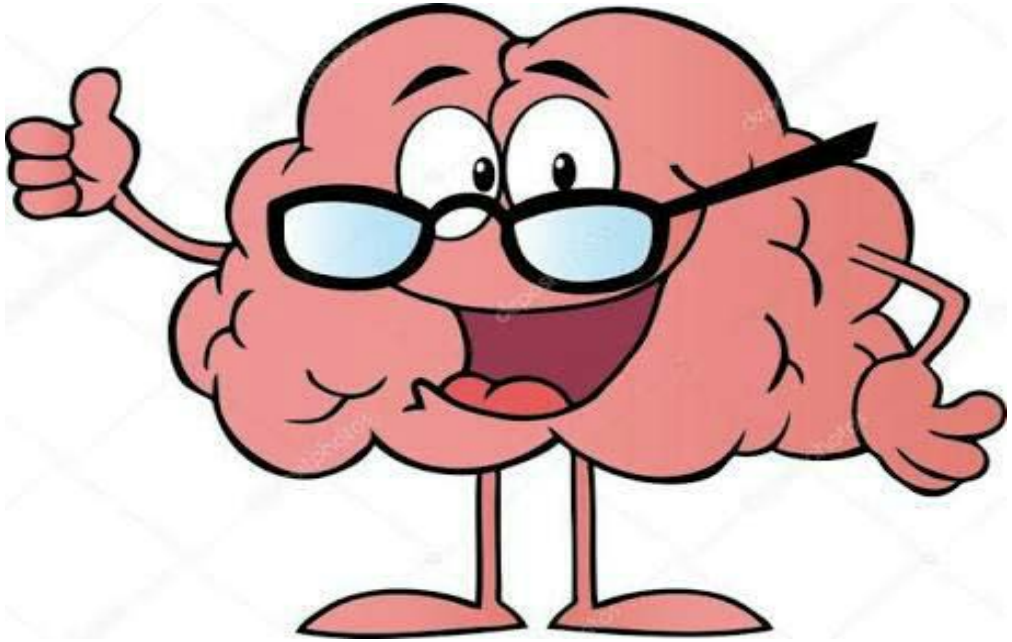
Unit 2

FYBA

The Biology of Mind



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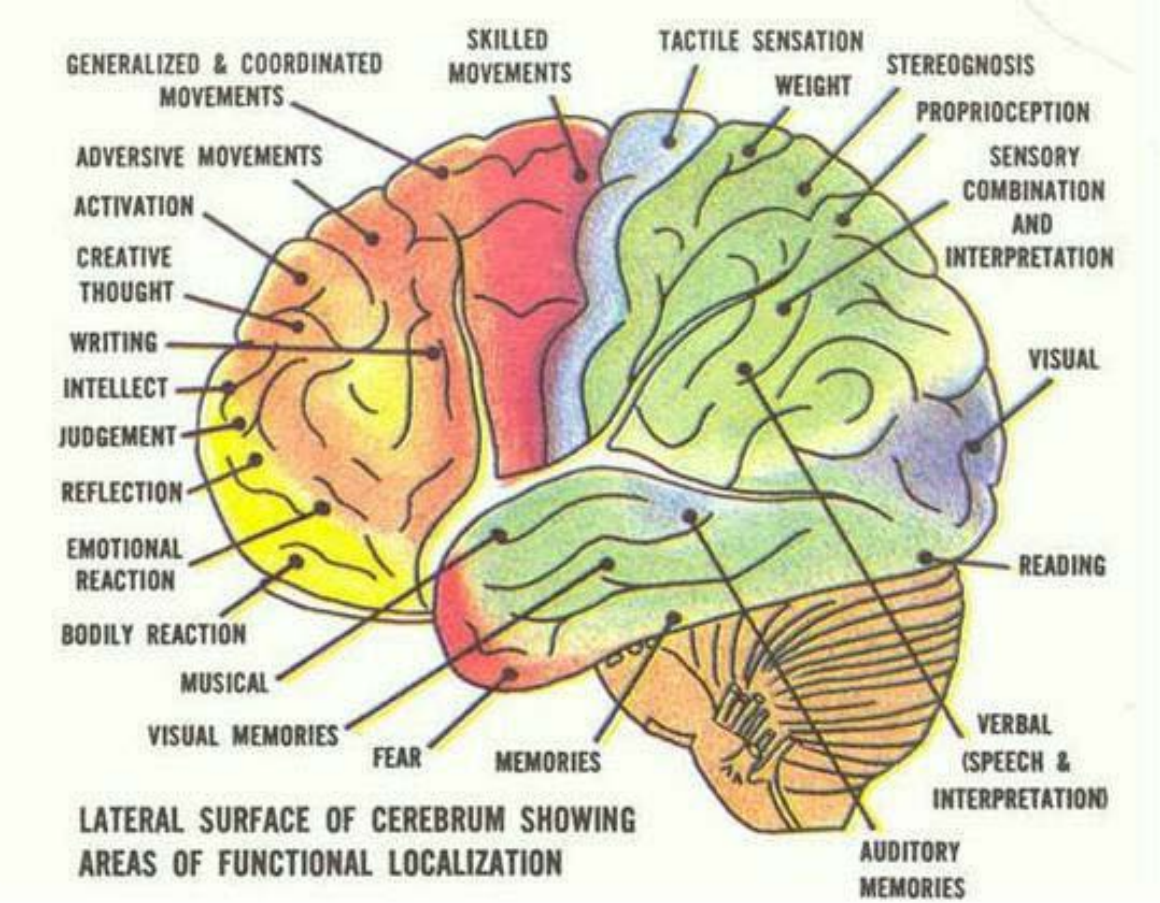
Biology, behaviour and mind

