

Week of April 6-10, 2020

High School Science

Debra Welch

Hello students! I hope all of you are staying healthy. I just want everyone to know that I am thinking you and miss having school as normal. Remember to keep your immune systems strong! Basic directions are: You need to complete one lesson a week for only the class you were currently enrolled in and choose from the 3 choices. Choices 1 & 2 are for review of material we have already covered this year. I will start at the beginning and go through the year's material. Choice #3 will always be new work using your textbook or other handouts I include. I will make every effort to keep your work simple to do, considering that we are not learning together in the classroom. Your work should be turned in as a hard (paper) copy to the office or through email in a word or google document. My email is: debra.welch@oakland5.org. Please be sure all work has your name! If you have not turned in the assignment by the following Monday, I will need to email your parents and/or place a phone call home. Please be diligent to turn work in on time. I suggest you set up a schedule just as if you were at school and allow for the normal time period. Most assignments I send you will take less time than our normal 40 minutes. Comments will be made on paper copies and returned to you. If you send in homework answers as an email I will reply to your email and give my comments/reflections of your work. I will be supplying you with the necessary notes or you will need to use your book to find the answers. If you have any questions feel free to email me and I will get back to you by email during my office hours. If you can't email feel free to call the office and leave me a message. Good Luck and stay healthy!

Anatomy: for those of you who wanted to continue learning throughout the body systems I will be including notes and sending you powerpoints to use with Choice #3. If you plan to go into a medical field I advise you to go ahead and complete the Enrichment on the body systems we could not study due to school closure.

Class	Choice 1	Choice 2	Choice 3 (Enrichment)
Biology	Lab-specimen identification: fill out the chart using the Key of Living Organisms.	Review of Classification (Ch17)- Do Act #6, 1-2. You will have notes in your binder .	Colorsheet: Intro to Viruses p31: read/color
Anatomy	Unit 3- Self Test over medical terms reviewed at beginning of year-use notes you have or look up online.	Vocabulary Exercise on Body Orientation Colorsheets: Movements Netter 1-3 Regions of Body p6	The Ear: Marieb packet p146-150 Colorsheet: Auditory & Vestibular System (I have included the Ear/Hearing Notes)

 Unit 3 Self-Test

PART 1

From the list on the right, select the correct meaning for each of the following terms. Write the letter in the space provided.

- | | |
|---|---|
| <input type="checkbox"/> 1. Thoracocentesis | a. Pertaining to the cerebrum and spinal cord |
| <input type="checkbox"/> 2. Cholelithotomy | b. Relating to the pelvis |
| <input type="checkbox"/> 3. Otorrhea | c. Wandering or out of the normal place |
| <input type="checkbox"/> 4. Cystotomy | d. Tapping or puncturing the chest cavity |
| <input type="checkbox"/> 5. Abdominalgia | e. Movement toward the midline |
| <input type="checkbox"/> 6. Cranium | f. Abnormal fear of water |
| <input type="checkbox"/> 7. Cerebrospinal | g. Running or draining from the ear |
| <input type="checkbox"/> 8. Hydrophobia | h. Incision into the bladder |
| <input type="checkbox"/> 9. Adduction | i. Producing pus |
| <input type="checkbox"/> 10. Streptococci | j. The bony vault surrounding the brain |
| <input type="checkbox"/> 11. Pyogenic | k. Incision for the purpose of removing a gallstone |
| <input type="checkbox"/> 12. Aberrant | l. Commonly referred to as a "bellyache" |
| <input type="checkbox"/> 13. Pelvic | m. Cocci bacteria that grow in chains |
| <input type="checkbox"/> 14. Cholecystotomy | n. Surgical repair of the nose |
| <input type="checkbox"/> 15. Rhinoplasty | o. Incision into the gallbladder |

PART 2

Complete each of the medical terms on the right with the appropriate word root:

- | | |
|---|----------------|
| 1. Herniation of a bladder | _____ cele |
| 2. Tapping or puncturing of the heart chamber | _____ centesis |
-

Anatomy D. Welch
4-6/4-10 choker

Pg 2

- 3. Surgical repair of the bony vault that encloses the brain
- 4. Earache
- 5. Gallstone
- 6. Inflammation of the nose
- 7. Measurement of the pelvis
- 8. Relating to the thorax
- 9. Collection of fluid in the head
- 10. Incision into the cranium
- 11. Relating to the formation of pus
- 12. Surgical repair of the chest cage
- 13. Instrument for measuring the pelvis
- 14. Relating to the abdomen
- 15. Surgical removal of the gallbladder

_____ plasty
_____ algia
_____ lith
_____ itis
_____ metry
_____ ic
Hydro _____
_____ otomy
_____ genic
_____ plasty
_____ meter
_____ al
Chole _____

VOCABULARY EXERCISE

Use the following terms to answer #'s 1-3.
superior inferior anterior posterior

1. Locate your elbow in relationship to
 - a) shoulder _____
 - b) wrist _____
2. Your elbow is on which side of your body? _____
3. Locate your chin in relation to
 - a) mouth _____
 - b) neck _____
 - c) chest _____
 - d) forehead _____

Using the terms from the above list plus the following to answer #'s 4-8
medial lateral proximal distal

