Pakistan School
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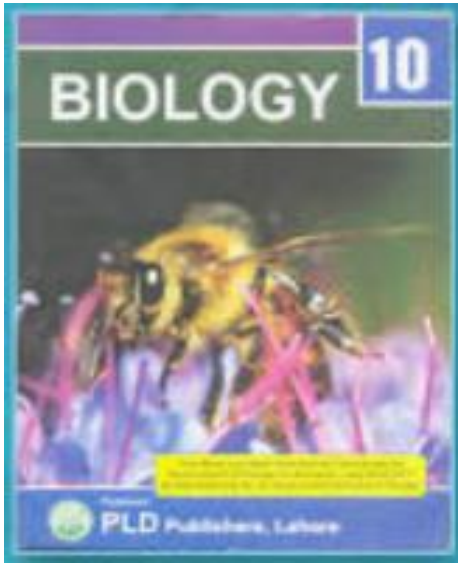
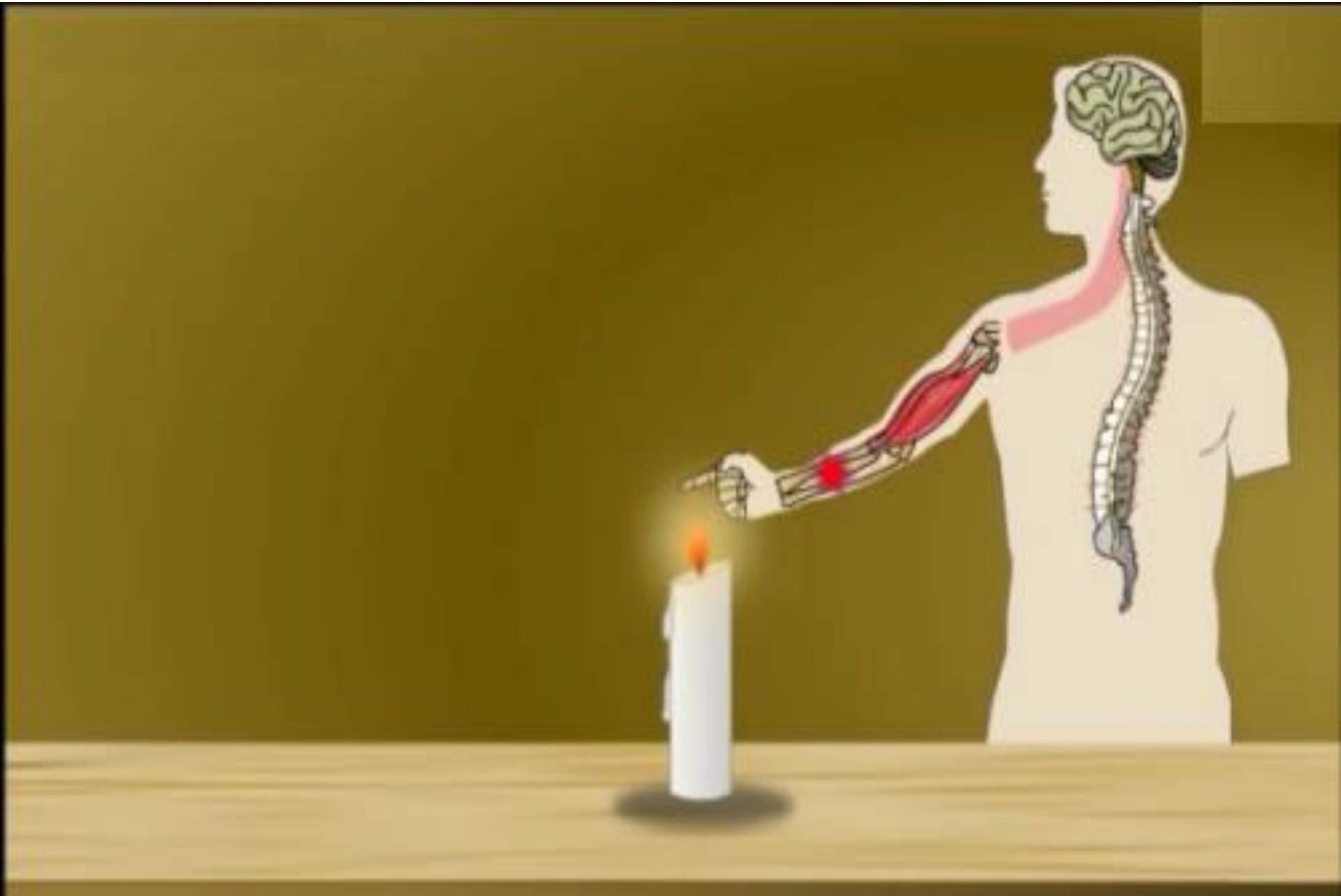

BIOLOGY
10
PLD Publishers, Lahore

ENGAGING STARTER



LEARNING OBJECTIVES

At the end of lesson, students will be able to;

- Define coordination and classify its types.
- Analyse the components of coordinated action.

Chapter 12. Coordination and control

Topic: Types of Coordination

Page- 32-34

Coordination:

The tissues and organs in the bodies of multicellular organisms do not work independently of each other.

They work together performing their many tasks as the needs of the whole body.

This means that these activities are coordinated. Coordination also enables the organism to respond to happenings in the world around it.

Animals have both the nervous and chemical coordination systems in their bodies while plants and other organisms have only chemical coordination.

Coordination also takes place in unicellular organisms. The response to stimuli is brought about through chemicals.