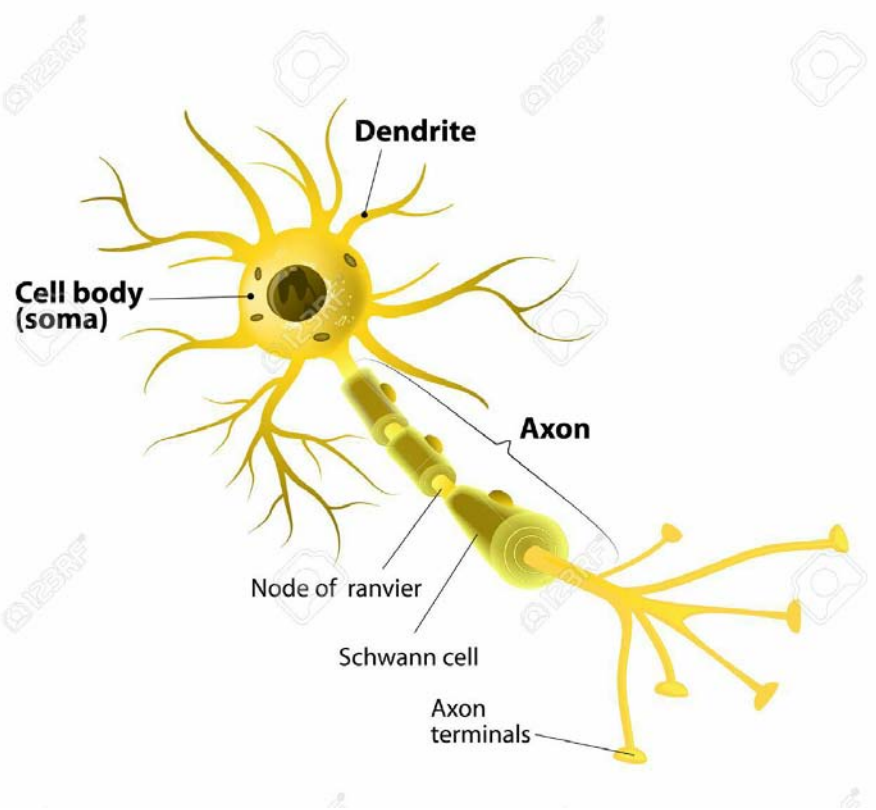
- **Biological perspective**

  - Studying the links between biological activity and psychological events.