4. Breast region in relation to the shoulder

5. Ears in relation to the chin

6. Thumb located in relation to the shoulder

7. Which is distal to the other ankle or calf? _____

1 Movements

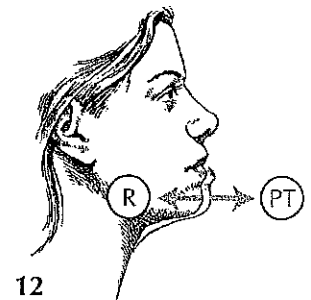
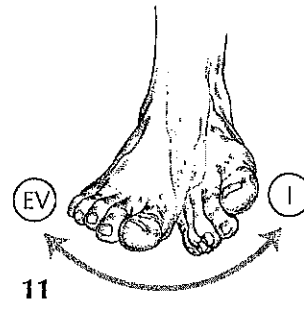
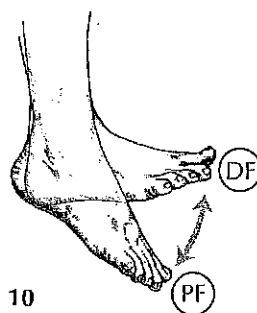
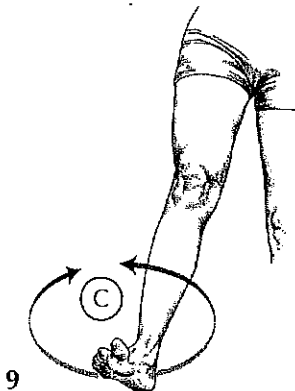
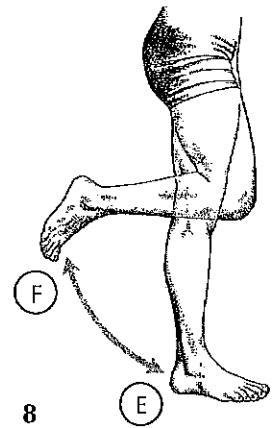
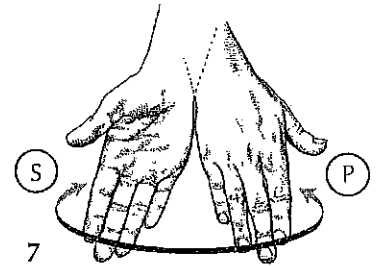
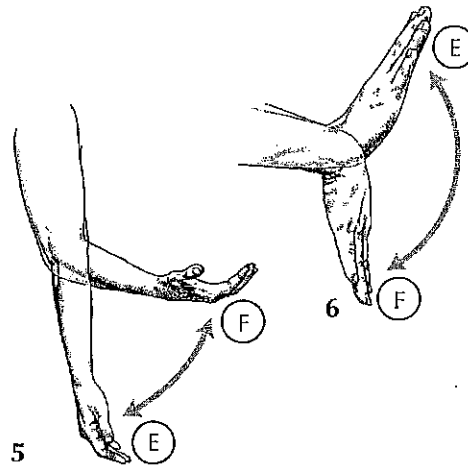
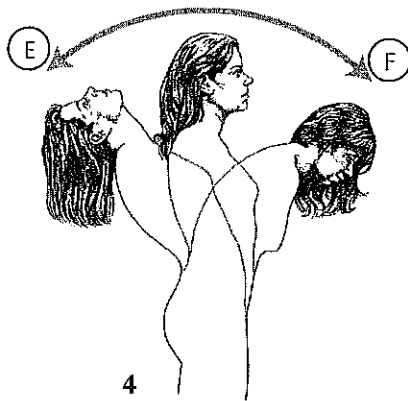
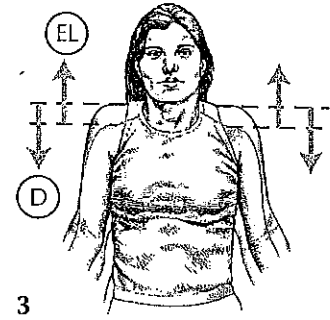
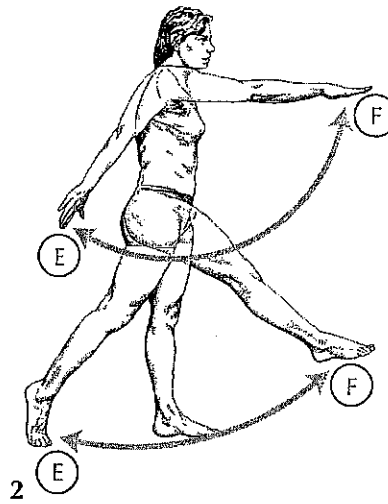
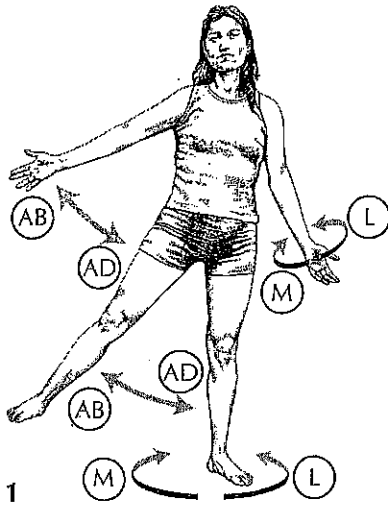
Body movements occur at joints, the points of articulation between two or more adjacent skeletal elements. Generally, when we refer to body movements we are focusing on movements about a joint that occur from the contraction (physical shortening) of skeletal muscle. These contractions result in the movement of a limb, the bending of the spine, the fine movements of our fingers, or the tensing of our vocal cords for speaking (phonation). Of course, many other types of movements also occur throughout the body, but the major movements about the joints are highlighted in the following list and illustrated.

COLOR the circle on the images corresponding to the numbered movement in the following list, using a different color for each movement. Note that the letter abbreviation of the movement (e.g., F = flexion) is shown in the circle and corresponds to the key in the list below.

- 1. Abduction (AB): move away from a central reference point
- 1. Adduction (AD): move toward a central reference point; the opposite of abduction
- 1. Lateral rotation (L): turning a bone or limb around its long axis laterally or away from the midline
- 1. Medial rotation (M): opposite of lateral rotation; turning medially toward the midline
- 2. Flexion (F): usually a movement that decreases the joint's angle
- 2. Extension (E): usually a movement that increases the joint's angle; the opposite of flexion
- 3. Elevation (EL): lifting superiorly, as in shrugging your shoulders
- 3. Depression (D): a movement of a portion of the body inferiorly
- 4. Flexion (F) and extension (E) of the spine (as it relates to the spine, flexion decreases the angle between the vertebral bodies and extension increases this angle)

- 5. Flexion (F) and extension (E) at the elbow
- 6. Flexion (F) and extension (E) at the wrist
- 7. Pronation (P): rotation of the radius about the ulna in the forearm causes the palm to face posteriorly (in anatomical position) or inferiorly (if hand held forward with the palm upward)
- 7. Supination (S): opposite of pronation; causes the palm to face anteriorly or superiorly
- 8. Flexion (F) and extension (E) at the knee joint
- 9. Circumduction (C): movement in space that circumscribes a circle or cone about a joint (circumduction of the lower limb at the hip joint is illustrated)
- 10. Dorsiflexion (DF): lifting the foot at the ankle joint (similar to extension at the wrist, but at the ankle it is referred to as dorsiflexion rather than extension)
- 10. Plantarflexion (PF): a downward movement or depression of the foot at the ankle (similar to wrist flexion)
- 11. Eversion (EV): movement of the sole of the foot laterally
- 11. Inversion (I): movement of the sole of the foot medially
- 12. Retraction (R): posterior displacement of a portion of the body without a change in angular movement
- 12. Protraction (PT): anterior displacement of a portion of the body without a change in angular movement

D Welch
Choice 2
4/6-12



REGIONS OF THE BODY (POSTERIOR)

CN: (1) Use the same colors for divisions marked A, B, E, and F that were used for those letters on the preceding plate.

Regional anatomy is the organization of human structure by regions. Here are shown the major regions within the principal areas of the body (e.g., head, neck). There are many regions within regions, each of which includes structures from different systems, such as bone, muscles, blood vessels, and nerves. Study of the body by dissection is generally accomplished region by region. An in-depth regional awareness of human structure is fundamental for most health care providers.

