

GENERAL BIOLOGY Lecture 30 - Sensory Systems

- I. Sensory systems and their importance
 - A. Why are the sensory systems important? - they help us to perceive the environment
 - B. Generalized mechanism
 - 1. Stimulus - **** receptor **** - integrator - effector - response
 - 2. Receptor = sensory organ
 - 3. Categories of receptors
 - a) Chemoreceptors (nose & tongue) - detect chemical energy
 - b) Mechanoreceptors (skin & ears) - detect mechanical energy
 - c) Photoreceptors (eyes) - detect photon energy
 - d) Thermoreceptors (skin) - detect radiant energy
 - C. Categories of the senses
 - 1. Sight (eyes)
 - 2. Hearing (ears)
 - 3. Touch (skin)
 - 4. Smell (nose)
 - 5. Taste (tongue)
 - 6. Pressure, heat, and pain (skin & others)
 - 7. Proprioception (muscle) - muscle tension
 - 8. Balance (ears)
 - *** Hunger and thirst (?)
- II. Some specific senses
 - A. Sight (vision) - photoreception
 - 1. Generalized structure
 - a) Outer covering (sclera) - protection
 - b) Curved transparent tissue (cornea) - helps focus light rays
 - c) Outer contractile tissue (iris) - controls amount of incoming light
 - d) Open center of iris (pupil) - entrance for incoming light
 - e) Packed photoreceptors (retina) - light reception and transduction
 - f) Axons of retinal cells (optic nerve) - carries signals from photoreceptors to brain
 - 2. Abnormalities
 - a) Astigmatism - distorted shape of the lens - light rays focus at a diffuse point and cause sharp points to appear diffuse
 - b) Myopia (nearsightedness) - eyeball diameter is long - focal point falls short
 - c) Hyperopia (farsightedness) - eyeball diameter is short - focal point lands long
 - B. Hearing and balance - mechanoreception
 - 1. Generalized structure
 - a) Outer ear - "catches" the sound and directs it to the eardrum (the eardrum simulates the sound in wave frequencies that it perceives)
 - b) Middle ear with fluid-filled parts (tympanum); hammer (malleus), anvil (incus), and stirrup (stapes) - amplify the stimulus and make "pressure" waves
 - c) Inner ear (coiled region = cochlea;) - uses pressure waves to make hairlike structures move, movement changes membrane permeability which, in turn stimulates sensory neurons
 - 2. Balance - semicircular canals
 - a) Also have specially oriented hairs suspended in a fluid (slosshy)