

9.14

Class #30: Hormonal and other influences on brain development and plasticity

Questions based on Schneider chapter 27 and classes:

- 1) What are three factors that are likely to play roles in the development of sex differences in the central nervous system of mammals including humans?
- 2) Neuroanatomical studies of sex differences in the human brain were initially focused on what region? More recent studies have used methods for imaging the brain of living persons. Give an example of findings using this method.
- 3) Name and describe the location of a cell group in the spinal cord where sexual dimorphism is very marked.
- 4) What appears to be a major cause of variation in sexual orientation in humans?
- 5) What were the striking findings made in Fernando Nottebohm's lab at Rockefeller University in their studies of canary brains? There were two major findings (actually pairs of findings).
- 6) What in addition to hormonal factors may explain male-female differences in brain structure and function?

Questions on additional readings: Swaab and Hofman

1. Briefly compare evidence for genetic factors, hormonal influences and social environment in the determination of sexual orientation.
2. What are three or four very clear examples of neurological or psychiatric disease where there are dramatic sex differences?
3. When are sex differences in gonadal hormone levels at the highest levels in human development, and when do morphological differences in the hypothalamus appear?
4. Describe one of the technical factors in studying morphological differences in the hypothalamus of postmortem human brains. What is the Swaab and Hofman solution?
5. What are two cell groups of the human hypothalamus which differ between the sexes? How are they different in hetero- and homosexuals?

Questions on readings: Nottebohm and abstracts

1. Describe the evidence from Nottebohm *et al.* that the male canary brain changes from season to season. What did he think the change was caused by? How has the work of Sarah Bottjer modified this view?
2. Although only male canaries sing, both male and female canary brains are constantly acquiring new neurons. Why might the females need new neurons (and loss of old ones)?
3. Describe the findings of Toran-Allerand which indicate that sex differences in the brain are probably much more widespread than has been indicated in the studies of cell-stained human post-mortem material.

Questions on readings: Baum

4. What structures in the CNS besides the hypothalamus have sexual dimorphism?
5. Why were some of these findings so controversial after the first reports?
6. Why do some human beings develop a female body and brain despite being genetically male and having testes rather than ovaries?

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