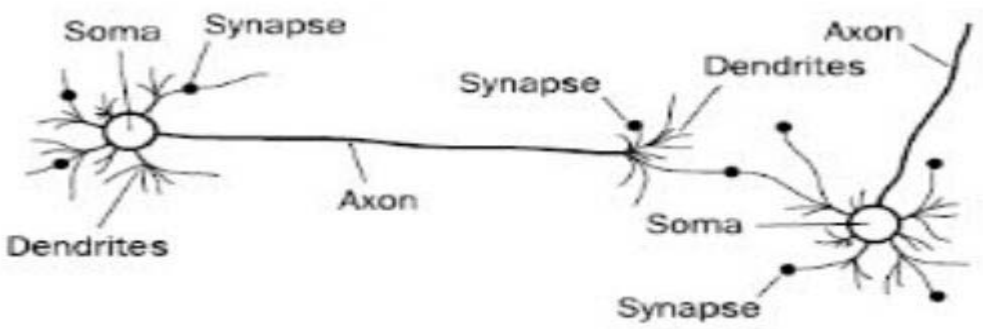


Neural Communication

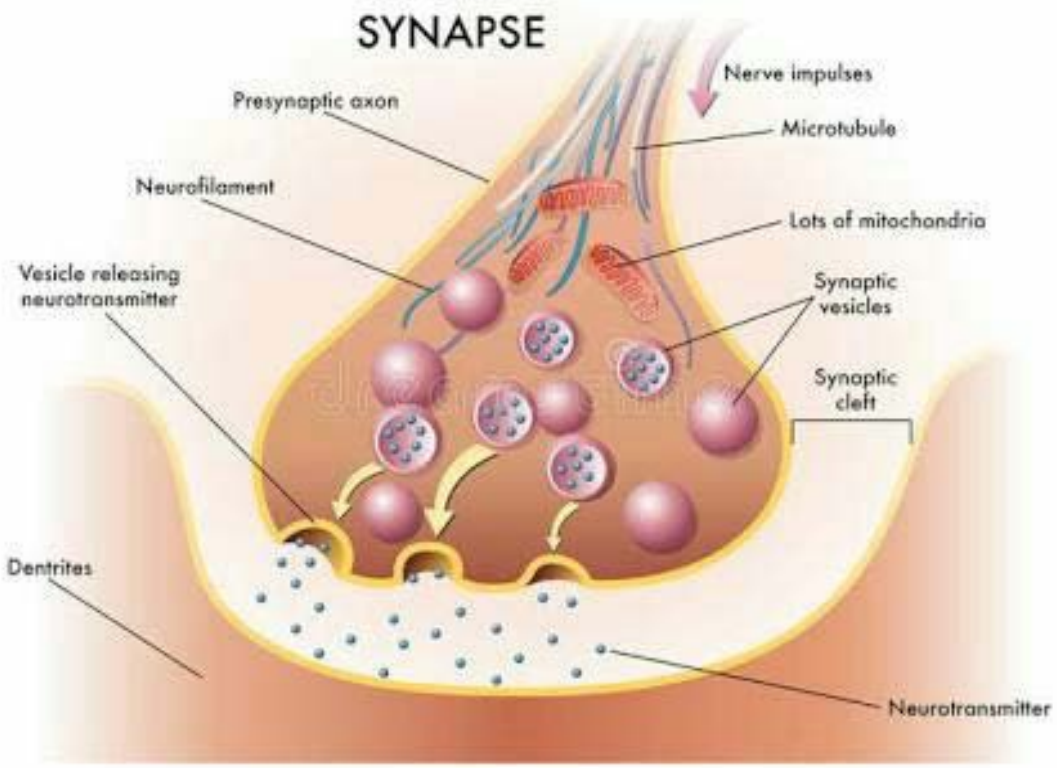
- Neurons
  are nerve cells ;
  which are the basic
  building blocks of the
  nervous system
  from top to toe.



How do neurons communicate



Communication mechanism
Jumping – firing –relay.



Neurotransmitters and their functions

Neurotransmitter	Function	Examples of malfunctions
Acetylcholine (Ach)	Enables muscle function, learning & memory	With Alzheimer's Ach producing neurons deteriorate.
Dopamine	Influences movement, attention, learning & emotion.	Oversupply linked to schizophrenia. Undersupply to decreased mobility in Parkinson's.
Serotonin	Affects mood, hunger, sleep & arousal.	Undersupply linked to depression.
Norepinephrine	Helps control alertness & arousal.	Undersupply can depress mood.
GABA (gamma aminobutyric acid)	Major inhibitory transmitter.	Undersupply linked to tremors & insomnia.
Glutamate	Excitory neurotransmitter, inolved in memory.	Oversupply can over stimulate the brain, producing migraines or seizures.

