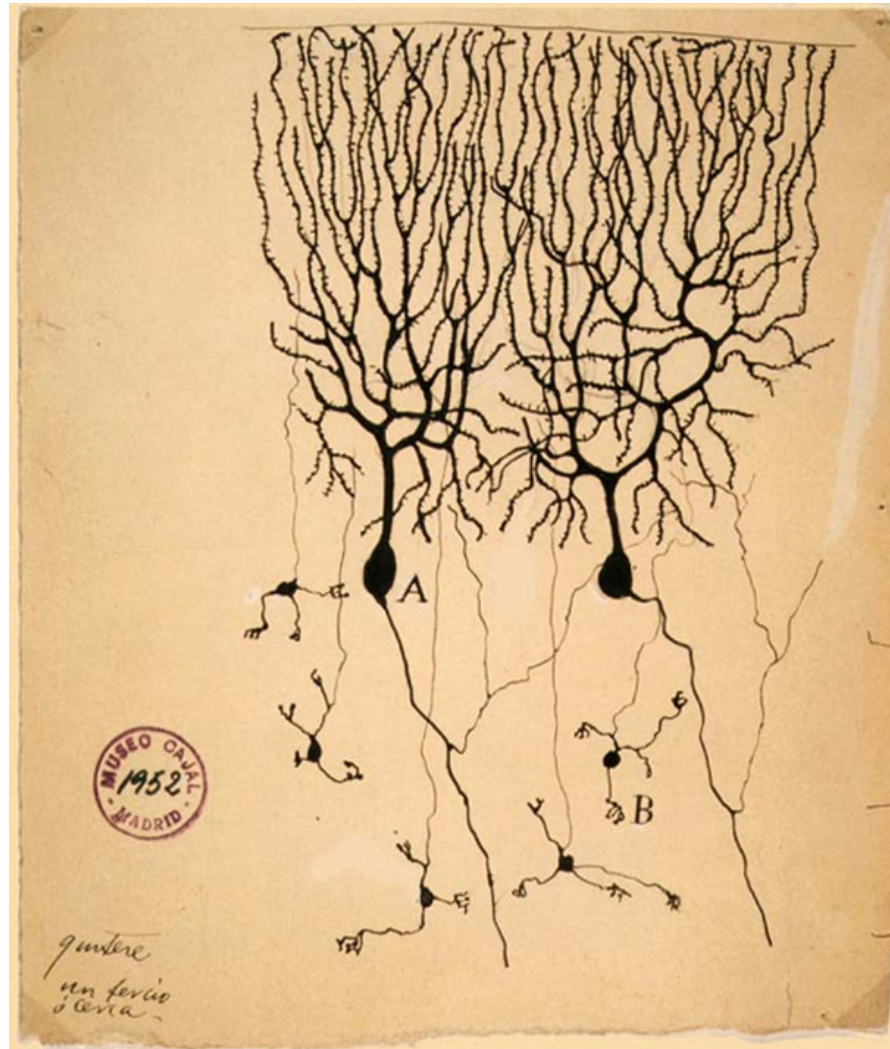


Introduction

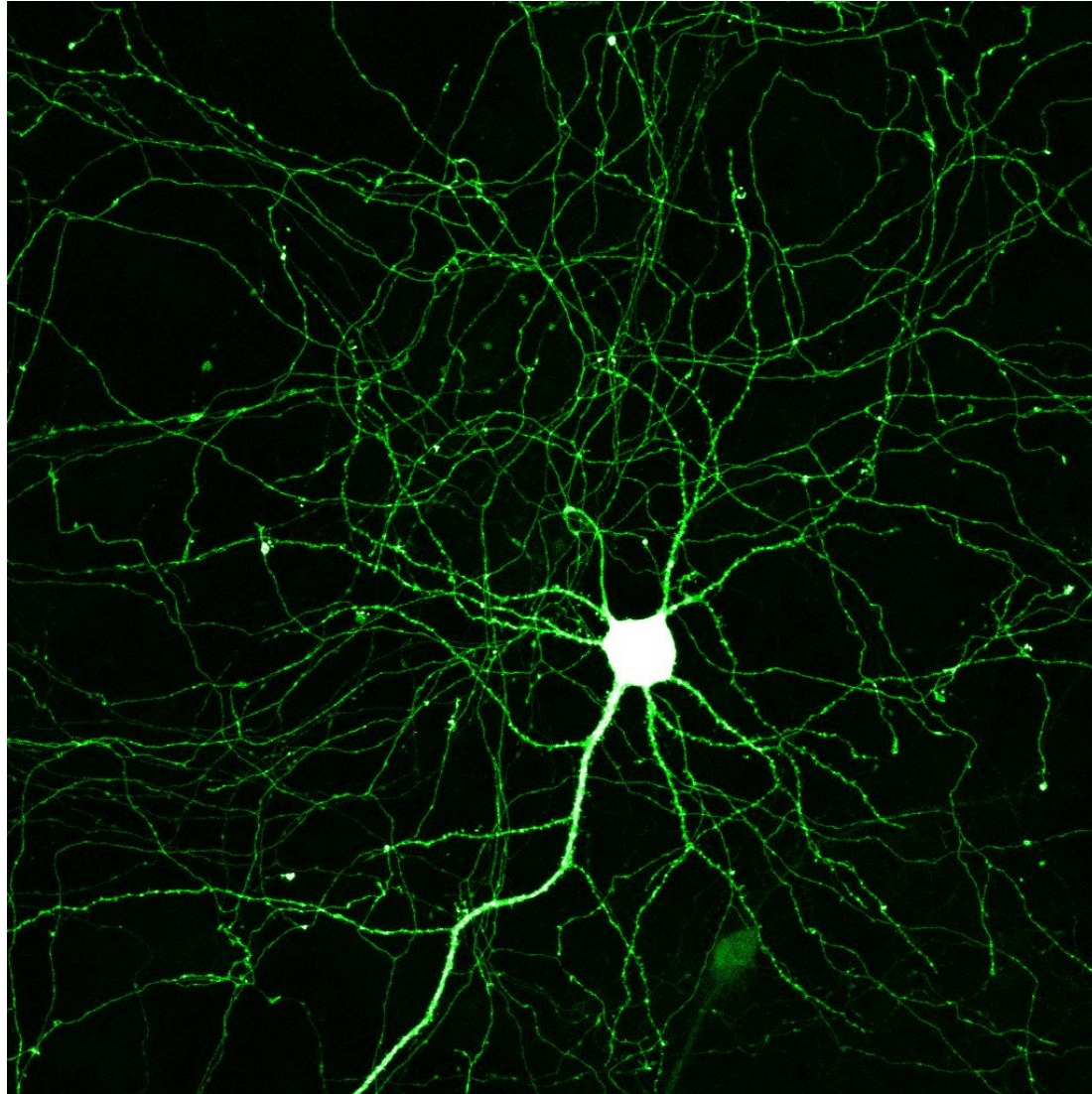
Sketch of Cerebellar Neurons by