



The Human Animal



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Human Brain


- Most complex biological entity in known universe
- 100 Billion neurons + 1 Trillion 'glia' support cells
- Incalculable number of connections



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Brain Architecture

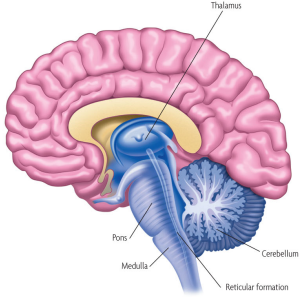
- Ascending, we get more recent evolution
- Brain stem: automatic functions (breathing, T⁺ regulation)
- Mid-brain: emotions
- Top brain: grey matter, complex processing



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Lower Brain and Stem

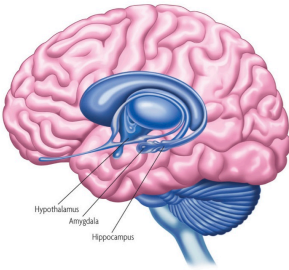
- Stem: general alertness and warning system
- Cerebellum: coordinates movement
- Thalamus: relays sensory info



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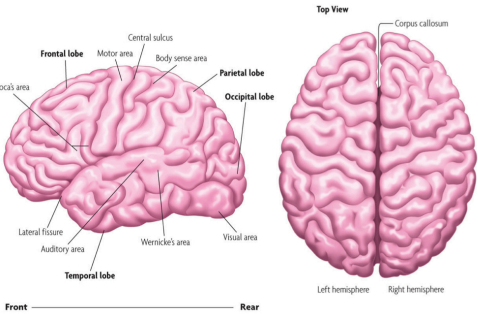
The Limbic System

- Hippocampus: storage of memories
- Amygdala: emotional control and emotional memories
- Hypothalamus: motivation and homeostasis



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The Cerebrum and Cortex



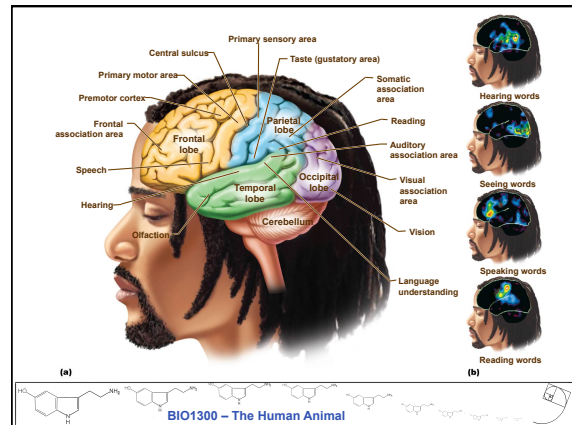
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Four Lobes

- **Frontal:** motor control, cognitive activities (planning, decisions, incentive)
- **Parietal:** sensations of touch, pain, temperature
- **Occipital:** visual information
- **Temporal:** hearing and sound processing

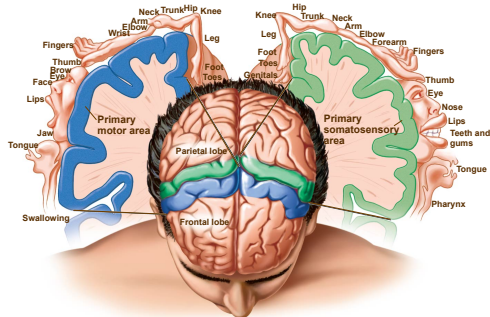


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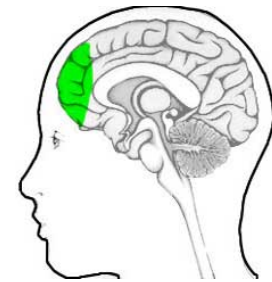
Primary Motor & Somatosensory Regions



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Prefrontal Cortex

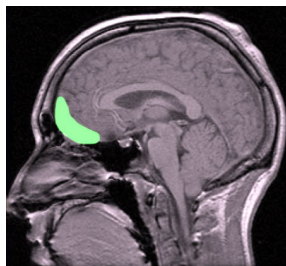
- Most recently evolved part of human brain
- Chief regulator of brain processes
- Evaluation of decision-making
- Emotional impulses acted upon or not



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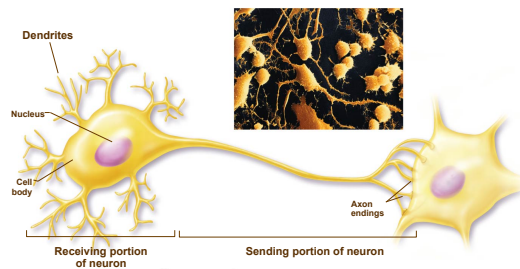
Orbitofrontal Cortex

- Mission-control of limbic system
- Integrates and assesses info from many sensory inputs
- Balances with previous experience
- Responsible for gut reactions, assessing emotions



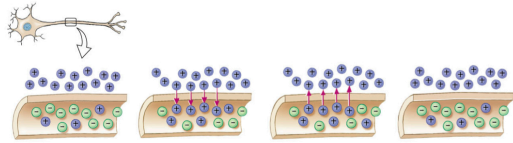
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Neurons

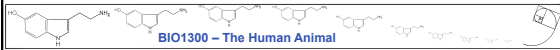


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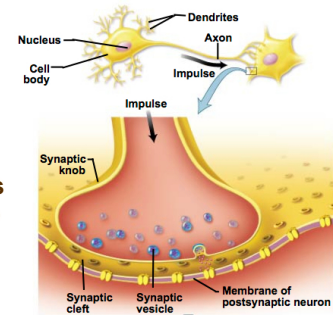
Nerve transmission



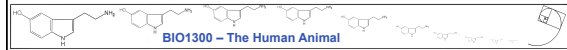
- Ion channels include: Na^+/K^+ gates and Na^+/K^+ pumps
- Resting potential slightly negative (70mV)
- Action potential: polarity change inside neuron



Synaptic Transmission

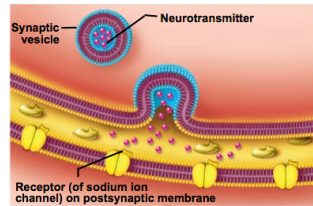


- Nerve impulse reaches axon ending
- Neurotransmitters are packaged into vesicles



Synaptic Transmission

- Vesicle fuses with presynaptic knob of axon endings
- Neurotransmitter released into synaptic cleft



Synaptic Transmission

- Neurotransmitters bind to receptors and open ion channels
- Ions flood in and stimulate action potential
- Neurotransmitters degraded by enzymes