Behaviour	Mind	Biological phenomena
Being suicidal	Suicidal thoughts, ideations & depression	Undersupply for serotonin
Throwing temperature tantrums	Anger	Hunger
Being fearful	Flight response	Secretion of epinephrine and non epinephrine
Being nervous	Anxiety	Activated adrenaline
Feeling happy	Positive thoughts	Secretion of endorphins

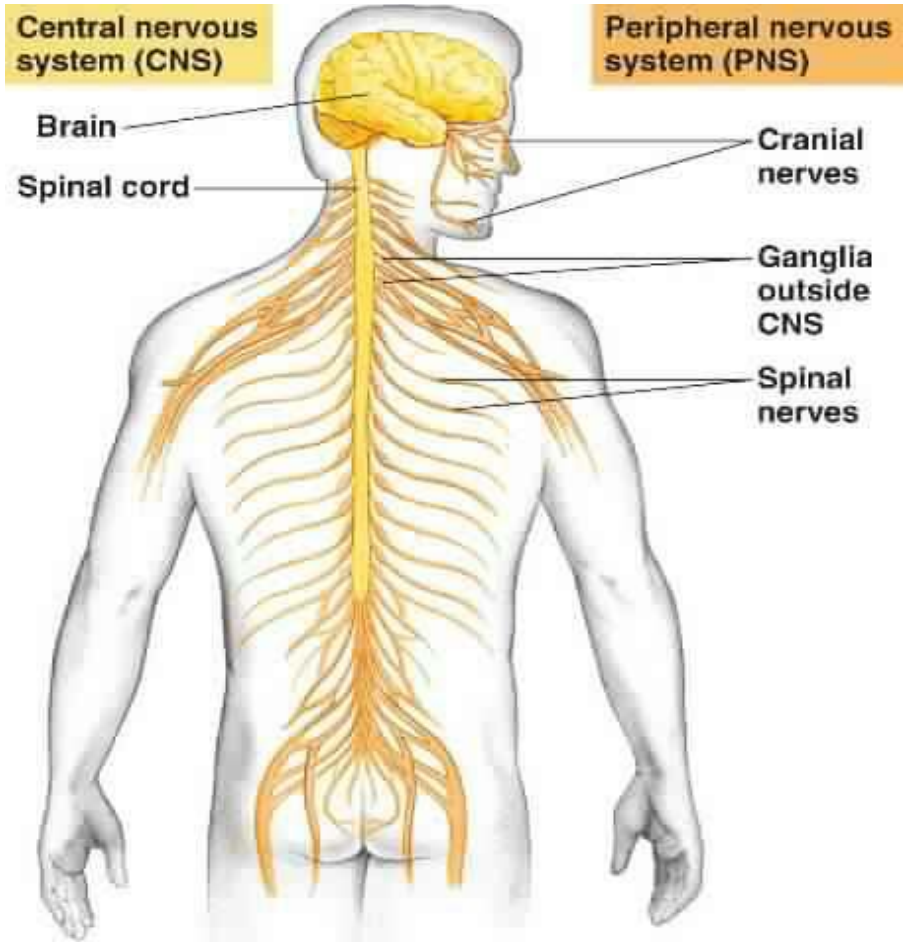
The nervous system

- **Central nervous system (CNS)**
  - consists of brain and spinal cord
  - functions as body's decision maker.

Ex. Stopping the vehicle when the red signal is seen.

- **Peripheral nervous system (PNS)**
  - responsible for gathering information and transmitting CNS decisions to other body parts.

