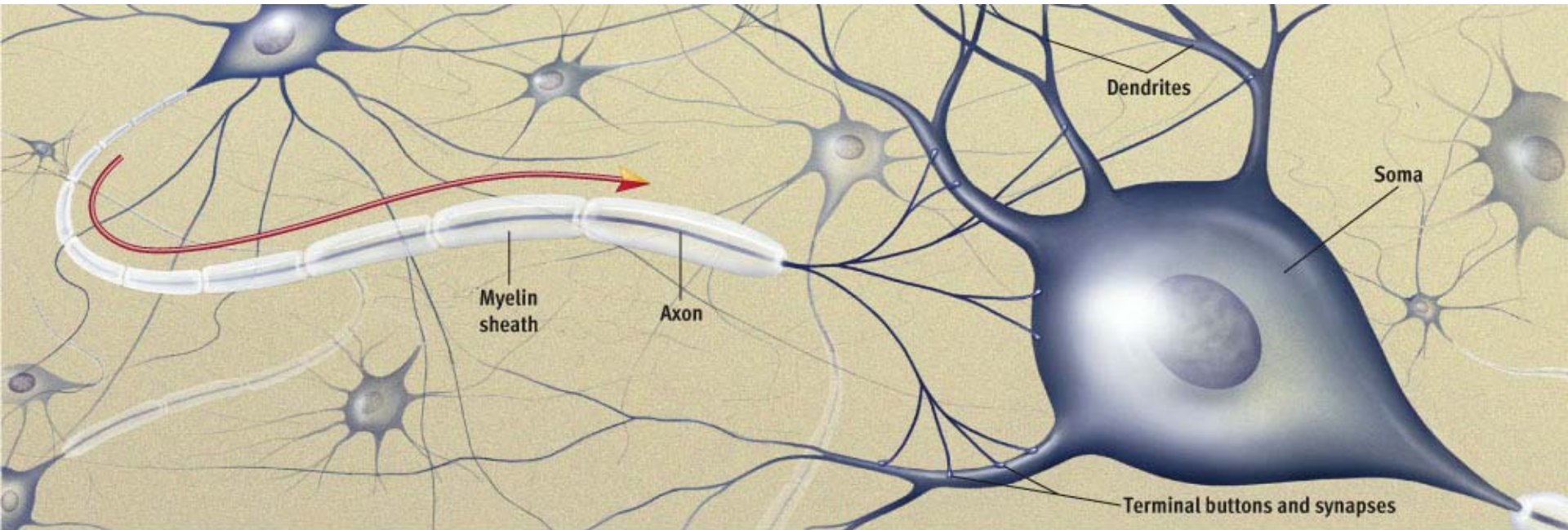


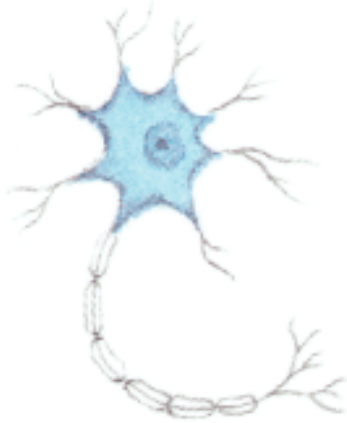
# Biological Bases of Behavior

# What do neurons look like? I

- These are the basic parts...



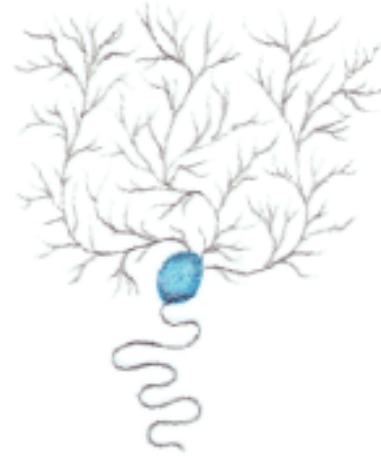
# Types of Neurons



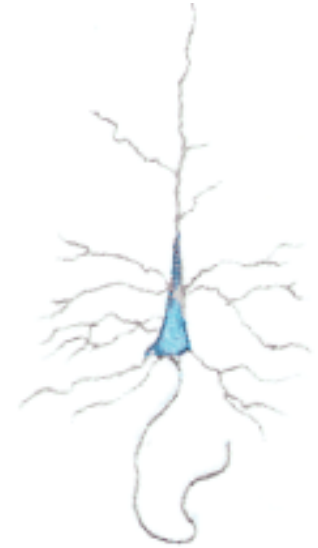
Spinal cord  
(motor neuron)



Thalamus

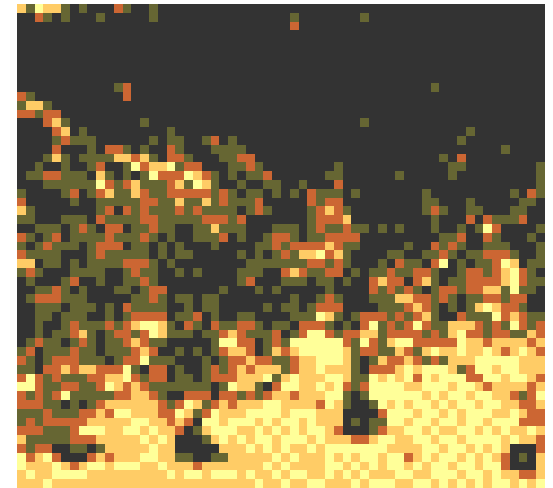
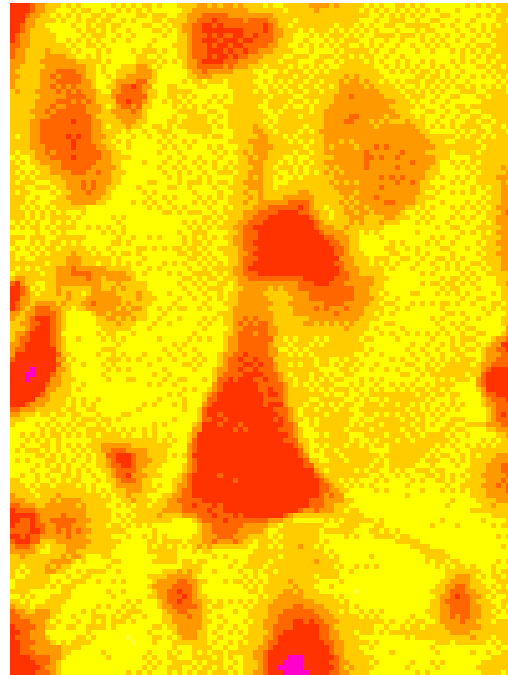


Cerebellum



Cortex

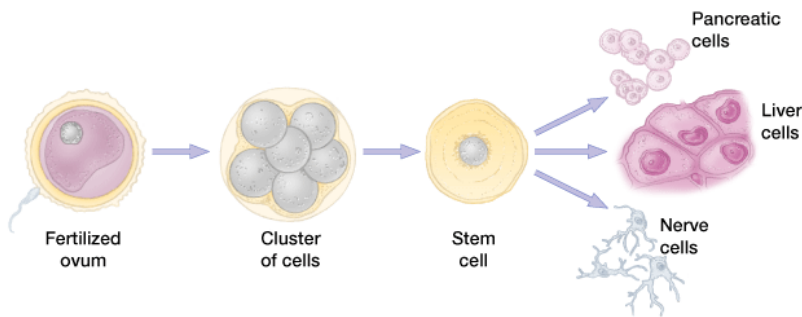
# What do neurons (really) look like?



# What do neurons do?

- Collect inputs on their \_\_\_\_\_
- If sufficient input then produce an \_\_\_\_\_
- Send action potential down \_\_\_\_\_ where it can influence other \_\_\_\_\_
- \_\_\_\_\_ process with \_\_\_\_\_ effects (like a battery)
- Neurons die and \_\_\_\_\_

# Neurons in the News

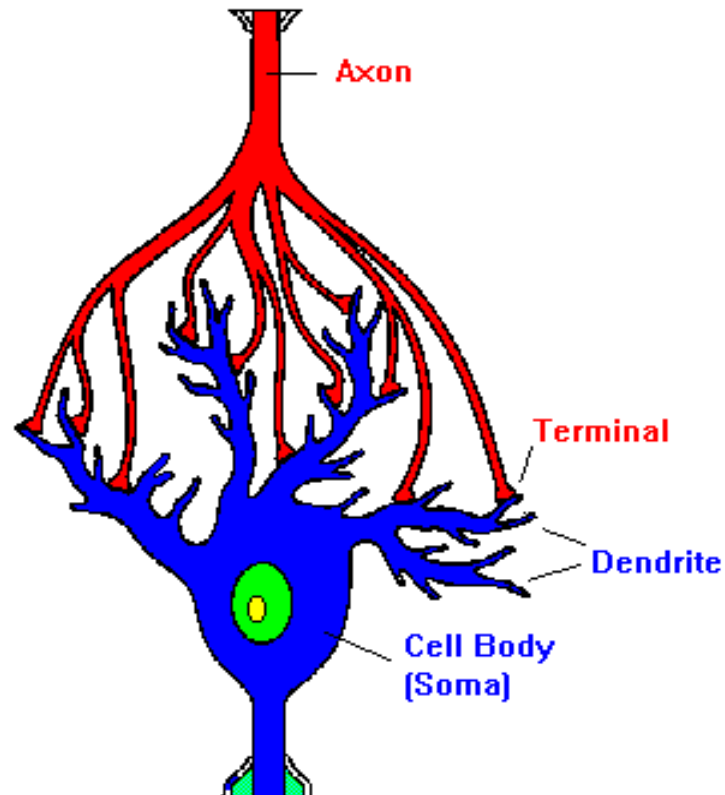


- \_\_\_\_\_
  - The production of new neurons from immature stem cells.
- \_\_\_\_\_ cells
  - Immature cells that renew themselves and have the potential to develop into mature cells.

