

Questions on Schneider chapter 34 (class 38): Neocortex 3

“Structural change in development and in maturity”

1. What is the subpial granular layer? When and where and in what animals is it found?
2. What is the difference between symmetric and asymmetric cell division, and what are the consequences for development?
3. Explain the importance of evolutionary changes in the periods of symmetric and asymmetric cell division in neocortical development, as postulated by Pasco Rakic.
4. Explain how Finlay and Darlington plotted the sizes of various brain structures in primates and other mammals, showing a kind of concerted evolution. What did their graphs show about the relative size of neocortex compared with other structures?
5. How do neurons that begin their migration from the ventricular zone in the neocortex reach their final destinations? What is meant by an “inside-out” pattern of migration?
6. Besides the ventricular zone, two other proliferative regions are the sources of other neurons that migrate into the developing cortical plate. Where are these two regions located, and what kind of neurons do these other cells become? (See p 230-231, 597, 607-608, 646-647, 651.)
7. Describe an example of how neuronal activity can affect the development of axonal connections even prenatally or before the eyes open, before there is any visual experience.
8. What evidence has been found in mammals for brain changes after blinding? Are the changes/anomalies necessarily structural in nature?
9. Describe experiments with mature monkeys in which changes in the primary somatosensory cortex were found. Describe the behavioral task and the nature of the changes found.
10. The important role of the hippocampus in the formation of now spatial or declarative memories has been made clear by effects of lesions. Where are the engrams underlying the long-term storage of these memories? Where are the cells that show an anatomical plasticity that is likely to be involved in the formation of such long-term memories?
11. What are two major types of transcortical inputs to the prefrontal areas that shape the planning of movements in the immediate future?

MIT OpenCourseWare
<http://ocw.mit.edu>

9.14 Brain Structure and Its Origins

Spring 2014

For information about citing these materials or our Terms of Use, visit: <http://ocw.mit.edu/terms>.