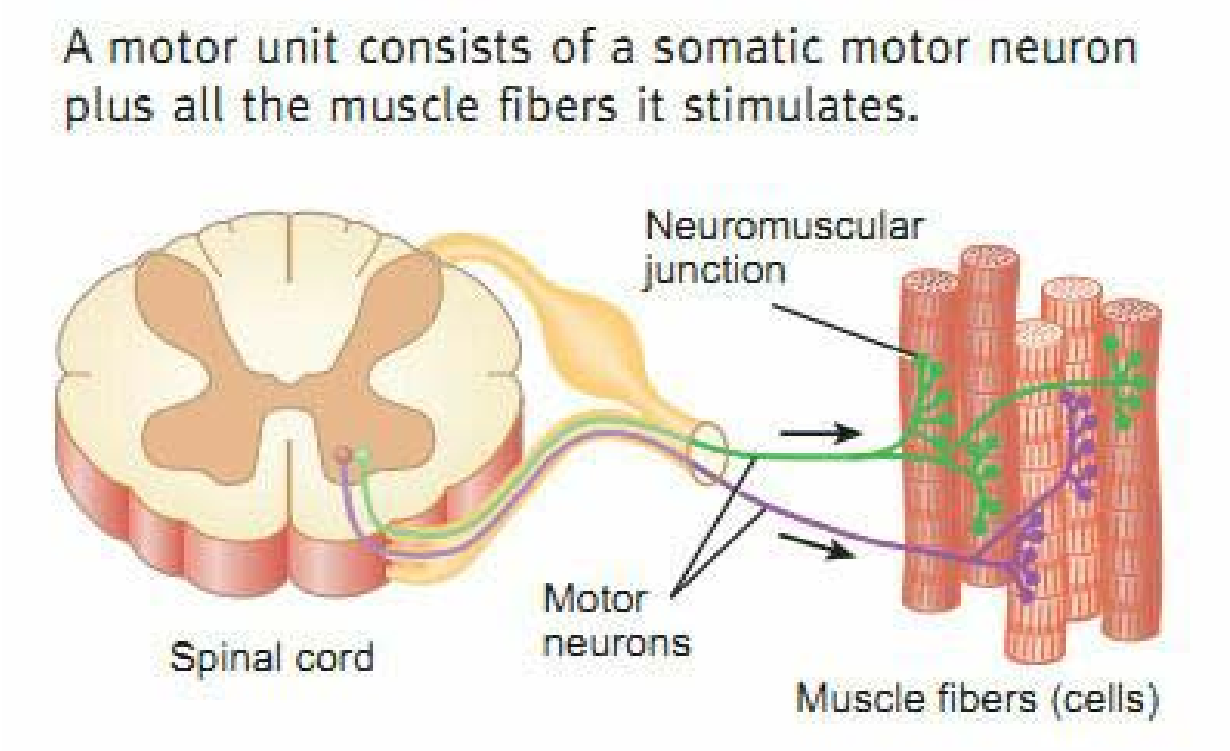
Ex. Constriction of pupil in fear.



Central nervous system

CNS is the part of the nervous system which in vertebrates consists of the brain and spinal cord, to which sensory impulses are transmitted and from which motor impulses pass out, and which coordinates the activity of the entire nervous system

A simple reflex



Peripheral nervous system

The nerves in the peripheral nervous system (**PNS**) connect the central nervous system (CNS) to sensory organs (such as the eye and ear), other organs of the body, muscles, blood vessels and glands.

- **Parasympathetic nervous system:**
  the part of the involuntary nervous system that serves to slow the heart rate, increase intestinal and glandular activity, and relax the sphincter muscles.

- Sympathetic nervous system:
  the part that contains chiefly andrenergic fibres and tends to depress secretion, decrease the tone and contractility of the smooth muscle.

