9.09J/7.29J - Cellular Neurobiology, Spring 2005
Massachusetts Institute of Technology
Department of Brain and Cognitive Sciences, Department of Biology
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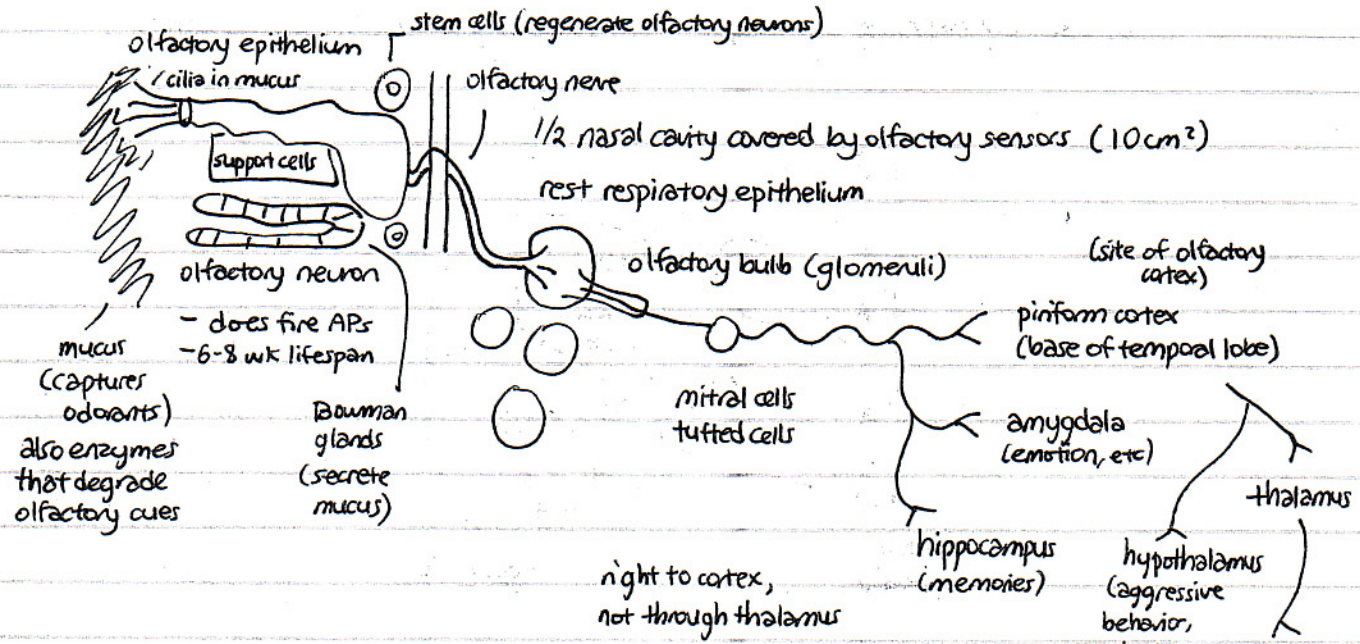
Lecture notes courtesy of Wyan-Ching Mimi Lee. Used with permission.

5/05/04

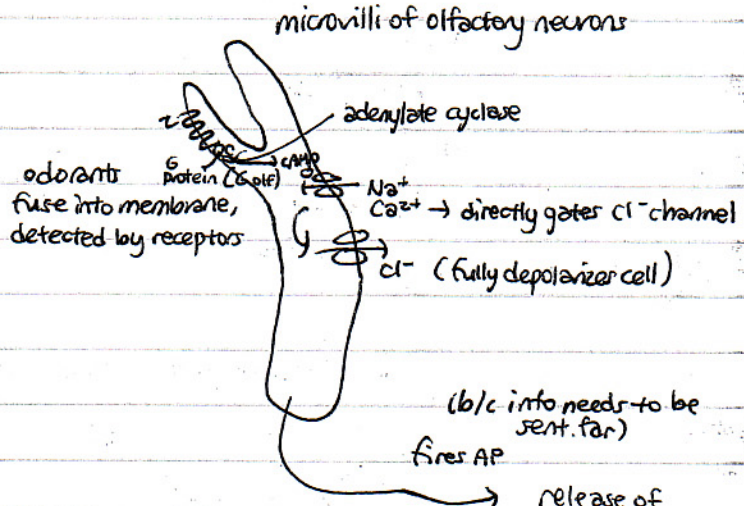
odor & taste:

- olfactory system can respond to thousands of odors



- olfactory neurons have to regenerate and then reform pathways

- genome encodes 200 - 1,000 olfactory receptors (all look quite similar, differences in TM domains (N, C -termini similar)



adaptation:

cAMP & Ca^{2+} gets PKA to phosphorylate & inactivate ~~channel~~ (receptor?)

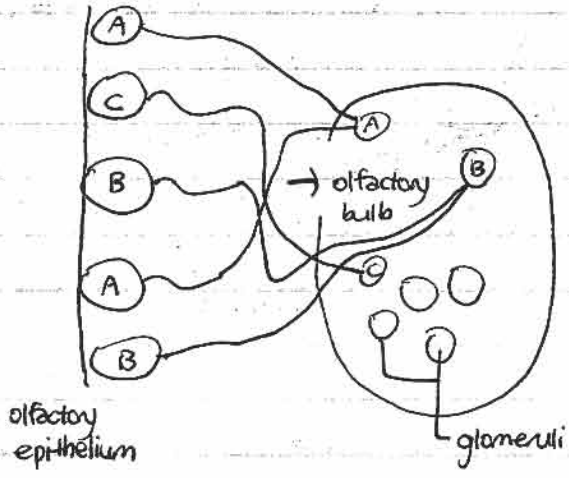
also, Ca^{2+} binds calmodulin, inhibits Na^+/Ca^{2+} channel

(2 mechanisms for shutting off stimulus)

(up to)

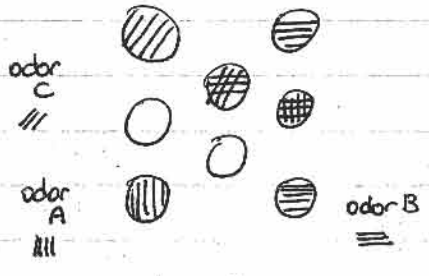
- humans recognize ≤ 10,000 odorants w/ only 1,000 receptors (receptors can each bind characteristic of odor)

1. receptors recognize multiple odors
2. each cell expresses one receptor (each olfactory neuron has one receptor)



≥ 10,000 neurons that express same receptor (distributed randomly throughout epithelium, but output to same ~~glomeruli~~) single glomerulus

olfactory receptor also plays role in path finding

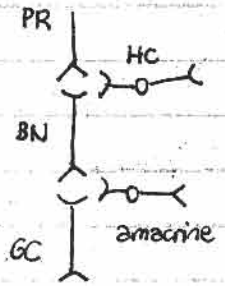


glomeruli

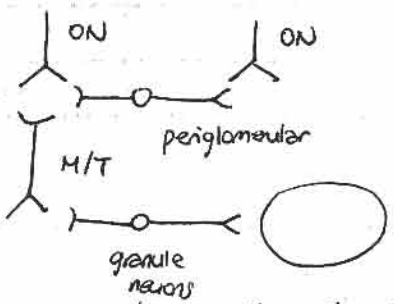
different odos light up different glomeruli

[odorant] ↑ can make glomeruli fire more, also fire new glomeruli

visual system:



