Senses, Vision & Hearing: CH 14

Types of Sensory Receptors

- Chemoreceptors - respond to nearby chemicals; taste, olfaction
  - Pain receptors - a type of chemoreceptors that respond to chemicals released by damaged tissue
- Photoreceptors - respond to light energy; vision
- Mechanoreceptors - respond to mechanical forces such as pressue; touch, hearing
- Thermoreceptors - stimulated by temp changes

How does sensation occur?

- Sensory receptors respond to enviornmental stimuli.
- nerve impulses travel to the cerebral cortex
- sensation (conscious preception) of stimuli occurs

Vision

- The eye of a human can distinguish 500 shades of gray & 1 - 10 million different colors.
- not all animals can see in color - some can see ultraviolet (UV) light.
- your eye contains millions of light detecting specialized neurons (200/mm2)
  - (birds up to 1,000,000 mm2)
- movement detection
  - humans: up to 50 Hz
  - birds: up to 100 Hz
- movement interpretation of discrete images
  - human brain can interpret 10-12 discrete images per second

- motion picture frame rates are higher
  - the brain interprets these series of fast changing pictures as constant motion
- under right conditions - human eye can see the light of a candle @ a distance of 14 miles.

Anatomy of the eye
- 2 compartments
  - Anterior chamber: between the cornea & lens filled w/ a clear fluid called aqueous humor
  - Posterior chamber: most of the eye, behind the lens contains a gelatinous material = Vitreous humor
- made of 3 layers of / coats -
  - Sclera: mostly white & fiborous except cornea
  - Choroid: darkly, pigmented vascular layer
  - Retina: inner layer containing photoreceptors

A. Sclera: The EYE
  - The White of the eye - that maintains shape
  - Cornea: transparent portion of the sclera that is important in refracting light

B. Choroid: The EYE
  - middle layer that absorbs light rays that are not absorbed by the retina.
- Iris: donut-shaped, colored structure that regulates the size of the pupil.
  - pupil: opening in the iris that allows light Eyeball
- Ciliary body: structure behind the iris that contains a muscle that controls the shape of the lens
- Lens attached to the ciliary bodies functions to refrac

& focus light rays.
The Lens : The EYE
- flexible, transparent, & concave structure
- the lens accomodates, changes, shapes, to focus light on the retina in order to form an image.
- as we age, the lens loses elasticity & we use glasses to correct this

C. Retina : The EYE
- contains photoreceptors called rods & cones
- rods are sensative to light (black & white vision)
- cones require bright light & see wave lengths of light (color)
- The fovea centralis is an area of the retina densely packed w/ cones where images are focused.
- sensory receptors from the retina form the optic nerve that takes impulses to the brain
- the blind spot is where the optic nerve attatches & lacks vision

Anatomy of the Retina
C. Photoreceptors of the Retina : The EYE
- Rods: - important for peripheral & night vision
  - contain visual pigment called rhodopsin
  - Vitamin A is important for proper function -ing
- Cones: - located mostly in fovea
  - allow us to detect detail & color
  - 3 diff kinds of cones containing red, green, & blue pigments

see Summary of Eye Structures