HEAD A-

- PARIETAL** A¹ (top and sides of head)
- OCCIPITAL** A² (back of head)

NECK B-

- POST. CERVICAL / NUCHAL** B¹ (back of neck)

BACK C-

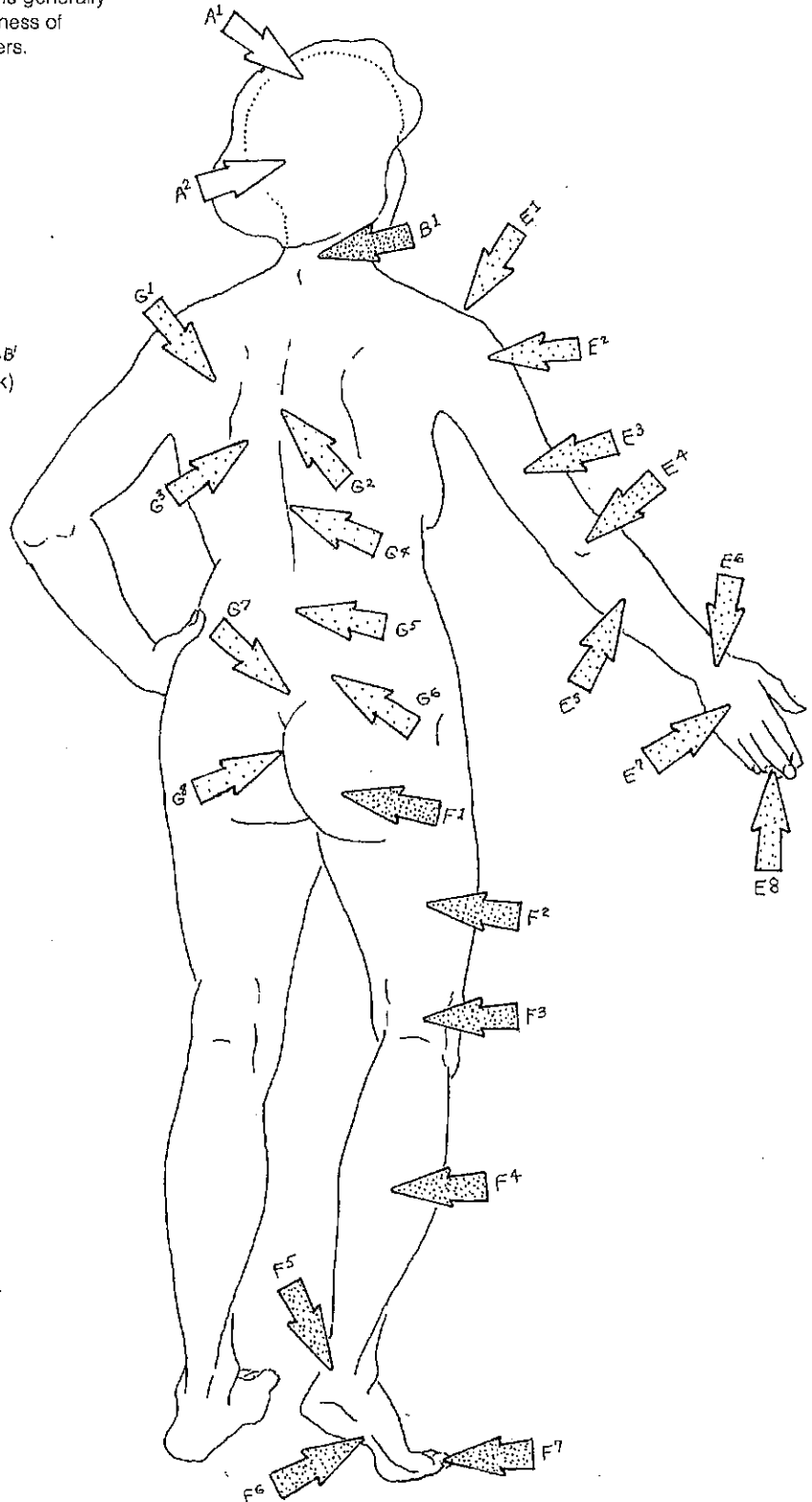
- SCAPULAR** C¹ (shoulder blade)
- VERTEBRAL** C² (spinal column)
- PARASPINAL** C³ (along side spinal column)
- THORACIC** C⁴ (posterior chest)
- LUMBAR** C⁵ (lower back)
- SACROILIAC** C⁶ (vertebro-pelvic joint)
- SACRAL** C⁷ (posterior pelvis)
- COCCYGEAL** C⁸ ("tail bone")

UPPER LIMB E-

- ACROMIAL** E¹ (top of shoulder)
- DELTOID** E² (shoulder/upper arm)
- BRACHIAL** E³ (arm)
- CUBITAL** E⁴ (elbow)
- ANTEBRACHIAL** E⁵ (forearm)
- CARPAL** E⁶ (wrist)
- HAND: DORSAL** E⁷ (back of hand)
- HAND: DIGITAL** E⁸ (fingers)

LOWER LIMB F-

- GLUTEAL** F¹ (buttock)
- FEMORAL** F² (thigh)
- POPLITEAL** F³ (back of knee)
- CRURAL** F⁴ (leg)
- TARSAL** F⁵ (ankle)
- FOOT: PLANTAR** F⁶ (sole)
- FOOT: DIGITAL** F⁷ (toes)



THE EAR: HEARING AND BALANCE

15. Using key choices, select the terms that apply to the following descriptions.
Place the correct letter in the answer blanks.

Key Choices

- | | | | |
|--|--------------------------------|------------------------|-------------------------|
| A. Anvil (incus) | E. External acoustic
meatus | I. Pinna | M. Tympanic
membrane |
| B. Auditory (pharyn-
gotympanic) tube | F. Hammer (malleus) | J. Round window | N. Vestibule |
| C. Cochlea | G. Oval window | K. Semicircular canals | |
| D. Endolymph | H. Perilymph | L. Stirrup (stapes) | |

- ____ 1. ____ 2. ____ 3. Structures composing the outer ear
- ____ 4. ____ 5. ____ 6. Structures composing the bony or osseous labyrinth
- ____ 7. ____ 8. ____ 9. Collectively called the ossicles
- ____ 10. ____ 11. Ear structures not involved with hearing

- ___ 12. Allows pressure in the middle ear to be equalized with the atmospheric pressure
 - ___ 13. Vibrates as sound waves hit it; transmits the vibrations to the ossicles
 - ___ 14. Contains the organ of Corti
 - ___ 15. Connects the nasopharynx and the middle ear
 - ___ 16. ___ 17. Contain receptors for the sense of equilibrium
 - ___ 18. Transmits the vibrations from the stirrup to the fluid in the inner ear
 - ___ 19. Fluid that bathes the sensory receptors of the inner ear
 - ___ 20. Fluid contained within the osseous labyrinth, which bathes the membranous labyrinth
16. Figure 8-3 is a diagram of the ear. Use anatomical terms (as needed) from key choices in Exercise 15 to correctly identify all structures in the figure provided with leader lines. Color all external ear structures yellow; color the ossicles red; color the equilibrium areas of the inner ear green; and color the inner ear structures involved with hearing blue.

