

9.14 Homework 5

due before Lecture 23.

NAME _____

Write brief answers to as many of the following questions as you can. They are based on a reading of chapters 18-22 of the book *Brain Structure and Its Origins*, and classes.

- 1) In comparative neuroanatomical studies, the taste system provides some of the most dramatic examples of mosaic evolution (illustrated in chapter 4). Explain the meaning of mosaic evolution and describe examples.
- 2) Describe a reflex pathway that goes through the gustatory nucleus of the hindbrain.
- 3) Contrast the very orderly organization of the olfactory nerve axons to the olfactory bulb, with the nature of the mitral cell projections to the olfactory cortex.
- 4) Contrast: “compensatory sprouting” and “compensatory stunting” of lateral olfactory tract axons.
- 5) What intrinsic factor may explain the above phenomena?
- 6) Distinguish between two very different visual functions of the midbrain tectum, each involving a different output pathway. For which of these functions is precise acuity more important? When precise acuity increases in evolution, what changes in the brain?
- 7) The superior colliculus of the midbrain and the visual cortical areas are each important for identification of a visual stimulus. However, there was a great expansion in visual identification abilities with the expansion of the neocortex. Why?
- 8) Describe at least four different anatomical methods that can be used to uncover distinct layers within the optic tectum or superior colliculus.
- 9) Deacon’s rule (“large equals well-connected”) is an important rule of thumb in brain evolution. What does this rule suggest in the discussion of multiple routes to the forebrain for visual information?
- 10) Visual inputs to most, probably all, visual areas in neocortex come via two types of pathways. What are the two types?
- 11) At the end of chapter 22 there is a list of readings relevant to visual endbrain structures and functions. One paper listed is by VM Montero (1993) on visual areas in the rat outside the striate area. Find this paper using Google Scholar, summarize the major findings in a paragraph, and then describe the relationship of this work on the rat to the study of mouse visual cortical areas included in the chapter.
- 12) Find another paper listed in the Readings section: the one on small-world networks published in 1998. Summarize the meaning of “small-world network” and list several areas to which the concept has been applied, beginning with brain structure.

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9.14 Brain Structure and Its Origins

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