Example 1:

When we are writing something our hands and fingers work in collaboration with our muscles, eyes, thoughts etc. and then very intricate movements result.

Example 2:

When a boy runs to catch a ball, he uses hundreds of muscles to move his arms, legs and back. His nervous system uses information from his sense organs and coordinates these muscles.

Example:

For example, breathing and heartbeat rates are increased blood pressure is adjusted, and extra heat is removed fast from the body.

Life activities are controlled and coordinated le body works as one unit, in which its different organs and systems cooperate and work in harmony with each other.

Types of Coordination:

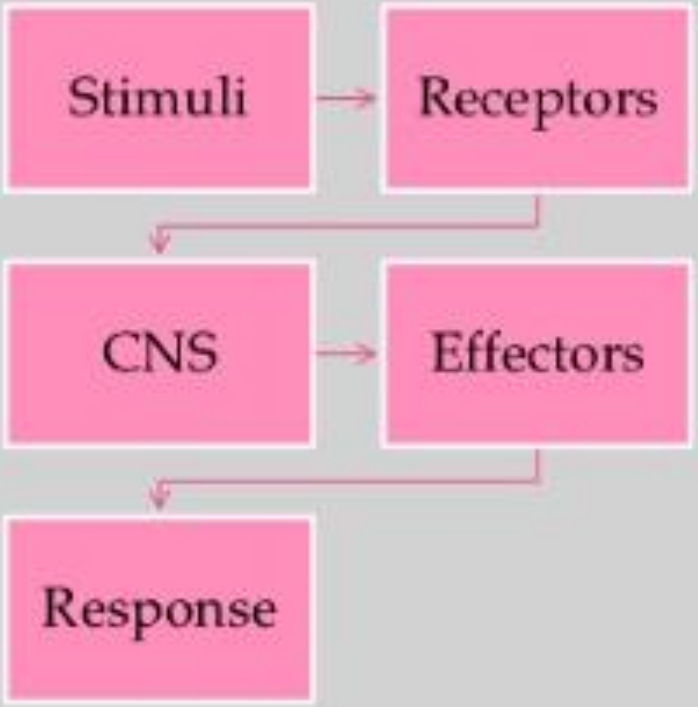
There are two types of coordination in organisms

