9.14 - Brain Structure and its Origins
Spring 2005
Massachusetts Institute of Technology
Instructor: Professor Gerald Schneider

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Classes #35-38: Neocortex
Study Questions on Allman and Striedter readings

Questions on Allman ch 7, pp 160-208 (*The evolution of big brains*)*:*

1. What animals are closest to humans in the brain-body weight relationship? (See p 161 and following pages.)

2. In this relationship, how do humans compare with fruit-eating primates and with leaf-eating primates?

3. How does human ability to cook food promote larger brain size? (See the discussion of energy requirements of various organs, p 166f.)

4. How does parenting relate to the constraint that probably sets an upper limit in the evolution of brain size (p 175)?

5. Sexual dimorphism in brains corresponds to differences in behavior between the sexes. How does this relate to longevity? (Why do females live longer in many, but not all, species? See p 177ff.)

6. How does Allman relate the longevity findings on humans to the serotonin system? How might this relate to hippocampal size (re findings of Robert Sapolsky)? (See pp 185-188.)

7. What is meant by calling humans a pedomorphic ape? (See figure p 197 and discussion in the text.)

8. What changes in Wernicke's area of the human brain appear to result from greater education, according to Golgi studies by Arnold Scheibel and collaborators (p 202)?

9. What are the "two great buffers against misfortune" in human evolution, according to Allman, in addition to more recent cultural institutions? See p. 203. (These two things come together in the "social brain" hypothesis.)

Questions on Striedter ch 9, pp 297-344 (*What's special about human brains?*)*:*

10. What are several differences between prosimian and simian skulls, and the correlates of these differences? (See figure 9.2)

11. Primate-typical brain features (mostly specializations of neocortex) involve what three regions? What, briefly, are their functions? (See section beginning on p 305.)

12. What are functions of the ventral premotor area, unique to primates? (See p 307.)

13. In what two regions are there neocortical areas that may be unique to humans?

14. What behavioral innovation in humans appears to be correlated with the halt in brain size expansion about 100,000 years ago?

15. Briefly summarize a few downsides to the great expansion of brain size in humans. (Give examples.)