Santiago Cajal (1899)

A: Purkinje cells
B: Granule cells



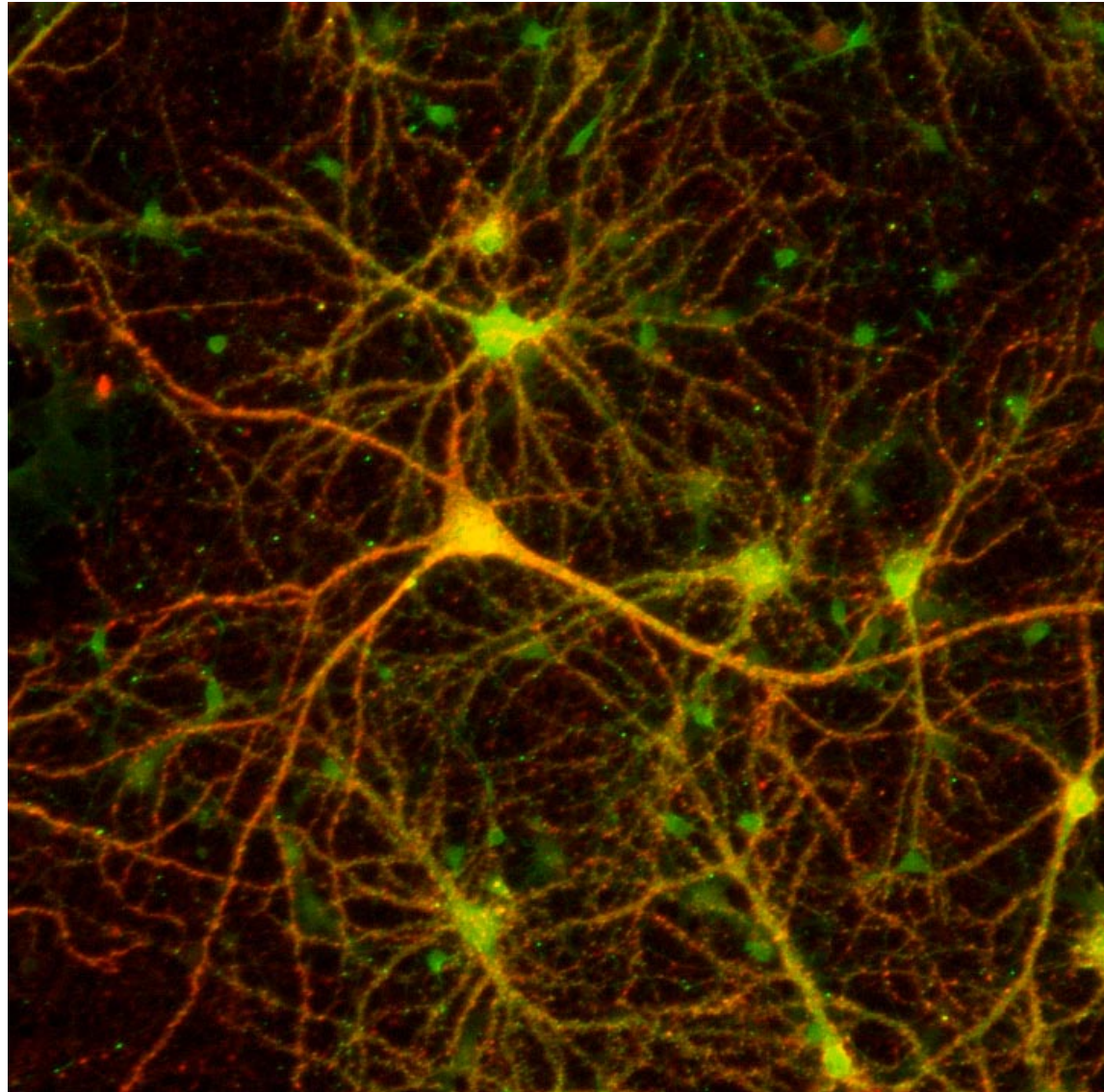
How do these cells work?

