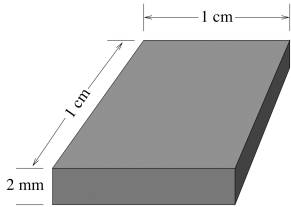


Neural Density in Cortex

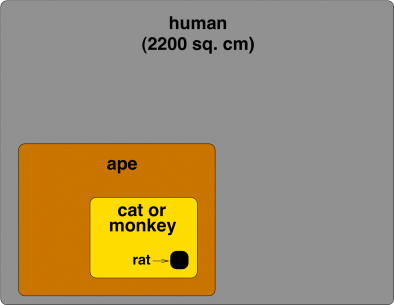


1 cm
1 cm
2 mm

- 148 000 neurons / sq. mm
- Hence, about 15 million / sq. cm

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Cortical Areas



human
(2200 sq. cm)

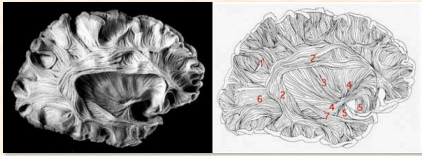
ape

cat or monkey

rat

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Intercortical Connections



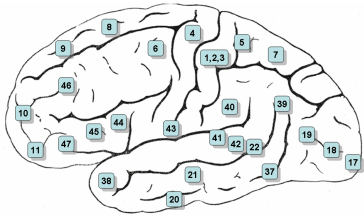
- (1) Short arcuate bundles, (2) Superior longitudinal fasciculus, (3) External capsule, (4) Inferior occipitofrontal fasciculus, (5) Uncinate fasciculus, (6) Sagittal stratum, (7) Inferior longitudinal fasciculus

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Neural Representations

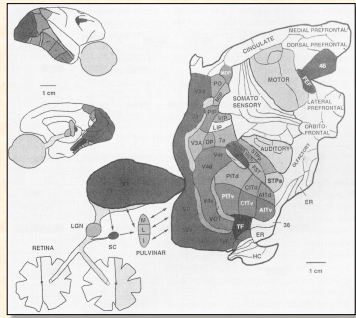
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Brodmann's Areas