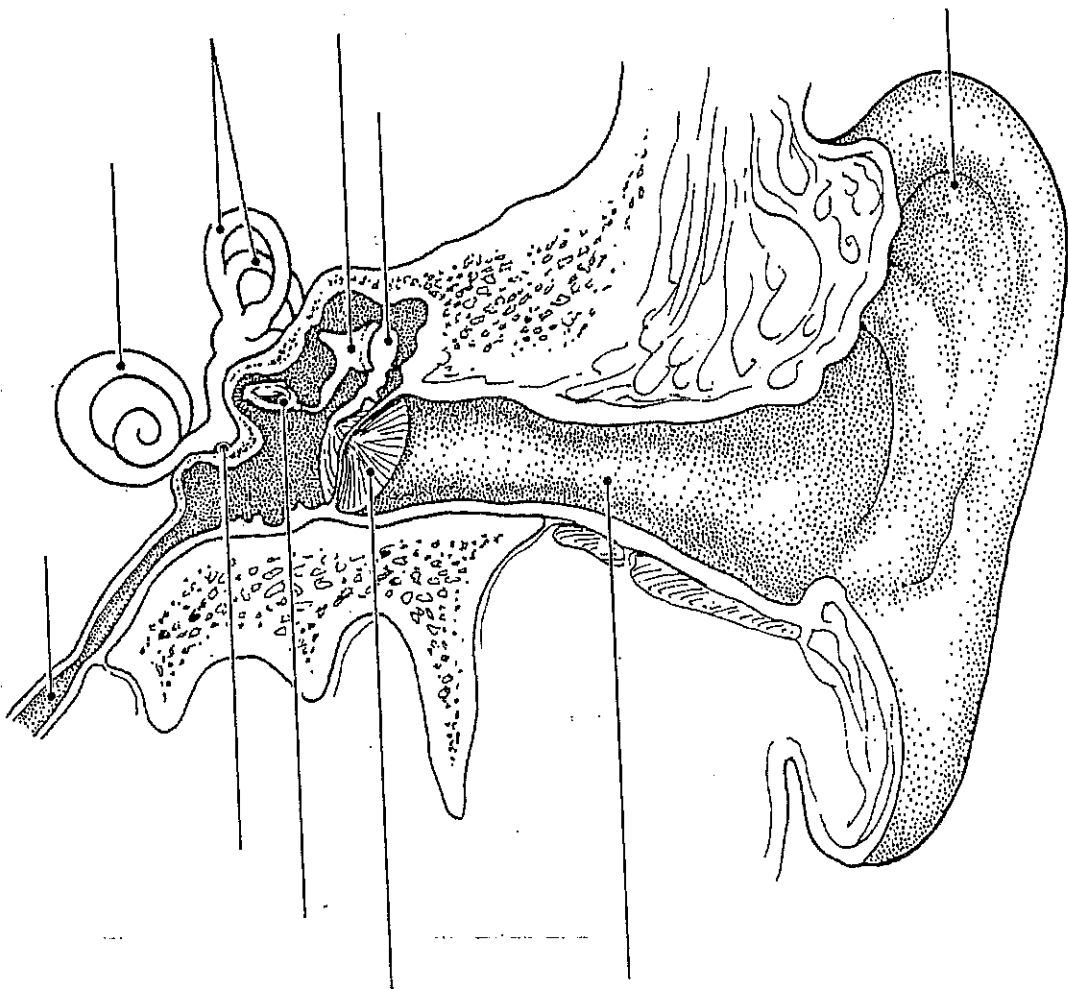
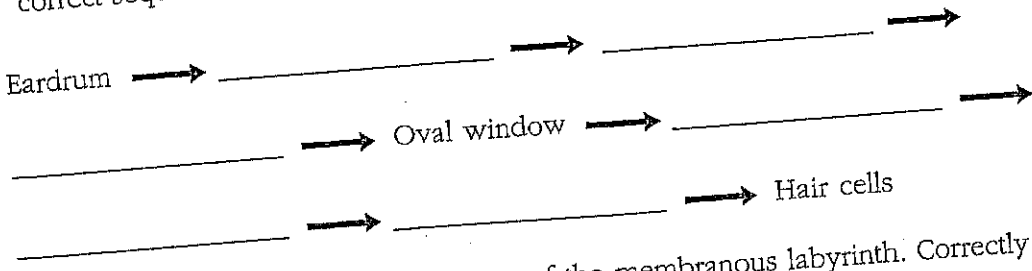


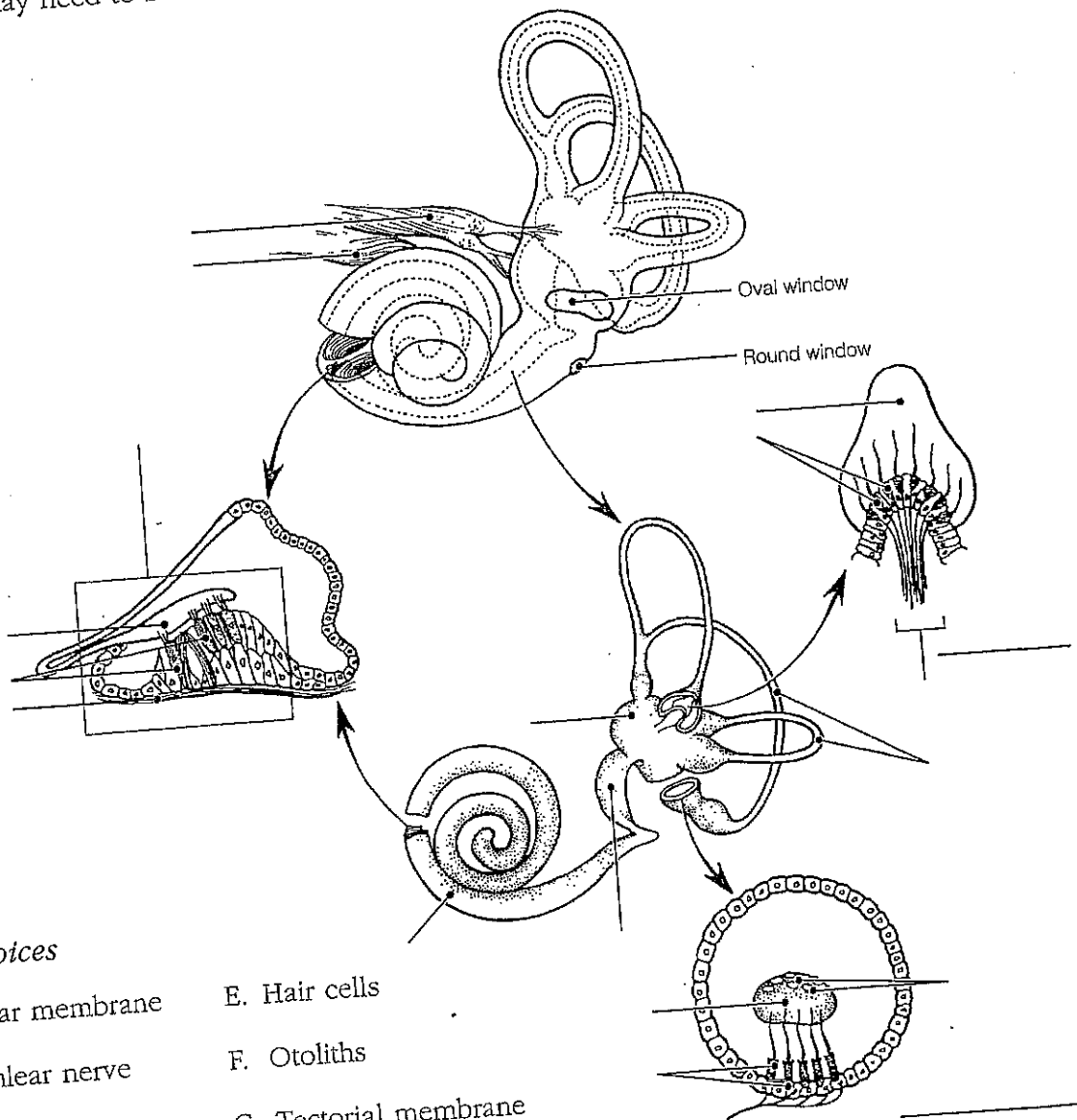
Figure 8-3

7. Sound waves hitting the eardrum set it into vibration. Trace the pathway through which vibrations and fluid currents travel to finally stimulate the hair cells in the organ of Corti. Name the appropriate ear structures in their correct sequence and insert your responses in the answer blanks.



