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Class 26: Introduction to the forebrain

Questions based on Schneider chapter and classes:

- 1) What was most likely the earliest part of the forebrain? Recall the earlier discussion of the invertebrate chordate Amphioxus (*Branchiostoma*).
- 2) What cranial nerves are attached to the forebrain? Two of these are not among the 12 that are usually named for human brain.
- 3) Long after removal or disconnection of the forebrain, animals are missing major segments of normal behavior, even if an island of hypothalamus remains attached to the pituitary. Describe missing aspects of behavior. (See also chapter 7.)
- 4) What studies in recent years have provided evidence for the old hypothesis that the endbrain in early chordate evolution was dominated by olfaction? (See also chapter 19.)
- 5) Contrast the suggested early functional roles of the medial pallidum and the corpus striatum.
- 6) In most chordate groups, brain size increases in evolution, but in a few groups, it decreases. Why would it ever decrease? (See also: Striedter readings.)
- 7) What, in evolution, was the major cause of the differentiation of dorsal and ventral parts of the corpus striatum?
- 8) From what part of the primitive endbrain did the neocortex evolve? What kinds of data support this?
- 9) Name several mammals now living that have a very small neocortex.

Questions on supplementary readings: Striedter

1. Can we link the evolution of neocortex and its expansion to the evolution of intelligent behavior? Why or why not?
2. What similarity in metabolism and autonomic control is shared by birds and mammals, and seems to be a precursor of enlarged brains?
3. Besides the changes in the auditory system, what was the other likely change in sensory capacities of mammals, especially placental mammals?

4. Give a rough estimate of the relative size of telencephalic cortex in very early mammals. Were their brains small or large? How do we know this?
5. What are some major similarities and differences between reptilian (e.g., turtle) dorsal pallium and mammalian neocortex?
6. What major endbrain structure is found in reptiles and birds but not in mammals? What was the finding, surprising at the time, of Harvey Karten, working at MIT in the 1960s, about this structure?
7. Summarize two major competing hypotheses concerning the mammalian homologue of this endbrain structure in sauropsids (reptiles and birds).
8. “The avian dorsal cortex is generally called the hyperpallium (previously, the hyperstriatum), or ‘Wulst’”. What is this structure in terms of function and connections and in what species is it most developed?
9. Evidence indicates that early placental mammals lost some of the color vision present in ancestral pre-mammalian animals. Why? How did their vision probably change? (See discussion of Gordon Walls’ “bottleneck hypothesis”).

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