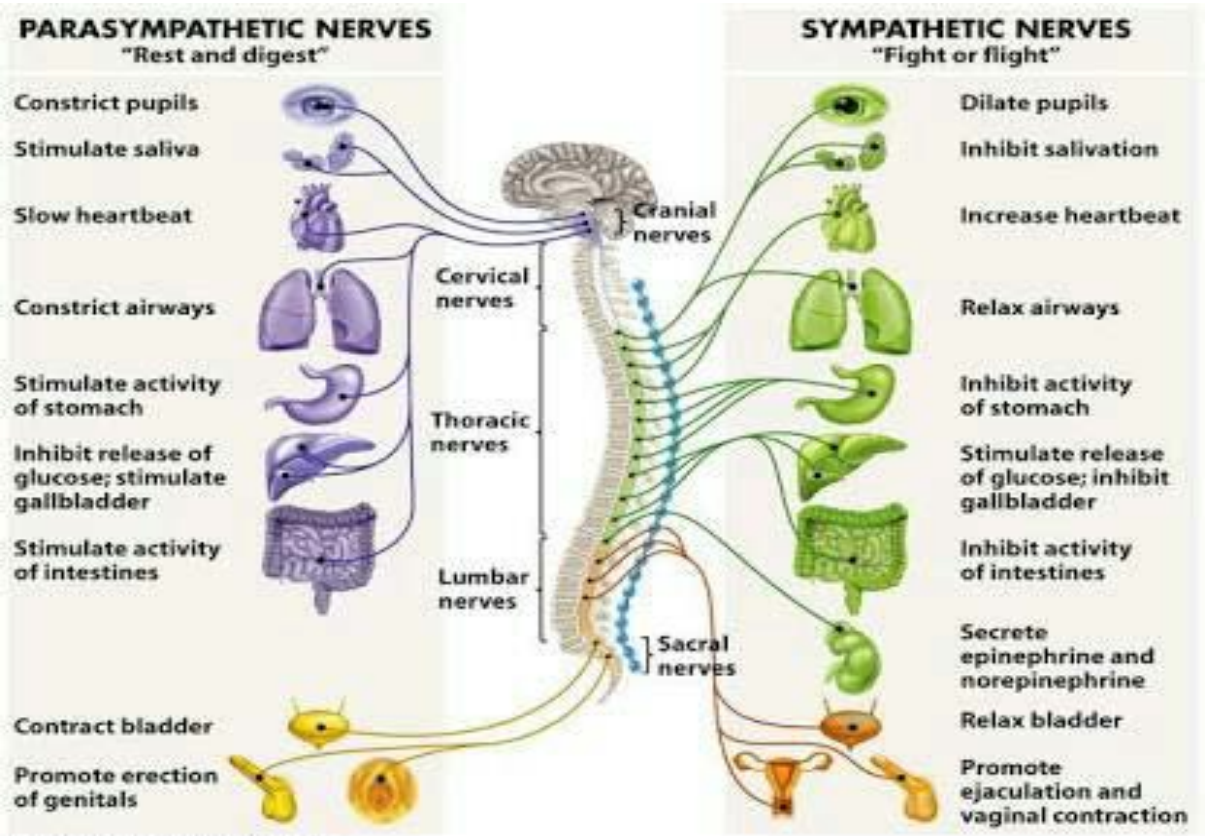
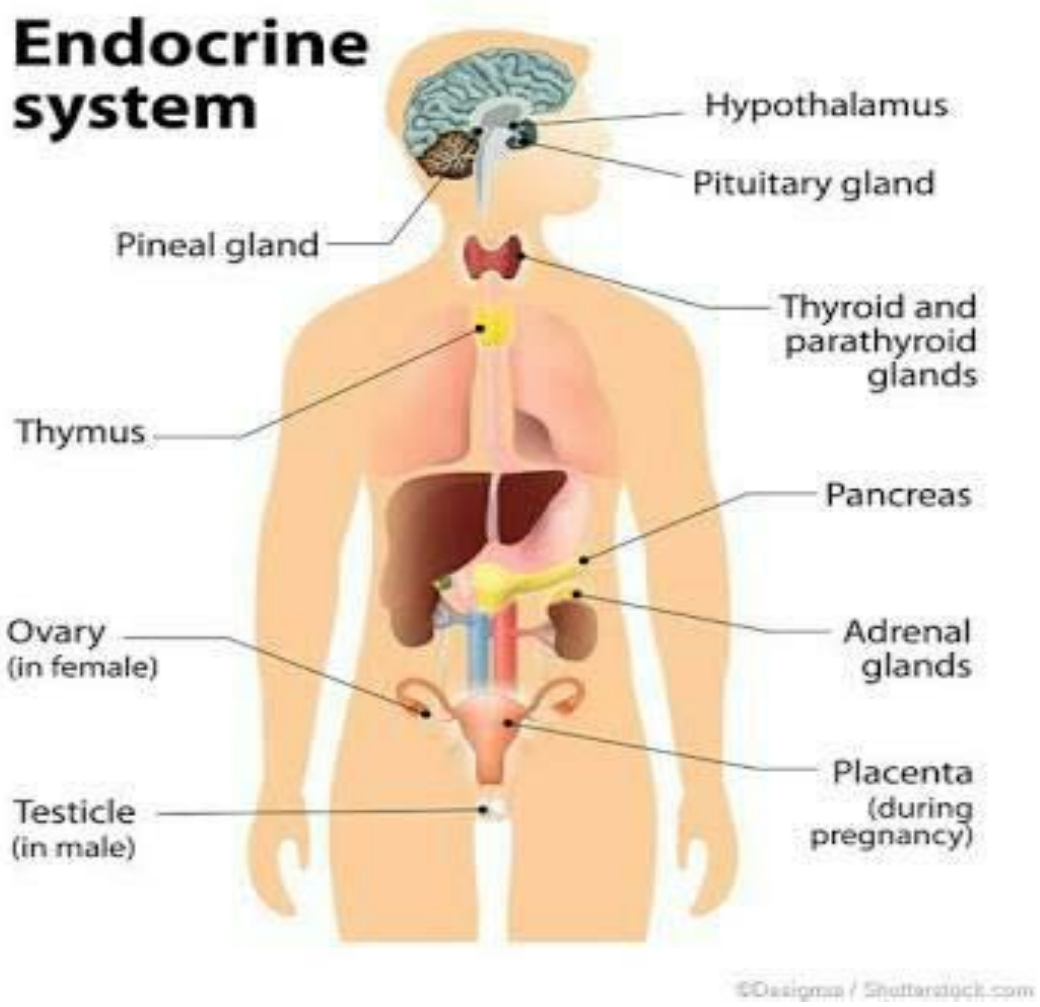


