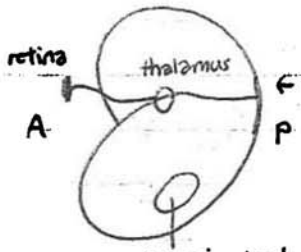
MIMI LEE'S NOTES.

Cellular Neurobiology 7.29J 2/4/04

CORTEX

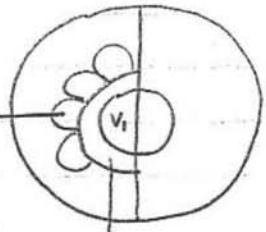


areas involved in facial recognition, eg

V_I (primary visual cortex)
← lesions here will give you blind spots

~~retinoscopy~~ retinotopic:
- image projected on retina upside-down, projected keeping local organization to V_I
- cells stimulated close together on retina still stimulated close together in V_I

back of brain



other visual areas; used for things like depth, motion, color

functional subdivision of visual processes

V_2 = more concerned w/ contrast etc

- conservation of main fissures and wrinkles in brain
  - sulci - valleys (big sulci = fissures)
  - gyri - prominences

main fissure: primary sensory cortex

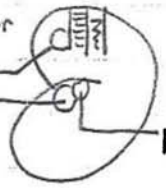
somatotopic: orderly representation of skin space (homunculus)

motor cortex (also somatotopic)

translates words into premotor patterns

Broca's oval (lesions = speak w/ difficulty)

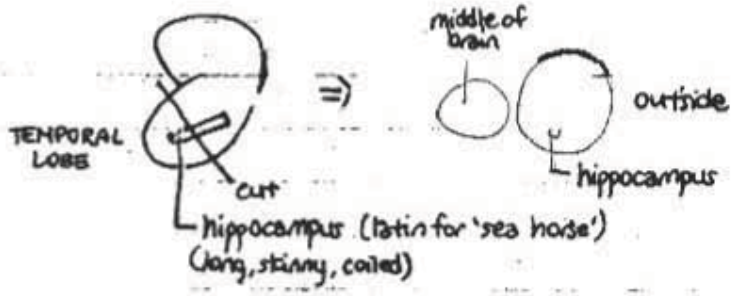
Wernicke's area (lesions = unable to speak sense; no proper sentence structure) processing of words into speech



primary auditory cortex (lesion = deaf in contralateral ear)

- sensory inputs sent to defined areas of cortex, often w/ topic organization

things not well understood about brain



- repetitive severe epileptic effects can destroy cortical function
  - many regions of brain identified through looking for epileptic sites in conscious patients
    - also lesions in humans and animals, recordings from animals
- hippocampus contains many epileptic foci; can usually be removed w/ little impairment
  - Henry M.: foci on both sides, had bilateral hippocampal removal (and more)
    - now amnestic; no long-term memory (can't make new memories)
      - intact memories to up to 2 years before his operation
      - can still gain new skills
  - hippocampus crucial for formation of new higher-order memories
    - ischemic/vascular patients may have small hippocampal defect; slightly amnestic

temporal lobe epilepsy - leads to constellation of character changes
- eg hypergraphia - compulsion to write
- latching onto moral implications of questions/issues (see things in hyper-moral terms)
- hyper-religiosity (zealots)
- hyposexual (but brief bouts of intense sexual involvement)

- "warm schizophrenics"
- eg Fyodor Dostoyevsky, Vincent van Gogh, Tom Wolfe
- also hippocampal stimulation type

frontal lobe lesions (prefrontal cortex) - Phineas Gage, eg
- personality change (no longer responsible + meticulous: lewd, rude, crude)

- less severe frontal lesions: lose application of knowledge in practical way (reasoning ability!)
  can't take learned information + organize into ordered acts

human brain - ~thousand billion cells, all specialized

- in nerve cord, some cells that have targets on other side
- correct wiring is not enough for proper brain function; development is complicated (wiring, then activity-dependent refinement)

need ligand + receptor for orderly targeting

Drosophila - ~300,000 neurons

knee-jerk reflex: stretch receptors → sensory neuron → motor neuron → muscle

(long wire) (long wire)

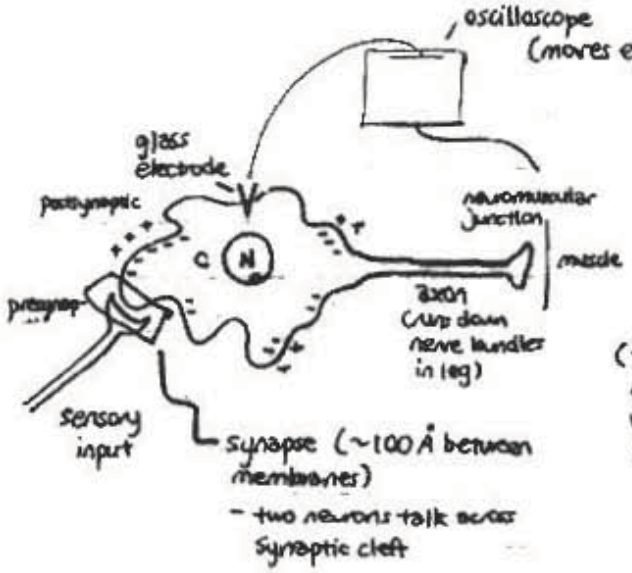
glass electrodes (~ 1 μm in diameter): fill w/ salt solution (usually AgCl)

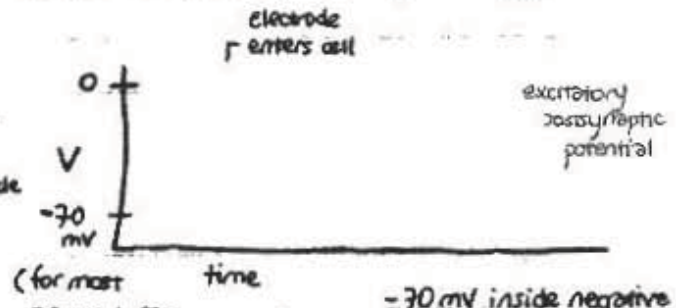
- glass = insulating outside (high R)

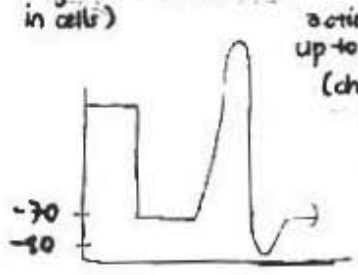
salt solution - continuous w/ cell inside

$V = IR$

- use oscilloscope instead of voltmeter







7.29J / 9.09J Cellular Neurobiology

Spring 2012