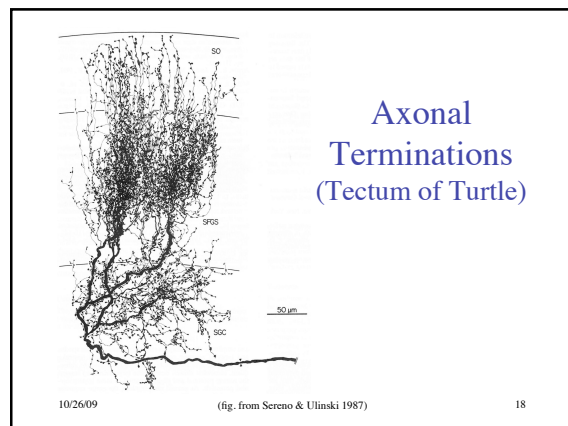
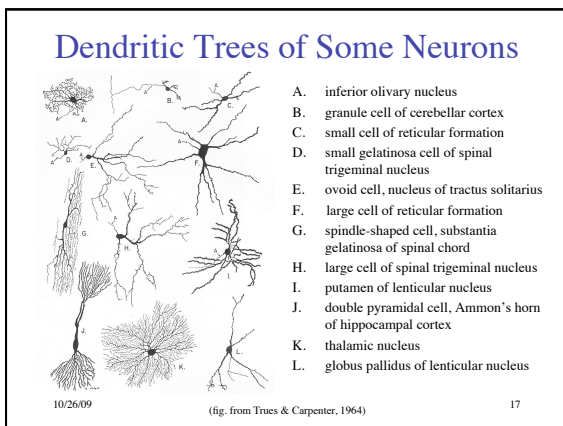
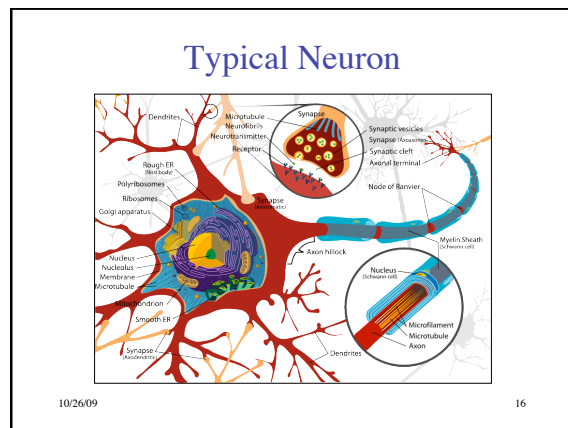
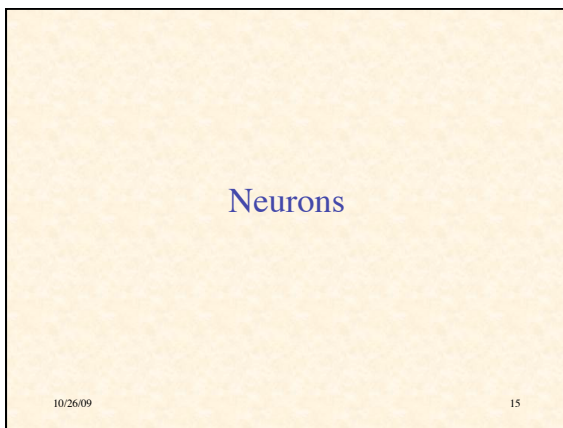
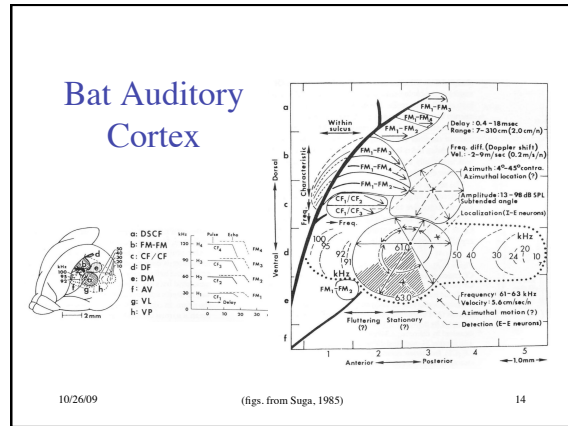
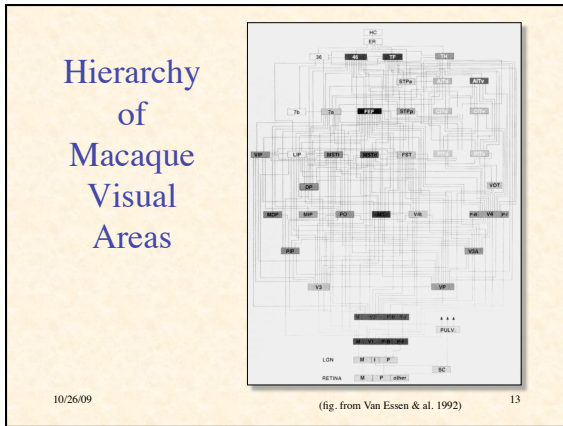
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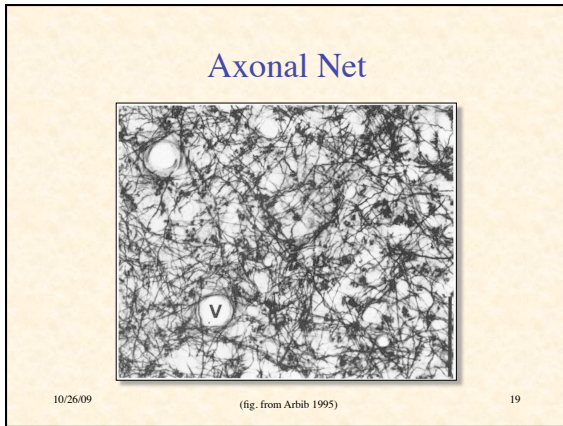
Macaque Visual System



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(fig. from Van Essen & al. 1992)