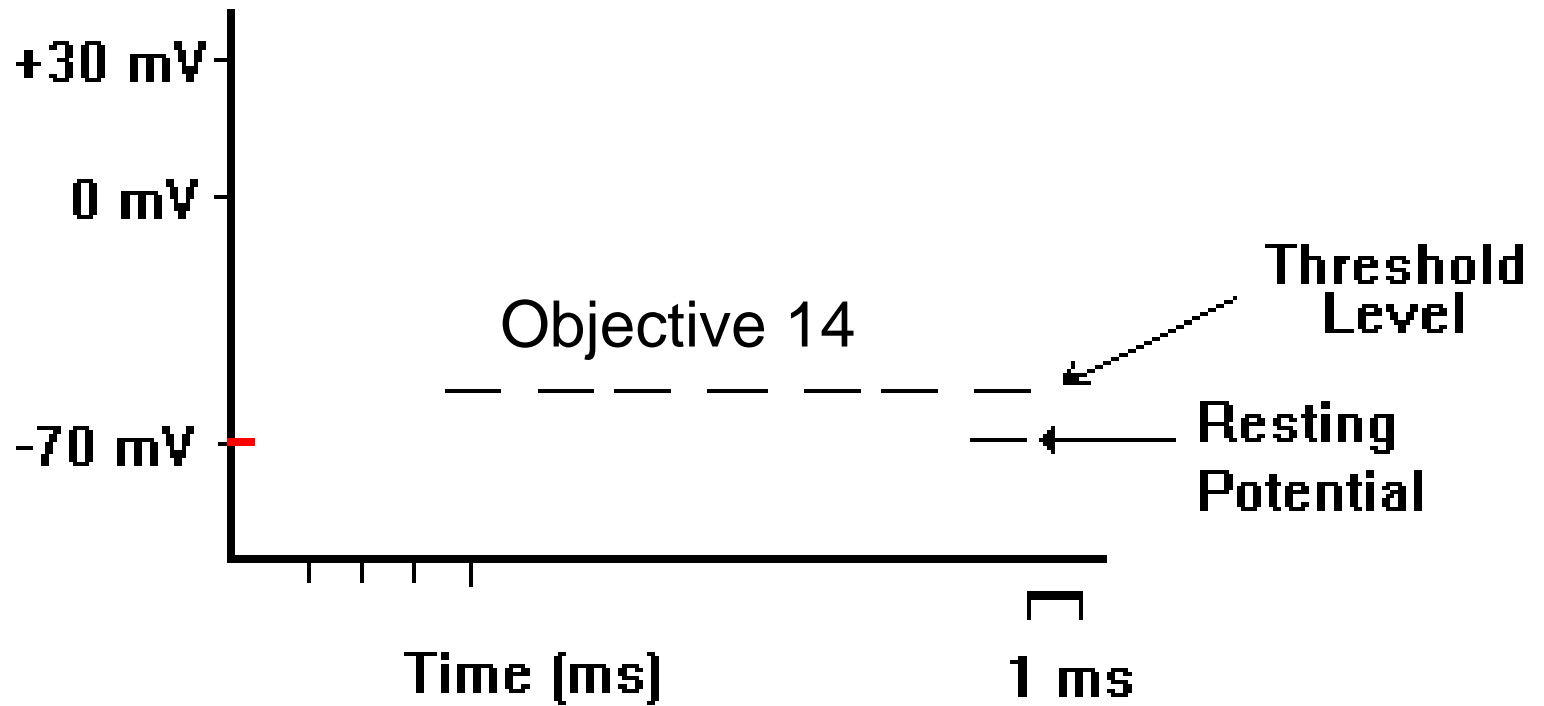
# How do neurons communicate?

The \_\_\_\_\_ :

The axon of one neuron connects with the dendrites of the next:



What's an \_\_\_\_\_? |



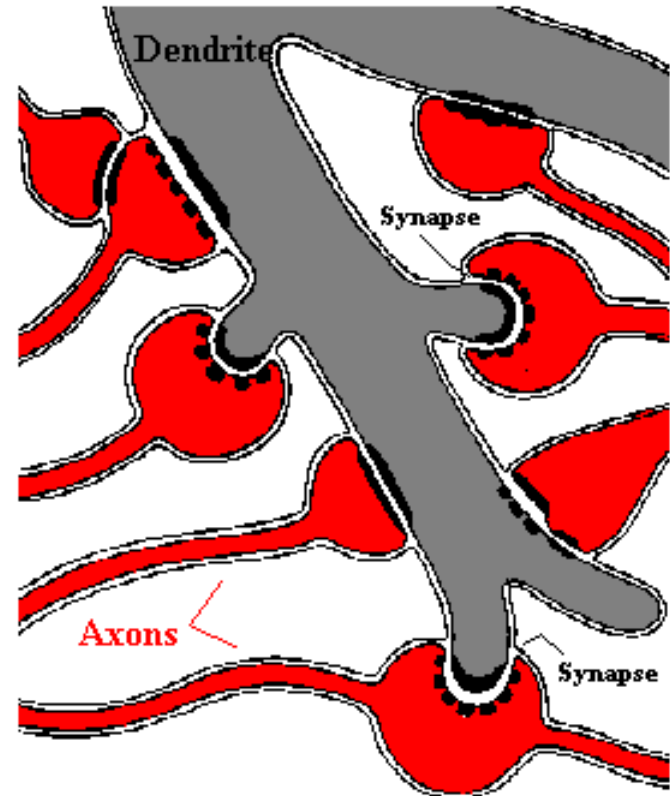


# What's an \_\_\_\_\_? II

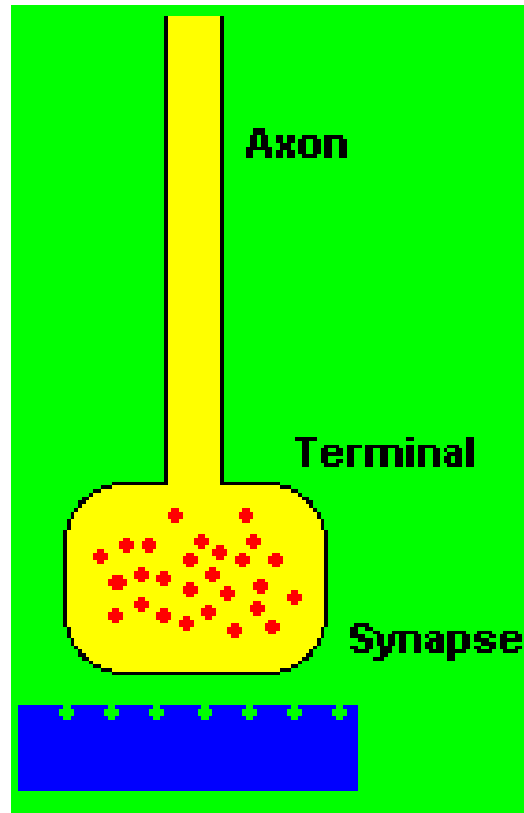
- An '\_\_\_\_\_ ' electro-chemical event
- A '\_\_\_\_\_ '
- Like a digital computer 1 or 0

# How do \_\_\_\_\_ communicate?

- \_\_\_\_\_ are chemical junctions between neurons.

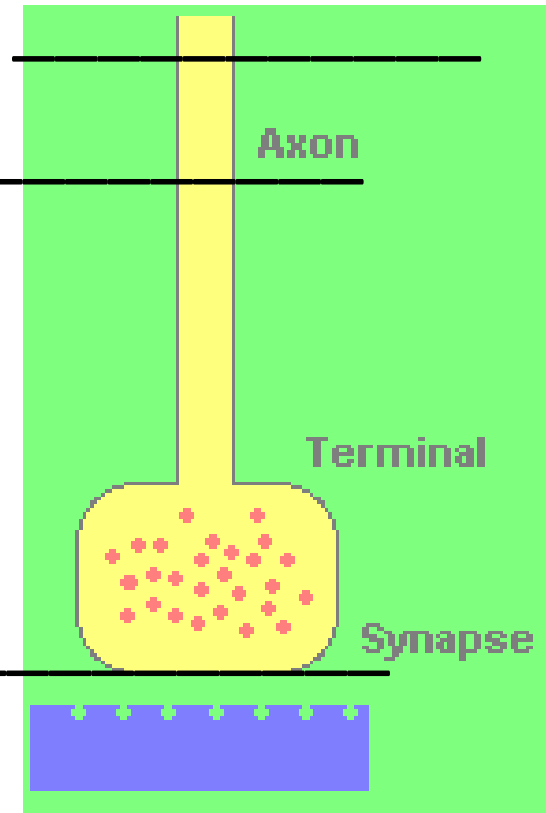


How do \_\_\_\_\_ work?



# How do \_\_\_\_\_ work?

- Action potential comes down \_\_\_\_\_
- Action potential arrives at \_\_\_\_\_
- Causes \_\_\_\_\_
- \_\_\_\_\_ is released
- Into \_\_\_\_\_ cleft
- \_\_\_\_\_ absorbed on \_\_\_\_\_



# Three Major Chemical Messenger Classes

- \_\_\_\_\_
  - Released by neurons, cause other neurons to fire
- \_\_\_\_\_
  - Aka “Endogenous opioid peptides”
  - Also function as \_\_\_\_\_, or neurotransmitter modifiers
- \_\_\_\_\_
  - Released by \_\_\_\_\_ glands into \_\_\_\_\_
  - Help regulate normal bodily functioning

# Major neurotransmitters (a selection)

- Acetylcholine
- Dopamine
- Endorphins
- Norepinephrine
- Serotonin
- GABA

\_\_\_\_\_

- First identified \_\_\_\_\_

- Involved in:

- \_\_\_\_\_ control

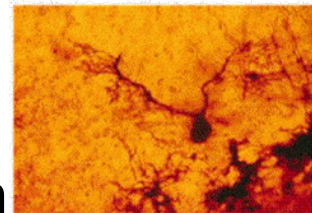
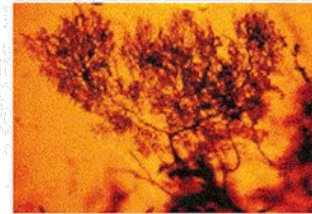
- \_\_\_\_\_

- Disorders implicated in:

- \_\_\_\_\_ disease (dementia)

- \_\_\_\_\_ loss

- \_\_\_\_\_ (poison – black widow spider)



# Drugs affecting \_\_\_\_\_

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- \_\_\_\_\_
  - Promotes release of acetylcholine, can cause paralysis & death
- \_\_\_\_\_ toxin
  - Poisonous agent produced by bacteria
  - Blocks release of acetylcholine
  - Reduces breathing rate, can cause death
- \_\_\_\_\_
  - Binds to and activates cholinergic receptors
- \_\_\_\_\_
  - Blocks cholinergic receptors
  - Quick acting, quickly cleared from the body





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- Involved in:

- \_\_\_\_\_
- \_\_\_\_\_
- Reward
- \_\_\_\_\_ control
- \_\_\_\_\_

- Disorders implicated in:

- \_\_\_\_\_ disease  
(mainly motor but also  
emotional blunting)
- \_\_\_\_\_ disease
- \_\_\_\_\_ (cognitive  
confusion)
- \_\_\_\_\_

# \_\_\_\_\_ : Drugs that stimulate

- \_\_\_\_\_
- \_\_\_\_\_
- Alcohol (indirectly)
- \_\_\_\_\_
- \_\_\_\_\_ (indirectly)
- \_\_\_\_\_ (indirectly)



- Involved in

- \_\_\_\_\_ cycles
- \_\_\_\_\_
- \_\_\_\_\_ state  
(happy/ sad)

- Disorders implicated in:

- \_\_\_\_\_?
- \_\_\_\_\_
- \_\_\_\_\_

- Drugs that alter:

- \_\_\_\_\_
- LSD
- \_\_\_\_\_
- “magic mushrooms”

---

# (Gamma-aminobutyric acid)

- Major \_\_\_\_\_ neurotransmitter in the brain
- Involved in \_\_\_\_\_ disorders
- Drugs that affect:
  - \_\_\_\_\_ (major tranquilizers)
  - \_\_\_\_\_ (minor tranquilizers)
  - \_\_\_\_\_ (Gamma hydroxybutyrate)
  - \_\_\_\_\_