A Single Neuron



A stained neuron with an extensive dendritic tree

A Population of Neurons



Several stained and possibly interconnected neurons

Invertebrates are good to study due to simple neural circuitry

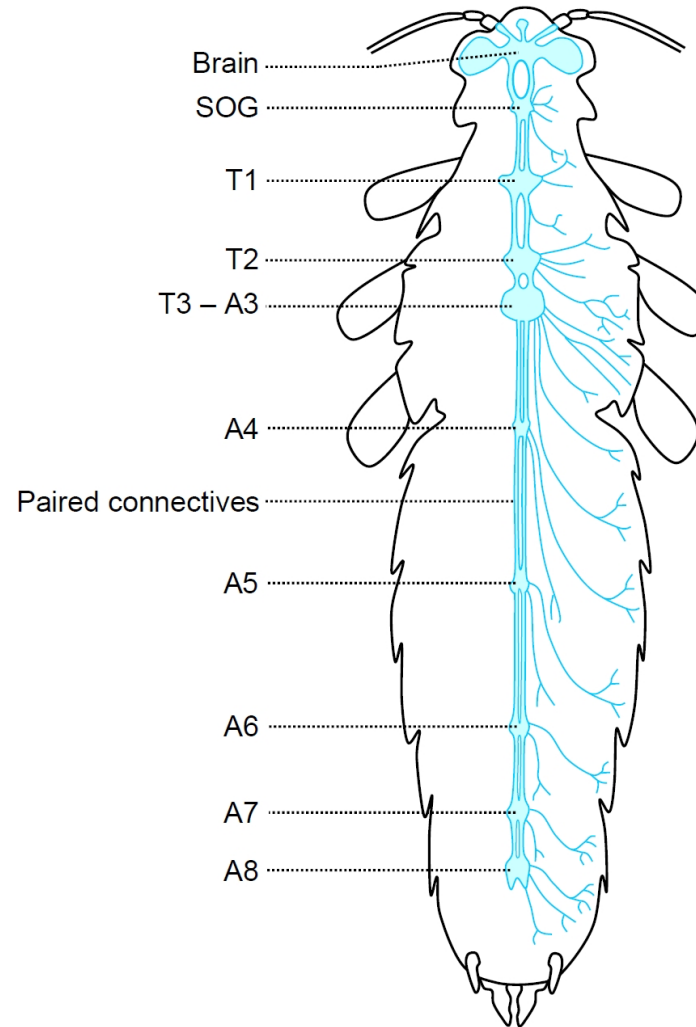
C. Elegans



302 neurons, 56 glial cells
contained in head and tail ganglia
and a spinal cord-like ventral nerve

Grasshopper Nervous System

The insect nervous system (grasshopper)