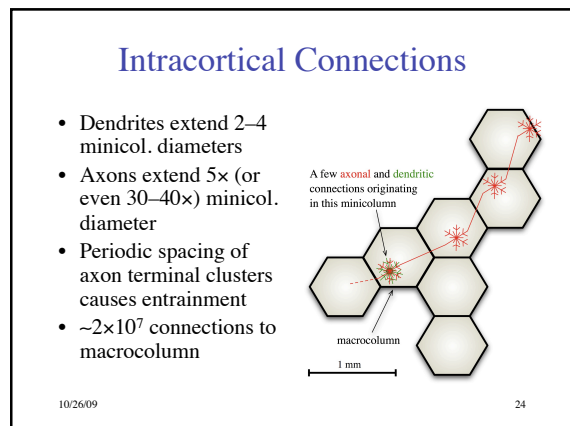
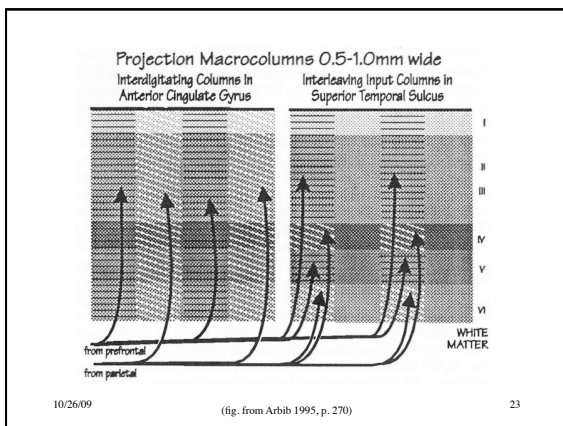
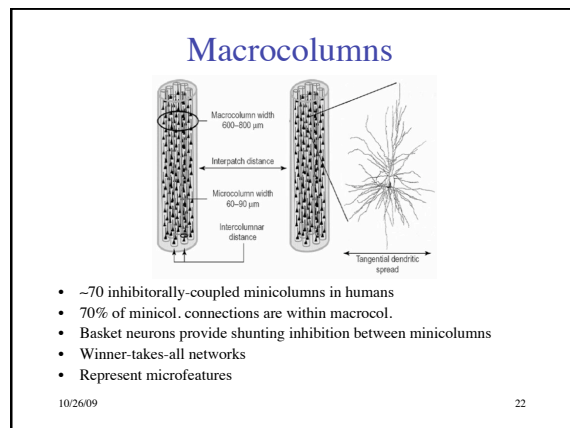
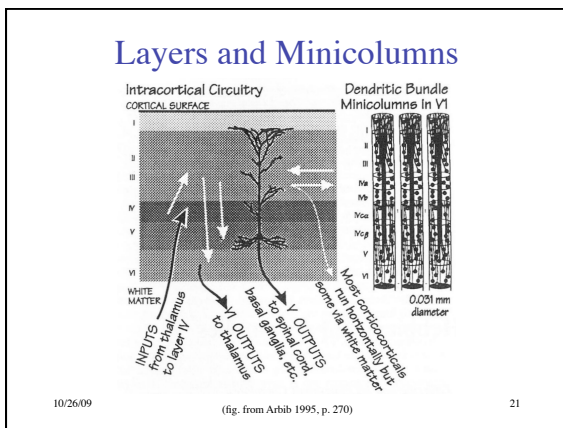