Figure 45-20 Biological Science, 2/e

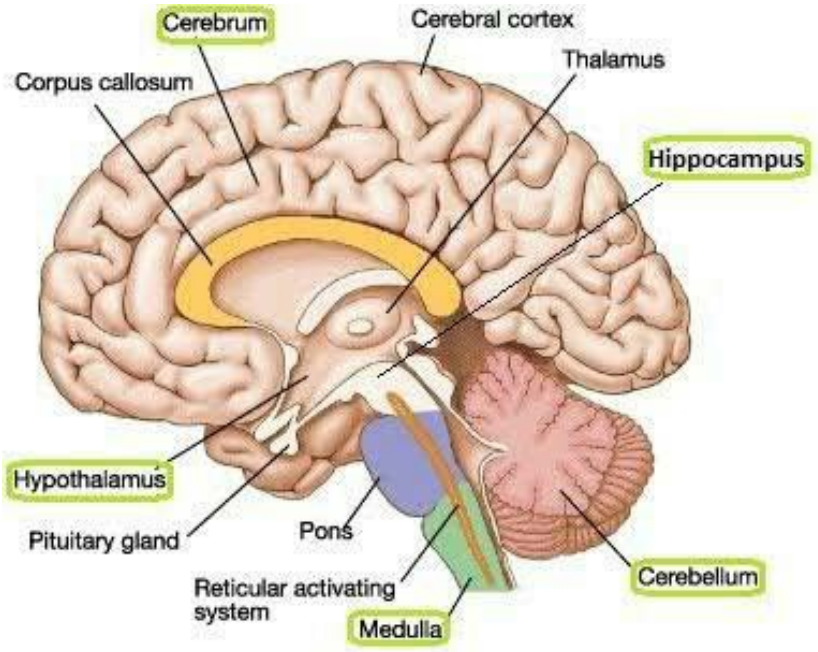
The endocrine system

The **endocrine system** is a chemical messenger system consisting of hormones, the group of glands of an organism that carry those hormones directly into the circulatory system to be carried towards distant target organs, and the feedback loops of homeostasis that the hormones drive. In humans, the major endocrine glands are the thyroid gland and the adrenal glands. In vertebrates, the hypothalamus is the neural control centre for all endocrine systems.



The structure of Brain

An organ of soft nervous tissue contained in the skull of vertebrates, functioning as the coordinating centre of sensation and intellectual and nervous activity.



Older brain structures

Structure	Location	Function
Brainstem	Central core of the brain, begins where spinal cord swells.	Automatic survival functions.
Medulla	Base of the brainstem.	Controls heartbeat & breathing.
Thalamus	Top of the brainstem.	Directs messages to sensory areas in cortex and transmits replies to cerebellum and medulla.
Reticular formation	Nerve network travels through brainstem.	Important role in controlling arousal.
Cerebellum	At the rear of the brainstem.	Processing memory input & coordinating movement output and balance.

The Limbic System

- lies between two cerebral hemispheres and consists of :

1) Amygdala

plays role in rage and fear, including perception of these emotions and processing of emotional memories.

2) Hypothalamus

influences hunger, regulate thirst & body temperature and steady internal state.

3) Hippocampus

processes conscious memories.

The Cerebral Cortex

the outer layer of the cerebrum (the *cerebral cortex*), is composed of folded grey matter and plays an important role in consciousness.