i. Nervous coordination brought about by nervous system and

ii. Chemical coordination about by endocrine system

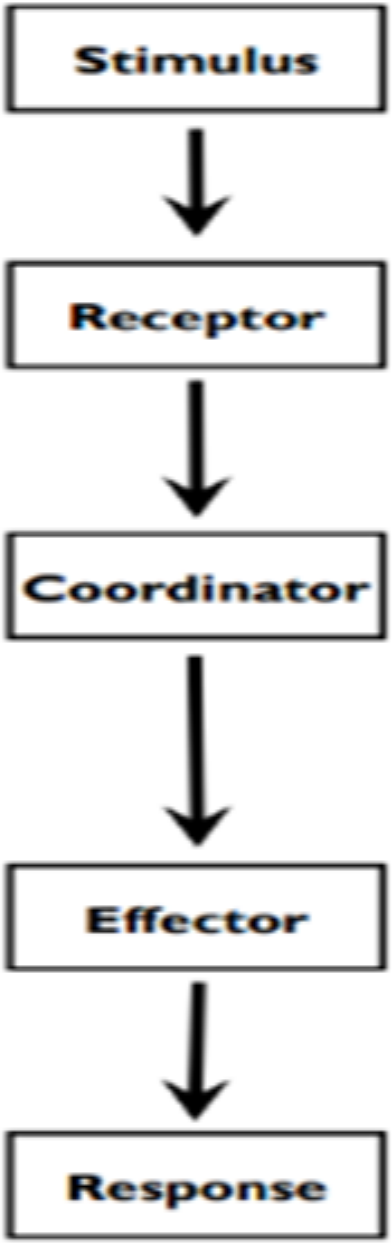
NERVOUS COORDINATION

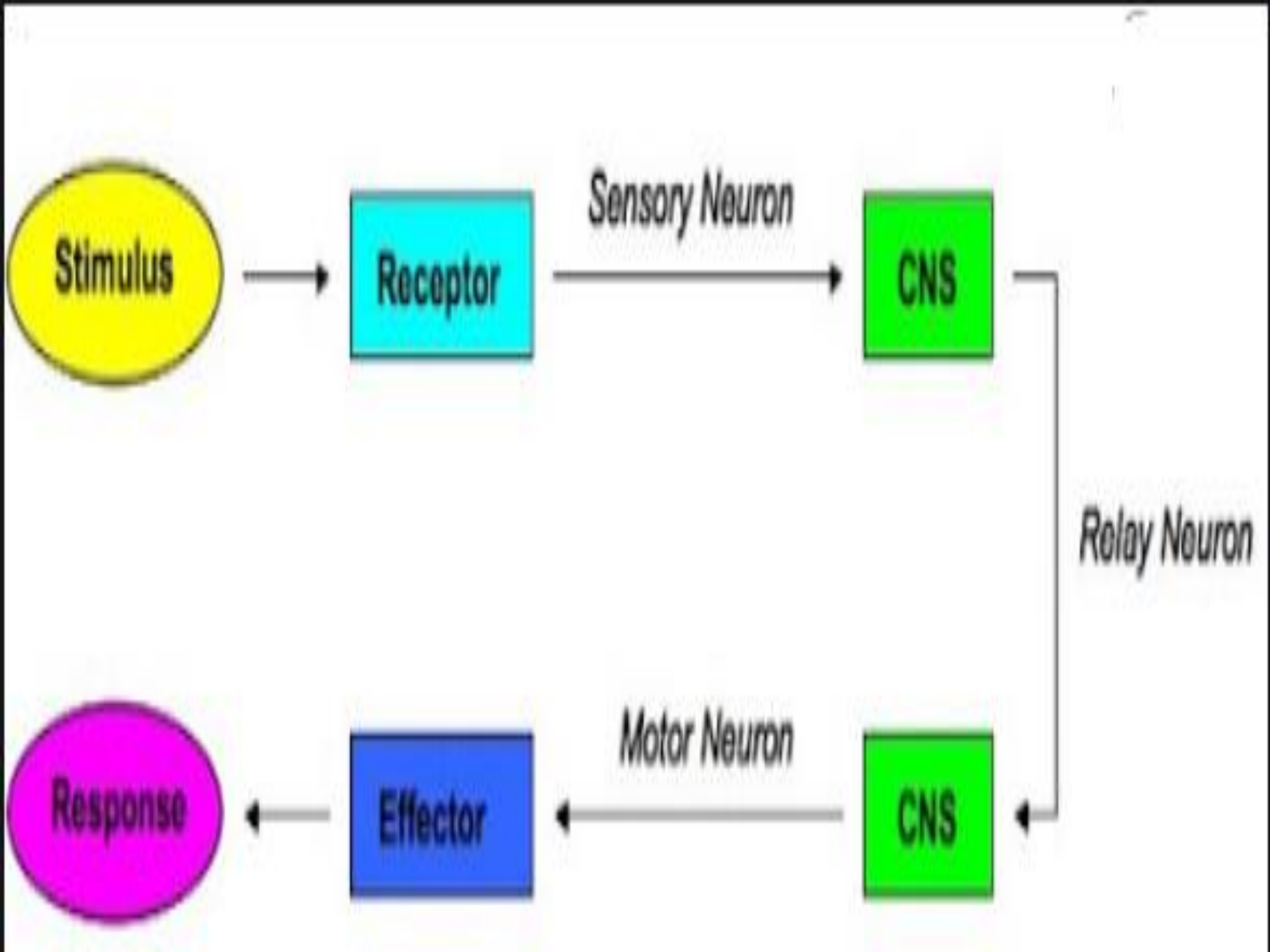
" Nervous coordination is brought about by means of **nervous system** which is the quickest way of communication in the body of an animal by electro-chemical messages called **nerve impulse.**"



CHEMICAL COORDINATION

" It is the type of coordination present between the cells or different organs within the body of multicellular organisms. In this kind of coordination a group of cells releases specific chemicals, which regulates the activities of other cell of the body."


Stimulus
Receptor
Coordinator
Effector
Response


Stimulus
Receptor
Sensory Neuron
CNS
Relay Neuron
Response
Effector
Motor Neuron
CNS

Coordinated Action:

A coordinated action has five components

Stimulus - Receptor - Coordinator - Effector - Response

i. Stimuli:

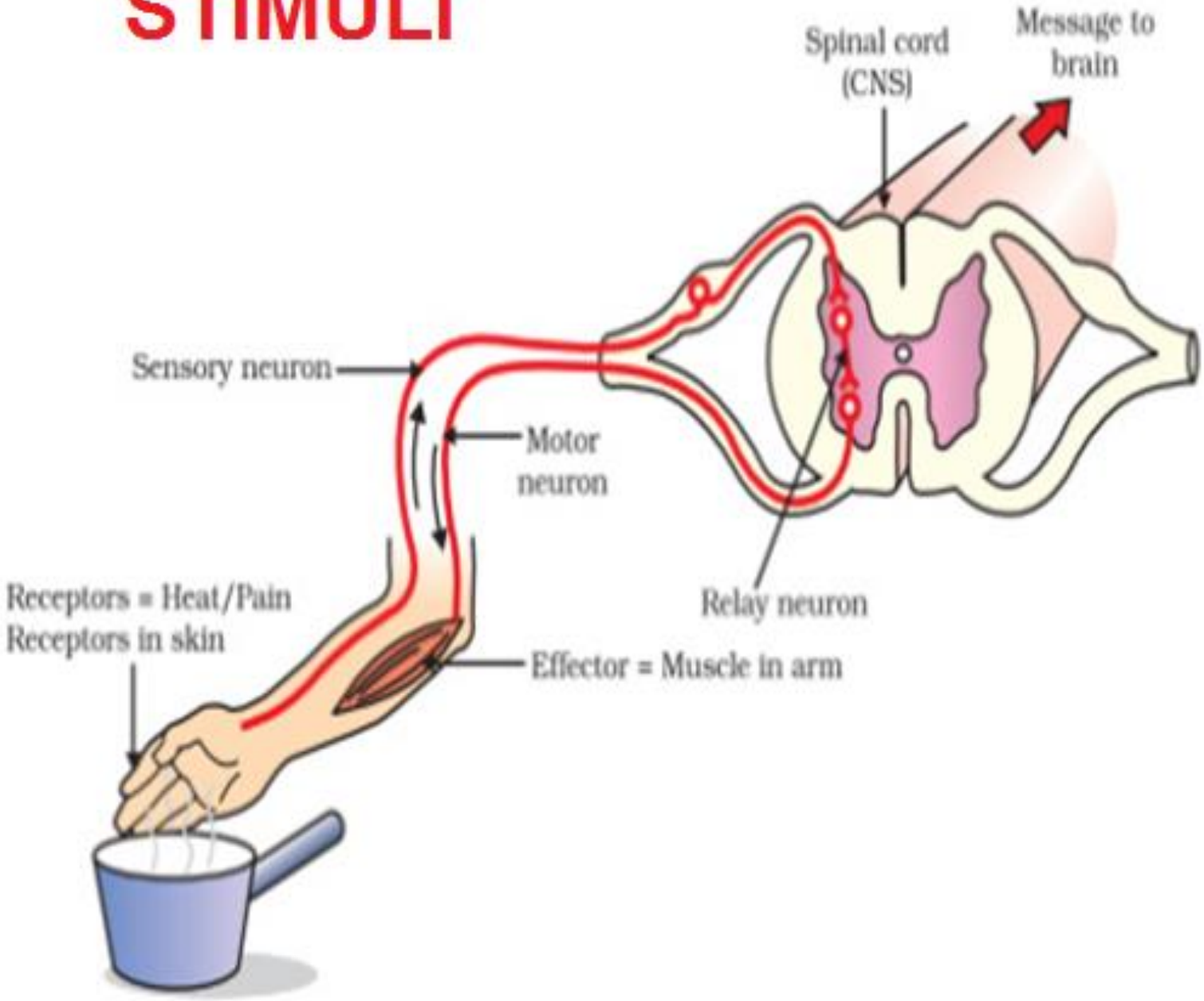
We can define a stimulus as any change in environment (external and internal), which can provoke a response in organism.