# Structure of the Nervous System

- 

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- Brain
- Spinal Cord

- 

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## Nervous System

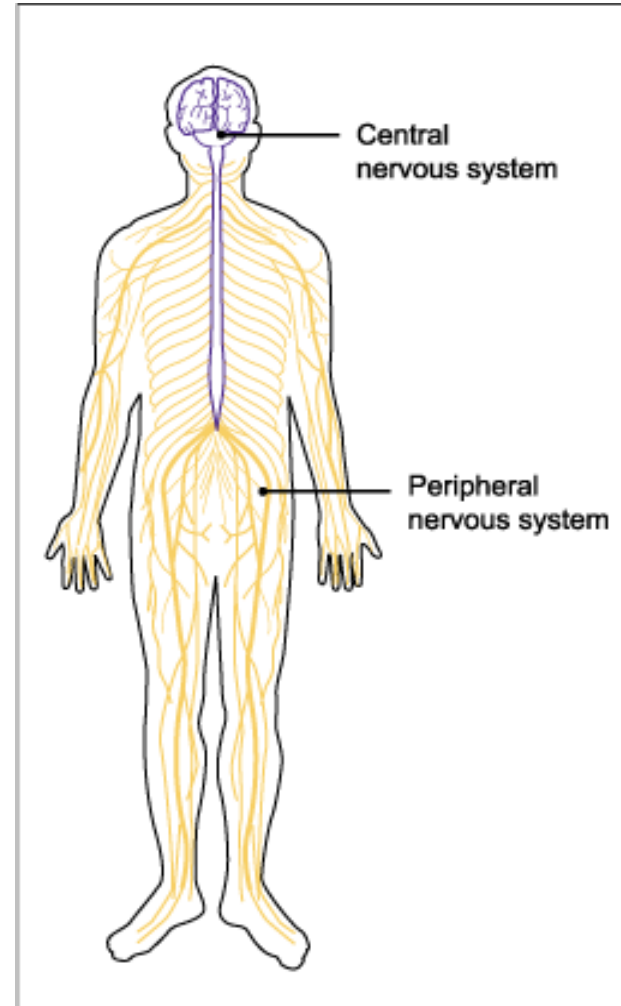
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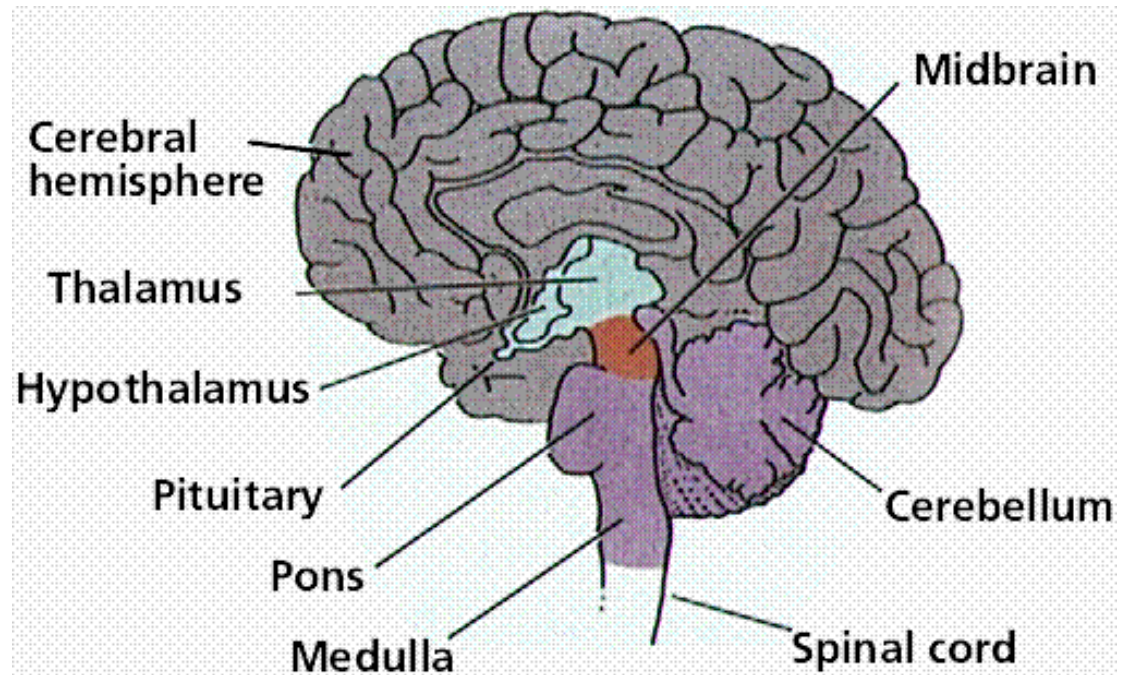
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- Sympathetic NS
- Parasympathetic NS

