

9.14 class #32: Limbic System 1: Olfactory system.

Special assignment: Videotapes on human brain dissection by M.I.T. Prof. Walle Nauta. [Videoclips on the web. If you want more, tapes are available in Shering-Plough Library. Ask at the desk.]

Nauta, W. J. H., "Tape 7, lesson 10: The fiber architecture of the cortical hemisphere (63 min.); Tape 8, lesson 11: Corona radiata (15.5 min.), lesson 12: Human brain cross sections (7.5 min.).", *The gross anatomy of the human brain*.

See also previously assigned reading: Brodal text, "chapter 20, Cerebral cortex", [Refer to the figures to see the sub-components of the large fiber systems discussed by Nauta.], pp. 583-620.

Readings:

Brodal, "chapter 10, Olfaction and taste", pp. 297-306.

Devor, M. and Schneider, G.E., "Neuroanatomical plasticity: the principle of conservation of total axonal arborization", *Aspects of neural plasticity INSERM, Les Colloques de l'Institut National de la Sante et de la Recherche Medicale*, Vital-Durand, F. and Jeannerod, M. (Eds.), 1975, 43: 191 - 200.

Alvarez-Buylla, A. and Garcia-Verdugo, J.M., "Neurogenesis in adult subventricular zone", *J. Neurosci.*, 2002, 22:629-634.

Ramon y Cajal, S., *Histology of the Nervous System*, vol.2, trans. N. Swanson and L. W. Swanson, Oxford Univ. Press. (orig. French ed. 1909; trans. English edition 1995)
[See drawings in chapters 28-30.] ----Selected figures available in handout.---

Also recommended:

Grafe, M.R., "Developmental factors affecting regeneration in the central nervous system: early but not late-formed mitral cells reinnervate olfactory cortex after neonatal tract section", *J. Neurosci.*, 1983, 3: 617 - 630.

Brodal, A., "Chapter 10, The olfactory pathways, the amygdala, the hippocampus, the "limbic system".", *Neurological Anatomy in Relation to Clinical Medicine*, 3rd edition. Oxford Univ. Press., 1981, pp. 640-697, but especially 640-654. (See one-page handout for key figures.)

Malnic, B., Hirono, J., Sato, T., and Buck, L., "Combinatorial receptor codes for odors" *Cell*, 1999, 96: 713-723.

Lois, C., Garcia-Verdugo, J.-M., Alvarez-Buylla, A., "Chain migration of neuronal precursors", *Science*, 1996, 271: 978 - 981.

*Questions:**Nauta tapes:*

1. Contrast: Uncinate fasciculus and arcuate fasciculus. Which one is more critical in verbal behavior, and why?
2. What is Meyer's loop? (Part of the so-called optic radiations, coming from lateral geniculate body, also containing fibers coming from visual cortex toward brainstem.)

3. Describe the approach to the lentiform nucleus in dissection of human brain. What covers it? How can that structure be seen when looking at the hemisphere from the side?
4. Why is the occipito-frontal fasciculus probably a misleading name? What does it really contain? (Refer to Brodal)

Brodal:

4. What is a glomerulus (plural: glomeruli)? What are the major components of the olfactory glomeruli in the olfactory bulb?
5. Where is the uncus? What kind of structure is it?
6. Describe one phenomenon of "olfactory imprinting".
7. Describe the pathway for taste impulses, from tongue to neocortex.

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

Devor and Schneider:

10. Contrast: compensatory sprouting and compensatory stunting of lateral olfactory tract axons.
11. What intrinsic factor may explain the above phenomena?