Cerebral Cortex (lobes)

Divided into 4 lobes:

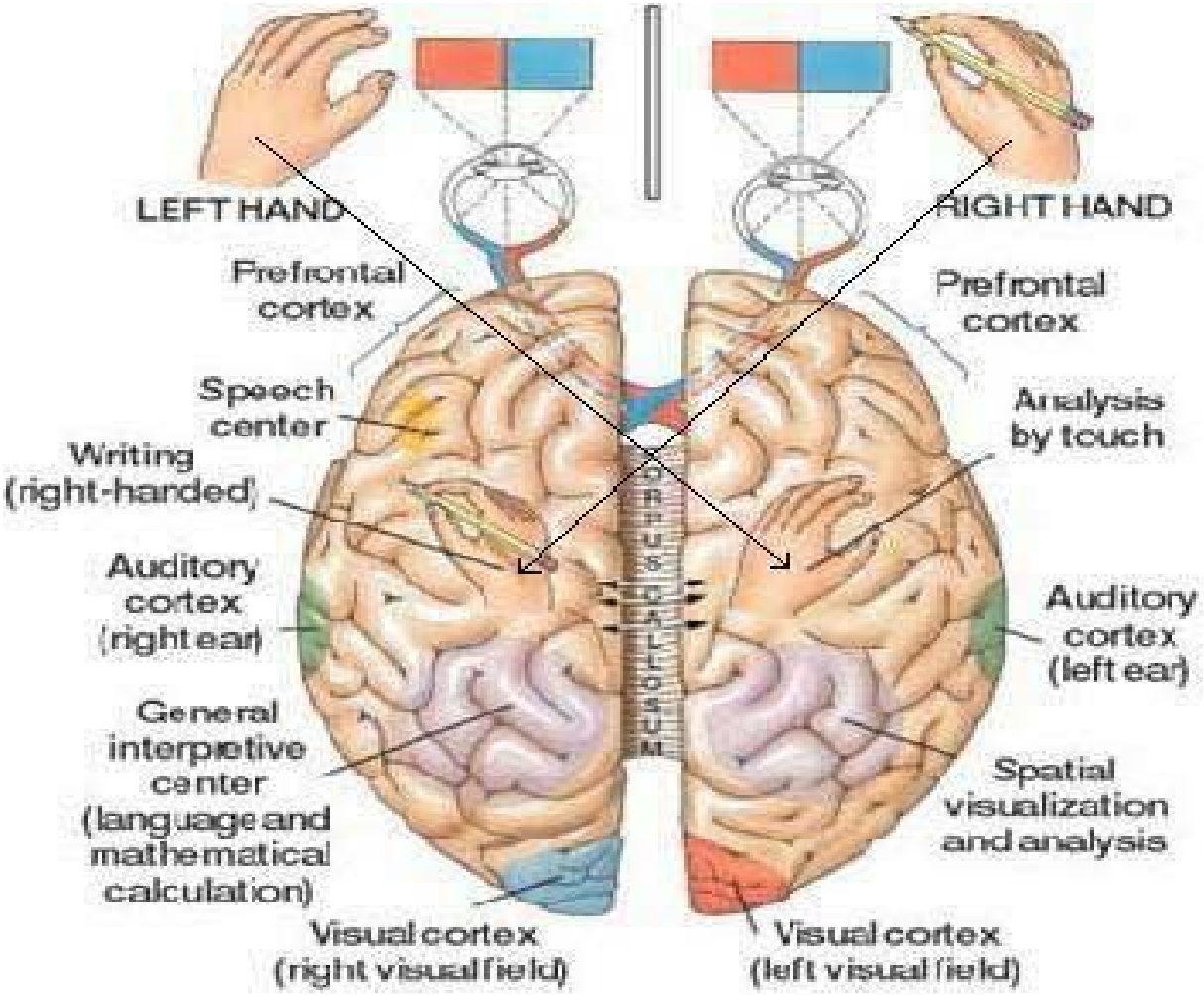
Frontal: motor function, motivation, aggression, smell and mood

Parietal: reception and evaluation of sensory info.

Temporal: smell, hearing, memory and abstract thought

Occipital: visual processing

Our divided brain



What you have learnt

1) Why are psychologists concerned with human biology?

2) What are neurons and how do they transmit information?

3) What are the functions of the nervous systems main divisions?

4) Write a note on the endocrine system?

5) How do neuroscientists study the brain‘s connections to behaviour and mind?

Lets Learn More...