

## 9.14

### **Classes #9-11: Differentiation of the brain vesicles**

**Tuesday February 22; Wednesday February 23; Friday February 25, 2005**

#### *Readings:*

Nauta ch 5 pp 64-84. (Recommended only: ch 10, 11)

Allman ch 5 pp 86-119.

Butler & Hodos ch 7 pp 95-106; ch 9 pp 120-122; ch 10 pp 133-134, (134-140).

#### *Questions on readings: Nauta ch 5*

1. Which primary sensory neurons are at the surface of the body?
2. What are muscle spindle organs? Describe their location and what they respond to. They are located at the sensory end of monosynaptic reflex arcs.
3. What is meant by a "lemniscus"?
4. Why is the term "spinothalamic tract" somewhat of a misnomer?
5. Draw, on an outline of the embryonic mammalian CNS, the spinothalamic pathway (the "paleolemniscus") leading from skin to neocortex. Note where the axons decussate, and where there are synapses.
6. Contrast the medial lemniscus and the lateral lemniscus: modality represented, origin of the axons.
7. Which receptor cells, of a major sensory modality, are part of the forebrain?

#### *Questions on readings: Allman ch 5*

8. What property evolved in birds and mammals that required a ten-fold increase in energy expenditure?
9. Which is energetically more expensive, to heat the body or to cool it? How does this explain the body temperature of endothermic animals?
10. What does Allman mean when he writes that "in a sense teeth are displaced and transformed bits of brain tissue"?
11. How is parenting behavior related to temperature homeostasis?
12. Name several of the multiple functions of the hormone oxytocin.

13. What was a very important result of the major transformation of the hearing apparatus occurred in the earliest mammals?
14. How is pedomorphism in early mammals related to relative brain size?
15. How is evolution of neocortex in mammals and related structures in birds related to temperature homeostasis?
16. What is the first region of the neocortex to develop?
17. Why does Allman think that the Wulst of the owl is more efficiently “wired” than the visual cortex of mammals?
18. What structure in birds is genetically related to the neocortex of mammals?

*Questions on readings: Butler & Hodos*

19. Why do Butler and Hodos find the traditional enumeration of 12 cranial nerves to be inadequate? (p. 120, 133-134, 127)
20. Why do the authors suggest that embryonic hindbrain divisions result from a kind of "bar code" pattern of gene activity? (p. 122 col. 1, fig. 9-1)
21. Contrast neural crest and placodal origin of sensory and other structures (main features). Give examples.