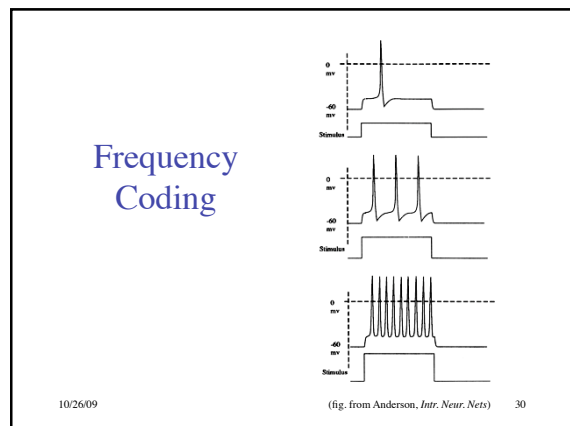
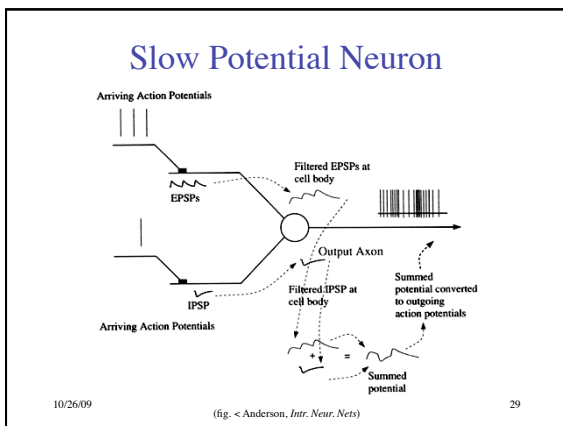
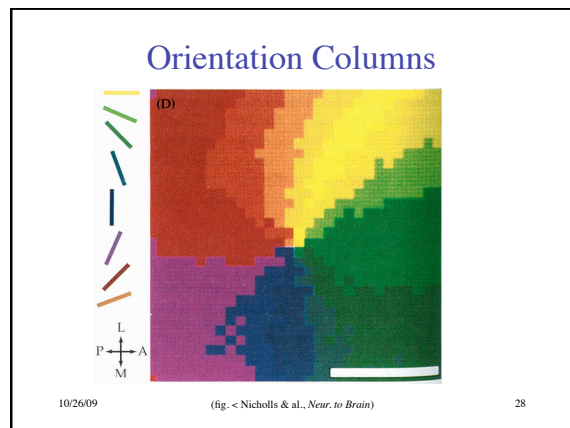
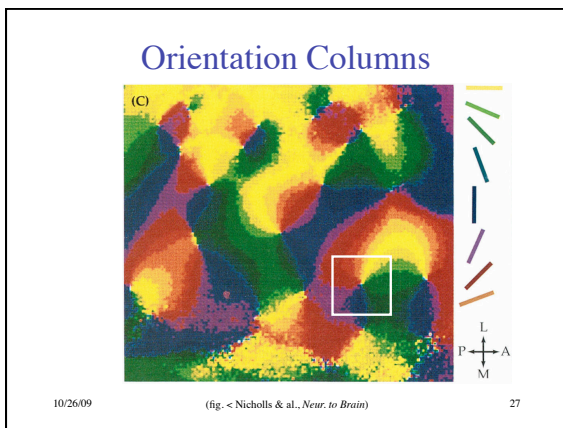
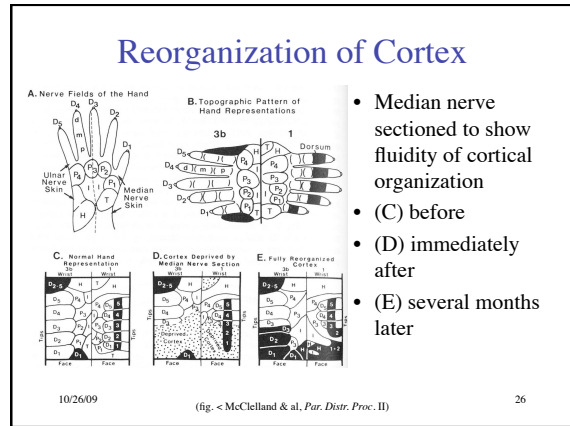
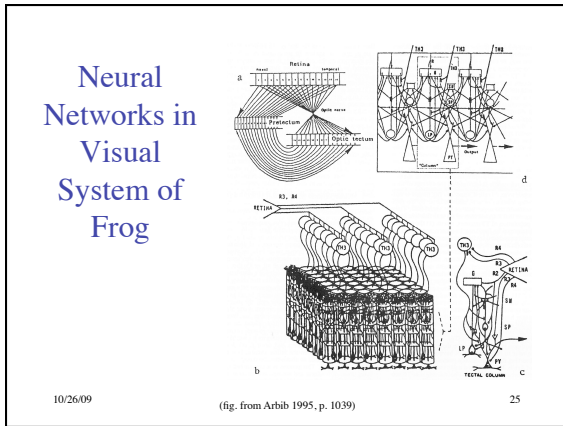
Minicolumn

I	25	10	2
II/III	10	5	
IVa	7	2	
IVb	4	2	
IVc	7	1	
IVd	10	2	
V	6	2	
VI	8	1	
VIB	2	1	
TOTAL	64	16	

- Up to ~100 neurons
 - 75-80% pyramidal
 - 20-25% interneurons
- 20-50µ diameter
- Length: 0.8 (mouse) to 3mm (human)
- ~6×10⁵ synapses
- 75-90% synapses outside minicolumn
- Interacts with 1.2×10⁵ other minicolumns
- Mutually excitable
- Also called *microcolumn*

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Variations in Spiking Behavior

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Synapses

video by Hybrid Medical Animation

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Chemical Synapse

1. Action potential arrives at synapse
2. Ca ions enter cell
3. Vesicles move to membrane, release neurotransmitter
4. Transmitter crosses cleft, causes postsynaptic voltage change

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(fig. from Anderson, *Intr. Neur. Nets*)

Typical Receptor

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(fig. from Anderson, *Intr. Neur. Nets*)

Axon Hillock

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(fig. from Peters, Palay & Webster)

Dendrite & Dendritic Branches

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(fig. from Peters, Palay & Webster)

