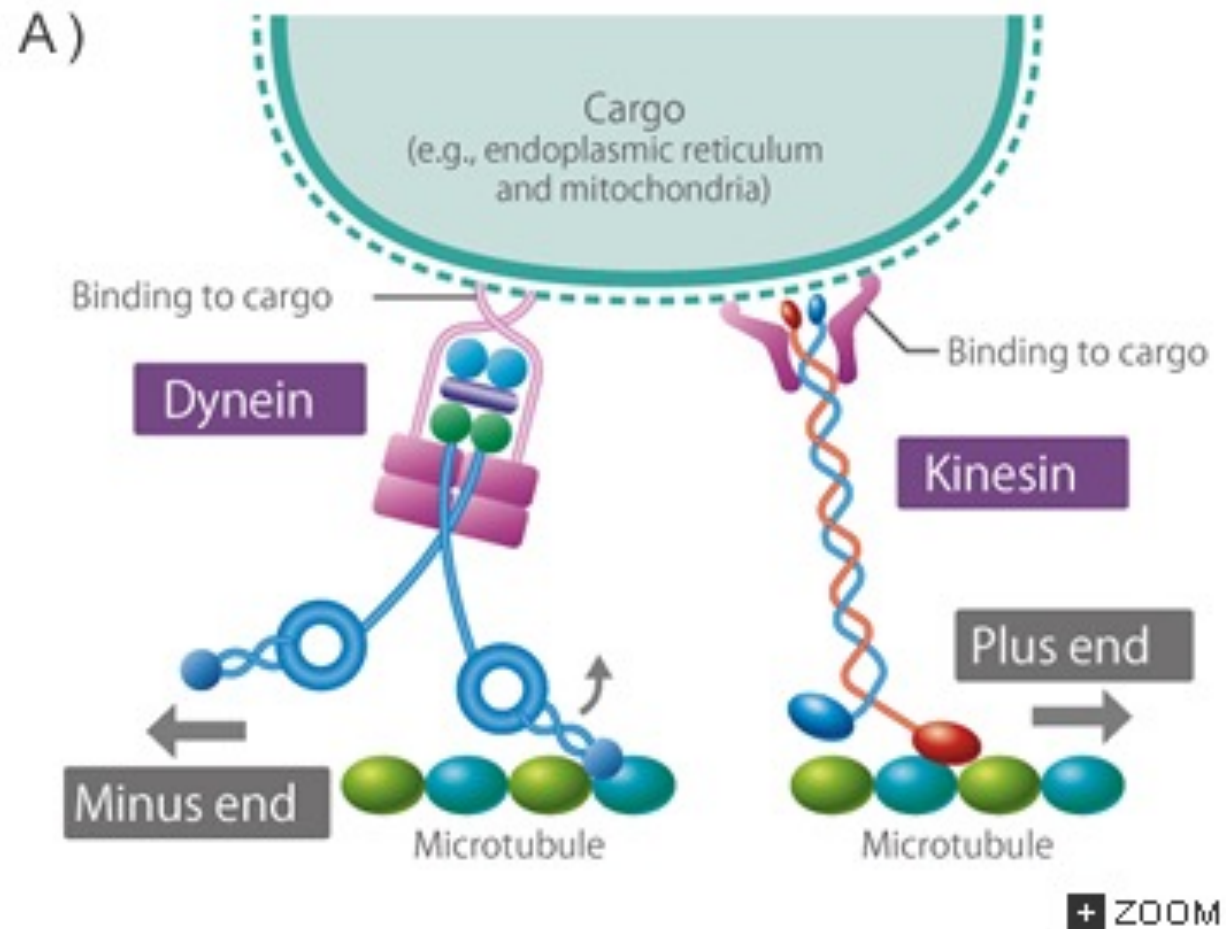


A



B

Axonal Transport



Neurotrophins