Touch light etc. are factors that can bring about certain responses living organisms These factors are called stimuli.

Examples:

Examples of stimuli are heat, cold, pressure, sound waves, presence of chemicals, microbial infections etc.

STIMULI


Spinal cord
(CNS)
Message to
brain
Sensory neuron
Motor
neuron
Receptors = Heat/Pain
Receptors in skin
Relay neuron
Effector = Muscle in arm

ii. Receptors:

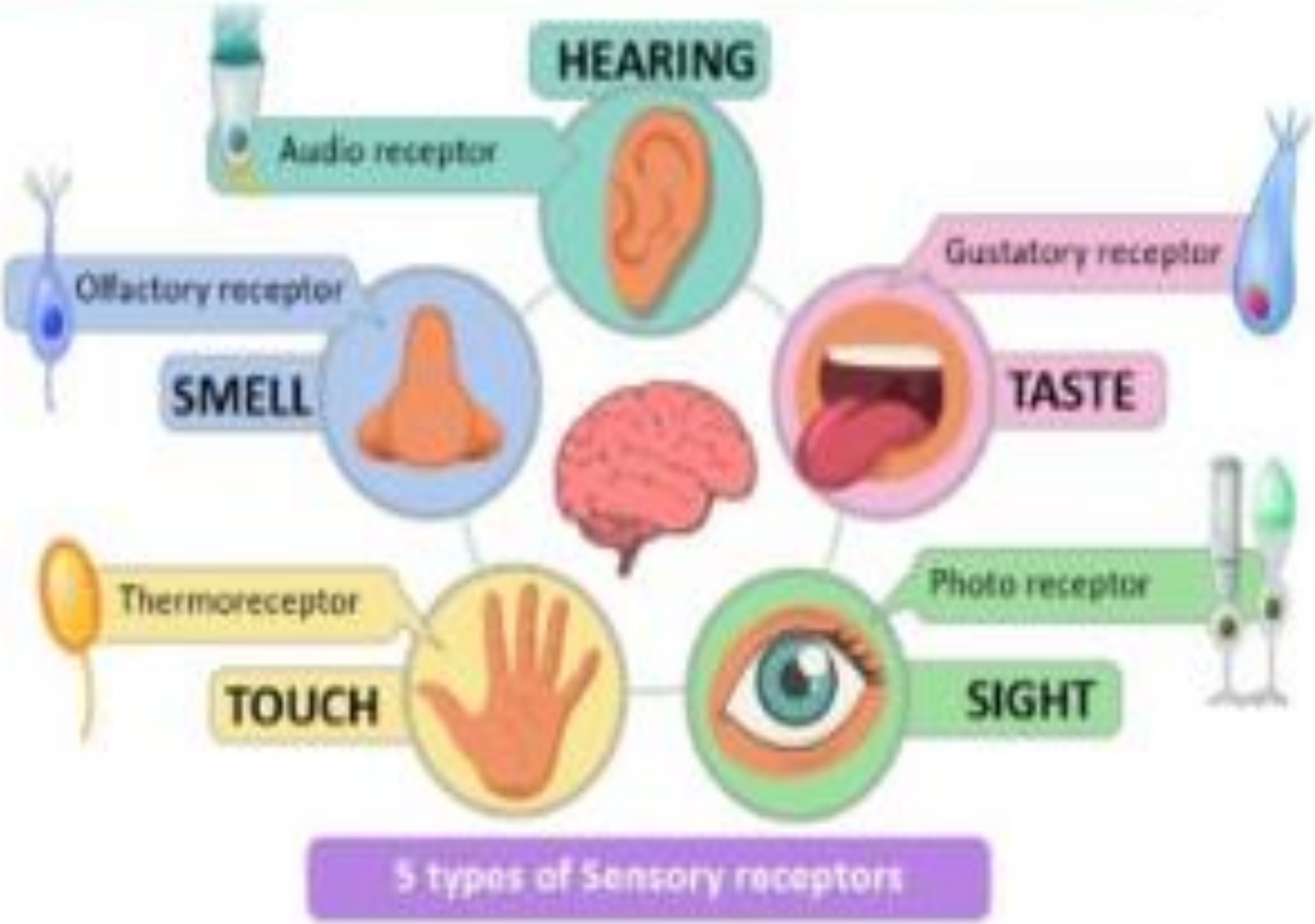
The organs, tissues or cells which are specifically built to detect particular type of stimuli are called receptors.