18. Figure 8-4 is a view of the structures of the membranous labyrinth. Correctly identify the following major areas of the labyrinth on the figure: *membranous semicircular canals*, *sacculle* and *utricle*, and the *cochlear duct*. Next, correctly identify each of the receptor types shown in enlarged views (organ of Corti, *crista ampullaris*, and *macula*). Finally, using terms from the key choices below, identify all receptor structures provided with leader lines. (Some of these terms may need to be used more than once.)

Figure 8-4



Key Choices

- A. Basilar membrane
- B. Cochlear nerve
- C. Cupula
- D. Gel
- E. Hair cells
- F. Otoliths
- G. Tectorial membrane
- H. Vestibular nerve

19. Complete the following statements on the functioning of the static and dynamic equilibrium receptors by inserting the letter or term from the key choices in the answer blanks.

Key Choices

- | | | |
|---------------------|-------------------|------------------------|
| A. Angular/rotatory | E. Gravity | I. Semicircular canals |
| B. Cupula | F. Perilymph | J. Static |
| C. Dynamic | G. Proprioception | K. Utricle |
| D. Endolymph | H. Saccule | L. Vision |

- _____ 1. The receptors for (1) equilibrium are found in the crista ampullaris of the (2). These receptors respond to changes in (3) motion. When motion begins, the (4) fluid lags behind and the (5) is bent, which excites the hair cells.
- _____ 2. When the motion stops suddenly, the fluid flows in the opposite direction and again stimulates the hair cells.
- _____ 3. The receptors for (6) equilibrium are found in the maculae of the (7) and (8). These receptors report the position of the head in space. Tiny stones found in a gel overlying the hair cells roll in response to the pull of (9). As they roll, the gel moves and tugs on the hair cells, exciting them. Besides the equilibrium receptors of the inner ear, the senses of (10) and (11) are also important in helping to maintain equilibrium.
- _____ 4.
- _____ 5.
- _____ 6.
- _____ 7.
- _____ 8.
- _____ 9.
- _____ 10.
- _____ 11.

20. Indicate whether the following conditions relate to conduction deafness (C) or sensorineural (central) deafness (S). Place the correct letter choice in each answer blank.

- _____ 1. Can result from the fusion of the ossicles
- _____ 2. Can result from damage to the cochlear nerve
- _____ 3. Sound is heard in one ear but not in the other, during both bone and air conduction
- _____ 4. Often improved by a hearing aid
- _____ 5. Can result from otitis media
- _____ 6. Can result from excessive earwax or a perforated eardrum
- _____ 7. Can result from a blood clot in the auditory cortex of the brain

21. List three things about which a person with equilibrium problems might complain. Place your responses in the answer blanks.

_____, _____, and _____

22. Circle the term that does not belong in each of the following groupings.

1. Hammer Anvil Pinna Stirrup
2. Tectorial membrane Crista ampullaris Semicircular canals Cupula
3. Gravity Angular motion Sound waves Rotation
4. Utricle Sacculle Auditory tube Vestibule
5. Vestibular nerve Optic nerve Cochlear nerve Vestibulocochlear nerve

CHEMICAL SENSES: SMELL AND TASTE

23. Complete the following statements by inserting your responses in the answer blanks.

- _____ 1. Three cranial nerves involved in transmitting impulses for the sense of taste are the (1), (2), and (3). Impulses for the sense of smell are transmitted by the (4) nerve. The receptors for smell are located in the (5) of the nasal passages; the act of (6) increases the sensation, because it brings more air into contact with the receptors. The receptors for taste are found in clusterlike areas called (7), most of which are located on the sides of (8) or (9) papillae.
- _____ 2.
- _____ 3.
- _____ 4.
- _____ 5. The five basic taste sensations are (10), (11), (12), (13), and (14). The most protective receptors are thought to be those that respond to (15) substances. When nasal passages are congested, the sense of taste is decreased. This indicates that much of what is considered taste actually depends on the sense of (16). It is impossible to taste substances with a (17) tongue, because foods must be dissolved (or in solution) to excite the taste receptors. The sense of smell is closely tied to the emotional centers of the brain (limbic region), and many odors bring back (18).
- _____ 6.
- _____ 7.
- _____ 8.
- _____ 9.
- _____ 10.
- _____ 11.
- _____ 12. _____ 15. _____ 17.
- _____ 13. _____ 16. _____ 18.
- _____ 14.

AUDITORY & VESTIBULAR SYSTEM (1)

Use yellow for Z, and light colors for I, M, N, W, and X. The view of the ear is magnified in the upper portion for coloring purposes. Color your way down the plate, beginning with the diagram at the top.

