

## 9.14

### Taste and olfactory systems -- READINGS (no meeting)

*Questions based on Schneider chapter 18:*

- 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 the functions of the innervation of the tongue by four different cranial nerves.
- 3) Describe the pathway for taste impulses from tongue to neocortex.
- 4) What other routes to the endbrain can activity generated by taste inputs follow? What functions might such pathways serve?
- 5) Describe a reflex pathway that originates in the gustatory nucleus of the hindbrain.

*Questions based on Schneider chapter 19:*

- 1) What were the structures that very likely shaped the early evolution of the forebrain? Three are mentioned at the beginning of the chapter, including two sensory inputs.
- 2) What are the major differences between the projections of the olfactory bulbs in a primitive vertebrate like the sea lamprey and in tetrapod vertebrates (amphibians, reptiles and mammals)?
- 3) What is a glomerulus (plural: glomeruli)? What are the major components of the olfactory glomeruli in the olfactory bulb?
- 4) Describe the difference between the main olfactory bulb and the accessory olfactory bulb: Inputs to the two portions of the bulb, and differences in their projections to the cerebral hemispheres.
- 5) 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.
- 6) Contrast: “compensatory sprouting” and “compensatory stunting” of lateral olfactory tract axons.
- 7) What intrinsic factor may explain the above phenomena?

*Questions on supplementary readings: Brodal*

1. Where is the uncus? What kind of structure is it?
2. Describe one phenomenon of "olfactory imprinting".

*Questions on supplementary readings: Lois et al.*

3. How can one prove the existence of neuronal precursors in the adult mammalian brain?
4. Describe the migration route of such cells. What guides the cells?

*Questions on supplementary readings: Striedter [optional but fascinating]*

5. Contrast concerted and mosaic evolution.
6. How much of the variation, across different species of mammals, in the size of neocortex and also other major brain regions, can be predicted from absolute brain size?
7. Explain the meaning of "late equals large" as a summary of the interpretive work of Finlay and Darlington. (Note: Barbara Finlay, of Cornell University, did her graduate work at MIT under Professors Schneider and Schiller.)
8. Is the "late equals large" rule always followed? I.e., to what extent do some structures evolve mosaically? Give specific examples. (Examples have been shown in class. Additional examples are found in the Striedter book.)

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## 9.14 Brain Structure and Its Origins

Spring 2014

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