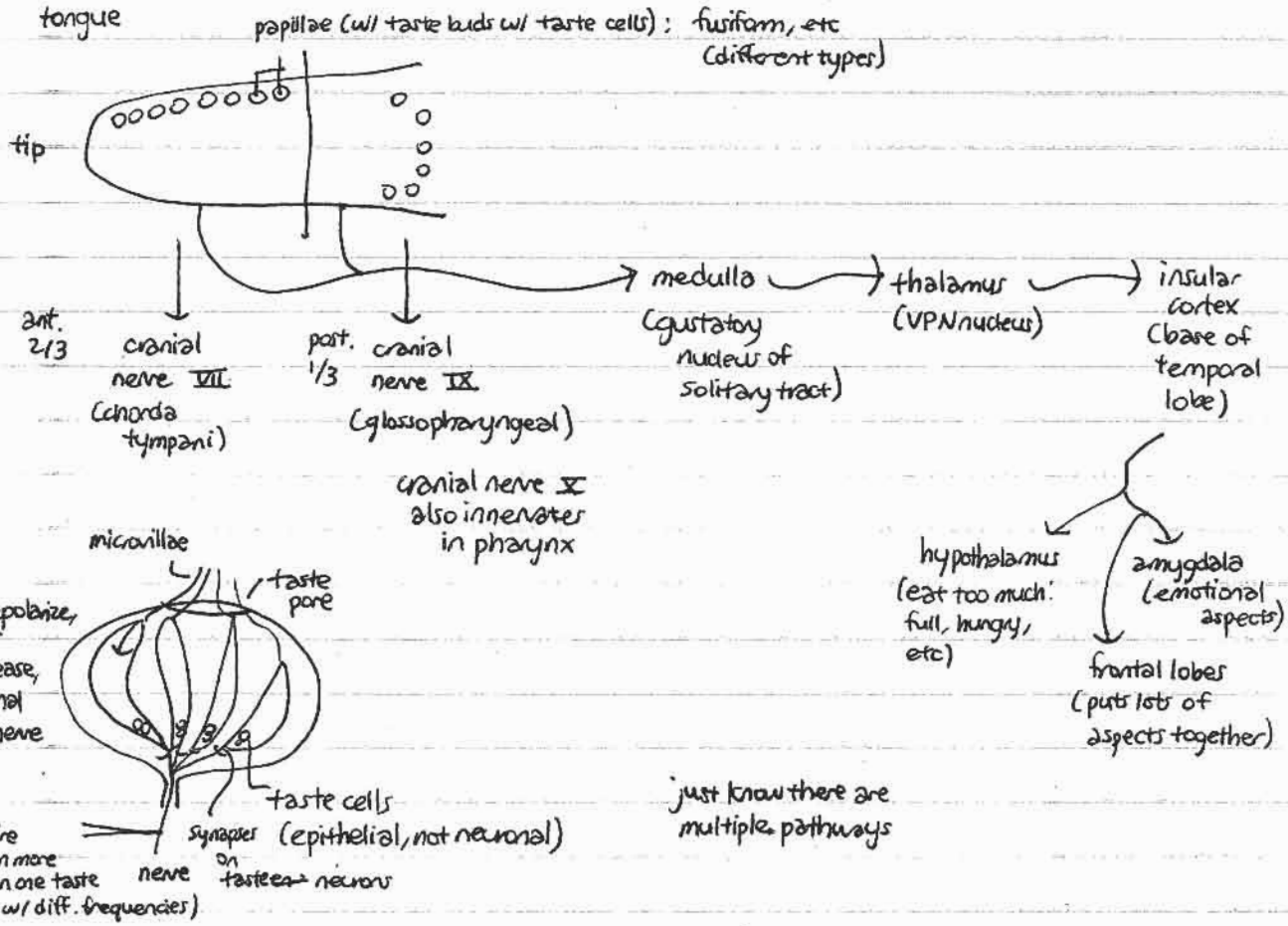
similar in olfactory ~~ae~~-system: (in olfactory bulb)



(so can talk to other glomeruli, silence neighbors

gustatory system: distinguish different tastes

- complex anatomy (multiple cranial nerves)



tastant categories: (multiple components on each taste cell?)

1. salty
2. sweet
3. bitter
4. sour
5. umami

binding to 7 TM receptor, →
6 proteins → channels open
(salty directly gates Na^+ channel
can inhibit H^+, K^+ can't get out)

- olfactory & gustatory systems ipsilateral