

9.14 Homework 2, due before Lecture 9.

Classes 5-8

- 1) Draw a dorsal view of an embryonic CNS, simplified as in classes. Repeat the drawing two more times. On the drawings, add three axons of the spinothalamic tract (one on each drawing): one from the lumbar cord, the second from the mid-thoracic cord, and the third from the cervical cord. Show the first reaching the hindbrain reticular formation (and not beyond), show the second reaching the midbrain reticular formation (and not beyond), and show the third reaching the caudal thalamus. Next, answer the following questions:
 - a. What region of body surface could be stimulated to activate the first type of axon?
 - b. What region could be stimulated to activate the second type of axon?
 - c. What region could be stimulated to activate the third type of axon?
 - d. If you were to draw an axon of the spinoreticular tract, what would be the major difference from the axons of the spinothalamic tract?
- 2) The snakes known as pit vipers have an ability to detect the location of sources of infrared radiation. Describe the location of the sensory receptors. How does this ability help these snakes? Which nerve innervates these receptors? A pathway from the secondary sensory neurons activated by this nerve can be followed to a structure in the midbrain (via one more synapse). What does that midbrain structure control, in response to the infrared radiation detection?
- 3) What are the barrel fields? Name some species that have them.
- 4) Describe a quantitative difference in brain lesion effects, contrasting a monkey, a rat and a frog. For two of these species, what would constitute a qualitative difference in brain function?
- 5) Why does sensory information from the body surface traveling through the dorsal column-medial lemniscus pathway reach the neocortex faster than sensory information traveling through the spinothalamic tract? Answer by describing at least two factors that are different in the two pathways.
- 6) Describe specific events in either gastrulation or neurulation that involve the basic cellular activities described by Wolpert (see chapter 8). Cite at least three of those cellular activities.

MIT OpenCourseWare
<http://ocw.mit.edu>

9.14 Brain Structure and Its Origins

Spring 2014

For information about citing these materials or our Terms of Use, visit: <http://ocw.mit.edu/terms>.