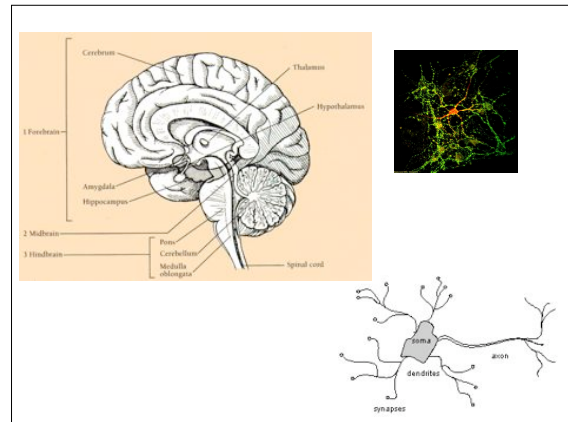
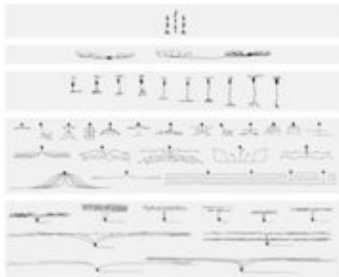


Neuroscience: basics

- Neuron: Ramon y Cayal (1839)
- Gall: phrenology
- Localization vs. mass action
- Penfield: direct stimulation
- Now: 30,000+ researchers at SFN



55 different cell types in the mammalian retina



How are areas identified?

- Anatomically: cytoarchitectonics (Brodmann)
- Functionally:
 - retinotopic map (close to 30 maps in monkey)
 - specialization (MT – motion, etc.)

Connections

- Feed-forward (bottom-up)
- Feedback (top-down)
- Horizontal
 - Within areas
 - Between areas

Extreme plasticity



Central dogma of NS

- No new neurons after birth!
- Some issues:
 - distinguishing new neurons from old ones (10^{13} cells in the human brain)
 - are they functioning neurons?

The slow death of the dogma

- Altman (1962-66): new neurons in cat and rat hippocampus
- Kaplan (1977-1985): confirmed
- Nottebohm (1985): songbirds
- 1990s: new techniques for cell identification, late 90s: adult neurogenesis in human

New neurons are functional

- Shors et al, 2001
Inhibiting neurogenesis in hippocampus -> rat can't learn association task

New neurons in the developing brain

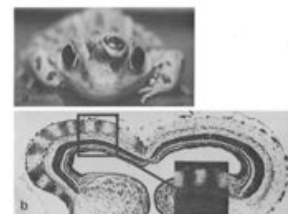
- Conel database (1939-67, 8 volumes)
- Shankle et al. (1998): number of neurons double from birth to 6 yrs of age

New neurons in the adult brain

- Numbers depend on experiences (env. rich in stimuli, but no stress)
- Hippocampus: learning and memory
- But: probably not an answer to all questions...

More on plasticity

Constantin-Paton & Law, 1978



Stem-cell therapies

- Parkinson, Alzheimer, stroke, MS