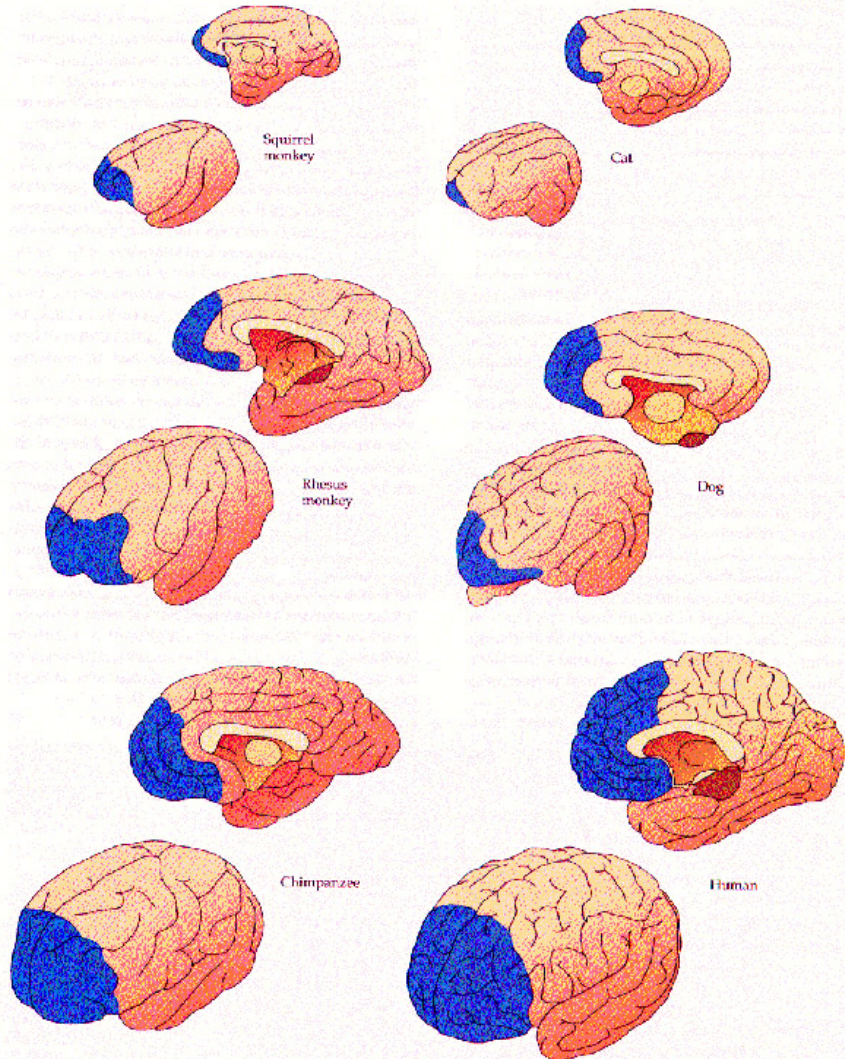


# Nervous System

- \_\_\_\_\_
- \_\_\_\_\_ Cord

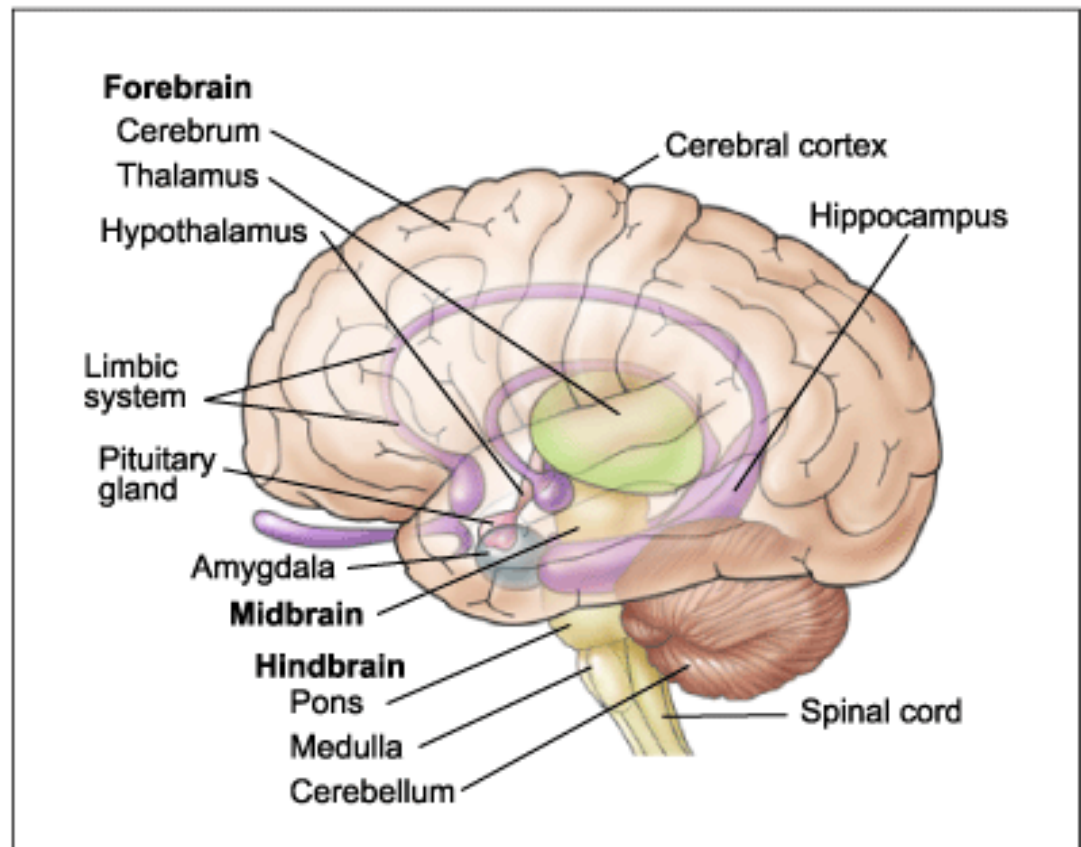


# cortexes compared



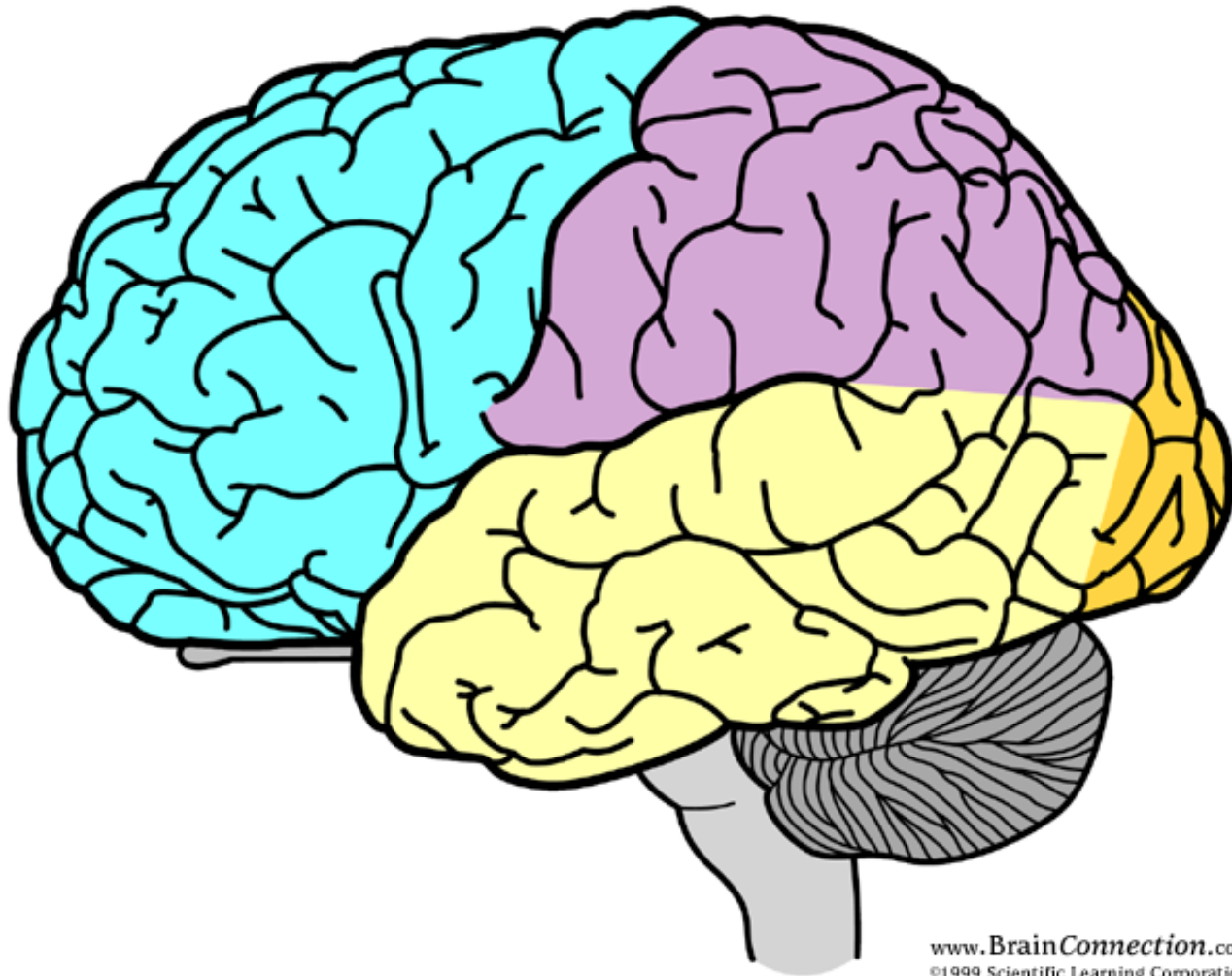
# The Structure of the Brain

The brain can be divided into \_\_\_\_\_ : the \_\_\_\_\_ , \_\_\_\_\_ , and \_\_\_\_\_ .

