**Chapter 14 Study Guide: Olfaction**

* Key terms:
* Odor: a general smell sensation of a particular quality. By contrast, when referring to a specific chemical entity, the term odorant should be used.
* Odorant: any specific aromatic chemical. For example, “You were given the odorant menthol to smell.”
* Nasal dominance: the asymmetry characterizing the intake of air by the two nostrils, which corresponds to differing sensitivity to odorants between the two nostrils throughout the day, but there is no predictability about when the nostrils alternate
* Anosmia: the total inability to smell, most often resulting from sinus illness or head trauma.
* cross adaptation: the reduction in detection of an odorant following exposure to another odorant. this is presumed to occur because the two odorants share one or more olfactory receptors for their transduction, but the order in which odorants are presented also plays a role
* cognitive habituation: the psychological process by which, after long-term exposure to an odorant, one is no longer able to detect that odorant or has very diminished detection ability ex. You can’t smell your own house
* pheromones: a chemical emitted by one member of a species that triggers a physiological or behavioral response in another member of the same species. Pheromones are signals for chemical communication and do not need to have any smell.
* odor hedonics: the liking dimension of odor perception, typically measured with scales pertaining to an odorant’s perceived pleasantness, familiarity, and intensity.
* receptor adaptation: The biochemical phenomenon, occurring after continual exposure to an odorant, whereby receptors stop responding to an odorant and detection ceases.
* Binaural rivalry: competition between the two nostrils for odor perception. when a different scent is presented to each nostril simultaneously, we perceive each scent to be alternating back and forth with the other, and not a blend of the two scents
* Know the olfactory system of an animal:
  + Animals rely on sense of smell to survive
  + Animals olfactory system consists of the main olfactory bulb and accessory olfactory bulb.
  + Mammals have ~1,000 or more genes about 80% functional in dogs, only ~35% functional in humans.
  + Some amphibians have a vomeronasal organ that's purpose is to detect things like pheromones.
* Why is olfaction a “mute sense”?:
  + because we cannot often place a name to an odor.
* Know the anatomy of the human olfactory system and the purpose of each part
  + Olfactory cleft: a narrow space at the back of the nose into which air flows where the main olfactory epithelium is located
  + Olfactory epithelium: a secretory mucosa in the human nose whose primary function is to detect odorants in the inspired air.located on both ides of the upper portions of the nasal cavity and the olfactory clefts.
  + Supporting cells: one of the three types of cells in the olfactory epithelium. Provides metabolic and physical support for the olfactory sensory neurons
  + Basal cells: one of the three types of cells in the olfactory epithelium. Precursor cells to olfactory sensory neurons
  + Olfactory neuron: the main cell type in the olfactory epithelium. Small neurons located beneath a watery mucous layer in the epithelium. He cilia on the OSN dendrites contain the receptor sites for odorant molecules
  + Cilia: hairlike protrusions on the dendrites of olfactory sensory neurons. Receptor sites for odorant molecules are on the cilia, first structures involved in olfactory signal transduction
  + Olfactory receptor: the region on the cilia of olfactory sensory neurons where odorant molecules bind.
  + Cribriform plate: a bony structure riddled with tiny holes, at the level of the eyebrows, that separates the nose from the brain. The axons from the olfactory sensory neurons pass through the tiny holes of the cribriform plate to enter the brain.
  + Olfactory (I) nerves: the first pair of cranial nerves. The axons of the olfactory sensory neurons bundle together after passing through the cribriform plate to form the olfactory nerve.
  + Olfactory bulb: the blueberry-sized extension of the brain just above the nose, where olfactory information is first processed. There are two olfactory bulbs, one in each brain hemisphere, corresponding to the right and left nostrils
* Mitral cells: main projective output neurons in olfactory bulbs
* Tufted cells: secondary class of output neurons in olfactory bulbs
* Primary olfactory cortex: the neural area where olfactory information is first processed, which includes the amygdaloid=hippocampus complex and the entorhinal cortex.
* Amygdala-hippocampus complex- the conjoined regions of the amygdaloid and hippocampus, which are key structures in the limbic system. The complex is critical for the unique emotional and associative properties of olfactory cognition.
* Know the pathway a signal is carried from the olfactory receptor to the brain (including nerves associated with olfaction and taste)
* Vibration theory vs shape pattern theory:
  + Vibration theory: describes how olfaction works. Proposes that every perceived smell has a different vibrational frequency, and that molecules that produce the same vibrational frequencies will smell the same.
  + Shape pattern theory: the current dominant biochemical theory for how chemicals come to be perceived as specific odorants. Shape pattern theory says that different scents activate different arrays of olfactory receptors in the olfactory epithelial. These various arrays produce specific firing patterns of neurons in the olfactory bulb, which then determine the particular scent we perceive.