Stimuli are detected by special organs, tissues or cells of body

Examples:

For example, sound waves are detected by ears, light is detected by eyes chemicals in air are detected by nose and so on.

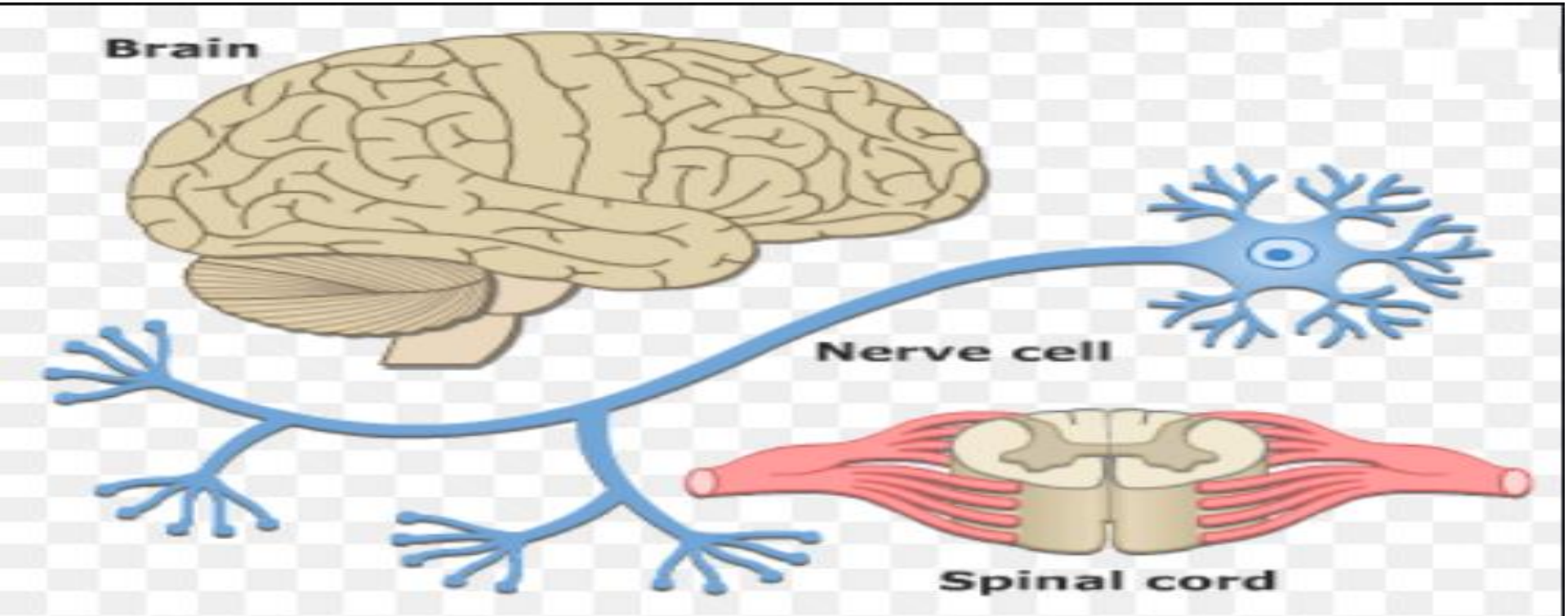
Neural Control and Coordination



iii. Coordinators:

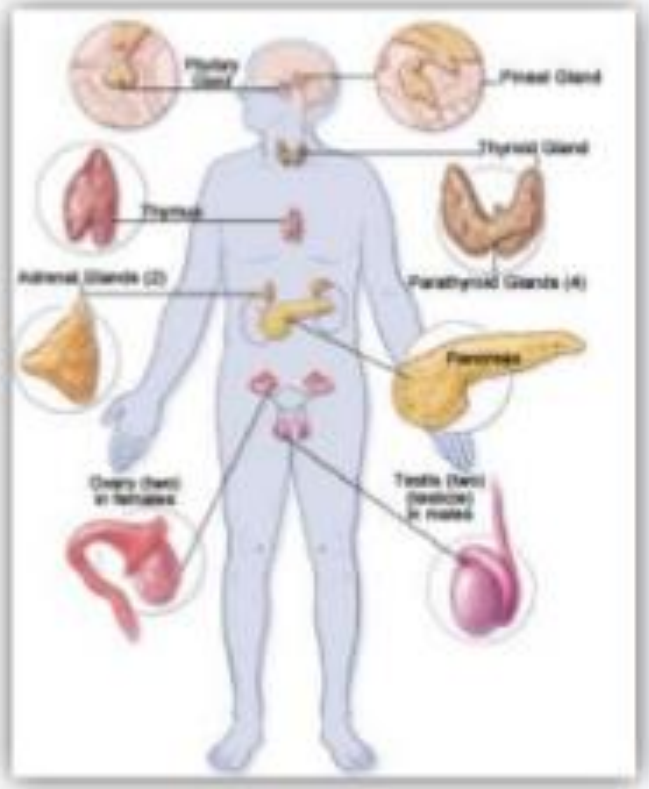
These are the organs that receive information from receptors and send messages to particular organs for proper action.