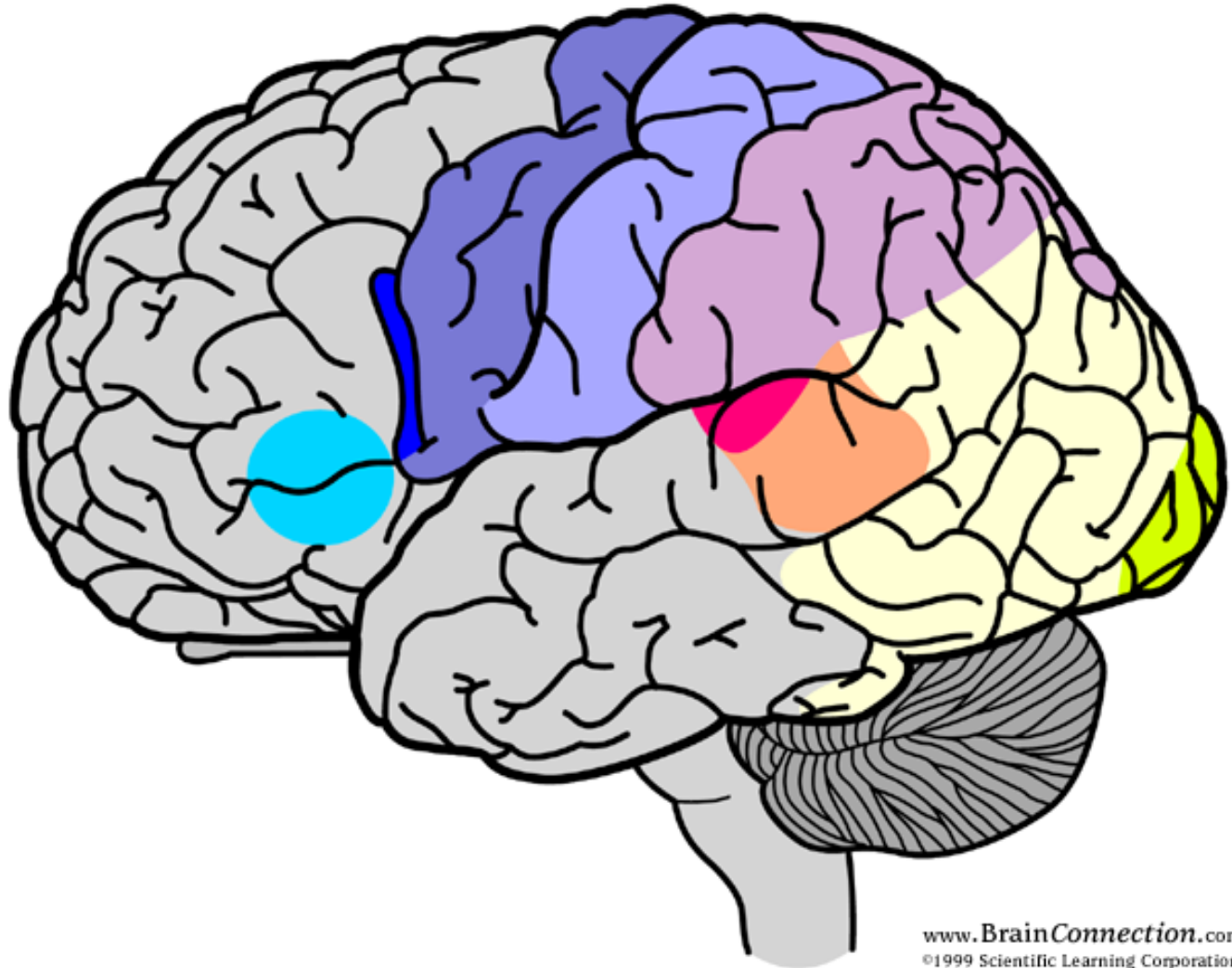




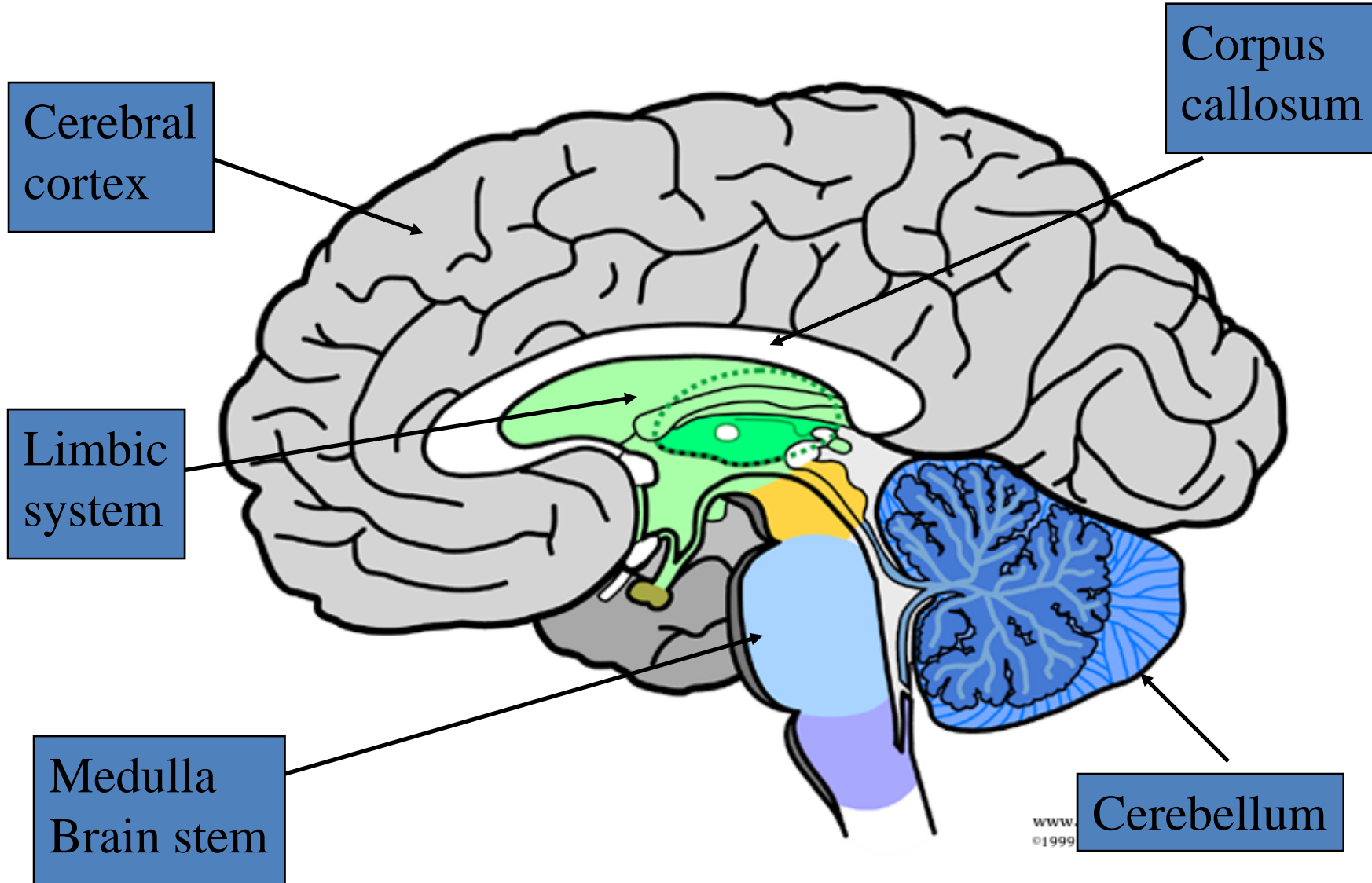
# Cortex: I



# Cortex: II

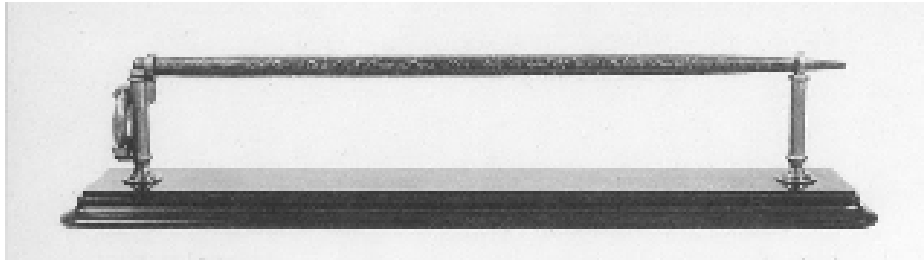


# Saggital Section

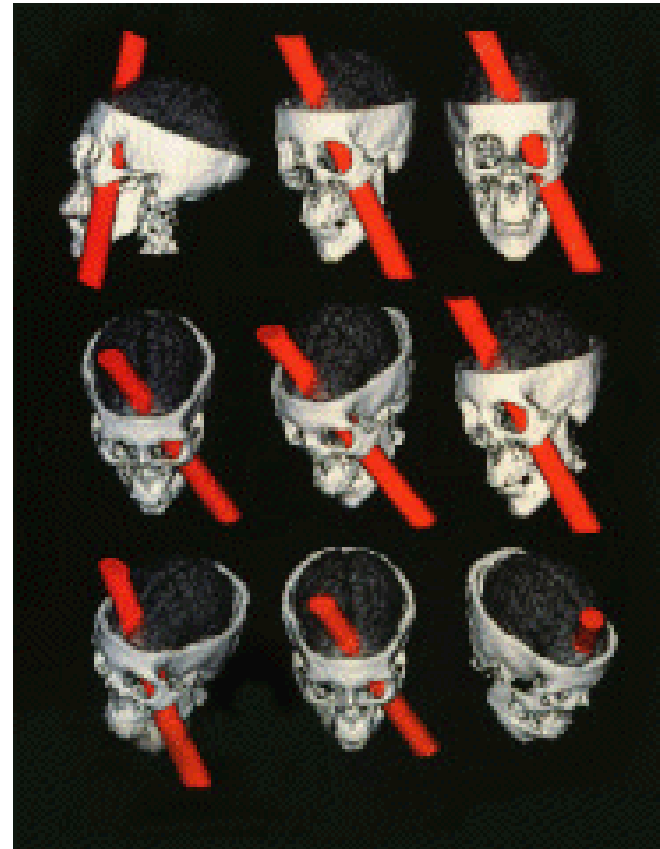


# Brain Damage: Phineas Gage

- Phineas Gage
- Tamping iron blew up in his face:



# Phineas Gage



# Phineas Gage

- Took two years to recover
- Changed personality
- “Gage was no longer Gage” (Doctor)

- 
- Dogs with “cut brains” were calmer (late 1890’s)
  - 1930’s: \_\_\_\_\_ lobes are severed using a variety of \_\_\_\_\_



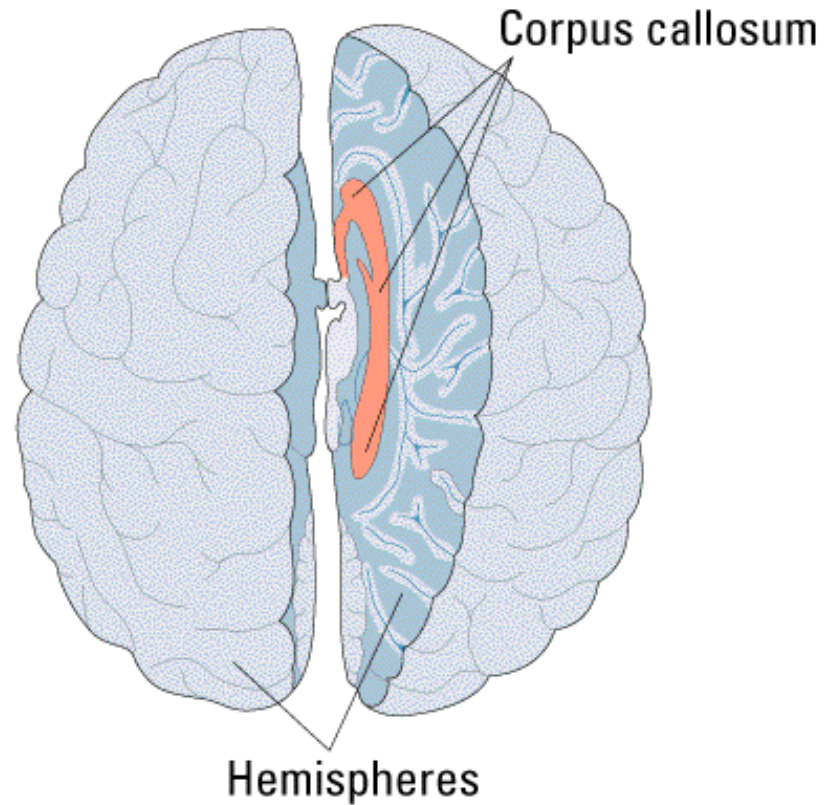
# \_\_\_\_\_ Results

- Patients generally calmer, less \_\_\_\_\_
- Patients have difficulty \_\_\_\_\_ things, planning, or following through on activities
- Suggests functions of \_\_\_\_\_ lobe
- Many patients have rather extensive brain damage (more than was purposeful)...



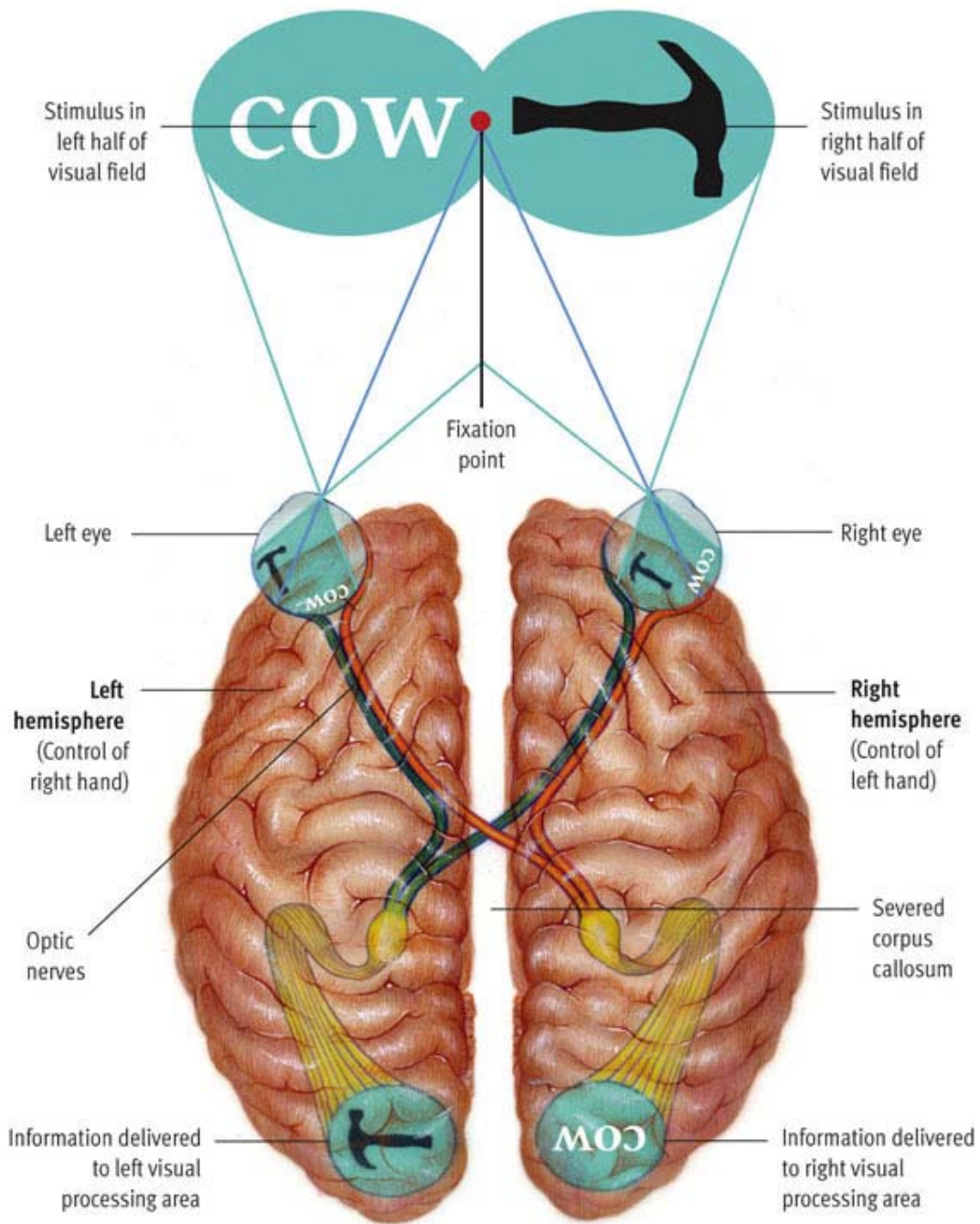
# The \_\_\_\_\_ Callosum

- Millions of \_\_\_\_\_ connecting the brain's hemispheres.
- Provides a pathway for \_\_\_\_\_ between hemispheres.
- If surgically severed to treat \_\_\_\_\_, hemispheres cannot \_\_\_\_\_ directly.

