

Avian Hearing and Balance

A. Structure

like mammalian ear has 3 sections

outer ear

middle ear

inner ear

Outer ear – no pinna

short canal (external auditory meatus)
covered by special feathers that don't
obstruct sound transmission

Middle ear – 1 middle ear bone, stapes

not 3 as in mammals (malleus, incus and
stapes)

Inner ear – 3 semicircular canals, saccule,
utricle and cochlea

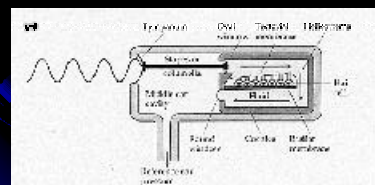
- semicircular canals, saccule and utricle
important in balance and equilibrium
- cochlea – sound converted to nervous
impulse



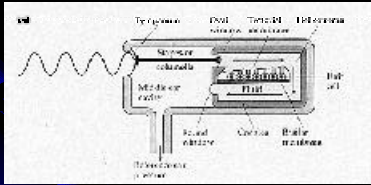
Fig. 3. Vestibular apparatus of inner ear. (Treatment of the utricle and saccule are based on the vertebrate ear; the utricle and saccule are shown in green and yellow, respectively.)

B. Mechanics

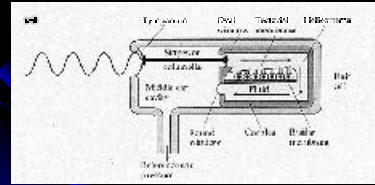
1. Pressure waves cause tympanic
membrane to vibrate



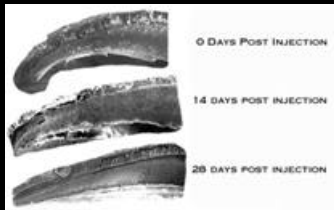
- 2. Vibration of membrane results in stapes vibrating
- 3. Vibration of stapes results in oval window (entrance to cochlea) vibrating



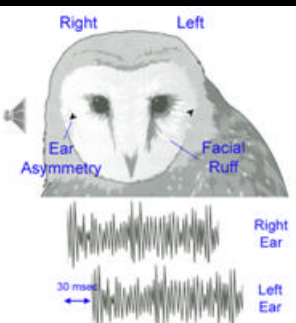
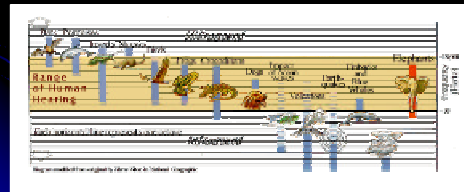
- 4. Vibration causes pressure waves in fluid of cochlea
- 5. Pressure waves deflect hair cells and generates nerve impulse



Loss or damage of hair cells unable to regenerate in humans,
Birds can!



C. Hearing Range
Most birds – hearing 1 – 4 kHz
Some – 10 – 12 kHz
Generally similar to humans



Asymmetrical placement of ears on owls facilitates prey location



D. Echolocation

Occurs in 2 families, Steatornidae, Apodidae

Used for orientation in dark caves

Produce clicking sounds, receive and interpret resulting echo



Oilbirds emit sounds within range of human hearing (very rapid clicks – 250 per second)