In nervous coordination brain and spinal cord are coordinators They receive information and send messages through neurons in the form of nerve impulses. On the other hand, in chemical coordination various endocrine glands play the role of coordinators. They receive information in the form of various chemicals and send messages by secreting particular hormones blood.



HUMAN ENDOCRINE SYSTEM

- Pituitary Gland
- Pineal Gland
- Thyroid Gland
- Parathyroid Gland
- Thymus Gland
- Adrenal Gland
- Pancreas
- Gonads (Testis & Ovary)



Nervous System vs Endocrine System

Nervous System

- Transmits electrical impulses
- Use the neurons to transmit the signal
- Signal transmission is fast
- Effect is localized

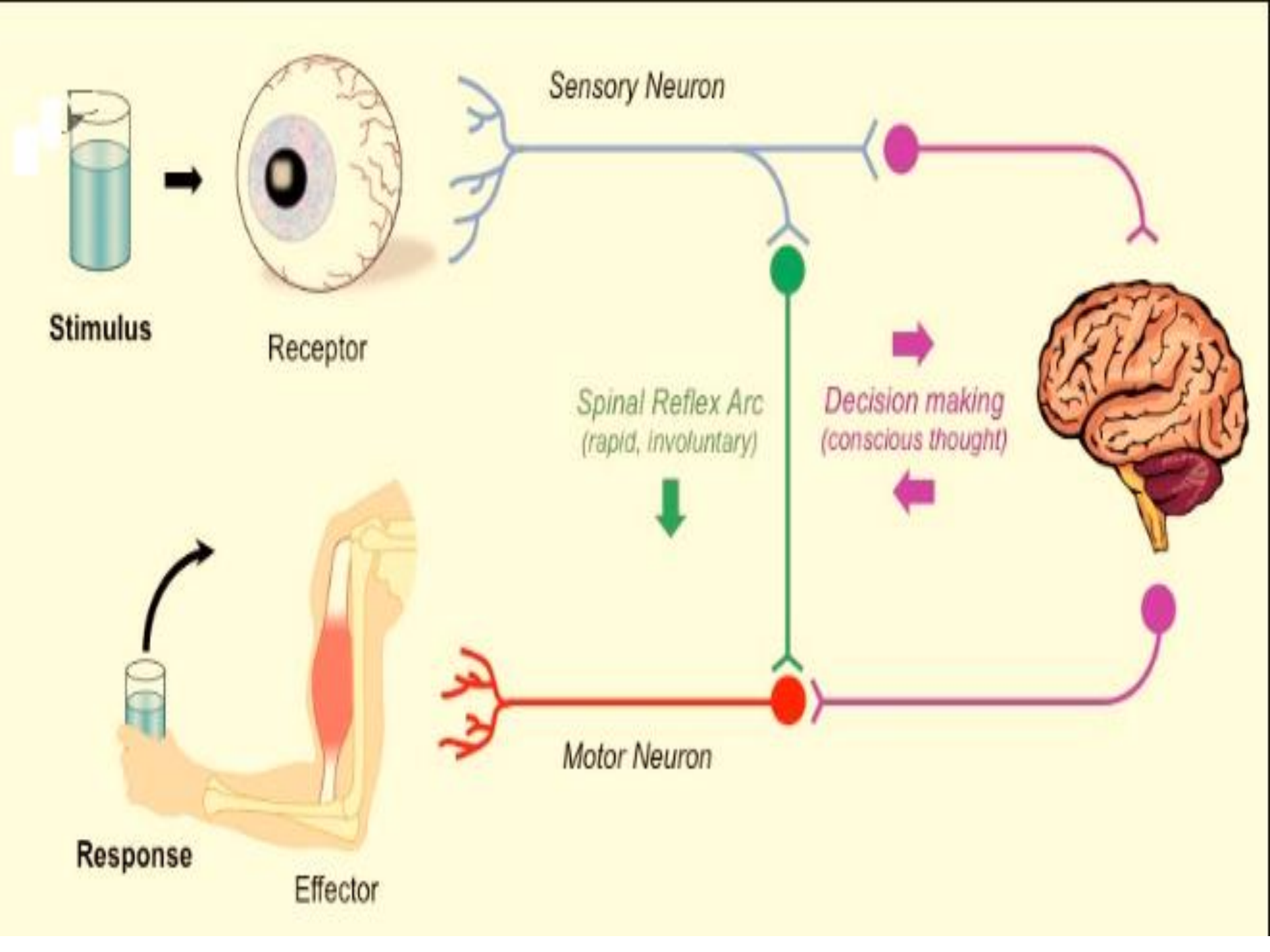
Endocrine System

- Transmits chemical biological messengers Impulses
- Use the circulatory system to transmit the signal
- Signal transmission is slow
- Effect is widespread

iv. Effectors:

These are the parts of body which receive messages from coordinators and produce particular responses In nervous coordination, neurons carry messages from coordinators (brain and spinal cord) to muscles and glands which act as effectors in chemical coordination particular hormones carry messages from coordinators (endocrine glands) to particular target tissues, which act as effectors.

For some hormones nephrons act as effectors Similarly, bones and liver act as effectors for many hormones


Sensory Neuron
Stimulus
Receptor
Spinal Reflex Arc
(rapid, involuntary)
Decision making
(conscious thought)
Response
Effector
Motor Neuron

v- Response

On receiving the message from coordinators, the effector performs action. This action is called response. For example, pulling our hand away from something very hot and the movement of the flower of sunflower towards light are responses. Usually, nervous coordination produces immediate but short-living responses while chemical coordination produces slow but long-living responses.