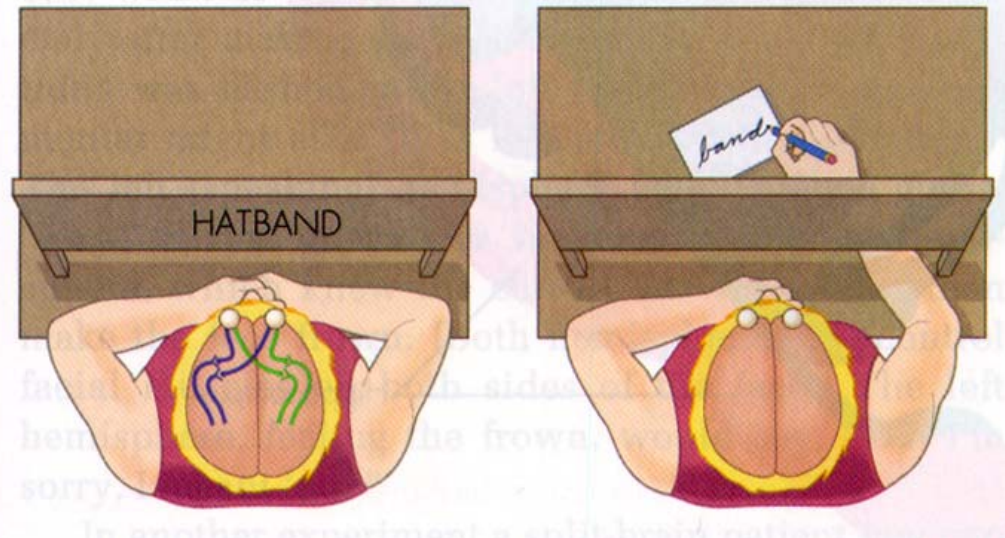
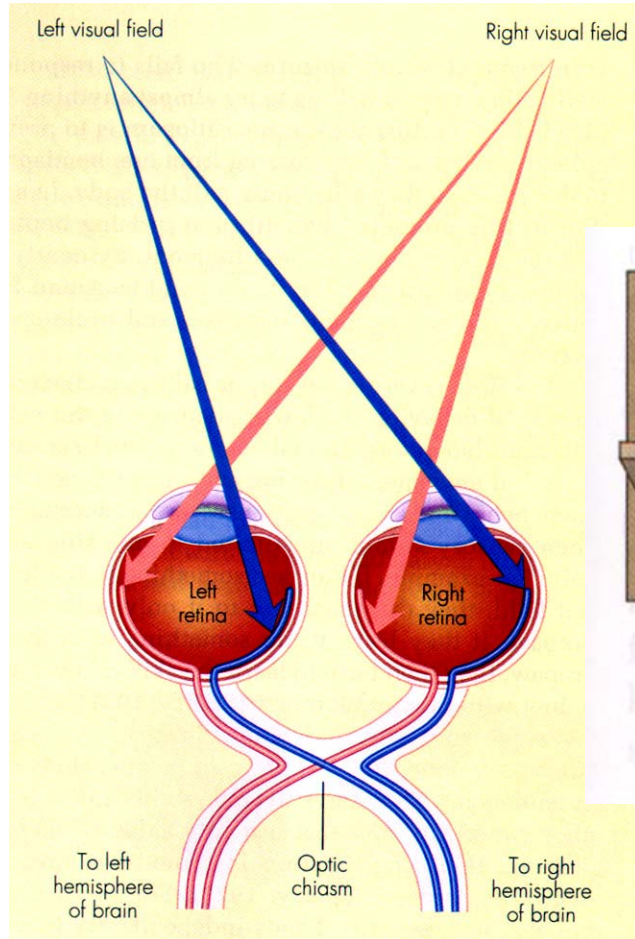


# \_\_\_\_\_ Experiment

- Subjects were presented information to one or the other side of their brains.
- Patients identified \_\_\_\_\_ the pictures to the \_\_\_\_\_ (i.e., boy).
- When asked to \_\_\_\_\_ to the face seen, the patients pointed to the \_\_\_\_\_ picture.



# Two Hemispheres – Split Brains



# The Two Hemispheres: Allies or Opposites?

- Research on split brain patients show us:
  - Nearly all right-handed and the majority of left-handed individuals process \_\_\_\_\_ mainly in the \_\_\_\_\_ hemisphere.
  - Many researchers believe in \_\_\_\_\_ dominance.
  - Others insist \_\_\_\_\_ important for spatial visual problem solving, comprehending non-verbal sounds, and some language abilities.

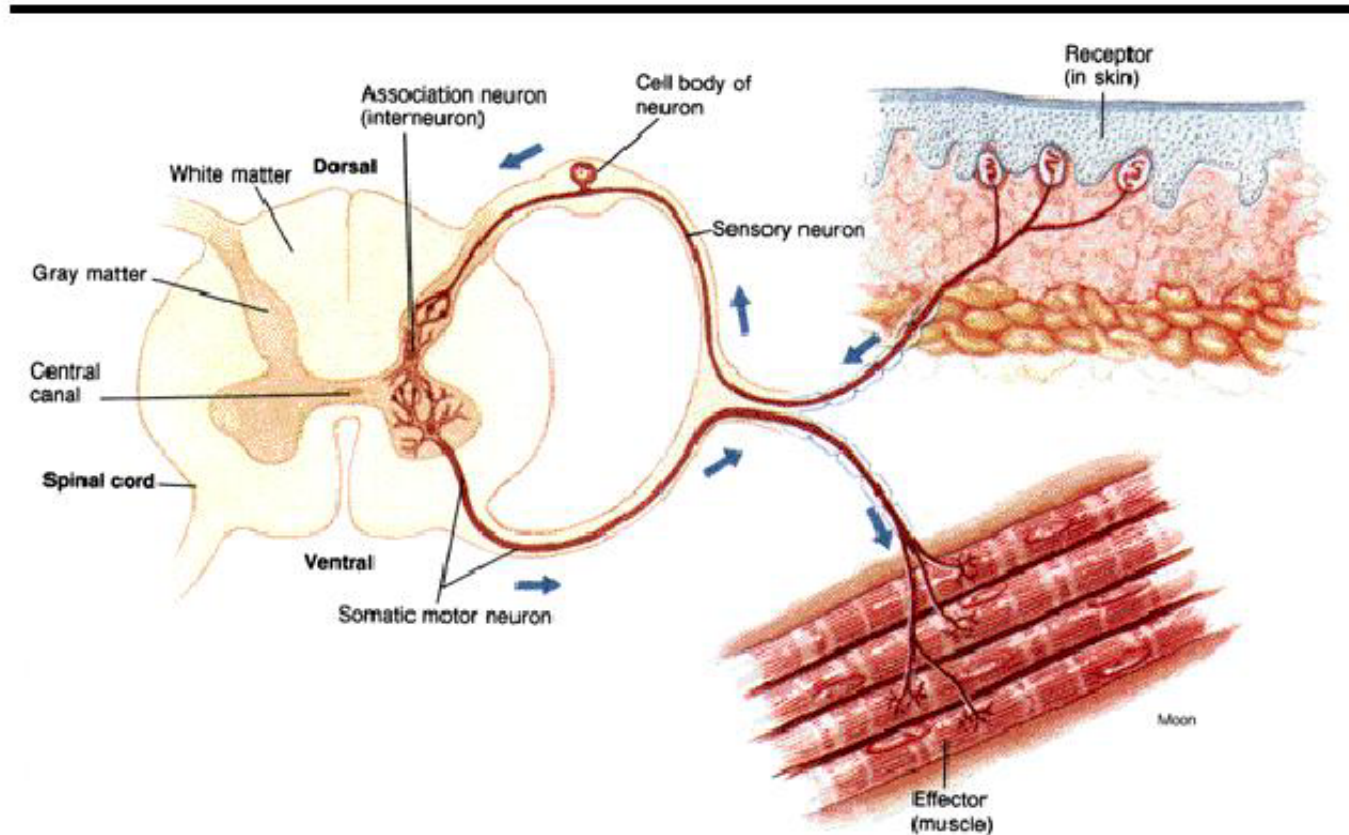
# Peripheral Nervous System

- \_\_\_\_\_ Nervous System
  - Sensory – afferent – inputs
  - Motor – efferent – outputs
- \_\_\_\_\_ Nervous System
  - \_\_\_\_\_
  - \_\_\_\_\_