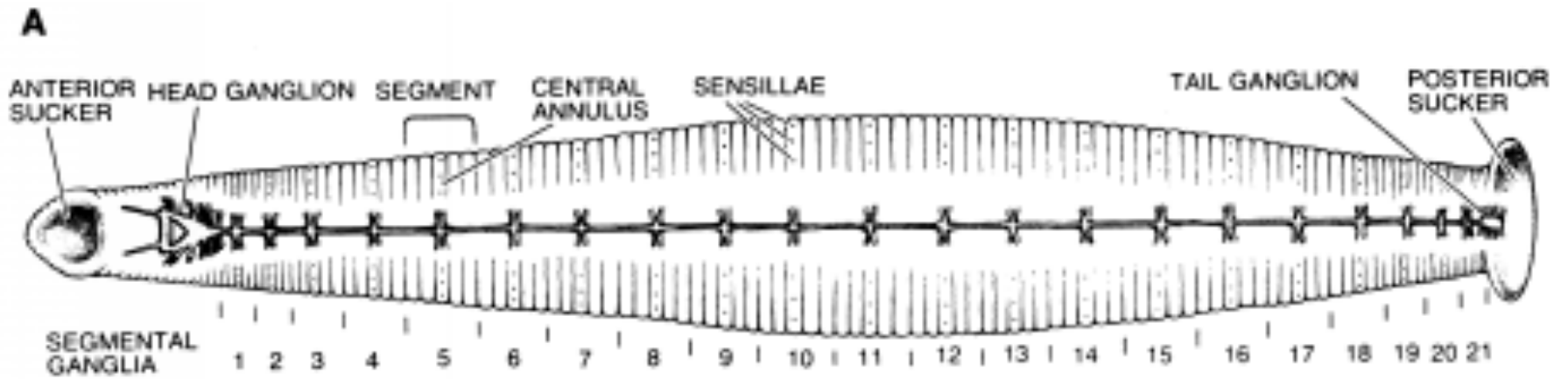


Nerve cells in ganglia, connected by a spinal cord-like structure

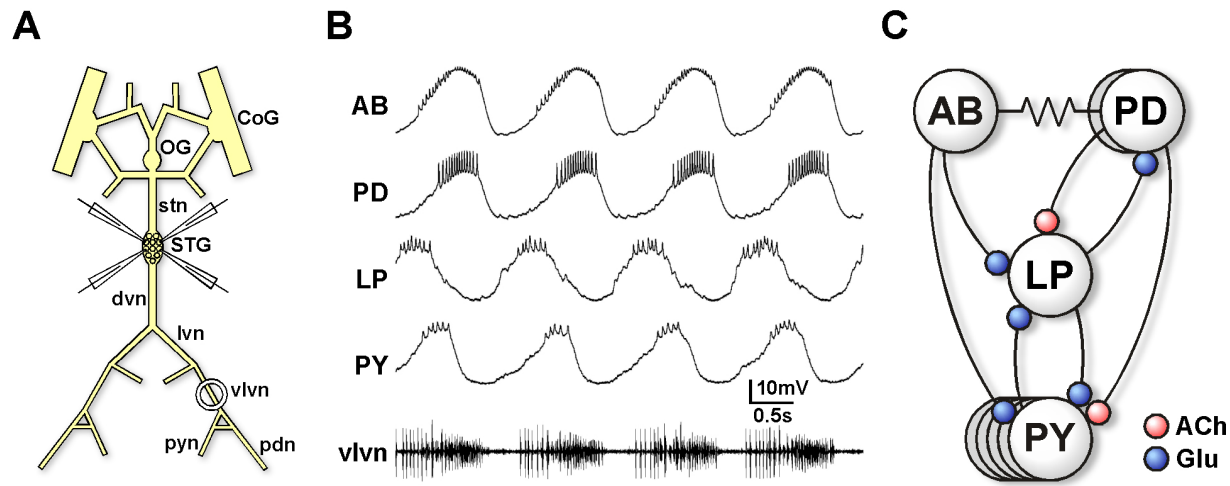
The Leech



Leech Ganglia



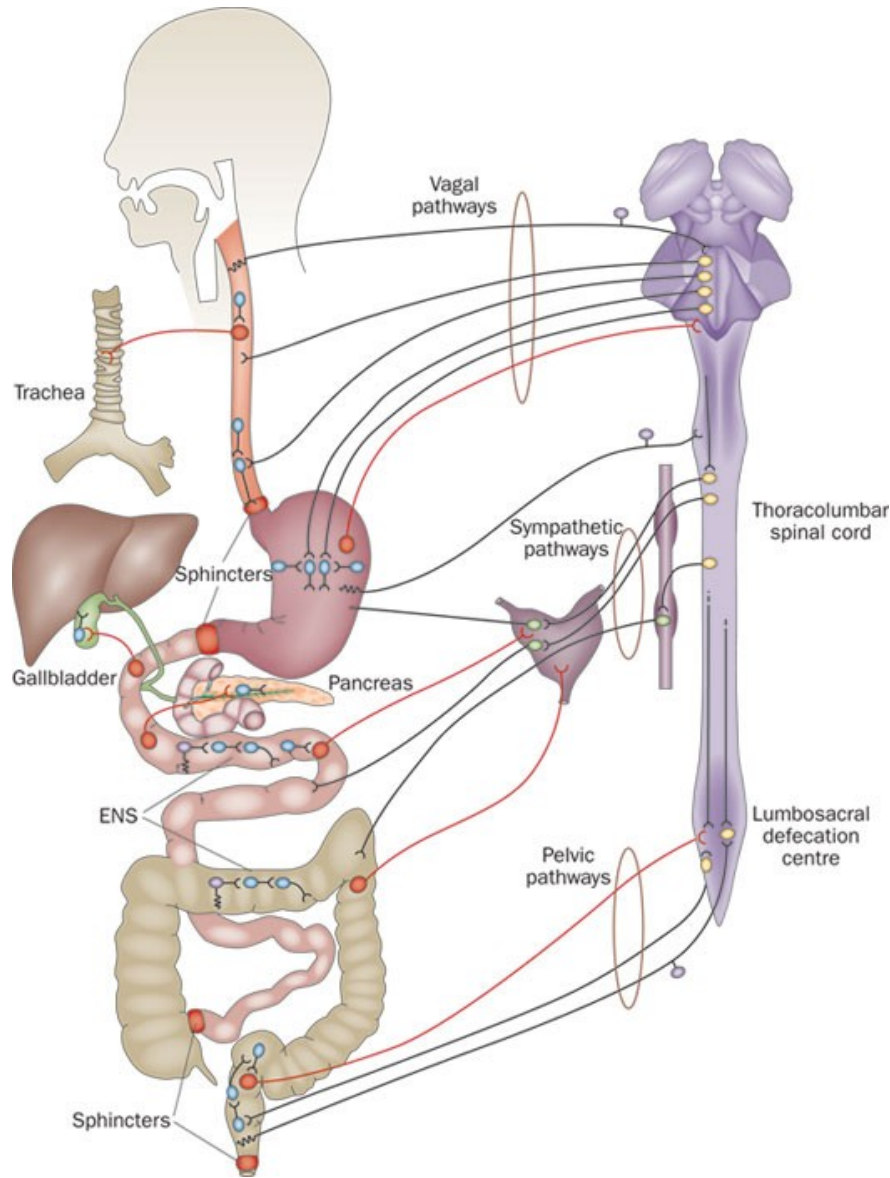
Crab Pyloric Network



From the Eve Marder lab, Brandeis University

Contained within the **stomatogastric ganglion**, which has about 30 neurons that comprise two central pattern generators, the **pyloric network** and the **gastric mill network**