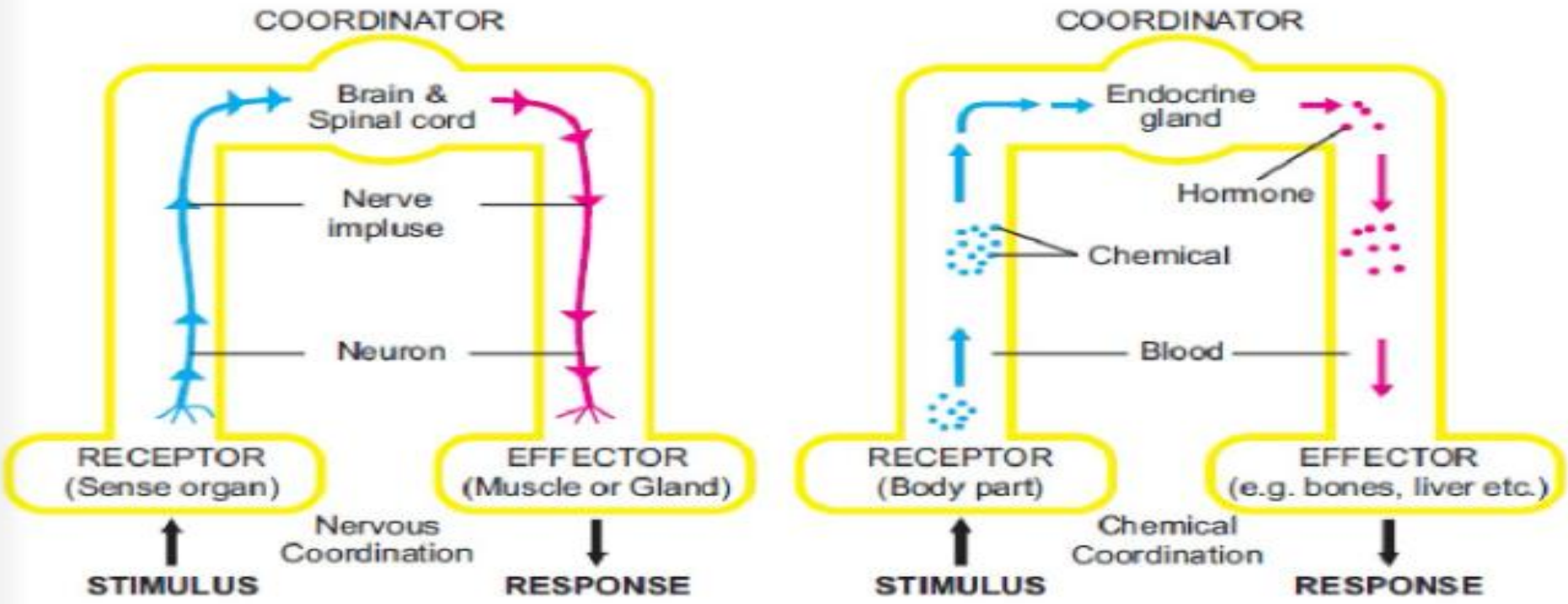
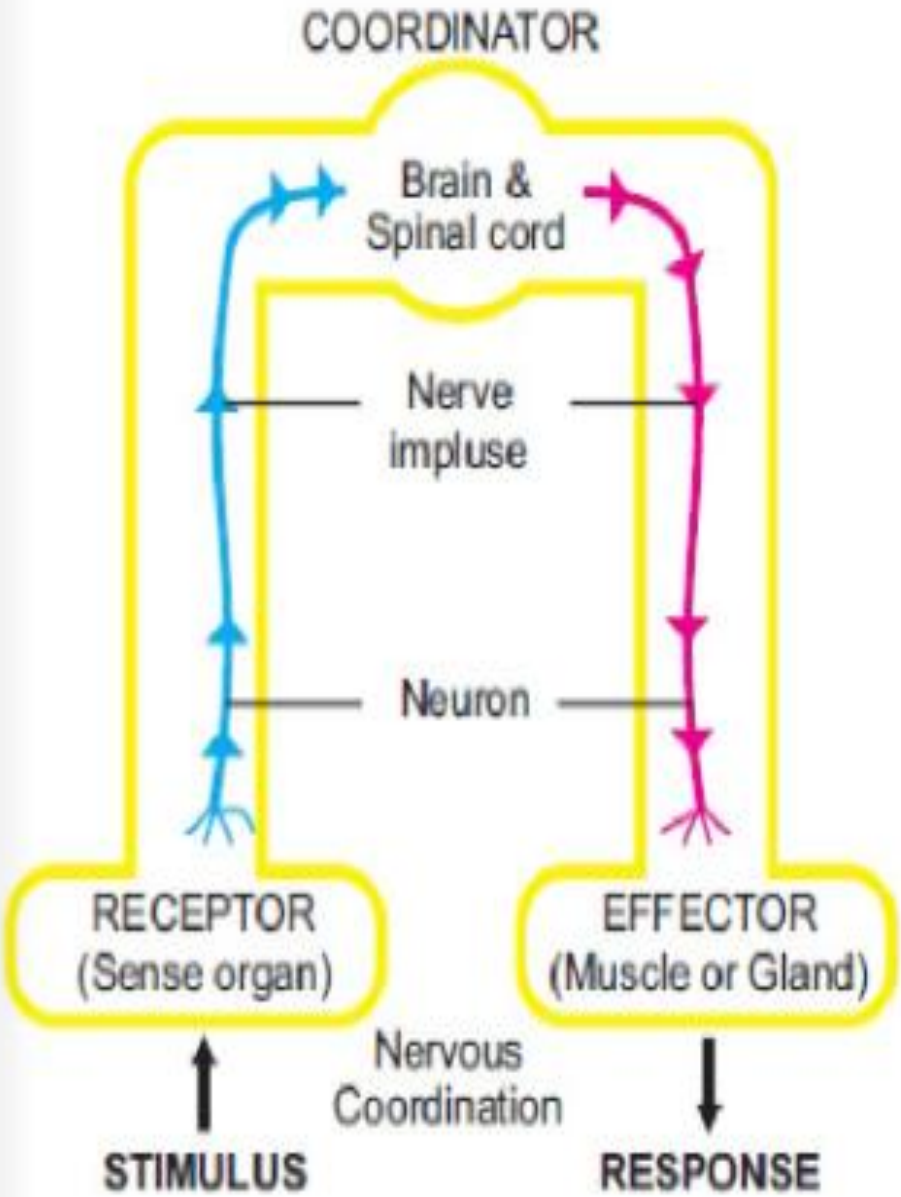