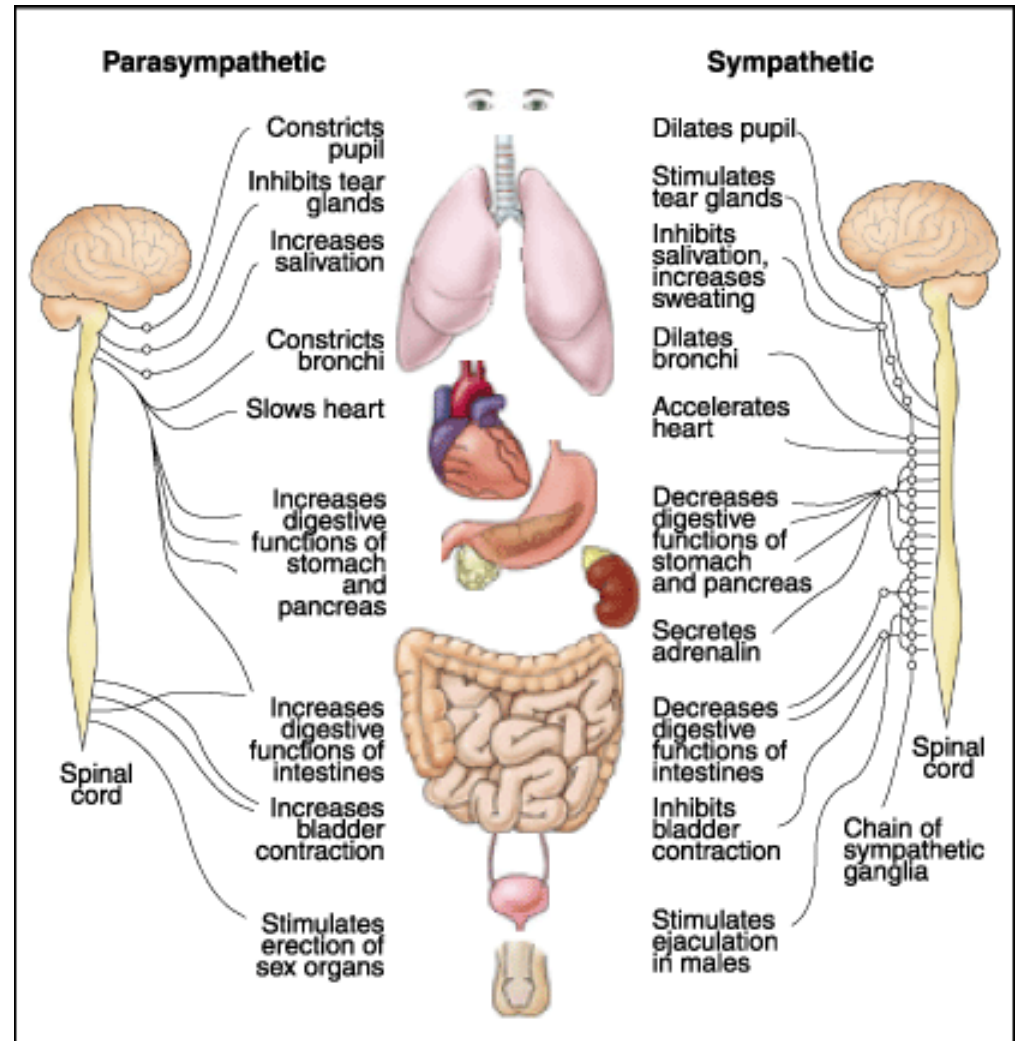


# Somatic Nervous System – Reflex Arc

## Reflex Arc

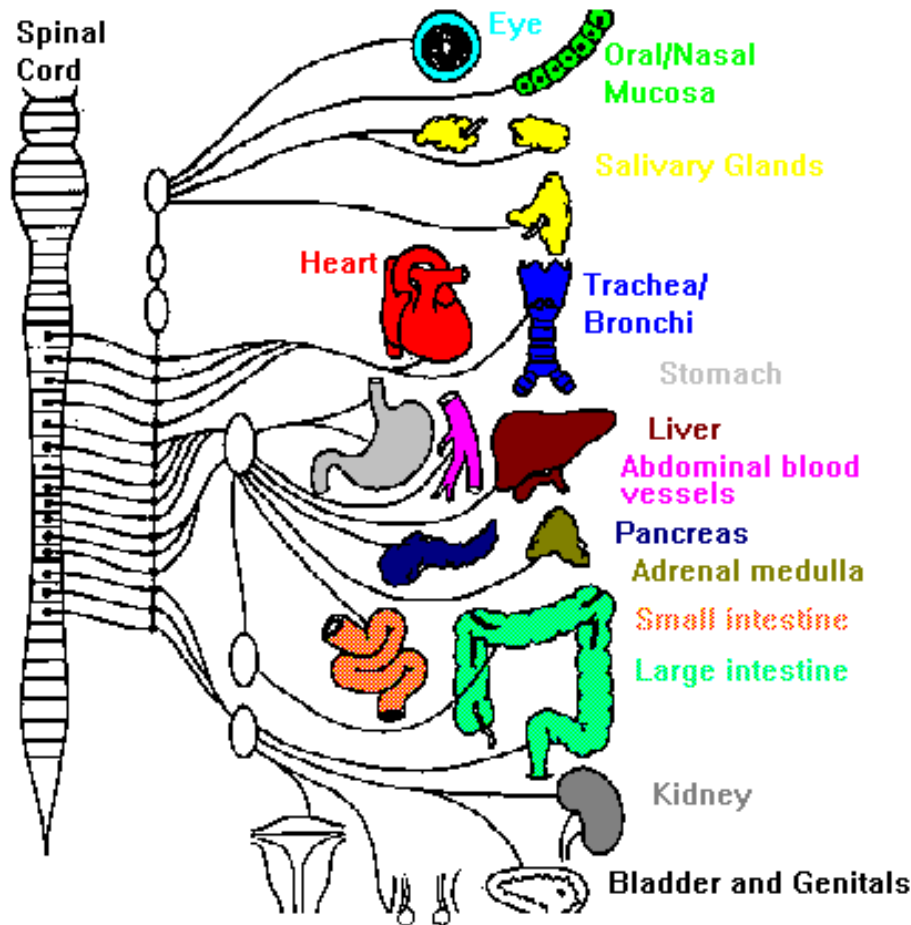


# Autonomic Nervous System



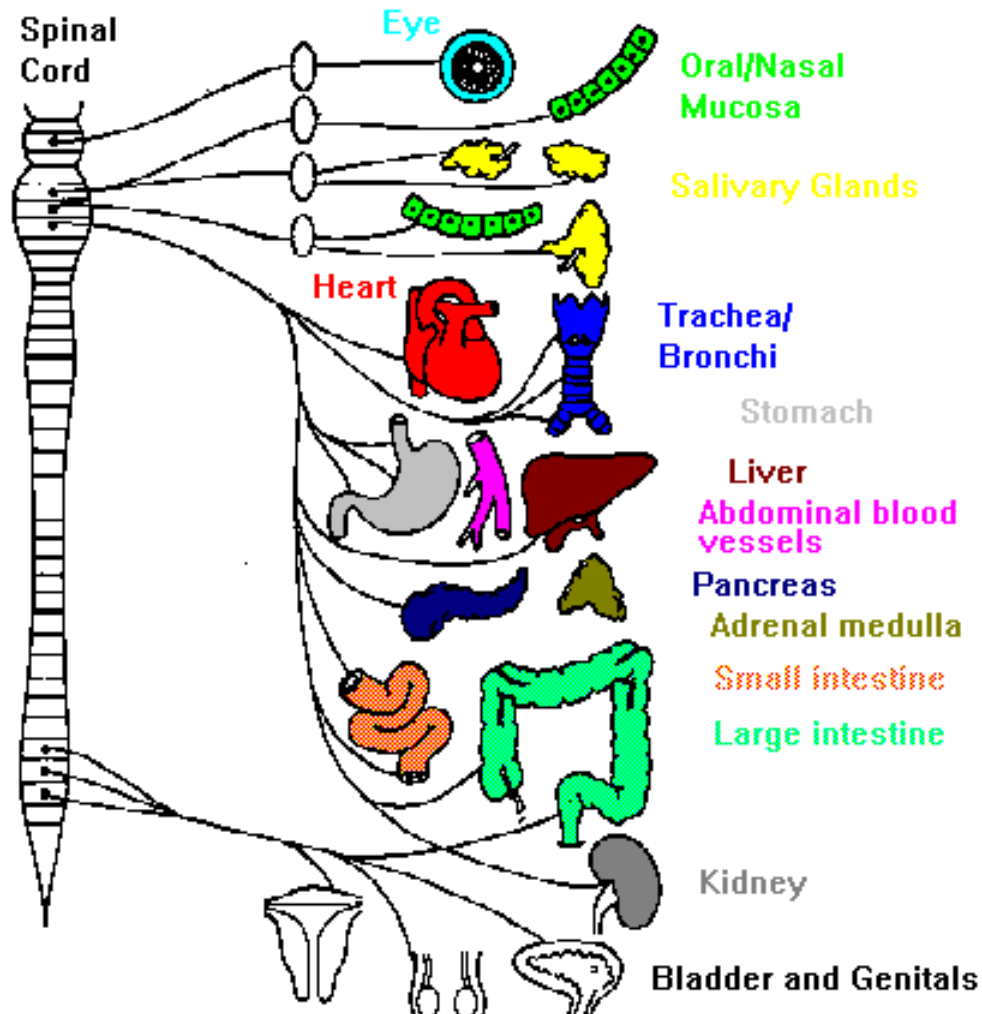


# ANS - Sympathetic

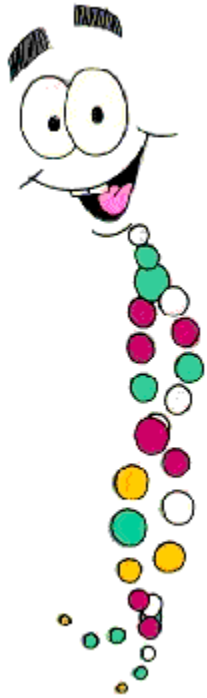


Fight or Flight

# ANS - Parasympathetic

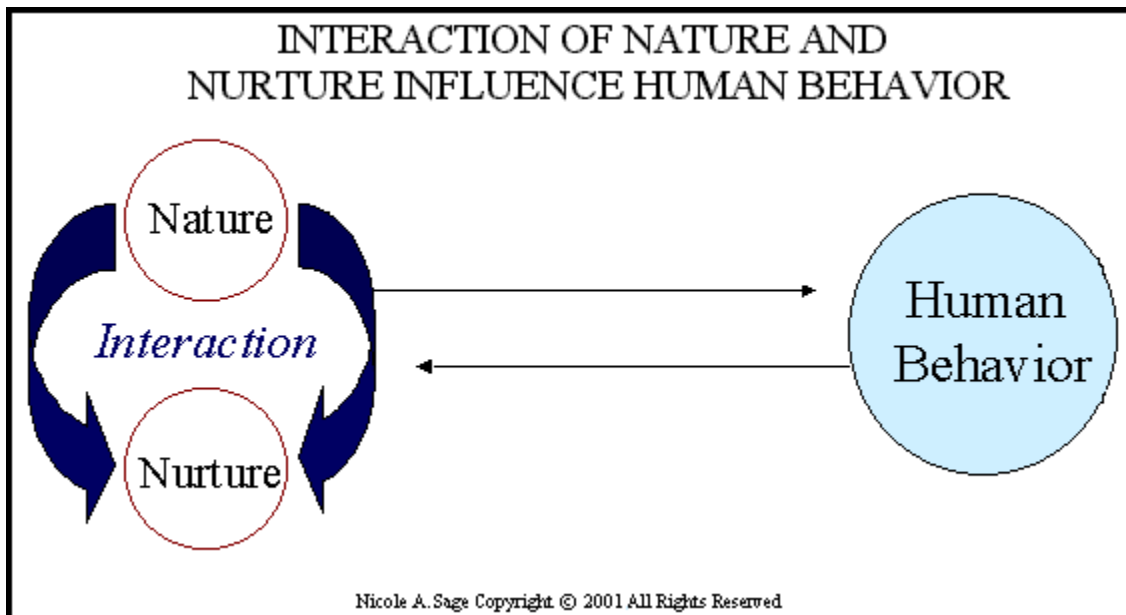


# Genes, Evolution, and Environment



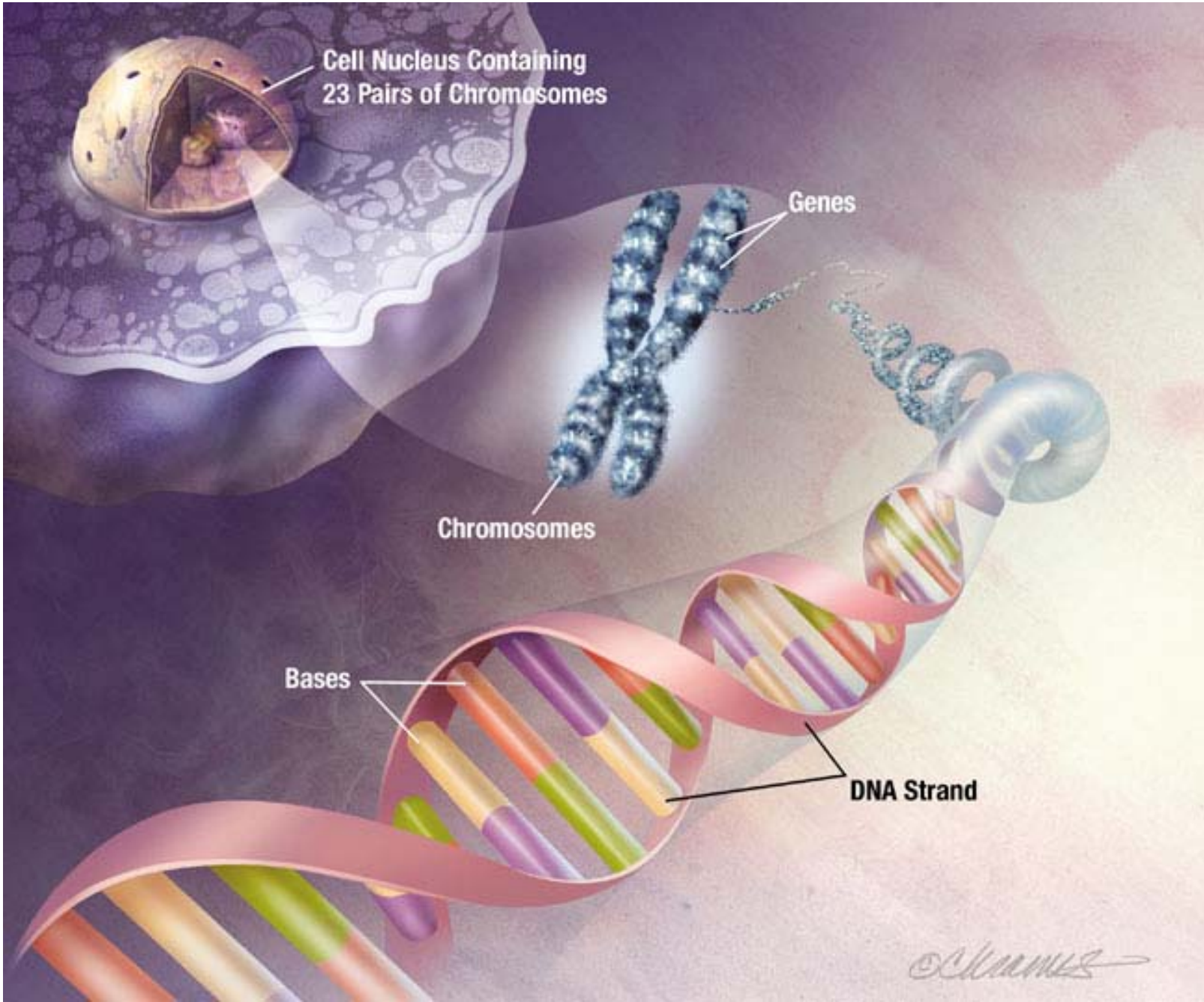
# Gene/environment \_\_\_\_\_

- Both \_\_\_\_\_ and \_\_\_\_\_ play a role in behavior
  - Nature/nurture debate still strong
    - Focused on the DEGREE of influence



# Unlocking the Secrets of Genes

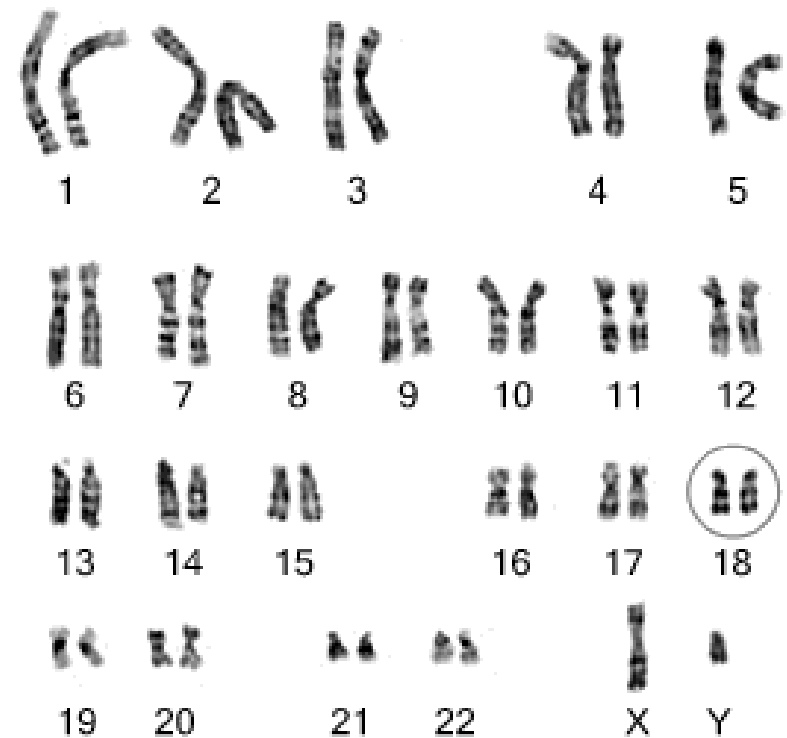
- \_\_\_\_\_
  - \_\_\_\_\_ structures within cells that carry genes.
- \_\_\_\_\_
  - functional units of heredity which are composed of \_\_\_\_\_ and specify the structure of proteins.
- \_\_\_\_\_ (\_\_\_\_\_ acid)
  - transfers \_\_\_\_\_ characteristics by way of coded instructions for the structure of proteins.



© Science



- Each human has \_\_\_\_\_ of chromosomes
  - \_\_\_\_\_
  - Sex chromosomes (X & Y)
- Differences in \_\_\_\_\_
  - Can have too many or too few chromosomes
  - E.g., Down's Syndrome





- \_\_\_\_\_ structure
- Joined by pairs of 4 amino acids
