

Questions based on Schneider chapter and on lectures:

1. Instinctive aversive behavior in response to loud noise, and learned fear responses to specific sounds, depend on different ascending connections. Contrast the connections.
2. What are the major functional requirements of a predator's auditory system that led to the evolution of two major ascending auditory system pathways? Where do these pathways terminate?
3. How is impedance matching achieved in the transfer of sound vibrations from air to fluid?
4. How is a "place code" used for encoding of sound frequency information? Describe the apparatus at the level of the periphery and of the secondary sensory neurons.
5. Describe how spatial summation and convergence are used in the detection of sound locations.
6. Where does information about location of sounds and sights converge in the CNS? What happens if the auditory and visual maps get out of register?
7. How are the maps of neocortical areas very similar in the visual system and the auditory system?
8. What is a major function of auditory cortex in the cat, from the results of unit recordings and from the effects of ablation?
9. Studies of functional activation of neocortical areas has led to the discovery of two major transcortical pathways in the auditory system. Describe these pathways and their relation to the visual system.

Questions on readings: Allman, supplemented by Striedter.

1. According to fossil evidence, what major transformation of the hearing apparatus occurred in early mammals?
2. What is believed to be the functional advantage of this transformation? How are the outer hair cells, another feature unique to mammals, involved?
3. Why does Allman think that these innovations were linked to developments in parental care, which was related to evolution of temperature homeostasis?

Questions on readings: Striedter ch 8

4. It is likely that early mammals were nocturnal. This would promote the evolution of olfaction and audition. What skull feature supports the idea of an innovation in the hearing apparatus just prior to evolution of mammals?
5. What brains of extant species probably resemble the brains of very early mammals?

Questions on readings: Striedter ch 5

6. What are the functions of the facial and vagal lobes of teleost fish, used by Striedter as examples of mosaic evolution?
7. What is the even more spectacularly enlarged hindbrain system in Mormyrid fish? What are the two structures most affected?
8. Describe the correlation between structural size of the Higher Vocal Center in songbirds and function.
9. How do the sizes of the superior and inferior colliculi of the midbrain vary among mammals?

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9.14 Brain Structure and Its Origins

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