Nerve Cells are Everywhere, not Just the Brain

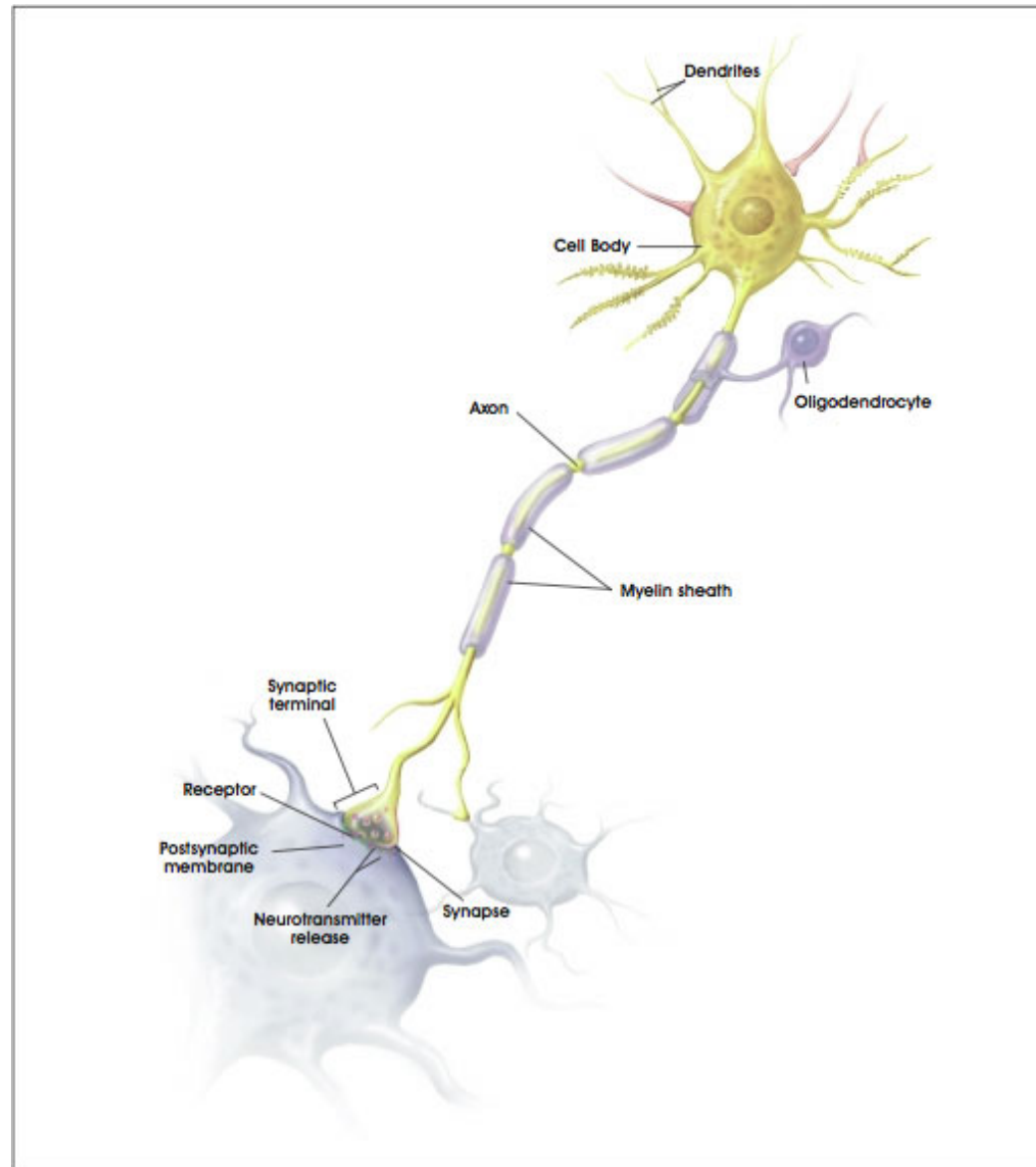


Human enteric nervous system

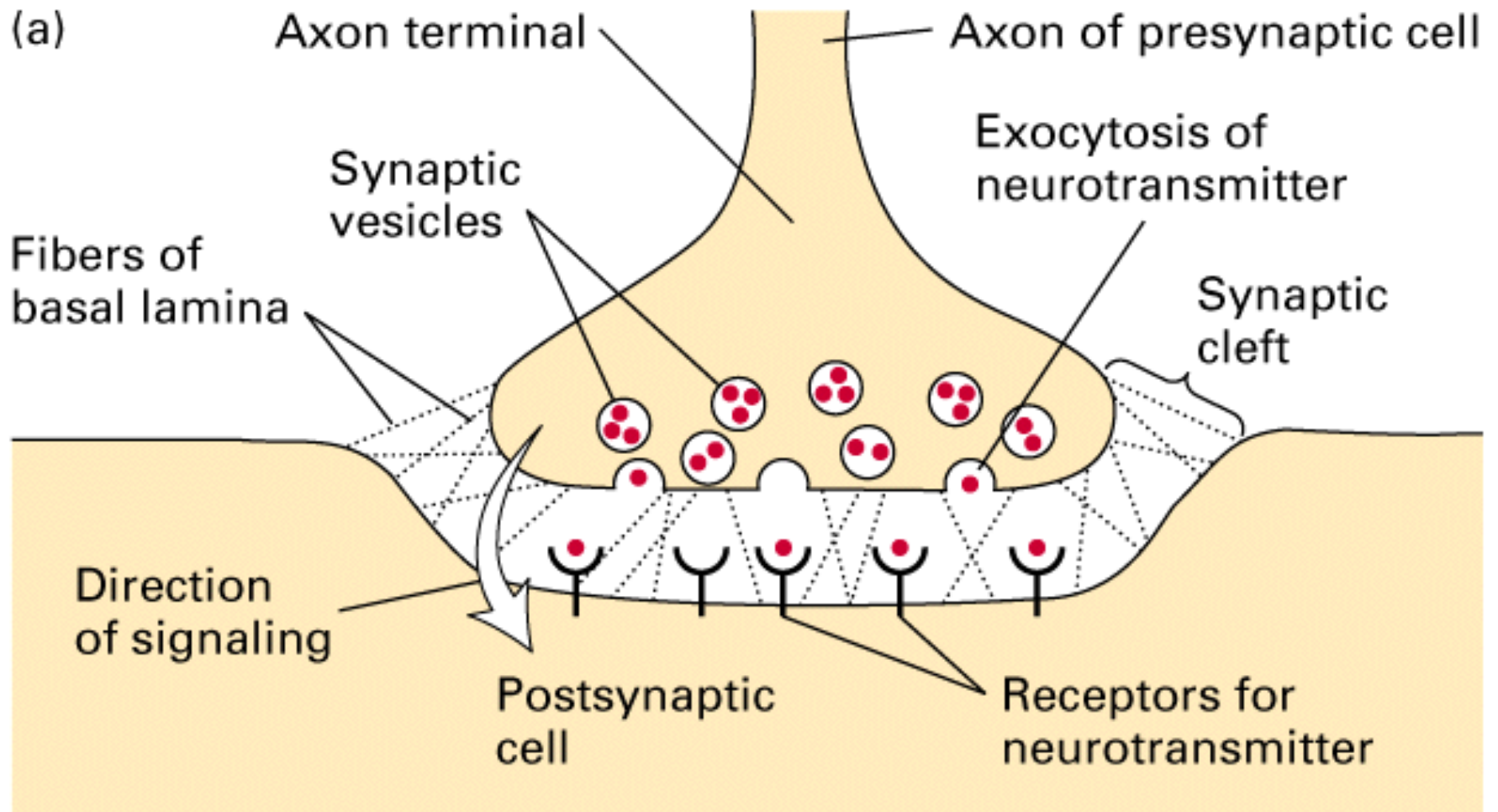
Furness, Nature Rev., 9:286, 2012

The neuron: the fundamental element of any nervous system