Figure 12.1: Nervous and chemical coordination



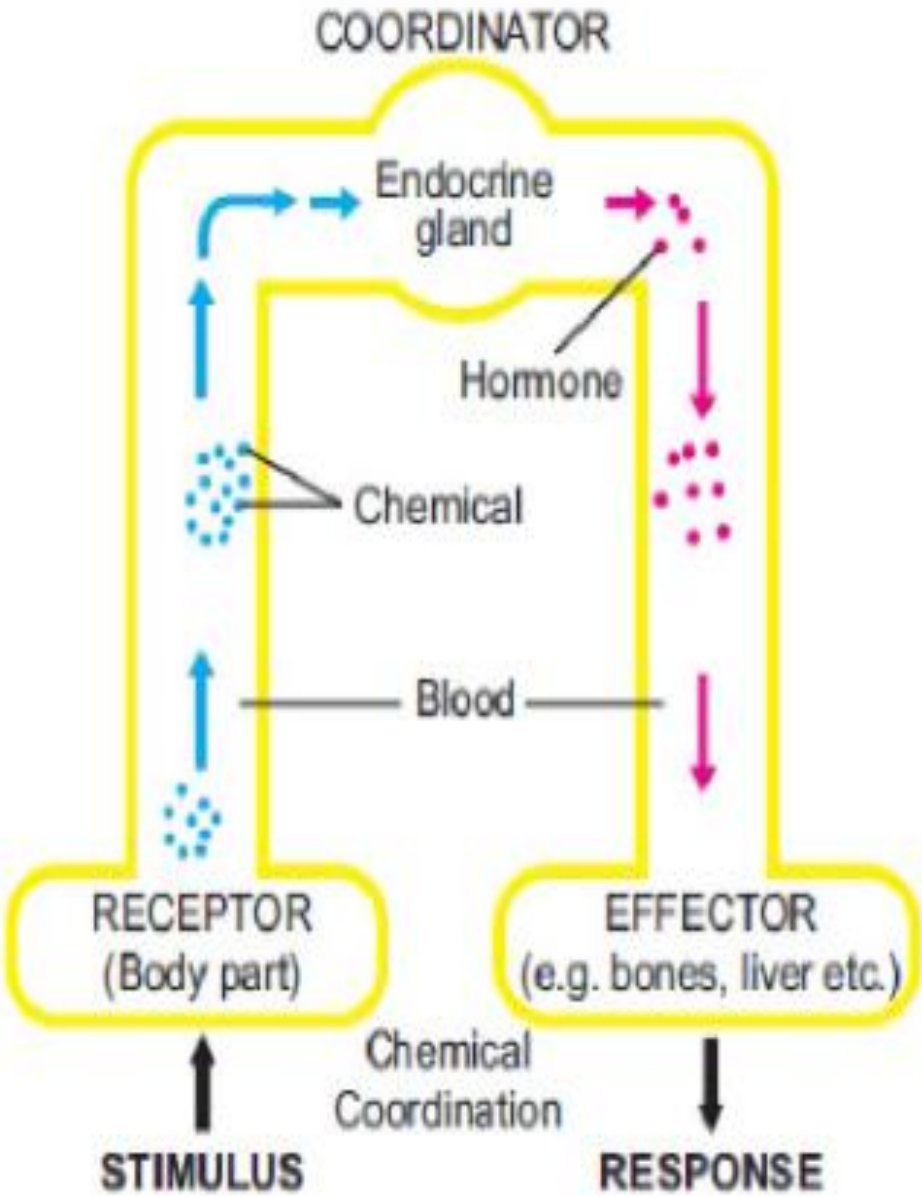


Figure 12.1: Nervous and chemical coordination

WORKSHEET1

Answer the Following Questions;

SHORT QUESTIONS

1. Identify the two types of coordination in living organisms.
2. Differentiate between the modes of nervous and chemical coordinations.
3. What are the main components of coordination?

Closure

- Today we have done the topic_____.
- Give one example of coordination from daily life.
- There are two types of coordination_____ and _____.
- A coordinated action _____ components.
- The difference between nervous coordination and chemical coordination is _____

HOME WORK

- Search on internet, how coordination occurs in unicellular organisms

Or

- Using the knowledge gained from today's topic , draw a table that can show the difference between nervous and chemical coordination.


Any
Questions?


Thank You!
Prepared By
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