  - Adenine
  - Thymine
  - Cytosine
  - Guanine
- Errors in DNA can cause problems
  - \_\_\_\_\_
  - \_\_\_\_\_
  - \_\_\_\_\_ disease



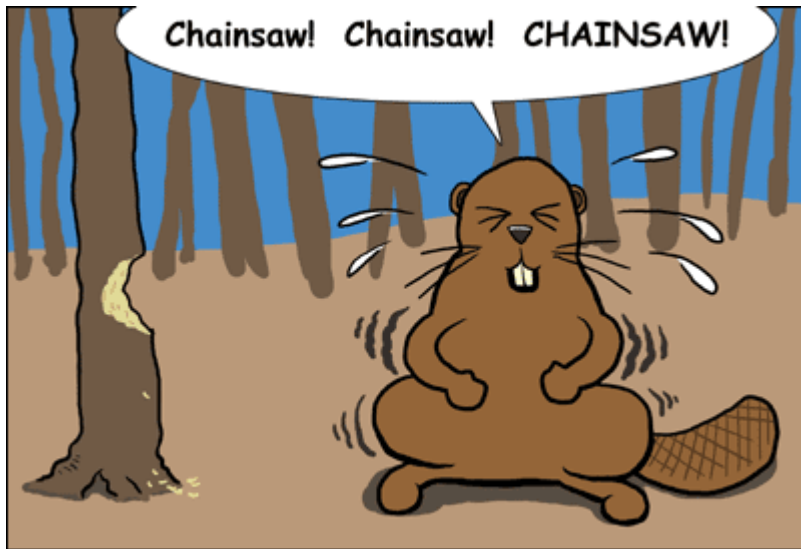
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- Definitions:
  - A change in \_\_\_\_\_ within a population over many generations;
  - A \_\_\_\_\_ by which genetically influenced characteristics of a population may change.
- Changes may occur due to :
  - \_\_\_\_\_ or errors occurring during copying of original DNA sequence.
  - \_\_\_\_\_ selection.

# Evolution: \_\_\_\_\_ Selection

- Individuals with genetically influenced traits that are adaptive in a particular environment:
  - tend to \_\_\_\_\_ ; and
  - to \_\_\_\_\_ in greater numbers.
  - As a result, their traits become more \_\_\_\_\_ in the population.

# Natural Selection: Misconceptions

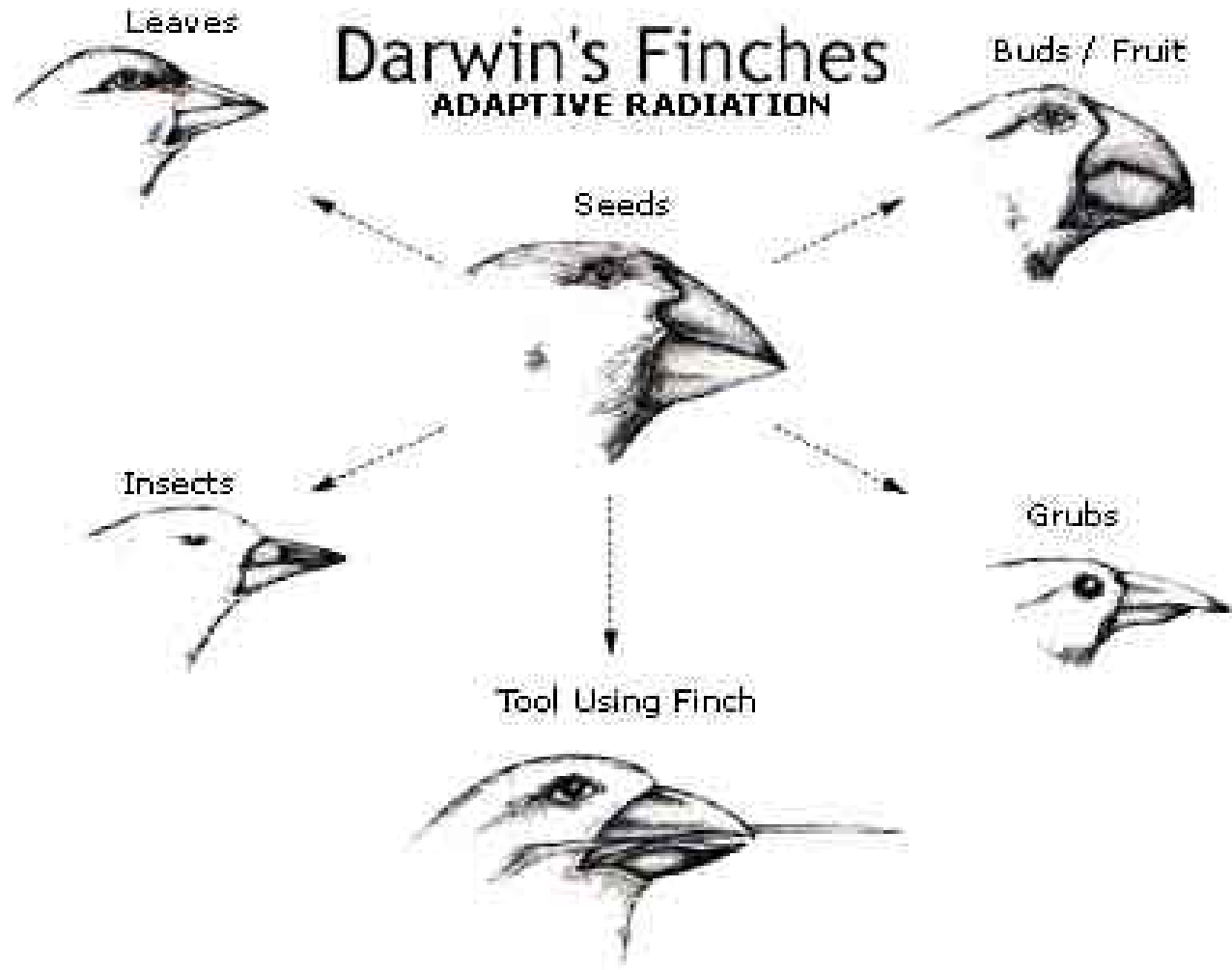


*Adaptation doesn't involve trying.*



*Natural selection does not grant organisms what they "need".*

# Natural Selection: Fitness



# Natural Selection: \_\_\_\_\_

- Every human gene has \_\_\_\_\_ features
  - Many features “come along for the ride”
    - Associated or linked to adaptive traits
  - Examples
    - \_\_\_\_\_
    - \_\_\_\_\_
    - Any others??