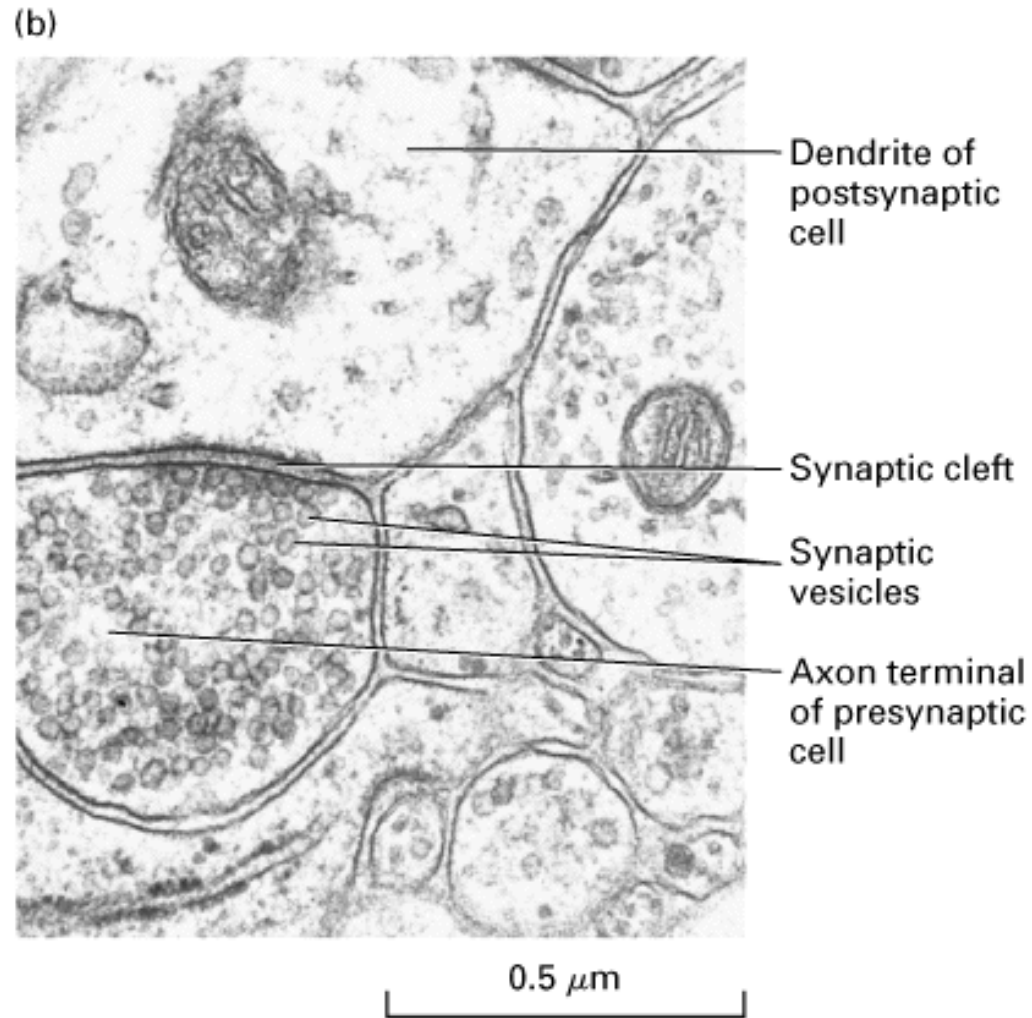
Structure of a Neuron



Communication via a Chemical Synapse

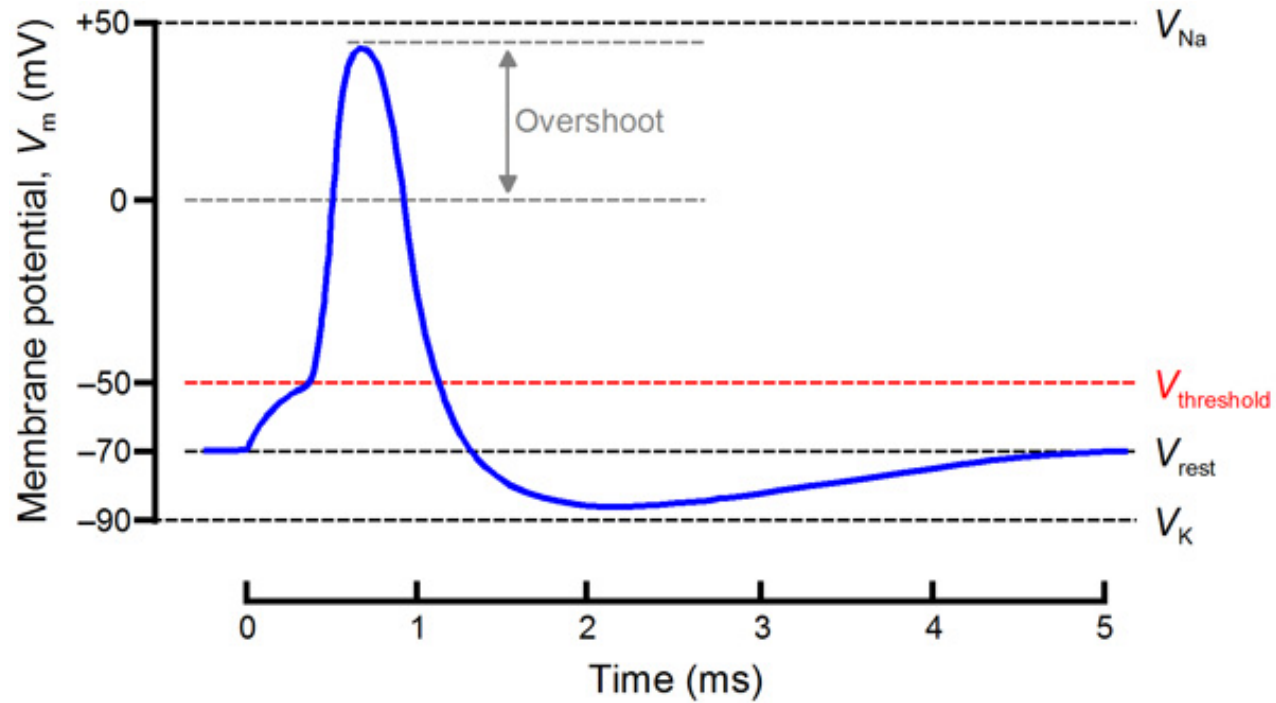


Communication via a Chemical Synapse



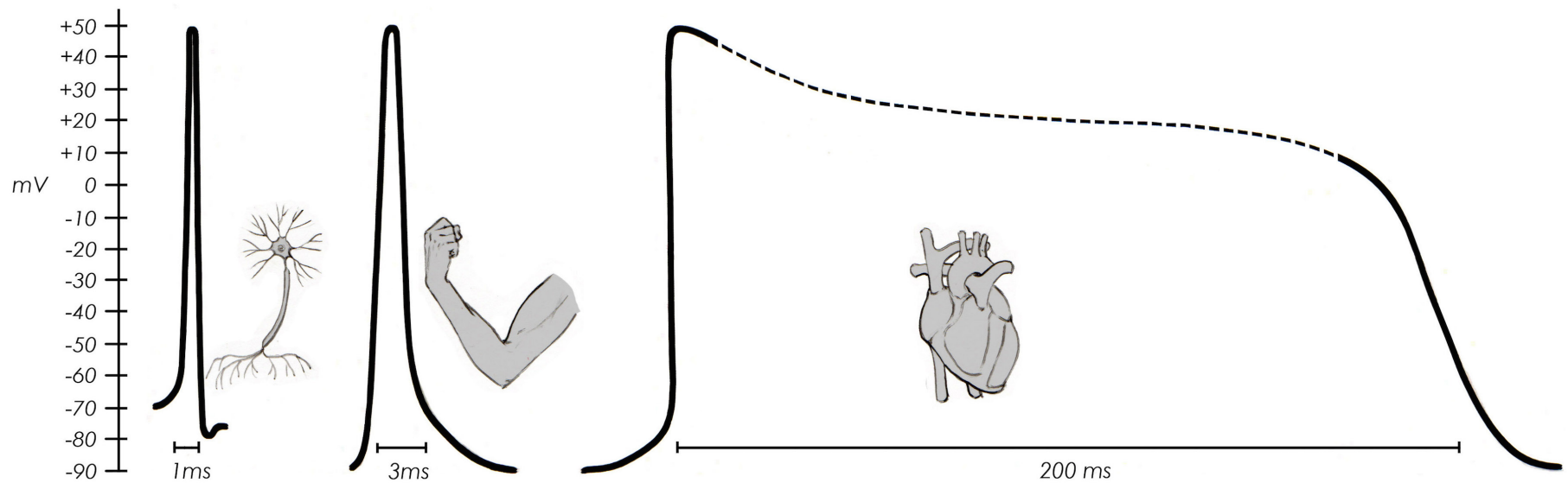
Electron micrograph showing a chemical synapse. From Lodish, 4th edition.

Neuronal Action Potential



© PhysiologyWeb at www.physiologyweb.com

Electrical Impulses are Ubiquitous



Pioneers of Modern Neuroscience



Alan Hodgkin
(1914-1998)



Andrew Huxley
(1917-2012)