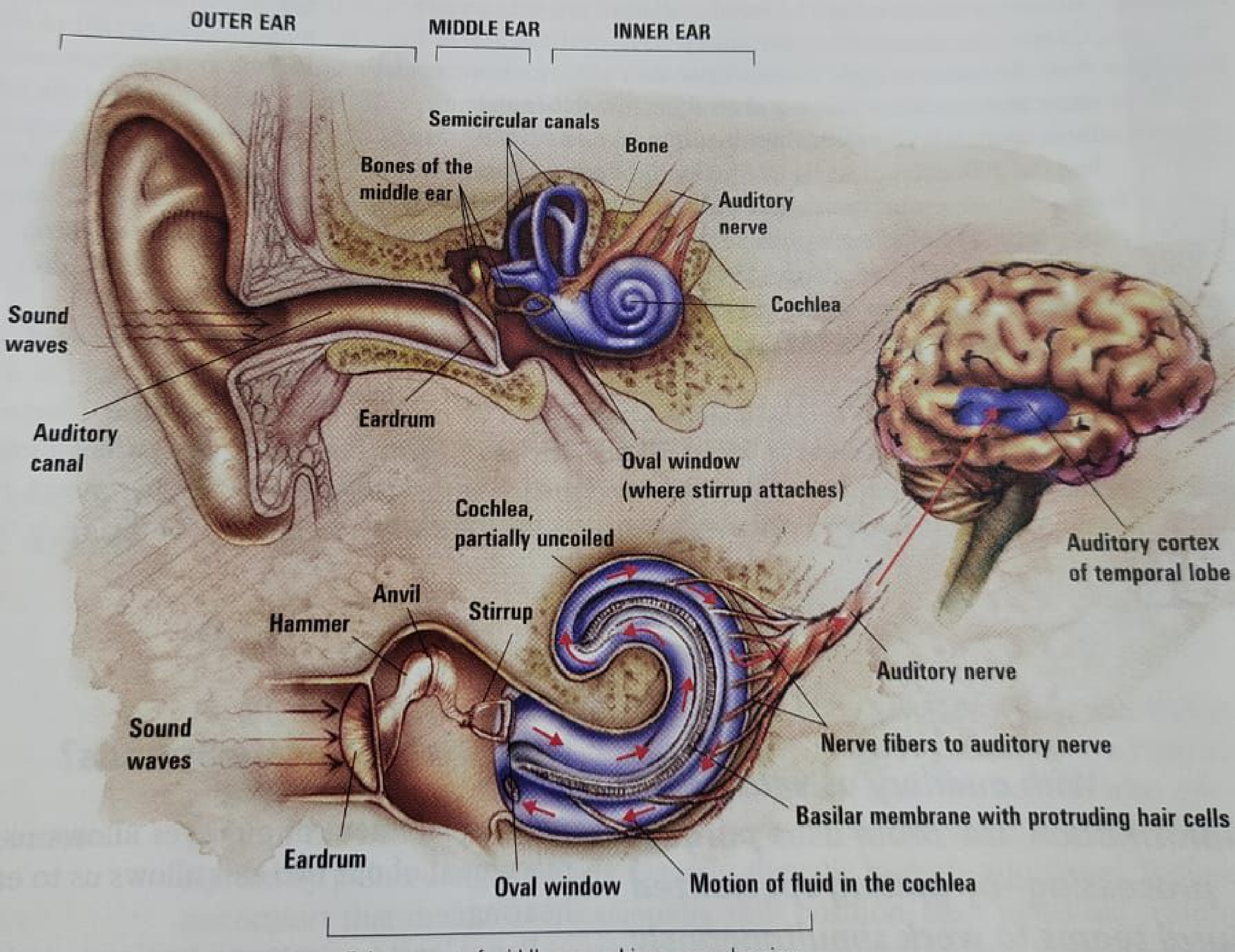
short, fast waves create
; slower waves.
amplitude create differing

... (the *hammer, anvil,* and *stirrup*) to a ... tube in the **inner ear** called the **cochlea** (KOHK-lee-uh). The incoming vibrations cause the cochlea's membrane (the *oval window*) to vibrate the fluid that fills the tube. This motion causes ripples in the *basilar membrane*, which is lined with *hair cells*, so named because of their tiny hairlike projections. At the end of this sequence, the rippling of the basilar membrane bends these hair cells, rather like the wind bending a wheat field. This hair cell movement triggers impulses in the adjacent nerve fibers, which converge to form the auditory nerve. Through this mechanical chain of events, sound waves cause the hair cells of the inner ear to send neural messages up to the temporal lobe's auditory cortex. From vibrating air to moving piston to fluid waves to electrical impulses to the brain: We hear.

Brief exposure to extremely intense sounds, such as gunfire near one's ear, and prolonged exposure to intense sounds, such as amplified music, can damage receptor cells and auditory nerves (Backus, 1977; West & Evans, 1990). Although rock and roll may be here to stay, the sad truth for some rock musicians is that their hearing may not be. For others, hearing loss, especially for the higher frequencies, accompanies the biology of aging. To many adults, chirping birds seem quieter, and soft conversation becomes frustratingly unintelligible.



Enlargement of middle ear and inner ear, showing cochlea partially uncoiled for clarity

TDC Part - I

9/7/2020

Ear. (Hearing)

Like our other senses, our hearing, or audition, is highly adaptive. We hear a wide range of sound, but we are best able to hear sounds having frequencies with in a range that corresponds to the range of the human voice. We also are remarkably sensitive to faint sounds; ~~obvious~~ We are also sensitive to differences in sounds. We can easily detect differences ~~an~~ among thousands of human voices, which helps us instantly recognize the voice of almost anyone we know.

The strength an amplitude of sound wave ~~length~~ determines Their loudness. Wave also vary in length, and therefore in frequency. Their frequency determines their Pitch: The longer the waves (lower their frequency) the lower the pitch the shorter the waves (the higher their frequency), the higher the pitch.

Decibles are the measuring unit for sound energy. The absolute threshhold for hearing is arbitrarily defined as 0 decibles.

Every 10 decibles corresponds to a tenfold increase in sound. Thus, normal conversation (60 decibels) is about 10,000 times louder than a soft whisper (20 decibels). And a tolerable 90-decibels sound is a trillions limes louder than the faintest detectable sound. When prolonged exposure to sounds above 85 decibels can produce hearing loss.

Structure & Function of Ear.

To hear, we must somehow convert sound wave into neural activity. The human ear works like a mechanical chain reaction. (See figure)

First, the visible outer ear channels sound wave through the auditory canal to the eardrum, a tight membrane that vibrates with the waves. The middle ear transmits the eardrum's vibration through a piston made of three tiny bones (the hammer, anvil and stirrup) to a Snail-shaped tube in the inner ear called the Cochlea. The incoming vibration cause the Cochlea's membrane (the oval window) to vibrate the fluid that fills the tube. This motion causes ripples in the basilar membrane which is lined with hair cells, ~~so~~ It is named so because of their tiny hair like structure. The basilar ~~membr~~ membrane bends these hair cells, like the wind bending a wheat field. This hair cell movement triggers impulses in the adjacent nerve fibers, which converge to form the auditory nerve. Through this mechanical chain of events, Sound wave cause the hair cells of the inner ear to send neural messages up to the temporal lobe's auditory Cortex. From vibrating air to moving piston to fluids waves to electrical impulses to the brain. We hear.