EXTERNAL EAR:-

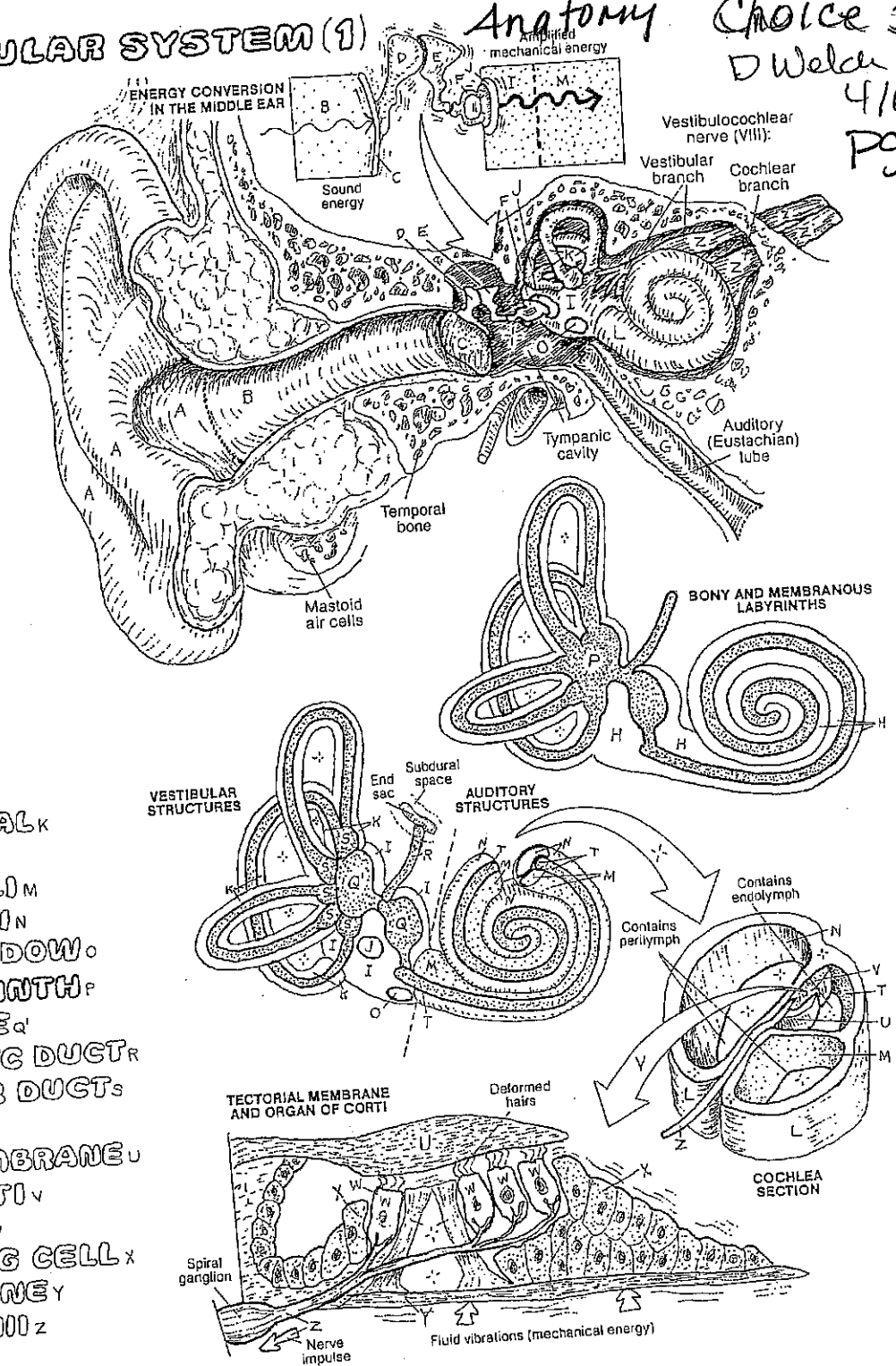
- AURICLE A
- EXT. AUDITORY MEATUS B
- TYPANIC MEMBRANE C

MIDDLE EAR:-

- MALLEUS (HAMMER) D
- INCUS (ANVIL) E
- STAPES (STIRRUP) F
- AUDITORY TUBE G

INTERNAL EAR:-

- BONY LABYRINTH H
- VESTIBULE I
- OVAL WINDOW J
- SEMICIRCULAR CANAL K
- COCHLEA L
- SCALA VESTIBULI M
- SCALA TYMPANI N
- ROUND WINDOW O
- MEMBRANOUS LABYRINTH P
- SACCULE / UTRICLE Q
- ENDOLYMPHATIC DUCT R
- SEMICIRCULAR DUCT S
- COCHLEAR DUCT T
- TECTORIAL MEMBRANE U
- ORGAN OF CORTI V
- HAIR CELL W
- SUPPORTING CELL X
- BASILAR MEMBRANE Y
- CRANIAL NERVE VIII Z



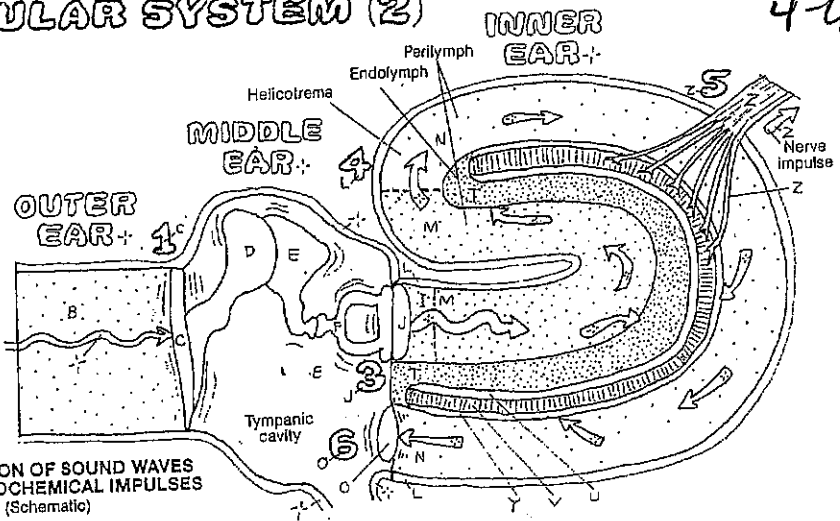
The ear is the organ of hearing and equilibrium (auditory and vestibular systems). It is organized into external, middle, and internal parts. The external ear includes the *auricle* (collector of sound energy) and the *external auditory meatus* or canal (a narrow passageway conducting sound energy to the *tympanic membrane*). This membrane, lined externally by skin and internally by respiratory mucosa, converts sound energy into mechanical energy by resonating in response to incoming sound waves.

The middle ear is a small area filled with much structure, including three small bones (*malleus*, *incus*, *stapes*) joined together by synovial joints. These ossicles vibrate with movement of the tympanic membrane, and amplify and conduct the mechanical energy imparted to them to the waters of the inner ear at the flexible, water-tight *oval window* (middle ear/inner ear interface). At the anterior-medial aspect of the middle ear cavity, the *auditory tube* runs to the nasopharynx, permitting equilibration of air pressure between nasal cavity (outside) and the middle ear. The internal ear, carved out within the petrous portion of the temporal

bone, consists of a series of interconnecting bony-walled chambers and passageways (*bony labyrinth*: *vestibule*, *semicircular canals*, and *cochlea*) filled with perilymph (extracellular-like) fluid. Within the bony labyrinth is a series of interconnecting membranous chambers and passageways (*membranous labyrinth*: *sacculle*, *utricle*, *cochlear duct*, and *semicircular ducts*), filled with endolymph (intracellular-like fluid). The *endolymphatic duct*, derived from the *sacculle*, ends in a blind sac under the dura mater near the internal auditory meatus (see Plate 25). It drains endolymph and discharges it into veins in the subdural space. Within the coiled, membranous *cochlear duct*, supported by bone and the fibrous *basilar membrane*, a ribbon of specialized receptor (*hair cells*) exists integrated with supporting cells, both covered with a flexible, fibrous glycoprotein blanket (*tectorial membrane*). This device (*Organ of Corti*) converts the mechanical energy of the oscillating tectorial membrane scraping against the receptor hair cells into electrical energy. The impulses generated are conducted along bipolar sensory (auditory) neurons of the *VIII cranial nerve*. (Continued on the next plate.)

AUDITORY & VESTIBULAR SYSTEM (2)

Titles with subscripts 1, 2, and 3 require new colors; all other subscripts (A-Z) refer to titles and colors used on the preceding plate, which should be frequently referred to when using those same colors on this plate. (1) Color the numerals with the appropriate color as you follow the sequence of events in the simplified diagram to the right. See the previous plate for the more accurate anatomical structure. (2) Color the parts of the vestibular system concerned with the maintenance of dynamic and static balance.



