

Questions on readings:

- 1) Explain what is meant by “brainlike functions in unicellular organisms”. Give examples (see Allman and Swanson).
- 2) According to Allman, what are the simplest organisms to possess nervous systems, with action potentials based on voltage gated sodium channels?
- 3) George Parker’s work at Yale (Swanson says he was at Harvard) is described by Nauta. Parker, using the Golgi technique, found a kind of nervous system in certain sea anemones, an even simpler organism. What kind of nervous system was it?
- 4) “...a sponge has no neurons—or else all its cells are neurons” (Nauta). What two types of intercellular junctions in the sponge was Nauta discussing? How are they recognized?
- 5) “Animals with large brains are rare—there are tremendous costs associated with large brains” (Allman). What costs?
- 6) Swanson describes the nerve net of hydra, including two-way connections made by motor neurons with each other. What structure makes such two-way conduction in single fibers possible? Ramon y Cajal called such fibers “amacrine processes”, distinguishing them from dendrites and axons.
- 7) How are interneurons defined? What neurons are not interneurons?

Additional questions based on Schneider lectures and book:

- 8) How do we talk about the brain such that we can understand each other? What is the basic standard terminology with which you should all be familiar?
- 9) Define “central nervous system” (CNS). What are its basic elements?
- 10) How do we define and recognize specific cell groups in the CNS?
- 11) How do we know about connectivities between cell groups?

12) Protozoa have all of the “primitive cellular mechanisms” possessed by neurons. Why do organisms need neurons?

General question to be answered over the entire term:

13) How did the brain become the way it is? (studies of evolution; descriptive and experimental studies of development and plasticity)

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9.14 Brain Structure and Its Origins

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