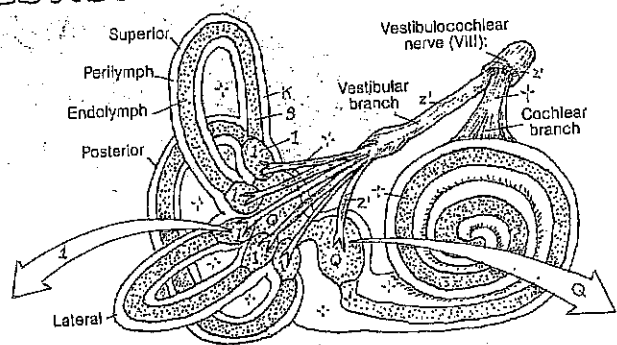
CONVERSION OF SOUND WAVES TO ELECTROCHEMICAL IMPULSES (Schematic)

In review: the external ear collects sound waves and rifles them to the *tympanic membrane*, which converts the sound energy into mechanical energy. The linkage of *ossicles* increases the amplitude of the energy and transmits the force to the *oval window* of the bony labyrinth of the inner ear. Vibratory movements of the *stapes* in the window are transmitted to the perilymph of the *vestibule* of the bony labyrinth, creating wave-like motions of the fluid. These waves spread throughout the vestibule, then enter and move through the *scala vestibuli* of the *cochlea* to the *helicotrema* at the apex of the cochlea (2½ turns) and on around to the *scala tympani*, which

terminates at the *round window*. Here, fluid waves and vibrations are dampened. The fluid motion in the *scala vestibuli* vibrates the roof of the membranous *cochlear duct*, creating endolymph waves in the cochlear duct. This motion stirs the *tectorial membrane*, which rubs against and bends the hair-like processes of the *receptor (hair) cells*, depolarizing them and inducing electrochemical impulses. These impulses are conducted by the sensory neurons of the cochlear division of the *VIII cranial nerve*. Stimulation of the hair cells from the apex of the cochlea to the base produces a continuum of increasingly high-pitched sound perceptions.

VESTIBULAR SYSTEM/EQUILIBRIUM

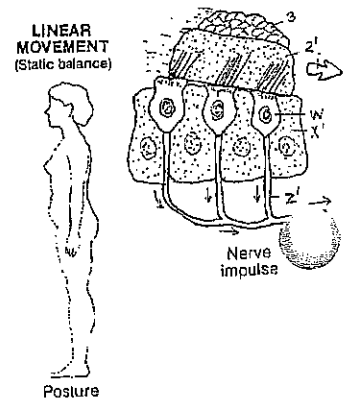
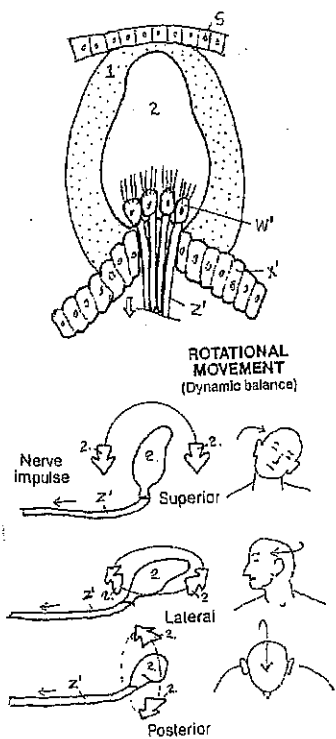
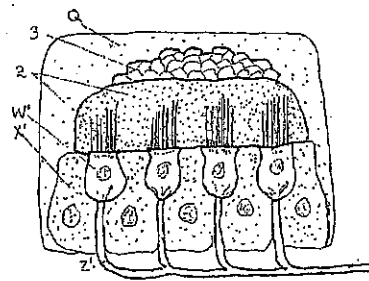
- AMPULLA: 1
- CRISTA: 1
- CUPOLA: 2
- HAIR CELL: w'
- NERVE FIBER: z'
- SUPPORTING CELL: x'



- SACCULE, UTRICLE: 1
- MACULA: 1
- GELATINOUS LAYER: 2
- OTOLITH: 3
- HAIR CELL: w'
- NERVE FIBER: z'
- SUPPORTING CELL: x'

SEMICIRCULAR CANAL SEMICIRCULAR DUCT

In review: the vestibular system is located in the inner ear. The bony *semicircular canals* are oriented at 90° to one another. Within these canals are the membranous *semicircular ducts*. Directly communicating with the utricle at one end, each duct terminates at the other end in an *ampulla*. Within the *sacculle/utricle* and the ampullae are sensors responsive to fluid (endolymph) movement. Each ampulla has a hillock of cells (*crista* or *crest*) consisting of *receptor (hair) and supporting cells*. The hair-like processes of these receptor cells are embedded in a top-heavy, gelatinous *cupola* (like an inverted cup). Movement of endolymph in response to head turning, and especially rotation, pushes these cupolas, bending the hair cells and causing them to depolarize, generating an electrochemical impulse. The impulses travel out the vestibular part of the *VIII nerve* to the vestibular nuclei in the lower brain stem. When the body is rotated rapidly, horizontal, oscillatory eye movements occur (*nystagmus*). These eye movements are mediated by ampullary sensory input to the brain stem. Such movements represent the brain's attempt to maintain spatial orientation (by momentary visual fixation) during head and/or body rotation. Sensations of rotational movement in the absence of body rotation are called *vertigo*.



Within the utricle/sacculle, *hair cells* and their *supporting cells* are covered with a *gelatinous layer* in which are embedded small calcareous bodies (*otoliths*). Movement of the endolymph induces movement of the gelatinous layer against the hair cells, with responses identical to those of the ampullary receptors. Receptor activity in the utricle/sacculle is influenced by linear (horizontal and vertical but non-rotational) acceleration of the body. Vestibular receptors have strong neural connections with cranial nerve nuclei concerned with eye movement and with postural motor centers.

BIOLOGY-II
NERVOUS SYSTEM
ACTIVITY #12

NAME _____
DATE 4/6-12 HOUR _____

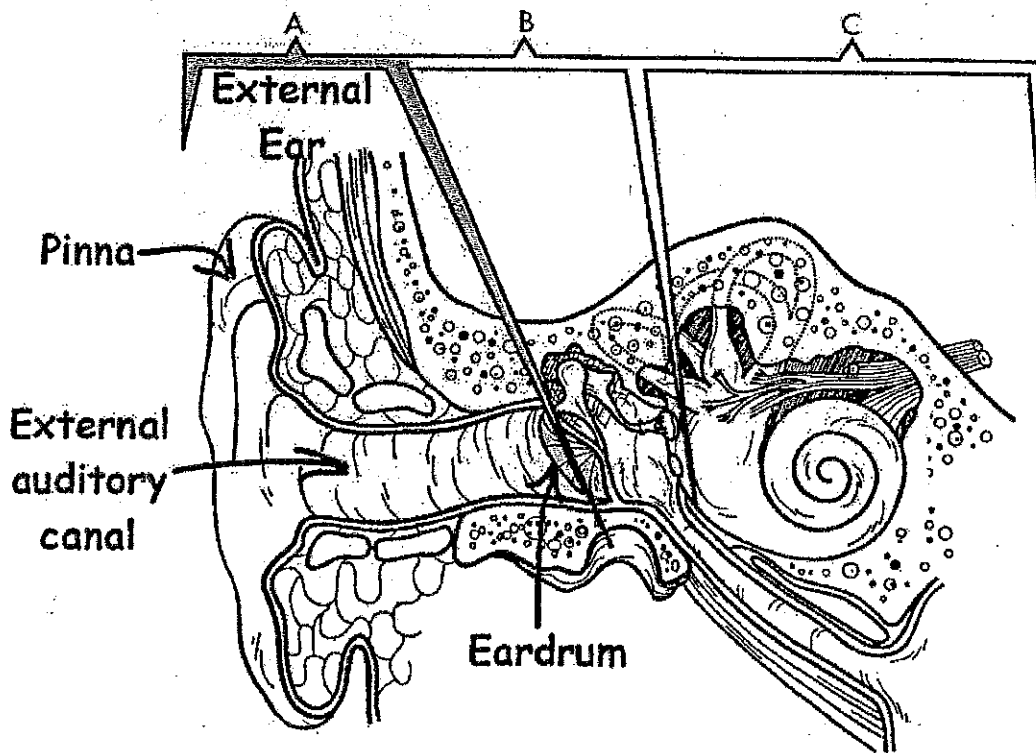
THE EAR AND HEARING

6

OBJECTIVES:

17. Explain how the ear converts sound waves into nerve impulses and identify all parts involved. (pp. 289 - 298)
18. Describe the receptors and processes involved in the sense of equilibrium. (pp. 291 - 294)

DIVISIONS OF THE EAR

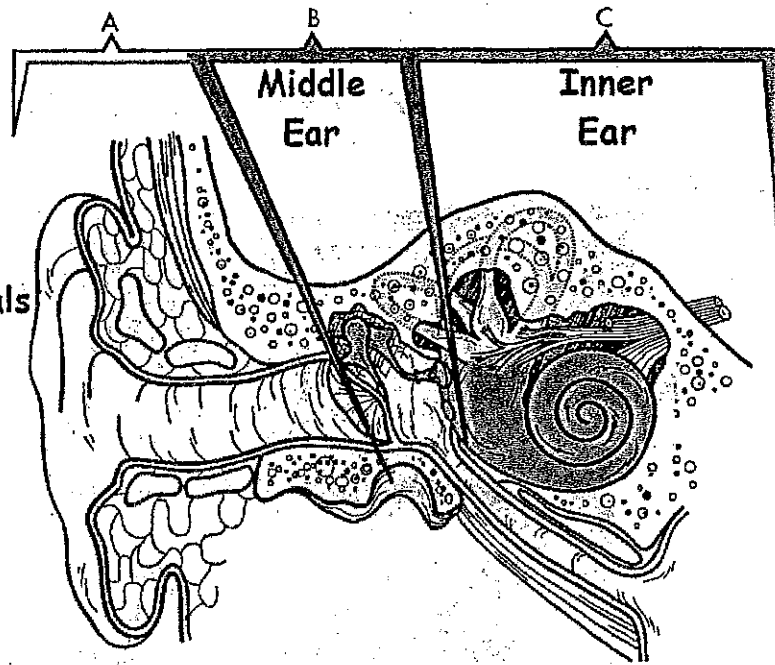


External Ear

- Visible portion of ear
- Collects and directs sound waves to eardrum
- Eardrum boundary between external & middle ear
- Wax - decreases growth of microorganisms
- Small hairs - help prevent entry of foreign organisms

DIVISIONS OF THE EAR

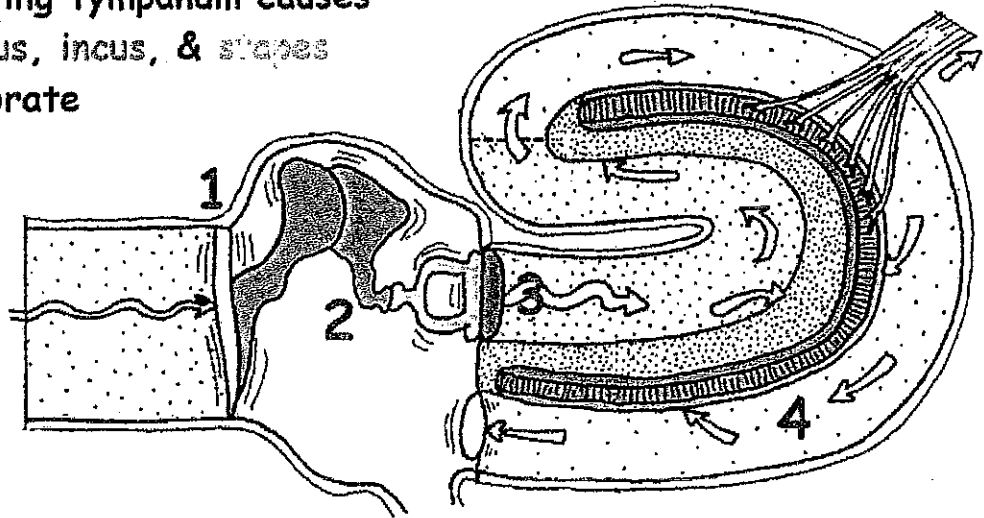
- Auditory ossicles
- Vestibule
- Semicircular canals
- Cochlea



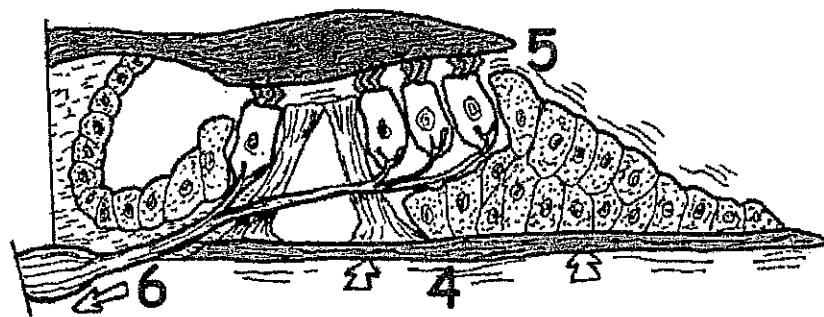
Middle Ear	Inner Ear
<ul style="list-style-type: none"> • Auditory ossicles transmit sound waves from tympanum to oval window • Eustachian tube <ul style="list-style-type: none"> - B/w middle ear & nasopharynx - Equalizes pressure on both sides of eardrum • Filled with air • Found w/in temporal bone 	<ul style="list-style-type: none"> • Houses receptors for hearing and equilibrium • Vestibule <ul style="list-style-type: none"> - Static equilibrium - Position of head with respect to gravity • Semicircular canals <ul style="list-style-type: none"> - Dynamic equilibrium - Rotational movements of head • Cochlea <ul style="list-style-type: none"> - Hearing - Converts sound waves into nerve impulses

HEARING

1. Sound waves cause tympanum to vibrate
2. Vibrating tympanum causes malleus, incus, & stapes to vibrate
3. Stapes causes oval window to vibrate which causes fluid in cochlea to vibrate



4. Vibrating fluid causes basilar membrane to vibrate
5. Vibrating basilar membrane pushes hair cells against tectorial membrane



6. Bent hair cells generate nerve impulse
Nerve impulse transmitted to brain

Anatomy
D. Welch
4-6/4-10
pg 4
Notes

Notes

The Hearing Process: (in a nutshell!)

1. Sound waves arrive at tympanic membrane
2. ^{chole} Movement of tympanic membrane cause displacement of auditory ossicles.
3. Movement of stapes at oval window establishes pressure waves in the perilymph of the vestibular duct.
4. Pressure waves distort the basilar membrane on their way to round window of the tympanic duct.
5. Vibration of *basilar membrane* causes vibrations of hair cells against the *tectorial membrane*.
6. Info about the region & intensity of stimulation is relayed to the CNS over the cochlear branch of the vestibulocochlear nerve (VIII).